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

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**(updated)**

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North Carolina Board of Governors in response to General Statute 143-613 as amended by Chapter 507 of the 1995 Session Laws (House Bill 230) of the 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. North Carolina AHEC and the Sheps Center produce this report each year using state licensure databases as well as national databases.

North Carolina is a national model for tracking annual workforce outcomes of its medical school graduates. This report includes analyses on:

- NC medical school graduates with a primary practice location in a NCDHHS safety net setting, where a significant proportion of care is delivered to vulnerable populations.
- Outcomes of NC medical school graduates at ten years post-graduation in addition to outcomes five years post-graduation, which better measures specialty after fellowship training is completed and likely permanent geographic practice location is established.

This report summarizes the five-year outcomes of NC class of 2016 graduates and ten-year outcomes of NC class of 2011 graduates. These analyses use 2021 NC medical license data; the most recent year available.

Data in this report show:

- Of the 440 NC medical school graduates from the class of 2016, 60 (14%) were in practice in primary care in NC in 2021, 6 (1%) of whom practice in a rural NC county.
- As in prior years, ECU retained the largest proportion of graduates in practice in NC at the five-year mark (52%), followed by UNC (39%), Wake Forest (19%), and Duke (15%).
- 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: 33%, n=21; UNC: 15%, n=26), compared to private medical school graduates (Wake Forest: 7%, n=8; Duke: 5%, n=5).
- Five graduates from the class of 2016 were in practice in safety net settings in NC in 2021, including four ECU graduates and one UNC graduate.
- Meanwhile, six graduates from the class of 2011 were in practice in safety net settings in 2021, including five UNC graduates and one Duke graduate.
- Of the 433 NC medical school graduates from the class of 2011, 53 (12%) were in primary care in NC in 2021, 10 years post-graduation; 9 graduates (2%) were in rural primary care in NC.
- Eleven percent (n=46 of 433) of the 2011 NC medical school graduates matched to a general surgery residency, and 3% (n=12) were in practice in general surgery in NC ten years later. One of those surgeons practiced in a rural NC county in 2021.

Continued monitoring of GME outcomes will allow assessment of potential pandemic effects on physician workforce dynamics, and in upcoming years, the state's newest medical school (Campbell) will have been established long enough to be included in these analyses. GME is an important component of health workforce development, but to develop and sustain access to care, GME should be partnered with loan repayment programs, continuous professional and practice support, technology, and other investments.

## 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. This annual report is the primary method that the state uses to track 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 these outcomes in John Iglehart's 2018 article on "The challenging quest to improve rural health care."[1]

While not required by the original legislation, the Sheps Center and NC AHEC have modified the annual report to address the state 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 practice in NC safety net settings[2] 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). In particular, 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 standard 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. In addition to tracking five-year outcomes for the 2016 cohort, this report also includes ten-year outcomes for the 2011 cohort.

[1] Iglehart J. The challenging quest to improve rural health care. NEJM, 2018. 378(5):473-479. https://www.nejm.org/doi/full/10.1056/NEJMhpr1707176

[2] NC DHHS Office of Rural Health. Safety Net Resources website. Accessed March 28, 2022. https://www.ncdhhs.gov/divisions/office-rural-health/safety-net-resources

## DATA SOURCES AND METHODS

### *Data Sources*

Data included in this report come from several sources:

- The North Carolina Medical Board's annual licensure files, maintained by the NC Health Professions Data System
- GMETrack, the graduate medical education tracking file of Association of American Medical Colleges (AAMC)
- Data from the alumni and student affairs offices at 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)
- The NC Department of Health and Human Services (DHHS) list of safety net sites, updated December 1, 2020

In the report we submitted most recently prior to this one, we included analyses of the 2008 and 2014 graduation year cohorts (2008 was used instead of 2009 because of data availability complications). This year, we are submitting this report in the spring, rather than in the fall, and this timing change allows us to submit even more timely analyses. Thus, this year's report includes analyses of the more up-to-date 2011 and 2016 cohorts compared to 2021 licensure data, rather than the 2010 and 2015 cohort analyses that might have been expected.

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. Campbell's first class graduated in 2017. In prior years, this report has not emphasized initial residency match data, as some physicians change residency specialties or locations over the course of their GME training. Outcomes are better measured after graduation from residency. However, given that workforce outcomes five years following graduation will only be available for Campbell starting later in 2022, we began reporting initial match data in the 2017 report and have continued that practice here.

### *Methods*

The format for the information on medical students is consistent with and comparable to the baseline information provided in the May 1994 report "Expanding the Pool of Generalist Physicians for North Carolina."

GMETrack data from the AAMC were merged with the NCMB annual licensure file to determine physician practice outcomes at five or ten years post-graduation from medical school. We produced descriptive statistics to determine where physicians were practicing and in which specialties.

For safety net provider information, we used the North Carolina Department of Health and Human Services safety net site list and we geocoded NC Medical Board file for physicians who reported a practice address in North Carolina. Safety net providers are defined as health care facilities that provide a significant level of health care and other health-related services to uninsured, Medicaid, and other vulnerable populations

One methodological issue over the past decade has been the dramatic increase of physicians choosing full time hospitalist practice, which decreases the proportion of primary care physicians in general internal medicine and, increasingly, other specialties. Hospitalists are included in primary care counts in the findings presented in this report because we do not have a way to systematically identify them in the dataset; this is likely a substantial issue for counts of internal medicine physicians.

*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, whether or not they were located in NC. These findings were possible because AAMC was able to match their data on medical school graduates to 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 2016 Outcomes: *Retention in Primary Care*

The most valuable measure of the choice of primary care careers is retention of graduates in clinical primary care after residency. **Table 1 (page 15)** shows the graduates and the percentage that remained in primary care in NC and in rural NC five years after graduation (in 2021).

**Figure 1: Retention of 2016 NC Medical Graduates in NC Rural Primary Care Five Years After Graduating**

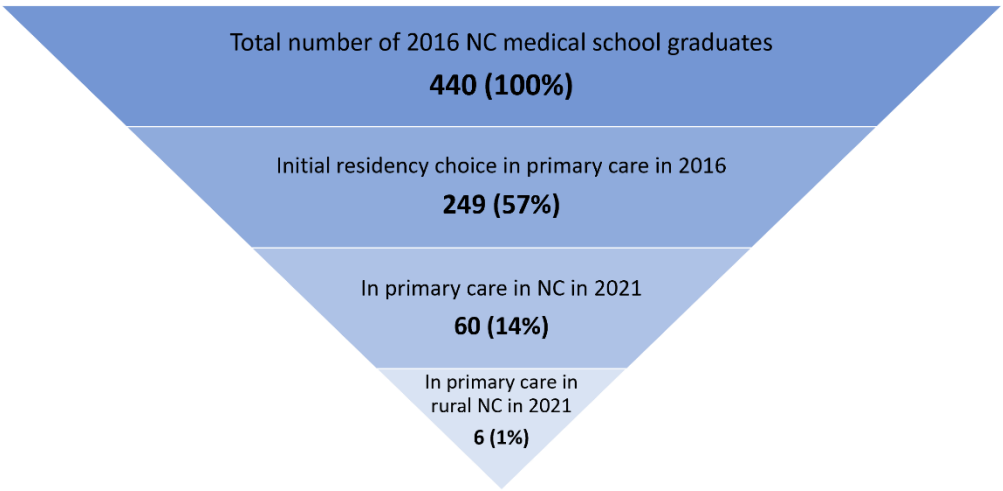



Figure 1: Produced by the Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Source: North Carolina Health Professions Data System with data derived from the Association of American Medical Colleges, and the NC Medical Board, 2021. Rural source: US Census Bureau and Office of Management and Budget, July 2017. "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.

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. Out of the 440 medical school graduates in 2016, 60 (14%) were in training or practice in primary care in NC in 2021 (**Figure 1**). For purposes of comparison, between 12% and 17% of the five previous graduating cohorts (the classes of 2010-2014), were in training or practice in primary care in NC five years after graduating, and the 2016 cohort has increased slightly as compared to the 2014 cohort. One percent (n=6) of the 2016 cohort was in primary care in a rural NC county, half as many as were seen from the 2014 cohort in 2019. Of the six graduates from the class of 2016 who working in rural NC primary care in 2021, one graduated from Duke, two graduated from ECU, and three graduated from UNC. Though lower than was seen in the last report, this percentage is in line with prior trends. 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, Wake Forest, and Duke. For the class of 2014, UNC for the first time had an in-state retention rate that was higher than ECU's (42% vs. 41%), but for the class of 2016, ECU's in-state retention had again risen higher than UNC's. ECU had a smaller class size in 2016 than 2014 (63 vs. 79), but retained just as many graduates in North Carolina five years after graduation (33 vs. 32). UNC retained two fewer graduates in the state as compared to the class of 2014 (65 vs. 67) out of a larger class size (168 vs. 161).

