

Outcomes of NC Medical School Graduates: How Many Stay in Practice in NC, in Primary Care, and in High Need Areas?

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North Carolina General Assembly

**Outcomes of NC Medical School Graduates:
How Many Stay in Practice in NC, in Primary Care, and in High Needs Areas?**

EXECUTIVE SUMMARY

In 1993, the General Assembly mandated an annual report on the progress of medical school graduates going into primary care. Since 1994, the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill (“Sheps Center”) and the NC Area Health Education Centers program (AHEC) have collaborated to produce this report which tracks the workforce outcomes of NC medical schools five years after graduation. As a result of the legislative mandate, NC is a national model for tracking medical student outcomes. While not required by the original legislation, the Sheps Center and NC AHEC have enhanced the annual report to address the state’s workforce needs and high-urgency workforce issues. As in prior years, this report tracks NC medical school graduate outcomes for physicians who practice in NC and in rural NC counties. This report also includes an analysis of the number of medical school graduates that practice in NC safety net settings¹ that deliver care to uninsured, Medicaid, and other vulnerable populations.

Historically, this report has examined NC medical school graduates at five years following graduation per the legislative mandate. However, this period is not ideal given the time required to complete residency (3-6 years). At five-years post-graduation from medical school, physicians in psychiatry, obstetrics & gynecology (ob/gyn), surgery, and medicine/pediatrics are just completing residency, or may be in fellowship/specialty training, and may not have settled in a permanent practice location. Thus, although not required by the legislature, this report also includes ten-year outcomes for the 2012 cohort. Also not required are Appendices describing actions taken by NC medical schools and others to increase the numbers of physicians and other providers providing primary care in rural areas of our state.

Analyses of the five-year outcomes of NC class of 2017 graduates and ten-year outcomes of NC class of 2012 graduates show:

- Of the 615 NC medical school graduates from the class of 2017, 86 (14%) were in practice or training in primary care in NC in 2022, and 8 (1.3%) are in primary care in a rural NC county.
- As in prior years, ECU retained the largest proportion of graduates in practice or training in NC after five years (42%), followed by UNC (35%), Wake Forest (30%), Campbell (28%), and Duke (23%).
- For the class of 2016, a greater percentage of public medical school graduates were practicing in primary care in-state five years after graduating (ECU: 24%, n=18; UNC: 19%, n=32), compared to private medical school graduates (Campbell: 14%, n=20; Wake Forest: 14%, n=16; Duke: 4.6%, n=5).
- Four graduates from the class of 2017 were in practice in safety net settings in NC in 2022, including three UNC graduates and one Wake Forest graduate.
- Two graduates from the class of 2012 were in practice in safety net settings in 2022, including one ECU graduate and one UNC graduate.
- Of the 442 NC medical school graduates from the class of 2012, 73 (17%) were practicing primary care in NC in 2022, 10 years post-graduation; 3 graduates (0.7%) were in rural primary care in NC.
- Eight 2012 graduates were in practice in general surgery in NC ten years after graduating.

¹ NC DHHS Office of Rural Health. Safety Net Sites website. Accessed February 20, 2023.
<https://www.ncdhhs.gov/divisions/office-rural-health/safety-net-resources/safety-net-sites>

BACKGROUND

In 1993, the North Carolina General Assembly expressed interest in expanding the pool of generalist physicians for the state. In N.C.S.L.1993-321, the General Assembly required each of the state's four medical schools to develop a plan to expand the percent of medical school graduates choosing residency positions in primary care. Primary care was defined as family practice, general internal medicine, general pediatric medicine, internal medicine-pediatrics, and obstetrics-gynecology. It set the goal for the East Carolina University (ECU) and UNC Schools of Medicine at 60% of graduates entering primary care. For the Wake Forest University and Duke University Schools of Medicine, it set the goal at 50%. Campbell University School of Osteopathic Medicine graduated its first class in 2017 and was therefore not included in these goals.

Since 1994, the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill ("Sheps Center") and the NC Area Health Education Centers program (AHEC) have collaborated to produce this report tracks the workforce outcomes for NC medical schools. As a result of the legislative mandate, NC is a national model for tracking medical student outcomes. Data from this report were featured in the New England Journal of Medicine as an example of how to track workforce outcomes in John Iglehart's 2018 article on "The challenging quest to improve rural ." ²

While not required by the original legislation, the Sheps Center and NC AHEC have enhanced the annual report to address the state's workforce needs and high-urgency workforce issues. As in prior years, this report tracks NC medical school graduate outcomes for physicians who practice in NC and in rural NC counties. This report also includes an analysis of the number of medical school graduates that practice in NC safety net settings ³ that deliver care to uninsured, Medicaid, and other vulnerable populations.

Historically, this report has examined NC medical school graduates at five years following graduation per the legislative mandate. However, this period is not ideal given the time required to complete residency (3-6 years). At five years post-graduation from medical school, physicians in psychiatry, obstetrics & gynecology (ob/gyn), surgery, and medicine/pediatrics are just completing residency, or may be in fellowship/specialty training, and may not have settled in a permanent practice location. This is typically the case for general surgeons, whose training period is five years, and for ob/gyns, psychiatrists and medicine/pediatrics residents who often do a fellowship after a four-year residency. Ten years following graduation from medical school is a more reasonable timeframe to track outcomes, as it allows for fellowship training following residency. Thus, although not required by the legislature, this report also includes ten-year outcomes for the 2012 cohort.

² Iglehart J. The challenging quest to improve rural health care. NEJM, 2018. 378(5):473-479.
<https://www.nejm.org/doi/full/10.1056/NEJMp1707176>

³ NC DHHS Office of Rural Health. Safety Net Sites website. Accessed February 20, 2023.
<https://www.ncdhhs.gov/divisions/office-rural-health/safety-net-resources/safety-net-sites>

DATA SOURCES AND METHODS

Data Sources

Data included in this report come from several sources:

- The North Carolina Medical Board's annual licensure files (NCMB), maintained by the NC Health Professions Data System
- GMETrack, the graduate medical education tracking file of the Association of American Medical Colleges (AAMC)
- Data from the alumni and student affairs offices at the Campbell University School of Osteopathic Medicine, the Duke University School of Medicine, the Brody School of Medicine at East Carolina University, the University of North Carolina at Chapel Hill School of Medicine, and the Wake Forest University School of Medicine
- The Federal Office of Management and Budget for population and core based statistical area data, which are used to determine which counties in NC are classified as metropolitan (urban) or non-metropolitan (rural). For this report, we used the March 2020 file in which 50 counties in North Carolina are rural (non-metropolitan).
- The NC Department of Health and Human Services (DHHS) list of safety net sites, updated December 1, 2020
- The 2019 vintage of the Area Deprivation Index produced by the University of Wisconsin Center for Health Disparities Research.

Campbell University School of Osteopathic Medicine (Campbell) is not mandated to provide data for this report, as the school did not exist when the 1993 legislation was passed. However, Campbell has provided initial match data for the last several years and now has its first five-year cohort reported in this report.

As in prior years, this report does not emphasize initial residency match data, as many physicians change residency specialties or locations over the course of their GME training. Outcomes are better measured after graduation from residency.

Methods

This report differs from previous reports in using the NCMB's licensure data as the primary data source, and only using GMETrack data to verify the NCMB data. The reasons for this change in methodology are twofold. One is that the AAMC were unable to provide data on 2017 Campbell graduates under the current data use agreement. The other reason is that 2022 GMETrack data are not available until later this year, meaning that we cannot use the GME Track data to determine the status and location of graduates who are still in training in 2022.

As a result, this report relies on the NCMB's licensure file to determine primary practice location and area of practice, as in previous reports, as well as medical school and graduation year, data which previously came from the GMETrack file. Where possible, data from GMETrack were still matched with the NCMB annual licensure file on variables like name, date of birth, and birth city to confirm and check the NCMB data. In only two instances across both cohorts, did the GMETrack data contain graduates who were not in the NCMB data for the cohort. Further analyses clarified that these individuals were present in the licensure file, but had entered an incorrect graduate year. Conversely, several graduates in each cohort were found in the NCMB data who did not initially match to graduates in the GMETrack data, usually because of

combinations of data entry errors (e.g., transposed birth dates) and name changes. These data validation analyses suggest that the change in methodology should not affect the outcomes reported.

This report uses the reports received directly from each medical school for the number of graduates in each cohort. Previous reports relied on the GMETrack data for these values, but as Campbell is not yet included in the data use agreement, we used the data we already have for each institution. Small variations exist between the data sources, as can be seen in **Table 1**.

Table 1: Comparison of the Number of Medical School Graduates Reported for 2017 By Each School and in the AAMC/GMETrack Data

School	2017 Grads from School	2017 Grads from AAMC
Campbell	147	N/A
Duke	108	105
ECU	74	78
UNC-CH	171	175
Wake Forest	115	113

Once the matching and checking were complete, we produced descriptive statistics to determine where physicians were practicing and in which specialties.

For safety net provider information, we geocoded both the North Carolina Department of Health and Human Services safety net site list and the practice addresses in the NCMB file for each cohort. We then intersected the geocoded datasets to find potential matches between providers and sites. Potential matches were manually checked for accuracy with many false positives being discarded. Safety net providers are defined as facilities that provide a significant level of and other health-related services to uninsured, Medicaid, and other vulnerable populations.

Data Limitations Starting in 2020

In prior iterations of this report, before 2020, we have reported the number and percent of NC medical school graduates in training or practice in primary care anywhere in the United States. These findings were possible because the AAMC was able to match their data on medical school graduates to the AMA physician Masterfile data on physician practice locations and specialties across the U.S. However, in 2020, the AAMC and AMA legal teams renegotiated their data use agreement for the AMA Masterfile. Per the terms of the new agreement, AAMC is no longer able to match and share AMA Masterfile data with the Sheps Center. In the past, we have used AMA data to identify physicians who had died or were no longer in practice. In addition, we compared names of physicians who practiced in NC per AMA data with the NCMB physician roster, to determine whether we were missing NC physicians due to name changes. In both cases, the corrections were small—but we were unable to make similar corrections for the graduating cohorts in this report. Our match rates for the cohorts in this report were in line with prior years' match rates, but it is possible that we are missing a few physicians that we would have been able to identify historically.

FINDINGS

Class of 2017 Outcomes: Retention in Primary Care

Figure 1 shows the aggregate outcomes of the 2017 North Carolina medical graduates regarding primary care. Per the 1993 legislation mandating this analysis, these primary care specialties include family medicine, general internal medicine, general pediatrics, obstetrics & gynecology, and internal medicine-pediatrics. However, internal medicine-pediatrics is not reported as an area of practice by the NCMB. However, physicians trained in internal medicine-pediatrics typically report either pediatrics or general internal medicine as an area of practice and are therefore still captured as primary care physicians.

Figure 1: Retention of 2017 NC Medical Graduates in NC Rural Primary Care Five Years After Graduating

