



**Eastern North Carolina Health Care Atlas**  
*A resource for healthier communities*  
**1997**

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# Acknowledgements

The principal author of the second edition of the *Eastern North Carolina Health Care Atlas* is James Wilson, but it was truly a group effort. Dr. Wilson designed and created all maps, most of the charts, and wrote the new sections and subsections of this work.

All members of the Center's staff contributed to the production of the *Atlas*. Compiling the data from a wide variety of sources and formats—a Herculean task—was primarily done by Zoe Yetman. She created and formatted all data tables found in this publication. Meredith Kiesnowski brought the *Atlas* together into one cohesive unit. In addition to creating the population pyramids found in the Demography Section, she imposed order with her computing skills and knowledge on what was once a plethora of files and data. Peggy Warren, in addition to other staff members, proofread all sections. Chris Mansfield, the Center Director, provided guidance and continuity to the staff's efforts.

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# **Introduction**

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## **Eastern North Carolina Health Care Atlas: A Resource for Healthier Communities 1997**

### **Introduction**

The first edition of the *Eastern North Carolina Health Care Atlas* was well received and used. Over 380 copies were distributed or purchased. The Center for Health Services Research and Development at East Carolina University is pleased now to publish the second edition. The *Eastern North Carolina Health Care Atlas* describes health care problems, needs, and resources of the eastern region of North Carolina. It is produced as an aid to accomplishing one of the university's primary missions: improving health services and health of people in the region. In addition to showing where graduates of our programs are most needed and where new services should be targeted, it is used by university faculty engaged in applied research. The *Atlas* is also useful to legislators, local officials, health service administrators, and health care providers who seek to understand and reform our present health care system, or to plan and implement health services at the local community level.

The *Eastern North Carolina Health Care Atlas* grew out of the need to meet the many requests for data and information that the Center receives. The *Atlas* integrates data from many different sources and provides accessible information to those who study, plan for, administer, and provide health care in the region. It is a resource for those who would plan to improve health or health care services at any geographical level within the eastern region of the state.

Structurally, the second *Atlas* edition maintains the basic organization and format of the 1994 edition. The maps and graphs in the Major Diseases and Causes of Death and Communicable Diseases sections still include references to objectives set for the nation in the US Public Health Service's publication *Healthy People 2000*. References to *Healthy Carolinians*, North Carolina's adaptation of the *Healthy People 2000*'s initiative are also included. Maintaining a consistent format across editions is important for charting progress in health status over time. It is also necessary and desirable to introduce new types of health related information as they become available and relevant to the health of Eastern North Carolina. The increased availability of high quality digital datasets combined with the increasing functionality of database management tools and Geographic Information Systems in the field of healthcare enables new ways of creating information from data.

Several changes have been made to the *Atlas* that reflect the availability and coverage of health data. Two sections of the 1997 *Atlas* edition are expansions from themes introduced in the previous edition. Pneumonia and Influenza and AIDS are now under a new communicable disease section. This section also includes tables and maps on tuberculosis and sexually transmitted diseases. Infant Mortality has been expanded into a section encompassing several aspects of maternal and infant health. This new section includes tables and maps for pregnancies, low weight births, and neonatal mortality. The

demography section has undergone changes to provide more socio-economic background to regional health issues. For example, education is an important factor in the consideration of a population's health status. New data and maps depicting disparities in education spending are included. Some maps have been added, a few eliminated, and some combined into a more efficient portrayal of information—the physician distribution maps are a prime example. Recent data necessary for showing hospital discharges are no longer readily available and so hospital discharges are not depicted in this edition. In sum, the 1997 *Atlas* is an evolutionary enlargement and refinement over the previous edition.

An explanation is necessary regarding the geographic boundaries for Eastern North Carolina. Eastern North Carolina has historically been so uniquely underserved, and economically and culturally distinct from the rest of the state, that it is frequently described as region unto itself. Indeed, upper case letters are often used when referring to this area (a convention adopted for this publication). There is little agreement, however, on the boundaries of the region. Geologically speaking it may be the coastal plain; commercially, it may contain two or more market areas. Under the organization of one major state bureaucracy (the Department of Environment, Health and Natural Resources) the eastern region comprises 22 counties. The eastern region for the Department of Human Resources the region comprises 33 counties. Health planning efforts, and descriptions of the tertiary care service area for the University Health Systems of Eastern Carolina (formerly University Medical Center), frequently focus on a 29 county area (Health Service Area VI). The state's Area Health Education Center program has a different geography with separate programs for the Wilmington area, an Eastern, and a five-county area in the northwest coincident with the state Administrative Planning Region L.

