

# Running the Numbers

*A Periodic Feature to Inform North Carolina Health Care Professionals  
About Current Topics in Health Statistics*

## The Rapid Expansion of Nurse Practitioners and Physician Assistants in North Carolina

The number of nurse practitioners (NPs) and physician assistants (PAs) in North Carolina and the United States has increased rapidly over the past quarter century. NPs and PAs occupy similar roles in the health care system that both overlap and complement those historically filled by physicians. They conduct physical exams, diagnose and treat medical conditions, order tests, prescribe medications, and assist in surgeries. In North Carolina, both NPs and PAs work under the supervision of a physician but do not need to be in the same physical location as the supervising physician.

The length of postgraduate training for PAs and NPs is shorter than for physicians. Physicians complete four years of medical school, then specialize in a field of medicine during residency (typically 3-5 years). They may pursue additional subspecialty training during fellowships (1-3 years). Physicians must complete at least one year of residency training prior to licensure. There are many education pathways for NPs. NP students apply to programs in a specific advanced practice area, such as family nurse practitioner. NP education programs are transitioning from a master's degree (2 years) to a doctorate of nurse practice (DNP, 3 years). PAs complete generalist medical education at PA school (2 years) and then go directly into practice. Although not required for licensure, some NPs and PAs complete one- or two-year post-graduate residency programs.

This article provides an overview of data on demographic, practice location, and primary versus specialty care practice characteristics for NPs, PAs, and physicians in North Carolina. We describe the growth of the NP and PA workforce in North Carolina from 2000 to 2017 and the expansion of NP and PA education programs.

### Methods and Data Sources

Data used in this analysis were obtained from the North Carolina Health Professions Data System

(HPDS), housed at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. The HPDS data are derived from annual licensure files received from the North Carolina Board of Nursing (NCBON) and the North Carolina Medical Board (NCMB). The data contain a snapshot of all licensed, active NPs, PAs, and physicians in the North Carolina workforce as of October 31 of each year who report a practice address in the state. For physician data only, federally employed physicians and residents in training were excluded from the data. Analyses are based on primary practice location and do not include additional practice locations. Interactive maps and charts for NPs, PAs, physicians, and other health professionals in the North Carolina workforce from 2000 to present are available online at <https://nhealthworkforce.unc.edu/supply/>.

North Carolina population census data and estimates were downloaded via Log Into North Carolina (<https://www.osbm.nc.gov/facts-figures/linc>), a data retrieval tool maintained by the North Carolina Office of State Budget and Management.

"Rural" (non-metropolitan) and "non-rural" (metropolitan) definitions in this article are based on 2017 federal Office of Management and Budget county definitions, which are based on population density and commuting patterns. Using this definition, North Carolina has 46 metropolitan counties and 54 non-metropolitan counties, which include those classified as micropolitan and non-Core Based Statistical Areas (CBSAs).

As part of the initial licensure and annual rereg-

---

Electronically published May 6, 2019.

Address correspondence to Julie C. Spero, 725 MLK Jr. Blvd, CB # 7590, Chapel Hill, NC 27599-7590 (juliespero@unc.edu).

**N C Med J. 2019;80(3):186-190.** ©2019 by the North Carolina Institute of Medicine and The Duke Endowment. All rights reserved.  
0029-2559/2019/80315

istration process, the NCMB asks all physicians and PAs to select a primary area of practice, described as “what you primarily do as a physician or physician assistant” (personal communication, NCMB annual full license application, Hari Gupta, chief of operations, NCMB, February 2018). We have classified physicians and PAs as “primary care” if they selected one of the following primary areas of practice: family medicine, general practice, internal medicine, internal medicine-pediatrics, pediatrics, adolescent medicine, or obstetrics/gynecology. Unlike PAs and physicians, NPs do not select a primary specialty during the NCBON licensure process, which makes practice specialty more difficult to determine. Some NP primary care definitions based on education or current certification suggest that approximately 80% of the NP workforce provides primary care, while a definition based on practice setting decreases that estimate below 60% in North Carolina [1]. For this study, NPs were classified as “primary care” if they reported both a) a primary care certification (adult nurse practitioner, family nurse practitioner, geriatric nurse practitioner, obstetrics/gynecology nurse practitioner, pediatric nurse practitioner, women’s health nurse practitioner) and b) a practice location in a primary care setting (group medical practice/physician office practice, group nursing practice, HMO or insurance company, home health care, hospital outpatient department, long-term care, public/community health, school health, or self-employed

as a nurse practitioner). We classified NPs, PAs, and physicians as underrepresented minorities (URMs) if they self-identified on licensure forms as African-American/Black, American Indian or Alaskan Native, and/or of Hispanic ethnicity (of any race).