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

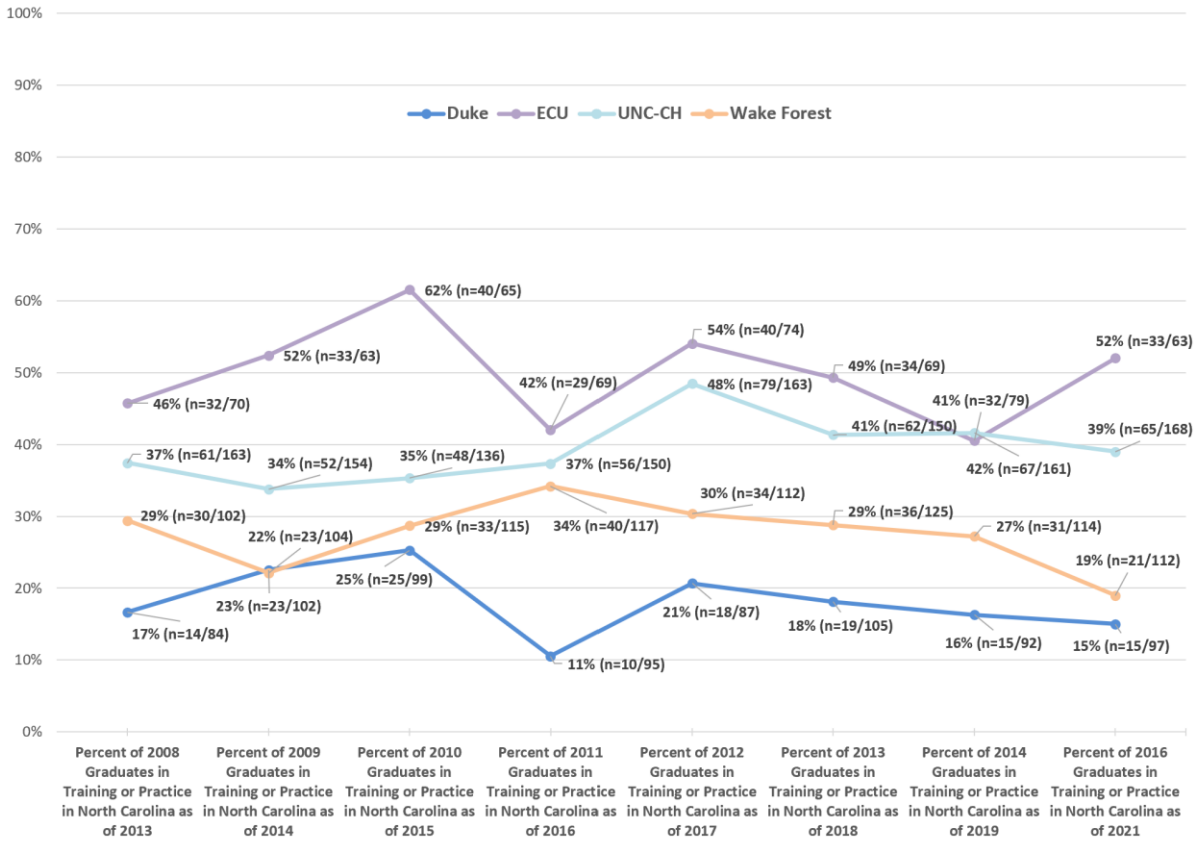


**Table 2 (page 16)** describes medical school graduates remaining in North Carolina. Thirty percent (n=134/440) of 2016 graduates from all four medical schools remained in NC five years after graduation. This percentage is right at the average for the past five years. In-state retention for the prior six medical school graduating cohorts ranged from 31% to 39%.

***Practice in Safety Net Settings and Most Economically Distressed Neighborhoods***

Safety net providers are defined as health care facilities that provide a significant level of health care and other health-related services to uninsured, Medicaid, and other vulnerable populations. **Table A** shows outcomes for 2016 graduates who were practicing in safety net settings in 2021. They include four ECU graduates in rural county safety net facilities and one UNC graduate in an urban safety net facility.

**Table A: Medical School, Primary Area of Practice, and Facility Type for Physicians Who Graduated from an NC Medical School in 2016 and Reported a Primary Practice Location in a Safety Net Setting in 2021**

| Medical School Primary Area of Practice | Number | Safety Net Facility Type | Rural County |
|---|---|---|---|
| ECU | 4 | | |
| *Family Medicine* | *2* | *Critical Access Hospital** | *Yes* |
| *Family Medicine* | *1* | *Federally Qualified Health Center* | *Yes* |
| *Emergency Medicine* | *1* | *Small Rural Hospital* | *Yes* |
| UNC-CH | 1 | | |
| *Family Medicine* | *1* | *Federally Qualified Health Center* | *No* |

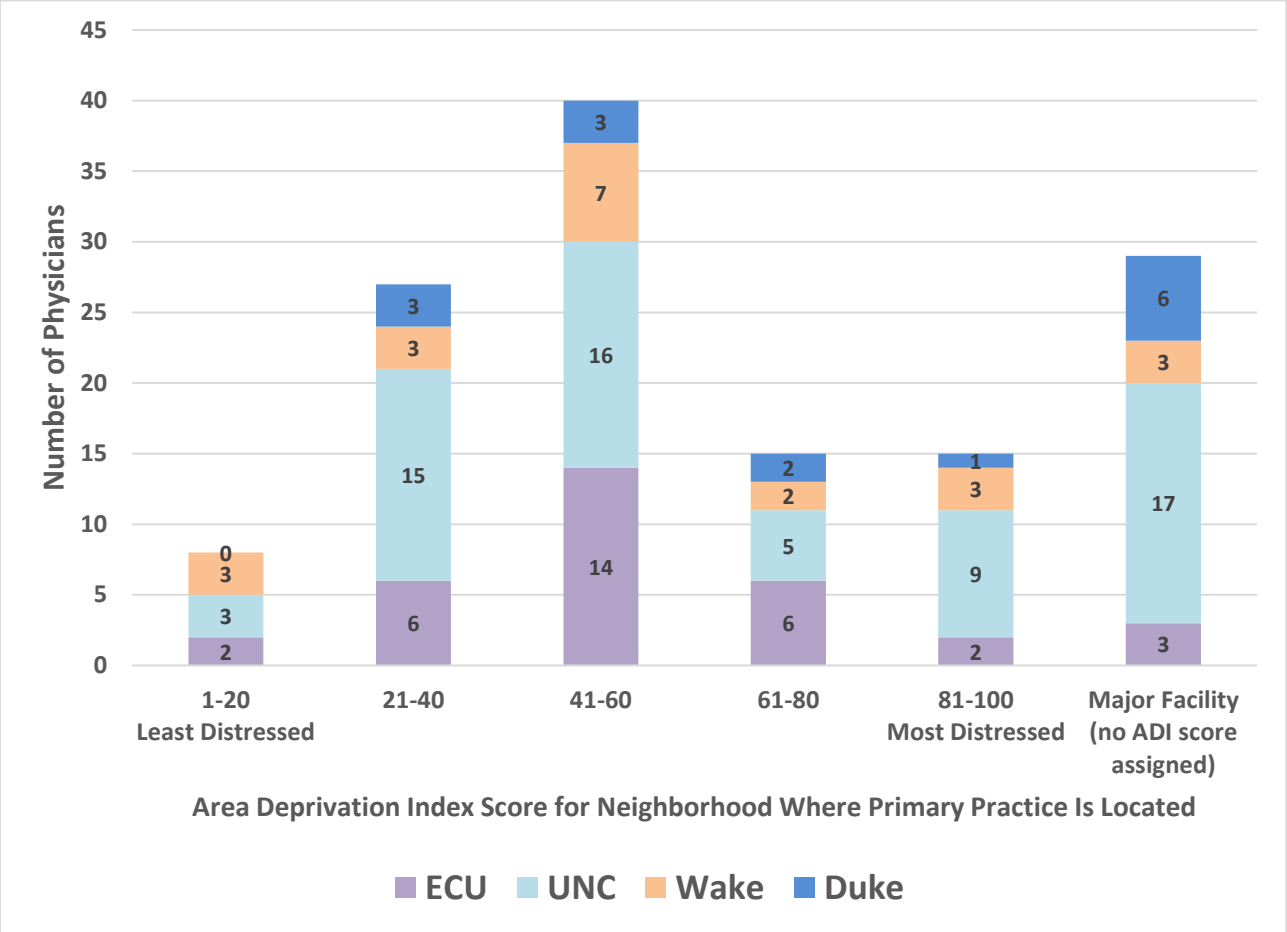
*Includes 1 at a hospital and 1 at a family care center at the same address.

