



HEALTH CARE ACCESS:

The Easy Way

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Key Findings

- Full practice authority for Pennsylvania nurse practitioners (NPs) would **increase the amount of time NPs can see patients** by about 45 minutes each week.
 - This translates into almost **one more week of patient access per NP per year**, or approximately an additional 109 patients per NP each year.
 - This is a **conservative estimate** given the calculation excludes patients likely seen by new NPs and other efficiency gains.
- Full practice authority trends towards **higher rates of NP self-employment** and indicates a greater shift to full-time work for the full year for both physicians and NPs.
 - Full practice authority results in a **statistically significant increase in NP earnings of \$3,535** (approximately 4 percent), while physician earnings show no statistically significant change.

Introduction

Pennsylvania's lack of health care providers is bad for our health and bad for our wallets. The supply of primary care physicians is inadequate. Yet, patients who receive timely primary and preventive care are less likely to have expensive emergency department visits and unnecessary hospitalizations. Primary care is cheaper than hospital care. This, in turn, saves money for the health care system. But a lack of primary care physicians, increasing physician burnout, and an aging population make the existing access problem worse.¹

For example, a recent study finds that the current primary care workforce would have to work about 27 hours a day to adequately take care of their patients' chronic diseases.² Similarly, the existing health care workforce contends with burnout which risks harming patient health.³

In Pennsylvania, the distribution of providers is lopsided. The federal government, through the Health Resources and Services Administration (HRSA), designates people and populations lacking health care access with two different designations: Health Professional Shortage Areas (HPSAs) and Medically Underserved Areas or Populations (MUA/P).⁴ An estimated 14 percent of Pennsylvanians live in an area designated as medically underserved.⁵ Figure 1 shows the geographic location of Pennsylvania's 143 designated Medically Underserved Areas.

1 Alexis Santos and Raeven Faye Chandler, "Ambulatory and Cognition Challenges Among Older Pennsylvanians," *Penn State Pennsylvania Population Network*, No. 12 (February 2022), <https://pop.psu.edu/sites/pri/files/Ambulatory%20Care%281%29.pdf>.

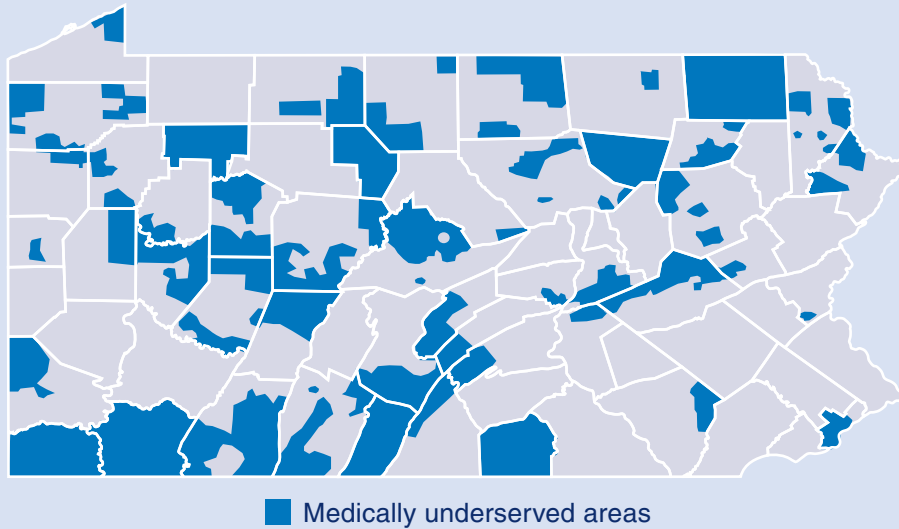
2 Justin Porter, et al., "Revisiting the Time Needed to Provide Adult Primary Care," *Journal of General Internal Medicine*, 38 (Issue date: January 2023), 147–55, <https://doi.org/10.1007/s11606-022-07707-x>.

3 Matthias Weigl, "Physician Burnout Undermines Safe Healthcare," *British Medical Journal* (BMJ), September 14, 2022, <https://doi.org/10.1136/bmj.o2157>.

4 Health Resources and Services Administration (HRSA), "What is a Shortage Destination?" accessed April 15, 2023, <https://bhwh.hrsa.gov/workforce-shortage-areas/shortage-designation>.

5 Drexel News, "New Research Shows Disparities Limiting Access to Health Care Services, Including COVID-19 Vaccines, In Pennsylvania's Underserved Communities," Synopsis: "Disrupting Disparities in Pennsylvania" [Pennsylvania AARP and Drexel University, White paper (2021)], April 5, 2021, <https://drexel.edu/news/archive/2021/april/cnhp-aarp-pa-disrupting-disparities-report>.