## Findings

In 2017, there were 6,026 PAs (5.87 PAs per 10,000 population), 6,644 NPs (6.47 NPs per 10,000 population), and 24,432 physicians (23.8 physicians per 10,000 population) in North Carolina’s workforce. Characteristics of these three workforces, summarized in Table 1, include several points worth highlighting. Compared to 21.5% of North Carolina’s population who lived in a rural county [2], 15.3% of NPs, 14.9% of PAs, and 12.6% of physicians reported a primary practice location in a rural county. While one-third (34.4%) of North Carolina’s population identifies as African-American/Black, American Indian or Alaskan Native, and/or of Hispanic ethnicity (of any race) [3], only 12.9% of NPs, 11.4% of physicians, and 8.5% of PAs self-identified as underrepresented minorities in 2017.

Using our primary care definitions, we classified 29.3% of physicians, 27.2% of PAs, and 50.7% of NPs as primary care providers. In 2017, 16.1% of primary care physicians reported practicing in a rural county, as did 18.5% of primary care NPs, and 23.3% of primary care PAs.

**TABLE 1.**  
Demographic, Education, and Primary Care Specialty Characteristics of Nurse Practitioners, Physician Assistants, and Physicians in North Carolina, 2017

	Nurse Practitioners			Physician Assistants			Physicians		
	NC	Rural	Urban	NC	Rural	Urban	NC	Rural	Urban
Total (Rate per 10k Population)	6,644 (6.47)	1,015 (4.59)	5,629 (6.98)	6,026 (5.87)	896 (4.05)	5,130 (6.36)	24,432 (23.78)	3,072 (13.90)	21,360 (26.49)
Female (%)	6,194 (93.2%)	933 (91.9%)	5,261 (93.5%)	3,385 (56.2%)	356 (39.7%)	1,744 (34.0%)	8,424 (34.5%)	864 (28.1%)	7,560 (35.4%)
Average Age (SD)	45.6 (11.2)	47.3 (11.1)	45.3 (11.2)	40.8 (11.7)	43.1 (12.5)	40.4 (11.5)	49.0 (11.9)	52.7 (12.0)	48.5 (11.8)
Underrepresented Minority (%)	855 (12.9%)	126 (12.4%)	729 (13.0%)	512 (8.5%)	77 (8.6%)	435 (8.5%)	2,779 (11.4%)	430 (14.0%)	2,349 (11.0%)
Professional Education in NC (%)	3,842 (57.8%)	576 (56.7%)	3,265 (58.0%)	2,476 (41.1%)	349 (39.0%)	2,127 (41.5%)	5,644 (23.1%)	675 (22.0%)	4,969 (23.3%)
Primary Care (Rate per 10k Population)	3,366 (3.28)	624 (2.82)	2,742 (3.40)	1,637 (1.59)	381 (1.72)	1,256 (1.56)	7,164 (6.97)	1,151 (5.21)	6,013 (7.46)

Notes. 7 NPs (0.11%) and 1 PA (0.02%) were missing data on sex. 41 NPs (0.63%), 376 PAs (6.24%), and 980 (4.01%) physicians were missing data on race. 550 PAs (9.13%) were missing data on PA school location.  
Sources. North Carolina Board of Nursing; North Carolina Medical Board; North Carolina Office of State Budget and Management.

## Growth of North Carolina's NP and PA Workforces Has Outpaced Physician Workforce Growth

In 2000, North Carolina's NP and PA workforces combined were 22% the size of the state's physician workforce. In 2017, the combined workforces were roughly half the size of the state's physician workforce; in rural counties, they were 62% the size of the state's physician workforce [4].