**Figure 3** compares the Area Deprivation Index (ADI)[3] of the neighborhoods where physicians report their primary practice location. The ADI is based on factors related to income, education, employment, and housing quality in a census block, 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. ADI scores are not assigned for census block groups dominated by large facilities, such as hospitals. ADI scores were not available for roughly a fifth (22%, n=29/134) of the graduating class of 2016 due to having a primary practice location at a large facility, most likely a hospital, which makes sense as many of these physicians are likely still in training.

Eleven percent (n=15/134) of the class of 2016 worked in a practice location in a most economically distressed neighborhood five years after graduation. UNC and Wake Forest had the highest proportion of 2016 graduates working in most economically distressed neighborhoods in NC in 2021, each with 14% (n=9/65 for UNC, n=3/21 for Wake Forest). Of the 2016 graduates working in North Carolina in 2021, 7% of Duke graduates (n=1/15), and 6% (n=2/33) of ECU graduates practiced in most distressed neighborhoods.

[3] Note that this year's report uses the national ADI score for NC neighborhoods, while last year's report used the state ADI score for those neighborhoods. In future reports, we will assess whether to use one or the other or both for trend analysis.

**Figure 3: Neighborhood Disadvantage Status of the 2021 Primary Practice Setting for Physicians Who Graduated from an NC Medical School in 2016**




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, 2021. 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.

Note that this year's report uses the national ADI score for NC neighborhoods, while last year's report used the state ADI score for those neighborhoods. This maintains the In future reports, we will assess whether to use one or the other or both for trend analysis.

***Retention in Psychiatry***

**Table 3 (page 18)** shows the retention of the 2016 graduates in psychiatry. For the class of 2016, 25 graduates matched to a psychiatry residency, with 13 from UNC alone, and more than twice as many in total as the number of graduates who matched to psychiatry residencies from the class of 2014 (n=11). Nine of the 2016 graduates who matched to psychiatry residencies remained in practice in psychiatry in NC in 2021 (8 UNC graduates and 1 ECU graduate). In 2019, four graduates from the class of 2014 were practicing psychiatry in NC, and all were UNC graduates.

***Differences in Retention by Practice Specialty***

To determine overall retention by practice specialty, we consolidated data for all NC medical schools in **Table 4 (page 19).** For the 2016 cohort, 55% (n=24/51) of physicians who initially matched to family medicine remained in clinical family medicine in NC five years post-graduation, with 8% (n=4/51) practicing in rural NC counties.

**Class of 2011 Outcomes**

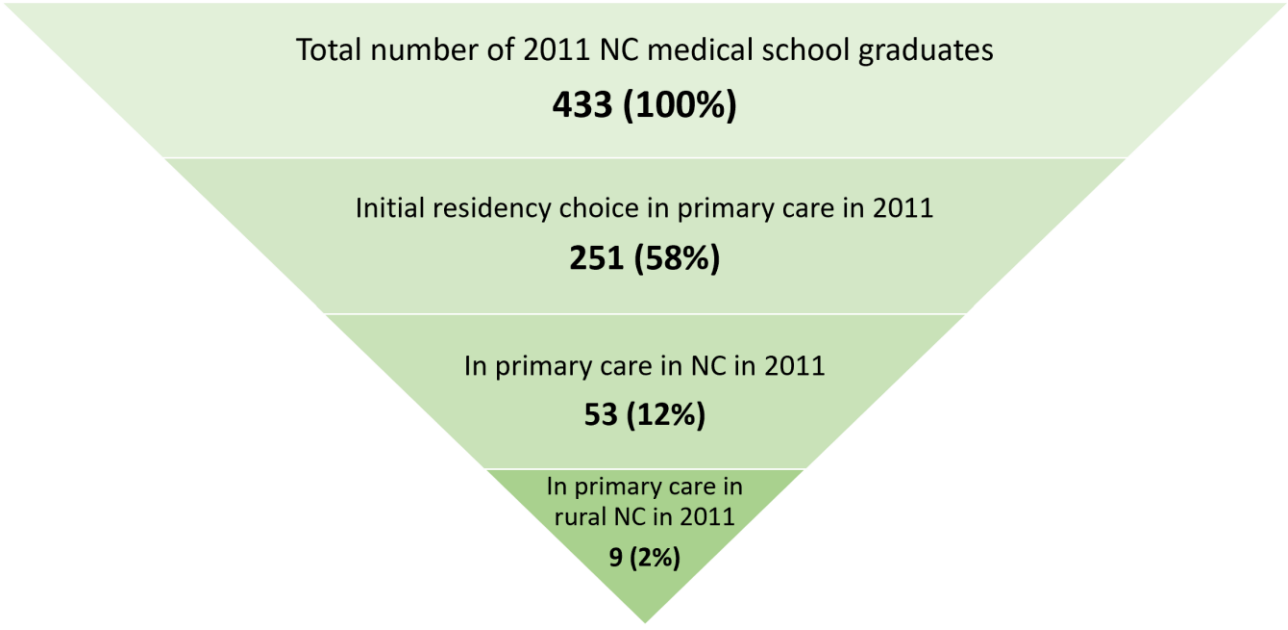
We conducted analyses on the 20011 graduates of NC medical schools to determine where graduates were ten years following graduation from medical school. As noted previously, ten years post-graduation from medical school allows time for physicians to complete residency and fellowship training. We used data from the 2011 graduating cohort that was matched to the 2021 NCMB licensure file.

**Table 5 (page 20)** shows the class of 2011's initial matches to primary care residencies.

**Table 6 (page 22)** shows the graduates from the class of 2011, retention in NC, in primary care in NC, and in primary care in rural NC ten years after graduation (in 2021).

Primary care specialties include family medicine, general internal medicine, general pediatrics, obstetrics/gynecology, and internal medicine-pediatrics. Out of the 433 medical school graduates from the 2011 cohort, 53 (12%) were in training or practice in primary care in NC as of 2021 (**Figure 4**). Two percent (n=9) of the 2011 cohort were practicing in primary care in a rural NC county.

**Figure 4: Retention of 2011 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, 2018. Rural source: US Census Bureau and Office of Management and Budget, July 2017. "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***

Retention of the class of 2011 in NC and in rural NC is shown in **Table 7 (page 24)**. One third (33%, n=145/433) of the class of 2011 was in practice in NC ten years after graduation. By school, this included 46% (n=32/69) of ECU graduates, 41% (n=62/151) of UNC graduates, 35% (n=41/117) of Wake Forest graduates, and 10% (n=10/96) of Duke graduates.

***Practice in Safety Net Settings and Most Economically Distressed Neighborhoods***

**Table B** shows outcomes for 2011 graduates who were practicing in safety net settings in 2021.

The physicians practicing in these facilities that provide a significant level of health care and other health-related services to uninsured, Medicaid, and other vulnerable populations from the class of 2016 include five UNC graduates, three in urban counties and two in rural counties, and one Duke graduate in a rural county. Notably, both the 5-year outcome cohort and 10-year outcome cohort included an emergency medicine specialist practicing in a safety net facility.

