

# Trends in the Supply of Pharmacists in North Carolina

March 2010

## Quick Facts, 2008

**Number of Pharmacists in NC:**  
8,578

**Pharmacists per 10,000 Population**  
North Carolina: 9.3  
United States: 8.0

**Average age of NC Pharmacists:**  
43 years, total  
48 years, male  
39 years, female

**Average hours worked per week:**  
37 hours, total  
39 hours, male  
36 hours, female

**From 2003-2008, relative to population:**  
69 counties gained pharmacists  
29 counties lost pharmacists  
2 counties had no pharmacists either year

## **North Carolina Health Professions Data System** Cecil G. Sheps Center for Health Services Research University of North Carolina at Chapel Hill

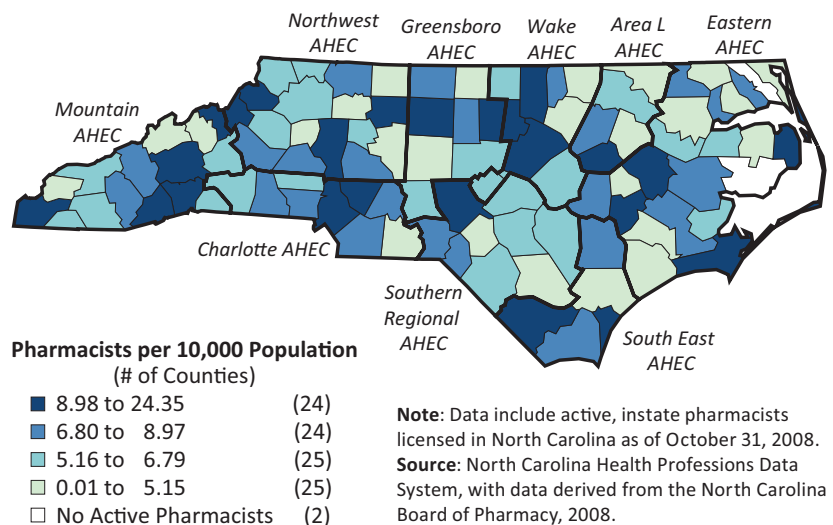
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## **Workforce Supply**

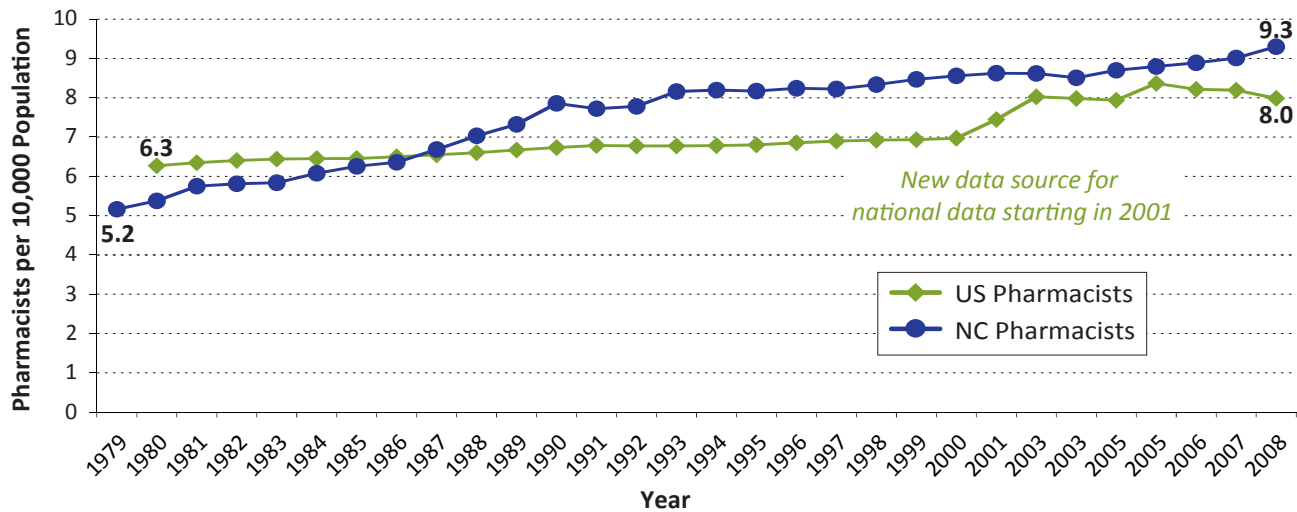
There were 8,578 pharmacists in active practice in North Carolina as of October 2008, or 9.3 per 10,000 residents. The ratio of pharmacists to population is a good indicator for comparisons with national and other state rates, and to track trends over time. The distribution of pharmacists varies across counties; Durham had the highest number of pharmacists relative to population (24.3) and two counties, Hyde and Camden, did not have an active pharmacist (Figure 1).

**Figure 1.**  
**Pharmacists per 10,000 Population, North Carolina, 2008**



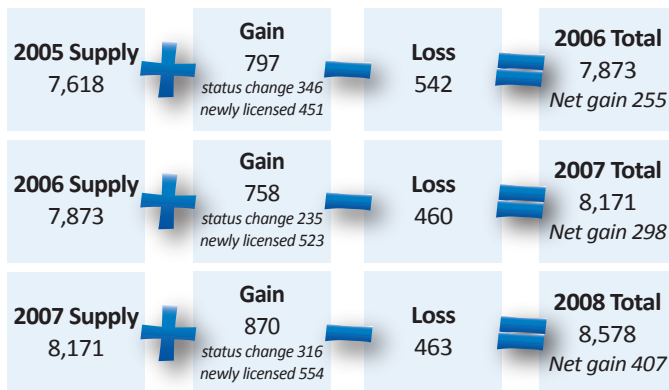
Comparisons to national benchmarks provide another metric by which to measure North Carolina's supply. Due to differences in national and state data sources and methodologies, specific comparisons between United States (US) and North Carolina practitioner-to-population ratios for any year should be interpreted with caution. Since 1987, North Carolina's supply of pharmacists relative to population has exceeded the national ratio, and in the last four years the state's supply has grown against population while the ratio has fallen for the nation (Figure 2).

**Figure 2. Pharmacists per 10,000 Population  
US and NC, 1979-2008**



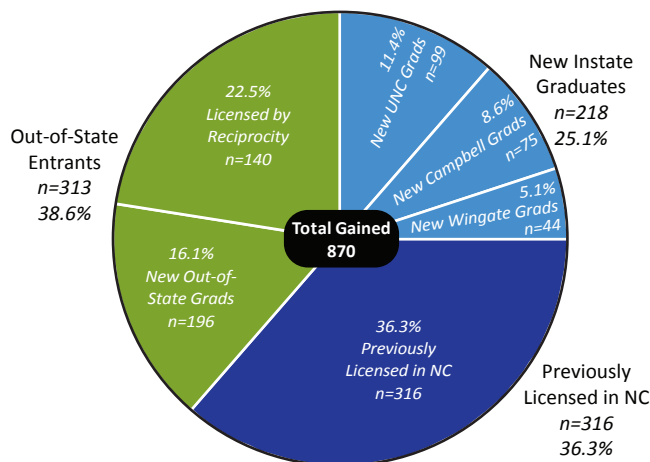
Sources: North Carolina Health Professions Data System, 1979 to 2008; HRSA, Bureau of Health Professions; US Census Bureau; North Carolina Office of State Planning. Figures include all licensed, active, instate pharmacists. Population data are smoothed figures based on 1980, 1990 and 2000 Censuses.

**Figure 3. Components of Change**



Each year, the North Carolina Health Professions Data System (HPDS) receives a file from the North Carolina Board of Pharmacy containing information on pharmacists licensed to practice in the state in that year. Comparison of these files from year-to-year is useful because it reveals, on an annual basis, the flow of pharmacists into and out of active practice. **Figure 3** shows that there is a dynamic gain and loss every year, where approximately 16% of the workforce either enters or exits active practice. Of the pharmacists added to the workforce in 2008, 554 were newly licensed in North Carolina, and 316 were previously licensed and moved from inactive to active practice or out-of-state to in-state status. The net gain from 2007-2008 was significantly higher than the previous two years.

**Figure 4. Gain\* in Pharmacists, 2008**



**\*Note:** New Graduates are those individuals who graduated in either the current or previous year and were licensed in 2008. Previously licensed pharmacists are those who were licensed in NC in an earlier year but were either inactive or active out-of-state in the previous year. Individuals who become licensed by reciprocity are those pharmacists who have been actively practicing in other states.

