

# Educating North Carolina's Oral Health Workforce in an Evolving Environment

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**In 2014, North Carolina had 4,681 actively practicing dentists and ranked 47th among US states in dentist-to-population ratio. The need for dentists is increasing as the population grows, and underserved areas persist. This commentary discusses the impact of the state's 2 dental schools and external factors on dental workforce trends.**

**N**orth Carolina has long had some of the nation's best dental education programs: the University of North Carolina at Chapel Hill (UNC) and East Carolina University (ECU). UNC graduates dentists, dental hygienists, dental assistants, specialists, and those with advanced master's degrees and doctoral degrees. ECU's dental school focuses on primary care for rural and underserved areas, with current programs in general dentistry and advanced general dentistry. ECU's residency in pediatric dentistry is starting in 2016.

## Dental Workforce Demographics

In 2014, North Carolina had 5,656 licensed dentists, with 4,681 (83%) actively practicing in state, 600 practicing out of state, 88 retired, and 287 inactive. About half of the dentists in North Carolina are UNC graduates, and approximately two-thirds of UNC graduates actively practice in North Carolina. UNC and ECU annually enroll 82 and 52 dental students, respectively, in 4-year programs. ECU graduated its first class of 50 general dentists in 2015.

In 2014, the demographic distribution of active dentists in North Carolina was 73% male, 82% white, 9% black or African American, 7% Asian or American Indian, less than 2% Hispanic, and less than 1% multiracial or other races (see Figure 1). The majority of active dentists were in private practice (86%), practiced general dentistry (78%), and practiced in urban areas (85%). In terms of specialties, there were 276 orthodontists, 191 pediatric dentists, 180 oral and maxillofacial surgeons, 123 periodontists, 123 endodontists, 66 prosthodontists, 7 oral and maxillofacial radiologists, and 5 oral and maxillofacial pathologists. There were 6 board certified public health dentists, and 69 dentists self-identified as working in public health practices.

North Carolina is a primarily rural state, with 54 of its 100 counties classified as rural by the Office of Management and Budget (see Figure 2) [1]. Of the 15% of active dentists who

are practicing in rural areas, most were white (90%), male (79%), and in private practice (86%). Nearly half (48%) are older than 55 years of age (compared to 36% statewide).

Currently, 70 counties in North Carolina are designated as dental health professional shortage areas (HPSAs) [2], and 29 counties have fewer than 2 dentists per 10,000 population. Camden, Hyde, and Tyrrell counties have not had a dentist for the past 10 years. The Health Resources and Services Administration (HRSA) projects that North Carolina's shortage of dentists will continue to worsen through 2025 [4].

North Carolina consistently ranks 47th among the 50 states in terms of dentist-to-population ratio [3]. In 2014, the state's ratio was 4.7 dentists per 10,000 population, compared to 4.4 dentists per 10,000 population in 2003, and well behind the national average of 6.0–6.2 dentists per 10,000 population during the period 1996–2011. The small increase in the state's dentist-to-population ratio may be due to recruiting dentists from other states or dentists delaying retirement. Of the 54 nonmetropolitan counties in North Carolina, 31 have fewer than 3 dentists per 10,000 population (see Figure 2). Dentist-to-population ratios do not consider number of hours practiced, types of services provided, types of third-party payment, or oral disease prevalence.

## Demographic Trends

The biggest demographic change in the dental profession is the increase in the proportion of women entering dentistry. Women comprised 45% to 56% of UNC dental students for the past 12 years and 46% to 54% of ECU dental students for the past 5 years. It will take time for this gender balance to be reflected in the profession overall. There are many male dentists of retirement age, but there are few female dentists over age 65 years (see Figure 3). The mean age of actively practicing North Carolina dentists in 2014 was 49.1 years, but this average varied by gender: 42.1 years for women and 51.7 years for men. There was no significant gender difference in patient care hours worked per week for

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dentists actively practicing in North Carolina, with 31.1 hours for men and 30.7 hours for women ( $P > .05$ ).

