

Trends in Medical Education in North Carolina

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Introduction

The North Carolina Institute of Medicine estimates that by 2014 about 1.1 million North Carolinians will gain access to health insurance under the provisions of the Patient Protection and Affordable Care Act (Public Law 111-148, 2010).¹ Chronic disease continues to be a serious health burden and North Carolina consistently ranks in the bottom third of states in many health outcomes. The state is 32nd in overall health outcomes, 36th in diabetes and smoking and 30th in obesity rates.² In 2008, heart disease, cancer, chronic lower respiratory disease and stroke were the top four leading causes of death in North Carolina.³ Experiments with new models of care, such as the Patient-Centered Medical Home, are becoming increasingly prevalent as one mechanism to address the growing burden of chronic disease and improve health outcomes. These three forces – insurance expansion, the rise in chronic disease and the implementation of new models of care – have called into question whether North Carolina (NC) will have an adequate supply, distribution and skill mix of physicians needed to meet the state's health care needs.

The University of North Carolina at Chapel Hill (UNC-CH) and East Carolina University (ECU) have recently expanded medical school class sizes and would expand further if additional resources were available. As budgets tighten and competing funding priorities emerge, it has become increasingly important to evaluate the state's return on investment in medical education. How many NC-educated physicians stay in-state after graduating? Which specialties do graduates choose to enter? Do NC graduates practice in areas of the state

where they are most needed? This report examines how retention in North Carolina after graduation, choice of specialty, and practice location vary between North Carolina's four medical schools.

If the demand for health care increases as rapidly as some have projected, policy makers, educators, employers and other stakeholders will need to take a more proactive role in health workforce planning.⁴ The goal of this report is to provide the data needed to plan for the future supply, specialty mix and distribution of physicians needed when health reform is implemented in 2014 and beyond.

Methods

The analysis draws on physician data housed at the North Carolina Health Professions Data System (HPDS) at the Cecil G. Sheps Center for Health Services Research (Sheps Center) at the University of North Carolina at Chapel Hill. The data are self-reported and are derived from the NC Medical Board's initial licensure and annual renewal forms, completed by all physicians licensed to practice in NC. Data include active, in-state, non-federal, non-resident-in-training physicians. Primary care includes general practice, family practice, general internal medicine, pediatrics, and obstetrics and gynecology.⁵

Metropolitan and nonmetropolitan status definitions were derived from the Office of Management and Budget's Core Based Statistical Areas (CBSAs), and are current as of the November 2009 update. Nonmetropolitan counties include micropolitan counties and counties outside of CBSAs.⁶

North Carolina Health Professions Data System

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Findings

North Carolina lags behind the nation in medical students per capita

North Carolina has consistently lagged behind the national average of medical students per capita. In 2010, NC had 19.8 students per 100,000 population compared to 23.5 students nationally. North Carolina also had fewer medical students per 100,000 population compared to the neighboring states of South Carolina (21.2), Virginia (22.6), and Tennessee (27.8) but had more students than Georgia (18.3) in 2010.⁷

North Carolina's two public medical schools have responded to the projected increase in physician demand by expanding enrollment. Over the past two years, UNC-CH increased the number of matriculating medical students by 12.5%, from 160 students in 2010 to 180 students in 2012. Of the 180 students, 11 will complete their second two years of medical school at the satellite campus in Asheville, a collaboration between Mission Health System and Mountain AHEC, and 15 students will finish their last two years at the satellite campus in Charlotte at Carolinas Medical Center. ECU has also expanded enrollment by about 10% in the past five years and matriculated 80 students in the fall of 2012. Campbell University, a private institution, is building an osteopathic school of medicine that will admit its first class of 150 students in 2013.

These expansions will increase North Carolina's ratio of medical students to population, but only about 40% of NC graduates ultimately end up in practice in the state. North Carolina is a net importer of medical students and will continue to rely on attracting physicians from other states that are also increasing medical school slots and opening new medical schools. For example, within the Southeast region in the past two years, two allopathic medical schools have opened—Virginia Tech Carilion School of Medicine, which will graduate their first class of 42 students in 2014, and the University of South Carolina School of Medicine-Greenville campus, which will graduate 50 students in 2016, eventually expanding enrollment to 100 graduates in the class of 2019.