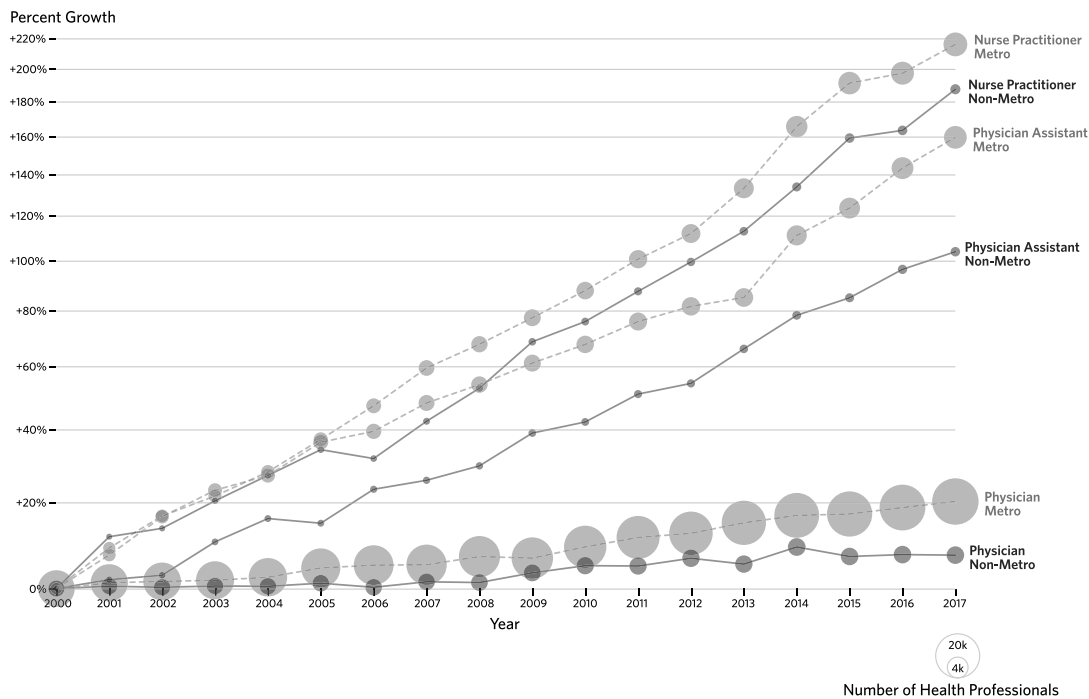
Figure 1 shows the rapid growth of the NP and PA workforce in North Carolina over the past 17 years. We examined the change in the ratios of health professionals per capita to account for the state's rapid population growth. In 2000, NPs were the smallest of the three workforces, with 2.1 NPs per 10,000 population (N = 1,656). Since then, the NP workforce has increased by 215.9% in non-rural counties and 187.3% in rural counties. NP growth per capita statewide and in rural counties has outpaced that of PAs and physicians.

## North Carolina Has Added New Health Professional Education Programs and Expanded Enrollment in Existing Programs

Programs training physicians, PAs, and NPs have expanded over the past decade in North Carolina and nationally. With the addition of Campbell University School of Osteopathic Medicine in 2013, North Carolina has five medical schools. Both the University of North Carolina School of Medicine and the Brody School of Medicine at ECU plan to expand their enrollment [5].

Enrollment at North Carolina NP and PA education programs has increased in recent years [6]. Figure 2 shows the state's 11 PA programs and a 12th program under development at Pfeiffer University, which will enroll students in January 2020 [7]. Including Pfeiffer University, seven of the PA programs opened in 2011 or later. North Carolina has nine NP education programs. National data demonstrate that despite the increased enrollment at

