Providers in Demand:

North Carolina's Primary Care and Specialty Supply

June 2007

North Carolina Institute of Medicine
In collaboration with the North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill and the North Carolina Area Health Education Centers Program

Funded by the Kate B. Reynolds Charitable Trust

The North Carolina Institute of Medicine serves as a nonpolitical source of analysis and advice on issues of relevance to the health and healthcare of North Carolina's population. The Institute is a convenor of persons and organizations with health-relevant expertise, a provider of carefully conducted studies of complex and often controversial health and healthcare issues, and a source of advice regarding available options and approaches for problem solutions.

The full text of this report is available online at:
http://www.nciom.org/projects/supply/primary_specialty.html

One complimentary copy of this report will be made available to requesting agencies and programs in North Carolina while supplies last. All requests must be submitted on official letterhead. There will be a $20 charge for each additional copy.

North Carolina Institute of Medicine
Woodcroft Professional Center
5501 Fortunes Ridge Drive, Suite E
Durham, NC 27713
919.401.6599

Suggested citation:
North Carolina Institute of Medicine. Providers in Demand: North Carolina's Primary Care and Specialty Supply. NCIOM Task Force on Primary Care and Specialty Supply. Durham, NC. June 2007.

Credits:
Report design and layout:
Angie Dickinson Design, angiedesign@windstream.net

Providers in Demand:

North Carolina's Primary Care and Specialty Supply

June 2007

North Carolina Institute of Medicine

In collaboration with the North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill and the North Carolina Area Health Education Centers Program

Funded by the Kate B. Reynolds Charitable Trust

Table of Contents

Acknowledgements 5

Task Force Members, Steering Committee, and Staff 9

Chapter 1: North Carolina's Healthcare Needs and Provider Supply Trends 13

Chapter 2: Addressing Provider Shortage by Developing New and More Efficient Models of Care or Increasing Provider Supply 23

Chapter 3: Acute Provider Shortages in Certain Areas of North Carolina 51

Chapter 4: Examining Provider Need by Specialty Area 65

Chapter 5: Underrepresented Minorities in the Health Professions 89

Chapter 6: Conclusion and Recommendations 99

Appendix A: Provider Supply Projection Method 115

Appendix B: North Carolina Organizations Providing Programs to Increase Underrepresented Minority Representation in the Health Professions 119

Appendix C: North Carolina Health Careers Access Program: Programs and Services 121

Acknowledgements

The Task Force was a collaborative effort between the North Carolina Institute of Medicine (NC IOM), the North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill, and the North Carolina Area Health Education Centers Program. The work of the Task Force was funded through a generous grant from the Kate B. Reynolds Charitable Trust.

The NC IOM extends special recognition to the Task Force Chair, E. Harvey Estes, Jr., MD, Chairman Emeritus, NC IOM Board of Directors, Professor Emeritus, Department of Community and Family Medicine, Duke University, who helped direct the work of the Task Force. The Task Force's work and clarity of vision would not have been possible without his leadership. The NC IOM also wants to thank the 34 members of the Task Force and Steering Committee (listed below) who gave freely of their time and expertise for more than a year to try to address the impending shortage of physicians, nurse practitioners, physician assistants, and certified nurse midwives.

In addition to Task Force members, the NC IOM would like to extend special appreciation to our partners at the North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies at the Cecil G. Sheps Center for Health Services Research. The North Carolina Health Professions Data System is the oldest and most comprehensive state-level health professions data system in the country. Thomas C. Ricketts, III, PhD, MPH, Deputy Director, Cecil G. Sheps Center for Health Services Research; Erin Fraher, MPP, Director, North Carolina Health Professions Data System; Katie Gaul, MA, Research Associate; and Jennifer King, Research Associate, were invaluable to this Task Force. Much of the Task Force's analyses would have been impossible without their help. They provided background information about the trends in provider supply, distribution of providers across the state, racial and ethnic composition of practitioners, and number of North Carolina providers who completed their medical training or residency in state. The NC IOM also wants to extend special thanks to our other partner, the North Carolina Area Health Education Centers Program. Thomas J. Bacon, DrPH, Executive Associate Dean and Director, North Carolina Area Health Education Centers Program, University of North Carolina at Chapel Hill School of Medicine, also has extensive knowledge about provider supply issues. He and his staff helped provide information about health professions training programs, graduate medical education, and educational pipeline programs. Torlen Wade, MPH, Director, North Carolina Office of Rural Health and Community Care, North Carolina Department of Health and Human Services; Andrea Radford, DrPH, MHA, Research Associate, North Carolina Office of Rural Health and Community Care; Pamela P. Highsmith, MEd, Associate Executive Director, North Carolina Medical Society Foundation; Cathy Wright, Former Associate Director, Community Practitioner Program, North Carolina Medical Society Foundation; and Jeff Spade, CHE, Executive Director, North Carolina Rural

Health Center, North Carolina Hospital Association, also were very instrumental in helping shape Task Force agendas, identifying speakers, and providing background information to the Task Force.

Pam Silberman, JD, DrPH, President and CEO, and Mark Holmes, PhD, Vice President, of the NC IOM helped guide the work of the Task Force. They, along with Kristen L. Dubay, MPP, helped write most of the Task Force report and fact sheets. E. Kiernan McGorty, JD, PhD, and Kimberly M. Alexander-Bratcher, MPH, Project Directors at the NC IOM, helped edit the report and fact sheets, assisted with the logistical arrangements of the meetings, and facilitated sessions at the summit. Phyllis Blackwell, Editorial Assistant for the *North Carolina Medical Journal*, also helped edit the final report. Key staff support was provided by Adrienne Parker, Director of Administrative Operations, and Thalia Fuller, Administrative Assistant, with the NC IOM. Morgan Wickizer Jones, MSPH, an intern at the NC IOM, helped with preparation of the summit.

The Task Force wants to recognize the following people for making presentations to the Task Force and providing background information. Specifically, the NC IOM would like to thank: George F. Sheldon, MD, Professor of Surgery, University of North Carolina at Chapel Hill; Warren Newton, MD, Chair, Department of Family Medicine, University of North Carolina at Chapel Hill; J. Lloyd Michener, MD, Chair, Council of Academic Societies of the Association of American Medical Colleges, Professor and Chair of Department of Community and Family Medicine, Duke University Medical Center; Mac Ernest, MD, Associate Dean for Student Services and Professor, Department of Obstetrics and Gynecology, Wake Forest University School of Medicine; Robert N. Golden, MD, Former Vice Dean, Assad Meymandi Professor and Chair of Psychiatry, University of North Carolina School of Medicine; Bruce E. Johnson, MD, Brody School of Medicine, East Carolina University; Michael K. Murphy, DO, FACOFP, Executive Director, A-OPTIC, Associate Dean for Post Graduate Education, Pikeville College School of Osteopathic Medicine; Justine Strand, MPH, PA-C, Chief, Physician Assistant Division, Associate Professor, Department of Community and Family Medicine, Duke University Medical Center, Foundation President, North Carolina Medical Society Foundation; Bobby Lowery, NP, School of Family and Community Nursing, East Carolina University; Patricia A. Payne, CNM, MPH, School of Family and Community Nursing, East Carolina University; Jackie Hutcherson, CNM, RN-C, MSN, School of Family and Community Nursing, East Carolina University; James T. McDeavitt, MD, Senior Vice President, Education and Research, Carolinas Healthcare System; Donald Pathman, MD, MPH, Professor and Research Director of Family Medicine, University of North Carolina at Chapel Hill School of Medicine; John Price, MPA, Assistant Director, North Carolina Office of Rural Health and Community Care; G. Douglas Atkinson, Vice President of Business Development, Wake Forest University Baptist Medical Center; Larry Chewning, MHA, CEO, Sampson Regional Medical Center; Margaret C. Merrick, MD, President, CEO, and Co-Founder, A+ Medical Business Services, Inc.; Steve Crane, MD, Family Practice Program Director, Hendersonville Residency Program; Domingo Rodriguez-Cue, MD, Family Medicine, Martin General Hospital; Anita Jackson-Kelley, MD, MPH, FACS, FAAOA, Immediate Past President, Old North State Medical Society; and

Acknowledgements

Carolyn M. Mayo, PhD, Former Executive Director, North Carolina Health Careers Access Program, Inter-Institutional Program of the University of North Carolina System.

The NC IOM would like to thank the following people for their presentations or facilitation assistance at the summit sessions: William Atkinson, PhD, President and CEO, WakeMed Health and Hospitals; Darlyne Menscer, MD, President, North Carolina Medical Society; Jordan J. Cohen, MD, Past President, Association of American Medical Colleges; Richard H. Dean, MD, President, Wake Forest University Health Sciences; Victor Dzau, MD, Chancellor, Duke University Medical Center; Michael J. Lewis, MD, PhD, Executive Assistant to the Chancellor, East Carolina University; William L. Roper, MD, MPH, Vice Chancellor for Medical Affairs, University of North Carolina at Chapel Hill; Jeffrey Simms, MPH, MDiv, Assistant Director, Office of Rural Health and Community Care, Division of Medical Assistance, North Carolina Department of Health and Human Services; Pamela P. Highsmith, MEd, Associate Executive Director, North Carolina Medical Society Foundation; Jacqueline Rollins Wynn, MPH, Associate Director, North Carolina Area Health Education Centers Program, University of North Carolina School of Medicine; Virginia Hardy, PhD, LPC, Interim Senior Associate Dean for Academic Affairs, Brody School of Medicine, East Carolina University; Milo M. Brunick, Jr, MBA, Vice President of Network Management, Blue Cross Blue Shield of North Carolina; John H. Frank, MBA, Director, Health Division, Kate B. Reynolds Charitable Trust; The Honorable Carmen Hooker Odom, MRP, Secretary, North Carolina Department of Health and Human Services; and The Honorable Anthony Rand, JD, North Carolina Senate.

Finally, the NC IOM want to extend special thanks to the Kate B. Reynolds Charitable Trust. The Task Force's work would not have been possible without their financial assistance. In addition, the Trust's historical mission of financing providers in underserved locations was invaluable experience in guiding the work of the Task Force.

North Carolina Institute of Medicine Primary Care and Specialty Supply Task Force

Chair

E. Harvey Estes, Jr, MD
Chairman Emeritus
NC Institute of Medicine Board of Directors
Professor Emeritus
Department of Community and Family Medicine
Duke University

Members

William B. Applegate, MD, MPH
Senior Vice President
Wake Forest University Health Sciences
Dean
Wake Forest University School of Medicine

G. Douglas Atkinson
Vice President of Business Development
Wake Forest University Baptist Medical Center

Thomas J. Bacon, DrPH
Executive Associate Dean and Director
NC Area Health Education Centers Program
The University of North Carolina at Chapel Hill School of Medicine

Joseph Mac Ernest, III, MD
Professor
Associate Dean for Student Services
Department of Obstetrics and Gynecology
Wake Forest University School of Medicine

John H. Frank, MBA
Director
Health Care Division
Kate B. Reynolds Charitable Trust

Robert N. Golden, MD
Former Vice Dean
Former Assad Meymandi Professor and Chair of Psychiatry
The University of North Carolina School of Medicine
UNC Health System

Frank N. Harrison, Jr, MD
Department of Obstetrics and Gynecology
Carolinas Medical Center

Nancy S. Henley, MPH, MD
Medical Director
NC State Health Plan

Pamela P. Highsmith, MEd
Associate Executive Director
NC Medical Society Foundation

Don Jablonski, DO, FAODME, FACOFP
Past President
North Carolina Osteopathic Medical Association
North Carolina Society of the American College of Osteopathic Family Physicians

Anita Jackson-Kelley, MD, MPH, FACS, FAAOA
President
Old North State Medical Society

Kathy Johnson, RN, FNP, MPH
Former Family Nurse Practitioner on the WATCH Mobile Unit
Wayne Memorial Hospital

Bruce E. Johnson, MD
Professor
Department of Medicine
Brody School of Medicine
East Carolina University

Jay Kennedy
Executive Director
Four County Health Network, Inc.