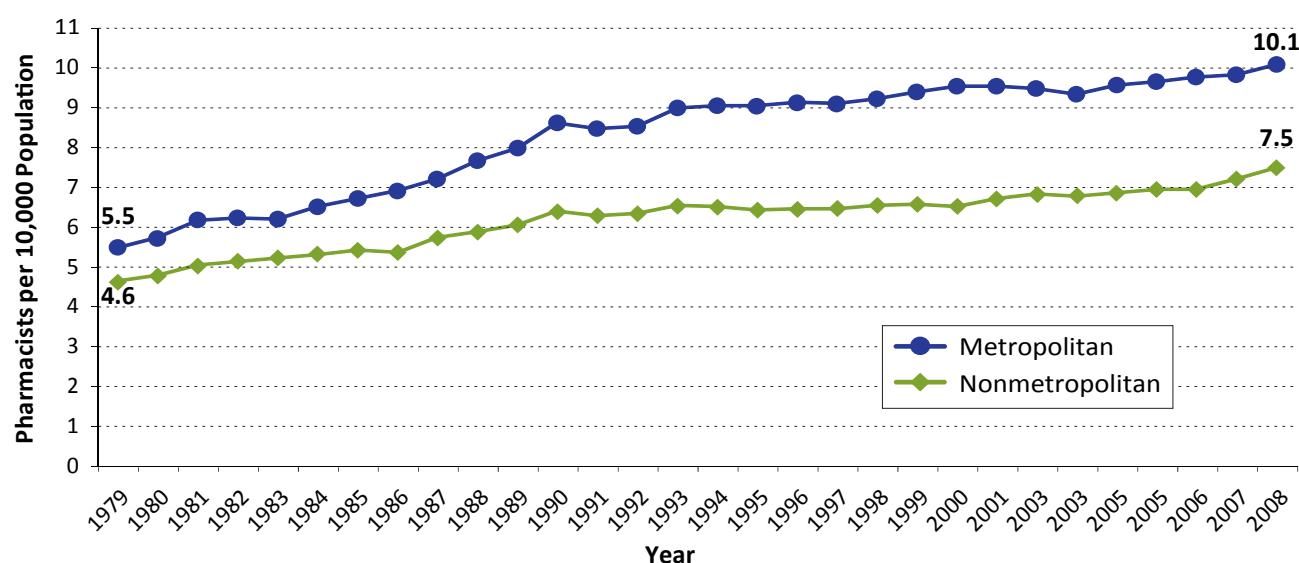
**Figure 4** shows additional detail about the pharmacists gained in 2008. Of the 870 new pharmacists in North Carolina, 25.1% were new graduates of North Carolina schools of pharmacy,

38.6% came from out-of-state, including new graduates and pharmacists licensed by reciprocity, and 36.3% previously held a license in North Carolina and were not practicing in the state in 2007. North Carolina imported nearly as many new graduates from other states as we produced, and more than one in three pharmacists gained was from out-of-state.

## **Distribution**

Although North Carolina's supply of pharmacists relative to population exceeds the national average, there are differences in the way the workforce is distributed among counties. **Figure 5** depicts the ratio of pharmacists per population in metropolitan and nonmetropolitan counties in North Carolina, and shows a recent uptick in supply in nonmetropolitan counties. In 2008, there were 10.1 pharmacists per 10,000 people in metropolitan counties, while non-metropolitan counties had 7.5. This gap has remained fairly consistent since 1979.

**Figure 5. Pharmacists per 10,000 Population by Metropolitan and Nonmetropolitan Counties, North Carolina, 1979 to 2008**

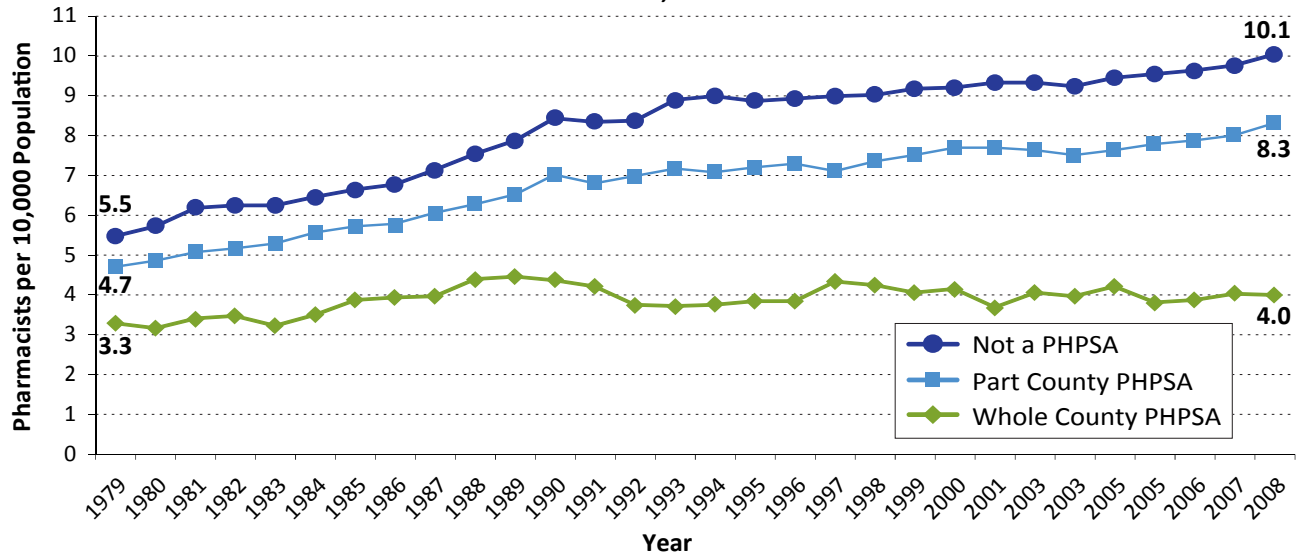


**Sources:** North Carolina Health Professions Data System, 1979 to 2008; North Carolina Office of State Planning; Office of Management and Budget. Figures include all licensed, active, instate pharmacists. North Carolina population data are smoothed figures based on 1980, 1990 and 2000 Censuses.

**Figure 6** paints a slightly different picture, showing pharmacists per 10,000 population by persistent Health Professional Shortage Area (HPSA) designation<sup>1</sup> (see **Appendix A** for map). There is no shortage designation specifically for pharmacists, so primary care HPSAs are used here as a proxy. The data in **Figure 6** indicate that, although overall supply has increased, the supply in whole county HPSAs has not generally improved, while supply in part-county HPSAs and counties not designated as HPSAs has grown.

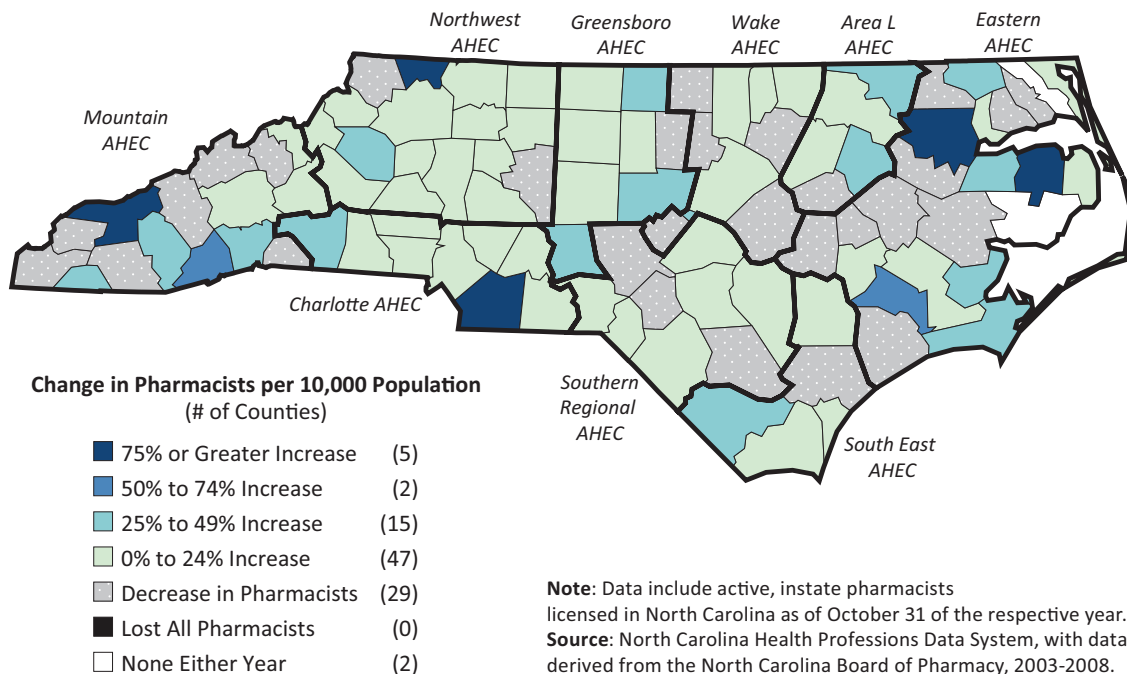
<sup>1</sup> HPSAs are federally designated by the Health Resources and Services Administration (HRSA); designation is generally given to areas with an inadequate number of primary care health professionals or whose population has unusually high needs for primary medical services or face increased barriers to accessing primary care services. Persistent HPSAs are defined by the Sheps Center as counties defined as HPSAs by HRSA from 1999-2005, or in 6 of the last 7 releases of HPSA definitions.

**Figure 6. Pharmacists per 10,000 Population by  
Persistent Health Professional Shortage Area (PHPSA) Status  
North Carolina, 1979 to 2008**



**Sources:** North Carolina Health Professions Data System, 1979 to 2008; North Carolina Office of State Planning. Figures include all licensed, active, in-state pharmacists. North Carolina population data are smoothed figures based on 1980, 1990 and 2000 Censuses. Source for Health Professional Shortage Areas: Area Resource File, HRSA, Department of Health and Human Services, 2006. Persistent HPSAs are those designated as HPSAs by HRSA from 1999 through 2005, or in 6 of the last 7 releases of HPSA definitions.