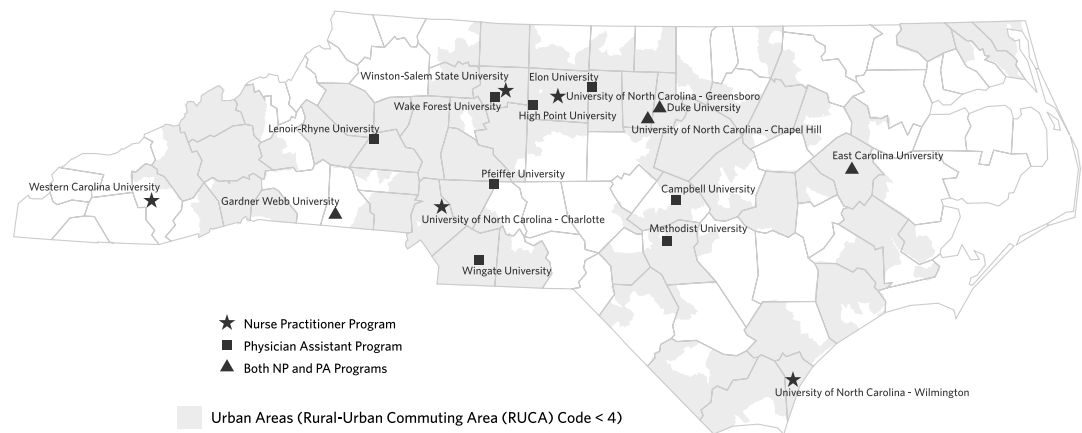
**FIGURE 1.** Cumulative Rate of Growth Per 10,000 Population in Metropolitan and Non-Metropolitan Counties in North Carolina since 2000: Nurse Practitioners, Physician Assistants, and Physicians



Source: Data are derived from the NC Board of Nursing and the NC Medical Board and include active, licensed NPs, PAs, and physicians in North Carolina as of October 31, 2017. Residents-in-training and federally employed physicians were excluded. NC population census data and estimates were downloaded via Log Into North Carolina (<https://www.osbm.nc.gov/facts-figures/linc>), a data retrieval tool maintained by the NC Office of State Budget and Management.

**FIGURE 2.**

**Nurse Practitioner and Physician Assistant Education Programs, North Carolina, 2019**



Note: Includes planned PA program at Pfeiffer University, inaugural class to matriculate in January 2020.

Source: Nurse practitioner program data from the American Association of Nurse Practitioners NP Program Search website, accessed February 1, 2019 from <https://npprogramsearch.aanp.org>. Physician assistant program data from the Physician Assistant Education Association Program Directory, accessed February 1, 2019 from <http://directory.paeaonline.org/>.

existing schools and the opening of new schools, admission to PA school remains competitive with roughly three applicants per student seat [8-10]. We were unable to identify data comparing NP applicants to matriculants.

### Closing Remarks

The rapid growth of the NP and PA workforce shows no signs of slowing, particularly given expansion of educational programs. Much of the discussion around the NP and PA workforce centers on the potential to alleviate workforce shortages in primary care and in rural areas. We were unable to use a standard definition of primary care across the three health professional types due to data limitations, and results should be interpreted with that caveat in mind. Relative to physicians and PAs, a greater percentage of NPs practice in primary care. Compared to primary care physicians, a greater percentage primary care PAs and primary care NPs practice in rural counties.

Job prospects are good for both NPs and PAs [11-13]. In 2014, 18% of job advertisements for PAs across North Carolina were for primary care positions while 82% were for positions in specialty care (personal communication, Perri Morgan, Director, Physician Assistant Research, Duke Health, to Julie Spero, February 15, 2019). Like

the national market, the North Carolina market is weighted toward PA employment in specialty fields [14]. Unlike physicians, many NPs and PAs change specialties over the course of their careers [15]. Ultimately, those with the most influence on NP and PA specialty choice are not educational institutions but employers. NCMJ

**Julie C. Spero, MSPH** director, North Carolina Health Professions Data System; research associate, Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

**Evan M. Galloway, MPS** research associate, Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

### Acknowledgments

The authors would like to thank Erin Fraher, PhD for her input.

The North Carolina Health Professions Data System is supported by the North Carolina Area Health Education Center (AHEC) Program in collaboration with the licensing boards.

Potential conflicts of interest. J.C.S. and E.M.G. have no relevant conflicts of interest.