Other conceptions of Eastern North Carolina have included 41 counties, with the western boundary roughly following the Interstate 95 Highway. Rather than limit presentation of data and information in this publication, we use the largest conception of the region and provide aggregate statistics for both the 29 county HSA VI region and the larger 41 county region. The geographic region selected for the *Atlas* does not imply any particular influence, responsibility, or "turf" of the University. East Carolina University's programs and the constituencies they serve vary greatly in distance from Greenville, but the university has historically defined or been given diverse missions in terms of responsibility to improve life for those who live in the eastern region of the state. Base maps in the Demography section show boundaries of both regions. Reference maps in Appendix B show how other institutions and agencies define the region.

Areas predefined for statistical purposes may not be the most appropriate way to look at specific problems. Few of our health care problems begin or end at a political boundary line and many of our health problems in the East are common to large groups of counties. For instance, the counties along the Virginia border have much in common with their neighbor counties across the state line. This can be seen with the map found at the end of Appendix A. One common characteristic, besides having similar racial and poverty proportions, is the extent to which the residents of these counties travel to Virginia to obtain health services. It should be noted that we have not described the health service resources available in Virginia nor how they are used by Eastern North Carolinians. These data are not available.

Readers should not jump to conclusions about health problems or possible solutions based solely on the way data appear when aggregated at the county level. In some cases, data at multi-county, zip code, or minor civil division levels are a better way to understand problems and solutions.

## Overview

The 1997 edition of the *Atlas* is organized into five sections: *Introduction*, *Demography*, *Major Diseases and Causes of Death*, *Communicable Diseases*, and *Health Care Resources*. In addition to these major sections are the appendices: *Methods*, *Base Maps*, and *Data Sources*. The *Demography* section begins with an overview of the data and maps that follow. The *Major Diseases and Causes of Death* section begins with a general discussion of health and mortality in Eastern North Carolina. This section is divided into nine subsections that each focus on one of the leading causes of death in North Carolina. Each subsection is comprised of a brief discussion of the particular cause of death and is accompanied by a set of maps and tables. The data for each subsection are charted as time series from 1969 and compared to the *Healthy People 2000* goal for that cause of death. For the time series, the Eighth Revision of the International Classification of Diseases was applied to data during the years 1969 through 1978; however, from 1979 to the present the Ninth Revision was used. In addition, the US data for these charts are reported for single years, while the NC data are reported as five year averages to minimize the statistical errors that might result from calculations on small numbers of deaths. The interval midpoints for the NC data are generally offset one year from the US annual data. Lastly, the *Healthy People 2000* Goal is an *overall* goal: it is not specific for any race or gender.

Although the *Atlas* focuses on Eastern North Carolina, contextual information is provided in order to make comparisons with the rest of the state and the country. In most cases, North Carolina data and maps are included for state and regional comparisons. Accompanying the state and regional data, where appropriate, are tables which show individual county totals, crude, and adjusted rates. The twelve counties that are not included in Health Service Area VI are highlighted in boldface. Totals and rates for Health Service Area VI, Eastern North Carolina, North Carolina, and the United States are given at the bottom of each of the tables. One improvement over the first *Atlas* edition is the procurement of data for many of the “to be determined” table cells with estimated totals and rates. *Appendix A* describes the methodology used in these estimations. Like the 1994 edition, the tables and maps face each other to facilitate analysis.

The temporal coverage of the 1997 *Atlas* is “moved ahead” by two years from the 1994 edition. In general, each time period is five years long and the interval rates represent an average for that period. This temporal “smoothing” is necessary in order to account for the fluctuations in rates. Crude rates are used for the 1990-1994 period. Age-sex-race adjusted rates are used for the 1989-1993 period. The application of these two rate types is discussed in *Appendix A*. The difference in coverage periods is due to the availability of the data sources used at the Center. Because both coverage periods are close in time and are averages they can be used in conjunction with one another with a fair degree of confidence. The adjusted data and maps for the 1991-1995 period should be available as inserts to this

edition sometime in early 1998.