A declining number of North Carolina-trained physicians retained in state

In 2010, about a quarter (25.3%) of physicians in active practice reported graduating from medical school in North Carolina (n=5,221). While the percentage of active North Carolina physicians who trained elsewhere in the United States and in Canada has hovered around 61% of the total workforce, the percentage of physicians trained in-state has decreased from 31.6% to 25.3% between 1990 and 2010. International medical graduates (IMGs) have increasingly filled the gap from declining in-state retention, increasing from 7.9% of the workforce in 1990 to 13.2% of the workforce in 2010 (**Figure 1**). Despite these increases, North Carolina has a lower percentage of IMGs than the US median of 17.8%.⁸

On average, the percent of North Carolina's physician workforce that trained in-state has been declining, but the trends are not the same across the state's four medical schools (**Figure 2**). Over the past twenty years, UNC-CH has consistently made up about 44% of the active physician workforce that went to medical school in-state. The percentage from ECU has also grown significantly, from 4.4% of NC educated physicians in 1990 to 16.1% in 2010. The state's two private schools, Wake Forest and Duke, have contributed a decreasing percentage of workforce educated in the state, declining 3.9 and 7.5 percentage points respectively.

The percentage of North Carolina's primary care physician workforce that trained in-state has declined more rapidly than the physician workforce overall. North Carolina medical schools' contribution to the primary care workforce declined from 36.2% in 1990 to 27.7% in 2010 (**Figure 3**). Over the same period, IMGs increased from 6.6% of the active North Carolina primary care physician workforce in 1990 to 16.7% in 2010.

IMG workforce more likely to be in primary care than NC graduates

Differences in physician specialty by medical school are shown in **Figure 4**. Slightly more than half (51.6%) of physicians in the North Carolina workforce

Figure 1. Active Licensed North Carolina Physicians by Medical School Location, 1990-2010

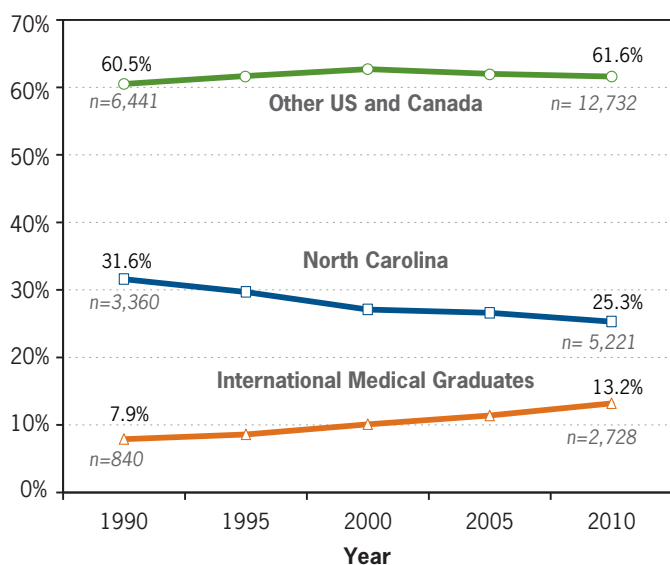


Figure 2. Active Licensed North Carolina Educated Physicians by North Carolina Medical School Location, 1990-2010

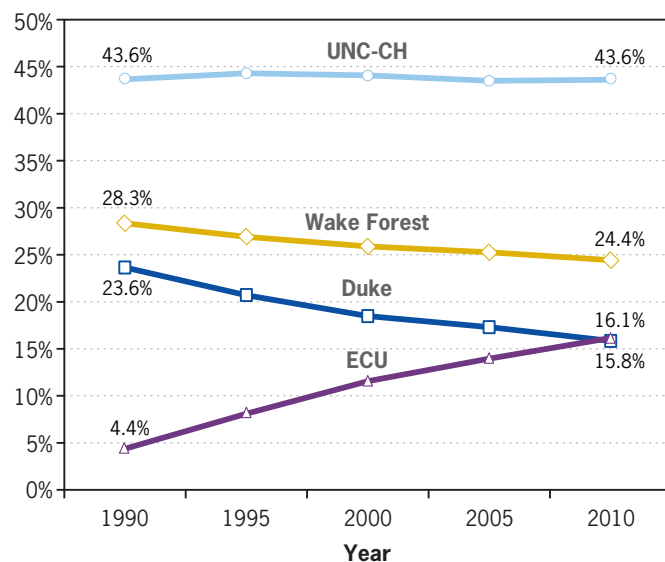


Figure 3. Active Licensed Primary Care Physicians in North Carolina by Medical School Location, 1990-2010