Bobby Lowery, MN, APRN, BC, FNP
Clinical Assistant Professor and
Clinical Site Placement Coordinator
Primary Care Nurse Practitioner Programs

North Carolina Institute of Medicine Primary Care and Specialty Supply Task Force

Nancy Mathias, CNM, MSN
Carolina Nurse Midwives

James T. McDeavitt, MD
Senior Vice President
Education and Research
Carolinas HealthCare System

Anthony A. Meyer, MD, PhD
Professor and Chair
Department of Surgery
The University of North Carolina at Chapel Hill

J. Lloyd Michener, MD
Professor and Chair
Department of Community and Family Medicine
Director
Duke Center for Community Research
Duke University Medical Center

Warren Newton, MD, MPH
William B. Aycock Professor and Chair
Department of Family Medicine
The University of North Carolina at Chapel Hill

Teck A. Penland, PhD
President and CEO
Mountain Area Health Education Center

Shiva K. Rao, MD, FACS
General Surgeon
Chairman
International Medical Graduate Section of NC Medical Society

Thomas C. Ricketts, III, PhD, MPH
Deputy Director
Cecil G. Sheps Center for Health Services Research
The University of North Carolina at Chapel Hill

Barbara Rowland, MD
Medical Director
Piedmont Health Services

Jeff Spade, CHE
Executive Director
NC Rural Health Center
NC Hospital Association

Justine Strand, MPH, PA-C
Chief
Physician Assistant Division
Associate Professor
Department of Community and Family Medicine
Duke University Medical Center

Marvin S. Swartz, MD
Professor of Psychiatry
Department of Psychiatry and Behavioral Sciences
Director
Duke AHEC Office
Duke University Medical Center

Torlen Wade, MPH
Director
NC Office of Rural Health and Community Care
NC Department of Health and Human Services

Charles F. Willson, MD
President
NC Medical Society
Clinical Professor
Brody School of Medicine
East Carolina University

Cathy Wright
Former Associate Director
Community Practitioner Program
NC Medical Society Foundation

Steering Committee

Thomas J. Bacon, DrPH
Executive Associate Dean and Director
NC Area Health Education Centers Program
The University of North Carolina at Chapel Hill School of Medicine

Erin Fraher, MPP
Director
NC Health Professions Data System
Cecil G. Sheps Center for Health Services Research
The University of North Carolina at Chapel Hill

Katie Gaul, MA
Research Associate
NC Health Professions Data System
Cecil G. Sheps Center for Health Services Research
The University of North Carolina at Chapel Hill

Pamela P. Highsmith, MEd
Associate Executive Director
NC Medical Society Foundation

Jennifer King
Research Associate
NC Health Professions Data System
Cecil G. Sheps Center for Health Services Research
The University of North Carolina at Chapel Hill

Andrea Radford, DrPH, MHA
Research Associate
NC Office of Rural Health and Community Care
NC Department of Health and Human Services

Thomas C. Ricketts, III, PhD, MPH
Deputy Director
Cecil G. Sheps Center for Health Services Research
The University of North Carolina at Chapel Hill

Jeff Spade, CHE
Executive Director
NC Rural Health Center
NC Hospital Association

Torlen Wade, MPH
Director
NC Office of Rural Health and Community Care
NC Department of Health and Human Services

Cathy Wright
Former Associate Director
Community Practitioner Program
NC Medical Society Foundation

North Carolina Institute of Medicine Staff

Pam Silberman, JD, DrPH
President and CEO

Mark Holmes, PhD
Vice President

Kristen Dubay, MPP
Project Director
Managing Editor for the *North Carolina Medical Journal*

E. Kiernan McGorty, JD, PhD
Project Director

Kimberly Alexander-Bratcher, MPH
Project Director

Thalia Fuller
Administrative Assistant

Adrienne Parker
Director Administrative Operations

Phyllis Blackwell
Editorial Assistant
Assistant Managing Editor for the *North Carolina Medical Journal*

North Carolina's Healthcare Needs and Provider Supply Trends

Chapter 1

Growth in the provider supply has not kept pace with growth in the overall population or the increased demand for health services in North Carolina. The state is likely to face a severe shortage of physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs) over the next 20 years, absent major changes in the healthcare delivery system or significant increases in the number of providers.

The North Carolina Institute of Medicine (NC IOM) convened a Task Force to analyze current and projected trends in provider supply and to examine whether the existing production of physicians, NPs, PAs, and CNMs will address the state's growing healthcare needs. The Task Force was a collaborative effort with the North Carolina Health Professions Data System and the Southeast Regional Center for Health Workforce Studies at the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill and the North Carolina Area Health Education Centers Program. The Task Force was chaired by E. Harvey Estes, Jr, MD, Chairman Emeritus of the NC IOM Board of Directors and Professor Emeritus, Department of Community and Family Medicine, Duke University. The 34 other Task Force and Steering Committee members were drawn from across the state and included representatives of professional associations (representing allopathic and osteopathic physicians, NPs, PAs, and CNMs), provider specialties, academic health centers, other health professions training programs, residency directors, hospitals, and the North Carolina Office of Rural Health and Community Care.

The state is likely to face a severe shortage of physicians, nurse practitioners, physician assistants, and certified nurse midwives over the next 20 years.

The Task Force examined trends in provider supply including: (1) types of providers (by specialty) likely to be needed to address future healthcare needs; (2) areas of the state that experience persistent shortages; and (3) underrepresentation of certain ethnic and racial minorities in specified health professions. The goal of the Task Force's work was to develop public and private policy options to ensure North Carolinians have access to the providers they need. In short, the goal was to ensure that North Carolina has the right combination of providers in the right places.

The Task Force met for over a year and developed a set of preliminary recommendations that were presented to a larger group of stakeholders at a summit in December 2006. The summit included more than 100 invited guests, including a broader array of healthcare professionals, hospitals, state and local policy makers, and insurers. Recommendations of the summit participants were considered and incorporated into the report. The work of the Task Force was supported by a generous grant from the Kate B. Reynolds Charitable Trust.

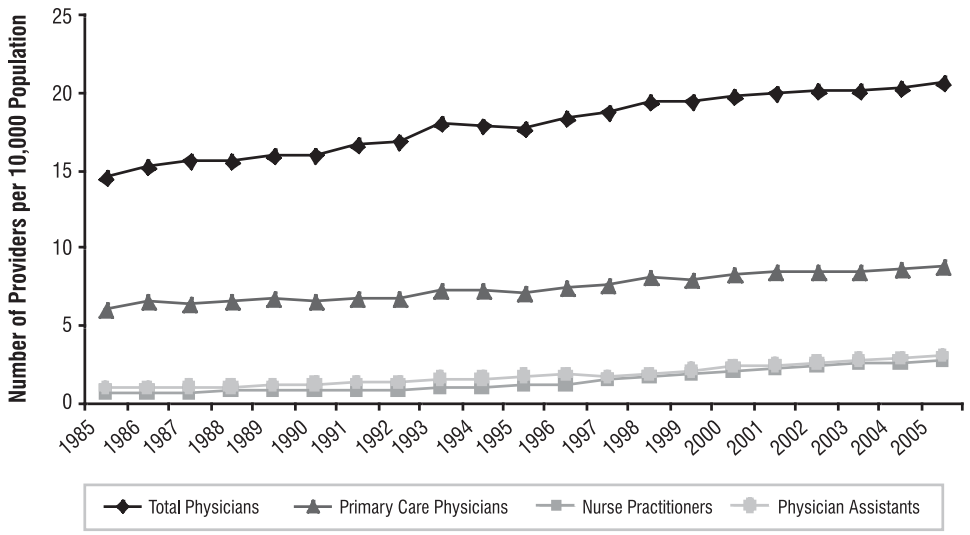
Provider Supply and Population Health

Physicians, NPs, PAs, and CNMs (referred to collectively as "providers") are indispensable practitioners in the state's healthcare system. Having access to these providers contributes to the overall well-being of the population. While the exact relationship of overall provider supply to population health measures is disputed,[1]

the specific contribution of physicians and other nonphysician clinicians to individual health is not in doubt. The consequences of not being able to see healthcare providers when needed are clear. Studies have shown people with less access to medical care live shorter lives with more disability and lower productivity.[2] Physicians, with their extensive education and training, provide the leadership and expertise to manage complex health conditions. NPs, PAs, and CNMs also help address the healthcare needs of North Carolinians.

For most of the last 20 years, North Carolina has seen a steady increase in the ratio of providers-to-population as the number of licensed providers has grown faster than the population. (See Chart 1.1.) Although there has been growth in the ratio of providers-to-population over the last 20 years, over the last five years the rate of growth has slowed. Between 1985 and 2000, the physician-to-population ratio increased by approximately 2.1% annually. However, starting in 2000, the annual growth rate slowed to 0.9%.

Chart 1.1
Providers per 10,000 Population, North Carolina, 1985-2005



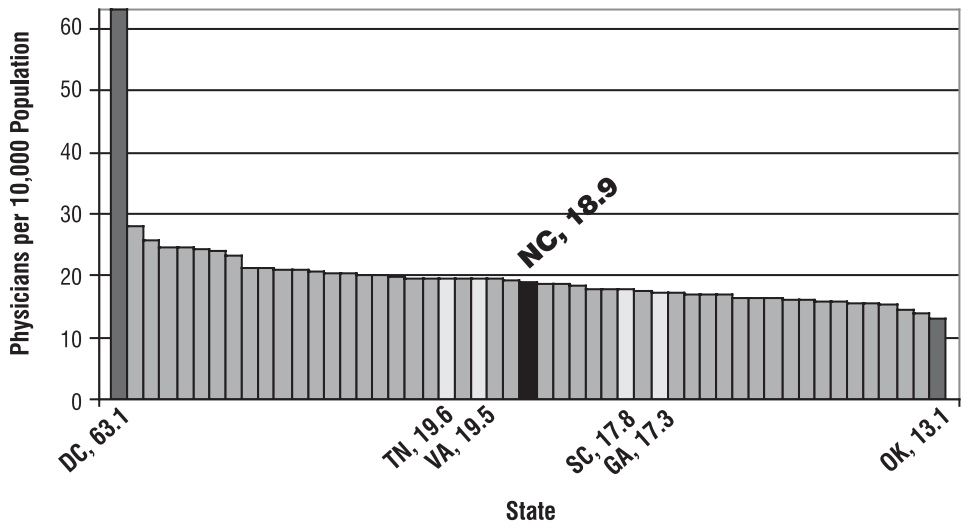
Note: Providers are active, in-state, non-Federal, non-resident-in-training providers licensed in North Carolina. Primary care physicians are those with a primary specialty of family practice, general practice, internal medicine, obstetrics /gynocology, or pediatrics.

Source: North Carolina Health Professions Data System and NC State Demographer.

While evidence suggests that more providers do not inevitably lead to better health outcomes,[3] other data suggest that too few providers, especially in underserved areas, can adversely affect health status.[4,5] No one currently knows the optimal number or type of providers needed to maximize population health. Yet, by most measures, North Carolina has neither too many nor too few physicians. Using data that allow state-to-state comparisons, North Carolina had 18.9 physicians to every 10,000 people in 2005, which is about average when compared to all states. (See Chart 1.2.) Note that these estimates come from American Medical Association (AMA) data. Caution should be used when comparing these data to data shown elsewhere in the report because of differences in the data collection efforts at the

AMA; the AMA master file relies on survey data and is updated throughout the year while the North Carolina data are collected in October of every year.

Chart 1.2
Physician Supply per 10,000 Population by State, 2005



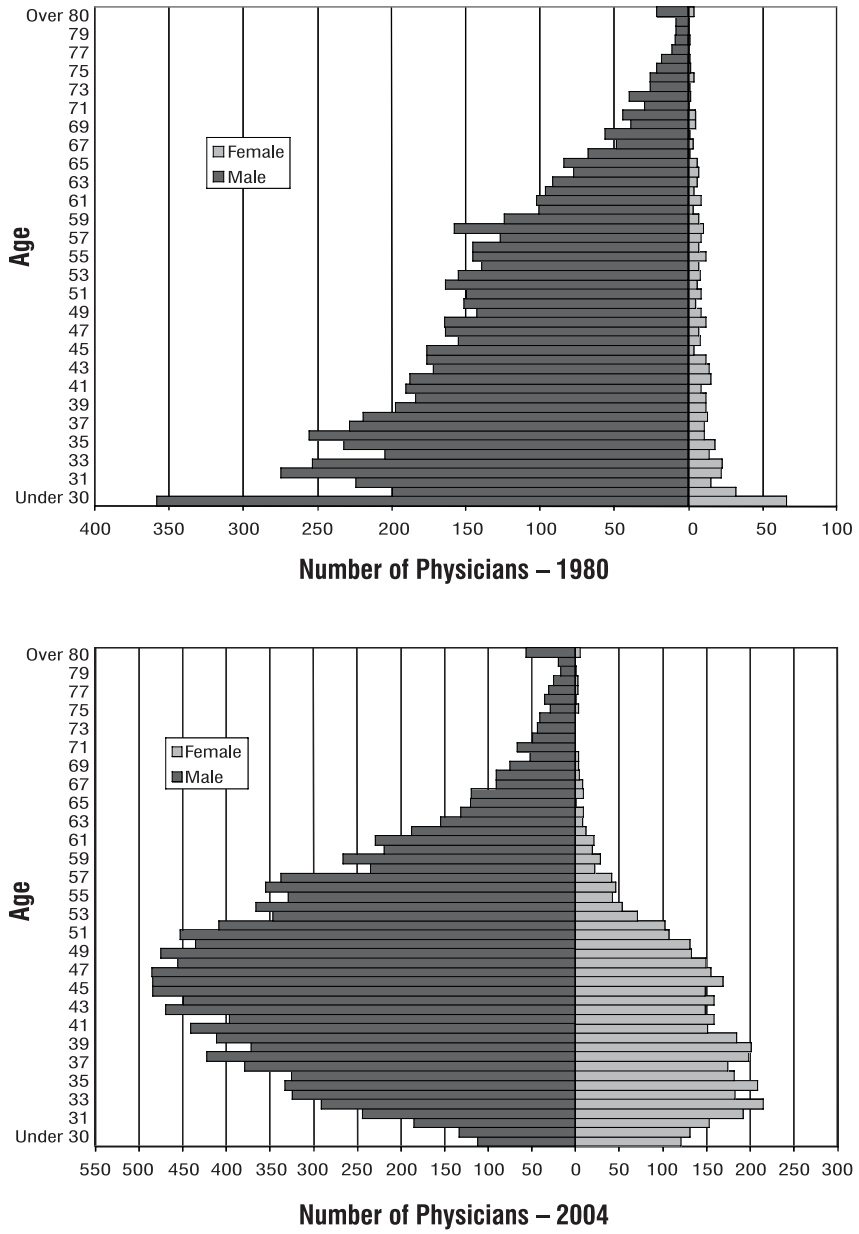
Source: American Medical Association Physician Masterfile. 2005.