### References

1. Spetz J, Fraher E, Li Y, Bates T. How many nurse practitioners provide primary care? It depends on how you count them. *Med Care Res and Rev.* 2015;72(3):359-375.
2. North Carolina Office of State Budget and Management Database. Log Into North Carolina. Raleigh, NC: NC OSBM; 2019; [http://data.osbm.state.nc.us/pls/linc/dyn\\_linc\\_main.show](http://data.osbm.state.nc.us/pls/linc/dyn_linc_main.show). Accessed February 1, 2019.

3. U.S. Census Bureau. American Community Survey (ACS). U.S. Census website. <https://www.census.gov/programs-surveys/acs/news/data-releases.html?#>. Accessed February 1, 2019.
4. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. North Carolina Health Professional Supply Data: Registered Nurses per 10,000 Population by County, North Carolina, 2017. North Carolina Health Professions Data System website. <https://nchealthworkforce.unc.edu/supply/>. Accessed February 1, 2019.
5. Spero JC, Fraher EP; Cecil G. Sheps Center for Health Services Research. Workforce Outcomes of North Carolina Medical School Graduates: A Report to the Joint Legislative Oversight Committee on Health and Human Services and the Joint Legislative Education Oversight Committee. [https://www.shepscenter.unc.edu/workforce\\_product/workforce-outcomes-nc-medical-school-graduates/](https://www.shepscenter.unc.edu/workforce_product/workforce-outcomes-nc-medical-school-graduates/). Accessed February 1, 2019.
6. Newton WP, Brown A. Community-Based Health Professions Education: Who Will Teach Our Students? A Report by the NC AHEC Program. Chapel Hill, NC: North Carolina AHEC; 2016. [https://www.ncahec.net/wp-content/uploads/2018/02/PreceptingReportSurvey\\_2018.pdf](https://www.ncahec.net/wp-content/uploads/2018/02/PreceptingReportSurvey_2018.pdf). Accessed February 1, 2019.
7. Pfeiffer University. Physician Assistant Admissions Timeline. Pfeiffer University website. <http://www.pfeiffer.edu/academics/programs/physician-assistant-ms-pas/5474/admissions-timeline>. Accessed February 1, 2019.
8. McDaniel MJ, Hildebrandt CA, Russell GB. Central application service for physician assistants ten-year data report, 2002 to 2011. *J Physician Assist Educ.* 2016;27(1):17-23.
9. McDaniel MJ, Ruback TJ. Physician assistant applicant pool: the first 50 years. *J Physician Assist Educ.* 2017;28(suppl 1):S18-S23.
10. Forster JG, Stilp C. A spatial analysis of physician assistant programs. *J Physician Assist Educ.* 2017;28(2):64-71.
11. Restuccia D, Taska B, Bittle S. *Different Skills, Different Gaps: Measuring and Closing the Skills Gap*. Boston, MA: Burning Glass Technologies; 2018. [https://www.burning-glass.com/wp-content/uploads/Skills\\_Gap\\_Different\\_Skills\\_Different\\_Gaps\\_FINAL.pdf](https://www.burning-glass.com/wp-content/uploads/Skills_Gap_Different_Skills_Different_Gaps_FINAL.pdf). Accessed February 1, 2019.
12. Morgan P, Leach B, Himmerick K, Everett C. Job openings for PAs by specialty. *JAAPA.* 2018;31(1):45-47.
13. Spero JC, Petiwala Z; Cecil G. Sheps Center for Health Services Research. The Physician Assistant Workforce In North Carolina. [https://www.shepscenter.unc.edu/workforce\\_product/the-physician-assistant-workforce-in-north-carolina/](https://www.shepscenter.unc.edu/workforce_product/the-physician-assistant-workforce-in-north-carolina/). Accessed February 1, 2019.
14. Morgan P, Himmerick KA, Leach B, Dieter P, Everett C. Scarcity of primary care positions may divert physician assistants into specialty practice. *Med Care Res Rev.* 2017;74(1):109-122.
15. Fraher EP, Morgan P, Johnson A. Specialty distribution of physician assistants and nurse practitioners in North Carolina. *JAAPA.* 2016;29(4):38-43.