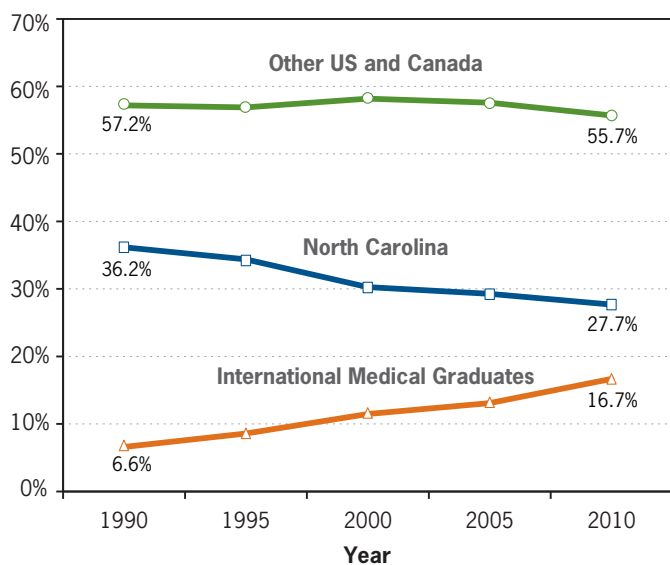
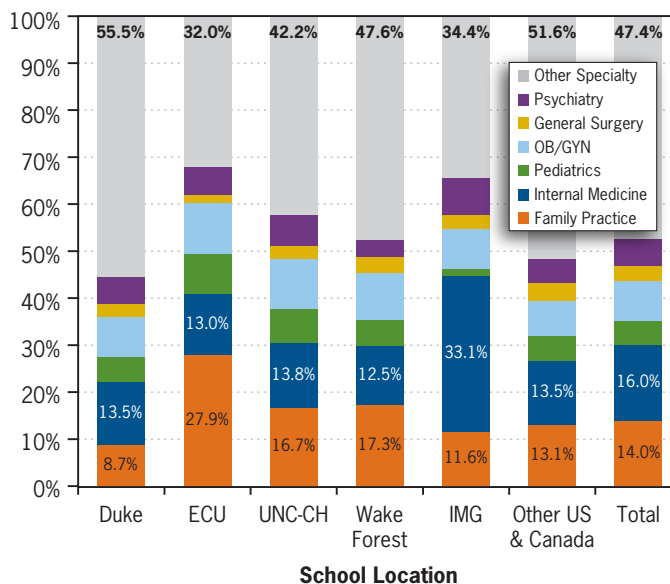


Figure 4. Specialty of Active Physicians in North Carolina in 2010 by Medical School Attended



that trained elsewhere in the US or in Canada became specialists, compared to 44.0% of physicians who attended a North Carolina medical school and 34.4% of IMGs. About half of those who graduated from in-state private institutions went into specialty care (Duke 55.5% , Wake Forest 47.6%) compared to 42.2% physicians who graduated from UNC and 32.0% of ECU graduates.

Concerns about North Carolina's primary care workforce supply: medical student tracking

In 1993 the North Carolina legislature, concerned about a primary care workforce shortage, mandated that the University of North Carolina Board of Governors track the number of graduates going into primary care from each the state's medical schools (Senate Bill 27) and to report this information annually

Table 1: Five-Year In-State Retention of 2005 North Carolina Medical School Graduate in Primary Care

School	2005 Graduates	% Initially Selecting PC Specialty	2010: % In Primary Care (Anywhere in the US)	2010: % In Primary Care (in NC)
Duke	78	60%	23%	8%
ECU	73	82%	59%	41%
UNC	152	60%	38%	21%
Wake Forest	105	60%	37%	17%
Total	408	64%	38%	21%

Source: North Carolina Health Professions Data System with data derived from ECU, Duke, UNC-CH, Wake Forest, AAMC and the North Carolina Medical Board, 2011.

to the General Assembly. The legislature set the ambitious goal of 60% retention in primary care for UNC and ECU graduates and 50% for Duke and Wake Forest graduates.⁵

Table 1 shows data for the graduating class of 2005, the most recent cohort tracked for each of North Carolina's four medical schools. On average, about two-thirds (64%) of graduates chose to enter a primary care residency but five years later only 38% remained in primary care anywhere in the United States. On average, North Carolina retains about one in five (21%) of our medical students in primary care in-state but there is a wide range of variation between the four schools. ECU retains the highest percentage with 41% of their graduates in primary care in North Carolina after five years compared to 21% of UNC's graduates and 17% of Wake Forest's students. Only 8% of Duke's medical students remain in-state in primary care five years after graduation.