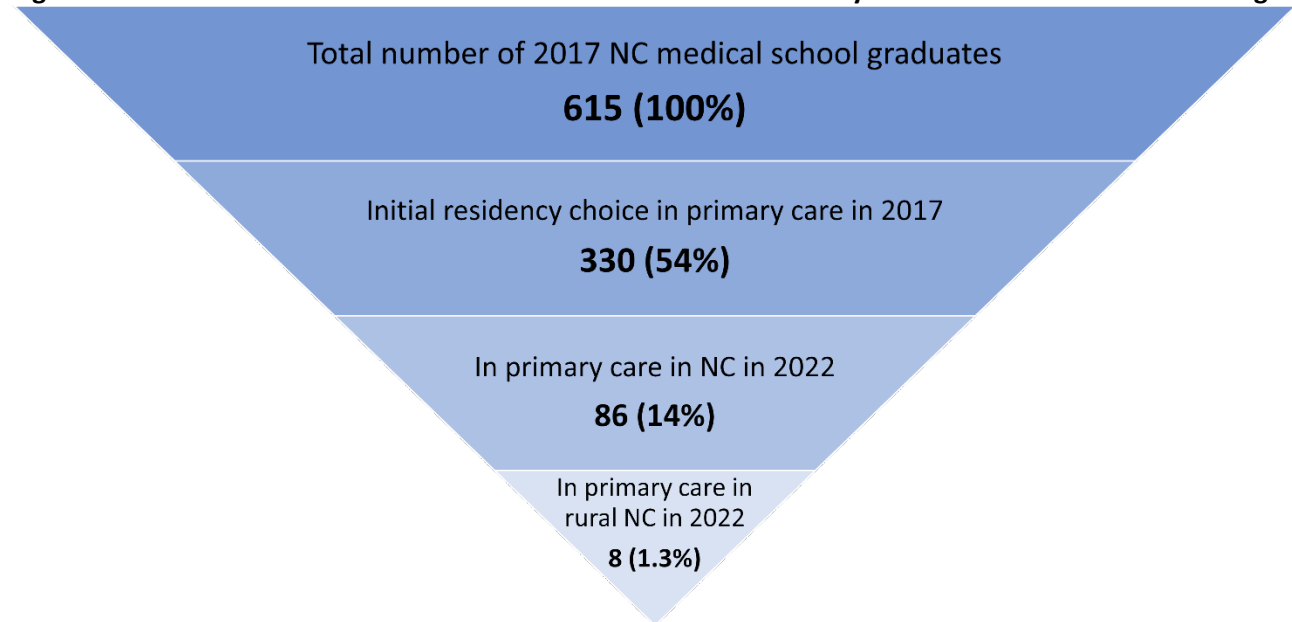


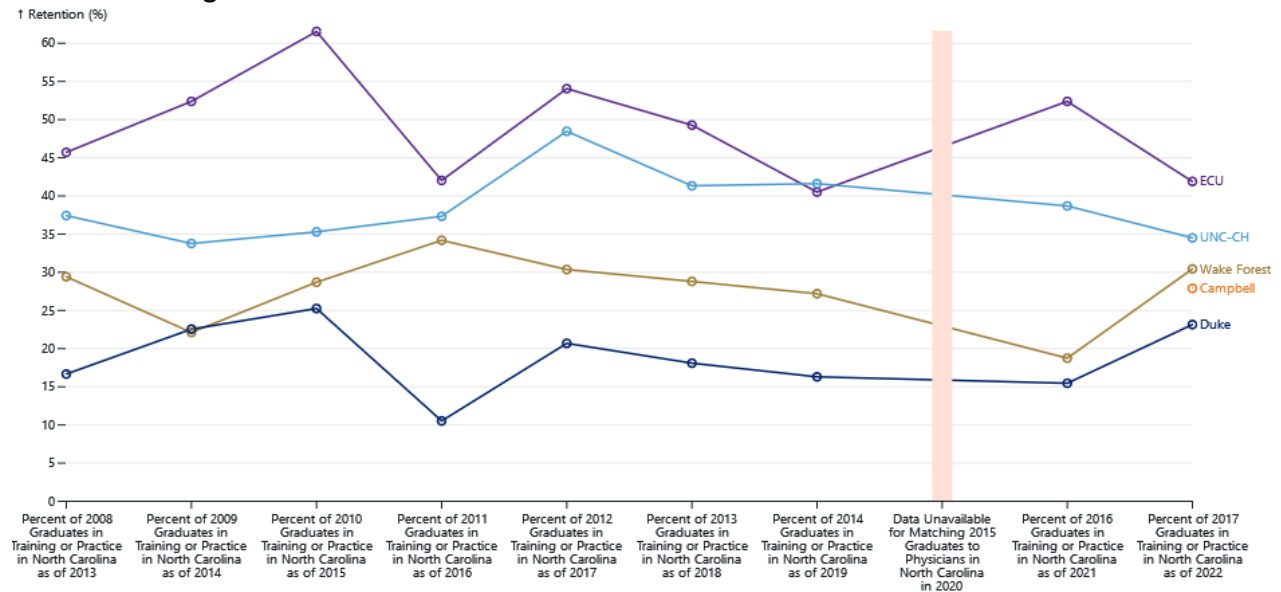
Figure 1: Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges, the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. "Core Based Statistical Area" (CBSA) is the OMB's collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

Out of the 615 medical school graduates in 2017, 86 (14%) were in training or practice in primary care in NC in 2022 (**Figure 1**). For purposes of comparison, between 12% and 17% of the most recent graduating cohorts (the classes of 2010-2016), were in training or practice in primary care in NC five years after graduating. A little over one percent (n=8) of the 2017 cohort was in primary care in a rural NC county. Typically, between 1% and 3% of NC medical school graduates tend to practice in primary care in rural NC five years after graduating.

Retention of Graduates in North Carolina and in Rural Counties

A greater percentage of graduates from the state's public medical schools are retained in NC five years after graduating, compared to the state's private medical schools (**Figure 2**). ECU tends to retain the greatest percentage of its graduates in state five years post-graduation, followed by UNC, Campbell, Wake Forest, and Duke.

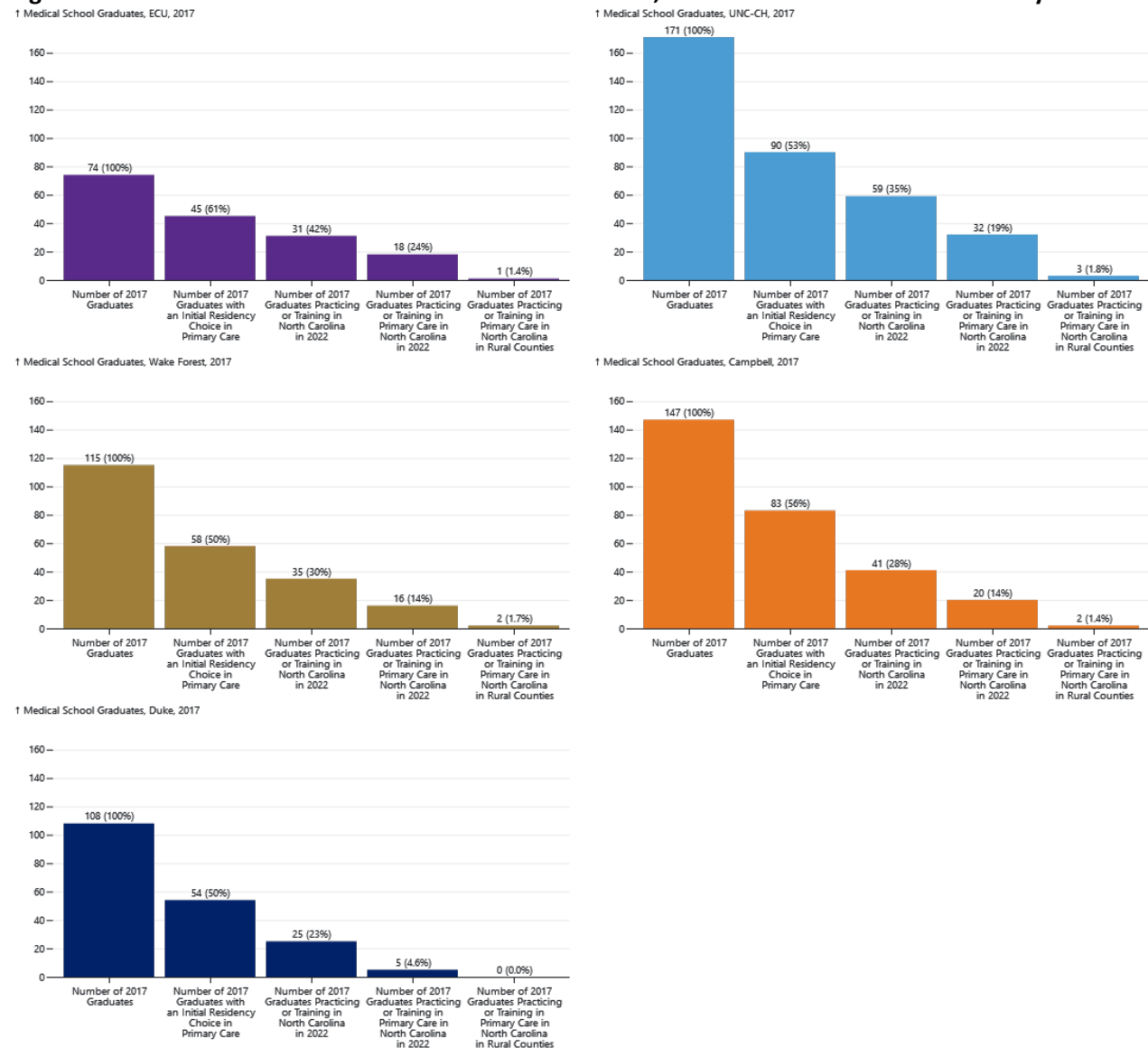
Figure 2: Percent of NC Medical School Graduates in Training or Practice in North Carolina Five Years After Graduating



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools.

Figure 3 shows the primary care practice or training outcomes for each school's 2017 graduates. Each individual figure is a version of **Figure 1** for each school's graduates. Very few graduates from any school are practicing primary care in a rural area. However, ECU retained 24% of its 2017 graduating class in North Carolina practicing or training in primary care. UNC retained 19% of its graduates in primary care, representing 32 physicians, making UNC the medical school contributing the largest number of medical school graduates retained in the state's primary care workforce.

Figure 3: Workforce Outcomes Five Years after Graduation, 2017 Medical School Graduates by School



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. “Core Based Statistical Area” (CBSA) is the OMB’s collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

Practice in Safety Net Settings and Most Economically Distressed Neighborhoods

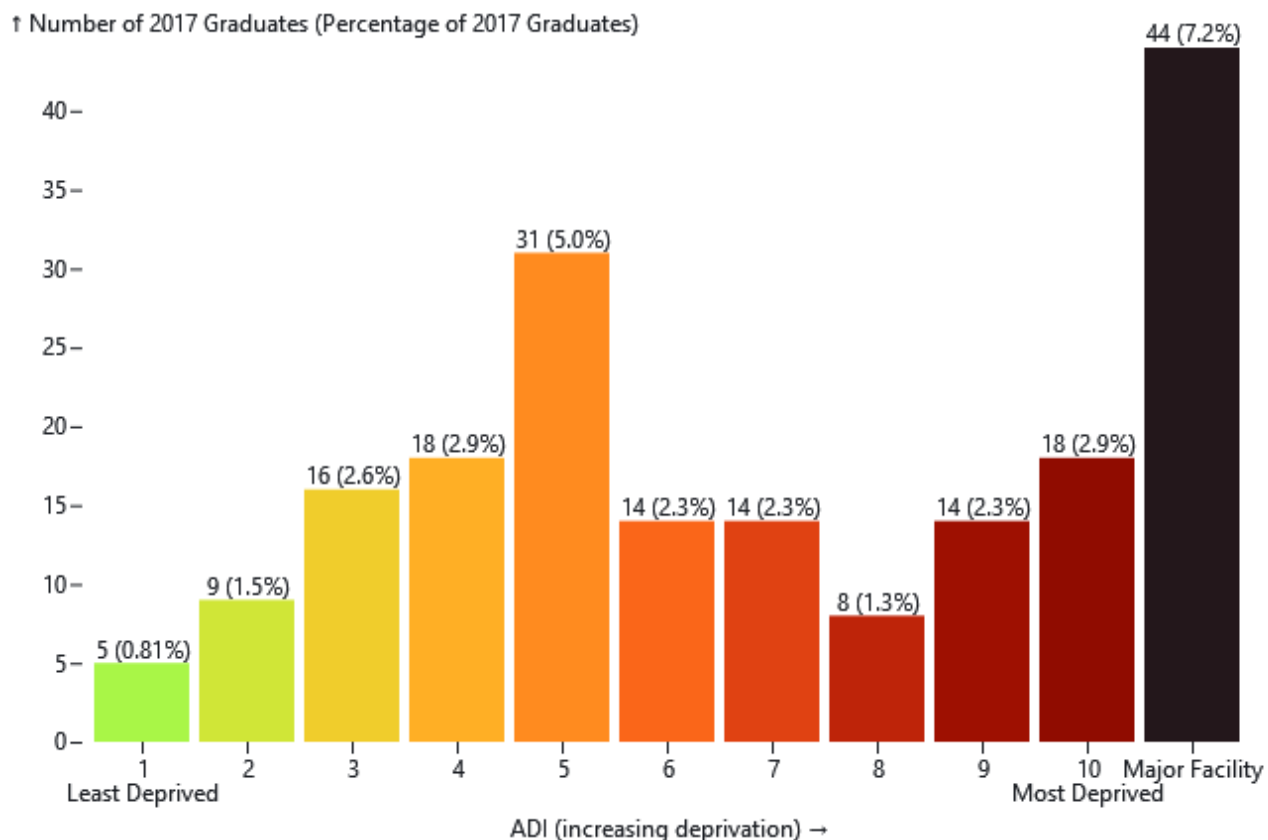
Safety net providers are defined as facilities that provide a significant level of and other health-related services to uninsured, Medicaid, and other vulnerable populations. Four graduates from the class of 2017 were in practice in safety net settings in NC in 2022, including three UNC graduates and one Wake Forest graduate. All four sites were Federally Qualified Health Centers (FQHCs).

Figure 4 compares the Area Deprivation Index (ADI) of the neighborhoods where physicians who were retained in North Carolina five years after graduation report their primary practice location. The ADI is based on factors related to income, education, employment, and housing quality in a census block group, which is the geographic equivalent of a neighborhood. Low scores indicate low levels of economic distress, and high scores indicate high levels of economic distress. Five percent (32/615) of the class of 2017 worked in a practice location in the top quintile (ADI 9 and 10) of economically distressed neighborhoods five years after graduation.

ADI scores are not assigned for census block groups dominated by large facilities, such as hospitals. ADI scores were not available for almost a quarter (23%, n=44/191) of the graduating class of 2017 who were still in North Carolina because their primary practice location was a large facility, most likely a hospital, which makes sense as many of these physicians are likely still in training.

Figures 4, 5, and 6 include only individuals who were active and licensed in North Carolina in 2022, as this report relies on the NCMB data for practice outcomes. The 424 (69%) graduates who were practicing or training in another state, or who were not active in 2022 are omitted. The values are calculated as a percentage of the total graduating class.