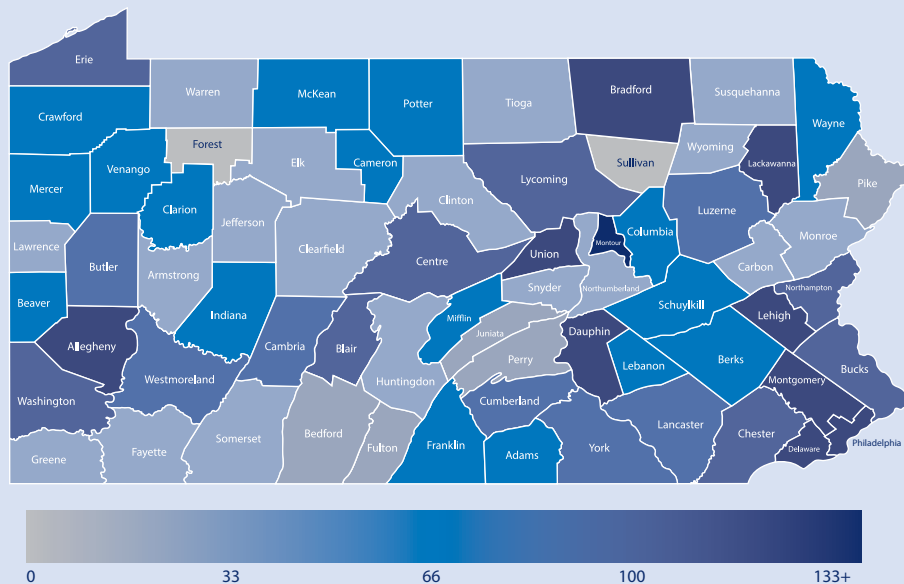
FIGURE 1: MEDICALLY UNDERSERVED AREAS IN PENNSYLVANIA



Source: HRSA, Medically Underserved Areas.

Figure 2 shows the 2021 County Health Rankings ratio of population to primary care physicians.

FIGURE 2: RATIO OF POPULATION OF PRIMARY CARE PHYSICIANS



Source: HRSA, Health Care Professional Shortage Areas.
Notes: Darker areas indicate worse access to care.

In similar fashion, Figure 3 shows the stark reality of health provider access in Pennsylvania—**nearly every county has a shortage area for primary care providers. Pennsylvania needs to address a growing gap between the number of providers and the number of patients seeking health care.**

FIGURE 3: HEALTH PROFESSIONAL SHORTAGE AREAS IN PENNSYLVANIA BY COUNTY

The map displays the following distribution of HPSAs by county:

| Count | Counties |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Greene, Washington, Beaver, Lawrence, Mercer, Venango, Crawford, Erie, Warren, McKean, Potter, Cameron, Lackawanna, Monroe, Northampton, Berks, Montgomery, Bucks, Philadelphia, Delaware, Chester, Lancaster, York, Adams, Cumberland, Perry, Juniata, Mifflin, Union, Snyder, Schuylkill, Northumberland, Columbia, Luzerne, Wyoming, Sullivan, Bradford, Wayne, Pike, Carbon, Lehigh, Dauphin, Lebanon, and Berks. |
| 1 | Forest, Elk, Jefferson, Clearfield, Centre, Clinton, Lycoming, Luzerne, Monroe, Northampton, Berks, Montgomery, Bucks, Philadelphia, Delaware, Chester, Lancaster, York, Adams, Cumberland, Perry, Juniata, Mifflin, Union, Snyder, Schuylkill, Northumberland, Columbia, Luzerne, Wyoming, Sullivan, Bradford, Wayne, Pike, Carbon, Lehigh, Dauphin, Lebanon, and Berks. |
| 2 | Butler, Clarion, Armstrong, Indiana, Cambria, Blair, Huntingdon, Bedford, Fulton, Franklin, and Tioga. |
| 3 | Susquehanna. |
| 4+ | Tioga. |

Source: HRSA, Health Care Professional Shortage Area.

A Different Approach to Improving Health Care Access

Many policies focus on improving health care access by expanding the demand for coverage of health care services, such as Medicaid eligibility expansions. But these reforms are unhelpful if the newly insured cannot access providers. **Despite the Affordable Care Act (ACA) Medicaid expansions, disparities in access to health care persists.**⁶ In other words, adding more patients without more providers does little to expand high-quality health care access.

Another approach is to increase the supply of health care providers. **Increasing the supply is a mixture of getting more providers to underserved areas, freeing providers to see more patients in those areas, and making the existing workforce more productive.** However, Pennsylvania's current scope of practice regulations artificially restrict the supply of health care providers.

Scope of practice regulations are set by state licensing boards and determine an NP's legal ability to perform specific procedures, such as referring patients to specialists, prescribing medicine, ordering diagnostic tests, and even signing disabled person placard forms. There are two main ways licensing regulations prevent full scope of practice for Advanced Practice Registered Nurses (APRNs). The first is the ability to practice without physician supervision. The second is prescriptive authority. As of 2023, twenty-seven states allow NPs full practice authority, or the ability to work independently and prescribe.⁷ Pennsylvania is a reduced practice state where NPs are supervised by a collaborative agreement with not one, but two physicians,

6 Benjamin Sommers, et al., “Three-Year Impacts of The Affordable Care Act: Improved Medical Care And Health Among Low-Income Adults,” *Health Affairs* 36, No. 6 (June 2017), 1119–28, <https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2017.0293>.