One of the most difficult aspects of map production is the determination of the class breakdown on the map, since it is very easy for spatial relations to be missed by the use of inappropriate classes. This is a challenging problem when producing an *Atlas* of this scope because it is impossible to know what the appropriate breakdown is for every user of the map. It is also difficult to find a universal classification scheme to be applied to all maps because distributions can be quite different in shape from one another. A general and intuitively simple method is to break down the distribution into a specified number of categories containing equal counts of data elements. For Eastern North Carolina and North Carolina, four categories are used. North Carolina has 100 counties; therefore each category contains approximately 25 counties. The rates used to delineate the category boundaries for North Carolina are applied to the Eastern North Carolina maps. The equal count method produces a map that shows the relative distribution of the extremes. This gives a sense of where the “best” and “worst” counties are and can serve as a starting point for future analysis. This method also works well for making comparisons between maps at two different points in time. Since the category boundaries remain constant, it is possible to observe the shifting of counties into different counties as conditions become better or worse. Of course, if changes in a particular direction continue, the map categories will no longer be of the equal count type.

Finally, a note about production; all of the maps and tables for the 1997 edition were produced at the Center using desktop computers and laser printers. Most of the raw and adjusted data were gathered from state and federal agencies in several formats: hardcopy, diskette, cd-rom, and the Internet (see *Appendix C*). The Center’s staff compiled the data from these sources. The maps were produced using *MapInfo 4.1*. Text, tables, and charts were produced using different editions of Microsoft’s *Office* (primarily *Word* and *Excel*). Large datasets were read and analyzed using *SPSS 7.5*. The final publication was produced in Microsoft’s *Publisher 97* to be translated to Adobe Acrobat 3.0 for available download from the Internet. The Center’s homepage is <http://www.chsrd.med.ecu.edu>.

## **The Center for Health Services Research and Development**

The Center for Health Services Research and Development is a component of the East Carolina University School of Medicine's Division of Health Sciences. The vision of the Center is to support interdisciplinary and collaborative examination of the needs and effectiveness of health services in the eastern region. Health services research promoted by the Center includes the study of clinical outcomes, disease patterns, effectiveness, access to care, health policy, health promotion, and patient-provider relationships. The Center brings faculty together from various departments and schools to address important research questions. In an outreach role the Center assists organizations and citizens of the eastern region with an interest in developing new services or finding information about health care policy, problems, and resources in their communities.

Services of the Center include assistance with proposal development for funding of research or development projects by government, business, or private foundations. The Center assists with the identification or recruitment of organizational or individual resources for research or development projects. In order to aid research and other projects, the Center has up-to-date hardware and software, a library, and access to a wide variety of demographic and health related datasets. The Center provides custom data analyses, maps, and conducts special studies on a contract basis.

For more information about the Center, please contact Christopher J. Mansfield, Ph.D., Director.

For information about datasets, analyses, special studies, and custom maps please contact James L. Wilson, Ph.D., Social Research Associate. (919) 816-2785.