Fewer physicians practicing in rural areas

Not shown in **Table 1** is the fact that only ten students (2%) of the 408 medical school graduates in 2005 were practicing in primary care in rural North Carolina in 2010. This statistic reflects a key point. While North Carolina has slowly increased its per capita physician supply over time, that supply has not "trickled out" to counties facing the most persistent health professional shortages.

Health Professional Shortage Areas (HPSAs) are areas – urban, rural, facility/special population – that meet shortage criteria and are designated by HRSA on a whole county or part-county basis.⁹ Persistent Health

Professional Shortage Areas (PHPSAs) are counties that have consistently qualified as HPSAs in six of the last seven designation periods.

Figure 5 is the ratio of physicians to population by PHPSA status and shows that per capita physician supply in state's most underserved counties – whole county PHPSAs – has not increased between 1990 and 2010.

There are important locational differences by medical school. IMGs are more likely to practice in underserved areas (**Figure 6**) with about one in three IMGs practicing in whole or part-county PHPSAs. Graduates from North Carolina medical schools are less likely than either IMGs or graduates of programs in other US states and Canada to practice in whole or part-county PHPSAs.

Figure 7 shows the distribution of North Carolina educated physicians in the workforce by practice location. Traditionally, ECU graduates have been the most likely to practice in whole or part county PHPSAs. However, 29% of both ECU and UNC's graduates were practicing in whole or part-county PHPSAs by 2010. Graduates from the state's two private institutions – Duke and Wake Forest – were less likely to practice in PHPSAs than graduates from the state's two public medical schools.

North Carolina is a net importer of medical school grads

The market for physicians is a national one. North Carolina does not retain everyone it trains, and it does not train every physician in practice in the state. In fact, NC is a net importer of physicians educated in other states. **Figure 8** (page 6) shows that of the total NC physician workforce in active practice in 2009,

Figure 5. Primary Care Physicians per 10,000 Population by Persistent Health Professional Shortage Area Status, North Carolina, 1990-2010

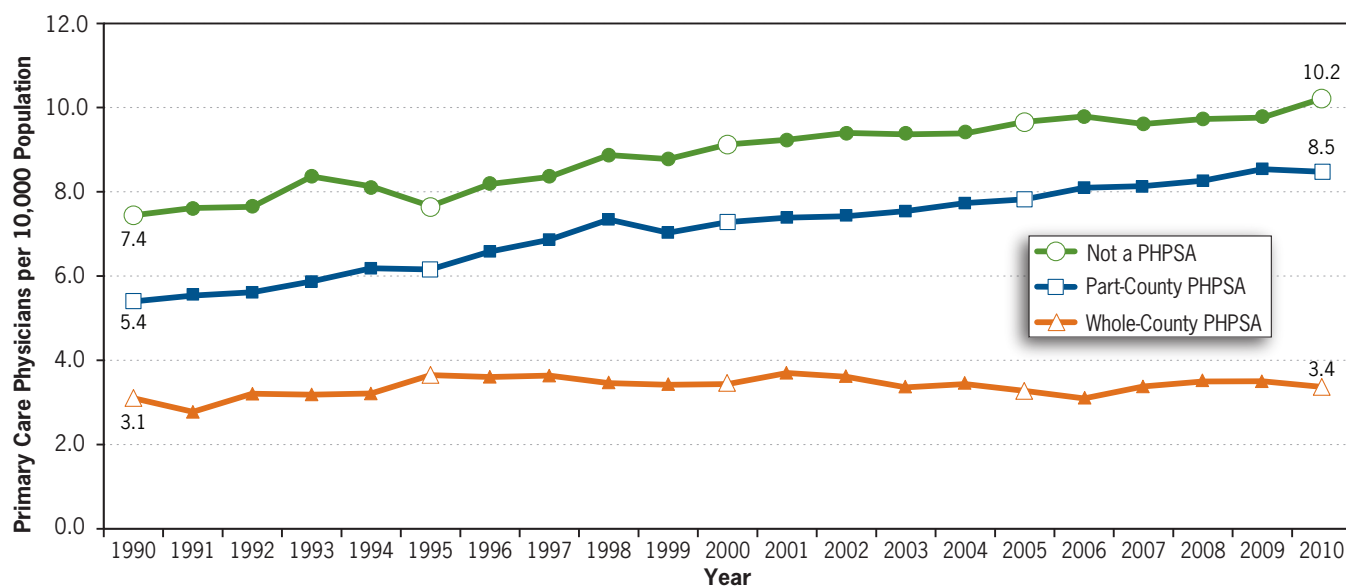


Figure 6. North Carolina Physicians Practicing in Whole or Part-County Persistent Health Professional Shortage Areas, 1990-2010