Figure 4: Neighborhood Disadvantage Status in 2022 of Physicians Retained in North Carolina Who Graduated from a NC Medical School in 2017



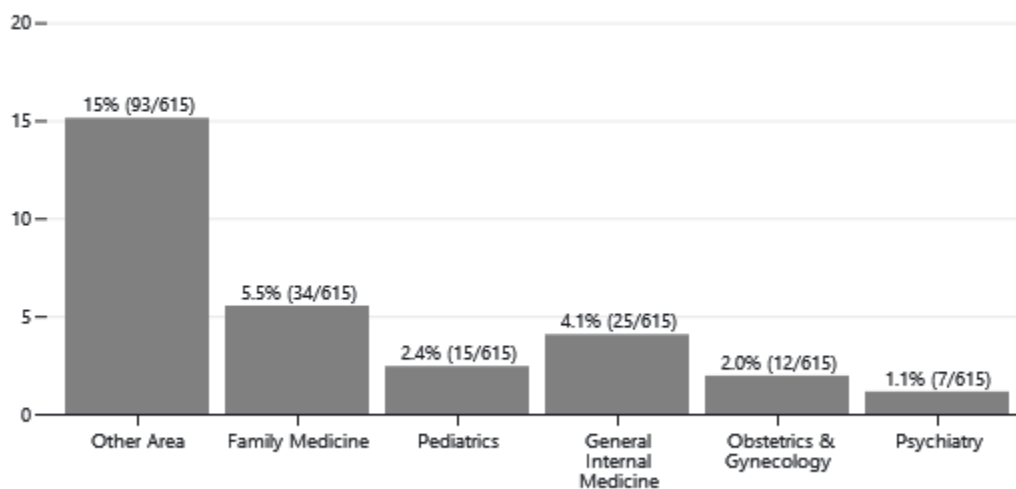
Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. ADI Score obtained from the University of

Retention in Primary Care and Psychiatry Areas of Practice

Figure 5 displays the outcomes for 2017 graduates by area of practice. Physicians report a primary area of practice to the NCMB each year of licensure. A physician's primary area of practice can differ from their training specialty.

Figure 5: Percentage of 2017 Medical School Graduates Practicing or Training in Primary Care in North Carolina by Area of Practice in 2022, North Carolina Overall and Rural

† Percentage of 2017 North Carolina Medical School Graduates by Area of Practice in North Carolina in 2022



† Percentage of 2017 North Carolina Medical School Graduates by Area of Practice in North Carolina in Rural Counties in 2022

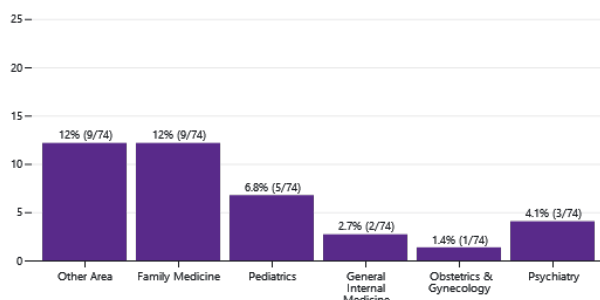


Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. “Core Based Statistical Area” (CBSA) is the OMB’s collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

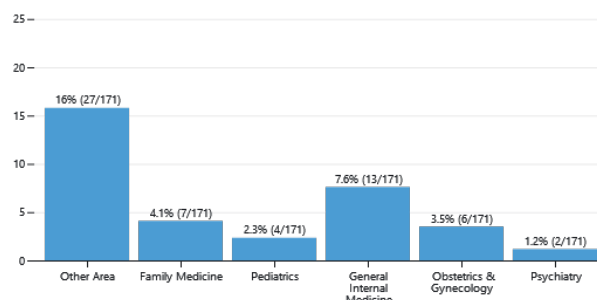
Figure 6 shows the same set of practice outcomes but for each school individually.

Figure 6: Percentage of 2017 Medical School Graduates Practicing or Training in Primary Care in North Carolina by Medical School and Area of Practice in 2022.

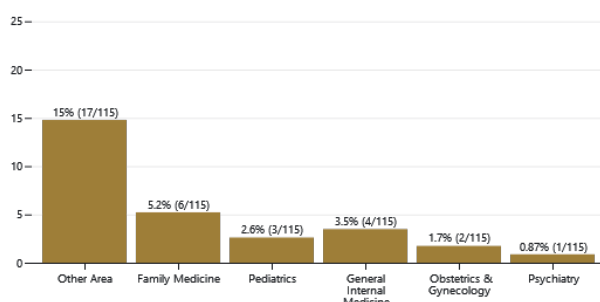
1 Percentage of ECU's 2017 Medical School Graduates by Area of Practice in North Carolina in 2022



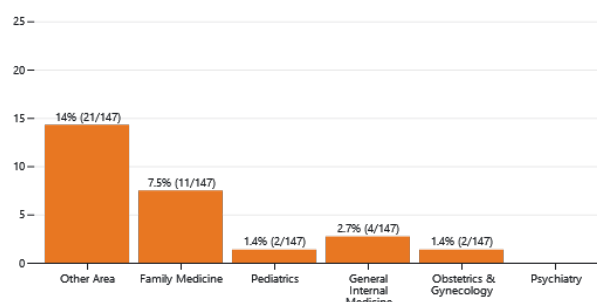
1 Percentage of UNC-CH's 2017 Medical School Graduates by Area of Practice in North Carolina in 2022



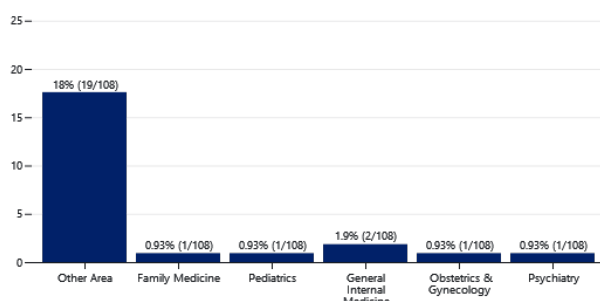
1 Percentage of Wake Forest's 2017 Medical School Graduates by Area of Practice in North Carolina in 2022



1 Percentage of Campbell's 2017 Medical School Graduates by Area of Practice in North Carolina in 2022



1 Percentage of Duke's 2017 Medical School Graduates by Area of Practice in North Carolina in 2022



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022.

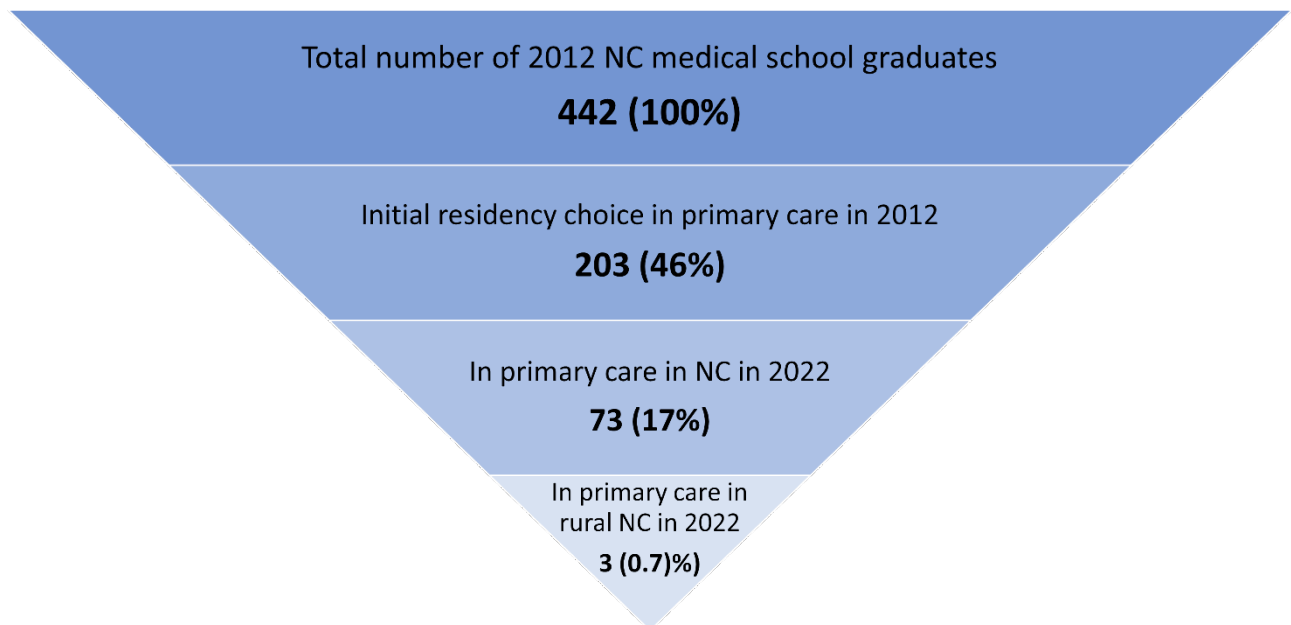
Psychiatry includes physicians who report practicing in the following specialties: Psychiatry, Child and Adolescent Psychiatry, Psychoanalysis, Forensic Psychiatry, Psychosomatic Medicine, Psychiatry/Geriatric, Family Medicine-Psychiatry, Internal Medicine-Psychiatry, and Pediatrics-Psychiatry.

Class of 2012 Outcomes

We also tracked 2012 graduates of NC medical schools to determine where graduates were ten years following graduation from medical school. As noted previously, ten years post-graduation from medical school allows time for physicians to complete residency and fellowship training.

Figure 7 illustrates the aggregate outcome of North Carolina’s medical school graduates ten years after graduation in 2012.

Figure 7: Retention of 2012 NC Medical Graduates in NC Rural Primary Care Ten Years After Graduating

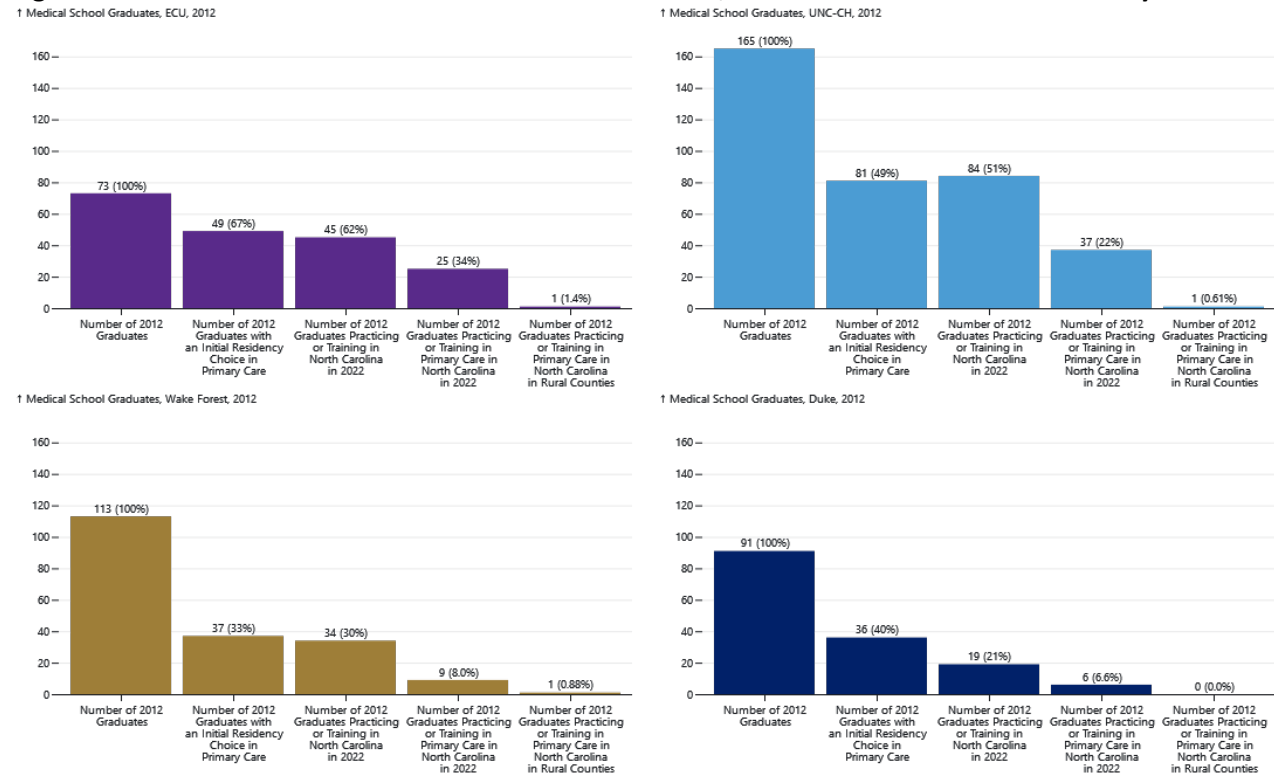


Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges, and the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. “Core Based Statistical Area” (CBSA) is the OMB’s collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

Retention of Graduates in North Carolina and in Rural Counties

The retention of primary care providers for each school's 2012 graduates is illustrated in **Figure 8**.