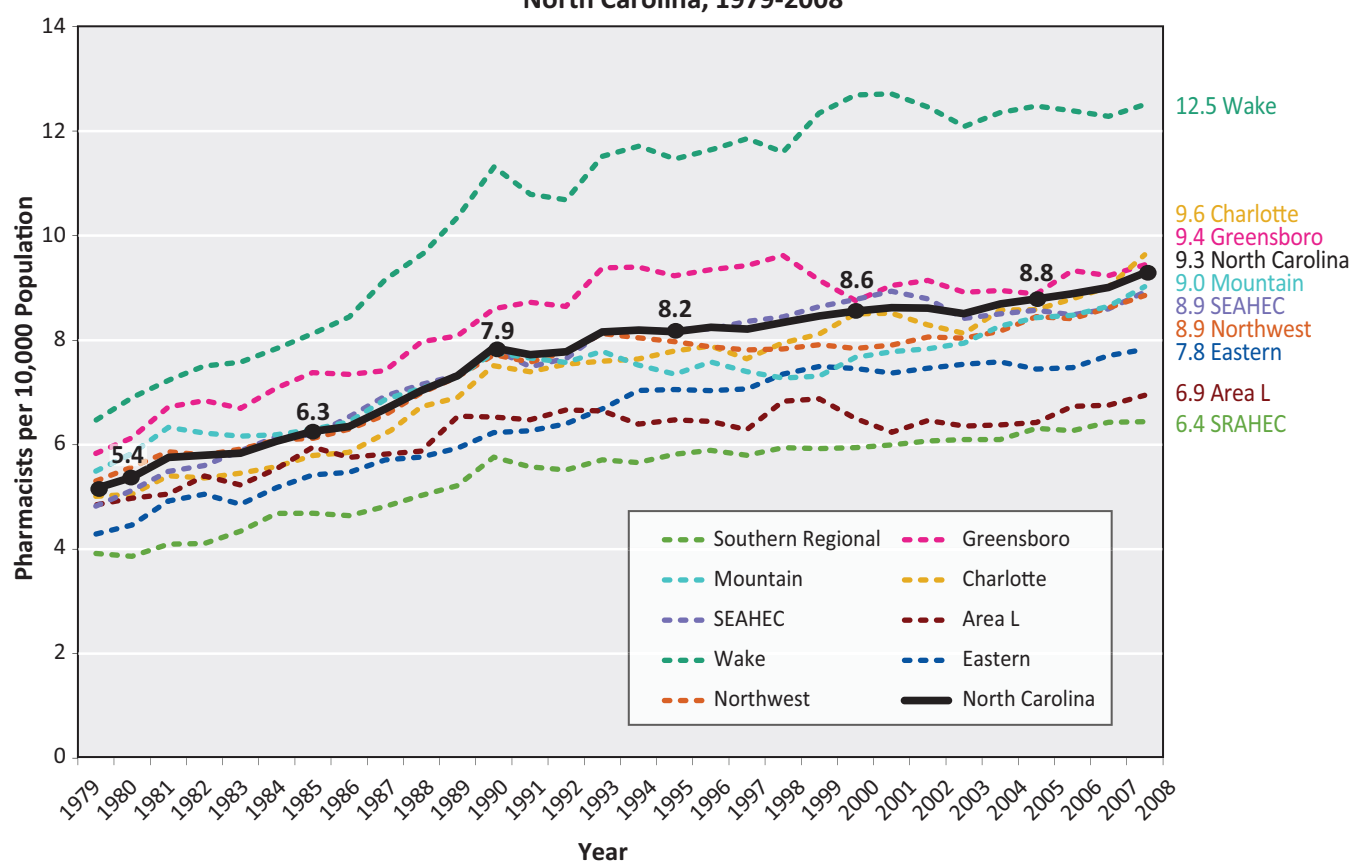
**Figure 7.  
Change in Pharmacists per 10,000 Population, North Carolina, 2003-2008**



Illustrating whether or not the supply of pharmacists in individual counties is keeping pace with population, **Figure 7** shows the change in supply of pharmacists per 10,000 population between 1998 and 2008. Supply grew more rapidly than population in 69 counties. Of the counties that saw a decrease in the ratio of pharmacists per population, sixteen gained pharmacists and five had no change in the number of pharmacists, but growth in population outpaced the gain in pharmacists. Eight counties lost at least one pharmacist between 2003 and 2008, including Hyde, which lost both of its pharmacists in 2001.

In addition to metropolitan and PHPSA designations, it is useful to examine regional variation. There are nine Area Health Education Centers (AHEC) regions in North Carolina, as shown by bold outlines in **Figures 1 and 7**. The data in **Figure 8** show pronounced disparities in the supply of pharmacists per population by AHEC region from 1979-2008. Wake AHEC, in which Raleigh is located, had 12.5 pharmacists per 10,000 population in 2008, and is consistently much higher than other regions and the state average. Area L, Southern Regional, and Eastern AHECs have the fewest pharmacists per 10,000 population. Charlotte AHEC saw a spike in their ratio from 2007 to 2008, due in part to the 2007 graduation of Wingate's first class of pharmacy students.

**Figure 8. Pharmacists per 10,000 Population by AHEC Region  
 North Carolina, 1979-2008**



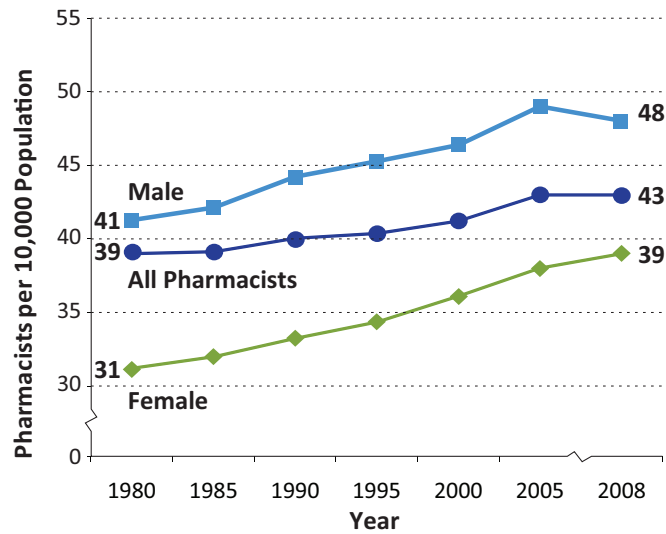
**Note:** Data include active, instate pharmacists licensed in North Carolina as of October 31 of the respective year. In 1998, Rutherford county was reassigned from Charlotte AHEC to Mountain AHEC. **Sources:** North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Board of Pharmacy; North Carolina State Data Center.

### Workforce Demographic Characteristics

The average age of pharmacists in North Carolina has grown from 39 years in 1980 to 43 years in 2008 (**Figure 9**). The female workforce, younger than male pharmacists by an average of nine years, continues to age steadily. The average age of men has decreased slightly in the most recent data. The overall increase in the average age of the workforce might partially be attributed to the move to the PharmD, and the longer training period associated with this degree.

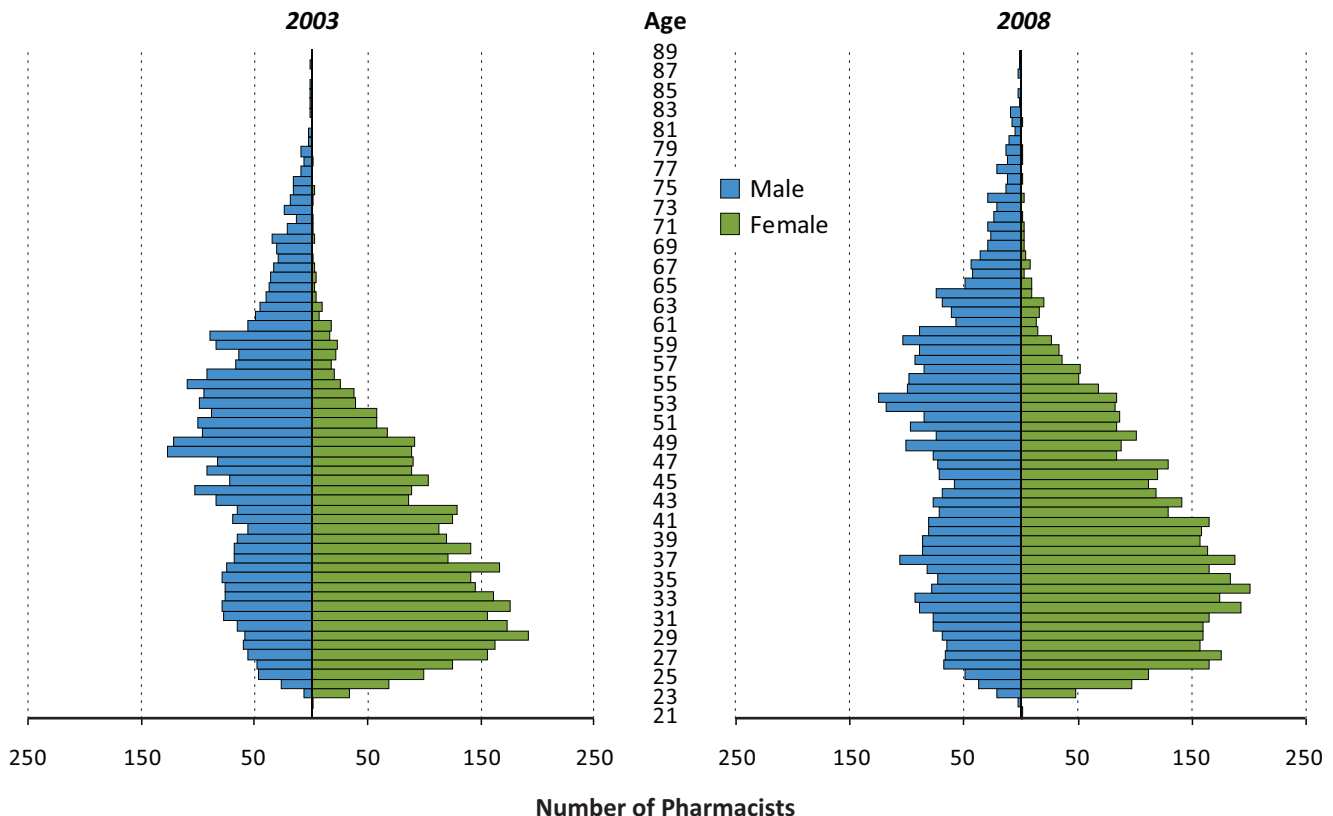
The age-gender pyramids in **Figure 10** show a growing cohort of young pharmacists between 2003-2008, the majority of which are female. This widening base suggests a good future supply of pharmacists in the state.