# **Base Maps**

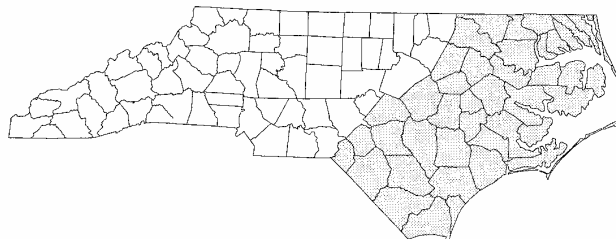
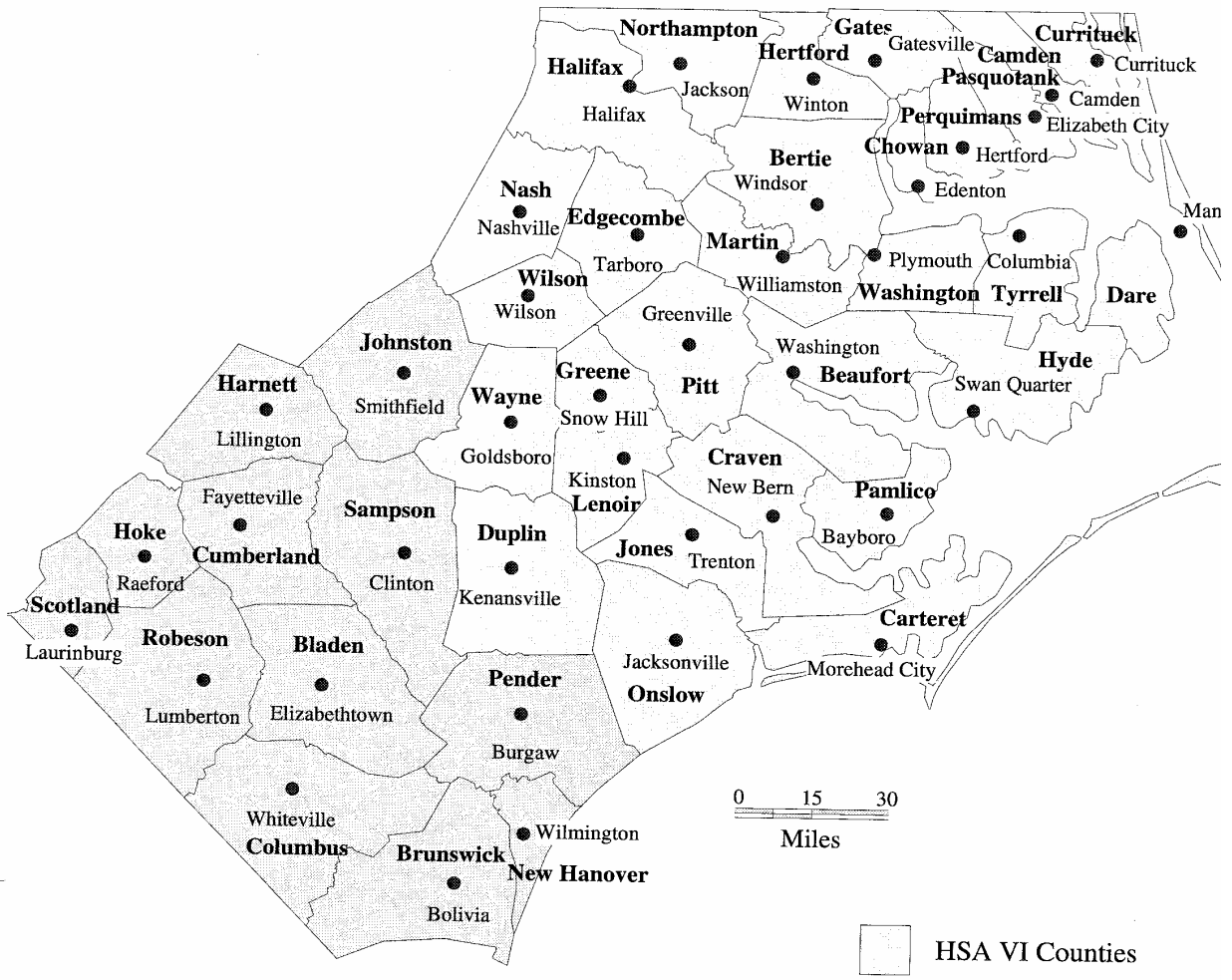
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## Eastern North Carolina 41 Counties with County Seat Locations

<b>County</b>	<b>County Seat</b>
Beaufort	Washington
Bertie	Windsor
<b>Bladen</b>	Elizabethtown
<b>Brunswick</b>	Bolivia
Camden	Camden
Carteret	Morehead City
Chowan	Edenton
<b>Columbus</b>	Whiteville
Craven	New Bern
<b>Cumberland</b>	Fayetteville
Currituck	Currituck
Dare	Manteo
Duplin	Kenansville
Edgecombe	Tarboro
Gates	Gatesville
Greene	Snow Hill
Halifax	Halifax
<b>Harnett</b>	Lillington
Hertford	Winton
<b>Hoke</b>	Raeford
Hyde	Swan Quarter
<b>Johnston</b>	Smithfield
Jones	Trenton
Lenoir	Kinston
Martin	Williamston
Nash	Nashville
<b>New Hanover</b>	Wilmington
Northampton	Jackson
Onslow	Jacksonville
Pamlico	Bayboro
Pasquotank	Elizabeth City
<b>Pender</b>	Burgaw
Perquimans	Hertford
Pitt	Greenville
<b>Robeson</b>	Lumberton
<b>Sampson</b>	Clinton
<b>Scotland</b>	Laurinburg
Tyrrell	Columbia
Washington	Plymouth
Wayne	Goldsboro
Wilson	Wilson