Figure 8: Workforce Outcomes Ten Years after Graduation, 2012 Medical School Graduates by School



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. "Core Based Statistical Area" (CBSA) is the OMB's collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

Practice in Safety Net Settings and Most Economically Distressed Neighborhoods

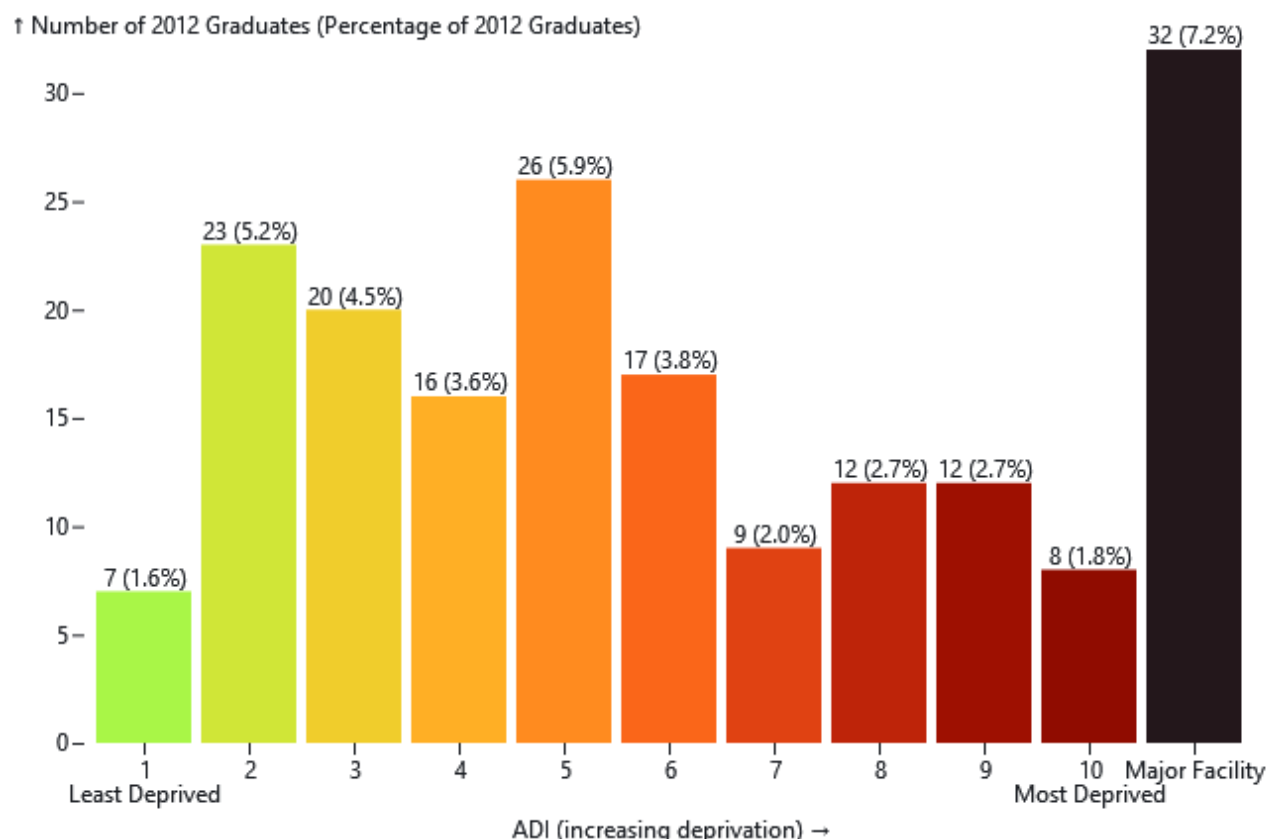
Two graduates from the class of 2012 were in practice in safety net settings in 2022, including one ECU graduate and one UNC graduate. One site was an FQHC and the other was a small rural hospital.

Figure 9 compares the Area Deprivation Index (ADI) of the neighborhoods in North Carolina where physicians from the class of 2012 report their primary practice location in 2022. Nearly five percent (n=20/442) of the class of 2011 worked in a practice location in the top quintile of economically distressed neighborhoods ten years after graduation. As with the 2017 cohort, note the large proportion of graduates for whom an ADI score is not available because their practice location is a major facility. Of course, depending on the location and type of facility, many of these graduates will also be serving many economically distressed patients.

Figures 9, 10, and 11 include only individuals who were active and licensed in North Carolina in 2022, as this report relies on the NCMB data for practice outcomes. The 260 (59%) graduates who were practicing or

training in another state, or who were not active in 2022 are omitted. The values are calculated as a percentage of the total graduating class.

Figure 9: Neighborhood Disadvantage Status in 2022 of Physicians Retained in North Carolina Who Graduated from a NC Medical School in 2012



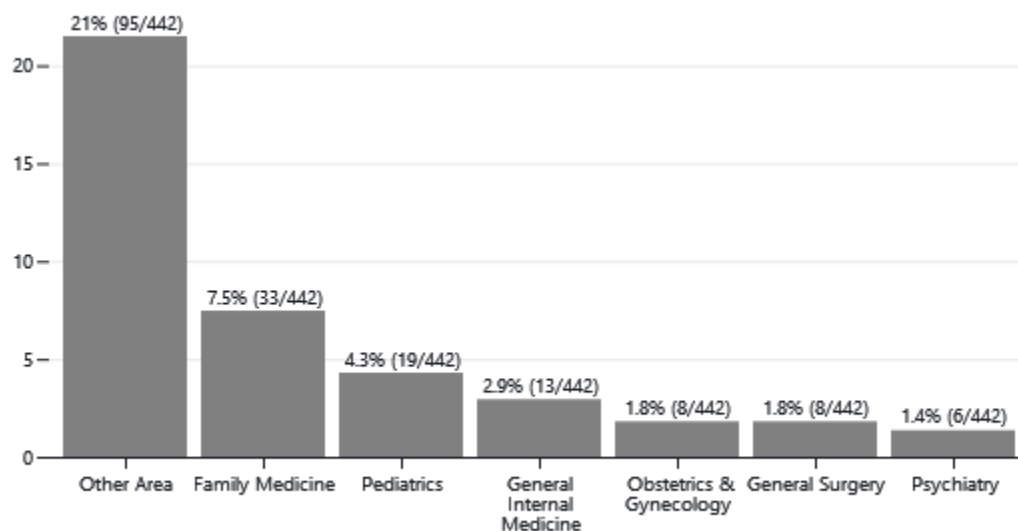
Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. ADI Score obtained from the University of Wisconsin School of Medicine Public Health. 2019 Area Deprivation Index v3.1 Downloaded from <https://www.neighborhoodatlas.medicine.wisc.edu/> January 11, 2022.

Retention in Primary Care, General Surgery, and Psychiatry Areas of Practice

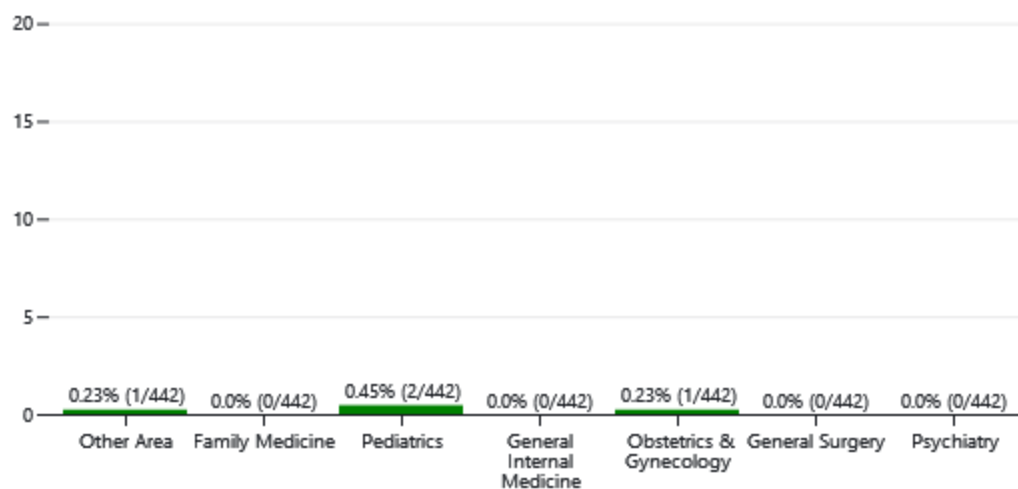
Figure 10 shows outcomes for 2012 graduates who are in North Carolina and have a primary care area of practice, or who are practicing psychiatry or general surgery. The outcomes for general surgery are reported here for the 2012 cohort, but not for the 2017 cohort, because general surgery residencies typically last five years, and many general surgeons complete a sub-specialty fellowship afterwards. For this reason, reporting on general surgery practice outcomes at five-years post-graduation may be misleading.

Figure 10: Percentage of 2012 Medical School Graduates Practicing or Training in Primary Care in North Carolina by Area of Practice in 2022, North Carolina Overall and Rural

† Percentage of 2012 North Carolina Medical School Graduates
by Area of Practice in North Carolina in 2022



† Percentage of 2012 North Carolina Medical School Graduates
by Area of Practice in North Carolina in Rural Counties in 2022

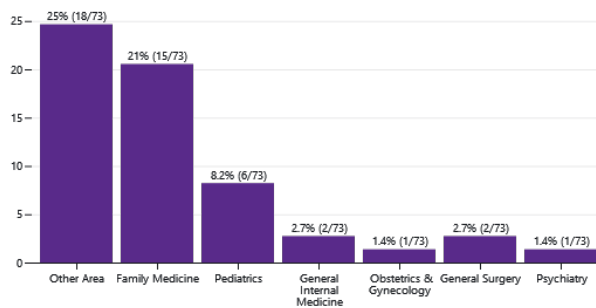


Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022. Rural source: US Census Bureau and Office of Management and Budget, March 2020. “Core Based Statistical Area” (CBSA) is the OMB’s collective term for Metropolitan and Micropolitan Statistical areas. Here, nonmetropolitan counties include micropolitan and counties outside of CBSAs.

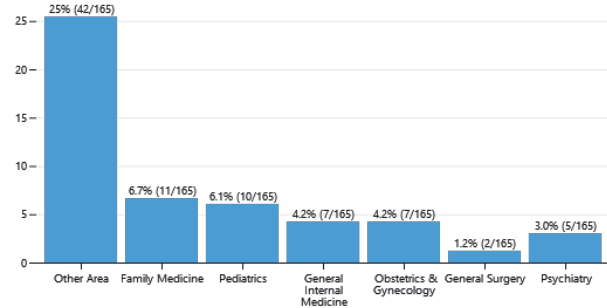
Figure 11 shows the same set of area of practice outcomes but for each school individually.

Figure 11: Percentage of 2012 Medical School Graduates Practicing or Training in Primary Care in North Carolina by Medical School and Area of Practice in 2022.

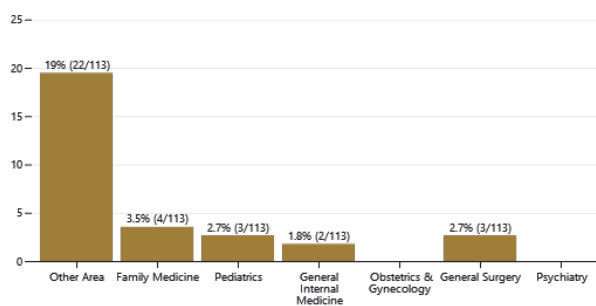
† Percentage of ECU's 2012 Medical School Graduates by Area of Practice in North Carolina in 2022



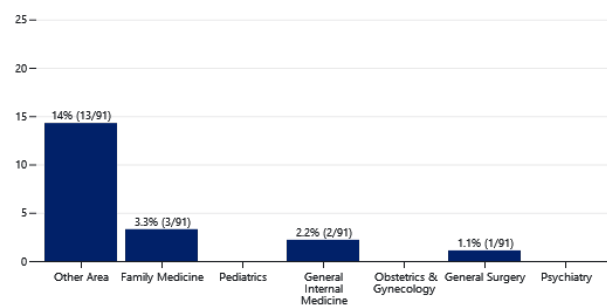
† Percentage of UNC-CH's 2012 Medical School Graduates by Area of Practice in North Carolina in 2022



† Percentage of Wake Forest's 2012 Medical School Graduates by Area of Practice in North Carolina in 2022



† Percentage of Duke's 2012 Medical School Graduates by Area of Practice in North Carolina in 2022



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges and the NC Medical Board, and the respective medical schools, 2022.

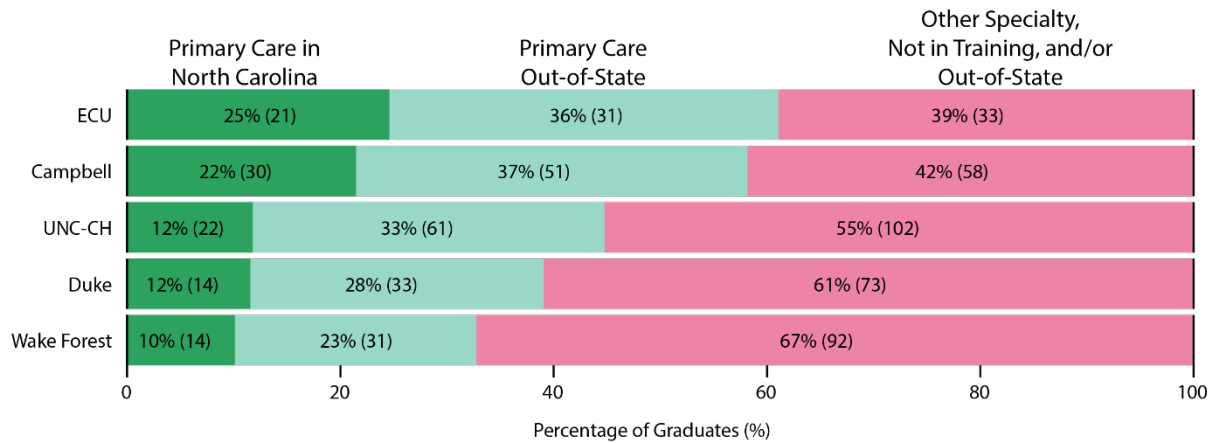
General surgery includes physicians report practicing in the following specialties: General Surgery, Abdominal Surgery, Colon & Rectal Surgery, Critical Care Surgery, Head and Neck Surgery, Oncology Surgery, Pediatric Surgery, Transplant Surgery, Trauma Surgery, or Vascular Surgery.