**Table B: Medical School, Primary Area of Practice, and Facility Type for Physicians Who Graduated from an NC Medical School in 2011 and Reported a Primary Practice Location in a Safety Net Setting in 2021**

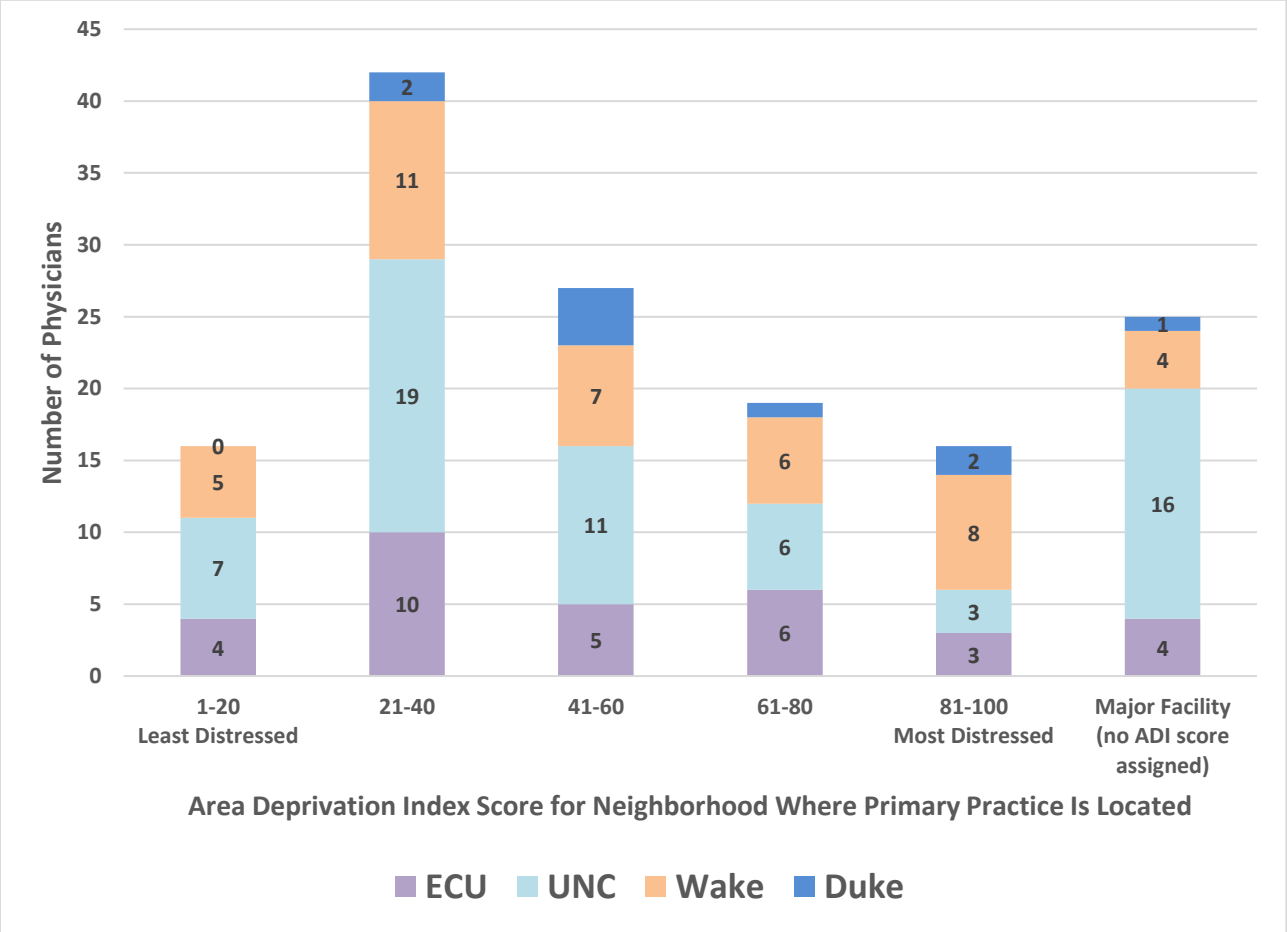
| Medical School Primary Area of Practice | Number | Safety Net Facility Type | Rural County |
|---|---|---|---|
| UNC-CH | 5 | | |
| *Family Medicine* | *1* | *Federal CMS Certified Rural Health Clinic* | *No* |
| *Family Medicine* | *1* | *Critical Access Hospital* | *No* |
| *Family Medicine* | *1* | *Federally Qualified Health Center* | *No* |
| *Family Medicine* | *1* | *Federally Qualified Health Center* | *Yes* |
| *Emergency Medicine* | *1* | *Small Rural Hospital* | *Yes* |
| Duke | 1 | | |
| *Family Medicine* | *1* | *Federally Qualified Health Center* | *Yes* |

**Figure 5** compares the Area Deprivation Index (ADI)[3] of the neighborhoods where physicians from the class of 2011 report their primary practice location in 2021.

Eleven percent (n=16/145) of the class of 2011 worked in a practice location in a most economically distressed neighborhood ten years after graduation, consistent with the proportion of the class of 2016 working in a most economically distressed neighborhood five years after graduation (page 7). Duke and Wake Forest had the highest proportion of 2011 graduates working in most economically distressed neighborhoods in NC in 2021, each with 20% (n=2/10 for Duke and n=8/41 for Wake Forest). The relatively small number of 2011 Duke graduates working in NC overall in 2021 (n=10) contributes to the higher proportion, despite Duke having the lowest headcount among all the schools for 2011 graduates practicing

in most distressed neighborhoods in 2021. For the other schools, 9% of ECU graduates (n=3/32) and 5% percent (n=3/62) of UNC graduates practiced in most distressed neighborhoods in 2021.

**Figure 5: Neighborhood Disadvantage Status of the 2021 Primary Practice Setting for Physicians Who Graduated from an NC Medical School in 2011**




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, 2021. 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 Psychiatry***

Outcomes for 2011 graduates who matched to psychiatry residencies are shown in **Table 8 (page 26).** Psychiatrist counts include 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. In the 2011 cohort, 16 graduates (4%) initially matched to a psychiatry residency.[4]

[4] The original version of this report only took into account the specific residency specialty of "Psychiatry," a total of 14, and this revised report has been edited to take into account all potential residency choices that fall into the Psychiatry category as defined for this analysis, which added two (2) 2011 graduates with an initial residency choice of Internal Medicine/Psychiatry, for a total of 16.

**Table 8 (page 26)** also shows the workforce outcomes of the 2011 graduates who became psychiatrists ten years post-graduation. Six remained in practice in NC: four UNC graduates, one ECU graduate, and one Wake Forest graduate. None of these practiced in a rural NC county.

***Retention in General Surgery***

We have refrained on reporting on general surgery outcomes in the five-year post-graduation analyses 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. Findings at ten-years post-graduation allows us to evaluate practice outcomes for general surgeons.

In this report, physicians are considered general surgeons if they practice in the specialties of 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.

**Table 9 (page 27)** shows that 11% (n=47/433)[5] of the 2011 NC medical school graduate cohort matched to a general surgery residency. **Table 9 (page 27)** also shows that ten years after medical school graduation, 12 graduates (3%) were in practice in general surgery in NC, including six graduates from UNC, four from Wake Forest, and two from ECU. One UNC graduate practiced in a rural NC county.

***Differences in Retention by Practice Specialty***

When data are combined across all NC medical schools for the class of 2011 (**Table 10, page 28)**, presents findings in retention by specialty. For the 2011 cohort, 47% (n=22/47) of physicians who initially matched to family medicine remained in clinical family medicine in NC ten years post-graduation, with 15% (n=7/51) practicing in rural NC counties. Proportionally, psychiatry and obstetrics & gynecology retained the next highest percentage of 2011 graduates, with 38% of 2011 graduates who initially matched psychiatry residencies practicing psychiatry in NC in 2021 (n=6/16) and 32% of 2011 graduates who initially matched obstetrics & gynecology residencies practicing OBGYN in NC in 2021 (n=8/25). One OBGYN graduate practiced in a rural NC county in 2021, and none of the psychiatry graduates practiced in a rural county in 2021.

**Initial Match Data: 2021 Graduating Cohort**

As mentioned earlier, we do 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. However, Campbell has graduated four classes of medical students and initial match counts are the only data available thus far on Campbell's workforce outcomes. We offer a note of caution when interpreting these data and a reminder that the five-year and ten-year outcome data are more accurate in estimating the workforce outcomes for each medical school. 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

[5] The original version of this report only took into account the specific specialty of "General Surgery," a total of 46, and this revised report now takes into account all potential residency choices that fall into the General Surgery category as defined for this analysis, which added one (1) 2011 graduate with an initial residency choice of vascular surgery, for a total of 47.

complete fellowship training and eventually practice in a sub-specialty field. Family Medicine is an exception to this trend.

**Table 11 (page 29)** shows that in 2021, the public medical schools (UNC and ECU) had the highest percentage of graduates matched to an NC residency (43%, n=82/191; 34%, n=27/81, respectively), followed by Duke (28%, n=30/109), Campbell (25%, 38/151), and Wake Forest (22%, n=32/143).

The highest percentage of matches to a primary care, psychiatry, or general surgery residency in NC were for ECU (29%, n=23/80), UNC (28%, n=54/191), Duke (18%, n=20/109), Campbell (17%, 25/151), and Wake Forest (12%, 17/143).

## 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. Legislators[6] and other influential stakeholders, many of whom may be able to directly influence the health system, often come from career paths outside of healthcare. When concerns about the availability of physicians to meet the demand for healthcare 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.

The newer analyses added in last year's report 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 2011 and 2016 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.