**Figure 9. Average of Active Licensed Pharmacists by Sex  
North Carolina, 1980 to 2008**



**Note:** Data include all active, instate pharmacists 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 Pharmacy, 2008.

**Figure 10. Age-Gender Pyramids, Pharmacists  
North Carolina, 2003 & 2008**



**Note:** Data include all active, instate pharmacists licensed in North Carolina as of October 31 of the respective year. There were 5 pharmacists missing age information in 2008. **Source:** North Carolina Health Professions Data System, with data derived from the North Carolina Board of Pharmacy.

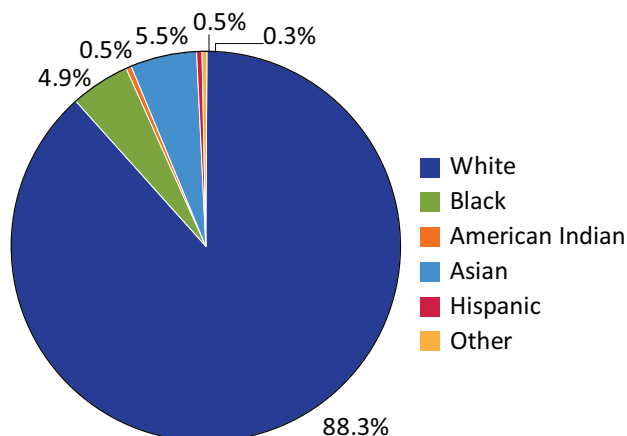
**Figure 11** shows that the North Carolina pharmacist workforce is predominately white (88.3%). Currently, only about 12% of North Carolina pharmacists are nonwhite, compared to 26% of North Carolina's total population. Although the makeup of the North Carolina pharmacist workforce does not match the racial and ethnic makeup of the general population, pharmacist diversity in North Carolina has shown improvement, with the proportion of nonwhite pharmacists growing from 3% of the workforce in 1980, to 6% in 2000, and 12% in 2008.

### Workforce Practice Characteristics

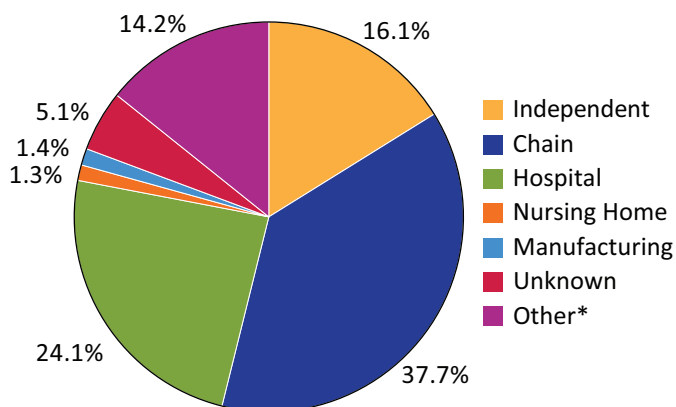
In 2008, the majority of North Carolina pharmacists worked for a chain pharmacy, (37.7%), hospital (24.1%) or independent pharmacy (16.1%) (**Figure 12**). While retail chains have grown rapidly over the last few decades, the distribution of pharmacists by employment setting has remained relatively unchanged. From 1998 to 2008, there was a slight decrease (-0.7%) in the percentage of pharmacists working in retail pharmacies and a 2% increase in the number of pharmacists employed by hospitals. The number of pharmacists working for independent pharmacies has remained relatively consistent since 2000.

**Figure 13** describes the form of employment, or type of position, that NC pharmacists hold. An overwhelming majority (59.2%) of the pharmacists in North Carolina report that they are staff pharmacists.

**Figure 11. Racial Composition of Active Pharmacists, North Carolina, 2008**

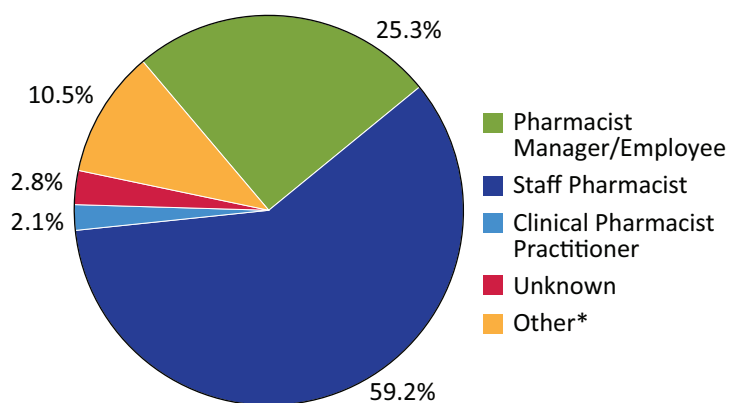


**Figure 12. Employment Setting of Active Pharmacists, North Carolina, 2008**



\*Other includes government, wholesale, teaching, other, sales, research and health department.

**Figure 13. Form of Employment of Active Pharmacists, North Carolina, 2008**



\*Other includes supervisor, unpaid worker, pharmaceutical sales, consultant, relief pharmacist, research, other (not specified), and long term care.

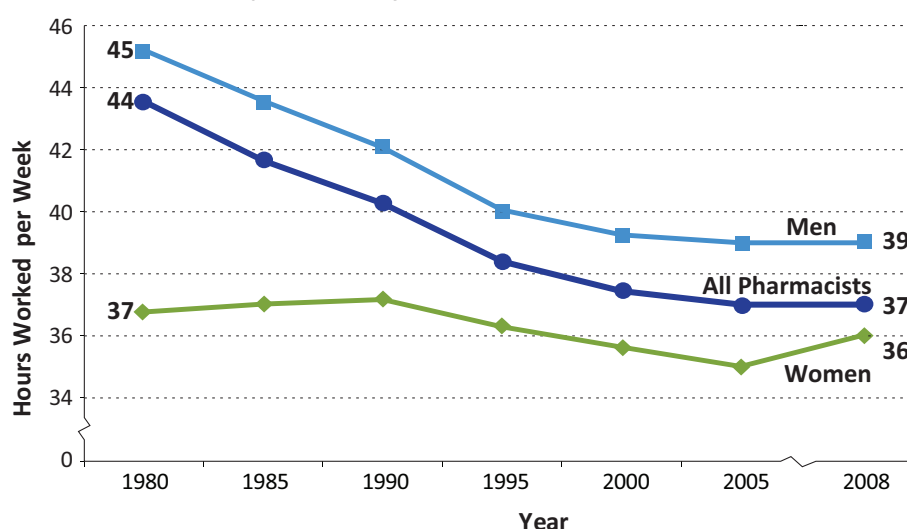
**Note:** Data include all active, instate pharmacists licensed in North Carolina as of October 31, 2008. **Source:** North Carolina Health Professions Data System, with data derived from the North Carolina Board of Pharmacy.



### North Carolina pharmacists

worked an average of 37 hours in 2008. Since 1980, men have worked more hours on average than women, but this number has decreased from 45 hours per week in 1980 to 39 hours per week in 2008 (Figure 14). Women worked an average of 37 hours in 1980 and 36 hours in 2008, working slightly longer hours from 2005 to 2008.

**Figure 14. Pharmacists' Average Hours Worked per Week by Sex, North Carolina, 1980-2008**



**Note:** Data include all active, instate pharmacists licensed in North Carolina as of October 31 of the respective year. Hours were not available for 263 women and 181 men. **Source:** North Carolina Health Professions Data System with data derived from the North Carolina Board of Pharmacy, 2008.

### Training Characteristics

The majority of pharmacists (58.3%) practicing in North Carolina in 2008 graduated from a North Carolina school of pharmacy (Table 1). The data also reveal South Carolina, Pennsylvania, New York and other countries as top contributors to the North Carolina pharmacist workforce. Neighboring Georgia, as well as Florida, also ranked in the top ten school states, and Tennessee was lower on the list, contributing just 0.7% of all active pharmacists in North Carolina.