The Potential Provider Shortage

While North Carolina's current overall supply may be adequate, state population growth, aging of both population and providers, and increase in the prevalence of chronic diseases may lead to a future workforce shortage. The growing population and aging of the provider workforce are two of the factors that contribute to decline in the provider-to-population ratio. The population is expected to grow 25.4% in North Carolina between July 2004 and July 2020. At the same time, provider supply is expected to increase only 23%. The physician workforce is aging, and a sizable portion of physicians are approaching traditional retirement age. In 1980, a large proportion of the physician workforce was in their 30s. (See Chart 1.3.) This cohort of physicians has remained the largest age group among North Carolina's practicing physicians, and so nearly 25 years later, this group of physicians is in their late 40s to early 50s. In fact, in 2004, 68% of North Carolina physicians were age 40 or older compared to 58% in 1980. Assuming the average retirement age of physicians (66) does not change significantly in the future, a large percentage of the current physician workforce is likely to retire in the next 20 years. NPs are similar as a group: 68% of NPs are age 40 or older. PAs are somewhat younger: 51% of PAs are age 40 or older.

In addition to state population growth and aging of the provider workforce, other factors affect provider supply. There is some evidence to suggest newer providers want to work fewer hours. This preference may be an effort to balance home and professional careers. Likewise, gender plays a role in physician supply. Female physicians are somewhat more likely to temporarily exit the profession during child raising years. Of the 173 physicians who were active in 2004 but became inactive in

Chart 1.3
Age Distribution of Physicians, 1980 and 2004



Note: There were three physicains with missing age.

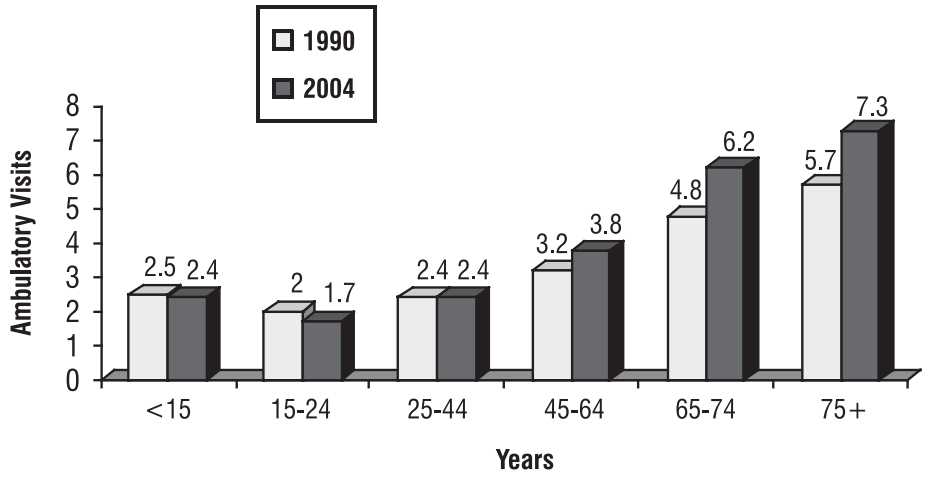
2005, 36 (21 percent) were women younger than 45.[6] This group constitutes 16% of all physicians, so women in this age group are slightly—1.3% versus 0.9%—more likely to become inactive than other physicians. Furthermore, on average women work slightly fewer hours per week than men.[a] As the percentage of physicians

a For example, in 2005 the average number of work hours per week reported by female physicians was about 91% of the average hours reported by males. NC Health Professions Data System. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. 2006. It is important to note this difference will have a larger effect in specialties that have more females.

who are female increases, these factors will combine to slightly reduce provider supply for a given number of trained physicians located in the state.

The need for healthcare services is likely to increase at the same time the supply of providers begins to slow. As people age, they use more health services. Between April 2000 and July 2003, North Carolina had the fourth largest growth in number of older adults of any state in the nation.[7] Further, the population of older adults (65 or older) is expected to grow 59% between July 2004 and July 2020.[8] Approximately 12% of North Carolinians were age 65 or over in 2004; this number is projected to increase to 15% by 2020. On average, people make approximately three visits per year to a physician's office or clinic. However, utilization varies by age: 25-34 year olds made 2.3 annual visits to a physician's office or clinic (2003), while 75-84 year olds had more than 7.3 visits. (See Chart 1.4.) Moreover, the average number of visits for people over age 45 has increased in the last 20 years.

Chart 1.4
Average Number of Ambulatory Visits by Age of Patient, 1990 and 2004



Source: National Center for Health Statistics. *National Ambulatory Medical Care Survey (NAMCS)*. Number, percent distribution, and annual rate of office visits with corresponding standard errors, by patient characteristics: United States, 2004. Hyattsville, MD: National Center for Health Statistics. Advance Data No. 374; Table 3. Available online at: http://www.cdc.gov/nchs/data/ad/ad374.pdf. Accessed August 24, 2006. National Center for Health Statistics. *National Ambulatory Medical Care Survey (NAMCS)*. Number, percent distribution, and annual rate of office visits by patient's age, sex, race and geographic region: United States. Hyattsville, MD: National Center for Health Statistics. Advance Data No. 213; Table 1. Available online at: http://www.cdc.gov/nchs/data/ad/ad213.pdf. Accessed September 15, 2006.

In addition to aging of the population, growth in the number of people with chronic illnesses also affects demand for services. As a general rule, healthier individuals use fewer health services, and less healthy individuals use more. Between 1987 and 2002, there was a significant increase in the treated disease prevalence of certain chronic diseases such as cerebrovascular diseases (161% increase) with strokes being most common; kidney problems (99% increase); pulmonary conditions (90% increase); diabetes (64% increase); presence of abnormal or elevated lipids (fatty molecules) in the blood (437% increase) with cholesterol being most common; and certain back problems (78%).[9] An increase in the prevalence of obesity explains part of the increase in demand for treatment. For example, in 2001, 24% of the adult population was considered obese, an

increase of 10 percentage points since 1987.[10] People who are obese use more health services, and this group accounted for 27% of the growth in real per capita spending on healthcare during this same time period.

There are other factors aside from aging and increased prevalence of chronic illnesses that can drive demand for health services. Growth in the economy has historically led to greater demand for services.[b,11] Advances in medicine have the potential to decrease the use of some health services but can lead to greater use of other health services. Efforts to weed out unnecessary or marginally beneficial services can help reduce the need for health services.

It is impossible to predict fully the demand for and supply of provider services 20 years into the future. There are a number of different factors that must be considered in projecting provider supply and increased demand for health services. Some of these factors include anticipated growth in the supply of new physicians, NPs, PAs, and CNMs; anticipated exodus from the profession (due to death, retirement, moving out of state, or other factors); growth in the overall state population; aging of the population (which affects demand for services); and overall prevalence of chronic illness. The combined effect of three primary drivers of demand—growth of the population, aging of the population, and increase in the prevalence of chronic illnesses—is expected to increase the demand for services in North Carolina (measured in annual visits) by 34% between 2004 and 2020.

The NC IOM Primary Care and Specialty Supply Task Force developed a set of different workforce projections based on different assumptions. These included "best case" and "worst case" scenarios. The "best case" scenarios are based on the current growth of physicians and the higher than average rate of growth of nonphysician clinicians experienced in the last five years. These projections weigh nonphysician clinicians at 0.75 full-time equivalent (FTE) of a physician.[12] The "worst case" scenarios are based on current growth of physicians and average rate of growth of nonphysician clinicians over the last 25 years. These projections weigh nonphysician clinicians at 0.50 FTE of a physician (as used by federal workforce projections). In addition, there are separate estimates for provider-to-population

Table 1.1
Projected Change in Provider-to-Population Ratios, North Carolina, 2020 and 2030

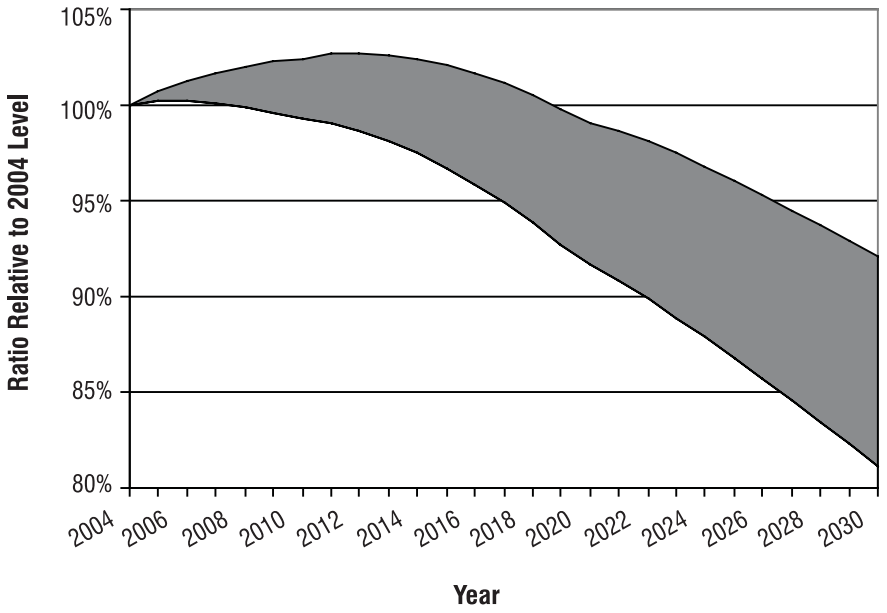
	Projected Change in Provider-to-Population Ratios		Projected Change in Provider-to-Adjusted Population Ratios	
	2020	2030	2020	2030
Physicians only	-8%	-21%	-12%	-26%
All providers				
Best Case	4%	-2%	-1%	-8%
Worst Case	-4%	-13%	-8%	-19%

Source: NC IOM and the NC Health Professions Data System. See Appendix A for details.

b There is a positive correlation between aggregate community wealth, measured by Gross Domestic Product (GDP) or personal income, and the demand for physician services. A longitudinal study of 14 Organisation for Economic Co-operation and Development (OECD) countries, including the US, found growth in physician supply corresponded to increases in GDP.

only and provider-to-adjusted population (based on increased demand due to aging of the population). These projections do not include the additional demand that would be anticipated from growth in the number of people with chronic illnesses. (See Table 1.1.) By 2030, under almost any realistic scenario, North Carolina is likely to experience significant provider shortages. Chart 1.5 presents the best and worst case projections for age-adjusted populations.

Chart 1.5
Range of Projected Provider-to-Population Ratios



Source: NC IOM and the NC Health Professions Data System. See Appendix A for details.