*The Role of AHEC Residencies in Primary Care*

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

[6] 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.

remainder of their careers.[7][8][9] 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.[10]

[7] 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

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

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TABLE 1
North Carolina Medical Students - Retention in Primary Care Five Years After Graduation
2016 Graduates

| School<br>*Primary Care* Residency Specialty* | Total Number of 2016 Graduates | Number of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* | Percent of 2016 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* | Number of 2016 Graduates in Training or Practice in Primary Care** in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Primary Care** in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice in Primary Care** in Rural*** Counties in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Primary Care** in Rural*** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|---|---|
| Duke | 97 | 15 | 15% | 48 | 49% | 5 | 5% | 1 | 1% |
| *Family Medicine* | | | | *6* | *6%* | *2* | *2%* | *1* | *1%* |
| *Internal Medicine* | | | | *29* | *30%* | *1* | *1%* | *0* | *0%* |
| *Pediatrics* | | | | *5* | *5%* | *1* | *1%* | *0* | *0%* |
| *IM/ Peds* | | | | *4* | *4%* | *0* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *4* | *4%* | *1* | *1%* | *0* | *0%* |
| ECU | 63 | 33 | 52% | 46 | 73% | 21 | 33% | 2 | 3% |
| *Family Medicine* | | | | *14* | *22%* | *11* | *17%* | *2* | *3%* |
| *Internal Medicine* | | | | *10* | *16%* | *4* | *6%* | *0* | *0%* |
| *Pediatrics* | | | | *13* | *21%* | *4* | *6%* | *0* | *0%* |
| *IM/ Peds* | | | | *4* | *6%* | *0* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *5* | *8%* | *2* | *3%* | *0* | *0%* |
| UNC-CH | 168 | 65 | 39% | 99 | 59% | 26 | 15% | 3 | 2% |
| *Family Medicine* | | | | *21* | *13%* | *12* | *7%* | *1* | *1%* |
| *Internal Medicine* | | | | *43* | *26%* | *3* | *2%* | *1* | *1%* |
| *Pediatrics* | | | | *17* | *10%* | *6* | *4%* | *0* | *0%* |
| *IM/ Peds* | | | | *9* | *5%* | *2* | *1%* | *0* | *0%* |
| *OBGYN* | | | | *9* | *5%* | *3* | *2%* | *1* | *1%* |
| Wake Forest | 112 | 21 | 19% | 56 | 50% | 8 | 7% | 0 | 0% |
| *Family Medicine* | | | | *10* | *9%* | *0* | *0%* | *0* | *0%* |
| *Internal Medicine* | | | | *30* | *27%* | *5* | *4%* | *0* | *0%* |
| *Pediatrics* | | | | *11* | *10%* | *2* | *2%* | *0* | *0%* |
| *IM/ Peds* | | | | *1* | *1%* | *0* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *4* | *4%* | *1* | *1%* | *0* | *0%* |
| **Total** | **440** | **134** | **30%** | **249** | **57%** | **60** | **14%** | **6** | **1%** |
| *Family Medicine* | | | | *51* | *12%* | *25* | *6%* | *4* | *1%* |
| *Internal Medicine* | | | | *112* | *25%* | *13* | *3%* | *1* | *0%* |
| *Pediatrics* | | | | *46* | *10%* | *13* | *3%* | *0* | *0%* |
| *IM/ Peds* | | | | *18* | *4%* | *2* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *22* | *5%* | *7* | *2%* | *1* | *0%* |

*Primary Care Residency Specialty includes Family Medicine, General Pediatric Medicine, General Internal Medicine, Internal Medicine/Pediatrics, and Obstetrics/Gynecology. Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial primary care figures.

**Primary care definitions are based on NC Medical Board licensure data and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology).

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

TABLE 2
North Carolina Medical Students-Retention in NC and in Rural NC
2016 Graduates

| School<br>*Primary Care**<br>*Residency Specialty* | Total Number of 2016 Graduates | Number of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice in Rural*** Counties in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Rural*** Counties in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice in Primary Care** in Rural*** Counties in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Primary Care** in Rural*** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|
| Duke | 97 | 15 | 15% | 1 | 1% | 1 | 1% |
| *Family Medicine* | | | | | | *1* | *1%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| ECU | 63 | 33 | 52% | 3 | 5% | 2 | 3% |
| *Family Medicine* | | | | | | *2* | *3%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| UNC-CH | 168 | 65 | 39% | 5 | 3% | 3 | 2% |
| *Family Medicine* | | | | | | *1* | *1%* |
| *Internal Medicine* | | | | | | *1* | *1%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *1* | *1%* |
| Wake Forest | 112 | 21 | 19% | 0 | 0% | 0 | 0% |
| *Family Medicine* | | | | | | *0* | *0%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| **Total** | **440** | **134** | **30%** | **9** | **2%** | **6** | **1%** |
| *Family Medicine* | | | | | | *4* | *0.9%* |
| *Internal Medicine* | | | | | | *1* | *0.2%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *1* | *0.2%* |

*Primary Care Residency Specialty includes Family Medicine, General Pediatric Medicine, General Internal Medicine, Internal Medicine/Pediatrics, and Obstetrics/Gynecology. Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial primary care figures.

** Primary care definitions are based on NC Medical Board licensure data (for NC physicians) and AAMC data (for non-NC physicians) and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology).

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:

NC AHEC Program

Cecil G. Sheps Center for Health Services Research

TABLE 3
North Carolina Medical Students – Initial Choice of Psychiatry Residency
2016 Graduates

| School | Total Number of 2016 Graduates | Number of 2016 Graduates in Training or Practice with an Initial Residency Choice of Psychiatry | Percent of 2016 Graduates in Training or Practice with an Initial Residency Choice of Psychiatry | Number of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice in Psychiatry* in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Psychiatry* in North Carolina as of 2021 | Number of 2016 Graduates in Training or Practice in Psychiatry* in Rural** Counties in North Carolina as of 2021 | Percent of 2016 Graduates in Training or Practice in Psychiatry* in Rural** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|---|---|
| Duke | 97 | 5 | 5% | 15 | 15% | 0 | 0% | 0 | 0% |
| *Psychiatry* | | *3* | *3%* | | | *0* | *0%* | *0* | 0% |
| *Child and Adolescent Psychiatry †* | | *1* | *1%* | | | *0* | *0%* | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *1* | *1%* | | | *0* | *0%* | *0* | 0% |
| *Psychosomatic Medicine* | | *0* | *0%* | | | *0* | *0%* | *0* | 0% |
| ECU | 63 | 1 | 2% | 33 | 52% | 1 | 2% | 0 | 0% |
| *Psychiatry* | | *1* | *2%* | | | *1* | *2%* | *0* | *0%* |
| *Child and Adolescent Psychiatry* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Internal Medicine/Psychiatry* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Psychosomatic Medicine* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| UNC-CH | 168 | 13 | 8% | 65 | 39% | 8 | 5% | 0 | 0% |
| *Psychiatry* | | *13* | *8%* | | | *3* | *2%* | *0* | 0% |
| *Child and Adolescent Psychiatry* | | *0* | *0%* | | | *4* | *2%* | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *0* | *0%* | | | *0* | *0%* | *0* | 0% |
| *Psychosomatic Medicine* | | *0* | *0%* | | | *1* | *1%* | *0* | 0% |
| Wake Forest | 112 | 6 | 5% | 21 | 19% | 0 | 0% | 0 | 0% |
| *Psychiatry* | | *6* | *5%* | | | *0* | *0%* | *0* | 0% |
| *Child and Adolescent Psychiatry* | | *0* | *0%* | | | *0* | *0%* | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *0* | *0%* | | | *0* | *0%* | *0* | 0% |
| *Psychosomatic Medicine* | | *0* | *0%* | | | *0* | *0%* | *0* | 0% |
| **Total** | **440** | **25** | **6%** | **134** | **30%** | **9** | **2%** | **0** | **0%** |
| *Psychiatry* | | 23 | *5%* | | | *4* | *1%* | *0* | *0%* |
| *Child and Adolescent Psychiatry* | | 1 | *0%* | | | *4* | *1%* | *0* | *0%* |
| *Internal Medicine/Psychiatry* | | 1 | *0%* | | | *0* | *0%* | 0 | *0%* |
| *Psychosomatic Medicine* | | 0 | *0%* | | | *1* | *0%* | 0 | *0%* |

*Psychiatry definitions are based on NC Medical Board licensure data and include Psychiatry, Child and Adolescent Psychiatry, Psychoanalysis, Forensic Psychiatry, Psychosomatic Medicine, Psychiatry/Geriatric, Family Medicine-Psychiatry, Internal Medicine-Psychiatry, and Pediatrics-Psychiatry.

