



# Envisioning the Future Optometry Workforce in North Carolina

Julie C. Spero, MSPH  
Saraí Narváez, BS  
Thomas Bacon, DrPH  
Erin P. Fraher, PhD, MPP

*March 2015*

This work was supported by the  
University of North Carolina General Administration



UNC

THE CECIL G. SHEPS CENTER  
FOR HEALTH SERVICES RESEARCH

PROGRAM ON HEALTH WORKFORCE  
RESEARCH AND POLICY

#### Corresponding author:

Julie C. Spero, MSPH | [juliespero@unc.edu](mailto:juliespero@unc.edu) | 919.966.9985

#### Program on Health Workforce Research and Policy

Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill.  
725 MLK Jr. Blvd, CB# 7590 | Chapel Hill, NC 27599-7590 | <http://www.healthworkforce.unc.edu> | 919.966.7112

#### Suggested citation:

Spero JC, Narváez S, Bacon T, Fraher EP. Envisioning the Future Optometry Workforce in North Carolina. Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill. March 2015.

#### Acknowledgments:

This work was supported by the University of North Carolina General Administration.

The authors wish to thank a group of optometry advisors for their generous contribution of expertise, data, editorial comments, and other input that greatly contributed to this work: David Anderson, Jill Bryant, Jamie Casper, Gordon DeFriesse, Melanie Denton, Adrienne Drollette, Hal Herring, Michael Holland, Nisha Mehta, Janice Peterson, William Rafferty, John Robinson, and Charles Sikes. The authors are indebted to the North Carolina Board of Optometry for their data and for their ongoing cooperation with the North Carolina Health Professions Data System. The authors gratefully acknowledge North Carolina State Education Assistance Authority (NCSEAA) staff Rashonn Albritton, Margie Ree Booker, William Cox, Elizabeth McDuffie, Stephanie Rinehart, and Edna Williams for their contributions to the report regarding state funding for North Carolina optometry students. Thanks go to Matt Minnotte, HPDS Data Coordinator, Sheps Center, UNC for creating the maps used in this report; Katie Gaul, Research Associate, Sheps Center, UNC, for her assistance in designing the graphics and layout of this report; and Sonya Sutton, Communications Specialist, Sheps Center, UNC, for the photographs used within the report. Cover photo by Les Black; Young Male Optometrist Holding An Ophthalmoscope; used under Creative Commons 2.0 license; <https://www.flickr.com/photos/sfloptometry/8666839556/>; retrieved March 27, 2015.

# Envisioning the Future Optometry Workforce in North Carolina

## Executive Summary

---

This study of the optometry workforce in NC was conducted by the Program on Health Workforce Research and Policy at the Cecil G. Sheps Center for Health Services Research (Sheps Center) in response to a request by the University of North Carolina General Administration.

### **Key Findings:**

#### **North Carolina Has a Strong Supply of Optometrists**

- In 2013, 1,127 optometrists were in active practice in NC.
- The total number of optometrists has increased steadily over the past 30 years, with an average annual growth of 3% over the past decade.
- NC's supply of optometrists has grown at a pace similar to the national average since 1979.

#### **The Ratio of North Carolina Optometrists Varies Significantly by County**

- Forty counties have an optometrist-to-population ratio at or above the state average of 1.1 optometrists per 10,000, while 60 counties are below the state average.
- No optometrists reported a primary practice location in 12 counties.
- The gap between optometrists per population in metropolitan and non-metropolitan counties based on primary practice location has widened over the past decade.

#### **The Demographics of the Optometrist Workforce are Changing**

- Sixty-one percent (n=686) of optometrists are age 50 or younger. The mean age for the entire workforce is 46.
- In 2003, just a quarter of the workforce was female (25.4%, n= 225). A decade later, in 2013, the percentage increased to 38% (n=428).
- North Carolina's optometrist workforce has diversified since 2003, when only 4% (n=34) of the optometry workforce was non-white. In 2013, 9% (n=105) of the optometrist workforce identified as non-white compared to 36% of NC's population.

#### **There has been a Recent Increase in the Number of Optometry Schools across the Country**

- The US (including Puerto Rico) has 21 schools of optometry.
- Four US optometry schools have opened since 2009, increasing national first-year optometry school enrollment by 16% (n=286).
- Three schools are in the process of developing new optometry programs, two of which are in states bordering North Carolina.

## **Conclusions**

North Carolina has a reputation for requiring high standards to achieve a license to practice optometry and being a progressive state in which to practice. These factors have steadily attracted optometrists to the state over the past 30 years and contribute to a strong supply of optometrists, despite the lack of an optometry school. Relatively few optometrists are nearing retirement age and young optometrists are entering the workforce. Following national trends, the optometrist workforce is becoming increasingly female. Despite greater diversification in recent years, the workforce is still primarily white. Most optometrists in the state practice primary eye care. There is increased competition for optical sales and practice consolidation has accelerated.

## **Data and Methods**

Data used in the study are from the North Carolina Health Professions Data System (derived from NC Board of Optometry licensure data). Licensure data were supplemented with data from other sources, including the US Census Bureau, the US Bureau of Labor Statistics, the Association of Schools and Colleges of Optometry, the American Optometry Association, the North Carolina State Education Assistance Authority (NCSEAA), and information from optometry licensure boards in neighboring states. Data were reviewed by an advisory group of optometry experts from across the state.

# Envisioning the Future Optometry Workforce in North Carolina

## Introduction

Optometrists are health care professionals who provide eye examinations, diagnose and treat eye diseases, and prescribe eyeglasses and contact lenses to correct vision.<sup>1</sup> Optometrists also prescribe medications to treat eye problems and diseases. To practice as an optometrist in North Carolina, practitioners must attain a Doctor of Optometry (OD) degree, pass the board examination, and become licensed by the NC Board of Optometry.<sup>2</sup> Optometry education is a four-year, post-baccalaureate program that includes clinical rotations. Although some optometrists complete a one-year residency program, a residency is not a requirement for licensure. North Carolina does not have a school of optometry; all practicing optometrists in North Carolina completed their optometry education outside of the state.

### Study Purpose

The budget passed by the North Carolina General Assembly in August 2014 (N.C.S.L. 2014-100, Section 11.21(a)) included language directing the Board of Governors of the University of North Carolina (UNC) to evaluate the feasibility of establishing a school of optometry in the state.<sup>3</sup> Eight UNC institutions were named in the legislation as potential locations for the new school:

- The University of North Carolina at Chapel Hill
- The University of North Carolina at Pembroke
- East Carolina University
- Elizabeth City State University
- Fayetteville State University
- North Carolina Agricultural and Technical State University
- North Carolina Central University
- Winston-Salem State University

In September 2014, the UNC General Administration asked the Program on Health Workforce Research and Policy at The Cecil G. Sheps Center for Health Services Research to conduct a study of North Carolina's optometrist workforce. The purpose of the study was to describe:

- the supply, distribution, and employment patterns of optometrists in NC;
- the demographic characteristics of optometrists practicing in NC; and
- the education and training of the national and NC optometrist workforce.

## Methods

### Data Analysis

The main source of data for this study was the North Carolina Health Professions Data System (HPDS), which has been maintained at the Sheps Center since 1979. The HPDS contains over 30 years of data on 19 health professions from 12 different licensure boards, and is one of the oldest continuous state-level health workforce data systems in the country. Data on the optometrist workforce are derived from annual licensure files from the North Carolina Board of Optometry and provide a complete picture of the optometrist workforce in the state as of October 31 of each year. Because many optometrists maintain licenses in multiple states or maintain licenses when not in active practice, this study included only those optometrists actively practicing within the state of North Carolina in each year. The North Carolina Board of Optometry approved the use of these data for the purposes of this report and the University of North Carolina Institutional Review Board (IRB) determined that this study did not require IRB approval.



Licensure data were supplemented with data from other sources, including the US Census Bureau, the US Bureau of Labor Statistics, the Association of Schools and Colleges of Optometry, the American Optometry Association, the North Carolina State Education Assistance Authority (NCSEAA), and information from optometry licensure boards in neighboring states.

### Optometrist Expert Advisory Group

The research team convened a group of optometrist experts from across the state. This group included members of the profession who provided clinical, educational, regulatory, employment, and policy perspectives on the profession ([Appendix](#)). The advisory group members provided a balance of insights by employment setting, geographic location in the state, gender, age, and racial/ethnic diversity. The group met on October 23, 2014 at the Sheps Center to review study findings and put them in context, as well as to provide added depth and insight into questions that could not be answered using licensure data.

Following the meeting, all group members were provided with a copy of the meeting summary and had an opportunity to provide feedback, edits, and corrections. Group members were also contacted independently on an as-needed basis to respond to questions from the research team.