7 American Association of Nurse Practitioners, "State Practice Environment," accessed April 20, 2023, <https://www.aanp.org/advocacy/state/state-practice-environment>.

and have limited prescription authority. Yet, while the physician workforce grew 1 percent per year over the last twenty years, the NP workforce has grown about 9 percent.⁸

Numerous recent policy proposals, such as that from the Hamilton Project of the Brookings Institution and a piece in the *New England Journal of Medicine*, find scope of practice reform to allow full practice authority as a viable approach to reform the health care system to prioritize patients.^{9, 10}

Ultimately, reform would benefit both rural and urban Pennsylvania. Rural Pennsylvanians would see increased access since NPs are more likely than physicians to move to rural communities and an increasing amount of care provided in rural areas relies on NPs.^{11, 12} Notably, residents of full practice authority states are more likely to be within 30 minutes of a primary care provider.¹³ Moreover, full practice authority also reduces costs and improves access to care in metro areas by allowing NPs to use their full training, which encourages competition.

Given that NPs are highly trained, a considerable body of research demonstrates that reforming scope of practice laws and passing full practice authority results in improved health outcomes.¹⁴ In a study published by *Journal of Health Economics*, the authors—using a unique dataset that spans 25 years and chronicles legislative changes allowing NPs independent prescriptive authority—discover that states that widen prescriptive authority see gains in population mental health.¹⁵ Another study finds an improvement in the treatment of diabetic care, whereas another finds an improvement in parental evaluations of child health.^{16, 17}

Full practice authority reform likely also has implications for potentially reducing health care costs.^{18, 19} One mechanism for the cost reduction is the better maintenance of chronic conditions such as diabetes.

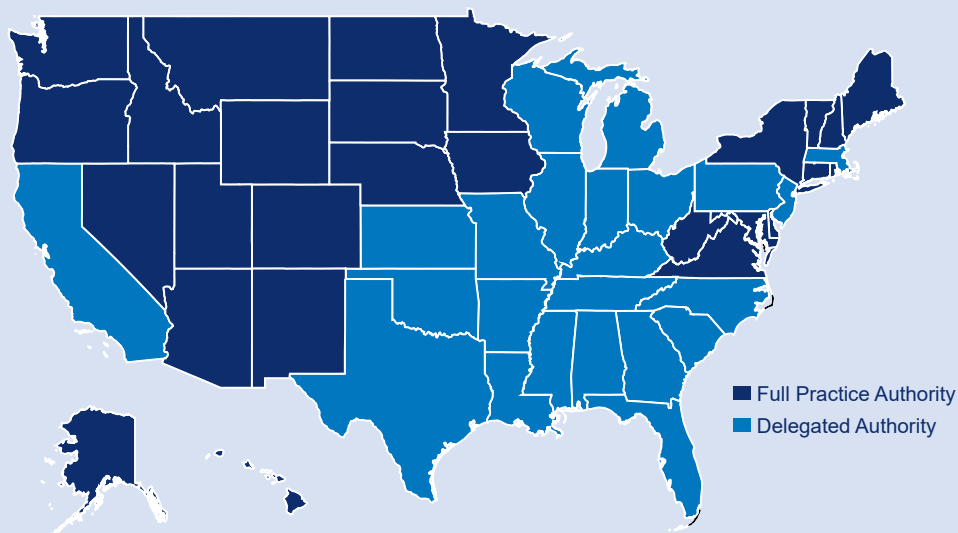
Expanding the health care labor force by fully utilizing NPs is an obvious way to improve health care access in Pennsylvania. This report examines how extending full practice authority to NPs in Pennsylvania will impact workforce outcomes like wages and how much physicians and NPs, choose to work.