# 41 County Region With County Seat Locations Eastern North Carolina

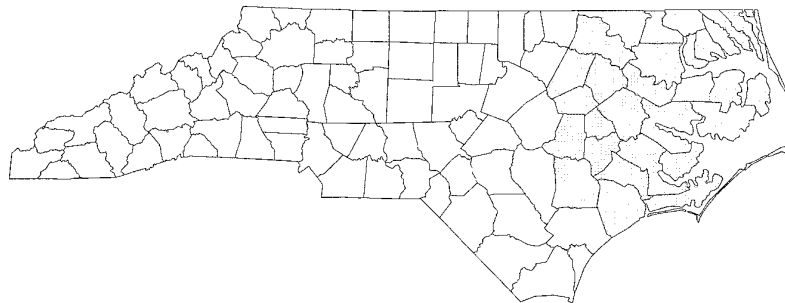


## Health Service Area VI

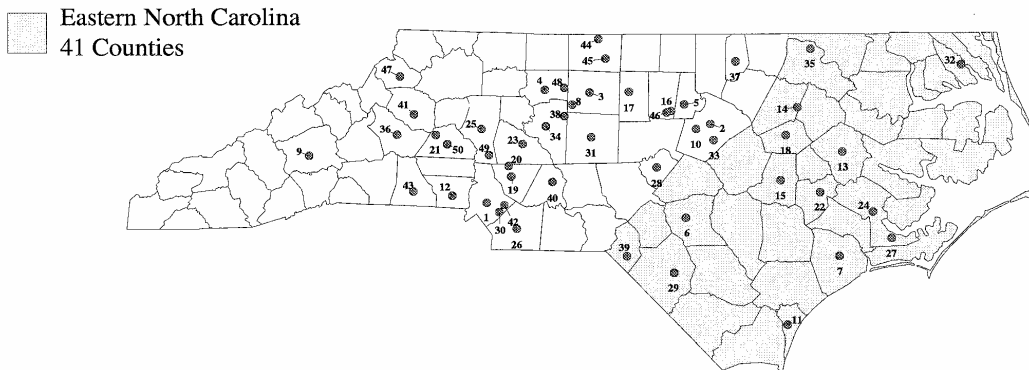
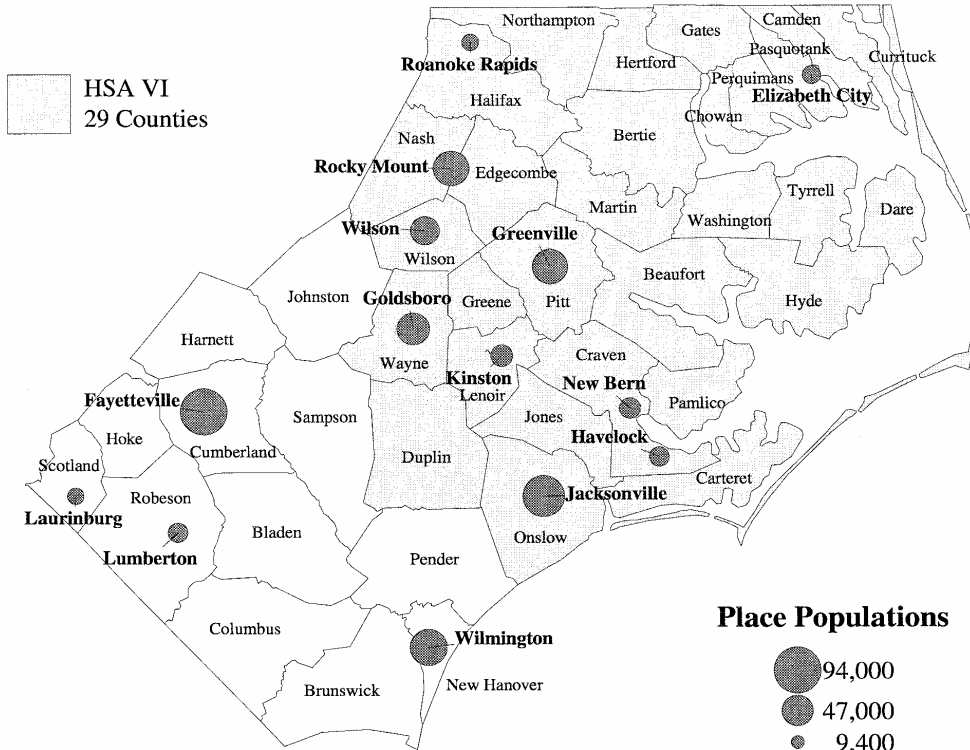
### 29 Counties with County Seat Locations