The state is likely to face a serious provider shortage over the next 20 years given growth in the population, aging of the population, and increase in chronic diseases. There are two fundamentally different approaches the state can take to address this problem: (1) restructure the healthcare delivery and finance system to create new and more efficient systems of care (particularly for people with chronic illnesses) or (2) increase provider supply. These options are not mutually exclusive. The state can redesign the healthcare delivery system and at the same time expand the overall supply of providers. North Carolina could maintain its current provider-to-population ratio (adjusted for demand changes) over the next 25 years by:

1) increasing yearly educational production of physicians by 20%, or
2) increasing production of nonphysician clinicians by over 30%, or
3) increasing in-migration of physicians by 15%, or
4) increasing the capacity of the health system to effectively manage the health of North Carolinians or improving the health of North Carolinians to reduce the need for health services by 15%.

Naturally, using multiple strategies would enable smaller percentage changes to satisfy the increasing demand. However, the longer the state waits to address

impending shortages, the greater percentage change that will be needed in future years. Options to expand the workforce or redesign the healthcare system to create new and more efficient models of care are discussed more fully in Chapter 2.

In addition to the projected overall provider supply shortage, the state is currently facing a significant maldistribution problem. North Carolina is a largely rural state and access to healthcare in rural areas has historically been a challenge. Some urban communities also face serious access barriers. North Carolina made significant headway in addressing provider maldistribution problems in the 1980s and 1990s; however, improvements have stagnated, and now maldistribution problems appear to be getting worse. There were 11 whole-county and 40 part-county health professional shortage areas in 2005.[c] Of these, 38 counties are considered persistent health professional shortage areas because they have failed to meet the minimum primary care provider-to-population ratio for six of the last seven years. Strategies to address the maldistribution issue are discussed more fully in Chapter 3.

In addition to an overall maldistribution problem, there are significant maldistribution issues among certain health professional specialties. Between 2000 and 2005:

- 27 counties experienced a decrease in primary care provider-to-population ratios;
- 53 counties experienced a loss in general surgeons relative to population, and five counties lost all general surgeons;
- 32 counties experienced a decline in the proportion of psychiatrists-to-population (six counties lost all psychiatrists), and 24 had no psychiatrists in either year; and
- 52 counties had either a decline in the ratio of physicians delivering babies to women of childbearing years or had no physicians providing deliveries.[d]

Shortages typically exist in rural areas, but there also are pockets of low provider supply in some low-income areas of larger cities. These shortages have varying impacts on affected communities. For example, despite the decrease in some areas of providers delivering babies, the average distance women across the state travel to deliver children has increased by only one third of a mile. By contrast, losing a general surgeon in a rural community can have a large impact on the financial sustainability of a rural hospital. Additionally, loss of psychiatrists working in the state's local management entities (LMEs) has been particularly acute in small population areas, where 44% of LME psychiatrists have stopped working with public patients.[13] Strategies to increase the number of providers, by type of specialty, are discussed in Chapter 4.

The state also faces a significant shortage of minority providers. In North Carolina, 69% of the state's 8.5 million residents are white, non-Hispanic; 21%

c The Bureau of Health Professions in the US Department of Health and Human Services has designated certain communities, population groups, or medical facilities as Health Professional Shortage Areas (HPSAs). Certain counties, or parts thereof, are considered HPSAs if they have fewer than one primary care provider to 3,500 people, or one primary care provider to 3,000 people in high-needs areas.

d 2004 are the most recent data available for physicians providing deliveries.

are African-American or black, non-Hispanic; 6% are Hispanic; 2% are Asian or Pacific Islander; and 1% are American Indian. By comparison, whites account for 82% of the physician population (17,090), Asians 7%, African-Americans 6%, and Hispanics 2%. Similarly, whites account for 90% and 88% of the NP and PA populations, respectively, while African-Americans account for only 5% and Hispanics account for 1-2% of each group. When given an option, individuals of all racial and ethnic groups are more likely to pick a provider who has a similar racial and ethnic background.[14,15] Studies suggest minority patients are generally more satisfied with care received from providers of similar race and/or ethnicity,[14,16,17] but the state is producing far too few providers from underrepresented minority populations to meet this need. Because minority providers are more likely to practice in underserved areas, increasing the number of minority providers also could lessen the maldistribution problem. Strategies to increase the number of underrepresented minorities in the profession are discussed in Chapter 5.

References

1. Cochrane AL, St Leger AS, Moore F. Health service "input" and mortality "output" in developed countries. *J of Epidemiol and Community Health*. September 1978;32(3):300-305.
2. Millman M, ed. *Access to Health Care in America*. Institute of Medicine. Washington, DC: National Academy Press; 1993.
3. Goodman DC, Stukel TA, Chang C, Wennberg JE. End-of-life care at academic medical centers: Implications for future workforce requirements. *Health Aff*. March/April 2006;25(2):521-531.
4. Robst J, Graham GG. The relationship between the supply of primary care physicians and measures of health. *Eastern Econ J*. Summer 2004. Available at: findarticles.com/p/articles/mi_qa3620/is_200407/ai_n9452295. Accessed November 16, 2006.
5. Shi L, Macinko J, Starfield B, et al. The relationship between primary care, income inequality, and mortality in US States, 1980-1995. *J Am Board Fam Pract*. Sept-Oct 2003;16(5):412-422.
6. NC Health Professions Data System. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. 2007.
7. North Carolina Division of Aging and Adult Services. *Aging North Carolina: The 2006 Profile*. Raleigh, NC: North Carolina Department of Health and Human Services. Available at: http://www.dhhs.state.nc.us/aging/cprofile/ncprofile.pdf. Accessed October 23, 2006.
8. North Carolina State Demographics. County total age groups standards: July 2004; July 2020. Available at: http://demog.state.nc.us/. Accessed October 23, 2006.
9. Thorpe KE, Florence CS, Howard DH, Joski P. The rising prevalence of treated disease: Effects on private health insurance spending. *Health Aff*. Web Exclusive 2005;W5:317-325.
10. Thorpe KE, Florence CS, Howard DH, et al. The impact of obesity on rising medical spending. *Health Aff*. Web Exclusive 2004;W4:480-486. Available at: http://content.healthaffairs.org/cgi/content/abstract/hlthaff.w4.480.
11. Cooper RA, Getzen TE, Laud P. Economic expansion is a major determinant of physician supply and utilization. Health Services Research. April 2003;38(2):675-696.
12. Larson EH, Hart LG, Ballweg R. National estimates of physician assistant productivity. *J Allied Health*. Fall 2001;30(3):146-152.
13. *Discarding Community Psychiatrists: The Third Report Card by the North Carolina Psychiatric Association*. Raleigh, NC: North Carolina Psychiatric Association; April 18, 2006. Available at: http://ncpsychiatry.org/NCPA%20Report%20Card%20III.pdf. Accessed October 5, 2006.
14. Cooper LA, Powe NR. Disparities in patient experiences, health care processes, and outcomes: The role of patient-provider racial, ethnic, and language concordance. New York, NY: The Commonwealth Fund; July 2004. Available at: http://www.cmwf.org/publications/publications_show.htm?doc_id=231670. Accessed November 7, 2006.
15. LaViest TA, Nuru-Jeter A. Is doctor-patient race concordance associated with greater satisfaction with care? *J Health Soc Behav*. 2002;43(3):296-306.
16. Smedley BD, Stith AY, Nelson AR, eds. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare*. Institute of Medicine of the National Academies. Washington, DC: The National Academy Press; 2003.
17. Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient-physician racial concordance and the perceived quality and use of health care. *Arch Intern Med*. 1999;159:997-1004.

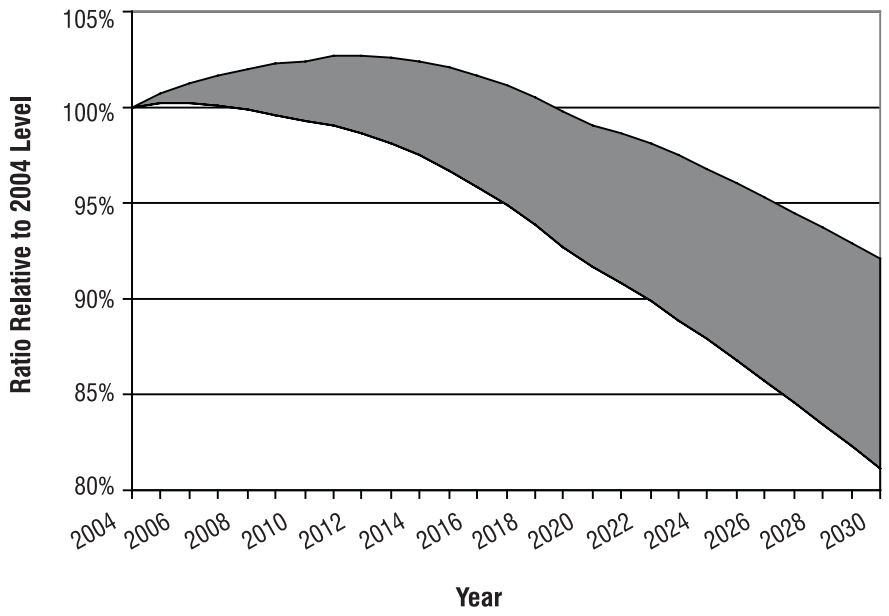
Addressing Provider Shortage by Developing New and More Efficient Models of Care or Increasing Provider Supply

Chapter 2

North Carolina is likely to experience a significant provider shortage over the next 15-25 years. Assuming the best case scenario, North Carolina will effectively lose 1% of the provider workforce by 2020 and 8% by 2030 (measured in provider-to-adjusted population demand ratio).[a] If growth in supply does not continue or estimates of the productivity of nonphysician clinicians is too optimistic, the state may effectively lose as much as 8% of the workforce by 2020 and 19% by 2030.[b] None of these projections factor into increased demand due to an increased number of people with chronic diseases. The increased prevalence of chronic diseases could result in an additional 3% increase in demand for services by 2020 and 5% by 2030.

North Carolina is better positioned than many states to examine impending provider shortages and develop workable strategies to expand the health professional workforce.

Chart 2.1
Range of Projected Provider-to-Population Ratios



Source: Details on the projection method are outlined in Appendix A.

North Carolina is better positioned than many states to examine impending provider shortages and develop workable strategies to expand the health professional workforce. North Carolina has a nationally recognized health professions data system that collects data on different types of healthcare professionals. North Carolina's

a The "best-case" projections are based on current growth of physicians and a higher rate of growth of nurse practitioners, physician assistants, and certified nurse midwives (based on average growth over the last five years). The projections also factor in the current rate of exodus from the professions (due to death, retirement, moving out of the state, or other factors). Nonphysician clinicians are weighted as 0.75 FTE of a physician; however, federal workforce projections factor nonphysician clinicians as 0.5 FTE of a physician.

b The "worst-case" projections are based on current growth of physicians and a lower rate of growth of nonphysician clinicians (based on the yearly increase in supply averaged over the last 25 years). Nonphysician clinicians are weighted as 0.5 FTE physician (as is used by federal workforce projections).

Health Professions Data System is the longest standing state health workforce data system in the country. North Carolina has also been a national leader in addressing health professional maldistribution problems and has a long history of supporting practice innovations. The state needs to use these data for ongoing oversight by stakeholders and policy makers to monitor the state's changing healthcare needs, as well as trends in provider supply, to ensure the emerging needs of the state are addressed. Therefore, the Task Force recommended:

Recommendation 2.1. (Priority Recommendation)

a) The NC General Assembly should appropriate $170,000 to support and expand the health professional workforce research center charged with examining current and future needs for health professionals, which is housed within the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. Research should be conducted at the individual practitioner level as well as the practice level. The Center will expand its current research to include analyses that:

1) identify the need for physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs) to meet the healthcare needs of the state 5, 10, and 20 years into the future;

2) identify new models of care that can improve the quality and efficiency of care offered by North Carolina providers;

3) examine the distribution of physicians, NPs, PAs, and CNMs across the state;

4) examine trends in the supply of minority health professionals in comparison to the general population and examine percentage of underrepresented minority students and residents who receive training in North Carolina but who leave the state for practice;

5) examine trends in the number of primary care and specialty providers by specialty area;

6) examine changes in health status and sociodemographic factors that might influence future healthcare needs so as to examine the mix of healthcare professionals necessary to address the state's healthcare needs; and

7) identify barriers that affect entry into the health professional workforce or continued practice, if any.

b) The NC General Assembly should create an ongoing Health Workforce Policy Board that is charged with developing strategies to address impending health professional workforce shortages.[c] The Board will include representation from the NC Office of the Secretary, NC Department of Health and Human Services, NC Office of Rural Health and Community Care, NC Area Health Education Centers Program, five North Carolina academic health centers, NC Community College system, relevant professional associations and licensing boards, NC Hospital Association, NC Medical Society Foundation, and nonmedical public members. The Board shall identify strategies to:

1) develop new models of care that encourage quality and efficiency of healthcare services;

2) increase the overall supply of physicians, NPs, PAs, and CNMs to meet the unmet health needs of the state's growing population;

3) encourage more health professionals to practice in health professional shortage areas;

4) establish priorities for which types of provider specialties are most needed to meet the healthcare needs of the state;

5) increase the supply of underrepresented minorities in the profession;

6) ensure the mix of health professionals is appropriate to meet the changing healthcare needs of the state; and

7) address barriers that affect entry into the health professional workforce or continued practice, if any.