Initial Match Data: 2022 Graduating Cohort

As mentioned earlier, this report does not emphasize initial match data from the NC medical schools. Residents sometimes switch specialties or residency programs throughout the course of their training, and many subspecialize. Matches to “primary care” specialties (Family Medicine, Internal Medicine, Pediatrics, Internal Medicine-Pediatrics, and Obstetrics & Gynecology) are inflated compared to the number of graduates eventually expected to practice in those fields. We also track two other needed specialties in NC: psychiatry and general surgery. Prior trends indicate that many NC graduates, including most of those who match to Internal Medicine and General Surgery, will go on to complete fellowship training and eventually practice in a sub-specialty field. Family Medicine is an exception to this trend.

Figure 12 shows the proportion of each school’s 2022 graduates who had an initial match to a primary care residency in North Carolina or in another state. ECU matched the greatest proportion to primary care residencies in North Carolina (25%, n = 21) and overall (61%, n= 52), but Campbell matched a greater number of graduates to primary care residencies both in North Carolina (30) and overall (81).

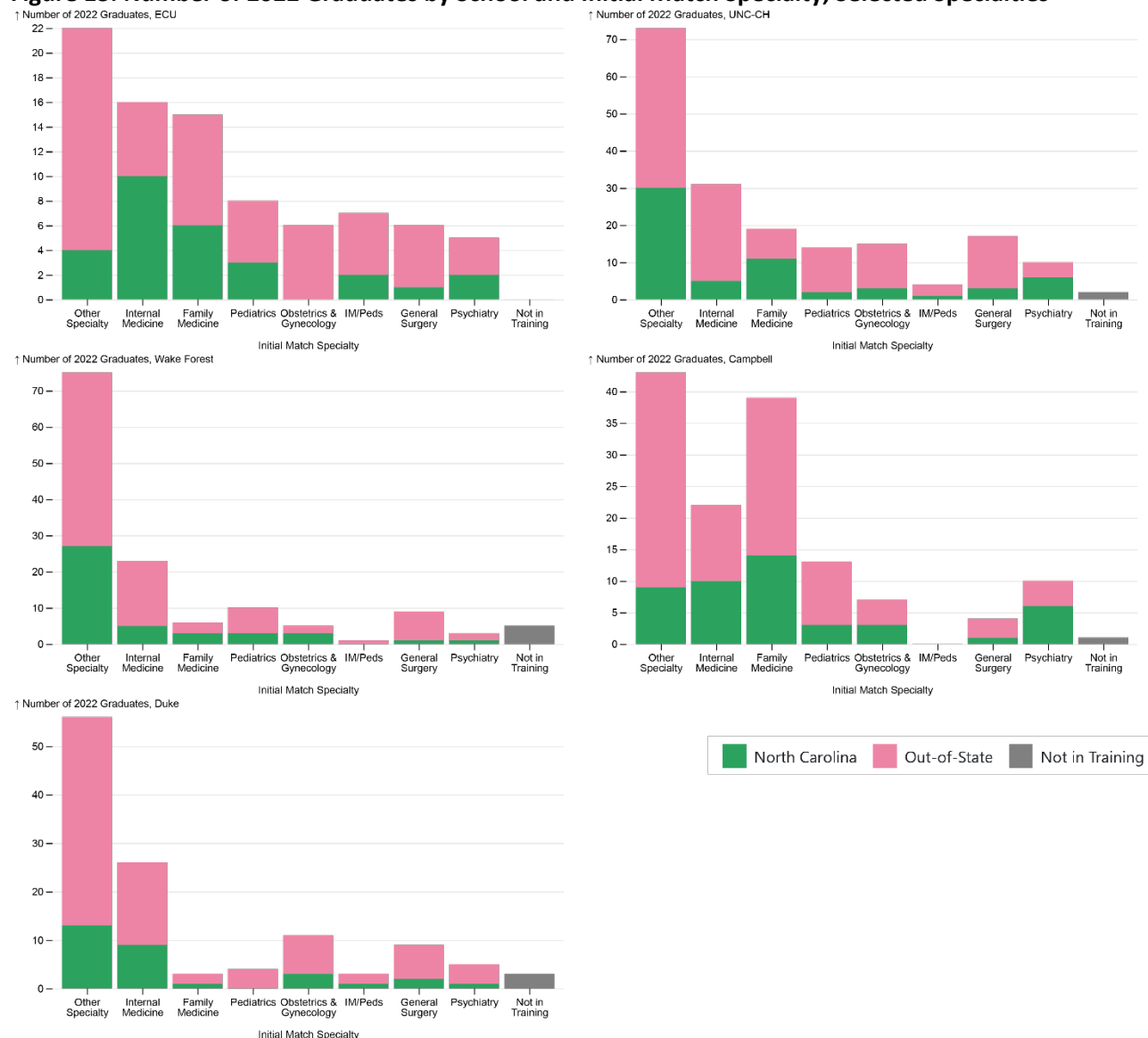
Figure 12: Initial Matches of 2022 Graduates for Primary Care by School



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: the respective medical schools, 2022.

Figure 13 displays the number of 2022 graduates who matched to primary care specialties, general surgery, or psychiatry. (Note that the axes are scaled to each school's number of graduates.)

Figure 13: Number of 2022 Graduates by School and Initial Match Specialty, Selected Specialties



Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: the respective medical schools, 2022.

DISCUSSION

While most people interact with the health system at some point in their lives and have a general understanding of the work physicians do, the majority are unaware of the specifics related to physician training—for example, the difference between a medical student and a resident. Legislators⁴ and other influential stakeholders, many of whom may be able to directly influence the health system, often come from career paths outside of health care. When concerns about the availability of physicians to meet the demand for health care arise, expanding medical education is a logical first impulse for those unfamiliar with physician training pathways. Medical school is one of multiple points along a physician's career trajectory where stakeholders can intervene to encourage practice in needed specialties and geographies.

⁴ Spero JC, Fraher EP, Ricketts TC, Rockey PH. GME in the United States: A Review of State Initiatives. Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill. September 2013.

The newer analyses tell an important and previously untold story about the contribution of NC medical schools to the NC physician workforce. Overall, again we see a small percentage of the 2012 and 2017 graduating cohorts working in safety net settings. To address state workforce needs, we need to think broadly about both where those populations are geographically located—not all of them are in rural areas—and we also need to think broadly about which types of physicians serve those populations, as many work in specialties other than primary care.

While this report tracks outcomes from NC medical schools, it still does not track outcomes of NC residency programs, and there is no legislative mandate to track NC residency program outcomes. While some NC medical school graduates also complete an NC residency, many residents in NC residency programs completed medical school outside of North Carolina. We continue to think it would be valuable to track the outcomes of NC residency programs.

Tracking NC residency program outcomes would provide information to make decisions about how to target state funds most effectively. The Sheps Center, in collaboration with AHEC, is a national leader in tracking the workforce outcomes for medical schools and GME programs at the program level. In short, there are resources within the state that can accomplish this work if legislation is passed that requires a study of NC residency outcomes.

A key driver of retention of primary care physicians in North Carolina is the availability of community based primary care residencies in the state. Medical students must go through at least three years of training before being able to practice independently, and many physicians practice close to their residencies for the remainder of their careers.⁵⁶⁷ AHEC primary care residencies have a solid track record of keeping physicians in the state. Data from the American Medical Association physician master file demonstrate that 53% of active physicians who completed an NC AHEC residency between 1997-2017 remained in practice in NC, compared to 41% who completed a non-AHEC residency.⁸]

In addition to residencies, other intervention points exist in the training of physicians that could further support the selection of primary care practice in a distressed community. Attachment B of this Report describes a Pathway to help admit students from those communities, deploy a focused curriculum with community health service tracks, provide rotations in Select Teaching Practices focused on and supported to provide high-quality primary care experiences, facilitate matching into a primary care residency training program, and provide Fellowships to support new graduates when the practices in those communities. Attachment C shows North Carolina counties with less than the 1,500:1 primary care to population ratio recommended by Healthy North Carolina 2030. This Pathway could target those communities. This pathway is more likely to succeed if accompanied by targeted scholarships with the goal of these students have no debt upon graduation and it must be observed that increased reimbursement rates for primary care would eliminate a substantial financial barrier to medical students choosing to practice primary care.

⁵ Dorner FH, Burr RM, Tucker SL. The geographic relationships between physicians' residency sites and the locations of their first practices. *Acad Med.* 1991;66(9):540–4

⁶ Seifer SD, Vranizan K, Grumbach K. Graduate medical education and physician practice location. *JAMA.* 1995;274(9):685–91.

⁷ Fagan EB, et. al. Family medicine graduate proximity to their site of training: policy options for improving the distribution of primary care access. *Fam Med.* 2015;47(2):124-30.

⁸ Spero J. Compared to Non-AHEC Residents, a Higher Percentage of NC AHEC Residents are Practicing in NC. Sheps Health Workforce NC Blog, 18 March 2019. Accessed 10/8/19 at: https://nhealthworkforce.unc.edu/ahec_resident_outcomes_2017/

Notes

Limitations: The information used in this analysis to determine a medical graduate's initial specialty choice for residency and to determine retention in primary care comes from different sources. When calculating retention in primary care five years after graduation, data directly from each medical school are used to determine initial choice of residency. When collecting this data, we do not differentiate between internal medicine and medicine-preliminary, so the data may appear to be inflated for initial residency choice of primary care.

Beginning with the class of 2014, Sheps no longer received AMA Masterfile data matched to AAMC GMETrack data as in prior years. This change was the result of a renegotiated data use agreement between AMA and AAMC that took effect in 2020. Without the AMA Masterfile data, it is not possible to track workforce outcomes for NC medical school graduates in practice or training outside of NC. In addition, Sheps no longer has access to variables from the AMA Masterfile indicating whether a physician is dead or has left active practice.

Beginning with the class of 2006, all MDs graduating in a year, regardless of month, are counted with that year's graduates.

Primary Care Coding: Primary care coding was revised in 2014 to reflect more accurate aggregation of AMA minor codes to AMA major codes. Primary care residency specialties are defined by legislation passed by the NC General Assembly in 1993 (Senate Bill 27/ House Bill 729) and include family medicine, general internal medicine, general pediatric medicine, internal medicine-pediatrics, and obstetrics and gynecology. Specialties included under the definitions of current practice specialties for primary care, psychiatry, and general surgery were revised in 2014 and reviewed by practicing clinicians for accuracy.

"Primary Care" is defined for both initial specialty of residency training (identified using match data provided by each medical school) and for current practice or training area (identified using NCMB data for physicians in NC).

More specialties are included under the definition of "primary care" for current practice or training area than for specialty of residency training because physicians may specialize within their primary care area of practice following training.

Appendix A

Self-reported responses to requests for information about what each medical school is doing to try to increase the number of students who will practice primary care in rural North Carolina.

Campbell University School of Osteopathic Medicine

The mission of the Campbell University School of Osteopathic Medicine (CUSOM) is to educate and prepare community-based osteopathic physicians in a Christian environment to care for the rural and underserved populations in North Carolina, the Southeastern United States, and the nation. The focus on community-based care is significant as it recognizes the unique health care needs of rural and underserved populations. The preparation to enter those environments is unique and has been a core focus for our school. The Christian environment that we foster has played a significant role in shaping the values and beliefs of our graduates and shaping the way they approach their work as physicians. By instilling a strong sense of compassion, empathy, and ethical principles in its graduates, CUSOM is helping to ensure that they are well-prepared to provide high-quality, patient-centered care that is consistent with institutional values.

Campbell University School of Medicine opened its doors to its inaugural class of 162 students in 2013. Campbell University also became the first College of Osteopathic Medicine to serve as an ACGME sponsoring institution for Graduate Medical Education. As a sponsoring institution, Campbell University has provided support and resources to its affiliated residency programs ensuring that they meet the standards and requirements set forth by the ACGME. 15 osteopathic programs successfully transitioned to ACGME accreditation under Campbell University's Sponsoring Institution. Campbell University now serves as the Sponsor for 24 ACGME accredited programs with 2 additional pending applications in partnership with 6 hospitals and systems.

Medical Student Impacts

The graduating class of 2017 (our inaugural class) would have completed 3 year residencies in 2020, 4 year residencies in 2021, and 5 year residency programs in 2022.

The graduating class of 2018 would have completed 3 year residencies in 2021, 4 year residencies in 2022, and 5 year residency programs in 2023.

Neither class is, likely, fully represented in the data collected by AAMC or UNC Sheps Center for Health Services Research until the 2023 and 2024 information is released.

Of the data that we have on the first two classes (2017 and 2018), 216 of our graduates are currently in practice with 65 of those graduates (30%) being located in the state of North Carolina. 41 are still in fellowship and 42 are still in a primary training program. The first two classes show 48% of our graduates being in the fields of Family Medicine or Internal Medicine and an additional 22% being in NC specific areas of need defined as General Surgery, Obstetrics, Psychiatry, and Pediatrics.