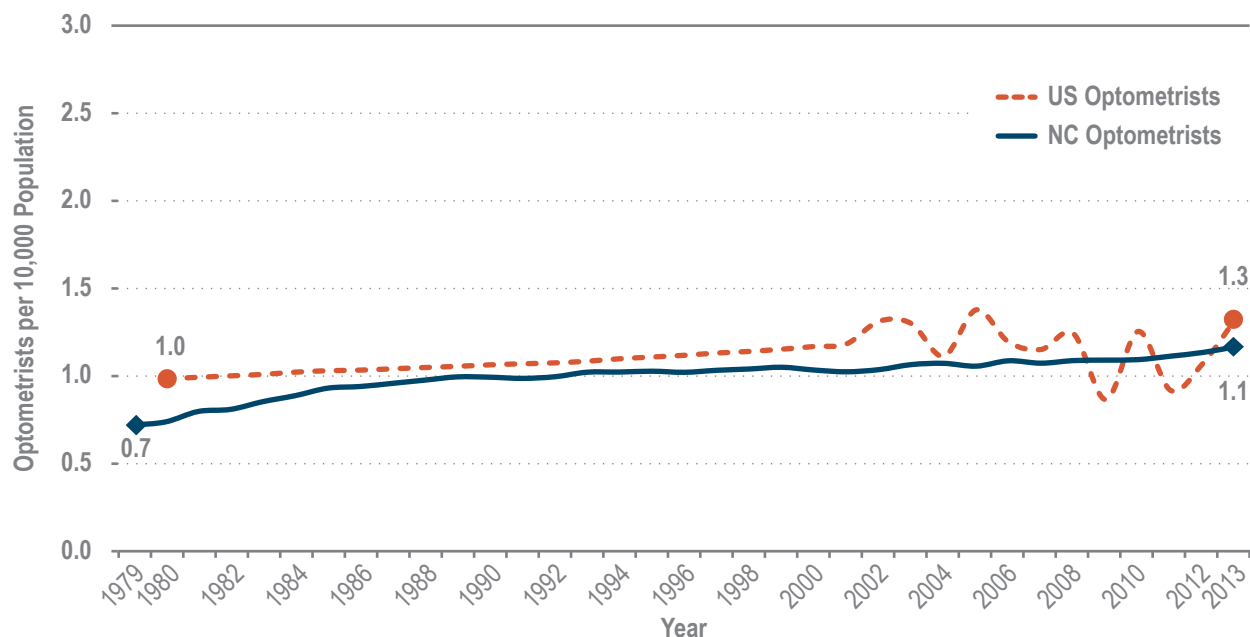
## Study Findings

### Workforce Supply and Distribution

#### *Comparing the National and State Supply of Optometrists*

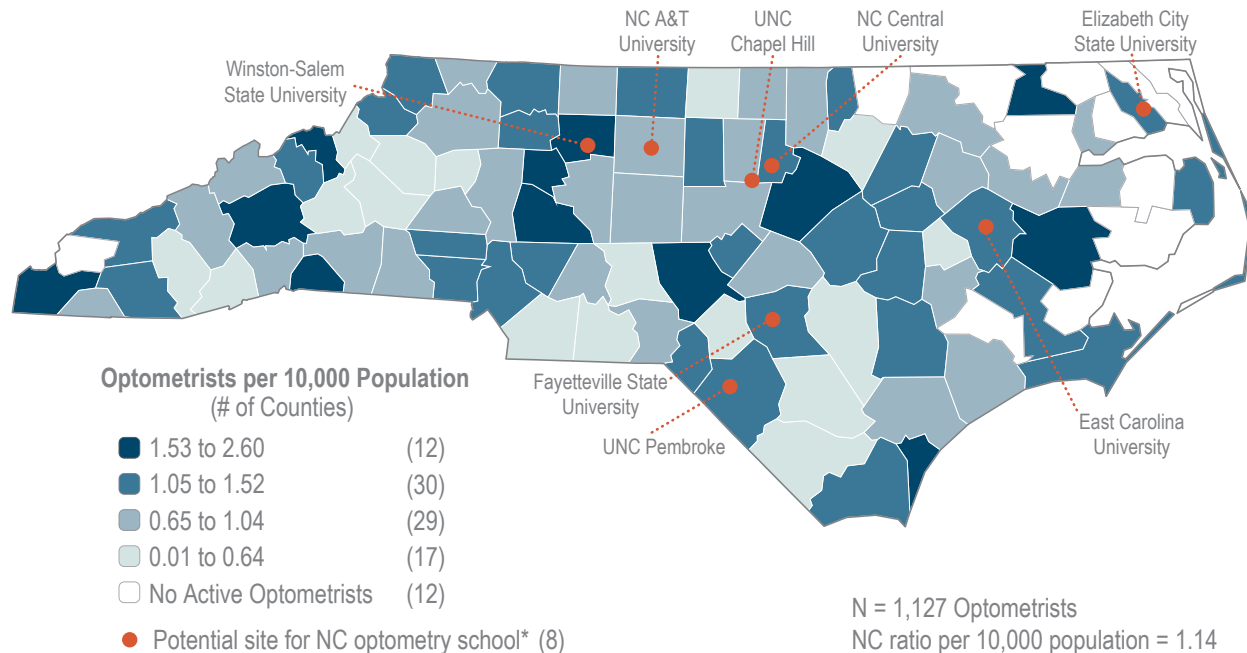
In 2013, 1,127 optometrists were in active practice in North Carolina. The total number of optometrists has increased steadily over the past 30 years, with an average annual growth of 3% over the past decade. However, because the population has also grown over time, the ratio of optometrists to population is often a more meaningful number when estimating overall supply. North Carolina's supply of optometrists has grown at a pace similar to the national average since 1979

Figure 1. Optometrists per 10,000 Population, United States and North Carolina, 1979-2013



Note: Figures include all licensed optometrists actively practicing in North Carolina as of October 31 of the respective year.  
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 1979-2013; US Bureau of Labor Statistics, various years; HRSA, BHW, NCHWA; North Carolina Office of State Planning. North Carolina population data are based on 1980, 2000 and 2010 Censuses.  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

**Figure 2. Optometrists per 10,000 Population by Primary Practice Location, North Carolina, 2013**



Note: Figures include all active, instate optometrists licensed in North Carolina as of October 31, 2013. Branch office locations are not included in the map.  
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 2013; \*North Carolina State Law 2014-100, Section 11.21(a)  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

(Figure 1). What appears to be instability in the national supply of optometrists in Figure 1 is an artifact of reporting differences between different years of data and is not due to actual supply fluctuations. In 2013, there were 1.1 optometrists per 10,000 population in North Carolina. This ratio is similar to the 2013 national average of 1.3 optometrists per population,<sup>a</sup> as well as that of our neighboring states of South Carolina, with 1.0

optometrists per 10,000 population,<sup>b</sup> and Virginia, with 1.4 optometrists per 10,000 population.<sup>c, d</sup>

### *Distribution of Optometrists within North Carolina*

Based on primary practice location, the ratio of optometrists-to-population varies significantly by county (Figure 2). All eight sites suggested by the NC state legislature for a possible school of optometry are located in counties where the ratio of optometrists per capita is greater than the state average. Forty counties have an optometrist-to-population ratio at or above the state average of 1.1 optometrists per 10,000, while 60 counties are below the state average, including 12 counties where no optometrists

<sup>a</sup> Comparisons should be made with caution due to differing national and state data sources. National data sources are not in agreement about the total number of optometrists in practice in the United States in 2013. Historically, the Sheps Center has used data from the US Bureau of Labor Statistics (BLS) regarding the national number of optometrists, which is the data source used for this report. According to the BLS, the United States had 32,040 optometrists in 2013.<sup>4</sup> BLS data are based on the Occupational Employment Statistics survey. Annual estimates for optometrists and other professions may vary based on the survey sample, which is derived from the list of establishments in varying sizes and geographic locations maintained by State Workforce Agencies for unemployment insurance purposes. According to the US Health Workforce Chartbook, which is based on data from the 2008-2010 American Community Survey Public Use Microdata Sample (ACS PUMS), there were 36,858 optometrists in the US workforce.<sup>5</sup> Similar to the BLS, ACS PUMS estimates are based on surveys and may be subject to sampling bias. A recent study of the optometrist workforce conducted by the Lewin Group estimated that there were 39,580 optometrists in the US in 2012, based on a data merge from a proprietary data source and data from the American Optometric Association.<sup>6</sup> Because data from the Lewin study are proprietary and we were unable to verify methodology, and because these estimates are substantially higher than prior national estimates, we elected not to use this estimate.

<sup>b</sup> Jan Meetze, SC Department of Labor, Licensing and Regulation, personal communication, October 20, 2014.

<sup>c</sup> Carol Stamey, Virginia Board of Optometry, personal communication, October 14, 2014.

<sup>d</sup> Virginia data are from 2014 and do not distinguish between active and inactive practice status, which may inflate the optometrist-to-population ratio. Data obtained from licensure boards in Tennessee and Georgia are not included in this report because the only data available were total licensee counts, and optometrists may not be in active practice or may hold licenses in states where they do not practice.

reported a primary practice location (although some of these counties have branch optometry offices, as explained below). Estimates based on primary practice locations likely underestimate optometrist coverage in rural counties.

Optometrists may practice in more than one location, but current licensure data only reflect primary practice location. The Board maintains a separate data file on optometry branch offices, which are sites other than the primary practice location where an optometrist practices. Because data on the number of hours optometrists practice in different locations are unavailable, we are unable to definitively estimate optometrist supply at the county level. For example, we are unable to determine if there is an optometrist at a particular branch office forty hours a week or four hours a month. Furthermore, while some branch locations are traditional optometrist clinics, others are in settings such as skilled nursing homes, assisted living facilities, and health and rehabilitation centers where optometrists provide services to specific patient groups. According to data from the North Carolina Board of Optometry, some optometrists travel from location to location. One optometrist in the state practices at 73 branch locations, while another practices at 55 branch locations.<sup>e</sup> Thus, branch office coverage in these settings may indicate coverage for a specific population group in a county, but not coverage for the county's population as a whole.