The Health Workforce Policy Board should report its findings and proposed recommendations on an annual basis to the University of North Carolina Board of Governors, the NC State Board of Community Colleges, and the NC General Assembly.

One example of a study the Health Workforce Policy Board could do is an investigation of the amount of care providers of all types, not just geriatricians, provide to adults aged 65 and older and whether there are any current or future supply issues in the state. Current data constraints limit such analyses. The Board could also evaluate potential educational needs that should be considered as population longevity increases and more providers treat chronically ill patients.

---

c Utah has established a similar workforce policy board. The legislation that created the Utah Medical Education Council (UMEC) authorized the UMEC to conduct ongoing healthcare workforce analyses and to assess Utah's training capacity and graduate medical education (GME) financing policies. The legislation requires the UMEC to report to the governor and the legislature on these issues and to provide policy recommendations for achieving state workforce objectives. UMEC is comprised of the Dean of the University of Utah Medical School; an educator member of the Board of Regents; the Assistant Dean of Curriculum and GEM at the University of Utah; a risk manager with a community hospital; the President and CEO of a health insurance company; the Director of Family Practice Residency at the Utah Healthcare Institute; and a nurse (RN) member of the Utah State Board of Education. Ha J. *Utah's Physician Workforce: A Study on the Supply and Distribution of Physicians in Utah*. Salt Lake City, UT: The Utah Medical Education Council; 2006.

New Models of Care

The US currently spends 16% of its Gross Domestic Product on healthcare, which is more than any other country.[1] Overall healthcare expenditures have risen between 6.3% and 8.8% between 2000 and 2004, creating an affordability crisis. Some people question whether the cost of training an expanded supply of providers is affordable. Using tuition costs as a proxy for the costs of training new providers, it costs approximately $35,000/year to train a new physician (or approximately $140,000 total for each medical school graduate),[d] $45,000 total to train a new physician assistant (PA),[e] and $35,000 total to train a new nurse practitioner (NP). These cost estimates use private university tuition as a proxy for cost because public universities receive state funding to subsidize program costs.[f] Yet, absent new delivery models that can improve quality and efficiency, the state may need to invest significant new resources into increasing the production of healthcare professionals.

Absent new delivery models that can improve quality and efficiency, the state may need to invest significant new resources into increasing the production of healthcare professionals.

North Carolina should restructure the healthcare delivery system and financing system to increase quality and efficiency, so providers, practices, and healthcare systems can appropriately manage a higher caseload. One way of increasing provider productivity involves reorganizing delivery of care. While conceptually this is a very attractive option, there have been few large-scale system redesigns that have led to major increases in productivity. However, several models have been tried and warrant further study.

Expand use of nonphysician clinicians:
One potential model would expand the use of and role of PAs, NPs, and certified nurse midwives (CNMs) in caring for patients with routine problems while physicians would manage the care of patients with more complex health conditions. These nonphysician clinicians provide direct patient care and can help ameliorate the impending physician shortages. A meta analysis of studies examining the role of NPs found there were no appreciable differences between doctors and NPs or advance practice nurses in health outcomes, process of care, resource utilization, or cost for primary care services.[2] Substituting NPs for physicians could potentially decrease physicians' workloads and direct healthcare costs, but there is no guarantee

---

d As a rough approximation of education costs per student, Duke University charged ~$34,800 in tuition costs (2005-2006) and ~$7,300 in other fees and books. Available at: http://medschool.duke.edu/modules/som_finaid/index.php?id=3. Accessed December 2006.

The University of North Carolina at Chapel Hill charged ~$9,340 in tuition for in-state students and $33,000 for out-of-state students, and ~$1,500 in required fees for both in-state and out-of-state. Available at: http://cashiers.unc.edu/tuition%20and%20fees%202005-06%20final%20revised%20102405.pdf. Accessed December 2006.

Wake Forest University charged ~$34,000 for tuition and $1,500 for books/supplies. Available at: http://www1.wfubmc.edu/FinancialAid/MD+Student+Cost.htm. Accessed December 2006.

The Brody School of Medicine at East Carolina University charged $7,676 for in-state student tuition and $1,153 for books/supplies. The Brody School of Medicine does not accept out-of-state students. Available at: http://www.ecu.edu/bsomstudentaffairs/FinancialAid/Cost.htm. Accessed December 2006.

Report 2 of the AMA Council on Medical Education (I-00) reports that the annual cost in 1996 dollars of educating a student ranged from $71,672 to $92,836 per year.

e The total tuition (over two years) for the Physician Assistant programs at Duke University, Methodist College, and Wake Forest University is approximately $52,000, $36,000, and $40,000, respectively.

f The total program cost for the Duke University nurse practitioner program is approximately $35,000.

substitutions will have this effect. Nurses tend to spend more time and consult more frequently with patients, which means fewer patients can be seen. While this attention may lead to higher patient satisfaction, as it did in some studies, reducing the number of patient visits in a day could offset any potential cost savings gained from using nurses. Further, nonphysician clinicians are not trained to provide all the same services as physicians—so while they can provide similar and complementary services, they are not a complete substitute for physicians.

Interdisciplinary team-based models can enhance productivity:
Team-based approaches to healthcare can be efficient, cost-effective models of care delivery. There are a variety of models that are utilized depending on the specific patient population and setting. The NC Medicaid program, Community Care of North Carolina (CCNC), uses a team-based approach to provide care to people with chronic illnesses. CCNC is organized around a local network of care that includes, at a minimum, primary care providers, nurse or social work care managers, health departments, hospitals, and social services agencies. In many communities, the nurse or social work care managers are housed in providers' offices, and they help provide disease management education or case management services needed to help patients manage their health problems. In this way, licensed practical nurses, registered nurses, or social worker case managers can help provide more intensive patient education or patient follow-up, leaving physicians more time to see patients.

Team-based approaches to healthcare can be efficient, cost-effective models of care delivery.

Studies have shown that NP-physician collaborative practices are cost-effective and lead to enhanced quality of care in nursing homes, emergency rooms, and surgical inpatient settings.[3] These integrated delivery models enable practitioners to perform the tasks most appropriate for their training and specialization. For example, in a surgical setting the NP can take initial health history, provide both pre and postoperative patient education, and assist with discharge planning.[4] The physician would have more time to work with the patient to make surgical decisions and to perform surgeries. Both NP and physician would be involved in developing the overall plan of care with the patient. Working in a collaborative practice with NPs has been shown to have positive impacts on physicians, including improved job satisfaction, reduced workload, and a higher standard of care.[3] In addition, interdisciplinary teams including healthcare practitioners with different specialties, social workers, and other allied health professionals have been essential to improved quality of care for geriatric patients with multiple health problems and restricted activities of daily living.[5,6]

While teams have been shown to be effective in improving care to patients in certain settings and in leading to higher provider satisfaction, there are barriers to effective implementation of interdisciplinary team approaches. Practitioner groups (eg, physicians, NPs, PAs, CNMs) are generally trained separately and do not have experience working in a fully integrated team environment. More work is needed to ensure that medical students are trained in a collaborative team environment with nurses, PAs, NPs, and other healthcare professionals. Models could be developed around care of people with chronic illnesses. The Task Force made a number of recommendations to provide incentives to health professions training programs to increase interdisciplinary team training. (See Recommendations 2.4, 2.5, 2.7, 2.8,

and 3.4.) In addition, there has not been extensive research, to date, on the impact of interdisciplinary teams on provider efficiency or cost-effectiveness across different healthcare settings. Having more providers see the same patients does not necessarily improve efficiency or quality. More research is needed to understand how to best utilize healthcare teams and to determine the cost-effectiveness of these approaches.

Current payment systems also create barriers to effective use of teams. Public and private insurers and payers do not always pay for the services of certain health professionals in the community (ie, case managers in physician offices and/or nutritionists). Another barrier is that reimbursement policies are generally set up to reimburse individual practitioners separately rather than unified teams of practitioners. In addition, current payment methodologies do not encourage the use of communication through the Internet or other methods that could reduce unnecessary office visits.

Another new trend which may increase the number of patients providers can see in an ambulatory setting is use of hospitalists (discussed more fully in Chapter 3). Hospitalists are physicians who practice exclusively in hospitals. Hospitalists can help free up time that primary care providers would otherwise spend doing rounds caring for their hospitalized patients. Theoretically, hospitalists could enable primary care providers to treat more patients in an ambulatory setting. However, use of hospitalists is relatively new, so there are no data on the impact of hospitalists on primary care practice.

Recommendation 2.2. (Priority Recommendation)

In order to develop and implement new models of care:

a) North Carolina foundations should help fund new models of care for improving quality and efficiency of primary and specialty care across North Carolina. New models should be evaluated to determine if they improve quality of care and/or efficiency.

b) Medical schools, other health professions schools, and residency programs should incorporate successful new models of care into training curricula and ensure that students and residents have the opportunity to practice using new models.

c) The State Health Plan, Division of Medical Assistance, and private insurers should modify reimbursement policies to support the long-term viability of new models that are shown to improve quality and/or efficiency.

New models of care also should be focused on how they can better provide services in underserved areas to reduce the maldistrbution problem across the state. (See Recommendation 3.4.) Furthermore, new models of care should be developed to target psychiatric specialty shortages across the state, but particularly in underserved areas. (See Recommendations 4.6 and 4.7.)

Electronic health records (EHRs) and health information technology, when properly used, have the potential to help increase productivity of providers and

practices. EHRs, integrated with practice billing systems, can help reduce overhead and labor costs. This technology allows practices to successfully operate in sparsely populated communities that may not otherwise be able to support a provider.[g] EHRs can help improve access to accurate, timely patient data; increase the quality of care provided to patients; and improve workflow in physician practices. These improvements will become increasingly important as payers move to pay-for-performance and providers have increased accountability.

There are several burdens associated with implementing an EHR system. Nationally, only about 15% of physician practices had an EHR system in 2005, and the adoption rate was lower for smaller practices.[7] The cost of implementing an EHR system, as well as monthly maintenance costs, can be prohibitive, especially to smaller practices.[h] The time and resources needed to train staff to successfully operate an EHR system is also substantial. Lack of capital resources, loss of productivity during the transition period, lack of support from physicians and other clinical staff, and an inability to find systems that meet practitioner needs are all barriers to implementation. In addition, practices must have effective management systems to realize the benefit of an EHR system. In other words, EHR systems cannot solve underlying practice management problems.

Carolinas Center for Medical Excellence (CCME) has funding from the Centers for Medicare and Medicaid Services (CMS) to offer technical assistance to practitioners in selecting an EHR system.[8] The national initiative, called the Doctor's Office Quality-Information Technology (DOQ-IT), works with physician offices to help practices evaluate their EHR needs and capabilities, evaluate different EHR options, provide assistance with vendor selection, help create workload efficiencies, and improve patient care. The consulting is free to the physician practice and is targeted to smaller offices (with eight or fewer physicians). However, CCME can only work with primary care practices that serve a Medicare population, and CCME only has funding from CMS to work with up to 200 practices for the 2006-2008 time period. Thus, CCME is currently unable to help pediatric practices (which tend to have few Medicare beneficiaries) evaluate their EHR needs.

Recommendation 2.3.

The NC General Assembly should appropriate:

a) $2.5 million to The Carolinas Center for Medical Excellence to increase the number of practices that receive technical assistance under the Doctor's Office Quality-Information Technology project and to expand this assistance to include pediatric offices;[i] and

g In certain communities, a provider's patient panel may not generate the revenues necessary to support a practice. Some of these providers may be able to maintain a financially viable practice if they can reduce overhead costs. The NC IOM Primary Care and Specialty Supply Steering Committee heard presentations from North Carolina physicians who operate low-overhead practices by increasing their use of technology EHRs.

h One study of 14 solo or small-group primary care practices reported that the initial costs of implementing an EHR averaged $44,000 per full-time equivalent provider, with ongoing costs of approximately $8,500/year. Practices generally were able to recoup their start-up and ongoing costs within two and one half years. Miller RH, West C, Brown TM, Sim I, Ganchoff C. The value of EHRs in solo or small-group practices. *Health Aff*. September/October 2005;24(5):1127-1137.