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- 8 David Auerbach, Peter I. Buerhaus, and Douglas O. Staiger, “Implications of the Rapid Growth of the Nurse Practitioner Workforce in the US: An Examination of Recent Changes in Demographic, Employment, and Earnings Characteristics of Nurse Practitioners and the Implications of Those Changes,” *Health Affairs* 39, No. 2 (February 2020), 273–79, <https://doi.org/10.1377/hlthaff.2019.00686>.
 - 9 Kathleen Adams and Sara Markowitz, “Improving Efficiency in the Health-Care System: Removing Anticompetitive Barriers for Advanced Practice Registered Nurses and Physician Assistants,” Hamilton Project, Policy Brief 8 (June 2018), https://www.hamiltonproject.org/assets/files/AM_PB_0620.pdf.
 - 10 Bianca Fronger, et al., “Modernizing Scope-of-Practice Regulations-Time to Prioritize Patients,” *New England Journal of Medicine* 382, No. 7 (February 2020), 591–93, <https://doi.org/10.1056/nejmp1911077>.
 - 11 Ryan Kandrack, Hilary Barnes, and Grant R. Martsolf, “Nurse Practitioner Scope of Practice Regulations and Nurse Practitioner Supply,” *Medical Care Research and Review* 78, No.3 (June 2021), 208–17, <https://doi.org/10.1177/1077558719888424>.
 - 12 Hilary Barnes, et al., “Rural and Nonrural Primary Care Physician Practices Increasingly Rely on Nurse Practitioners,” *Health Affairs* 37, No. 6 (June 2018), 908–14, <https://doi.org/10.1377/hlthaff.2017.1158>.
 - 13 Donna Felber Nef, et al., “The Impact of Nurse Practitioner Regulations on Population Access to Care,” *Nursing Outlook* 66, No. 4 (July-August 2018), 379–85, <https://doi.org/10.1016/j.outlook.2018.03.001>.
 - 14 Benjamin J. McMichael, “Nurse Practitioner Scope-of-Practice Laws and Opioid Prescribing,” *Milbank Quarterly* 99, No. 3 (September 2021), 721–45, <https://doi.org/10.1111/1468-0009.12524>.
 - 15 Diane Alexander and Molly Schnell, “Just What the Nurse Practitioner Ordered: Independent Prescriptive Authority and Population Mental Health,” *Journal of Health Economics* 66 (July 2019), 145–62, <https://doi.org/10.1016/j.jhealeco.2019.04.004>.
 - 16 Danny Hughes, Candice Filar, and David T. Mitchell, “Nurse Practitioner Scope of Practice and the Prevention of Foot Complications in Rural Diabetes Patients,” *Journal of Rural Health* 38, No 4. (September 2022), 994–98, <https://doi.org/10.1111/jrh.12599>.
 - 17 Moiz Bhai and David T. Mitchell, “The Effects of Occupational Licensing Reform for Nurse Practitioners on Children’s Health,” *Southern Economic Journal*, July 3, 2022, <https://doi.org/10.1002/soej.12592>.
 - 18 Laura Barrie Smith, “The Effect of Nurse Practitioner Scope of Practice Laws on Primary Care Delivery,” *Health Economics* 31, No. 1 (January 2022), 21–41, <https://doi.org/10.1002/hec.4438>.
 - 19 Alexandra Wallace and Moiz Bhai, “The Effect of Scope of Practice Reform on the Healthcare Outcomes of Diabetes Patients,” Georgia Institute of Technology unpublished working paper (2022).

The Workforce Implications of Full Practice Authority Reform

Our analysis follows Benjamin McMichael's and Sara Markowitz's classifications of states as full practice authority states or non-full practice authority states (combining reduced and restricted practice into one category) based on state-level code.²⁰ Figure 4 shows the geographic variation in full practice authority at the end of 2019 which coincides with other data utilized in this report.²¹

FIGURE 4: NURSE PRACTITIONER FULL PRACTICE AUTHORITY IN THE UNITED STATES IN 2019



Source: McMichael and Markowitz.

Note: The classifications used in this study differ from the criteria used by the American Association of Nurse Practitioners.

NPs are registered nurses with additional graduate-level coursework and clinical hours. They take national board exams and hold state licenses. Table 1 provides a brief primer on the NP workforce using data from the National Sample Survey of Nurse Practitioners (NSSNP), the most appropriate and largest sample survey for NPs. The NSSNP examines the type of licensing, compensation, and types of work that NPs perform, along with other professional and personal characteristics. While NPs can have more than one, this study focuses on their main specialty.

Table 1 shows that most NPs, approximately 75 percent, choose to specialize in primary care both in terms of areas of certification and their work. As expected, all respondents had a type of certification or licensure from the State Boards of Nursing in their respective states. Some have multiple forms of credentials/certification to practice, while the most common attribute is a master's degree in nursing.

20 Benjamin J. McMichael and Sara Markowitz, "Toward a Uniform Classification of Nurse Practitioner Scope of Practice Laws," *Medical Care Research and Review* (2022), <https://doi.org/10.1177/10775587221126777>.

21 To the reader, there is a fair amount of dispute on when certain states crossed the threshold to full practice authority. See McMichael and Markowitz for their treatment of these controversies.

TABLE 1: NURSE PRACTITIONER TRAINING AND SPECIALTY

| Highest Education | % | Area of Certification | % |
|---------------------|--------|------------------------|--------|
| Associate or Less | 2.69% | Family | 45.69% |
| Baccalaureate | 3.97% | Pediatric | 10.79% |
| Master's | 86.61% | Other Primary Care | 20.18% |
| Doctorate or Higher | 6.84% | Other NP certification | 19.91% |
| | | None | 5.72% |

| Additional Education | % | Main Type of Work | % |
|----------------------------|--------|----------------------|--------|
| Certificate Program | 10.61% | Primary Care | 48.13% |
| Master's Degree in Nursing | 82.88% | Internal Medicine | 16.13% |
| Post Master's Certificate | 13.28% | Surgical Specialties | 8.62% |
| Doctor of Nursing Practice | 1.68% | Other | 25.31% |
| | | No Specialty | 1.81% |

Source: The 2012 National Sample Survey of Nurse Practitioners (NSSNP).