**Table 1. Training Location of North Carolina Pharmacists Active in 2008**

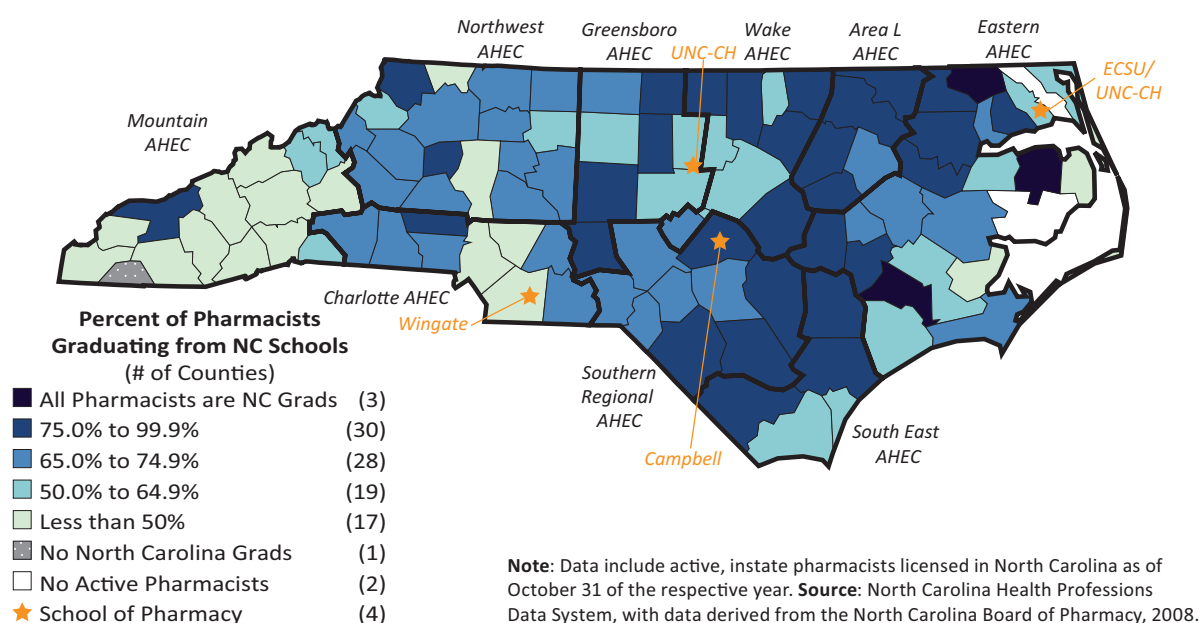
	School State	Number (Rank)	Percent of All Pharmacists	Percent of Pharmacists Trained Outside of NC
	North Carolina	5003 (1)	58.3%	--
	UNC Chapel Hill	3,967	46.3%	
	Campbell	948	11.1%	
	Wingate	88	1.0%	
Adjacent	South Carolina	443 (2)	5.2%	12.4%
	Georgia	256 (6)	3.0%	7.2%
	Virginia	190 (8)	2.2%	5.3%
	Tennessee	56 (16)	0.7%	1.6%
Region	Florida	158 (9)	1.8%	4.4%
	West Virginia	111 (11)	1.3%	3.1%
	Alabama	108 (12)	1.3%	3.0%
Other Top Contributors	Louisiana	69 (15)	0.8%	1.9%
	Pennsylvania	359 (3)	4.2%	10.0%
	New York	315 (4)	3.7%	8.8%
	International	264 (5)	3.1%	7.4%
	Ohio	220 (7)	2.6%	6.2%
	Massachusetts	129 (10)	1.5%	3.6%
	Michigan	95 (13)	1.1%	2.7%
	Indiana	93 (14)	1.1%	2.6%

**Source:** North Carolina Health Professions Data System with data derived from the North Carolina Board of Pharmacy. Data include active, instate pharmacists licensed in North Carolina as of October 31, 2008.



The distribution of North Carolina graduates as a percentage of the county-level workforce is shown in **Figure 15**. Less than 50% of the workforce in a large cluster of counties in the western part of the state graduated from a North Carolina program; in these counties, North Carolina graduates still accounted for the majority of pharmacists, but Georgia, South Carolina and Florida were also key contributors. Clay County, which didn't have any pharmacists trained in NC and is shaded gray in the map, had one pharmacist from Florida, five from Georgia, and one from Massachusetts. **Figure 16** shows the data in a slightly different light, showing the proportion of pharmacists in each county that graduated from UNC, Campbell, Wingate, and outside of North Carolina.

**Figure 15. Percent of Active Pharmacists in 2008 Graduating from a School of Pharmacy in North Carolina**



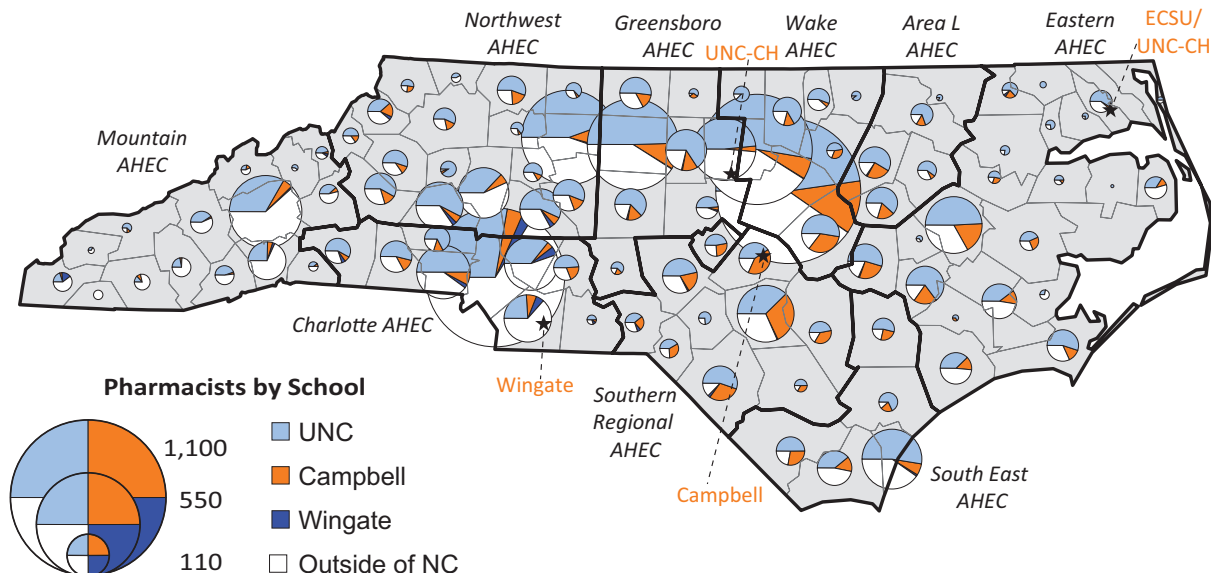
Of the new pharmacists practicing in North Carolina, new NC graduates (21.1%) were more likely to practice in nonmetropolitan counties than new graduates from other states (13.3%) or those licensed by reciprocity (15.0%). Pharmacists who were previously licensed in North Carolina (26.3%) were the most likely to practice in nonmetropolitan counties. There was not a significant difference in the likelihood of practicing in whole or part county HPSAs.

### **North Carolina Programs**

North Carolina has three schools of pharmacy, including UNC-Chapel Hill (founded 1887), Campbell (established 1986), and Wingate (established 2002). UNC-Chapel Hill and Elizabeth City State University (ECSU) have a PharmD partnership that launched in the fall of 2005, and enrolls 10-15 students per year. Students spend the first three years at ECSU before enrolling in clinical practice experiences. They graduate with a doctor of pharmacy from UNC-Chapel Hill, with an acknowledgment of the partnership with ECSU.<sup>2</sup>

<sup>2</sup> <http://pharmacy.unc.edu/programs/the-pharmd/ecs-partnership>

**Figure 16. Percent of Active Pharmacists in 2008 Graduating from a School of Pharmacy in North Carolina**



**Note:** Size of circle represents total number of active pharmacists in the county. Size of slices indicates percent of those pharmacists by school. Data include all active, in-state pharmacists licensed in North Carolina as of October 31, 2008.

**Source:** North Carolina Health Professions Data System, with data derived from the North Carolina Board of Pharmacy, 2008.

In 2009, UNC received 772 applications for 153 slots, Wingate received 1,132 applications for 76 slots, and Campbell received 1,744 applications for 108 slots. The number of applications for UNC and Wingate has fluctuated from year to year, and no steady increase or decrease is discernable. For Campbell, however, the number of applications doubled between 2003 and 2004, increased steadily through 2008, and declined by 17% in 2009. On average, UNC admits approximately 19% of applicants, and Campbell and Wingate, with greater numbers of applicants and fewer available seats, admit approximately 7.1% and 6.4% respectively.<sup>3</sup>

### **Expansion of Pharmacy Education Programs**

Several new US schools of pharmacy have recently opened or expanded, including some in North Carolina, and more are being developed. In 1986, the establishment of Campbell University School of Pharmacy marked the first new US school of pharmacy to open in 35 years.<sup>4</sup> Wingate School of Pharmacy opened in 2002, graduated their first class in 2007, is increasing their class size to 90 upon completion of a new facility in 2011, and plans to expand to the Asheville/Hendersonville area in 2011, enrolling an additional 72 students.<sup>5,6</sup> With the development of the UNC-ECSU PharmD Partnership in 2005, UNC saw an increase in the number of admissions. Four new schools are in development or have recently opened in Tennessee, Virginia opened one in 2008, and Presbyterian College in South Carolina is slated to open its doors in Fall 2010 (**Figure 17**).