Overall, these trends suggest that CUSOM is making a positive contribution to the development of the physician workforce in North Carolina and that its graduates are well-prepared to enter the workforce and provide high-quality care to patients. It's great to see that a significant number of the CUSOM graduates from the classes of 2017 and 2018 have entered practice or fellowship programs, with a substantial number remaining in North Carolina. The strong commitment to primary care fields and

specific areas of need is critical to positively impacting our state's ability to provide comprehensive, patient-centered care.

Graduate Medical Education Impacts

Campbell University had a goal of having a net neutral impact on the number of graduate medical education positions by creating enough positions that we would not graduate more medical students than the graduate medical education positions we created. To date, Campbell University has started 24 residency and fellowship programs in North and South Carolina with 2 pending applications. Those programs contain 427 GME positions with 157 of those being PGY-1 positions. We have residency programs in Family Medicine (x4), Internal Medicine (x3), Emergency Medicine (x2), General Surgery, Psychiatry, OBGYN, Dermatology, Transitional Year (x5) and ONMM. We have fellowship programs in Sports Medicine (x2), Child and Adolescent Psychiatry, Cardiology, and Moh's Micrographic Surgery.

Our first resident started in 2014. Since that time, Campbell University Graduate Medical Education programs have placed 84 providers into active clinical practice with 32 of those remaining in North Carolina (38%) and 19/32 (59%) being in the fields of Family Medicine or Internal Medicine. Primary care is a critical component of health care, as it provides the foundation for patient care and helps to manage the overall health and well-being of individuals and populations. A solid primary care workforce is essential to ensuring that patients have access to comprehensive, high-quality care and that health care systems can effectively address the health needs of their communities.

Summary

Campbell University Graduates are now currently active in 32 of North Carolina's 100 counties. The full impact of Campbell University graduates to the physician workforce is still emerging. 2020 saw the inaugural class graduate from 3-year primary care programs. 2022 saw the first graduates in Surgery and Psychiatry from Campbell University GME programs. Combining the efforts of our medical school and our graduate medical education programs, Campbell University has placed 99 new providers in 32 North Carolina counties as of February 2023.

Duke University School of Medicine

Duke provides medical student clinical rotations. The goals of this program are for students to learn clinical skills in the context of a local community and to appreciate the effects of culture and context on health and health behaviors. 20 Duke students each year rotate through clinics in Roxboro, Henderson, Oxford, Mebane, Fremont, evaluating and following patients in these rural communities.

Duke also offers the Primary Care Leadership Track (PCLT), the goal of which is to create change agents for the system through primary care. The 4-year program offers leadership training, a longitudinal-integrated 2nd year clerkship, which includes following pregnant mothers and delivering their babies, time for service with a community agency, and 3rd year research in community-engaged population health.

PCLT graduates have chosen primary care residencies: family medicine (outpatient adults, children, and prenatal care), general internal medicine (adults only), primary care pediatrics (children only), pediatrics/psychiatry, medicine/psychiatry, and Obstetrics/gynecology

ECU Brody School of Medicine

- Our Mission
 - Increase the supply of primary care physicians serving North Carolina
 - In most recent Match, 43% matched in North Carolina and 51% in primary care¹
 - Brody ranks in the 91st percentile nationally in medical schools on the percent of graduates practicing in-state after completing residency training²
 - 52% of ECU (Brody) graduates are retained in-state five years after graduating – the highest among medical schools in North Carolina³
 - ECU (Brody) has 33% of graduates practicing primary care in-state five years after graduating - the highest among medical schools in North Carolina³
 - 69% of Brody graduates from 1980 to 2017 practice in underserved areas⁴
 - Percent of graduates statewide in⁴
 - Socioeconomically disadvantaged communities – 20%
 - Hispanic communities – 22%
 - Black communities – 21%
 - High-poverty communities – 24%
 - Ranked 22nd in Most Graduates Practicing Primary Care by US News and World Report⁵
 - #7 in the top 20 medical school programs in Family Medicine⁵
 - Improve the health status of eastern North Carolina's residents
 - We partner with practice environments in rural Eastern North Carolina in order to provide our students the opportunity to get to know these communities better and enhance their desire to move to these areas after they complete their training.
 - 82% of graduates participated in a free clinic for the underserved⁶
 - 31% of our graduates have experiences in community health before graduating²
 - We have developed our curriculum to assure that our students are introduced to the social determinants of health and made aware of existing health care disparities in order to better prepare them to make an impact in addressing them during the course of their careers.
 - 85% of our students have experiences in health disparities and 78% in cultural awareness before graduating²
 - 98% of our students are prepared to care for patients from different backgrounds (Brody ranks nationally in the 92nd percentile)²
 - Ranked 16th by US News and World Report for Most Graduates Practicing in Health Professional Shortage Areas⁵
 - Enhance access of minority and disadvantaged students to a medical education
 - Current enrollment is 344¹
 - 26% of our medical students are from rural counties
 - 46% came from Tier 1 (24%) and Tier 2 (22%) counties in North Carolina
 - 18% are first generation
 - 30% are from underrepresented minority groups
 - 27% from EO1 and EO2 socioeconomic status (whose parent(s) completed highest level of education less than a Bachelor's degree with service, clerical, skilled and unskilled occupation)
 - Ranked in Top 10% of Most Diverse Best Medical Schools by US News and World Report⁵

Sources:

¹ Internal records (Student information system; admission records, and NRMP Match data file (2022))

² AAMC Missions Management Tool (2023)

³ Outcomes of NC Medical School Graduates: How Many Stay in Practice in NC, in Primary Care and in High Needs Areas. March 30, 2022. Sheps Health Workforce NC. Cecil G. Sheps Center for Health Service Research.

⁴ AMA ChangeMedEd Graduate Profile (2023).

⁵ US News & World Report (2023)

⁶ AAMC Graduate Questionnaire (2022)

University of North Carolina at Chapel Hill School of Medicine

Kenan Rural Primary Care Scholars Program – With support of the Sarah Graham Kenan Endowment and the William R. Kenan, Jr. Charitable Trust, the Kenan Primary Care Scholars Program offers medical students rural experiences in Central, Eastern, and Western North Carolina. These longitudinal exposures during medical school prepare students for careers in rural primary care while also providing financial support and enrichment experiences to sustain their commitment to rural primary care in North Carolina.

FIRST (Fully Integrated Readiness for Service Training) Program – The FIRST program began in 2015 and aims to increase primary care physicians in rural and underserved areas in North Carolina. Students complete medical school at an accelerated pace – in three years instead of four. The students have conditional acceptance at affiliated residency programs in Family Medicine and Psychiatry Pediatrics, and Surgery. They then serve in a rural or underserved area of North Carolina for at least three years. Students are recruited to the FIRST Program prior to entering medical school and during the fall of their first year of medical school. The FIRST Program promotes close faculty mentorship and familiarity with the system, includes a longitudinal quality improvement project with an assigned patient panel, includes early integration into the clinic, and fosters a close cohort of fellow students.

NC Rural Promise Scholarship - The NC Promise Scholarship is a scholarship program which allows students additional “on-ramps” for pursuit of rural primary care. Students who determine after their first year of medical school a commitment to primary care in rural North Carolina are eligible to apply in their second or third year of medical school. Students are supported with rural placements for rotations, connections to rural educational opportunities through the Office of Rural Initiatives (ORI), and support for practice placement after residency through the Office of Rural Health and others. If a student determines commitment in 4th year, they can apply for a one-time scholarship NC Rural Promise Scholars plan to enter the fields of family medicine, pediatrics, internal medicine, OB/Gyn, psychiatry, or general surgery and commit to serving in one of North Carolina’s rural counties. The scholarship funding was allocated by the North Carolina General Assembly in recognition of the mission of the School of Medicine and the potential impact graduates can make caring for the people of the state. Scholarship support is paid toward debt reduction before graduation. Upon the completion of residency training, the honorees have made a commitment to serve in one of the state’s rural counties that is underserved.

Important Pathway Programs before medical school – UNC SOM has a wide array of other programs that seeks to connect high school and college students to rural primary care programs and interests. Examples include the Rural Medicine Summer Academy that offers rising high school seniors a week-long immersive experience on UNC’s SOM campus; The Rural Medicine Pathway Program, a partnership with the Carolina

Covenant Scholars Program provides mentorship, guidance, and community engagement experiences to students from rural areas of North Carolina and helps prepare students to apply to UNC SOM. The new S.E.R.V.E. initiative out of ORI connects programs from middle school through college programming for students from rural SE NC counties, including exploration events hosted in their local communities; Heal Day with the Heels, bringing students to campus, and an On Call Speaker Series connecting providers who graduated from those high schools back to share their journeys with students. The SEEDS Scholarship Program enters year two offering support specifically to students from five counties in SE NC, and those who plan to pursue needed specialties in the region. In partnership with OSEEE and AHEC partners, ORI also provides outreach and program support to high schools, community college, and undergraduate institutions across the state and works with collaboratives such as Rockingham Primary Care Initiative on community-based programs to develop workforce for in North Carolina.

Wake Forest University School of Medicine

Family Medicine Interest Group: The mission of the Wake Forest School of Medicine Family Medicine Interest Group is to encourage interest in the specialty of Family Medicine; furthering the ideal of longitudinal, patient-centered care. Inspired by the AAFP Family Physicians' Creed and the Mission Statements of the AAFP and NCAFP, we strive to holistically improve the health of our community while exemplifying professionalism and creativity. Our overarching goal is to support and recruit interest by capturing students in training to become exceptional, humanistic physicians. Exposing students to Family Medicine as a career path early at interest fairs and via lunch talks supports this goal. Having upper-level students (formally and informally) mentor new students continues this pipeline through the residency match process. Further, our events consider health care policy and affordability, striving to advance high quality clinical evidence and advocate for health equity. By hosting events and combining efforts with other student groups, we hope that topics (e.g. LGBTQ health) that do not receive extensive attention elsewhere in the curriculum are illuminated. While we hope that our efforts lead to more students entering the primary care Family Medicine workforce, those who choose other specialties will also benefit from our diverse programming. 134 students signed-up on Canvas; 52 members in the groupme; suture workshop with 20 students on February 28

Share the Health Fair: According to the 2021 Forsyth County Measures Report, the top five intervenable leading causes of death for the county are cancer, heart diseases, chronic lower respiratory disease, cerebrovascular disease, and diabetes. Share the Health Fair exists to help meet these health discrepancies by minimizing barriers to care, improving social determinants of health, increasing awareness of preventative measures to avoid common chronic diseases, connecting fair participants to options for year-round health care, and empowering fair participants with the tools necessary to take their health into their own hands. Since its inception in 2000, the mission of the Share the Health Fair has been to provide basic medical screenings and information on health care and healthy living for all members of the Winston-Salem community, especially those who may not otherwise have adequate access to these services. It is an entirely student-organized effort, providing a unique opportunity for Wake Forest University School of Medicine (WFSUOM) students to learn about community health and promote wellbeing within the community that has welcomed us as we pursue medical education. The fair in 2022 was staffed by over two-hundred volunteers, including 201 students from WFUSOM, 30 students from WSSU PT, 13 NW AHEC Scholars, 21 physician volunteers, and other outreach program volunteers.

DEAC Clinic: DEAC provides an opportunity for to deliver high quality patient care adapted to our unique student-run clinical model. Students and attending physicians love our new clinical space with areas for exam rooms, lab space, triage, front desk, and teaching from our wonderful physician volunteers. Our new clinic also allows us to deliver new initiatives like providing hot meals in partnership with Campus Kitchen. As our clinic grows, we look forward to further developing the wonderful roles that DEAC plays in our community over the many years in this new space. The Vision Clinic is a new student-run clinic run in partnership with City with Dwellings and currently funded via the Schweitzer Fellowship and will see primarily homeless population for vision related issues. We are currently purchasing equipment, establishing educational material for student volunteers, and setting up the new space which should be completed in early 2023. As of October 24th, DEAC is excited to announce that we have successfully implemented our Food Insecurity pilot program in partnership with Campus Kitchen. Campus Kitchen is an organization at Wake Forest University that aims to reduce food waste by distributing excess produce to the community. As part of our partnership, Campus Kitchen prepares fresh, nutritious meals with the surplus they acquire for distribution at DEAC clinic. All patients being seen at the clinic are offered a meal to take home with them at the end of their visit. We have received positive feedback and gratitude from patients who otherwise would not have had time to cook dinner that night. As a cross-disciplinary team, we recently added 2 new PA directors to our board, both 1st year PA students. They will help us connect more with our PA colleagues in the PA school in addition to serving as managers in our clinic and special initiatives like our efforts to address food insecurity. In addition, we have had PA alumni reach out to our clinic to seek opportunities to donate and help which we graciously appreciate. There are 74 fourth year pharmacy students rotating at Atrium Health Wake Forest Baptist (AHWFB) during the 2022-2023 academic year. We have had 3 pharmacy volunteers each week of clinic from July to September. We have extended the uncontrolled hypertension project and enrolled two patients during Q3. We are currently out of blood pressure cuffs, but recently ordered more and are waiting for the shipment. We encourage Med Teams to continue to utilize this resource as we have found it beneficial to our patients. Regarding medication assistance, we have utilized both Crisis Control and MedHelp (previously known as Charity Care) through AHWFB to provide support to our patients. We utilize Crisis Control as a first-line resource if the patient lives locally and MedHelp as a secondary resource. We have printed applications for this in English and Spanish and have them available when needed.