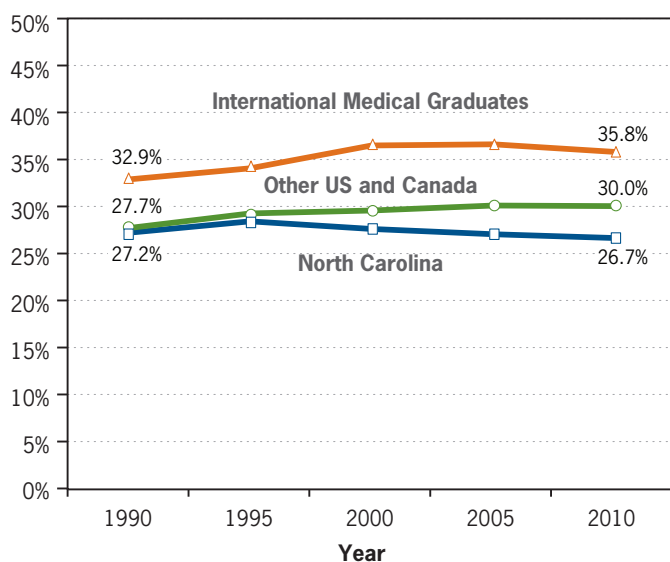
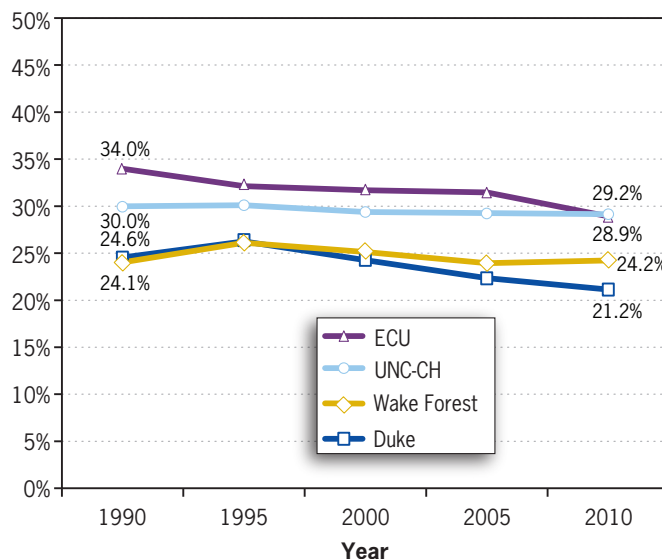