Data from the Board indicate that 10 of the 12 counties that do not have a primary practice optometrist have optometry branch offices. Three counties (Bertie, Pamlico, and Warren) have general optometrist branch offices. Camden and Tyrrell counties do not have primary or branch optometry locations. The seven remaining counties (Currituck, Gates, Graham, Hyde, Jones, Northampton, and Perquimans) only

have optometrist coverage in assisted living, rehabilitation, or nursing home settings.

Historically, North Carolina has had a relatively even distribution of optometrists per population in metropolitan and non-metropolitan counties<sup>f</sup> based on primary practice location (**Figure 3**). Although this gap has widened over the past decade, it is far smaller than that of other health professions in the state, such as physicians,<sup>7</sup> dentists,<sup>8</sup> and pharmacists.<sup>9</sup> Of the optometrists who graduated from optometry school after 2008 (n=193), 89% (n=172) have primary practice locations in metropolitan counties in North Carolina, compared to 11% (n=21) in non-metropolitan counties. This trend is consistent with the practice locations of the previous cohort from 2002 and 2007 (n=185). Of those graduates, 90% (n=166) are practicing in metropolitan counties and 10% (n=19) are in non-metropolitan counties.

## Workforce Demographics

### *Age and Gender of the Optometry Workforce*

North Carolina's optometrist workforce has a relatively small proportion of optometrists nearing retirement age. The workforce has a strong pipeline of new entrants, implying that North Carolina will not face a shortage of optometrists in the near future (**Figure 4**). Sixty-one percent (n=686) of optometrists are age 50 or younger. The mean age for the entire workforce is 46. Female optometrists tend to be younger than male optometrists, with an average age of 39 (n=428) compared to 50 (n=699). This difference in mean ages is largely due to the feminization of the optometrist workforce in recent years.

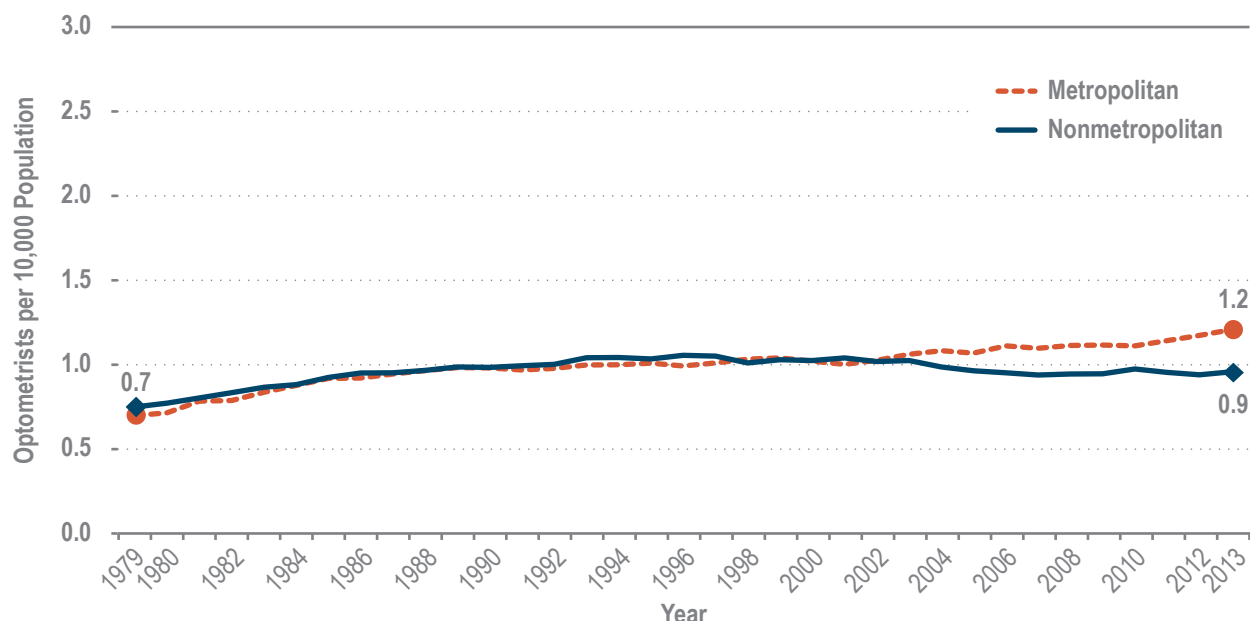
In 2003, just a quarter of the workforce was female (25.4%, n= 225). A decade later, in 2013, the percentage increased to 38% (n=428). Over

<sup>e</sup> John Robinson, Executive Director, NC Board of Optometry, personal communication, November 5, 2014.

<sup>f</sup> Metropolitan status is defined by the 2013 US Census Bureau and Office of Management and Budget's Core Based Statistical Areas, which are derived from the 2013 Area Health Resources File. Using this definition, North Carolina has 54 non-metropolitan counties.

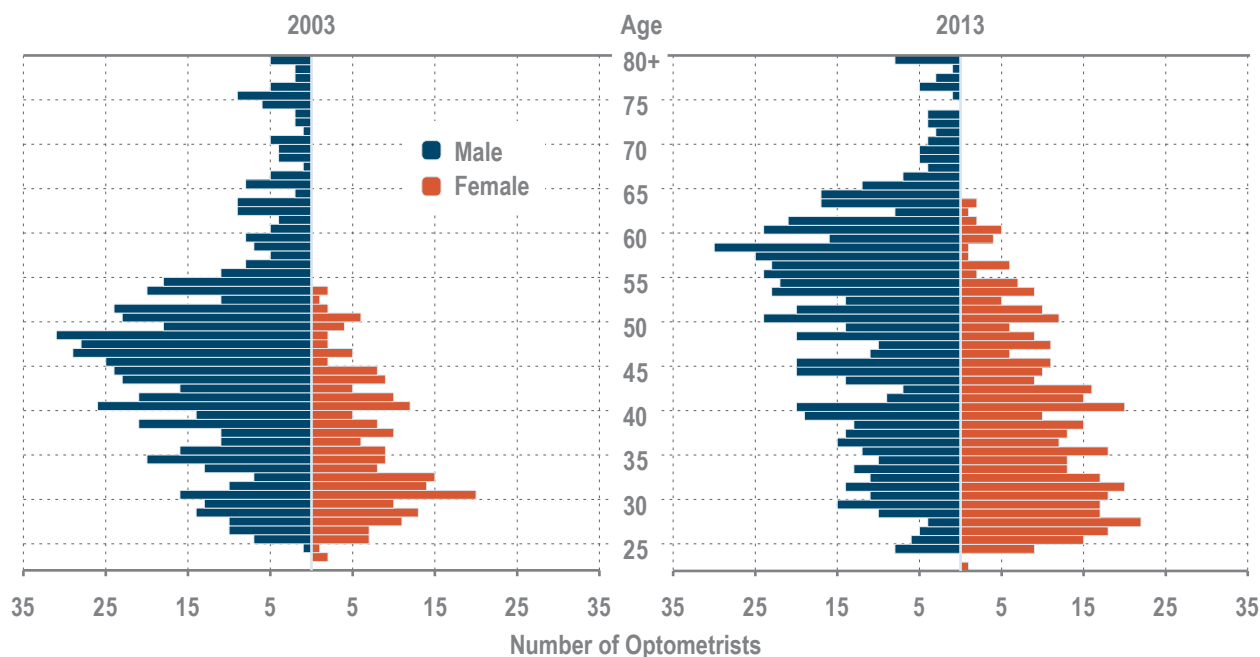


**Figure 3. Optometrists per 10,000 Population, by Primary Practice Location in Metropolitan and Nonmetropolitan Counties, North Carolina, 1979-2013**



Note: Figures include all active, in-state optometrists licensed in North Carolina as of October 31, 2013. Branch office locations are not included in the chart.  
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 1979-2013; US Bureau of Labor Statistics, various years; HRSA, BHW, NCHWA; North Carolina Office of State Planning. North Carolina population data are based on 1980, 2000 and 2010 Censuses; US Census Bureau and Office of Management and Budget, 2013.  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

**Figure 4. Optometrist Workforce by Age and Gender, North Carolina, 2003 and 2013**



Note: Figures include all active, in-state optometrists licensed in North Carolina as of October 31 of the respective year.  
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 2003 and 2013.  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

the past 10 years, the number of women entering the optometrist workforce has outpaced the number of men. North Carolina's experience reflects national trends in optometry education. Data from the Association of Schools and Colleges of Optometry (ASCO) show that more women than men have applied and enrolled in optometry programs over the past 4 years.<sup>10</sup> Of the 6,676 students enrolled in American optometry schools in 2013, 65% (n=4,366) were female.