**"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

† Includes initial residency choice of "Pediatrics/Psychiatry/Child and Adolescent Psychiatry"

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:
NC AHEC Program
Cecil G. Sheps Center for Health Services Research

TABLE 4
North Carolina Medical Students – Retention by Medical Specialty in NC
2016 Graduates

| | Physician Specialty | | | | | |
|---|---|---|---|---|---|---|
| | **Family Medicine** | **Internal Medicine** | **Pediatrics** | **IM/ Peds** | **OBGYN** | **Psychiatry** |
| Number of 2016 Graduates by Initial Specialty Match* | 51 | 112 | 46 | 18 | 22 | 25 |
| Number *(Percent)* of 2016 Graduates in Training or Practice as Generalist** in Specialty in North Carolina as of 2021 | 24 *(47%)* | 13 *(12%)* | 13 *(28%)* | 2 *(11%)* | 7 *(32%)* | 9 *(36%)* |
| Number *(Percent)* of 2016 Graduates in Training or Practice As Generalist** in Specialty in Rural*** Counties in North Carolina as of 2021 | 4 *(8%)* | 1 *(1%)* | 0 *(0%)* | 0 *(0%)* | 1 *(5%)* | 0 *(0%)* |

*2016 Data Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial match to Internal Medicine.

**Practice specialty definitions are based on NC Medical Board licensure data (for NC physicians) and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology); General Surgery (General Surgery, Abdominal Surgery, Colon & Rectal Surgery, Critical Care Surgery, Head and Neck Surgery, Oncology Surgery, Pediatric Surgery, Transplant Surgery, Trauma Surgery, and Vascular Surgery); and Psychiatry (Psychiatry, Child and Adolescent Psychiatry, Psychoanalysis, Forensic Psychiatry, Psychosomatic Medicine, Psychiatry/Geriatric, Family Medicine-Psychiatry, Internal Medicine-Psychiatry, and Pediatrics-Psychiatry.)

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

TABLE 5
North Carolina Medical Students – Initial Choice of Primary Care Residency
2011 Graduates

| School<br>*Primary Care* Residency Specialty* | Total Number of 2016 Graduates | Number of 2016 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* | Percent of 2016 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* |
|---|---|---|---|
| Duke | 97 | 48 | 49% |
| *Family Medicine* | | *6* | *6%* |
| *Internal Medicine* | | *29* | *30%* |
| *Pediatrics* | | *5* | *5%* |
| *IM/ Peds* | | *4* | *4%* |
| *OBGYN* | | *4* | *4%* |
| ECU | 63 | 46 | 73% |
| *Family Medicine* | | *14* | *22%* |
| *Internal Medicine* | | *10* | *16%* |
| *Pediatrics* | | *13* | *21%* |
| *IM/ Peds* | | *4* | *6%* |
| *OBGYN* | | *5* | *8%* |
| UNC-CH | 168 | 99 | 59% |
| *Family Medicine* | | *21* | *13%* |
| *Internal Medicine* | | *43* | *26%* |
| *Pediatrics* | | *17* | *10%* |
| *IM/ Peds* | | *9* | *5%* |
| *OBGYN* | | *9* | *5%* |
| Wake Forest | 112 | 56 | 50% |
| *Family Medicine* | | *10* | *9%* |
| *Internal Medicine* | | *30* | *27%* |
| *Pediatrics* | | *11* | *10%* |
| *IM/ Peds* | | *1* | *1%* |
| *OBGYN* | | *4* | *4%* |
| **Total** | **440** | **249** | **57%** |
| *Family Medicine* | | *51* | *12%* |
| *Internal Medicine* | | *112* | *25%* |
| *Pediatrics* | | *46* | *10%* |
| *IM/ Peds* | | *18* | *4%* |
| *OBGYN* | | *22* | *5%* |

*2011 Primary Care Residency Specialty includes Family Medicine, General Pediatric Medicine, General Internal Medicine, Internal Medicine/Pediatrics, and Obstetrics/Gynecology. Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial primary care figures.

Sources:

NC Medical Board

Compiled by:

NC AHEC Program

Cecil G. Sheps Center for Health Services Research

TABLE 6
North Carolina Medical Students – Retention in Primary Care in NC 10 Years After Graduation
2011 Graduates

| School<br>*Primary Care**<br>*Residency Specialty* | Total Number of 2011 Graduates | Number of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* | Percent of 2011 Graduates in Training or Practice with an Initial Residency Choice of Primary Care* | Number of 2011 Graduates in Training or Practice in Primary Care** in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Primary Care** in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in Primary Care** in Rural*** Counties in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Primary Care** in Rural*** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|---|---|
| Duke | 96 | 10 | 10% | 47 | 49% | 0 | 0% | 0 | 0% |
| *Family Medicine* | | | | *4* | *4%* | *0* | *0%* | *0* | *0%* |
| *Internal Medicine* | | | | *28* | *29%* | *0* | *0%* | *0* | *0%* |
| *Pediatrics* | | | | *8* | *8%* | *0* | *0%* | *0* | *0%* |
| *IM/ Peds* | | | | *5* | *5%* | *0* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *2* | *2%* | *0* | *0%* | *0* | *0%* |
| ECU | 69 | 32 | 46% | 42 | 61% | 18 | 26% | 5 | 7% |
| *Family Medicine* | | | | *14* | *20%* | *9* | *13%* | *4* | *6%* |
| *Internal Medicine* | | | | *7* | *10%* | *2* | *3%* | *0* | *0%* |
| *Pediatrics* | | | | *12* | *17%* | *3* | *4%* | *0* | *0%* |
| *IM/ Peds* | | | | *6* | *9%* | *1* | *1%* | *0* | *0%* |
| *OBGYN* | | | | *3* | *4%* | *3* | *4%* | *1* | *1%* |
| UNC-CH | 151 | 62 | 41% | 88 | 58% | 21 | 14% | 2 | 1% |
| *Family Medicine* | | | | *16* | *11%* | *4* | *3%* | *2* | *1%* |
| *Internal Medicine* | | | | *35* | *23%* | *4* | *3%* | *0* | *0%* |
| *Pediatrics* | | | | *17* | *11%* | *7* | *5%* | *0* | *0%* |
| *IM/ Peds* | | | | *6* | *4%* | *2* | *1%* | *0* | *0%* |
| *OBGYN* | | | | *14* | *9%* | *4* | *3%* | *0* | *0%* |
| Wake Forest | 117 | 41 | 35% | 74 | 63% | 14 | 12% | 2 | 2% |
| *Family Medicine* | | | | *13* | *11%* | *9* | *8%* | *1* | *1%* |
| *Internal Medicine* | | | | *29* | *25%* | *1* | *1%* | *0* | *0%* |
| *Pediatrics* | | | | *25* | *21%* | *3* | *3%* | *1* | *1%* |
| *IM/ Peds* | | | | *1* | *1%* | *0* | *0%* | *0* | *0%* |
| *OBGYN* | | | | *6* | *5%* | *1* | *1%* | *0* | *0%* |
| **Total** | **433** | **145** | **33%** | **251** | **58%** | **53** | **12%** | **9** | **2%** |
| *Family Medicine* | | | | *47* | *11%* | *22* | *5%* | *7* | *2%* |
| *Internal Medicine* | | | | *99* | *23%* | *7* | *2%* | *0* | *0%* |
| *Pediatrics* | | | | *62* | *14%* | *13* | *3%* | *1* | *0%* |
| *IM/ Peds* | | | | *18* | *4%* | *3* | *1%* | *0* | *0%* |
| *OBGYN* | | | | *25* | *6%* | *8* | *2%* | *1* | *0%* |

*2011 Primary Care Residency Specialty includes Family Medicine, General Pediatric Medicine, General Internal Medicine, Internal Medicine/Pediatrics, and Obstetrics/Gynecology. Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial primary care figures.

** As of 2017, primary care definitions are based on NC Medical Board licensure data (for NC physicians) and AAMC data (for non-NC physicians) and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology).