Clinic Information

1. In this most recent quarter, there were 57 total visits in the DEAC Clinic (10 telehealth, 47 In-person). Of those visits, 18 were for patients new to DEAC and 39 visits were for patients returning to DEAC.
2. The clinic continues to see patients within one week of the patient requesting an appointment.
3. Show rate: 68% (39/57) of patients showed up for their scheduled appointment between Oct- Dec 2022.
4. During Oct- Dec 2022, 11 patient encounters required use of a translator during the visit.
5. Total cost of operation for the DEAC Clinic October - December 2022: \$3,178
6. Number of student volunteers Oct - Dec 2022: 65 Students volunteered 114 times
7. Number of preceptor volunteers Oct - Dec 2022: 9 preceptors volunteered 19 times

Clerkships: As part of the Wake Ready Curriculum, students complete a variety of community rotations/experiences between our two campuses (Winston-Salem and Charlotte) during the clerkship, with the opportunity to participate in electives in the post-clerkship curriculum. During the clerkship curriculum, all students complete an Ambulatory IM clerkship and Family Medicine clerkship. Students

also complete ambulatory components during their Pediatrics, Psychiatry and Obstetrics/Gynecology clerkships. A description of the dedicated community/ambulatory clerkships of Ambulatory IM and Family Medicine are included below.

Clerkship: Ambulatory Internal Medicine

Duration: 2 weeks

Description of Clerkship: The core clerkship in Ambulatory Internal Medicine focuses on the basic competencies of ambulatory internal medicine. Students spend time in various ambulatory settings which include continuity care clinics, complex care teams and urgent care clinics. Students are expected to participate in the care of patients presenting to these clinics, including but not limited to conditions such as COPD, Diabetes, Hyperlipidemia, Hypertension, Obesity, Tobacco Use, Depression and Joint Pain. Also, as part of the clerkship, students complete a Population Health QI activity in which students address patient's health maintenance by addressing vaccine gaps in patients they are participating in their care.

Participants in clerkship: All third year medical students on the Winston-Salem and Charlotte campuses (approx. 145 total)

Outcomes: Participation in care of patients with the above listed diagnoses/conditions and completion of the Population Health project.

Clerkship: Family Medicine

Description of Clerkship: The core clerkship in Family Medicine is a 4 week clerkship on the Winston-Salem campus and a longitudinal clerkship on our Charlotte campus during the 2022-2023 academic year. The clerkship consists of students participating in patient care in the outpatient family medicine clinics in both Winston-Salem and Charlotte. Students are expected to participate in the care of patients presenting with back/neck pain, dysuria, headache, joint pain, rashes, asthma/COPD, depression, diabetes mellitus, hyperlipidemia, hypertension, obesity, respiratory illness, tobacco use, adult and pediatric maintenance health exams, and counseling on smoking cessation.

Participants in clerkship: All third year medical students on the Winston-Salem and Charlotte campuses (approx. 145 total)

Outcomes: Participation in care of patients with above noted presentations, along with final exam in course (NBME exam).

Also during the clerkship phase of the curriculum, students also complete the Health Equity thread/curriculum. The curriculum encompasses a series of activities that focuses on health equity and the social determinants of health, such as housing, transportation, access to care, maternal-fetal health disparities as examples. When possible, the experiences are partnered with a community organization in Winston-Salem and Charlotte that are working to address these disparities.

Health Equity

Goals of Program:

1. Understand the scope of health disparities in the United States
2. Identify ways to contribute to the reduction of health disparities as a practicing clinician
3. Demonstrate the knowledge and skills needed to improve the health of underserved populations
4. Explore activities with community partners that will foster an interest in careers working with underserved populations.

Number of participants: All third year medical students at both campuses (approximately 145 students)

Outcomes: Completion of multiple exercises during curriculum addressing health equity and the social determinants of health

During the post-clerkship curriculum, students have the opportunity to participate in electives that are community based and related to primary care. The following electives can be enrolled in by students, with various enrollment each year.

**Strengthening the Training of the Physician Workforce Needed to Create a Healthy North Carolina
A Roadmap for a Statewide (and Nationwide) Approach**

An AHEC Proposal to develop a Collaboration between NC Medical Schools

Objectives:

1. Facilitate a path into medicine for students from rural and other underserved communities who might otherwise not have been able to envision themselves as future physicians.
2. Improve the supply and distribution of physicians in needed specialties in rural communities and other communities with less access to resources to create a healthy North Carolina.
3. Develop and extend learning opportunities across the state of North Carolina through community-based learning and relationships.

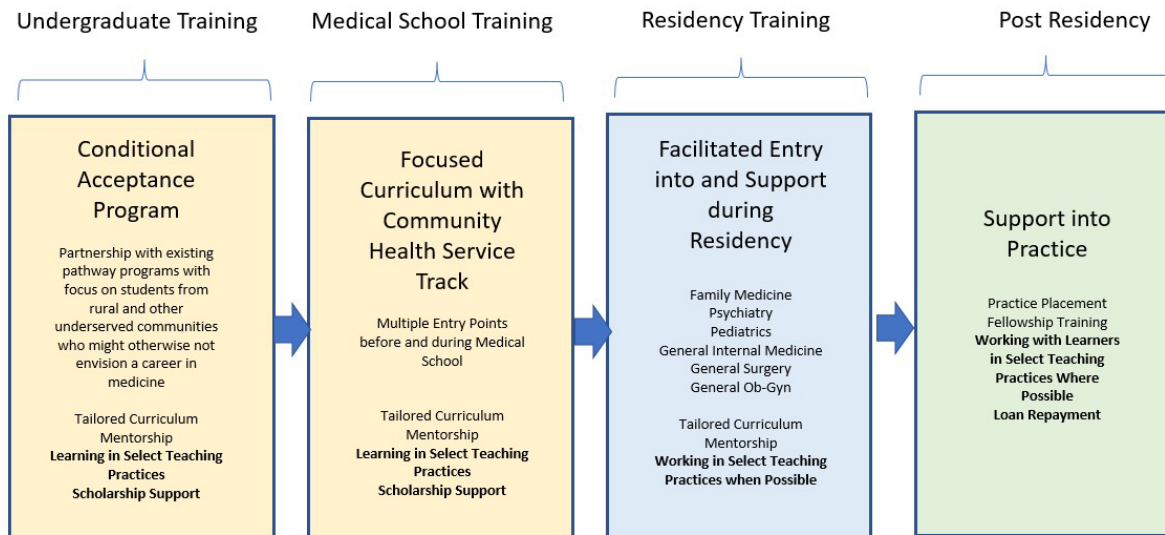
Summary:

A multi-pronged approach is needed to address this set of complex and important issues. The different components of the approach are described in more detail below. AHEC seeks to convene educational leaders of the two state medical schools to focus on 1) how to recruit more students who are likely to pursue careers in needed specialties, 2) how to train students in high quality primary care while in medical school and 3) how to create and support high functioning practices in which to teach students. The other components are also critically important and need to be addressed in a different manner.

Critically Important Areas of Focus to Achieve Objectives:

To reach these objectives, the program will:

- 1) Recruit students into medical school who are more likely to pursue careers in needed specialties in rural and other underserved communities (**Conditional Acceptance Programs into Medical School**)
- 2) Train these students in high quality primary care while in medical school (**Focused Curriculum with Community Health Service Tracks**)
- 3) Creation and Support of high functioning primary care practices able to effectively teach (**Select Teaching Practices**)
- 4) Help students match into appropriate residencies and support them during residency training (**Facilitated Primary Care Residency Training**)
- 5) Provide further support and training after residency to optimize their successful entry into practice in rural and other underserved areas (**Fellowship Training Programs**)
- 6) Provide financial support during training to allow learners to focus on their training and not be burdened by debt load that dissuade them from pursuing careers in primary care with a goal of entering practice without debt (**Scholarships and Loan Forgiveness Programs with Goal of Zero Debt**)
- 7) Continue to work at a national and state level to increase financial investments in primary care to allow for long term sustainability of primary care practices (**Increase Primary Care Reimbursement**)



Area of Focus #1: Conditional Acceptance Program

The program will recruit students with strong intentions to practice medicine in rural and other underserved communities in North Carolina at the end of their first year of undergraduate school and notify them of acceptance into program prior to their second year of undergraduate school. The students will have conditional acceptance into the participating NC medical schools if students meet defined milestones. Medical Schools participating in the collaboration will either have such a program already in existent or will develop such a program. The draft program components are further described below. **The educational collaborative convened by AHEC will further refine these components.**

Undergraduate students during their first year are nominated by their undergraduate programs. Partner HBCUs, Community Colleges, and Universities in the UNC System will be selected based on their interest in participating and their ability to recruit students who will likely pursue careers in rural and other underserved areas.

Criteria for Consideration:

- 1) Intends to practice in rural and other underserved communities in North Carolina
- 2) Strong connection to rural or other underserved communities in North Carolina
- 3) Completed one college level math and college level science course
- 4) In state residency

Nominated students are reviewed by participating medical schools for conditional acceptance into the program at the end of their first year of college.

Program Components that supplement Undergraduate Education:

- 1) Mentorship
- 2) Curriculum focusing on professional formation, clinical skills, and foundational sciences
- 3) Training in Select Teaching Practices for the majority of outpatient clinical experiences – Students will learn clinical medicine in teaching practices that are chosen based on the location of the

practice in a rural or otherwise underserved setting, the quality of care delivered in the practice, and the high commitment to education. These practices will receive additional support and training to allow them to effectively train Track students. This teaching model is described further below.

Proposed Milestones to Matriculate into Medical School:

- 1) Students enrolled in the program must meet the following milestones to be considered for admission into medical school.
- 2) Complete course work required for graduation with a BS or BA from undergraduate program at one of the partner institutions identified through the program and maintain a science GPA 3.5 or higher
- 3) Achieve MCAT score of 500 or higher prior to matriculation
- 4) Complete required clinical and community service experiences

Admission is not automatic. Their performance in the program will be reviewed and voted upon by the respective SOM admission's committee.

Program participants who matriculate into medical school are guaranteed a place in the Community Health Service Track described below and will be encouraged to pursue programs for workforce development in needed specialties across North Carolina. Participation, however, is not required as a condition of matriculation.

Area of Focus #2: Focused Curriculum with Community Health Service Track:

This track is intended to expand the total number of students engaged in rotations and experiences across rural and less resourced communities. In addition, having a specific and named rural track for students committed to rural practice will provide students additional leverage for residency placement through an LCME accredited track. Medical Schools participating in the collaboration will either have such a track already in existent or will develop such a track. Schools may choose to name their track differently. The components below are draft components of what such a track should include. **The educational collaborative convened by AHEC will further refine these components.**

Participating medical schools will work together to offer students an augmented rural and underserved curriculum. This will allow team formation among students who have shared commitment to education and engagement in rural and underserved communities across the state. Where possible this curriculum will be offered virtually to allow didactic learning without returning to the home campuses.

This track will also serve as a recruitment and gateway program for students identified through the conditional early assurance program. Program participants will be offered a guaranteed spot in the Community Health Service Track, but do not have to pursue the track to be considered for the conditional assurance program.

The track focuses on training MD students to become physicians who will serve rural and other underserved communities.

Sample Program Components:

- 1) Mentorship – Entering into Community Health Track, every student will be assigned a rural health preceptor. They will help students develop a statewide network of support that will provide important academic, professional, and social development.
- 2) Curricular Enhancements – Students in the track will complete all core requirements of the respective medical school curricula, but in addition will learn skills essential to being a rural physician in NC such as enhanced procedural skills including advanced point of care ultrasound skills.
- 3) Training in rural hospitals for a portion of required and elective inpatient experiences.
- 4) Training in Select Teaching Practices for the majority of outpatient clinical experiences – Select Teaching Practices are essential to the success of this program and are currently underdeveloped at most medical schools. For this reason, Creation and Support of Select Teaching Practices is discussed as a separate area of focus.

Area of Focus #3: Creation and Support of Select Teaching Practices

Students will learn clinical medicine in teaching practices that are chosen based on the location of the practice in a rural or otherwise underserved setting, the quality of care delivered in the practice, and the high commitment to education. These practices will receive additional support and training to allow them to effectively train Track students.

The creation of high functioning primary care practices in which to teach learners (Elite Teaching Practices) deserves further discussion. Developing these Select Teaching Practices is fundamental to ensuring a well-prepared primary care workforce for our future.

- 1) Select Teaching Practices will provide learners with the skills needed to succeed in primary care.
- 2) Select Teaching Practices inspire learners to pursue careers in primary care by role modeling the creativity and innovation that is possible in primary care.

Draft components of Select Teaching Practices are further described below. **The educational collaborative convened by AHEC will further refine these components.**

Sample Components that make Select Teaching Practices different from currently existing community preceptors:

- 1) Engaged Practices that provide high quality care. Select Teaching Practices will be high functioning primary care offices that provide a broad range of services to patients and have an enthusiasm for passing on their knowledge to the next generation of physicians. Select Teaching Practices will teach regularly so they can hone teaching skills and so that students integrate effectively into practice and directly contribute to the care of patients. Teachers in Select Teaching Practices will participate in occasional events to help improve their teaching skills and help us improve the curriculum. Select Teaching Practices will be important members of the teaching team will have an important voice in how students are trained.
- 2) Student assigned to Select Teaching Practices intend to pursue careers in primary care. These students have been carefully selected for their interest in primary care and are receiving focused training in high quality primary care. Select Teaching Practices are thus able to teach a highly motivated group of students that share the practices enthusiasm for primary care.