### Optometrist Work Hours

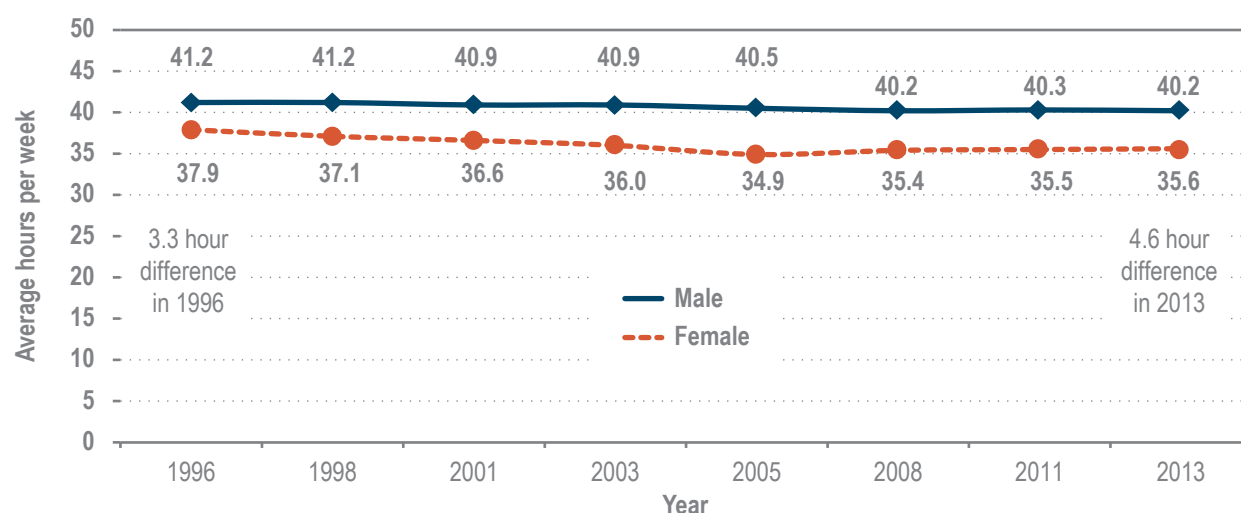
The average number of optometrist hours worked per week in North Carolina has declined slightly since 1996 (Figure 5). In 2013, female optometrists as a whole worked 36 hours on average each week, 4 fewer hours than the weekly average for male optometrists. The difference in hours worked varies not just by gender but also by age (Figure 6). Male and female optometrists aged 30 and younger reported similar average hours worked each week in 2013. Female optometrists aged 30 to 50 reported fewer average hours worked each week than did male optometrists. Female optometrists aged 51 to 60 reported an

increase in average weekly work hours, shrinking the overall gap in hours worked by men and women in this older age group. This U-shaped curve for female optometrist hours is typical for many different professions and may reflect fewer hours worked by women due to obligations to care for children or elderly family members.<sup>11</sup>

### Optometrist Workforce Diversity

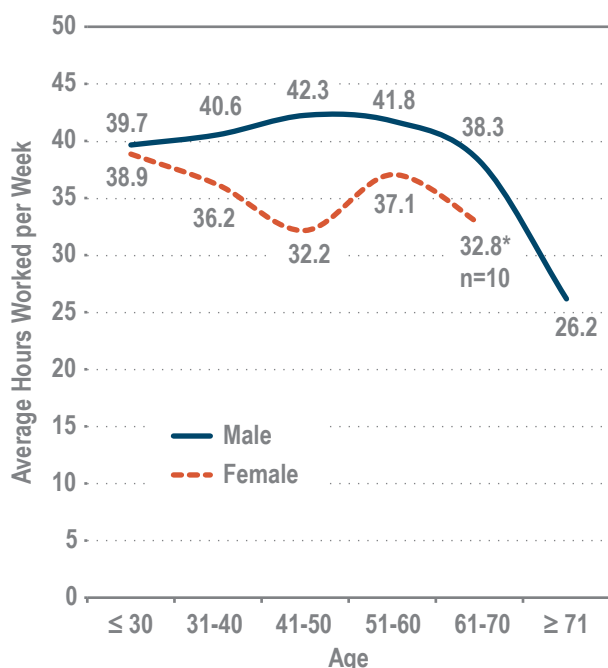
While the optometry workforce has become more racially and ethnically diverse in the last ten years, it does not reflect the diversity of North Carolina's population (Figure 7). In 2013, 9% (n=105) of the optometrist workforce identified as non-white, while 36% of the state's population identified as non-white. This gap is particularly striking for Hispanics and African-Americans. In 2013, 9% of North Carolinians identified as Hispanic and 22% identified as African-American. The same year, 1% (n=11) of North Carolina optometrists identified as Hispanic and 2.5% (n=28) as African-American. North Carolina's optometrist workforce has diversified since 2003, when only 4% (n=34) of the optometry workforce was non-white. The increased diversification has primarily been driven

Figure 5. Optometrist Workforce Average Hours Worked per Week by Sex, North Carolina, 1996-2013



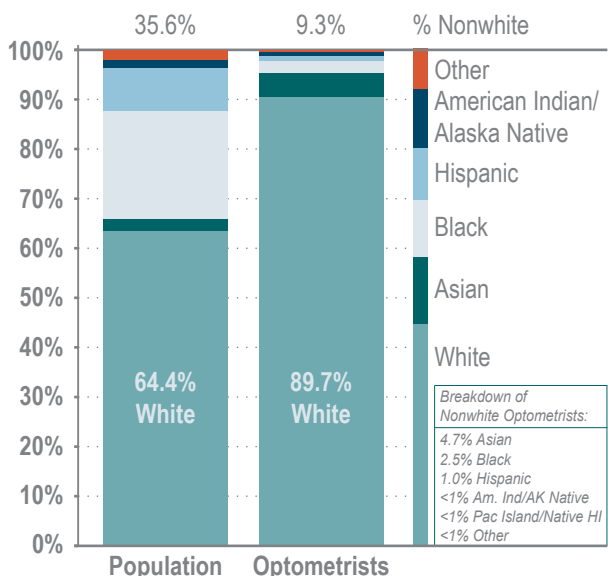
Note: Figures include all active, in-state optometrists licensed in North Carolina as of October 31 of the respective year.  
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 1996-2013.  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

**Figure 6. Optometrist Workforce Average Number of Hours Worked per Week by Age and Sex, North Carolina, 2013**



Note: Figures include all active, instate optometrists licensed in North Carolina as of October 31, 2013. Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 2013; US Census Bureau 2013 State and County QuickFacts. Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

**Figure 7. Diversity of the State's Population and Optometrist Workforce, North Carolina, 2013**



Note: Figures include all active, instate optometrists licensed in North Carolina as of October 31, 2013. Race data were missing for 11 optometrists. Pacific Islander/Native Hawaiian makes up 0.1% of population and optometrists, and is included with "other." Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Optometry, 2013; US Census Bureau 2013 State and County QuickFacts. Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

by an increase in the number of optometrists who identify as Asian. Compared to other professions, optometrists are less diverse than North Carolina pharmacists, dentists, registered nurses, respiratory therapists, primary care physicians, and licensed practical nurses.<sup>12</sup>

The limited diversity of North Carolina's workforce mirrors national trends seen in students enrolled in optometry school. Data from the Association of Schools and Colleges of Optometry (ASCO) indicate that of the 6,676 students enrolled in American optometry schools in 2013, the majority identified as white (56%) or Asian (29%).<sup>13</sup> Fewer than 5% identified as Hispanic/Latino and just 3% identified as African-American.

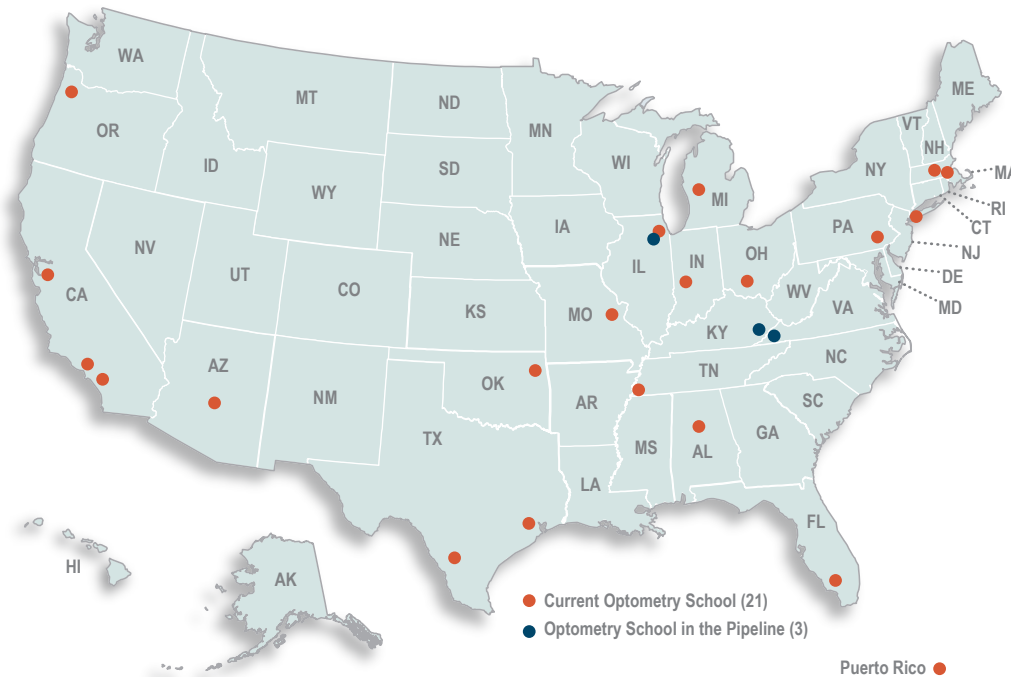
## Practice Characteristics

In the last ten years, there has been little change in the primary specialties reported by NC optometrists. In 2013, 94% (n=974) of optometrists specialized in general practice/primary eye care, a slight increase over 93% (n=763) in 2003. Unlike other health professions experiencing a rapid increase in specialization, optometrists have remained largely in primary eye care.