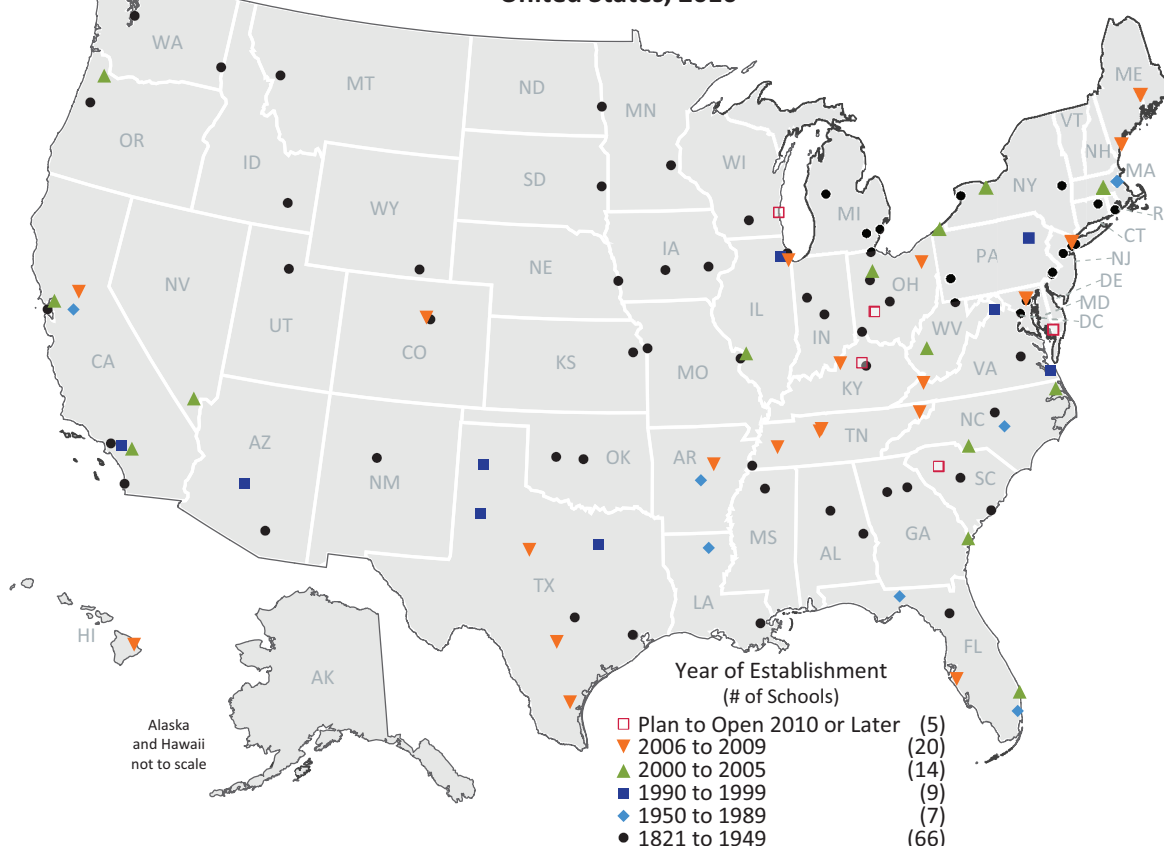
<sup>3</sup> Data obtained through personal communication with representatives from UNC-Chapel Hill, Campbell, and Wingate.

<sup>4</sup> <http://www.campbellpharmacy.net/academics/graduate/mspas/index.html>, accessed 2/25/10.

<sup>5</sup> Data obtained through personal communication with representatives from Wingate (2/16/10).

<sup>6</sup> Wingate News. "Pharmacy program to expand to Western N.C." March 24, 2010. [http://www.wingate.edu/calendar/news\\_details.asp?ID=5079](http://www.wingate.edu/calendar/news_details.asp?ID=5079), accessed 3/25/10.

**Figure 17. Location of Pharmacy Programs, by Year Established  
United States, 2010**



**Sources:** Pharmacy College Application Service (PharmCAS). The Directory: Participants by State. <http://www.pharmcas.org/collegesschools/directoryalphastate.htm>, accessed March 2, 2010; American Association of Colleges of Pharmacy (AACP). Pharmacy School Locator, 2010. <http://www.aacp.org/resources/student/Pages/SchoolLocator.aspx>, accessed March 2, 2010; Accreditation Council for Pharmacy Education (ACPE). Accredited Professional Programs of Colleges and Schools of Pharmacy. [http://www.acpe-accredit.org/shared\\_info/programsSecure.asp](http://www.acpe-accredit.org/shared_info/programsSecure.asp), accessed March 4, 2010.

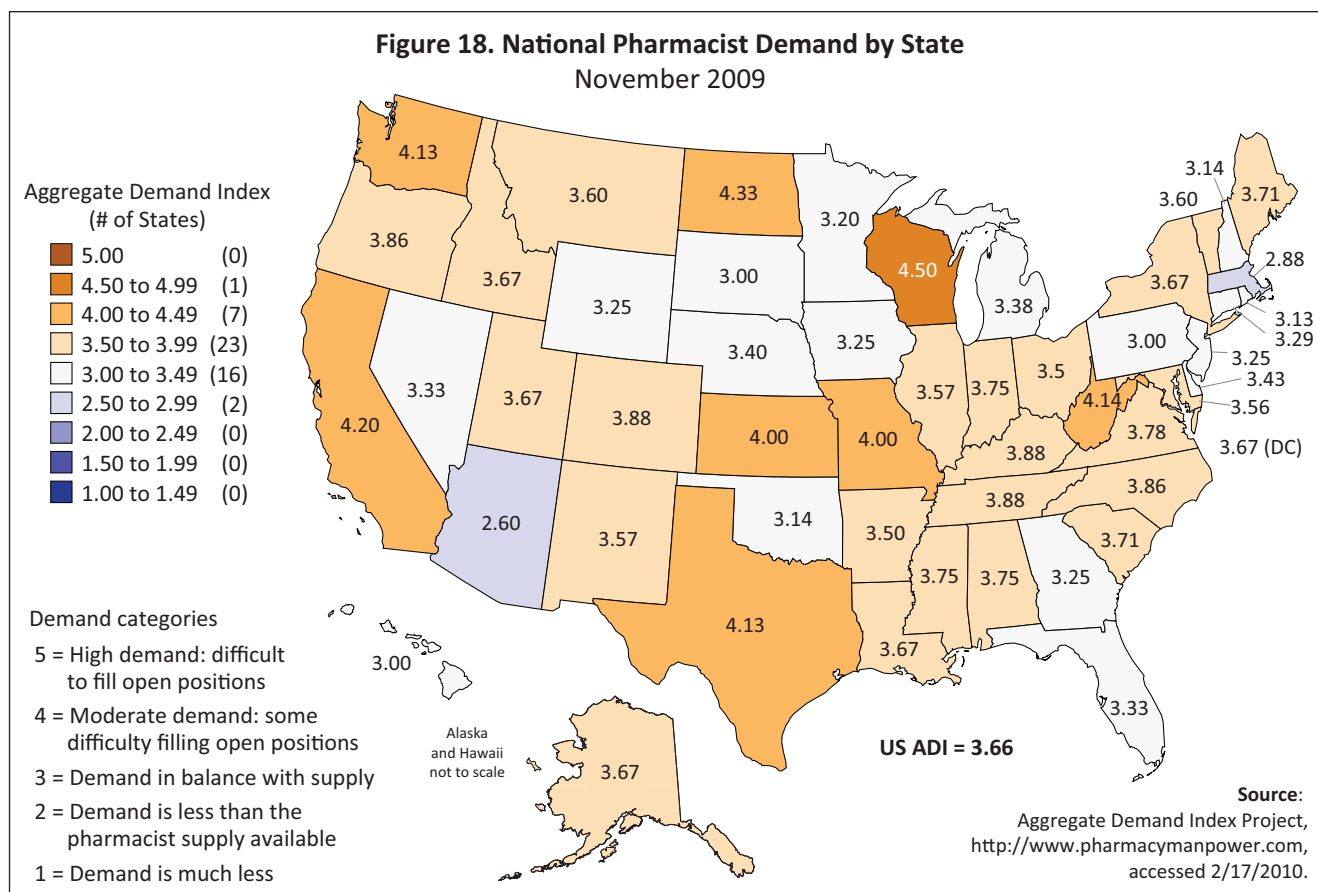
## Demand-Side Factors

Much is revealed about the supply of pharmacists from the licensure data, for instance, where they work, where they trained, how old they are, and how many hours they work per week. What the licensure data don't reveal are demand-side indicators.

### Aggregate Demand Index

At the national level, the Aggregate Demand Index (ADI) is a rough indicator of pharmacist demand. The ADI is based on monthly surveys from those involved in hiring pharmacists and seeks to gauge pharmacist supply at the national, regional and state levels. A continuous scale characterizes the level of need. In November 2009, the mean ADI for the US was 3.66, and was 3.86 for North Carolina; values between 3.0 and 3.9 indicate that demand is in balance with supply (**Figure 18**). From March 2009 to January 2010, the ADI for North Carolina went from 4.43 to 3.56. From January 2009 to January 2010, the ADI for the US went from 3.79 to 3.44.<sup>7</sup>

<sup>7</sup> For more information on the Aggregate Demand Index and the Pharmacy Manpower Project, see <http://www.pharmacymanpower.com/>; visitors are cautioned that the data and information available through the website are for informational purposes only. Data cited in the text were obtained from the website's homepage and archived state-level maps; January data accessed 3/30/10, older data accessed 2/17/10.