Notes: Sample size is 12,923. For Additional Education, respondents can check multiple categories. Education below baccalaureate is surely a miscode/respondent error since those individuals would not be allowed to take national NP exams.

Given that physicians and NPs have some overlapping skill sets, it is reasonable to ask what the impact of full practice authority has on both groups. Three high-quality studies explore how full practice authority can influence the health care labor markets.

First, a study using the American Community Survey finds that regulations requiring supervision by physicians, or restrictions on prescriptive authority, when prescribing controlled substances reduces NP wages by about 14 percent and increases physician wages by about 7 percent. Further, the findings show that prescription restrictions lead to a reduction in NP hours worked of between 6 to 14 percent per year. These regulations are also associated with a 6 to 9 percent increase in physician hours. **Their analysis of insurance claims data shows that licensing regulations raise the price of a well-child medical exam by 3 to 16 percent.**²² To test safety, they analyze and find no evidence that full practice increases infant mortality rates or malpractice premiums. It is important to note that this study uses data from before 2010.

Second, in terms of absolute headcounts, a study published in 2021 carefully looks at the change in NP supply at the county level in states that change scope of practice. The authors look at beginning supply and supply two years later. They find that states with full practice authority have more NPs, but they do not find that changing NP laws improves the headcount of NPs except in one model which focuses on health professional shortage areas. Rather, the study suggests that the improvement in health care is probably the result of NPs working more hours and providing more services. **When NPs have less administrative and supervisory hours, they can provide more patient services.**²³

Using the 2012 National Sample Survey of Nurse Practitioners (NSSNP), a study on NP autonomy from 2017 finds that when NPs work in states without physician oversight requirements, they

22 Morris M. Kleiner, et al., "Relaxing Occupational Licensing Requirements: Analyzing Wages and Prices for a Medical Service," *Journal of Law and Economics* 59, No. 2 (2016), 261–91, <https://www.journals.uchicago.edu/doi/10.1086/688093>.

23 Ryan Kandrack, Hilary Barnes, and Grant R. Martsof, "Nurse Practitioner Scope of Practice Regulations and Nurse Practitioner Supply," *Medical Care Research and Review* 78, No. 3 (June 2021), 208–17, <https://doi.org/10.1177/1077558719888424>.

are more likely to work in rural areas. Further, those NPs practicing independently were more likely to have a Drug Enforcement Administration (DEA) number, hospital admitting privileges, and to bill using their own National Provider Identifier (NPI) number. In the survey, the authors find that **rural NPs practicing to the fullest extent of their training were more likely to be satisfied with their work and planning to stay in their jobs.**²⁴

Finally, Markowitz and E. Kathleen Adams, in research published by the *American Journal of Health Economics*, use the National Sample Survey of Registered Nurses (NSSRN) with data approximately every four years between 1977 and 2008. Markowitz and Adams find that APRNs do not alter many aspects of their labor supply decisions in response to changes in states' scope of practice environments. Using the NSSRN during those years, they find that full practice authority for NPs does not change the probability of part-time work, holding multiple jobs, moving to a different state for work or statistically significant changes in their wages. However, **there is evidence that weekly hours of work in the primary job and total hours of work across all jobs are higher in full practice authority states.**²⁵

Taken as a whole, the previous literature evidences that full practice authority can improve the health care provider labor market. Allowing for full practice authority reduces administrative burdens of occupational licensing and allows the health care labor markets to function more efficiently for workers, patients, and society resulting in improved health care access and outcomes for residents. This report updates and generates new estimates on how full practice authority can improve access to care in Pennsylvania.

Data and Methodology

This report uses a quasi-experimental empirical approach to estimate the effects of granting full practice authority to NPs in Pennsylvania on various labor-market and economic outcomes of physicians and NPs. Our approach takes advantage of full practice authority adoption across the United States by comparing what happens to NPs and physicians as a result of these advances in state-level scope of practice legislation within states across time. The use of this approach (a difference-in-difference research design) ensures that changes in our key outcome variables are likely driven by regulatory policy changes as opposed to other unobserved confounding factors. Therefore, our quasi-experimental research design allows us to emulate the gold standard of treatment and control in a non-experimental setting and to generate credible estimates. Our full paper further strengthens the robustness of the research design.²⁶

The primary source data comes from the American Community Survey, a yearly sample of 1 percent of Americans.²⁷ We begin in 2010 when APRNs such as NPs are uniquely identified in the data and end in 2019, preceding the 2020 COVID-19 Pandemic. The ten-year-long study period combined with geocodes for respondents allows us to precisely link and analyzes the impacts of state-level shifts to full practice authority on labor-market outcomes. Table 2 summarizes our findings.