Optometrist practice settings have shifted over the past decade. Between 2003 and 2013, the percent of optometrists who worked in partnerships or groups increased from 23% (n=188) to 28% (n=284). According to the North Carolina Board of Optometry, practice consolidation increased dramatically in 2014, which is not reflected in the data presented in this report. The Executive Director of the Board noted that over the past year, several practices have joined myeyedr.com.<sup>g</sup> The Board expects this trend to continue in the near future.

<sup>g</sup> John Robinson, North Carolina Board of Optometry, personal communication, 22 September 2014.

Figure 8. Optometry Schools and Colleges in the United States and Puerto Rico, 2014



Source: Association of Schools and Colleges of Optometry, 9/23/14.  
 Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

## Education

As of November 2014, the United States and Puerto Rico had 21 schools of optometry (Figure 8). Most schools are located in the Midwest or along the coasts, with just three schools (the Southern College of Optometry in Tennessee, the University of Alabama at Birmingham, and Nova Southeastern University in Florida) in the southeast.

### State Funding for North Carolina Optometry Students Attending Schools Out-of-State<sup>h</sup>

Historically, there have been four sources of support for North Carolina residents attending optometry school outside of North Carolina: the Student Loan Program for Health, Science and Mathematics (HSM), the Southern Regional Education Board (SREB) Contract Program, the Optometry Scholarship Loan (OSL) and the Forgivable Education Loans for Service (FELS).

<sup>h</sup> The text in this section of the report was contributed by the North Carolina State Education Assistance Authority. We gratefully acknowledge Rashonn Albritton, Margie Ree Booker, William Cox, Elizabeth McDuffie, Stephanie Rinehart, and Edna Williams for their contributions to this report.

The Student Loan Program for Health, Science and Mathematics (HSM) was created during the 1950's as the North Carolina Medical Student Loan Program and evolved over time with changes to the administration of the program. In 2011-12, the final loans were originated with renewal available to students who remained eligible in subsequent years. The program provided loan support to students each year in the amount of \$13,900 (2011-12) with a service repayment requirement of one year of work in optometry in North Carolina for each year of loan funding received. To date, 125 North Carolina optometry students participated in this program. As of October 2014, 79 recipients of the HSM optometry support had completed the service requirements, while 42 recipients did not service the loan and are repaying with cash. Six students have deferred or are still in a grace period. The NC General Assembly merged HSM with other loan programs effective July 1, 2012 and established the Forgivable Education Loans for Service Program.

Another source of funding for optometry students was through the Southern Regional Education Board Regional Contract Program. Since the State does not have an Optometry school, the UNC system contracted with SREB to procure 14 spaces per year for North Carolina residents in the following schools: Southern College of Optometry, University of Houston, and the University of Alabama at Birmingham. UNC also contracted with Salus University (formerly the Pennsylvania College of Optometry) for seven seats per year at the same rate as negotiated with SREB. In the final year of operation, the grant amount was \$13,900 for each of the students attending these schools. NC typically had more contract seats available than students who filled those positions. Only renewal students were funded through the SREB Contract program after 7/1/2008. This program ended in 2011.

The Optometry Scholarship Loan (OSL) program was created in 2008-09 to allow support for optometry students. The program funded one class of 18 students and funding ended after FY 2011-12 with the creation of the FELS program. In the final year of the program, students received \$13,900. To date, 11 borrowers have completed their service requirement, 3 are repaying in cash, and 4 have obtained deferrals or are in a grace period.

The Forgivable Education Loans for Service (FELS) program was created as a result of merging numerous scholarship/loan programs into one program serving multiple disciplines. Optometry and other doctoral students receive \$14,000/year and may attend any optometry school in the country. To date, 29 students have been funded and all students are still enrolled in school. Optometry FELS recipients are required to work in North Carolina in their discipline one year for each year of funding received. If they do not repay the loan in service, the loan must be repaid in cash within 10 years of graduation or from the date the student withdraws. The loan carries an interest rate of 8% calculated from the time of

disbursement. Repayment through work cancels both the principal and the accrued interest.

### Training Location of North Carolina Optometrists

In 2013, more than 70% of optometrists actively practicing in North Carolina had been educated in one of three schools: 29% (n=327) graduated from the Pennsylvania College of Optometry at Salus University, 29% (n=326) from the Southern College of Optometry, and 12% (n=129) from the University of Alabama at Birmingham. North Carolina historically funded NC optometry students at all three of these institutions through the SREB Regional Contract Program.

### Schools of Optometry Under Development in Three States

The American Optometric Association's Accreditation Council on Optometric Education is the accrediting body for professional optometric degree, optometric residency, and associate degree optometric technician programs. Programs seeking accreditation must progress through the following stages: stage one applicant, stage two applicant, and preliminary approval, which is a formal pre-accreditation status.

In addition to the 21 existing optometry schools in the United States and Puerto Rico, there are three schools in the process of developing new optometry programs. The University of Pikeville, Appalachian College of Optometry with Emory & Henry College, and Midwestern University have initiated the process of creating these schools. The University of Pikeville is located in Pikeville, Kentucky and expects to have an entering class of 60 students starting in the fall of 2016.<sup>14</sup> Appalachian College of Optometry, in partnership with Emory & Henry College, will be located in Grundy, Virginia and have an entering class of 48 students.<sup>15</sup> It also anticipates opening in the fall of 2016. Notably, the University of Pikeville and the Appalachian College of Optometry are



located within 50 miles of one another. Midwestern University, which already has a school of optometry in Arizona, plans to expand to Downers Grove, Illinois and enroll 50 students in its first class.<sup>16</sup>

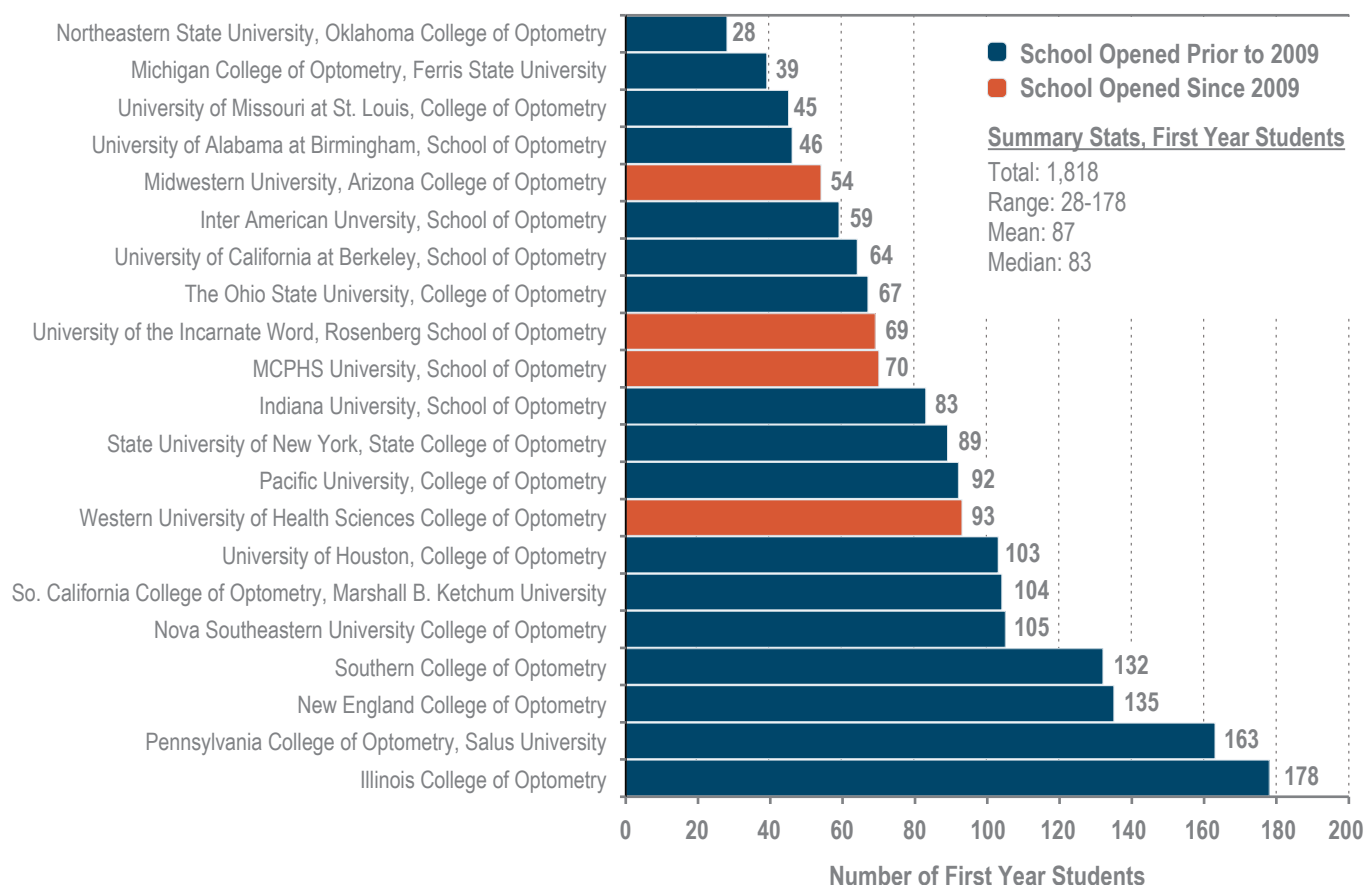
As of November 1<sup>st</sup>, the University of Pikeville and Emory & Henry College are stage one applicants.<sup>17,18</sup> While in stage one, schools are required to submit a formal letter of intent and complete a feasibility study. Midwestern University is in the early planning stages and presented initial planning documents on July 1, 2014 to council members.<sup>19</sup> It has not obtained state approval for the program or entered the accreditation process.