## Retail Prescriptions Dispensed

As the population grows and ages, demand for prescription medications generally increases. Data obtained from IMS Health<sup>8</sup> allow for the calculation of the average number of retail prescriptions per person annually, and in conjunction with North Carolina licensure data, the average number of retail prescriptions filled per retail pharmacist.

The rate of growth for retail prescriptions filled relative to population has slowed. Between 1992 and 2000 there was a 76% increase in the number of prescriptions dispensed in retail settings in North Carolina (52.1 million to 91.8 million prescriptions),<sup>9</sup> but between 2000 and 2008 there was only a 27% increase in prescriptions dispensed (91.8 million to 116.7 million prescriptions). Comparable data available for the US show a 44% growth in the number of retail prescriptions dispensed between 1992-1999, and 22% growth from 1999-2008.<sup>10</sup>

In 1992, retail pharmacists, on average, dispensed 15,817 prescriptions in a year, and in 2000, 24,062 prescriptions were dispensed, increasing by 52%.<sup>9</sup> In 2008, this figure rose to 25,255, an increase of only 5% since 2000<sup>8</sup> (**Figure 19**). Perhaps a more tangible measure of pharmacist workload is the number of prescriptions filled

<sup>8</sup> Prescription data for 2008 include total dispensed prescriptions from retail channels (chain, mass merchandiser, food store, independent pharmacies); Xponent™, January 2008-December 2008, IMS Health Incorporated. All Rights Reserved. See Data and Methodology section for additional information.

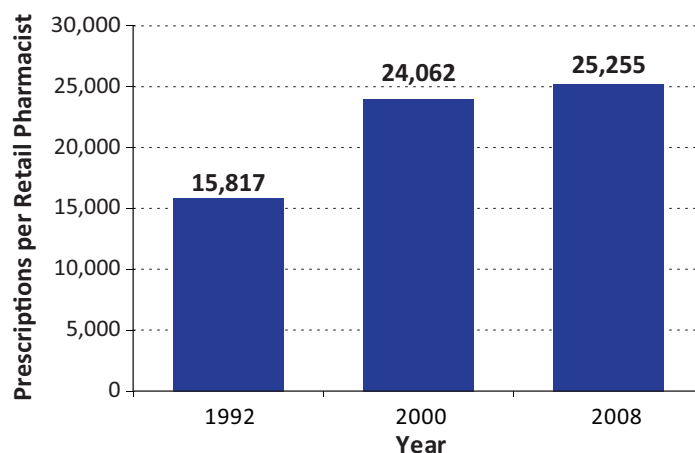
<sup>9</sup> Fraher EP, Smith LM, Dyson S, Ricketts TC. August 2002. "Figure 17. Annual Retail Prescriptions Dispensed Per Retail Pharmacist, US and NC, 1991-2000" (pg. 35). In *The Pharmacist Workforce in North Carolina*. Cecil G. Sheps Center for Health Services Research.

<sup>10</sup> US data were not available for the year 2000; instead, data for 1999 are used.

per hour. Assuming that pharmacists, on average, work about 2,000 hours annually, North Carolina pharmacists filled about 12.0 prescriptions per hour in 2000 (or 144 per 12-hour day),<sup>9</sup> and in 2008, they filled 13.0 prescriptions per hour (152 per 12-hour day).<sup>11</sup> However, the workload for retail pharmacists is not evenly distributed among the state, ranging from 1.3 prescriptions per hour (Gates county) to 39.8 prescriptions per hour (Orange county).

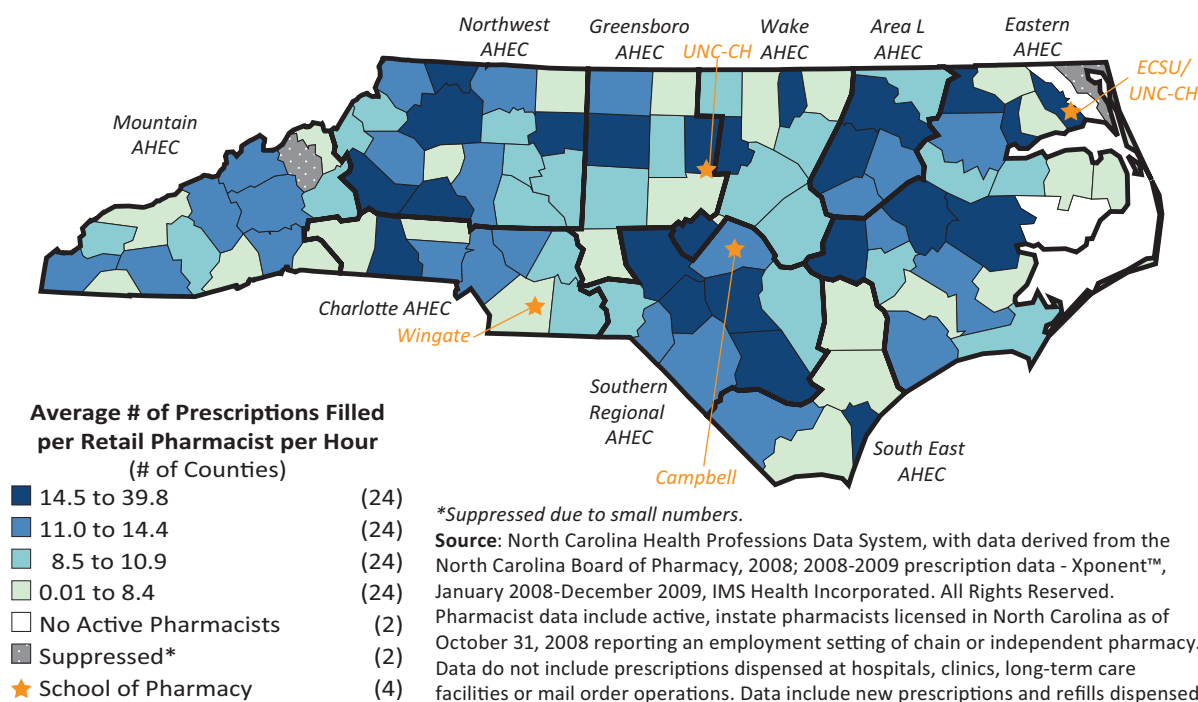
The map in **Figure 20** shows the average number of retail prescriptions filled per retail pharmacist per hour by North Carolina county in 2008. Due to small cell sizes and to protect confidentiality, data for Camden, Currituck, Hyde, and Yancey counties were omitted from the map.

**Figure 19. Annual Retail Prescriptions Dispensed per Active, Instate Retail Pharmacist North Carolina, 1992 to 2008**



**Source:** North Carolina Health Professions Data System, with data derived from the North Carolina Board of Pharmacy, 2008; 2008 prescription data - Xponent™, January 2008-December 2008, IMS Health Incorporated. All Rights Reserved. Pharmacist data include active, instate pharmacists licensed in North Carolina as of October 31, 2008 reporting an employment setting of chain or independent pharmacy. Data do not include prescriptions dispensed at hospitals, clinics, long-term care facilities or mail order operations. Data include new prescriptions and refills dispensed. 1992-2000 prescription data: Fraher EP, Smith LM, Dyson S, Ricketts TC. August 2002. "Figure 17. Annual Retail Prescriptions Dispensed Per Retail Pharmacist, US and NC, 1991-2000" (pg. 35). In *The Pharmacist Workforce in North Carolina*. Cecil G. Sheps Center for Health Services Research.

**Figure 20. Average Number of Retail Prescriptions Filled per Retail Pharmacist per Hour North Carolina, 2008**



<sup>11</sup> Average hours worked per year is based on a 40 hour work week for 50 weeks per year, as used in Fraher EP, Smith LM, Dyson S, Ricketts TC. August 2002. *The Pharmacist Workforce in North Carolina*. Cecil G. Sheps Center for Health Services Research. See Data and Methodology section for additional information.

**Table 2. Retail Pharmacists and Average Hourly Workload by AHEC Region, 2008**

AHEC Region	Total Population	Number of Retail Pharmacists	Average Prescriptions Filled per Retail Pharmacist per Hour
Area L	301,094	136	14.4
Charlotte	1,701,378	945	11.6
Eastern	956,466	444	14.1
Greensboro	1,088,392	519	15.5
Mountain	714,325	406	11.3
Northwest	1,524,295	761	14.1
South East	455,190	267	12.4
Southern Regional	868,197	316	14.9
Wake	1,560,428	818	11.7
<b>North Carolina</b>	<b>9,227,016</b>	<b>4,621</b>	<b>13.2</b>

**Source:** Prescription data include total dispensed prescriptions from retail channels (chain, mass merchandiser, food store, independent pharmacies); Xponent™, January 2008-December 2008, IMS Health Incorporated. All Rights Reserved. See Data and Methodology section for additional information. Pharmacist data from the North Carolina Health Professions Data System with data derived from the North Carolina Board of Pharmacy; data include active, instate pharmacists licensed in North Carolina as of October 31, 2008, using average hours per week as reported by pharmacists at time of license renewal.

**Table 2** describes the regional variation in average prescriptions filled per retail pharmacist per hour. On average in 2008, retail pharmacists in Mountain AHEC filled 11.3 prescriptions per hour, while retail pharmacists in Greensboro AHEC were filling 15.5 prescriptions per hour.