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:

NC AHEC Program

Cecil G. Sheps Center for Health Services Research

TABLE 7
North Carolina Medical Students-Retention in NC and in Rural NC
2011 Graduates

| School<br>*Primary Care* Residency Specialty* | Total Number of 2011 Graduates | Number of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in Rural*** Counties in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Rural*** Counties in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in Primary Care** in Rural*** Counties in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Primary Care** in Rural*** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|
| Duke | 96 | 10 | 10% | 0 | 0% | 0 | 0% |
| *Family Medicine* | | | | | | *0* | *0%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| ECU | 69 | 32 | 46% | 7 | 10% | 5 | 7% |
| *Family Medicine* | | | | | | *4* | *6%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *1* | *1%* |
| UNC-CH | 151 | 62 | 41% | 4 | 3% | 2 | 1% |
| *Family Medicine* | | | | | | *2* | *1%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *0* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| Wake Forest | 117 | 41 | 35% | 2 | 2% | 2 | 2% |
| *Family Medicine* | | | | | | *1* | *1%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *1* | *1%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *0* | *0%* |
| **Total** | **433** | **145** | **33%** | **13** | **3%** | **9** | **2%** |
| *Family Medicine* | | | | | | *7* | *1.6%* |
| *Internal Medicine* | | | | | | *0* | *0%* |
| *Pediatrics* | | | | | | *1* | *0%* |
| *IM/ Peds* | | | | | | *0* | *0%* |
| *OBGYN* | | | | | | *1* | *0.2%* |

*Primary Care Residency Specialty includes Family Medicine, General Pediatric Medicine, General Internal Medicine, Internal Medicine/Pediatrics, and Obstetrics/Gynecology. Source: Association of American Medical Colleges (AAMC).

**Primary care definitions are based on NC Medical Board licensure data and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology).

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:

NC AHEC Program

Cecil G. Sheps Center for Health Services Research

TABLE 8
North Carolina Medical Students – Initial Choice of Psychiatry Residency
2011 Graduates

| School | Total Number of 2011 Graduates | Number of 2011 Graduates in Training or Practice with an Initial Residency Choice of Psychiatry | Percent of 2011 Graduates in Training or Practice with an Initial Residency Choice of Psychiatry | Number of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in Psychiatry* in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Psychiatry* in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in Psychiatry* in Rural** Counties in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in Psychiatry* in Rural** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|---|---|
| **Duke** | 96 | 3 | 3% | 10 | 10% | 0 | 0% | 0 | 0% |
| *Psychiatry* | | *2* | *2%* | | | *0* | *0%* | *0* | 0% |
| *Child & Adolescent Psychiatry* | | *0* | *0%* | | | *0* | | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *1* | *1%* | | | *0* | | *0* | 0% |
| **ECU** | 69 | 4 | 6% | 32 | 46% | 1 | 1% | 0 | 0% |
| *Psychiatry* | | *3* | *4%* | | | *1* | *1%* | *0* | *0%* |
| *Child & Adolescent Psychiatry* | | *0* | *0%* | | | *0* | | *0* | *0%* |
| *Internal Medicine/Psychiatry* | | *1* | *1%* | | | *0* | | *0* | *0%* |
| **UNC-CH** | 151 | 8 | 5% | 62 | 41% | 4 | 3% | 0 | 0% |
| *Psychiatry* | | *8* | *5%* | | | *3* | *2%* | *0* | 0% |
| *Child & Adolescent Psychiatry* | | *0* | *0%* | | | *1* | *1%* | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *0* | *0%* | | | *0* | | *0* | 0% |
| **Wake Forest** | 117 | 1 | 1% | 41 | 35% | 1 | 1% | 0 | 0% |
| *Psychiatry* | | *1* | *1%* | | | *0* | *0%* | *0* | 0% |
| *Child & Adolescent Psychiatry* | | *0* | *0%* | | | *1* | | *0* | 0% |
| *Internal Medicine/Psychiatry* | | *0* | *0%* | | | *0* | | *0* | 0% |
| **Total** | **433** | **16** | 4% | **145** | **33%** | **6** | **1%** | **0** | **0%** |
| *Psychiatry* | | *14* | *3%* | | | *4* | *1%* | *0* | *0%* |
| *Child & Adolescent Psychiatry* | | *0* | *0%* | | | *2* | *0.5%* | *0* | *0%* |
| *Internal Medicine/Psychiatry* | | *2* | *0%* | | | *0* | *0%* | *0* | *0%* |

*Psychiatry definitions are based on NC Medical Board licensure data and include Psychiatry, Child and Adolescent Psychiatry, Psychoanalysis, Forensic Psychiatry, Psychosomatic Medicine, Psychiatry/Geriatric, Family Medicine-Psychiatry, Internal Medicine-Psychiatry, and Pediatrics-Psychiatry.

**"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:
NC AHEC Program
Cecil G. Sheps Center for Health Services Research

TABLE 9

North Carolina Medical Students – Initial Choice of General Surgery Residency

2011 Graduates

| School | Total Number of 2011 Graduates | Number of 2011 Graduates in Training or Practice with an Initial Residency Choice of General Surgery | Percent of 2011 Graduates in Training or Practice with an Initial Residency Choice of General Surgery | Number of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in General Surgery* in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in General Surgery* in North Carolina as of 2021 | Number of 2011 Graduates in Training or Practice in General Surgery* in Rural** Counties in North Carolina as of 2021 | Percent of 2011 Graduates in Training or Practice in General Surgery* in Rural** Counties North Carolina as of 2021 |
|---|---|---|---|---|---|---|---|---|---|
| **Duke** | 96 | 7 | 7% | 10 | 10% | 0 | 0% | 0 | 0% |
| *General Surgery* | | *7* | *7%* | | | *0* | *0%* | *0* | *0%* |
| *Abdominal surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Critical Care Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Head and Neck Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Oncology Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Vascular Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| **ECU** | 69 | 11 | 16% | 32 | 46% | 2 | 3% | 0 | 0% |
| *General Surgery* | | *11* | *16%* | | | *1* | *1%* | *0* | *0%* |
| *Abdominal surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Critical Care Surgery* | | *0* | *0%* | | | *1* | *1%* | *0* | *0%* |
| *Head and Neck Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Oncology Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Vascular Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| **UNC-CH** | 151 | 17 | 11% | 62 | 41% | 6 | 4% | 1 | 1% |
| *General Surgery* | | *16* | *11%* | | | *3* | *2%* | *1* | *1%* |
| *Abdominal surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Critical Care Surgery* | | *0* | *0%* | | | *1* | *1%* | *0* | *0%* |
| *Head and Neck Surgery* | | *0* | *0%* | | | *1* | *1%* | *0* | *0%* |
| *Oncology Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Vascular Surgery* | | *1* | *1%* | | | *1* | *1%* | *0* | *0%* |
| **Wake Forest** | 117 | 12 | 10% | 41 | 35% | 4 | 3% | 0 | 0% |
| *General Surgery* | | *12* | *10%* | | | *1* | *1%* | *0* | *0%* |
| *Abdominal surgery* | | *0* | *0%* | | | *1* | *1%* | *0* | *0%* |
| *Critical Care Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Head and Neck Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| *Oncology Surgery* | | *0* | *0%* | | | *2* | *2%* | *0* | *0%* |
| *Vascular Surgery* | | *0* | *0%* | | | *0* | *0%* | *0* | *0%* |
| **Total** | **433** | **47** | 11% | **145** | **33%** | **12** | **3%** | **1** | **0%** |
| *General Surgery* | | *46* | *0%* | | | *5* | *1%* | *1* | *0%* |
| *Abdominal surgery* | | *0* | *0%* | | | *1* | *0.2%* | *0* | *0%* |
| *Critical Care Surgery* | | *0* | *0%* | | | *2* | *0.5%* | *0* | *0%* |
| *Head and Neck Surgery* | | *0* | *0%* | | | *1* | *0.2%* | *0* | *0%* |
| *Oncology Surgery* | | *0* | *11%* | | | *2* | *0.5%* | *0* | *0%* |
| *Vascular Surgery* | | *1* | *11%* | | | *1* | *0.2%* | *0* | *0%* |

*General Surgery definitions are based on NC Medical Board licensure data (for NC physicians) and include General Surgery, Abdominal Surgery, Colon & Rectal Surgery, Critical Care Surgery, Head and Neck Surgery, Oncology Surgery, Pediatric Surgery, Transplant Surgery, Trauma Surgery, and Vascular Surgery.