24 Joanne Spetz, Susan M. Skillman, and C. Holly A. Andrilla, "Nurse Practitioner Autonomy and Satisfaction in Rural Settings," *Medical Care Research and Review* 74, No. 2 (April 2017), 227–35, <https://doi.org/10.1177/1077558716629584>.

25 Sara Markowitz and E. Kathleen Adams, "The Effects of State Scope of Practice Laws on the Labor Supply of Advanced Practice Registered Nurses," *American Journal of Health Economics* 8, No. 1 (Winter 2022), 65–98, <https://doi.org/10.1086/716545>.

26 Moiz Bhai and David T. Mitchell, "New Evidence on Scope of Practice and the Labor Supply of Physicians and Nurse Practitioners," *Unpublished Working paper* (2022).

27 Steven Ruggles, et al., Integrated Public Use Microdata Series: Version 8.0 [dataset], Minneapolis: University of Minnesota, 2018, <http://doi.org/10.18128/D010.V8.0> or <https://www.ipums.org/projects/ipums-usa/d010.v8.0>.

TABLE 2: DESCRIPTIVE STATISTICS ON NURSE PRACTITIONERS AND PHYSICIANS

| | Physicians | | Nurse Practitioners | |
|----------------------|-------------------|---------------------|----------------------------|---------------------|
| | U.S. | Pennsylvania | U.S. | Pennsylvania |
| Demographics | | | | |
| Age | 49.58 | 48.85 | 47.13 | 45.86 |
| Female | 0.35% | 0.35% | 0.91% | 0.91% |
| White | 0.76% | 0.79% | 0.89% | 0.96% |
| Black | 0.04% | 0.03% | 0.05% | 0.02% |
| Married | 0.79% | 0.78% | 0.73% | 0.74% |
| Child | 0.42% | 0.40% | 0.44% | 0.43% |
| Advanced Degree | 0.99% | 0.99% | 0.91% | 0.93% |
| Outcomes | | | | |
| Earnings | \$218,098 | \$217,151 | \$89,181 | \$84,272 |
| Hours Worked | 50.29 | 51.72 | 39.71 | 40.59 |
| Full-Time, Full Year | 0.78% | 0.81% | 0.72% | 0.78% |
| Part-Time, Full Year | 0.07% | 0.07% | 0.15% | 0.12% |
| Full-Time, Part Year | 0.10% | 0.09% | 0.06% | 0.06% |
| Part-Time, Part Year | 0.05% | 0.04% | 0.06% | 0.04% |
| Self-Employed | 0.17% | 0.12% | 0.02% | 0.01% |

Source: American Community Survey (2010–2019)

Notes: Each cell contains the average for each variable for the U.S. and Pennsylvania.

Findings

EARNINGS

Table 3 contains the estimates from our statistical models. We begin by examining inflation-adjusted earnings, and **we find that full practice authority improves the labor market for NPs as passage results in a statistically significant increase in earnings of \$3,535 (approximately 4 percent) in column 1.** These findings are robust to the inclusion of macroeconomic control variables in column 2. For physicians, the change in earnings is not statistically different from zero due to passage of full practice authority (while the coefficient is a small economically significant negative amount.) This implies that markets without full practice authority constrain NP earnings, whereas physicians are not harmed due to passage of full practice authority. It is also possible that the increase in NP earnings reflects retained

earnings from payments to physicians under collaborative practice as opposed to increased compensation. In one study, the average collaborative practice agreement imposes a cost on NPs of \$1,048 a month.²⁸

HOURS WORKED PER WEEK

Next, the research evaluates how full practice authority influences the labor supply of NPs and physicians using the usual hours worked in a week variable. **Our findings show a statistically significant increase in usual hours worked per week for NPs by about three-quarters of an hour and this remains robust. For physicians, we find a statistically significant decrease in usual hours worked per week by about twenty minutes. While we are unable to examine these differences, indirectly, full practice authority reduces administrative burdens on both physicians and NPs thereby allowing them more time to see patients. Therefore, our numbers for NPs are likely underestimates.** It is unclear how much of the change in physician labor supply is due to changes in the health care system, reduced administrative burden, or reductions in labor supply. Unfortunately, it is not possible to separate these pathways.

Our analysis for NPs in terms of patients seen implies that existing NPs increase hours worked by about 42 minutes a week which translates into approximately a little more than two patients a week or 109 patients per year using estimates on time of patients visits by researchers at Duke University.²⁹ It is important to keep in mind that this excludes the patients that are likely to be seen by new NPs and excludes the potential efficiency gains from a reduced administrative burden. Therefore, the 109 more patients seen is an underestimate and scope of practice reform would likely increase the overall number of patients seen above 109.