## National Optometry School Admissions and Enrollment

During the 2012-2013 application period, 2,639 individuals applied to optometry school. Of those applicants, 1,856 received at least one offer of admission.<sup>20</sup> Across all of the optometry schools, 70% of people who applied were admitted to at least one school. In 2013, a total of 1,818 students enrolled.<sup>21</sup>

The number of first year optometry students across schools ranges significantly from 28 to 178 (mean=87, median=83) (**Figure 9**). First year student enrollment in professional O.D.

**Figure 9. Number of First Year Optometry Students, US Optometry Schools, Academic Year 2013-2014**



**Note:** Figures include all active, in-state optometrists licensed in North Carolina as of October 31 of the respective year.

**Source:** Association of Schools and College of Optometry Annual Student Data Report, Academic Year, 2013-2014; n=1,818 first year students.

**Produced by:** Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

programs in the United States is increasing due to the development of new schools and expanded enrollment in existing programs. The enrollment of 1,818 students in 2013 represents a 22.3% increase from 2008 (n=1,486).<sup>21</sup> The opening of four new optometry schools between 2008 and 2013 accounts for 86% of this increase, while 14% was due to increases in first year enrollment. Midwestern University in Arizona and Western University of Health Sciences in California both opened in 2009. In 2010 the University of the Incarnate Word opened in Texas, followed by MCPHS University in Massachusetts in 2012. These four schools contributed an additional 286 first year students. Once the proposed schools in Kentucky, Virginia, and Illinois open, annual first year enrollment is projected to increase by 8.7% (n=158) from 2013.

### Enrollment of North Carolina Residents in Optometry School

In 2013, 36 NC residents enrolled in optometry school (**Figure 10**).<sup>i</sup> On average, approximately 30 NC residents enroll each year. From 2008-2012, a total of 146 NC residents enrolled in optometry school. Of those students, 53.4% went to school at the Southern College of Optometry in Tennessee (30.8%) or the Pennsylvania College of Optometry at Salus University (22.6%). Other popular schools include the University of Alabama at Birmingham (8.2%), the Illinois College of Optometry (8.2%), and Nova Southeastern University in Florida (7.5%).

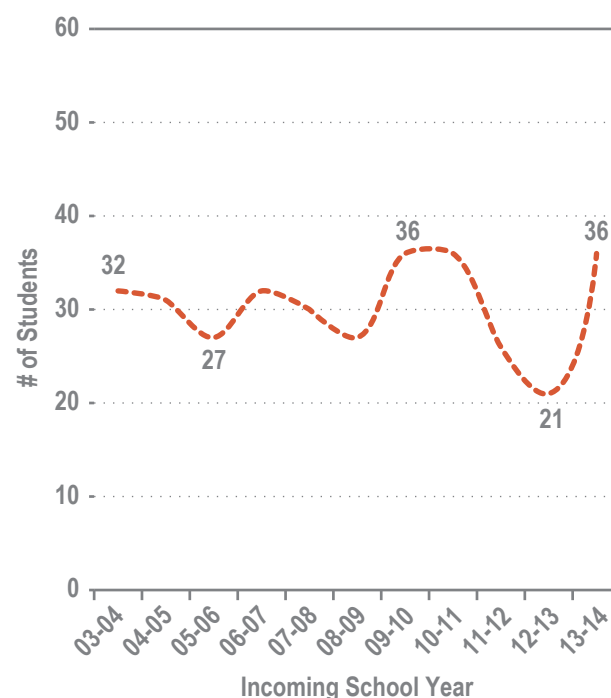
### State and National Optometry Residency Trends

Following graduation from optometry school, some optometrists choose to continue their training by completing an optometric residency program. Optometric residency programs are accredited by the Accreditation Council of Optometric Education (ACOE). Most

are year-long programs. There are 11 types of optometric residencies including: family practice optometry, primary eye care, cornea and contact lenses, geriatric optometry, pediatric optometry, low vision rehabilitation, vision therapy and rehabilitation, ocular disease, refractive and ocular surgery, community health optometry, and brain injury vision rehabilitation.<sup>22</sup>

During the 2012-2013 school year, 329 optometry residency slots were available in the United States. Of these 329 positions, 47% were funded by the U.S. Department of Veterans Affairs, 26% were funded by optometry schools, 22% were funded by non-VA institutions, and 5% were funded using other sources. The average stipend amount provided to residents who began their programs in 2012 was \$34,279.<sup>23</sup>

**Figure 10. First Year North Carolina Resident Enrollment in Optometry School, 2003-2013**



Note: Figures include all NC permanent residents entering their first year in optometry school.  
Source: North Carolina Health Professions Data System with data derived from the Association of Schools and Colleges of Optometry, 2003-2014.  
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

<sup>i</sup> North Carolina residency status data are self-reported. Optometry students were asked to identify their “home state” (Joanne Zuckerman, Association of Schools and Colleges of Optometry, phone communication, October 13, 2014).

North Carolina has two accredited optometry residency programs, both in primary eye care. The program at the Womack Army Medical Center in Fayetteville, NC has one position but is only open to members of the military.<sup>24</sup> The W.G. (Bill) Hefner Veterans Affairs Medical Center in Salisbury, NC has six positions available for optometry residents annually and provides a salary/stipend of \$31,965.<sup>25,26</sup>

South Carolina provides students with four residency opportunities for a total of 6 positions. Three of the four residency programs (five out of six positions) are located in a VA medical center or VA community based outpatient clinic with a stipend of \$31,965 or \$32,000. Similarly, Virginia offers two residency programs (3 positions) and both are located at VA medical centers with a stipend of \$31,965. Tennessee, which has a school of optometry (Southern College of Optometry), offers 11 residencies or 19 positions. Five of those residencies (seven positions) are located at the optometry school. The salary/stipend for the residencies ranges from \$28,000 to \$38,000.<sup>25</sup>

## October 2014 Optometry Expert Advisory Group Discussion Summary

On October 23, 2014, the Program on Health Workforce Research and Policy convened a meeting of optometrists who provided clinical, educational, regulatory, employment, and policy perspectives on the profession. The group reviewed study findings, discussed emerging trends in the field, and considered the possibility of a new school in the state. The following section summarizes that discussion. This summary should not be interpreted as a consensus statement given the complex and varied discussion.

### The Practice Environment for Optometrists is Changing due to External Market Forces

Expert advisory group members noted that the growth of the online marketplace for glasses and

contacts has permanently altered the reimbursement model for many private practice optometry clinics. The expectation is that this shift in optical sales will become more dramatic in the future. In the past, many optometry clinics relied on sales of glasses and contact lenses as a significant portion of their revenue streams. Now, many patients only see an optometrist to get a prescription, choosing to purchase glasses or contacts from online vendors or large chain stores that typically offer lower prices than traditional optometry practices. Over the past year, the Board observed that several independent private practices were acquired by myeyedr.com. Advisory members noted that myeyedr.com and other large groups benefit from economies of scale from sales of glasses and contacts, which cuts overhead costs. Large groups also use more intense marketing, which helps them to compete more effectively. Between online and chain retailers and practice consolidators, independent practices are struggling to compete in the marketplace for glasses and contacts. One group member noted that he was phasing optical sales out of his practice because sales had been “less fruitful” in recent years.

Advisory group members also noted that changes in technology would likely alter the practice of optometry in the future, including the potential for devices that will automatically take refractive measurements for eyeglass prescriptions. Prescriptions obtained from such a device may be less reliable or accurate than those obtained by an optometrist. Nevertheless, if the general public believes that the results of an automated test are “good enough” to subsequently purchase corrective eyewear at a retailer, optical sales at optometrist offices may decline further. Because the sale of materials is a diminishing portion of optometry’s revenue stream, group members felt that the future of the profession could be in a more medically-oriented practice model.