- 3) Students assigned to Select Teaching Practices make useful contributions to care. The same group of students are assigned to Select Teaching Practices over time so that they get to know the practice. This allows students to contribute to patient care in meaningful ways. The students are able to assist in value based care, patient education, and documentation. Other ideas have been put forth by national organizations;
<https://www.stfm.org/media/1348/studentsasaddedvalue2018.pdf>. These students may also return to your communities as colleagues and even partners.
- 4) Enhanced support to make it easier for Select Teaching Practices to teach. Draft ideas are listed below.
 - Payment that is more than a token of thanks. Select Teaching Practices will be reimbursed at a substantially increased rate. This support may come from participating medical schools or participating clinical organizations.
 - More clear expectations for students. Define clearly what a practice can offer the student and then clearly communicate those expectations to the student. Better two-way communication between the school and the Select Teaching Practice and more flexibility on the part of the school.
 - Reduced administrative burden of teaching. Standardization of course assignments, requirements, and grading forms between schools. Greater flexibility in assignments. Engage preceptors when creating course assignments and course requirements. Collaborate with curricular leaders to allow students to participate in ongoing projects of the practice and still get course credit.

Additional Areas of Focus that are important but are not part of this collaborative:

Additional Area of Focus: Facilitated Primary Care Residency Training

Participating residencies will ensure that Track students continue to receive mentorship and support during residency.

The goal of this longitudinal approach is to train students in needed specialties to work in rural and underserved communities. Formal training often ends with residency. A minority of medical students from NC medical schools will practice primary care or psychiatry, and far fewer still will practice in rural and underserved areas.

Graduate Medical Education (GME) in NC has grown from 4 communities 50 years ago to 26 communities now. Most GME outside of academic health centers is in primary care psychiatry. NC is home to three new psychiatry programs in the last five years and at least one new program is well into planning. Training residents in the communities in rural and urban communities where people live and work is a proven strategy to increasing provider supply and improving access to care.

Students from the track will be encouraged to schedule guest rotations with AHEC supported primary care and psychiatry residency programs and other community-based residency programs. These students will be encouraged to consider these programs as ideal opportunities to train in the types of communities they want to live and work and develop professional connections to those communities.

Additional Area of Focus: Fellowship Training Programs

Upon completion of residency, the program will support entry into practice with additional fellowship training. Fellowship training will provide enhanced clinical and business skills to succeed in rural practice. The fellowship will also provide teaching skills to grow the next generation of elite teaching practices.

MAHEC and UNC Office of Rural Initiatives have developed a rural fellowship program. Recently trained providers with employment in a rural community can have a portion of their professional time covered by the fellowship (10-20%) to allow the physician time to develop specific skills for rural practice as well as networking and rural leadership development. This fellowship has demonstrated early success and efforts will be made to expand it statewide.

Additional Area of Focus: Financial Support and Reduction of Loan Burden

Loan burden on student graduating from medical school has increased dramatically over the past decade. The current average debt of graduating medical students nationally is now about \$200,000. With continued wide disparities in salaries between specialties, large debt burden can influence student choice of specialties.

Even for students trained in needed specialties, large health systems in wealthier communities often provide larger recruiting incentives and salaries, making it more difficult to recruit physicians into rural and underserved areas.

Programs to minimize financial pressures during training and reducing eventual total debt burden are an important part of ensuring an appropriate physician workforce in rural and other underserved communities. The goal of this program is to have participants enter practice with zero debt.

Additional Area of Focus: Increase Primary Care Reimbursement

Work at a national and statewide level to implement the recommendations of the National Academies of Science Engineering and Medicine to pay for primary care teams to care for people not doctors to deliver services. The report recommends that:

- Payers should evaluate and disseminate payment models based on the ability of those models to promote the delivery of high-quality primary care, not on achieving short-term cost savings.
- Payers using a fee-for-service (FFS) model should shift primary care payment toward hybrid (part FFS, part capitated) models, and make them the default over time.
- The Centers for Medicare & Medicaid Services (CMS) should increase the overall portion of spending going to primary care.
- States should implement primary care payment reform by facilitating multi-payer collaboration and by increasing the overall portion of spending in their state going to primary care. Implementing high-quality primary care begins by committing to pay primary care more and differently because of its capacity to improve population health and health equity for all of society, not because it generates short term returns on investment for payers. High-quality primary care is a common good promoted by responsible public policy and supported by private-sector action.

Selected References:

Implementing High Quality Primary Care: Rebuilding the Foundation of . The National Academies of Science, Engineering and Medicine 2021. <https://www.nationalacademies.org/our-work/implementing-high-quality-primary-care>

Multiple Models exist on which this proposal is built. Links to some of these programs are provided below:

Alabama College of Community Health Sciences: <https://cchs.ua.edu/rural-programs/rmsp/#:~:text=The%20Rural%20Medical%20Scholars%20Program,where%20they%20are%20most%20needed>

Michigan State: <https://msururalhealth.chm.msu.edu/programs/rural-physician-program.html>

U of Minnesota <https://med.umn.edu/md-students/individualized-pathways/rural-physician-associate-program-rpap>

NE Ohio Medical School: [https://www.neomed.edu/medicine/admissions/paths/early-assurance/Eight Year Continuum](https://www.neomed.edu/medicine/admissions/paths/early-assurance/Eight%20Year%20Continuum). Brown Rhode Island. <https://plme.med.brown.edu/>

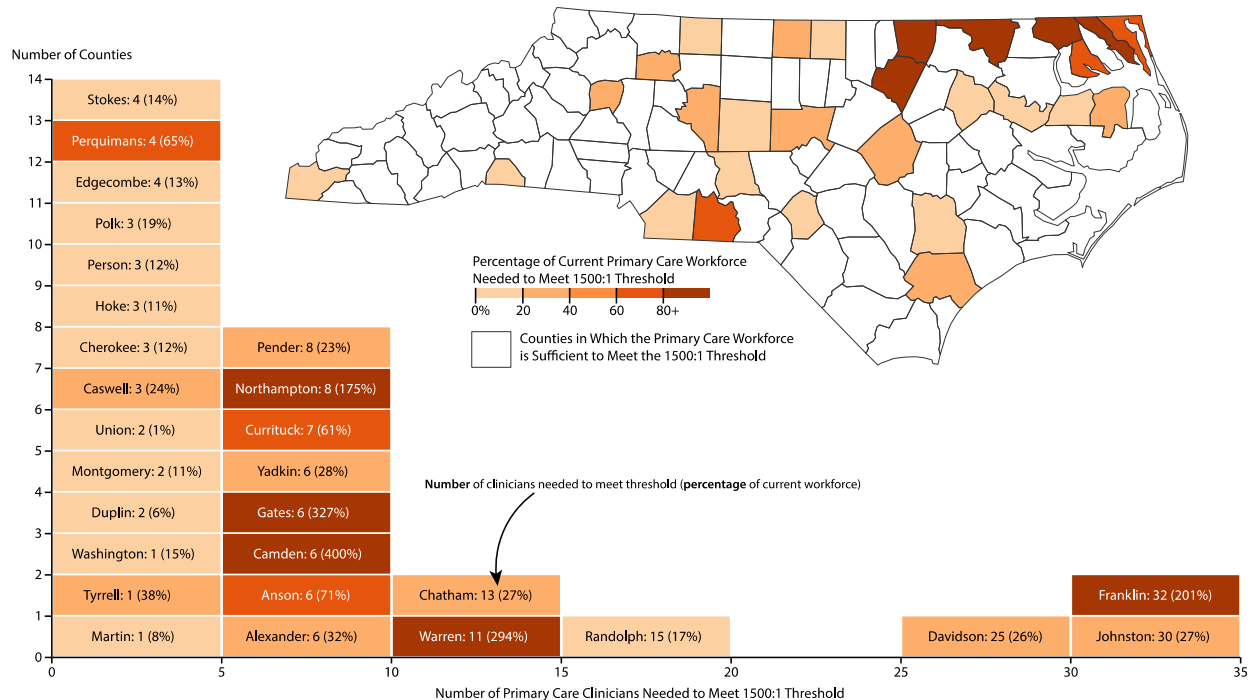
JAMP with support from Texas Legislature: <https://www.uta.edu/academics/schools-colleges/science/degree-programs/health-professions/special-programs-volunteering-research-opportunities/jamp>

WWAMI; Recruit students from rural communities and enroll them in Rural Track (TRUST). <https://www.uwmedicine.org/school-of-medicine/md-program/wwami>

Attachment C

Healthy North Carolina 2030 includes a goal for each North Carolina county to have a 1,500:1 population to primary care clinician ratio. Although this is not specific to primary care physicians graduating from North Carolina medical schools, it provides some insight into where additional primary care clinicians are most needed. Recruiting students from these communities and providing robust primary care experiences in these counties should enhance the likelihood of those students providing primary care there.

Percentage of Current Primary Care Workforce Needed to Meet 1500:1 Population to Clinician Threshold, 2017 - 2021 Average, North Carolina



Notes: Primary care physicians, physician assistants, and nurse practitioners are defined as in Spero, J. C., & Galloway, E. M. (2019). Running the Numbers. North Carolina Medical Journal, 80(3), 186-190. Physicians with a primary area of practice of obstetrics/gynecology were weighted as 0.25 of a full-time equivalent (FTE) primary care practitioner. All other primary care physicians were weighted as 1 FTE. Primary care physician assistants, nurse practitioners, and certified nurse midwives were weighted as 0.75 FTE. Physician and physician assistant data are derived from licensure data provided by the North Carolina Medical Board. This analysis only includes physicians who are not residents-in-training and are not employed by the Federal government. Nurse practitioner and certified nurse midwife data is derived from licensure data provided by the North Carolina Board of Nursing. Data include active, licensed practitioners in practice in North Carolina as of October 31 of each year. Practitioners are assigned to counties based on primary practice location. County populations were adjusted for age and gender according to primary care use rates described in data from the Medical Expenditure Panel Survey. The raw (unadjusted) population data was from the NC Office of State Budget and Management (<https://www.osbm.nc.gov/demog/county-projections>).

NC Center on the Workforce for Health

NC Center on the Workforce for Health

What is the issue and why is it important? North Carolina's historic, persistent, and worsening health workforce shortages can best be addressed through intentional, transparent, and collaborative engagement by the communities interested in solving those problems. Although many organizations focus on health workforce development, that work typically is focused on a specific profession, geography, or institution. We propose a more comprehensive and strategic approach to the evolving workforce needs of North Carolina's health ecosystem.

What do we propose to do about it? The NC Center on the Workforce for Health will provide a forum for health employers, workers, educators, regulators, policymakers, and others throughout North Carolina to convene, discuss challenges and opportunities, share best practices and lessons learned, identify potential solutions and metrics for success, and monitor progress toward addressing these challenges. Feedback from extensive interviews indicates the desire for immediate solutions to these urgent problems, and support for a forum to share emerging best practices and assistance in identifying practical solutions. There is broad consensus that sustained collaborative work will be necessary to create a renewed statewide system of workforce development that meets the needs of the employers and prioritizes whole-person care, including the social drivers of health.

How will we do it? The Center's work will evolve to respond to progress and new challenges.

It will assess data, policy and best practices research, and inputs from participants, and provide actionable syntheses and forum for stakeholders to develop consensus strategies for collective or individual pursuit. All initiatives and recommendations will include desired outcomes and metrics to monitor progress. Participation in the Center is voluntary and inclusive; its agenda and outcomes will be participant driven. Information flows will be bi-directional: statewide data, analysis and information will be distributed to local communities for their consideration and local responses and needs will inform statewide priorities, analysis, and work. For example, great local work that is responsive to health workforce challenges and opportunities will inform the Center's work, and the Center will provide data and information for those communities to consider, technical assistance when requested, and an opportunity for participants to learn from each other. The Center will serve as a voice for the recommendations, and participants will operationalize and advocate for them as appropriate.

The Center is currently staffed by volunteer time provided by NC AHEC, NCIOM, and the Sheps Center for Health Services Research. Work to secure ongoing financial support for the center is underway. We envision a model of staff support at the Center to develop meeting agendas, synthesize participant feedback to inform recommendations and strategies, conduct data analysis and policy research and identify improvements to recommendations as appropriate. We also envision a team of local leaders to convene community stakeholders to facilitate local discussions and coordinate communications between those communities and the Center's statewide work.

The Center meets quarterly to conduct and advance its work. Committees can be leveraged within available resources and as needed for more in-depth or focused work.

The Center meets quarterly to conduct and advance its work. Committees can be leveraged within available resources and as needed for more in-depth or focused work.

NC Center on the Workforce for Health

The Center will

- Provide a mechanism to ensure that efforts to address health workforce issues persist over time which will ultimately better align the supply of health workers with the demand for those workers.
- Convene employers, educators, workers, regulators, and others to develop, deploy, monitor, and assess efforts to address health workforce issues. Convenings will be at the state and local levels with bi-direction information flow.
- Gather and make available relevant data and policy, analyze, and synthesize that information to make it actionable, and provide technical assistance and guidance to interested parties when acting to address health workforce issues.
- Provide a forum for interested parties to share best practices and lessons learned.

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