HOURS WORKED PER YEAR

Finally, our other assessment of changes in labor force participation tends to find full practice authority is associated with NPs statistically shifting their working habits from part-time during the year to **more likely to work full-time during the year. We see a similar pattern of more work hours for physicians, moving from full-time part of the year to full-time all of the year. For both physicians and NPs, our findings provide suggestive evidence of increases in self-employment (with incorporation.) As a whole, these supplementary workforce variables indicate full practice authority encourages increased workforce participation for both NPs and physicians with an emphasis on self-employment.**

28 Ashley Z. Ritter, et al., "Nurse Practitioner State-Required Collaborative Practice Agreements: A Cross-Sectional Case Study in Florida," *Nursing Economics* 38, No. 4 (2020), 185–93, <https://www.proquest.com/docview/2437194640>.

29 Perri Morgan, Christine M. Everett, and Esther Hing, "Time Spent with Patients by Physicians, Nurse Practitioners, and Physician Assistants in Community Health Centers, 2006–2010," *Healthcare* 2, No. 4 (December 2014), 232–37, <https://doi.org/10.1016/j.hjdsi.2014.09.009>.

TABLE 3: EFFECT OF FULL PRACTICE AUTHORITY ON EARNINGS AND LABOR SUPPLY IN PENNSYLVANIA

| Outcomes | Physicians | | Nurse Practitioners | |
|----------------------|------------|------------------|---------------------|------------------|
| | Baseline | Local Variations | Baseline | Local Variations |
| Earnings | \$-724 | \$-714 | \$3,535* | \$2,900* |
| Hours Worked | -0.442** | -0.381* | 0.690* | 0.741** |
| Full-Time, Full Year | 0.008%* | 0.007% | 0.039%*** | 0.038%*** |
| Part-Time, Full Year | 0.004% | 0.003% | -0.027%** | -0.027%* |
| Full-Time, Part Year | -0.010%** | -0.009%** | -0.011% | -0.007% |
| Self-Employed | 0.009%* | 0.007% | 0.007% | 0.007% |

Source: American Community Survey (2010-2019)

Notes: Asterisks *, **, *** indicate significant at the 90, 95, and 99 percent levels, respectively. Column 1 is the baseline regression while column 2 controls for local economic conditions such as log of per capita GDP and the local unemployment rate.

This report concentrates on two complementary forms of labor-market outcomes related to labor supply: wages and hours worked and generally finds full practice authority improves the earnings and labor supply of NPs without adverse consequences for physicians. Our estimates are in line with a number of research articles that examine the effects of full practice authority on labor-market outcomes. Next, we use our empirical model to generate a counterfactual scenario on the adoption of full practice authority for Pennsylvania adjusting for its workforce characteristics. Using our statistical model in Equation 1, we generate the potential impacts for Pennsylvania if it were to adopt full practice authority. Table 4 summarizes these forecasts.

TABLE 4: PRIMARY CARE WORKFORCE FORECASTS FOR PENNSYLVANIA WITH FULL PRACTICE AUTHORITY

| Outcomes | Physicians | | Nurse Practitioners | | |
|----------------------|------------|------------|---------------------|------------|----------|
| | Actual | Forecasted | Actual | Forecasted | Increase |
| Earnings | \$222,083 | \$221,358 | \$83,998 | \$87,533 | \$3,535 |
| Hours Worked | 51.15 | 50.71 | 40.38 | 41.08 | 0.70 |
| Full-Time, Full Year | 0.80% | 0.81% | 0.77% | 0.81% | 0.04% |
| Self-Employed | 0.12% | 0.132% | 0.01% | 0.018% | 0.01% |

Source: American Community Survey (2010-2019).

Notes: Forecasts are generated from the baseline model in Equation 1. Huber-White standard errors for forecasted outcomes calculated using the delta method.

Conclusion and Policy Implications

The key findings from this report indicate that NPs are adversely affected by limits on their area of practice, which may reduce access to primary care in the health care system. The results also suggest that, at the very least, full practice authority would increase NP earnings without adversely affecting the labor supply of physicians. Overall, the findings of this report suggest that allowing for full practice authority is an important policy tool for improving health care access and health in Pennsylvania.

The results from this policy report are especially timely and pertinent because of various health care shocks, such as the COVID-19 pandemic and the ACA and COVID-19 Medicaid Expansions that have ensued an increase in the demand for health services. Increases in the demand for health care have encountered an inadequate supply of primary care providers. And Pennsylvania's demographics indicate the demand for health care services will continue to rise. An earlier Commonwealth Foundation report found evidence of better health outcomes and an increase in the number of NPs with full practice authority.³⁰ This report provides additional evidence that granting full practice authority to Pennsylvania NPs has the potential to significantly expand health care access while concurrently improving health outcomes for people in Pennsylvania.

30 Edward Timmons, et al., "How Full Practice Authority Can Increase Access and Improve Outcomes," Commonwealth Foundation, November 15, 2022 <https://www.commonwealthfoundation.org/research/full-practice-authority-pennsylvania/>.