One model of optometry practice that the literature indicates has been increasingly prevalent over the



John D. Robinson, OD (left), Executive Director, North Carolina Board of Optometry, and Gordon DeFrieze, PhD (right), former director of the Sheps Center.

past decade is the co-location of optometrists in practices with ophthalmologists.<sup>27</sup> A few advisory group members practice in these “MD/OD” settings. One group member noted that while the overall approach to care for patients was similar to a non-MD/OD practice, optometrists in these types of settings had the ability to refer patients for more specialized care to a provider in the same building.

### **Group Members had Diverse Opinions on Possible Future Roles for Optometrists**

Expert advisory members noted that an optometrist’s practice could vary widely depending on the setting, practice type, and geographic location. Individual optometrists, like other health professionals, provide varying scopes of services depending on the availability of other practitioners and their own preference to manage versus refer complex cases. An optometrist practicing in a metropolitan area is likely to have more locally available options should he or she elect to refer patients to specialized ophthalmologic services. Advisory group members remarked that, like other rural healthcare providers, rural optometrists tend to provide a wider variety of services than optometrists in metropolitan areas due to an absence of nearby providers to refer complex patients. While optometrists are required to

practice within the regulated scope of services, some members of the advisory group believed that there may be opportunities for expanding the scope of services provided by optometrists in rural areas to serve this population.

### **The Optometrist Job Market in North Carolina is Competitive**

Advisory group members noted that North Carolina is an attractive place to practice optometry. In 1977, North Carolina passed legislation allowing optometrists to prescribe medications, making the optometry practice legislation the most progressive in the US at the time. North Carolina has maintained the ability for optometrists to practice near the highest level of their scope of practice. The state board exam for optometry has the reputation of being one of the most difficult to pass in the country. The Board views the exam as one of the ways it can ensure quality in the field and provide public protection. Due to these high practice standards, group members noted that practicing in North Carolina is a point of pride. North Carolina is appealing for other geographic and regional features (good weather, access to ocean and mountains, etc.), and has steadily attracted optometrists despite the lack of an optometry school and few residency programs.



Jobs for optometrists in North Carolina are available; however, a representative from the State's optometric society noted that, to obtain a job in the state, new graduates may need to be willing to consider a wider range of geographic locations or practice settings than they would initially prefer. One group member noted that academic health centers are "a hard place to find jobs." Another noted that jobs were available, but that he had to compromise on mode of practice when initially starting work in North Carolina by working at five different practice locations, a different one each day of the week. Another group member who graduated from school five years ago elected to live in a rural area, but was working at a large metropolitan area in a different county while she paid down her student loans. Eventually, this optometrist plans to start her own practice, but she noted that it "would be hard to start a practice cold" in her rural area. Starting an independent optometry practice in the state was considered by group members to be "risky, but not impossible." Banks are willing to provide loans for this purpose.

### **Pros and Cons of Opening an Optometry School in North Carolina**

The expert advisory group discussed the question of opening an optometry school in North Carolina and created a list of pros and cons.

On the pro side, members noted that a new school would allow North Carolina to develop innovative training models, including cross-training with other professions, that would ensure that the profession was responsive to changes in the field and population needs in the state. One optometrist noted that she had received emails from undergraduate students at the University of North Carolina who were interested in optometry but had difficulty locating optometrists to shadow. A school of optometry would create more of these opportunities and potentially increase overall interest in the field by bringing more visibility to the profession. A

school that followed the Eastern Carolina University School of Dentistry model, using demonstration clinics in rural areas of the state, could potentially increase optometry coverage in areas of need. Also, an in-state school may increase the number of optometrists retained in-state. A school would make optometry residency programs and clinical rotations, called externships, easier to facilitate and organize. Finally, unlike a scholarship or grant program that relied on continued support for funding, a brick-and-mortar school would require stable funding and would not be in danger of disappearing due to budgetary limitations.

On the con side, group members discussed challenges related to starting an optometry school. A new school will be expensive both in terms of start-up costs and annual operating costs. Group members were concerned that a North Carolina school would add to a potential over supply of optometrists. A 2014 optometrist workforce study conducted by the Lewin Group indicated that there will be an oversupply of optometrists in the nation<sup>6</sup>; however, the methodology of this study has been criticized for drastically underestimating the average number of patients seen daily by optometrists due to reliance on survey data with a small sample size.<sup>28</sup>

Outside of the new schools under development in Kentucky, Virginia, and Illinois, group members had heard of new optometry schools potentially under development in Wisconsin, West Virginia, and Mississippi. Research team staff subsequently contacted the Accreditation Council on Optometric Education, the Association of Schools and Colleges of Optometry, and the American Optometric Association to confirm the development of these schools. None of the organizations were able to provide confirmation.

Some group members suggested that an in-state optometry school would be less expensive to attend for North Carolina students, who may be otherwise dissuaded from pursuing an optometry



degree due to out-of-state tuition costs. However, without knowing the estimated tuition or overall graduation cost estimation for the potential North Carolina optometry school graduate, it is difficult to determine whether a North Carolina optometry school would be less costly than a current out-of-state school. Similarly, some members suggested that an optometry school may encourage a more progressive practice environment for optometrists. However, North Carolina already has more progressive optometry practice regulation than most other states. Group members therefore did not include in-state tuition factors or effects on practice regulation into either the pro or con lists.

Finally, the group noted that while the legislative language suggested eight UNC institutions as potential sites for an optometry school, it was also possible that a private school would be interested in pursuing development of an optometry school in the state.

### **Financial Support for NC Students Who Attend Optometry School Out-of-State**

The expert advisory group discussed the changes in state support for optometry students over the past decade. Some group members expressed

concerns about an increased tuition cost for NC students pursuing optometry, as compared to NC students in other health professions who have the option to attend a school with in-state tuition. To address this issue, some members suggested that reinstating the Regional Contract Program seats would make tuition costs more equitable for optometry students. Additionally, members suggested that a loan forgiveness program could be structured to require service in underserved areas of North Carolina. Members noted that if the state decides to move forward with the development of an optometry school, these programs could be implemented in the interim.

### **Potential to Expand Optometry Clinical Training Opportunities in North Carolina?**

There are two types of clinical training opportunities for optometry trainees. Optometry students complete three-month-long clinical rotations referred to as “externships” in optometrist practices during their 3rd and 4th years of school. Externships are a required component of optometry education. Optometry school graduates may also complete a year-long residency in a specific area of optometry care, such as primary eye care, pediatric



From left to right: David Anderson, OD; Tom Bacon, DrPH; Charles Sikes, OD; and Jamie Casper, OD, PhD, FAAO.

optometry, or ocular disease. Residency programs are not required for licensure. Group members suggested that student experiences during these clinical training periods may be more influential in determining whether an optometry graduate decides to practice in North Carolina than location of optometry school. Two group members completed an optometry residency program out-of-state and remarked that the distance created difficulties when seeking and interviewing for jobs in North Carolina.

Optometry residencies are competitive, largely because there are too few to satisfy the demand from optometry graduates. The program at the W.G. (Bill) Hefner Veterans Affairs Medical Center in Salisbury has six available positions and is the only optometric residency program in North Carolina open to non-military personnel.<sup>26</sup> Residencies must be affiliated with an optometry school, but the school does not need to be located in the same state as the residency program. Group members suggested that while an in-state optometry school may make future development of residencies in North Carolina easier, new residency programs in the state could also be developed in collaboration with an existing residency school. Expanding optometry residencies in North Carolina may be a “stepping stone” for optometrists to relocate here.


Expansion of externship opportunities may be another way to attract optometrists to North Carolina. Again, group members suggested that an in-state optometry school would make the development of additional externships easier, but externships could be developed with existing schools. The primary difficulty with increasing the availability of North Carolina externships

is that there is no central coordinating body for optometry externships; rather, externships are developed on an individual basis between a particular school and an optometry practice. One group member suggested that North Carolina could develop a “consortium” of optometry externships. Such a consortium would require a body to organize and administer the consortium.

## Conclusions

---

North Carolina has a reputation for requiring high standards to achieve a license to practice optometry and being a progressive state in which to practice. These factors have steadily attracted optometrists to the state over the past 30 years, despite the lack of an optometry school. Relatively few optometrists are nearing retirement age and young optometrists are entering the workforce. Following national trends, the optometrist workforce is becoming increasingly female. Despite greater diversification in recent years, the workforce is still primarily white. Most optometrists in the state practice primary eye care. There is increased competition for optical sales and practice consolidation has accelerated.

North Carolina does not have an optometry school, but has historically provided support to NC optometry students who are trained out-of-state. At the time of this report, there are 21 optometry schools in the US and Puerto Rico, with three additional schools in the development stage. Most optometrists in North Carolina were trained at one of three schools in Alabama, Tennessee, and Pennsylvania. On average, 30 NC students enroll in optometry school each year. 