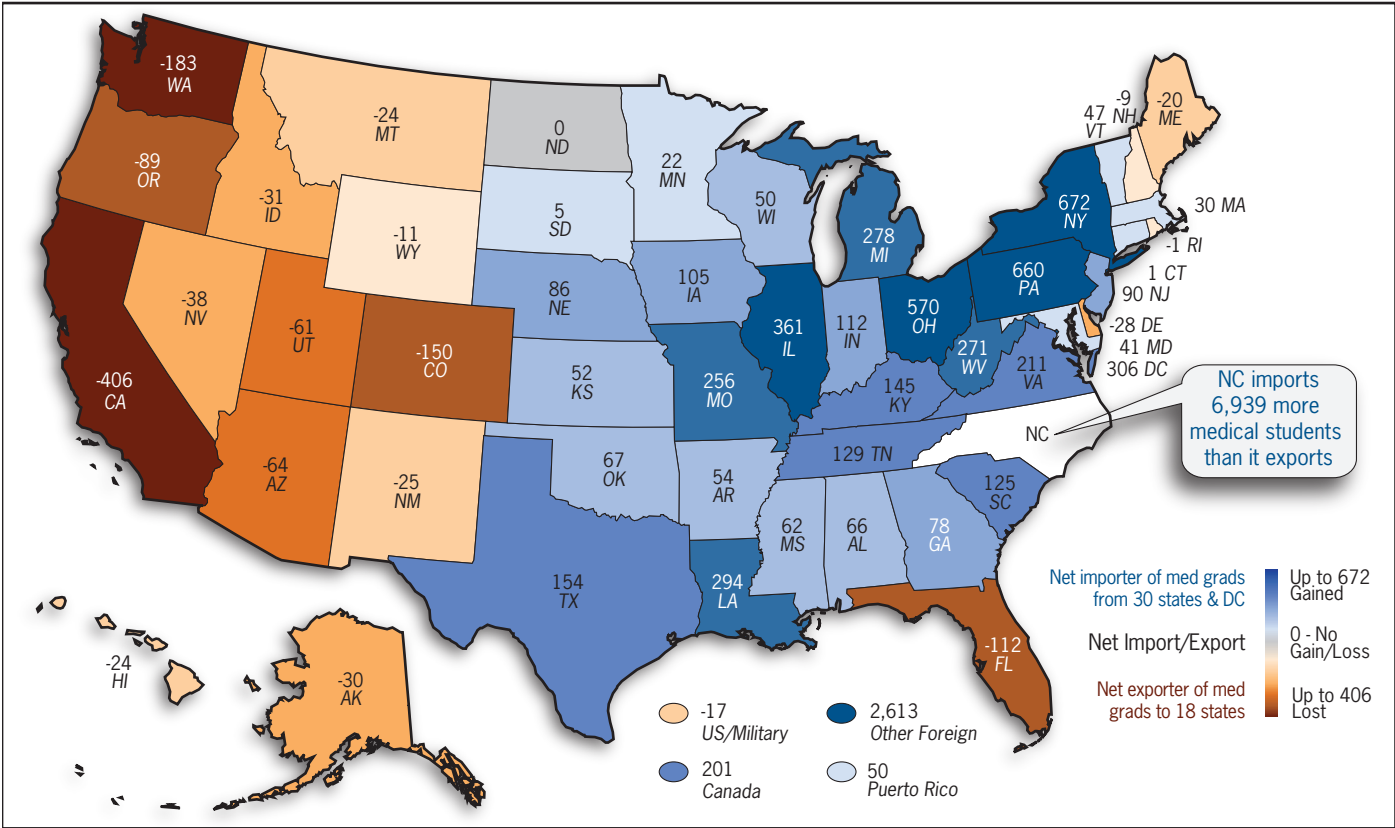
Figure 7. North Carolina Educated Physicians Practicing in Whole or Part-County Persistent Health Professional Shortage Areas, 1990-2010



NC imported 6,939 more medical students graduating from other states than it exported to other states. For example, NC has a trade surplus with New York because NC imported 672 more students who went to medical school in New York than it contributed to the New York physician workforce. By contrast,

Florida's physician workforce is comprised of 112 more physicians who completed medical school in NC than Florida medical schools have contributed to NC's physician workforce. As Florida's new medical schools begin to increase output in the coming years, this picture is likely to change.

Figure 8. North Carolina Net Import/Export of Medical Students, 2009



Data Source: AMA 2009 Physician Masterfile.
Notes: Includes only clinically active, non-federal, non-resident in training, non-locum tenens physicians. One physician practicing in North Carolina was missing medical school state.
Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

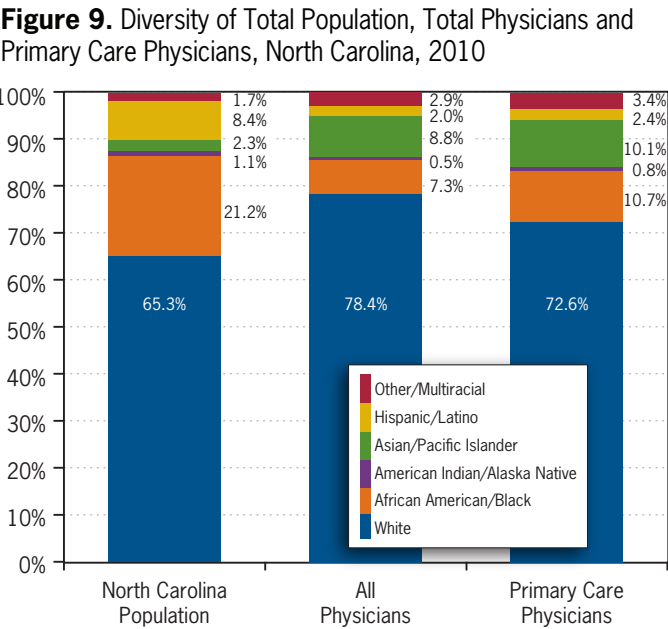
The North Carolina physician workforce does not represent the state's racial diversity

North Carolina's physician workforce does not reflect the ethnic and racial diversity of the state (Figure 9). According to the 2010 Census, one in three North Carolinians is a minority while only about one in five North Carolina physicians is a minority (n=4,337). Two-thirds of minority physicians in 2010 were Black (n=1,486) or Asian (n=1785) and only a tenth of minority physicians were Hispanic (n=412).