<b>County</b>	<b>County Seat</b>
Beaufort	Washington
Bertie	Windsor
Camden	Camden
Carteret	Morehead City
Chowan	Edenton
Craven	New Bern
Currituck	Currituck
Dare	Manteo
Duplin	Kenansville
Edgecombe	Tarboro
Gates	Gatesville
Greene	Snow Hill
Halifax	Halifax
Hertford	Winton
Hyde	Swan Quarter
Jones	Trenton
Lenoir	Kinston
Martin	Williamston
Nash	Nashville
Northampton	Jackson
Onslow	Jacksonville
Pamlico	Bayboro
Pasquotank	Elizabeth City
Perquimans	Hertford
Pitt	Greenville
Tyrrell	Columbia
Washington	Plymouth
Wayne	Goldsboro
Wilson	Wilson

# 29 County Region With County Seat Locations Health Service Area VI Eastern North Carolina



# Population Centers of Eastern North Carolina 1995



Center for Health Services Research and Development  
East Carolina University  
I.B.5

Source: NC Office of State Planning

## Eastern North Carolina Population Centers

ENC Rank	NC Rank	City	County	1995 Population	1990 Population
1	6	Fayetteville	Cumberland	93,219	75,850
2	7	Jacksonville	Onslow	75,069	30,398
3	11	Wilmington	New Hanover	62,256	55,530
4	13	Greenville	Pitt	56,307	46,305
5	14	Rocky Mount	Nash	55,952	49,961
6	15	Goldsboro	Wayne	47,992	40,709
7	18	Wilson	Wilson	40,232	36,930
8	22	Kinston	Lenoir	25,729	25,295
9	24	New Bern	Craven	21,696	17,363
10	27	Havelock	Craven	21,042	20,300
11	29	Lumberton	Robeson	19,409	18,733
12	32	Elizabeth City	Pasquotank	17,255	14,292
13	35	Roanoke Rapids	Halifax	16,379	15,722
14	39	Laurinburg	Scotland	15,904	11,643

## 50 Most Populated Cities in North Carolina

NC Rank	City	County	1995 Population	1990 Population	NC Rank	City	County	1995 Population	1990 Population
1	Charlotte	Mecklenburg	469,809	395,934	26	Monroe	Union	21,273	16,385
2	Raleigh	Wake	249,332	212,092	27	Havelock	Craven	21,042	20,300
3	Greensboro	Guilford	193,298	183,894	28	Sanford	Lee	20,745	14,755
4	Winston-Salem	Forsyth	165,750	143,485	29	Lumberton	Robeson	19,409	18,733
5	Durham	Durham	148,129	136,612	30	Matthews	Mecklenburg	18,362	13,651
6	Fayetteville	Cumberland	93,219	75,850	31	Asheboro	Randolph	17,971	16,362
7	Jacksonville	Onslow	75,069	30,398	32	Elizabeth City	Pasquotank	17,255	14,292
8	Highpoint	Guilford	71,791	69,428	33	Garner	Wake	17,248	14,716
9	Asheville	Buncombe	68,474	61,855	34	Lexington	Davidson	17,053	16,581
10	Cary	Wake	65,912	44,397	35	Roanoke	Halifax	16,379	15,722
11	Wilmington	New Hanover	62,256	55,530	36	Morganton	Burke	16,357	15,085
12	Gastonia	Gaston	57,181	54,725	37	Henderson	Vance	16,284	15,655
13	Greenville	Pitt	56,307	46,305	38	Thomasville	Davidson	16,174	15,915
14	Rocky Mount	Nash	55,952	49,961	39	Laurinburg	Scotland	15,904	11,643
15	Goldsboro	Wayne	47,992	40,709	40	Albemarle	Stanly	15,903	14,940
16	Chapel Hill	Orange	43,539	38,711	41	Lenoir	Caldwell	15,876	14,192
17	Burlington	Alamance	42,273	39,498	42	Mint Hill	Mecklenburg	15,859	11,615
18	Wilson	Wilson	40,232	36,930	43	Shelby	Cleveland	15,854	14,669
19	Concord	Cabarus	35,468	27,347	44	Eden	Rockingham	15,598	15,238
20	Kannapolis	Rowan	34,423	29,709	45	Reidsville	Rockingham	14,280	12,183
21	Hickory	Catawba	30,058	28,474	46	Carrboro	Orange	14,107	12,134
22	Kinston	Lenoir	25,729	25,295	47	Boone	Watauga	13,983	12,949
23	Salisbury	Rowan	24,543	23,626	48	Kernersville	Forsyth	13,146	10,899
24	New Bern	Craven	21,696	17,363	49	Mooreville	Iredell	12,536	9,317
25	Statesville	Iredell	21,655	17,567	50	Newton	Catawba	12,005	9,077