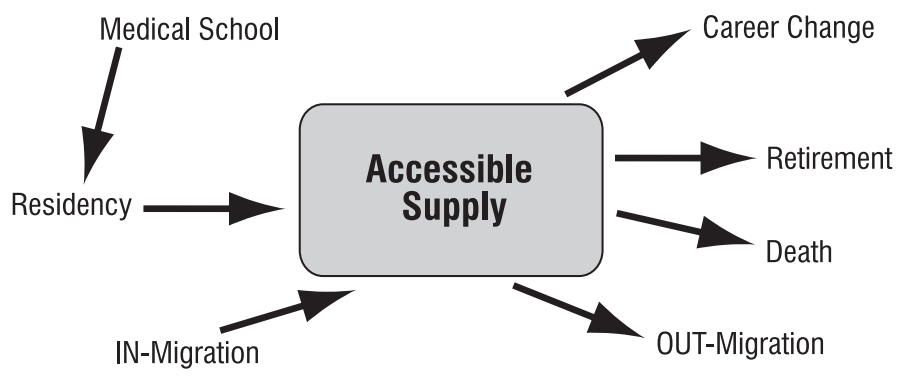
i The Carolinas Center for Medical Excellence estimates it would cost approximately $2.5 to $3 million to extend DOQ-IT technical assistance to between 100-125 non-Medicare practices.

b) **$4.8 million to the NC Medical Society Foundation to provide grants to small or solo practitioners to purchase health information technologies to improve quality performance and practice efficiencies.**[9]

Increasing Provider Supply

To increase the supply of providers practicing in North Carolina, the state must either increase the number of providers entering practice, decrease attrition, or both. (See Figure 2.1.) There are short-term and long-term strategies to address the provider workforce shortage. Over the short term, the state can put more effort into recruiting providers from other states to practice in North Carolina. North Carolina is a net importer of physicians. Most of the physicians practicing in North Carolina completed their undergraduate medical education and residency training out of state. However, most other states also will be in the midst of a physician shortage.[j,10] Thus, there will be increased competition for the limited number of physicians. Over the long term, there is a need to educate and train more physicians by increasing undergraduate medical education and residency positions. More PAs, NPs, and CNMs also need to be trained. Most practicing NPs and PAs in North Carolina were trained in state. Additionally, North Carolina can improve the

Figure 2.1
Factors in the Supply



practice environment by reducing the number of North Carolina-trained providers who leave the state, retire, or change professions. North Carolina also can make it easier for practitioners who have temporarily left the profession to reenter the workforce.

There are two primary ways to address supply issues related to the impending primary care and specialty provider shortage in North Carolina:

1) North Carolina can produce more practitioners who set up practice in state by increasing the number of medical students, NPs, PAs, CNMs, and/or physicians who complete their postgraduate training in state.

j The following states have issued reports highlighting physician workforce shortages: Texas (2002), California (2004), Mississippi (2004), Wisconsin (2004), Arizona (2005), Georgia (2005), Kentucky (2005), Massachusetts (2005), Michigan (2005), and Oregon (2005).

2) North Carolina can improve the practice environment to encourage more practitioners to move to North Carolina and to reduce the number of practitioners who leave practice in this state.

Both of these options are discussed more fully below.

Increasing production of providers practicing in North Carolina:
In order to practice medicine, physicians must attend an accredited allopathic[k] or osteopathic[l] medical school in the US or attend a foreign medical school and complete other licensure requirements.[m,n] In 2004, 81.7% of the physicians who entered practice in North Carolina graduated from allopathic schools, 8.7% were from osteopathic schools, and 9.6% were international medical graduates (IMGs).[o]

The growth in medical education in the US over the last 20 years has not kept pace with the growth in the overall population. Between 1982 and 2001, the US population increased 23%, but US medical school enrollment grew only 7%.[11] Medical student enrollment per 100,000 population actually decreased 13% during that same time period. Graduates from allopathic schools have stayed relatively constant over the last 25 years (approximately 15,700/year), but graduates from osteopathic schools have increased by more than 200% during the same time period. The number of students trained in international medical schools also has increased substantially.[p]

The growth in medical education in the US over the last 20 years has not kept pace with the growth in the overall population.

Despite the growth in osteopathic graduates and US-IMGs, the overall rate of growth in physician supply is not keeping pace with the growth in overall population or increased demand for services. The Association of American Medical Colleges (AAMC) recently recommended US medical schools increase the number of undergraduate medical students they enroll by 30% in order to meet the need for physicians in the future.[12] While there is a growing recognition of the need to

---

k Allopathic schools are accredited through the Liaison Committee on Medical Education (LCME).

l Osteopathic schools are accredited through the American Osteopathic Association (AOA). Information on the American Osteopathic Association (AOA) is available at: http://www.osteopathic.org/. Accessed April 3, 2006.

m There is not a standard accreditation process for foreign medical schools.

n All medical students are required to take three licensure exams, one after the second year of medical school, another during the fourth year, and the last during postgraduate education (typically at residency). Allopathic students trained in the US take their United States Medical Licensure Exam (USMLE) through the National Board of Medical Examiners. Osteopathic students take their Comprehensive Osteopathic Licensure Examination through the National Board of Osteopathic Medical Examiners, although osteopaths wishing to pursue postgraduate medical education through an allopathic residency placement must take their exam through the USMLE. Internationally-trained medical graduates (IMGs) take their first two exams through the Educational Commission for Foreign Medical Graduates. In addition to successfully passing the licensure exams, physicians also must complete at least one year of postgraduate education (internship or residency).

o In 2004, 64% of the medical students who entered US residency programs graduated from allopathic schools, 11% were from osteopathic schools, and 25% were international medical graduates (of whom 5% were US citizens trained in international schools, US-IMGs).

p There also has been a large increase in the number of medical students educated overseas. Between 1977 and 2004, there was a significant increase in the number of medical schools established in the Caribbean (from 1 in 1977 to 21 in 2004). US citizens educated overseas are eligible to be matched into US residency programs, but non-US citizens must first obtain a visa to enter the country in order to complete a residency in the US. In 2004, 22.6% of Educational Commission for Foreign Medical Graduates (ECFMG) Certificates were issued to US-born international medical graduates (US-IMGs) (1,360 out of 6,004). From 1980 to 2004, 13.9% of ECFMG certificates were issued to US-IMGs. Boulet JR, Norcini JJ, Whelan GP, Hallock JA, Seeling SS. The international medical graduate pipeline: Recent trends in certification and residency training. *Health Aff.* Web Exclusive. 2006;25(2):469-477. In 2004-2005, 7.5% of all residents in primary care programs were US-IMGs (3,358 of 44,668). Of all IMG primary care residents, 22.0% were US-IMGs (3,358 of 15,225). Brotherton SE, Rockey PH, Etzel SI. US graduate medical education, 2004-2005, trends in primary care specialties. JAMA 2005;294(9):1075-1082. Table 2.

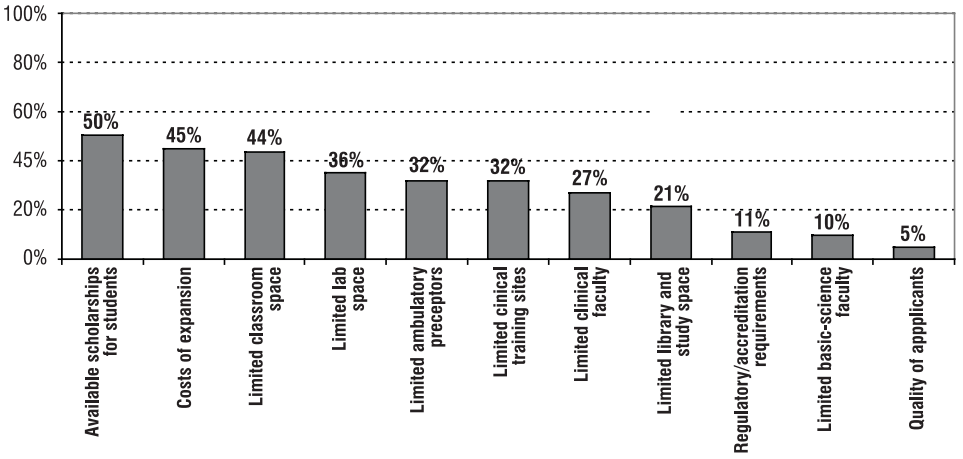
increase enrollment in medical schools, there are several barriers to expansion including financial support for students, costs of expansion, need for additional classroom and laboratory space, and need for additional faculty and preceptors. (See Chart 2.2.)[q]

North Carolina has four medical schools. They are located at Duke University, East Carolina University (ECU), University of North Carolina at Chapel Hill (UNC-CH), and Wake Forest University (WFU). The four schools graduate approximately 440 students per year. The number of students trained in North Carolina medical schools has not changed significantly since 1977 when the Brody School of Medicine at ECU began enrolling students. North Carolina does not have a school of osteopathy.

Even if all 440 of the medical students trained in North Carolina ended up practicing in state, there would still be a need to import physicians trained elsewhere just to replace the physicians who leave the profession.

North Carolina schools do not produce enough graduates each year to meet the state's need for additional physicians. Most physicians actively practicing in North Carolina received their undergraduate medical education out of state. A little more than one quarter (26.9%) of North Carolina physicians graduated from a North Carolina medical school. More than three fifths (62.4%) went to other US or Canadian medical schools, and 10.7% were international medical graduates. Between 2001 and 2004, approximately 1,240 physicians left practice each year due to death, retirement, changed professions, or other reasons. Thus, even if all 440 of the medical students trained in North Carolina ended up practicing in state,

Chart 2.2
Barriers to Enrollment Expansion:
Percentage of Schools Identifying Barriers as "Major" or "Very Significant," 2005



Source: Association of American Medical Colleges Center for Workforce Studies. *Medical School Expansion Plans: Results of the AAMC 2005 Survey of US Medical Schools.* Washington, DC: AAMC; April 2006. Figure 14. Available at: http://www.aamc.org/workforce/enroll.pdf. Accessed September 9, 2006.

q Respondents from allopathic medical schools reported that larger increases in enrollment would make it potentially more difficult to find qualified students. For example, only about 14% of respondents from the allopathic medical schools thought there would be a problem finding qualified applicants if there were a 10% increase in enrollment (with 1% being very concerned), but 71% of the respondents thought it would be a problem with a 30% increase in enrollment (with 27% very concerned). Association of American Medical Colleges Center for Workforce Studies. *Medical School Expansion Plans: Results of the AAMC 2005 Survey of US Medical Schools.* April 2006. Figure 15. Available at: http://www.aamc.org/workforce/enroll.pdf#search='AAMC%20Medical%20School%20Expansion%20Plans'. Accessed September 9, 2006.

there would still be a need to import physicians trained elsewhere just to replace the physicians who leave the profession.

Over the last 40 years, approximately 40% of the students trained in North Carolina medical schools ended up practicing in state.[13] Those who complete their training in a publicly funded medical school are more likely to practice in state. This may be

Table 2.1
North Carolina Medical School Enrollment and Graduates Practicing in the State

School	2004-2005 Academic Year			
	Total Enrollment	New Entering Students	% New Students In-State	% Graduates Practicing in NC
Brody School of Medicine, East Carolina University	290	72	100%	59%
Duke University School of Medicine	467	101	20%	24%
University of North Carolina School of Medicine	649	160	85%	49%
Wake Forest University School of Medicine	427	108	40%	39%

Source: American Medical Association. *Medical schools in the United States. JAMA.* Medical Education Issue. September 7, 2005;294(9):1119-1127; NC Health Professions Data System. September 2006.

partially explained by the fact that publicly-financed medical schools (UNC-CH and ECU) are more likely to admit North Carolina students. North Carolina medical students originally from the state are more likely to practice in North Carolina.

The state should target medical school expansions to North Carolina students in order to have the greatest chance of increasing the number of physicians who ultimately set up practice in state. The two state medical schools that admit a higher proportion of North Carolina students also have a much higher proportion of students who choose to practice in North Carolina after finishing their residency programs (eg, retention rates).