The diversity of the North Carolina physician population varies by specialty (Figure 9). North Carolina primary care physicians are more diverse than the overall physician workforce with a greater percentage of Blacks (10.7%), Asians (10.1%) and Hispanics (2.4%).

International medical graduates make up about 40% of the nonwhite physician workforce in the state (Figure 10). The growing number of IMGs in the workforce has increased the representation of

minority physicians in active practice, particularly Asian minorities. Thirty-eight percent of the nonwhite physician workforce attended medical school in another US state or Canada, 16.7% were educated



in-state and about 4% attended a Historically Black College or University (such as Howard, Meharry and Morehouse).

Figure 11 shows the breakdown of NC-educated nonwhite physicians by school. Looking at the data in **Figure 11** and **Figure 2** (page 3), one sees the relative contribution of each school to the overall NC-educated workforce compared to each school's contribution to the minority workforce educated in state. For instance, UNC-CH makes up 43.6% of the NC-educated workforce and 48.6% of nonwhite NC-educated physicians. ECU also makes a relatively larger contribution to the minority workforce (20.7%) than would be expected given its contribution to the overall workforce (15.8%). Duke University's contribution to the overall workforce is almost the same as its minority contribution—16.1% of NC-educated physicians attended Duke and 15.5% of minority physicians attended Duke. By contrast, Wake Forest makes up 24.4% of the NC-educated workforce but only makes up 15.2% of minority physicians.

Conclusion

North Carolina retains about 40% of medical students educated in-state; 21% go into primary care and only 2% go into primary care in NC's rural counties. Although the General Assembly mandated in 1993 that the University of North Carolina Board of Governors annually track the number of graduates going into primary care from each the state's medical schools, there is currently no clear way to connect educational and other workforce policy decisions to the results of these analyses. The reports on specialty and location of graduates are presented each year to the UNC Board of Governors and to the General Assembly, but there is no formal way to engage in a public dialogue about how the outcomes observed are subsequently linked to specific policy decisions regarding the financing or structuring of medical education in the state. The

Figure 10. Nonwhite Physicians in North Carolina by Medical School Location, 2009

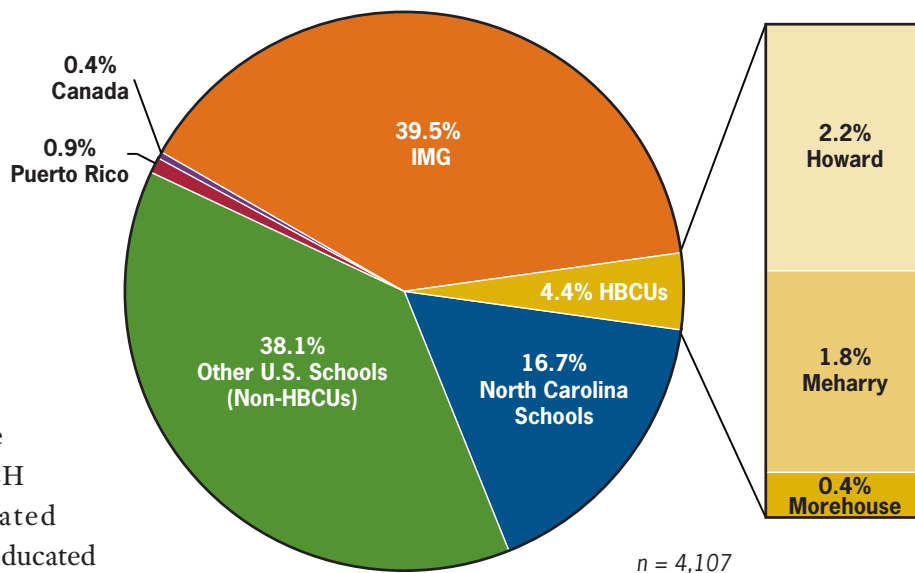
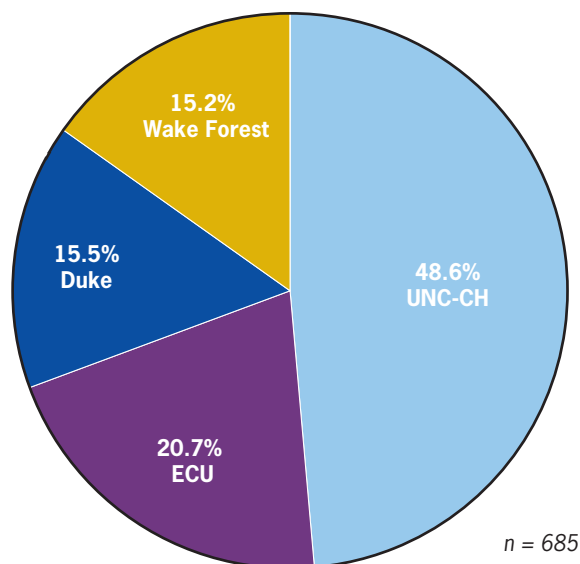