# References

- 1) North Carolina General Stat §90-114. [http://www.ncga.state.nc.us/EnactedLegislation/Statutes/HTML/BySection/Chapter\\_90/GS\\_90-114.html](http://www.ncga.state.nc.us/EnactedLegislation/Statutes/HTML/BySection/Chapter_90/GS_90-114.html). Accessed October 31, 2014.
- 2) N.C. Gen Stat §90-118. [http://www.ncga.state.nc.us/EnactedLegislation/Statutes/PDF/ByArticle/Chapter\\_90/Article\\_6.pdf](http://www.ncga.state.nc.us/EnactedLegislation/Statutes/PDF/ByArticle/Chapter_90/Article_6.pdf). Accessed October 31, 2014.
- 3) North Carolina State Law. 2014-100, Section 11.21(a). <http://www.ncleg.net/Sessions/2013/Bills/Senate/PDF/S744v9.pdf>. Accessed October 31, 2014.
- 4) US Bureau of Labor Statistics: Occupational Employment and Wages, May 2013: 29-1041 Optometrists. <http://www.bls.gov/oes/current/oes291041.htm>. Accessed September 28, 2014.
- 5) US Department of Health and Human Services Health Resources and Services Administration National Center for Health Workforce Analysis. November 2013. The US Health Workforce Chartbook, Part II: Clinicians and Health Administration. <http://bhpr.hrsa.gov/healthworkforce/supplydemand/usworkforce/chartbook/index.html>. Accessed September 28, 2014.
- 6) The Lewin Group. April 25, 2014. Eye Care Workforce Study: Supply and Demand Projections: Executive Summary. Prepared for the American Optometric Association and the Association of Schools and Colleges of Optometry.
- 7) Fraher E. Health Workforce Supply in North Carolina: Future Trends, Opportunities, and Challenges. Powerpoint Presentation presented at North Carolina General Assembly Committee on Health Care Provider Practice Sustainability and Training/Additional Transparency, December 16, 2013, Raleigh, NC. [http://www.shepscenter.unc.edu/hp/presentations/NCGA\\_Fraher\\_Dec2013.pdf](http://www.shepscenter.unc.edu/hp/presentations/NCGA_Fraher_Dec2013.pdf). Accessed November 1, 2014.
- 8) Fraher E. The Dental Workforce in North Carolina: Trends, Challenges, and Opportunities. Powerpoint presentation. Presented at 2013 NC Dental Public Health Educational Conference, March 5, 2013, Charlotte, NC. [http://www.shepscenter.unc.edu/hp/presentations/PubHlthDentists\\_5Mar2013.pdf](http://www.shepscenter.unc.edu/hp/presentations/PubHlthDentists_5Mar2013.pdf). Accessed November 1, 2014.
- 9) Spero JC, Del Grosso C, Fraher EP. February 2014. Pharmacists in North Carolina: Steady Numbers, Changing Roles. Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill. February 2014. [http://www.shepscenter.unc.edu/hp/publications/NCpharmacists\\_Feb2014.pdf](http://www.shepscenter.unc.edu/hp/publications/NCpharmacists_Feb2014.pdf). Accessed November 1, 2014.
- 10) Association of Schools and Colleges of Optometry, Profiles of the Entering Classes (2010-2013). <http://www.opted.org/about-optometric-education/professional-o-d-programs/applicants-and-advisors/student-profile-prerequisites/profiles-of-the-entering-classes-2010-2012/>. Accessed October 29, 2014.
- 11) Fraher E. Slacker Gen Xers or Workaholic Boomers?: An Analysis of Age, Gender, Cohort and Period Effects on Hours Worked in Patient Care. International Medical Workforce Conference; September 2008; Edinburgh, Scotland. [http://rcpsc.medical.org/publicpolicy/imwc/Fraher\\_IMWC\\_Career\\_Structure\\_071808.pdf](http://rcpsc.medical.org/publicpolicy/imwc/Fraher_IMWC_Career_Structure_071808.pdf). Accessed January 17, 2014.
- 12) McGee V, Fraher E. August 2012. The Diversity of North Carolina's Health Care Workforce. North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. [http://www.shepscenter.unc.edu/hp/publications/Diversity\\_Aug2012.pdf](http://www.shepscenter.unc.edu/hp/publications/Diversity_Aug2012.pdf). Accessed November 1, 2014.
- 13) Association of Schools and Colleges of Optometry: Student Profiles and Prerequisites. <http://www.opted.org/about-optometric-education/professional-o-d-programs/applicants-and-advisors/student-profile-prerequisites/>. Accessed October 29, 2014.
- 14) Optometry Times. (2014, March 7). University of Pikeville to open 22nd optometry school in US. <http://optometrytimes.modernmedicine.com/optometrytimes/content/tags/education/university-pikeville-open-22nd-optometry-school-us>. Accessed November 1, 2014.
- 15) Gibson AR. (2014, January 30). Appalachian College of Optometry, E&H sign agreement. [http://www.tricitie.com/news/article\\_4f7bc6fe-89ce-11e3-9c28-0017a43b2370.html](http://www.tricitie.com/news/article_4f7bc6fe-89ce-11e3-9c28-0017a43b2370.html). Accessed November 1, 2014.
- 16) McCarthy CE. (2014, July 15). Midwestern University unveils plans for new optometry school. <http://optometrytimes.modernmedicine.com/optometrytimes/content/tags/midwestern-university-chicago/midwestern-university-unveils-plans-new-op?page=full>. Accessed November 1, 2014.
- 17) American Optometric Association: Archive of ACOE Accreditation Actions – July 28, 2014. <http://www.aoa.org/optometrists/for-educators/accreditation-council-on-optometric-education/recent-aoe-accreditation-actions/archive-of-accreditation-actions/archive-of-accreditation-actions--july-28-2014?sso=y>. Accessed November 1, 2014.
- 18) American Optometric Association: Archive of ACOE Accreditation Actions – March 11, 2014. <http://www.aoa.org/optometrists/for-educators/accreditation-council-on-optometric-education/recent-aoe-accreditation-actions/archive-of-accreditation-actions/archive-of-accreditation-actions--march-11-2014?sso=y>. Accessed November 1, 2014.
- 19) McMenamin E. (2014, July 10). Midwestern University eyes new optometry school in Downers Grove. Retrieved from <http://www.mysuburbanlife.com/2014/07/03/midwestern-university-eyes-new-optometry-school-in-downers-grove/a5xbfud/>. Accessed November 1, 2014.
- 20) Association of Schools and Colleges of Optometry. Optometry Centralized Application Service: OptomCAS Applicant Data Report – A National Snapshot 2012-2013. <http://www.optomcas.org/files/2012-2013.pdf>. Accessed October 24, 2014.
- 21) Association of Schools and Colleges of Optometry. Annual Student Data Report Academic Year 2013-2014. <http://www.opted.org/wp-content/uploads/2013/03/2-ASCO-2013-2014-Annual-Student-Data-Report.pdf>. Accessed on September 12, 2014.
- 22) FAQs about Residencies. Association of Schools and College of Optometry. <http://www.opted.org/about-optometric-education/residency-programs/faqs-about-residencies>. Accessed October 29, 2014.
- 23) Residency Program Funding and Promotion Survey: 2012-2013 Academic Year. Association of Schools and Colleges of Optometry. <http://www.opted.org/wp-content/uploads/2013/03/2012-2013SummaryResidencyProgramFundingPromotion.pdf>. Accessed November 5, 2014.
- 24) ASCO Residency Program Website. <http://asco.surveydomain.org/residency/view/159/program>. Accessed November 1, 2014.
- 25) Residency Search. Association of Schools and Colleges of Optometry. <http://asco.surveydomain.org/residency/search>. Accessed November 5, 2014.
- 26) ASCO Residency Program Website. <http://asco.surveydomain.org/residency/view/34/program>. Accessed November 1, 2014.
- 27) Kim JJ, Kim CM. Models for joint ophthalmology-optometry patient management. *Current Opinion in Ophthalmology*. 2011 July;22(4):256-60
- 28) Myers K. September 2014. Lewin Survey Finds Large Optometry Surpluses: An Editorial Analysis. <http://www.charlesmullen.com/wp/wp-content/uploads/2014/09/Lewin-Study-Optometry-Surplus.pdf>. Accessed October 24, 2014.

## Appendix: Sheps Center Optometry Expert Advisory Group, 2013

---

**David Anderson, OD**

Tarboro Clinic PA

**Jill Bryant, OD, FAAO, FSLs**

Assistant Clinical Professor of Ophthalmology

Medical Director of Contact Lens

Duke Eye Center

**Jamie J. Casper OD, PhD, FAAO**

Cape Fear Eye Institute OD PA

**Gordon H. DeFrieze, PhD**

Former Director

Cecil G. Sheps Center for Health Services Research

**Melanie J. Denton, OD, FAAO**

Hendersonville Eye Care

**Adrianne M. Drollette**

Executive Director

North Carolina State Optometric Society

**Hal C. Herring, Jr., OD**

Fairmont Optometric Clinic

**Michael V. Holland, OD**

Holland & Holland Eye Care Center

**Nisha P. Mehta, OD, FAAO**

Clinical Assistant Professor

UNC Ophthalmology

**Janice Peterson, RN**

Administrative Secretary

North Carolina Board of Optometry

**William B. Rafferty, OD, FAAO, FAARFM**

Assistant Professor of Ophthalmology

Duke University Eye Center

**John D. Robinson, OD**

Executive Director

North Carolina Board of Optometry

**Charles Sikes, OD**

President

North Carolina State Optometric Society







UNC

THE CECIL G. SHEPS CENTER  
FOR HEALTH SERVICES RESEARCH