The students in UNC and ECU dental classes in 2014 were more diverse than North Carolina dentists actively practicing at that time (see Figure 1). However, the proportions of black or African American and Hispanic or Latino dental students were still below those of the North Carolina population. Nationally, between 2010 and 2014, the first-year enrollment of dental students has been about 4–5% black or African American and 7–8% Hispanic or Latino (see Figure 1) [5].

### Allied Dental Professions

In 2015, there were 19 dental assisting and 13 dental hygiene programs in North Carolina [6, 7]. The number of dental assisting program graduates in the state increased 39% from 2004 to 2013, similar to a national trend [6]. UNC has the only baccalaureate degree dental hygiene program in North Carolina, as well as a master’s degree program in dental hygiene education, which helps to provide faculty for allied dental programs. The number of graduates from dental hygiene programs in North Carolina remained stable from 2004 (227 graduates) to 2013 (226 graduates). Nationally, there has been a steady increase in graduates of dental hygiene programs over this time period. Overall, North Carolina has a plethora of dental hygienists, and HRSA projects that this oversupply will continue to increase through 2025 [4].

Nationally, the number of graduates of dental laboratory technology programs is small and decreasing. In 2004,

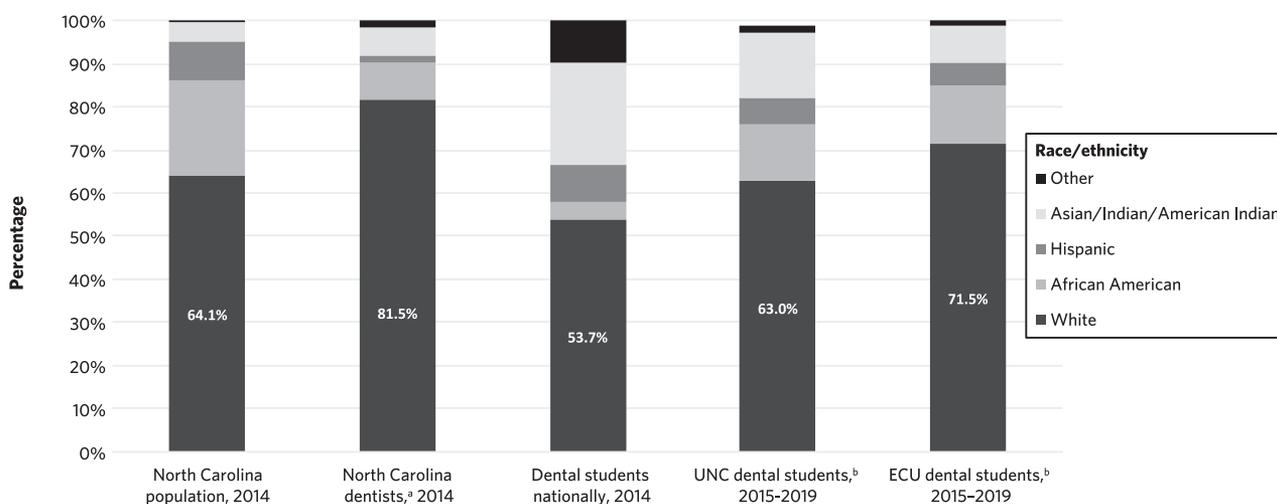
there were 387 graduates nationally, but there were only 297 graduates in 2013. There were only 5 such graduates in North Carolina in 2013. Durham Technical Community College has the only accredited dental laboratory technician program in the state, 1 of approximately 24 accredited programs nationally [6].

### External Factors

Many external changes will affect the future of the dental workforce. From 2013 to 2014, North Carolina grew from the 10th to the 9th most populous state in the country [8]. North Carolina is also growing in diversity, with the Hispanic population more than doubling from 2000 to 2010 [9]. Finally, the state’s population is aging, as are practicing dentists. Eventually, Baby Boomer dentists will be retiring in large numbers.