**"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

Sources:

Association of American Medical Colleges

NC Medical Board

Compiled by:

NC AHEC Program

Cecil G. Sheps Center for Health Services Research

TABLE 10
North Carolina Medical Students – Retention by Medical Specialty in NC
2011 Graduates

| | Physician Specialty | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Family Medicine** | **Internal Medicine** | **Pediatrics** | **IM/ Peds** | **OBGYN** | **General Surgery** | **Psychiatry** |
| Number of 2011 Graduates by Initial Specialty Match* | 47 | 99 | 62 | 18 | 25 | 46 | 14 |
| Number *(Percent)* of 2011 Graduates in Training or Practice as Generalist** in Specialty in North Carolina as of 2021 | 22 *(47%)* | 7 *(7%)* | 13 *(21%)* | 3 *(17%)* | 8 *(32%)* | 12 *(26%)* | 4 *(29%)* |
| Number *(Percent)* of 2011 Graduates in Training or Practice As Generalist** in Specialty in Rural*** Counties in North Carolina as of 2021 | 7 *(15%)* | 0 *(0%)* | 1 *(2%)* | 0 *(0%)* | 1 *(4%)* | 1 *(2%)* | 0 *(0%)* |

*2011 Data Source: Association of American Medical Colleges (AAMC). Internal medicine in this case also includes "medicine - preliminary," which likely overestimates the initial match to Internal Medicine.

**Practice specialty definitions are based on NC Medical Board licensure data (for NC physicians) and include Family Medicine (Family Medicine, Family Medicine-Adolescent Medicine, Family Medicine-Geriatric, Family Medicine-Sports Medicine, General Practice; Internal Medicine (Internal Medicine, Internal Medicine-Geriatric); Pediatrics (Pediatrics, Pediatrics-Adolescent, Pediatric-Sports Medicine); Internal Medicine-Pediatrics (Internal Medicine-Pediatrics, Internal Medicine-Adolescent Medicine); OBGYN (Obstetrics & Gynecology, Obstetrics, Gynecology); General Surgery (General Surgery, Abdominal Surgery, Colon & Rectal Surgery, Critical Care Surgery, Head and Neck Surgery, Oncology Surgery, Pediatric Surgery, Transplant Surgery, Trauma Surgery, and Vascular Surgery); and Psychiatry (Psychiatry, Child and Adolescent Psychiatry, Psychoanalysis, Forensic Psychiatry, Psychosomatic Medicine, Psychiatry/Geriatric, Family Medicine-Psychiatry, Internal Medicine-Psychiatry, and Pediatrics-Psychiatry.)

***"Rural" is based on 2017 Core-Based Statistical Area (CBSA) definitions, and includes counties that are "micropolitan" and "outside of CBSAs." Using this definition, NC has 54 rural counties.

TABLE 11
NC Medical School Graduates - Initial Residency Matches
Class of 2021

| School<br>*Residency Specialty* | Total Number of 2021 Graduates | Number of 2021 Graduates not in Training or Practice | Number of 2021 Graduates with an Initial Residency Match | Number of 2021 Graduates with an Initial Residency Match in NC (All Specialties) | Percent of 2021 Graduates with an Initial Residency Match in NC (All Specialties) | Number of 2021 Graduates with an Initial Residency Choice of Primary Care, Psychiatry, or General Surgery | Percent of 2021 Graduates with an Initial Residency Choice of Primary Care, Psychiatry, or General Surgery | Number of 2021 Graduates with an Initial Residency Choice of Primary Care, Psychiatry, or General Surgery **in NC** | Percent of 2021 Graduates with an Initial Residency Choice of Primary Care, Psychiatry, or General Surgery **in NC** |
|---|---|---|---|---|---|---|---|---|---|
| Campbell | 152 | 1 | 151 | 38 | 25% | 97 | 64% | 25 | 17% |
| *Family Medicine* | | | | | | *25* | *17%* | *7* | *5%* |
| *Internal Medicine* | | | | | | *30* | *20%* | *7* | *5%* |
| *Pediatrics* | | | | | | *17* | *11%* | *2* | *1%* |
| *IM/ Peds* | | | | | | *4* | *3%* | *1* | *1%* |
| *OBGYN* | | | | | | *5* | *3%* | *1* | *1%* |
| *Psychiatry* | | | | | | *12* | *8%* | *6* | *4%* |
| *General Surgery* | | | | | | *4* | *3%* | *1* | *1%* |
| Duke | 112 | 3 | 109 | 30 | 28% | 64 | 59% | 20 | 18% |
| *Family Medicine* | | | | | | *2* | *2%* | *1* | *1%* |
| *Internal Medicine* | | | | | | *32* | *29%* | *9* | *8%* |
| *Pediatrics* | | | | | | *6* | *6%* | *1* | *1%* |
| *IM/ Peds* | | | | | | *5* | *5%* | *3* | *3%* |
| *OBGYN* | | | | | | *9* | *8%* | *4* | *4%* |
| *Psychiatry* | | | | | | *5* | *5%* | *1* | *1%* |
| *General Surgery* | | | | | | *5* | *5%* | *1* | *1%* |
| ECU | 80 | 0 | 80 | 27 | 34% | 35 | 44% | 23 | 29% |
| *Family Medicine* | | | | | | *7* | *9%* | *7* | *9%* |
| *Internal Medicine* | | | | | | *8* | *10%* | *8* | *10%* |
| *Pediatrics* | | | | | | *6* | *8%* | *3* | *4%* |
| *IM/ Peds* | | | | | | *1* | *1%* | *1* | *1%* |
| *OBGYN* | | | | | | *4* | *5%* | *3* | *4%* |
| *Psychiatry* | | | | | | *1* | *1%* | *1* | *1%* |
| *General Surgery* | | | | | | *8* | *10%* | *0* | *0%* |
| UNC-CH | 194 | 3 | 191 | 82 | 43% | 115 | 60% | 54 | 28% |
| *Family Medicine* | | | | | | *17* | *9%* | *14* | *7%* |
| *Internal Medicine* | | | | | | *29* | *15%* | *12* | *6%* |
| *Pediatrics* | | | | | | *18* | *9%* | *7* | *4%* |
| *IM/ Peds* | | | | | | *4* | *2%* | *3* | *2%* |
| *OBGYN* | | | | | | *19* | *10%* | *9* | *5%* |
| *Psychiatry* | | | | | | *15* | *8%* | *7* | *4%* |
| *General Surgery* | | | | | | *13* | *7%* | *2* | *1%* |
| Wake Forest | 143 | 0 | 143 | 32 | 22% | 72 | 50% | 17 | 12% |
| *Family Medicine* | | | | | | *14* | *10%* | *4* | *3%* |
| *Internal Medicine* | | | | | | *24* | *17%* | *8* | *6%* |
| *Pediatrics* | | | | | | *12* | *8%* | *0* | *0%* |
| *IM/ Peds* | | | | | | *1* | *1%* | *0* | *0%* |
| *OBGYN* | | | | | | *2* | *1%* | *0* | *0%* |
| *Psychiatry* | | | | | | *8* | *6%* | *5* | *3%* |
| *General Surgery* | | | | | | *11* | *8%* | *0* | *0%* |
| **Total** | **681** | **7** | **674** | **209** | **31%** | **383** | **57%** | **139** | **21%** |
| *Family Medicine* | | | | | | *65* | *10%* | *33* | *5%* |
| *Internal Medicine* | | | | | | *123* | *18%* | *44* | *7%* |
| *Pediatrics* | | | | | | *59* | *9%* | *13* | *2%* |
| *IM/ Peds* | | | | | | *15* | *2%* | *8* | *1%* |
| *OBGYN* | | | | | | *39* | *6%* | *17* | *3%* |
| *Psychiatry* | | | | | | *41* | *6%* | *20* | *3%* |
| *General Surgery* | | | | | | *41* | *6%* | *4* | *1%* |

Sources: Timmery Frey, MPH, Project Manager, Student Affairs, Bowman Gray Center for Medical Education, Wake Forest School of Medicine; Gaye Tennison, Associate Registrar, Brody School of Medicine, East Carolina University; Sheba Hall, Staff Assistant, Office of Student Affairs, Duke University School of Medicine; Matthew Huff, MHA, Associate DIO and Director of Post-Graduate Affairs, Campbell University Jerry M. Wallace School of Osteopathic Medicine; Elizabeth Steadman, PhD, MA, Senior Director of Medical Student Education, Office of Medical Education, University of North Carolina School of Medicine.

**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 from the AAMC are used to determine initial choice of residency. AAMC does 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 Tables:** 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 AAMC data and denoted by the use of one asterisk) and for current practice or training area (identified using NCMB data for physicians in NC and denoted by the use of two asterisks).

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.

**State-Supported Students at Duke and Wake Forest Medical Schools:** Prior analyses tracked outcomes just for the subgroup of students that received the state IMEO funds (roughly 35% of the Wake Forest Students and 20% of the Duke students). Students were identified using data from NCSEAA. The IMEO grant program was repealed in 2009 legislation (see Senate Bill 202) and tracking for those students is no longer a component of this analysis.