Figure 11. North Carolina-Educated, Nonwhite Primary Care Physicians by Medical School, North Carolina, 2009



result is that the data are not being used to increase the accountability of programs to produce graduates whose specialty choice, geographic distribution and diversity match the population's health needs.

The original legislation did not include a mandate to track medical students beyond five years, but this information is critical to understanding trends in specialization. For example, five years after graduating medical school, 40% of the 2000 cohort were in primary care but ten years later only 21%

were in primary care. With increasing specialization of medicine, particularly from internal medicine into subspecialty training that takes beyond five years to complete, it is important to track graduates ten years after graduation.

The original legislation focused on tracking primary care but arguably needs to be expanded to include other medical specialties critical to improving population health that are in short supply in the state (e.g., general surgeons and psychiatrists).¹ The mandate could also be expanded to explicitly track the number of graduates who practice in rural counties and persistent health professional shortage areas.

North Carolina has been successful in increasing physician workforce diversity in part by increasing the diversity of the medical school classes, but also by importing graduates from other states and countries. The degree to which schools are graduating a physician workforce that matches the ethnic and racial diversity of the population is another important metric that should continue to be monitored.

While tracking North Carolina medical school graduates is important given the amount of money the state invests in undergraduate medical education, it is also important to track the specialty choice, geographic distribution and diversity of physicians who complete residency training in the state. Where a physician completed their post-graduate education (residency) is an even better predictor of where they will ultimately practice than where they attended medical school.¹⁰ An upcoming fact sheet will examine trends in residency education in North Carolina.

North Carolina is experiencing an unprecedented transformation in the organization and consolidation of health care services. The demand for physicians

will increase as the population expands and ages, as the prevalence of chronic disease rises and as more people gain access to health insurance. At the same time, the market for physicians is likely to become more competitive and the state's ability to import physicians may decrease. Continuing to track trends in the physician workforce is essential so we can plan now for the physician workforce needed in North Carolina in the future. ❏

References

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- 4) Council on Graduate Medical Education. (2005). Sixteenth Report: Physician Workforce Policy Guidelines for the United States, 2000-2020. Washington, DC.
- 5) Note: Obstetrics/Gynecology is included as a primary care specialty in the state legislation mandating the tracking of North Carolina medical students in primary care. Source: Current Operations Appropriations Act of 1993. North Carolina General Assembly. S. L. 1993-321, SB 27, Section 78(b).
- 6) Micropolitan areas are defined by the Office of Management and Budget as an urban core of at least 10,000 but less than 50,000 population. United States Census Bureau. <http://www.census.gov/population/metro/>. Accessed July 17, 2012.
- 7) Barzansky B, Etzel SI. 2010. "Medical Schools in the United States, 2009-2010." *JAMA*. 304(11): 1247-1253.
- 8) Association of American Medical Colleges. (2011). Figure 6: Percentage of Active Physicians Who Are International Medical Graduates (IMGs), 2010. 2011 State Physician Workforce Data Book. <https://www.aamc.org/download/263512/data/statedata2011.pdf>. Accessed August 7, 2012.
- 9) Health Resources and Services Administration (July 2012). "HPSA Designation Criteria" Health Resources and Services Administration: Health Professions. <http://bhpr.hrsa.gov/shortage/hpsas/designationcriteria/designationcriteria.html>. August 7, 2012.
- 10) Seifer SD, Vranizan K, Grumbach K. 1995. Graduate Medical Education and Physician Practice Location: Implications for Physician Workforce Policy. *JAMA*. 274(9): 685-691.

Data Notes

Unless otherwise noted, the data included in this report include active, in-state, non-federal, non-resident-in-training physicians licensed in North Carolina as of October 31 of the respective year. Primary care includes family practice, general practice, general internal medicine, OB/GYN and pediatrics. Data are self-reported annually by physicians at time of their initial application for licensure and subsequent renewals. **Source:** North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board.