Recommendation 2.4 (Priority Recommendation)

North Carolina medical schools should increase enrollment by 30% (AAMC recommendation). Expansion can be accomplished through an increase in enrollment on existing campuses[r] or through satellite campuses.[s] In expanding programs, medical schools should consider

r More than one half of medical schools around the country planning to increase enrollment plan to incorporate innovations in medical curriculum to accommodate expansion. These innovations include: patient simulations and IT-based self-directed/independent learning; use of interdisciplinary courses; community-based services/hands-on learning; and telemedicine, distance learning, and video-conferences. Association of American Medical Colleges Center for Workforce Studies. *Medical School Expansion Plans: Results of the AAMC 2005 Survey of US Medical Schools.* April 2006. Available at http://www.aamc.org/workforce/enroll.pdf#search=' AAMC%20Medical%20School%20Expansion%20Plans'. Accessed September 9, 2006.

s Satellite campuses often have basic science education for the first two years at the parent campus, with clinical education the last two years at the satellite location. In 2003, there were 20 medical schools with satellite campuses across the country. Mallon WT, Liu M, Jones RF, Whitcomb M. *Mini-Med: the Role of Regional Campuses in US Medical Education.* Washington, DC: Association of American Medical Colleges; 2003. Available online at: https://services.aamc.org/Publications/showfile.cfm?file=version47.pdf&prd_id=57&prv_id=161&pdf_id. Accessed September 9, 2006.

changing admissions criteria[t] or using other strategies to increase the overall supply of physicians practicing in the state, increase the number of physicians who set up practice in underserved areas, increase the number of physicians who specialize in shortage specialties, increase the number of underrepresented minority physicians practicing in the state, and enhance interdisciplinary team training.

Strategies to increase the number of underrepresented minorities in the profession are discussed more thoroughly in Chapter 5.

Recommendation 2.5

If current medical schools are unable to increase enrollment by 30%, the NC General Assembly should consider creation of a new public allopathic or osteopathic medical school or provide incentives to encourage development of a new private medical school. Specifically:

a) The NC General Assembly should appropriate funds to build a new state-supported allopathic or osteopathic medical school that will focus on increasing the supply of physicians who practice in North Carolina, particularly those willing to practice in medically underserved areas or in shortage specialties.[u,v] Special consideration should be given to creating a medical school that focuses on increasing the number of underrepresented minority physicians in the state, increasing the overall supply of physicians practicing in the state, increasing the number of physicians who set up practice in underserved areas, increasing the number of physicians who specialize in shortage specialties, and enhancing interdisciplinary team training.

b) Alternatively, as part of state efforts to increase economic development in communities across the state, the Department of Commerce should consider incentives to attract private osteopathic or allopathic medical schools into the state.

---

t For example, one option medical schools could explore is giving higher preference in the admission criteria to individuals who were raised in medically underserved areas and who express an interest in returning to those areas.

u The exact cost of building a new medical school is unknown. The costs would vary depending on potential enrollment, curriculum design and other factors. One state that recently (1999) developed estimates for a new medical school was Florida. Florida State University developed a proposal for a new medical school that would focus on training physicians to meet the primary healthcare needs of the state, particularly the needs of the elderly, rural populations, and other underserved citizens. They designed a school that would enroll 120 students per class and provide most of the third and fourth year clinical training using a community-based model with a special focus on rural health. Their cost estimates were $50 million for the new school and $39 million annually for operational costs (some of which would be offset by tuition). MGT of America, Inc. Plan for a Four-Year Allopathic School of Medicine at Florida State University. Submitted to: Florida State University. Tallahassee, FL: MGT Management, Inc; November 15, 1999. Available at: http://med.fsu.edu/pdf/10_four_year_allopathic.pdf. Accessed September 13, 2006.

v The cost of building a new osteopathic school would depend on different factors. For example, building a new osteopathic school from the ground up could cost approximately $100 million. Developing an osteopathic medical school within a college or university with existing infrastructure would cost less. The American Osteopathic Association is requiring at least $50 million be held in earnest before creating a new Osteopathic school. Personal communication with M Murphy, Associate Dean, Clinical Sciences, Pikeville College School of Osteopathic Medicine, Pikeville, KY. September 18, 2006.

Despite the fact there is no osteopathic medical school in North Carolina, the population of osteopathic physicians is growing rapidly. Osteopathic physicians remain only a small proportion of the overall physician population in North Carolina (3% in 2005), but their potential to practice could be increased by providing financial assistance to students choosing osteopathic medical schools in other states with an obligation to return for practice in North Carolina and by developing joint accredited American Osteopathic Association (AOA) residencies. (See Recommendation 2.10.)

Recommendation 2.6.

The NC General Assembly should appropriate funds to pay for allocated seats for North Carolina students admitted to osteopathic schools in other states (eg, Alabama or Kentucky model) with an obligation that students return to practice in North Carolina.[w]

Expanding the number of PAs, NPs, and CNMs also can help reduce demand for physicians. NPs and PAs can provide many—but not all—of the same healthcare services provided by physicians. Under North Carolina state laws, NPs and PAs must operate under supervision of a physician and can only provide the services authorized in a practice agreement with the supervisory physician.[x] Within certain limitations, NPs and PAs can diagnose and prescribe medications, tests, and treatments.[y] NPs and PAs often serve as primary care providers, helping to manage the health of patients. They can provide services directly in a physician's office, clinic, hospital, nursing home, or other healthcare facility. While the physician need not be present at the same location, he or she must have a policy to review periodically the NP's or PA's prescribed medicines, tests, and treatments. NPs and PAs also can serve in specialty areas of medicine, and their job responsibilities vary by specialty and supervising physician. CNMs typically provide a range of health services to women and newborns including prenatal, intrapartum, postpartum, newborn, and family planning services.

---

w For example, Kentucky provides a primary care scholarship that is the difference between in-state tuition and the tuition at Pikeville College School of Osteopathic Medicine. Students are required to pursue primary care residencies but must return to Kentucky and practice a year for each year the scholarship was received. If they choose not to do a primary care residency, they are required to pay the scholarship back at the normal loan rate. Kentucky has 200 students on the scholarship with 90% completing their obligation to practice primary care in Kentucky. The difference in tuition is currently $15,000 for each student, for a total of $3,000,000 dollars per year. M Murphy, Associate Dean, Clinical Sciences, Pikeville College School of Osteopathic Medicine, Pikeville, KY. September 18, 2006.

x Physicians work with PAs to establish a supervisory arrangement, a written statement that describes the medical acts, tasks, and functions delegated to the PA by the primary supervisory physician. NPs must have a collaborative practice agreement with a supervisory physician. A collaborative practice agreement is an agreement between a physician and NP that provides ongoing supervision, consultation, collaboration, referral and evaluation of care provided by the NP. The scope of services provided by a PA or NP must be consistent with their education, training, skill, and competence.

y PAs and NPs can perform medical acts under supervision of physicians [NCGS §90-18(c)(13)(PA) and NCGS §90-18(c)(14)(registered nurses)]. Both PAs and NPs can prescribe medicine, if they have been authorized by the NC Medical Board (and in the case of NPs, also authorized by the Board of Nursing), and if their supervising physicians provide written instructions about indications and counterindications for prescribing drugs and have a policy to periodically review the drugs prescribed [NCGS §90-18.1(a)(PA) and NCGS § 90-18.2(a) (NP)]. Similar rules apply when a PA or NP orders medications and tests and treatments in hospitals, clinics, nursing homes, and other facilities. [NCGS 90-18.1(d)(PA) and NCGS §90-18.2(d)(NP)].

Expanding the number of NPs and PAs is a less expensive option and yields more immediate results than increasing the number of physicians. Unlike medical schools, which typically require four years of training and three-year, postgraduate residency programs, NPs, PAs, and CNMs can complete their education and training within two to three years after completing their undergraduate degree. Upon graduation, NPs, PAs, and CNMs must pass national certification exams.[z] In North Carolina, there are currently seven NP schools,[aa] four PA schools,[bb] and one CNM program, which collectively graduate approximately the same number of practitioners as do medical schools.

One cost effective way to expand the array of primary care and specialty providers is to increase the supply of NPs, PAs, and CNMs. However, increasing the number of NPs who are trained in state may be particularly challenging as there is currently a severe shortage of nursing faculty needed to train NPs. Without addressing the underlying nursing faculty shortage, it will be difficult to significantly increase NP class size or begin new programs.[14]

Recommendation 2.7. (Priority Recommendation)

a) **North Carolina physician assistant (PA) programs should increase student enrollment by 30%. Expansion can be accomplished through an increase in enrollment on existing campuses or through satellite campuses. In expanding programs, PA schools should consider changing admissions criteria or using other strategies to increase the overall supply of PAs practicing in the state, increase the number of PAs who set up practice in underserved areas, increase the number of PAs who specialize in shortage specialties (including but not limited to geriatrics and behavioral health), increase the number of underrepresented minority PAs practicing in the state, and enhance interdisciplinary team training.**

b) **North Carolina nurse practitioner (NP) schools should increase student enrollment by 30%. In expanding programs, NP schools should consider changing admissions criteria or using other strategies to increase the overall supply of NPs practicing in the state, increase the number of NPs who set up practice in underserved areas, increase the number of NPs who specialize in shortage**

---

z In addition to passing the national exam, PAs must maintain certification by taking 100 hours of CME every two years and passing a recertification exam every six years.

aa There are seven NP programs in North Carolina: Duke University, East Carolina University, University of North Carolina at Chapel Hill, University of North Carolina at Charlotte, University of North Carolina at Greensboro, University of North Carolina at Wilmington, Winston-Salem State University, and Western Carolina University. Each year these programs graduate approximately 240 new NPs (2005-06 data) most of whom stay in North Carolina.

bb There are four PA programs in North Carolina: Duke University (45-49 graduates/year; 39% in primary care; 44% remain in North Carolina); Wake Forest University (44-48 graduates/year; 38% in primary care; 67% remain in North Carolina); East Carolina University (24-45 graduates/year; 40% in primary care; 88% remain in North Carolina) and Methodist College (25-30 graduates/year; 51% in primary care; 86% remain in North Carolina). Strand J. Chief, PA Division, Duke University Medical Center. Presented at: Primary Care and Specialty Supply Task Force Steering Committee Meeting, North Carolina Institute of Medicine; February 13, 2006; Cary, NC.

specialties (including but not limited to geriatrics and behavioral health), increase the number of underrepresented minority NPs practicing in the state, and enhance interdisciplinary team training.

c) The Nurse Midwifery program at East Carolina University should increase student enrollment by 30%.[cc]

The NC General Assembly should tie future financial incentives to existing medical schools and other health professions schools that increase production of healthcare providers who set up practice in North Carolina and that address the state's pressing workforce needs, including, but not limited to: maldistribution issues, underrepresentation among certain minority populations, and supply of specific provider specialty areas.

Recommendation 2.8. (Priority Recommendation)

a) The NC General Assembly should provide financial support to encourage or reward medical schools and other health professions schools that produce physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs) who fill the unmet health needs of the state's population. Incentives should be provided to increase the overall supply of healthcare providers, appropriately distribute physicians, NPs, PAs, and CNMs practicing in the state, and promote interdisciplinary training. Enhanced funding should be tied to outcomes that result in:

   1) increased numbers of physicians, NPs, PAs, and CNMs who set up and maintain practices in underserved areas;

   2) increased numbers of physicians, NPs, PAs, and CNMs who obtain qualifications for and practice in primary care or other shortage specialties as identified by the Health Workforce Policy Board;

   3) increased numbers of practicing physicians, NPs, PAs, and CNMs who are members of underrepresented minorities; or

   4) greater interdisciplinary didactic and clinical team training among physicians, NPs, PAs, CNMs, nurses, and other health professionals (eg, pharmacists, social workers, allied health workers).[dd]

b) In order to determine the effectiveness of various training programs in meeting the healthcare workforce needs of North Carolina, the NC

cc The East Carolina University Nurse Midwifery School estimates it would cost $206,000 annually to increase enrollment by 30%. The program currently enrolls and trains 6-12 students a year from across the state via internet and other distance learning techniques.

dd Section 754 of Title VII of the Public Health Service Act provides federal funding to demonstrate and evaluate innovative interdisciplinary methods and models designed to provide access to cost-effective comprehensive healthcare. The Quentin N. Burdick Rural Program for Interdisciplinary Training program lost federal funding in FFY 2007; however, similar programs should be encouraged through state funding.

General Assembly should amend NCGS §143-613 to require medical schools, PA programs, NP programs, and CNM programs to report information on an annual basis to the Health Workforce Policy Board, the Board of Governors of the University of North Carolina, and the NC General Assembly. Medical schools and NP, PA, and CNM programs shall cooperate with the Health Workforce Policy Board to identify on an annual basis the following data and information:

1) **number and location of graduates in active patient care practice and number of graduates no longer in active patient care practice by year of graduation;**
2) **percentage of graduates who enter residencies in primary care specialties or other specialties that are deemed as shortage areas in North Carolina as defined by the Health Workforce Policy Board;**
3) **percentage of graduates who practice in federally-designated health professional shortage areas in North Carolina and in areas specified as shortage areas by the Health Workforce Policy Board;**
4) **number and percentage of underrepresented minorities who are enrolled in and who graduate from these schools and programs and where they practice; and**
5) **number of graduates who have been involved in formalized interdisciplinary didactic or clinical training programs that involve students from multiple disciplines working together as teams in patient care.**

Residency programs in North Carolina that qualify physicians in family medicine, general pediatrics, general internal medicine, and primary care obstetrics and gynecology shall cooperate with the Health Workforce Policy Board to identify on an annual basis the practice status and location of physicians completing those programs.