To determine if North Carolina has enough dentists, we must consider provider supply, consumer need, and demand. With regards to supply, the number of dentists both entering and leaving the system needs to be quantified. This includes the number of new dental graduates entering the system from our schools; how many of this number stay within the state and the locations where they practice; how many dentists from schools outside of North Carolina come to this state to practice; and how many North Carolina dentists no longer practice here because they move, change careers, retire, or die. In the past 5 years, UNC’s dental school received 1,400 applications for 82 positions, and ECU’s dental school received approximately 400 in-state applications for 52 positions. ECU accepts only North Carolina residents.

**FIGURE 1.**  
Diversity of North Carolina’s Population, Dentists, and Dental Students



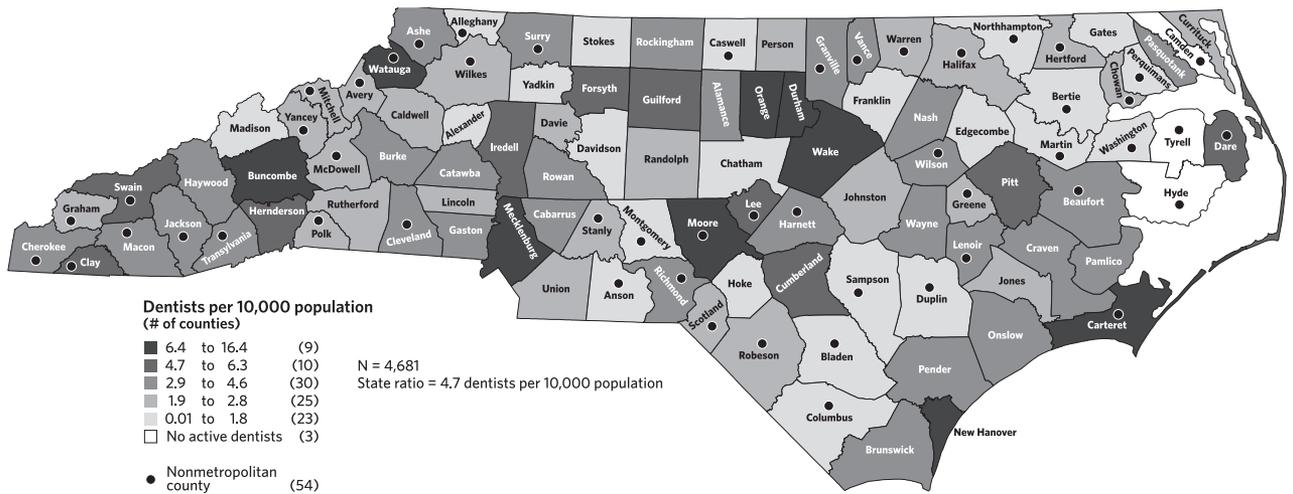
Note. Race/ethnicity categories were adapted from the data sources.

<sup>a</sup>Dentists were included if they were actively practicing in North Carolina.

<sup>b</sup>Dental students at the University of North Carolina (UNC) and East Carolina University (ECU) were included if they were first-year enrollees in each cohort’s expected graduation year.

Source: Data derived from the North Carolina State Board of Dental Examiners, American Dental Education Association Snapshot of Dental Education, 2015–2016, University of North Carolina at Chapel Hill, East Carolina University, United States Census Bureau. Data accessed through the North Carolina Health Professions Data System at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill.

**FIGURE 2.**  
Active Dentists per 10,000 Population in North Carolina, 2004–2014



Source: Data derived from the North Carolina State Board of Dental Examiners. Data accessed through the North Carolina Health Professions Data System at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill.

Some of the state’s aspiring dentists may attend dental school outside of North Carolina and then return here to practice.