### ***Hospital Workforce Surveys***

Each year, the North Carolina Hospital Association (NCHA) surveys their member hospitals to collect data on the North Carolina hospital workforce. The following data were gathered from published reports and unpublished, preliminary data for 2009.<sup>12</sup>

Pharmacists and pharmacy technicians make up approximately 2% of all hospital workers in the state. Vacancy rates for hospital pharmacists hover near or above the vacancy rate for all hospital professions. Two factors that point to difficulties in hiring hospital workers are average days to fill vacant positions and cost to recruit for a position. On average, it takes over three months to recruit a pharmacist to a vacant hospital position, and from 2004-2008, pharmacists took the longest to recruit. Pharmacists are also one of the professions with the highest recruitment costs in North Carolina hospitals, where an average of \$11,325 was spent to recruit a pharmacist in 2004; that figure fluctuates from year to year, but rose to approximately \$18,000 in 2008, \$14,000 in 2009. In rural counties, it is more expensive and takes longer to recruit a pharmacist than in urban counties. In 2008 it cost \$1,000 more to recruit a pharmacist to hospitals in rural counties, and it took 63 days longer to fill a rural position.

<sup>12</sup> Fraher EP, McKethan A, Broome SJ, Haygood MK, Heilig KE. North Carolina Hospital Workforce Trends Analysis, 2004-2006. North Carolina Hospital Association. July 2008; Broome SJ. 2008 NCHA Workforce Report. North Carolina Hospital Association. April 2009; Preliminary 2009 hospital workforce data provided by Dr. Sarah Broome, Director of Economic Research, North Carolina Hospital Association, Cary, NC. Data based on the annual NCHA workforce survey for 2009. The survey had a response rate of 76%. Missing responses imputed based on total licensed beds.



## Data and Methodology

Data on North Carolina pharmacists were analyzed by the North Carolina Health Professions Data System using licensure data from the North Carolina Board of Pharmacy. These data represent all pharmacists actively practicing in the state of North Carolina and are based on yearly snapshots effective October of each year. All data are self-reported by the pharmacist at time of initial application for licensure and subsequent renewals. When analyzing the dynamics in pharmacist supply between years, newly licensed pharmacists are those who are new to file with a license date in the current or previous year. Status change pharmacists are those who were licensed in NC in an earlier year but were either inactive or active out of state in the previous year. Pharmacists can be licensed by exam or by reciprocity. Pharmacists who become licensed by reciprocity are those individuals who have been actively practicing in other states.

National pharmacist data were accessed from the Statistical Abstract of the United States: 2010 (129th Edition), U.S. Census Bureau, Washington, DC, 2009; <http://www.census.gov/statab/www/>. Earlier editions are available at [http://www.census.gov/compendia/statab/past\\_years.html](http://www.census.gov/compendia/statab/past_years.html).

North Carolina population data were retrieved from the Office of State Planning and U.S. population data were accessed from the U.S. Census Bureau. Population data are dependent on the year, and are corrected census counts (April 1, 1970, 1980, 1990 or 2000), or the estimates or projections from the data source (April 1, 2000, 2010; July 1, other years). All years subsequent are projected. A projection differs from an estimate in that it relies on certain assumptions about long-term trends in data, which are not yet available, while an estimate is always based on data from predictor variables, which are available for the estimate year.

A list of the location and year of establishment of US pharmacy programs (shown in **Figure 18**) was generated from the Pharmacy College Application Service (PharmCAS), the American Association of Colleges of Pharmacy (AACP), and the Accreditation Council for Pharmacy Education (ACPE). Additional information was verified at individual college of pharmacy websites. This list may not include all satellite locations.

Metropolitan and Nonmetropolitan status definitions were derived from the Office of Management and Budget's Core Based Statistical Areas, and are current as of the November 2008 update. Nonmetropolitan counties include micropolitan and counties outside of CBSAs.

Persistent Health Professional Shortage Areas (PHPSAs) are derived from the Area Resource File, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services. Persistent HPSAs are those designated as HPSAs by HRSA from 1999 through 2005, or in 6 of the last 7 releases of HPSA definitions. Current HPSA designations can be found at <http://bhpr.hrsa.gov/shortage/>.

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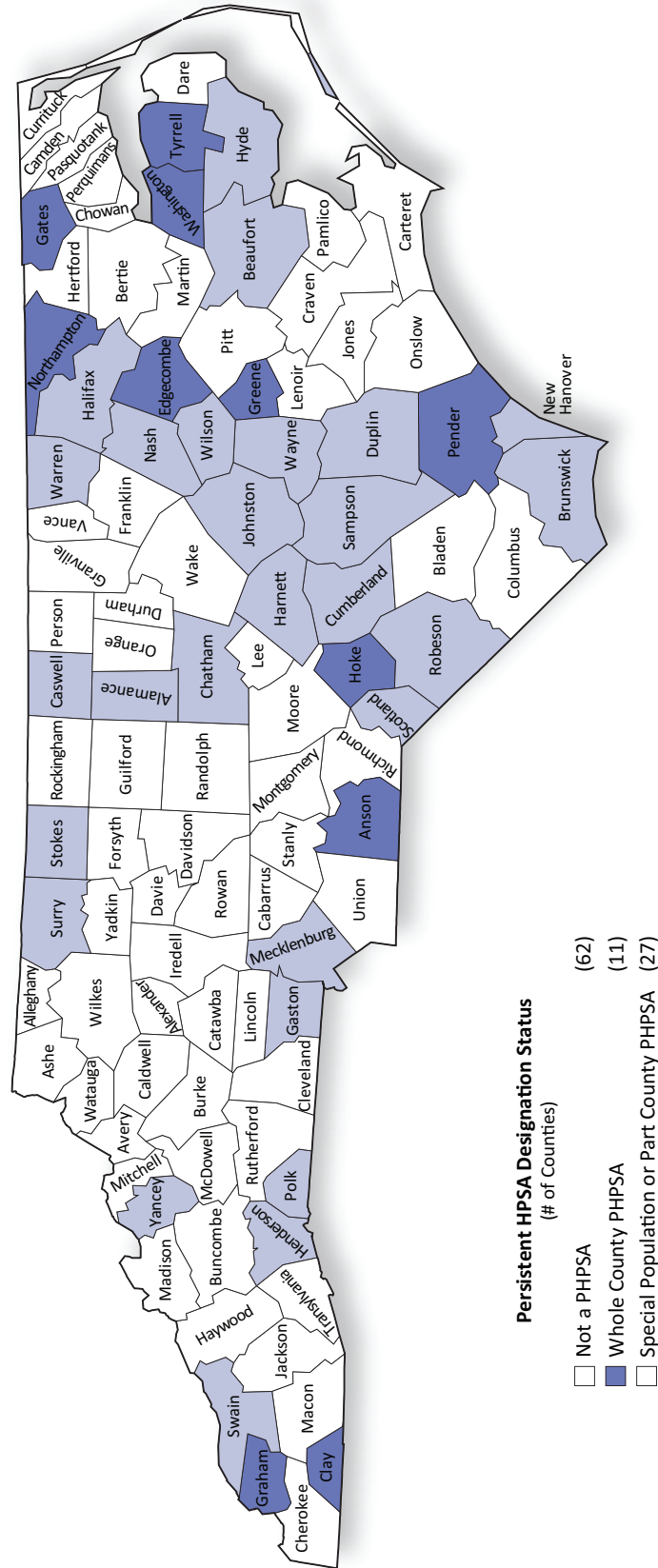


findings, conclusions, views, and opinions are not necessarily those of IMS Health Incorporated or any of its affiliated or subsidiary entities. IMS Health data were extracted March 4, 2010, and include total dispensed prescriptions, new dispensed prescriptions and refill dispensed prescriptions through retail settings (chain, mass merchandiser, food stores and independent pharmacies) from January 2008-December 2008 and January 2009-December 2009 for the United States, North Carolina, and North Carolina counties.

Average annual retail prescriptions were calculated using North Carolina population data retrieved from the Office of State Planning and U.S. population data accessed from the U.S. Census Bureau in combination with the total number of retail dispensed prescriptions data provided by IMS Health. Average annual retail prescriptions per retail pharmacist were calculated using the total number of retail dispensed prescriptions and licensure data from the North Carolina Pharmacy Board; only pharmacists who identified a specialty in a retail setting (chain or independent pharmacy) were included. Data in the text on page 14 showing the annual number of retail prescriptions filled per retail pharmacist per hour were calculated using retail pharmacist counts and an assumption that, on average, pharmacists work 2,000 hours per year (40 hours per week for 50 weeks). This was done in order to allow for direct comparison between current and previously published state-level data in Fraher, et. al's 2002 report on the pharmacy workforce. However, data in **Figure 20** and **Table 2** use pharmacists' average hours per week as reported to the North Carolina Board of Pharmacy at time of their annual license renewal; this method takes into account pharmacists working fewer than 40 hours per week and gives a more accurate estimate of workload at smaller units of geography (county and region). These data were then used in conjunction with the IMS Health Incorporated data to determine the average number of retail prescriptions filled per retail pharmacist per hour. ❖

## Appendix A

### Persistent Health Professional Shortage Areas\* (PHPSAs) North Carolina, 2005



**Note:** Persistent PHPSAs are those designated as PHPSA by the Health Resources and Services Administration (HRSA) from 1999 to 2005, or in 6 of the last 7 releases of PHPSA definition.

**Source:** Area Resource File, HRSA, DHHS, 2005; Bureau of Health Professions, Shortage Designation Branch, 2005.

Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

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