Appendix I: Statistical Model

We build our statistical model on nationally representative data between 2010 and 2019 from the American Community Survey (ACS) for both physicians and nurse practitioners (NPs). The ACS offers a rich set of personal and professional characteristics for use in our statistical analysis, such as working conditions, industry of work, educational attainment, age, gender, race, and other sociodemographic variables. The ACS's sizable sample of respondents in the health care professions includes geocodes on states of residence. The ACS also contains a large number of physicians (combined with surgeons) and NPs (combined with Certified Nurse Midwives [other Advanced Practice Registered Nurses (APRNs)]) along with detailed labor market data and is the most appropriate data source for this policy analysis.

We build two subsets from the data for NPs and physicians using industry-of-work occupational codes from the ACS. We implement a difference-in-difference statistical model given by the following equation:

$$(1) \text{ Labor Market Outcome}_{ist} = \alpha * \text{State}_s + \tau * \text{Year}_t + \beta_1 \text{Scope of Practice}_{st} + \text{Demographics}_{ist} \gamma + \varepsilon_{ist}$$

The outcome of interest are various labor-market outcomes, such as adjusted annual wages, usual hours worked in a week, self-employment status, full-time work, and part-time work for survey respondent i in states at year t . On the right-hand side is the key policy variable of interest which captures whether a state has enacted full practice authority (FPA) for NPs. In this empirical model, we also include characteristics of survey respondents that can influence their economic and labor-market behaviors, such as their demographic attributes, alongside other socioeconomic predictors. We calculate Equation 1 separately for NPs and physicians. For robustness, we also re-estimate Equation 1 with local economic conditions from the Bureau of Economic Analysis (BEA), such as Log of GDP per Capita and the Unemployment rate, to account for macroeconomic factors. Finally, in both models we cluster our standard errors at the state-level.

Using the baseline national empirical model from Equation 1, we next generate counterfactual events for Pennsylvania based on what would happen if Pennsylvania were to reform scope of practice laws and grant FPA. Essentially, this statistical model generates counterfactual forecasts for Pennsylvania on a series of economic and labor-market outcomes based on historical changes that have occurred in other states that have implemented FPA adjusting for the respective characteristics of the physician and NP workforces in Pennsylvania. Therefore, our forecasted outcomes for these variables predict how scope of practice reforms would likely affect outcomes in Pennsylvania.

TABLE 3A: EFFECT OF FPA ON EARNINGS AND LABOR SUPPLY OF NPS AND PHYSICIANS

| Outcomes | Physicians | | Nurse Practitioners | |
|----------------------|----------------------------|---------------------|----------------------------|---------------------|
| | (1) | (2) | (1) | (2) |
| Earnings | -724 (2370) | -714 (2504) | 3535* (2074) | 2900* (1685) |
| Hours Worked | -0.442** (0.179) | -0.381* (0.195) | 0.690* (0.358) | 0.741** (0.352) |
| Full-Time, Full Year | 0.008* (0.004) | 0.007 (0.004) | 0.039*** (0.011) | 0.038*** (0.014) |
| Part-Time, Full Year | 0.004 (0.003) | 0.003 (0.003) | -0.027** (0.013) | -0.027* (0.016) |
| Full-Time, Part Year | -0.010** (0.004) | -0.009** (0.004) | -0.011 (0.008) | -0.007 (0.009) |
| Part-Time, Part Year | -0.001 (0.002) | -0.001 (0.002) | -0.002 (0.009) | -0.004 (0.009) |
| Self-Employed | 0.009* (0.005) | 0.007 (0.004) | 0.007 (0.006) | 0.007 (0.008) |

Source: American Community Survey (2010-2019)

Notes: Asterisks *, **, *** indicate significant at the 90, 95, and 99 percent levels, respectively. Huber-White Standard Errors clustered at the state-level below coefficients. All regressions contain state and year fixed effects and a full set of indicator variables for race, age, Hispanic ethnicity, family demographics (marital status and child at home.) Column 1 is the baseline regression while column 2 controls for local economic conditions such as log of per capita GDP and the local unemployment rate.

TABLE 4A: FORECASTS FOR PENNSYLVANIA

| Outcomes | Physicians | | Nurse Practitioners | |
|----------------------|---------------|-------------------------|---------------------|-------------------------|
| | Actual | Forecasted | Actual | Forecasted |
| Earnings | 222083 | 221358 (2362) | 83998 | 87533 (2127) |
| Hours Worked | 51.15 | 50.71 (0.173) | 40.38 | 41.08 (0.358) |
| Full-Time, Full Year | 0.80 | 0.81 (0.004) | 0.77 | 0.81 (0.011) |
| Part-Time, Full Year | 0.07 | 0.078 (0.003) | 0.12 | 0.093 (0.013) |
| Full-Time, Part Year | 0.08 | 0.072 (0.004) | 0.06 | 0.052 (0.008) |
| Part-Time, Part Year | 0.04 | 0.039 (0.002) | 0.04 | 0.041 (0.009) |
| Self-Employed | 0.12 | 0.132 (0.005) | 0.01 | 0.018 (0.006) |

Source: American Community Survey (2010-2019)

Notes: Forecasts are generated from the baseline model in Equation 1. Huber-White standard errors for forecasted outcomes calculated using the delta method.



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