On the consumer side, we must consider trends in oral health status and perceived need for dental care. Some statewide oral health status data are available for North Carolina children in specific grades, but data are not available for adults [10]. With regards to demand, adult dental visits are decreasing slightly after years of growth. However, dental visits for those under age 18 years and those over age 65 years are experiencing modest growth [11].

There is a change in where dental students practice after graduation. Nationally, it is rare for graduates to immediately start their own private practices. Among both UNC and ECU graduates, half or more enroll in advanced dental education programs after graduation. In 2014, no UNC graduates established a new private practice. A 2015 national survey of dental school seniors indicated that 49.4% intended to enter private practice; of those, 44.6% intended to be employed as an associate in a solo practice, 25.1% sought employment in a group practice, and 11.7% planned to work in a corporate-owned group practice. Only 4.9% intended to purchase an existing practice as the sole proprietor or as a partner (4.9%), and only 3.9% expected to establish a new private practice [5]. It is too soon to know where ECU graduates will practice.

In North Carolina, state support for higher education is declining, and this has significantly affected dental education. At UNC, the dental school’s state budget allocation has declined approximately \$5 million since 2009. ECU sustained cuts in state appropriations of approximately \$2 million. At both schools, tuition and resulting student debt are much lower than national estimates.

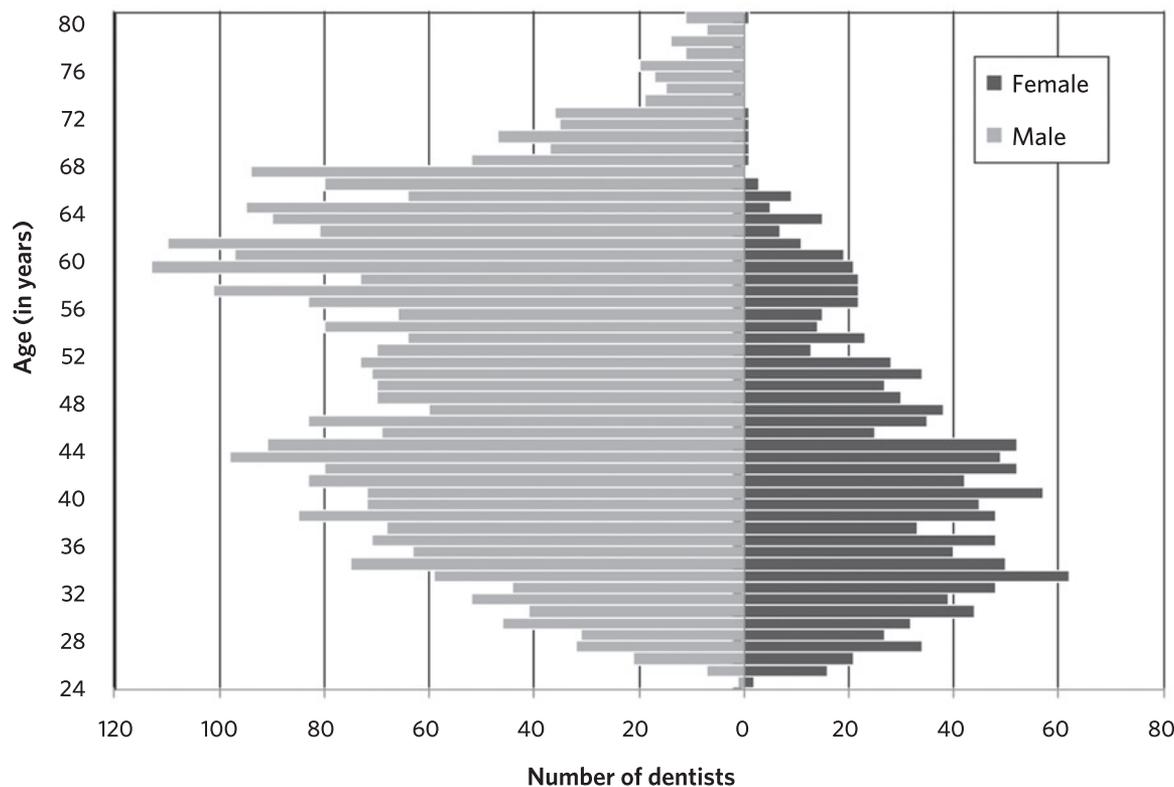
The UNC and ECU dental school clinics provide major

sources of care for patients who cannot afford private practice fees, lack private insurance, cannot afford high copayments, and/or do not have access to a dentist who accepts dental Medicaid. UNC dental students and residents provided 47,369 onsite patient visits at reduced fees at the dental school in Chapel Hill in fiscal year 2015. Additionally, general practice residents provide care primarily at the UNC hospital system in Chapel Hill, and specialty residents provide care during rotations at sites such as Veterans Affairs (VA) Medical Centers, county health departments, and prisons. In addition, ECU’s student and resident clinics in Greenville provided approximately 24,889 patient visits in the 12 months ending October 2015.

Both schools are committed to increasing access to care in North Carolina. UNC dental students participate in the Dentistry in Service to Communities Program for 2 month-long extramural rotations during the summer between their 3rd and 4th years of school. In fiscal year 2015, students provided care during 10,860 patient visits. The 43 rotations were in community health centers located in underserved areas, hospitals, prisons, and VA Medical Centers spread across 34 counties. Similarly, ECU’s 4th-year students gain experience while providing care in the school’s 8 community service learning centers (CSLCs) located in rural and underserved areas across the state. Of the 33,665 total patient visits conducted in the school’s CSLCs, students and residents provided 23,551 patient visits in the 12 months ending October 2015. The number of patient visits is expected to increase as newer CSLCs mature.

Volunteer services also contribute to dental care in underserved areas. The North Carolina Dental Society hosts the state’s Mission of Mercy volunteer program, which provides free dental services. In fiscal year 2015, UNC dental, dental hygiene, and graduate students provided free health

**FIGURE 3.**  
**North Carolina Dentists by Age and Sex, 2014**



Source: Data derived from the North Carolina State Board of Dental Examiners. Data accessed through the North Carolina Health Professions Data System at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill.

education and an estimated \$4.5 million in dental services through curricular and voluntary programs.

North Carolina is fortunate to be 1 of 19 states that provides Medicaid dental benefits to both children and adults [12]. Minimal dental benefits are provided to older adults under Medicare, except in rare instances involving medical emergencies, and no adult dental services were included in the Patient Protection and Affordable Care Act of 2010. To date, North Carolina has not participated in Medicaid expansion. If this occurred, more people (especially children) would become eligible for dental services.

Some states are pursuing other mechanisms to increase access to dental care, including educational programs for foreign-trained dentists and the development of new types of dental professionals such as dental therapists, advanced dental hygiene practitioners, and community dental health coordinators. Federal programs such as the National Health Service Corps scholarship and loan repayment programs require service in HPSAs, thereby increasing the number of dentists practicing in underserved areas.

A report by the National Academy of Medicine made recommendations on improving access to oral health care for vulnerable populations, including through nondental providers such as physicians, physician assistants, and nurses [13].

North Carolina has been a leader in initiatives that integrate oral health with primary care or school-based care, particularly the Oral Health Section's provision of children's preventive dental services through school-based dental sealant programs and the Into the Mouths of Babies (IMB) program [14]. The IMB program trains medical providers to conduct oral health assessments, refer children to a dentist, educate parents, and provide fluoride varnish to young children.

In light of the state's dental workforce needs, the North Carolina Oral Health Collaborative developed a strategic plan to improve access to care and health equity [15]. One of the primary goals of this interdisciplinary statewide coalition is to ensure that North Carolina has an adequate and equitable distribution of oral health professionals so that the dental health workforce meets the lifelong oral health needs of all North Carolinians. **NCMJ**

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