One precondition to expansion or creation of a new medical school or PA, NP, or CNM program is that the program has the capacity to provide needed clinical training. In the past, there have been attempts to move clinical rotations out of academic health centers and hospitals and into communities, particularly underserved communities, in an effort to enhance clinical training and to encourage providers to set up practice in those locations. However, developing community clinical training sites is challenging. Students need places to live during their temporary assignment to new communities. In addition, the time it takes for a community practitioner to serve as a preceptor reduces the time that practitioner can spend treating patients (thereby lowering revenues). AHEC currently helps support clinical rotations for health professions students; however, resources available to support additional clinical rotations are limited and need to be expanded. (See Recommendation 2.9.)

Increasing number of physicians who complete their residency in North Carolina: After graduating from medical school and successfully passing licensure exams, physicians must complete at least one year of postgraduate training (internship or residency).[ee] Foreign-trained medical students generally have longer postgraduate education requirements before beginning practice. Specialists have longer residency programs and also must take specialty board examinations offered by the American Board of Medical Specialties.

Most residency placements run between three and seven years, depending on the specialty.[ff] Physicians who complete their residencies in North Carolina are even more likely to remain in state than those who go to North Carolina medical schools. Over the last forty years, almost one-half (49%) of physicians who completed their residencies in North Carolina remained in the state to practice. More than two-thirds (67%) of physicians who completed their residencies at AHEC family practice residencies remained in state.

Over the last forty years, almost one-half of physicians who completed their residencies in North Carolina remained in the state to practice.

In 2004, there were 2,648 residents in 12 postgraduate programs across the state. (See Table 2.2.) Of these 2,648 residents, 16% were in internal medicine, 10% in

Table 2.2
Number of Residents by Location, 2004

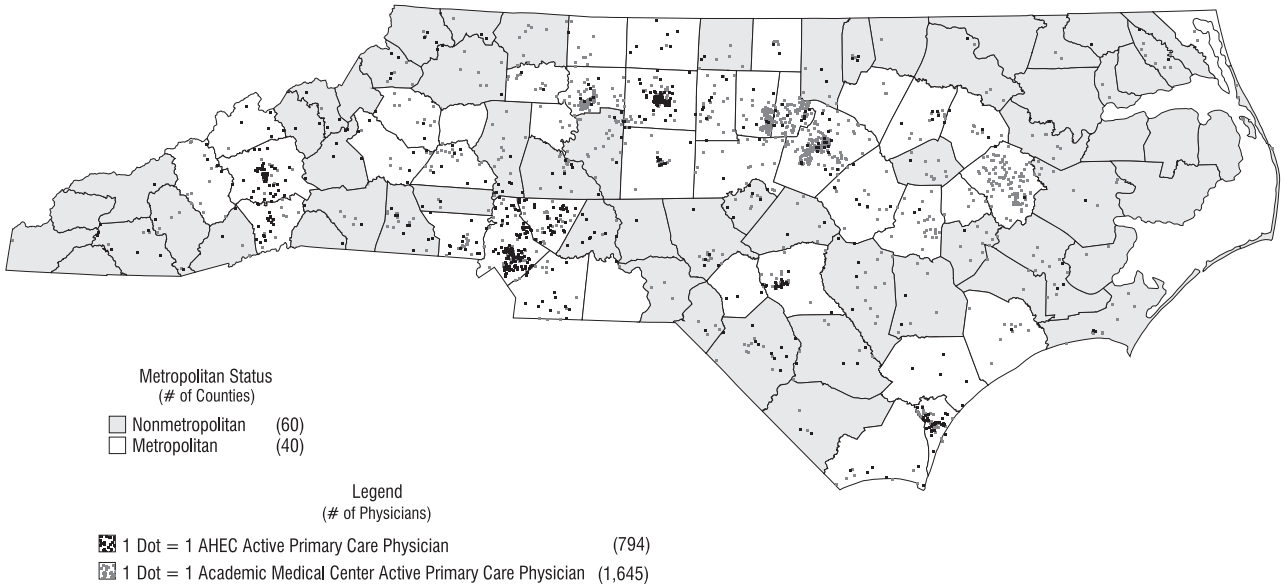
Location	Number of Residents
Duke University Medical Center	880
UNC/UNC Hospitals	648
Wake Forest/Baptist	583
East Carolina University/Pitt County Memorial Hospital	318
Charlotte/Carolinas Medical Center	200
Coastal AHEC/New Hanover Regional	61
Greensboro AHEC/Moses Cone	47
Mountain AHEC/Mission Hospitals	46
Cabarrus/Northeast Medical Center	23
Southern Regional AHEC/Cape Fear Valley	17
Monroe	6
Hendersonville	6
Total	**2,648**

Source: NC Health Professions 2004 Data Book.

ee Each state has its own rules for licensure and practice. In North Carolina, applicants who attend US medical schools must graduate from an accredited medical school, pass the US Medical Licensure Examinations or its equivalent, and complete at least one year of graduate training. If the applicant graduates from a foreign medical school, that individual must be individually certified by the Educational Commission for Foreign Medical Graduates and complete at least three years of postgraduate residency training. NC Medical Board. Available at: http://www.ncmedboard.org/. Accessed April 3, 2006.

ff Postgraduate education is accredited through the Accreditation Council for Graduate Medical Education (ACGME). ACGME includes 27 specialty Resident Review Committees (RRCs) that set standards for residency programs for 199 specialties and subspecialties. Nationally, these programs train approximately 100,000 residents annually. Accreditation Council for Graduate Medical Education. *History and Organization of the Accreditation Council for Graduate Medical Education*. Available at: http://www.acgme.org/acWebsite/25_anniv/25_history.asp. Accessed April 3, 2006.

Map 2.1*
Distribution of Active Primary Care Physicians Who Graduated from a North Carolina Residency Program AHEC and Academic Medical Center Program, North Carolina, 2003



Data are for active, in-state, non-federal, non-resident-in-training physicians indicating primary care specialties of FP, GP, IM, Ob/Gyn or Pediatrics, who were licensed as of October 2003 with residency graduation dates from 1972 and later. Internship data were used if residency data were missing.

Source: NC Health Professions Data System with data derived from the North Carolina Medical Board, 2005; NC Area Health Education Centers Program, 2003; US Census Bureau, 2004.

Core Based Statistical Areas are current as of the December 2003 update. Nonmetropolitan counties include micropolitan and counties outside of CBSAs.

* Color versions of all maps are available at http://www.nciom.org/projects/supply/primary_specialty.html.

family practice, 7% in pediatrics, 6% in OB/GYN, 7% in general surgery, and 47% in other specialty areas (eg, anesthesiology, dermatology, emergency medicine, pathology, surgical specialties, neurology, radiology).[15] North Carolina has a slightly lower than average number of residency spots: 3.1 per 10,000 population compared to 3.4 nationally.

Generally, North Carolina has been able to fill more than 90% of its approximately 630 first-year residency positions over the last ten years; however, the exact percentage of filled positions varies by specialty and location. Family practice has a 72% match rate[gg] whereas general surgery has a 100% match rate.[hh] Most physicians set up practice within 90 miles of where they completed their residency.[16]

gg Family medicine programs across the country are having difficulty filling their residency positions.

hh General surgery is different from preliminary surgery residencies, the latter of which has a 65.7% match rate. Preliminary surgery residents often are not counted in a longitudinal track of residents in general surgery since many subspecialize. Preliminary surgery residency positions (like those of preliminary medicine) are one-year positions tailored to residents who know they want to subspecialize. Residents spend one year in these positions and then move on to other programs elsewhere. As a result, residents are not usually counted in a longitudinal track of residents in that particular specialty because most are headed into a subspecialty area. Preliminary medicine residents are frequently headed to programs in radiology, anesthesiology, or other hospital-based residencies.

As with medical education, North Carolina has more physicians who completed their postgraduate medical education out of state than in state. (See Appendix A.) In 2005 approximately two-thirds (64.7%) of all physicians actively practicing in North Carolina completed their postgraduate education in other states or Canada (2003). One-third (35.3%) of the physicians practicing in state completed their postgraduate education in state. North Carolina does not currently offer enough postgraduate training programs to meet the need for new physicians.

One way to expand the number of physicians who practice in North Carolina is to expand the number of postgraduate education residency spots, since about one-half of all physicians who complete residencies in North Carolina stay in state-to-practice. Residency programs are underwritten through Medicare and Medicaid graduate medical education funds paid to teaching hospitals, clinical income, state funds, grants, and other sources. Estimates for residency training range from $250,000-$400,000 in gross costs per resident. Depending on the residency program, one-half to one-third of these costs can be covered through clinical revenues generated by faculty and residents (eg, surgical or specialty residency programs can generate more clinical revenues than family medicine).

North Carolina does not currently offer enough postgraduate training programs to meet the need for new physicians.

It also is important to track the impact of hospitalists in recruitment and retention of physicians in underserved areas (discussed more fully in Chapter 3). If increased use of hospitalists leads to higher provider retention in underserved areas or greater productivity in primary care settings, then the state should consider the feasibility of creating special tracks for hospitalists within internal medicine residencies and other primary care programs.

The state can increase the number of residency positions, although new Medicare graduate medical education (GME) funds are not available to help support this expansion.[ii] In 1974, the NC General Assembly appropriated $4.5 million to provide stipends of $15,000 per resident to help pay for primary care residency training.[jj] The goal was to expand the number of primary care residency positions. Since 1974, 730 new primary care residency positions have been established, but state funds have grown only to a level capable of supporting 324 positions for a current total of $4.86 million. Efforts also have been made over the years to increase the amount of the stipend, but it remains at the $15,000 level established in 1974.

The NC General Assembly should increase the funding for residency programs either through a direct appropriation or through an increase in Medicaid GME funds.[17] The annual cost of training a resident is approximately $100,000, which

ii The Balanced Budget Act of 1997 capped Medicare GME funds, limiting the number of slots that it would support. In 2005, the US Centers for Medicare and Medicaid Services (CMS) reallocated Medicare GME funded slots from training programs that were unable to fill all of their allocated slots to other programs. North Carolina received the second largest increase in Medicare GME funded slots (6.55%) as a result of this reallocation process. Nevertheless, all of these reallocated Medicare slots simply covered existing unfunded positions and did not result in a growth in residency positions.

jj Residencies in family practice, pediatrics, internal medicine, OB-GYN, and med-peds qualify as primary care residencies eligible for the state-supported stipend.

covers the resident's salary and benefits and pays for a small portion of faculty members' salaries and related costs.[kk]

North Carolina paid $75.7 million in Medicaid GME funds to support graduate medical education.[ll] This amount could be increased and targeted to produce types of physicians or other graduate health professionals needed to meet the state's future healthcare needs. North Carolina currently pays GME funds as part of the hospital's per diem rate. Funding is limited to support graduate *medical* education. However, 12 states also provide GME funding for graduate nursing education, and 13 states use GME funds to support graduate training of other health professionals.[mm] Eleven states specifically link Medicaid GME payments to achieve certain state policy goals such as training in certain shortage specialties (eg, primary care), training in certain settings (eg, rural or medically underserved communities), or increasing the supply of health professionals serving Medicaid beneficiaries.

Recommendation 2.9. (Priority Recommendation)

The NC General Assembly should appropriate $13 million in new funding and/or Medicaid GME funding to the NC Area Health Education Centers (AHEC) Program to support additional and expanded clinical rotations for health science students and expansion of primary care or other residency programs that meet specialty shortages.

a) $3 million should be provided to develop new clinical training sites for students; to pay stipends to community preceptors who supervise and teach primary care students; and to provide housing, library, and other logistical support for students in community settings. Enhanced payments should be made to preceptors who practice in health professional shortage areas.

b) $10 million should be provided to fund 100 new residency positions across the state targeted toward the high priority specialty areas of primary care, general surgery, and psychiatry or targeted toward other specialty shortage areas identified by the Health Workforce Policy Board. This funding should be provided to AHEC, with AHEC then making grants to AHEC- and university-based residency programs that agree to expand residency slots and to create programs designed to graduate physicians likely to settle in rural and other underserved areas of the state.

In addition to creating new residency positions, the state could more easily attract osteopathic doctors into North Carolina residency programs if North Carolina residency programs were accredited by both the Accreditation Council for Graduate Medical Education (ACGME), necessary for allopathic residencies, and the American

kk The state could support 100 new positions with an additional $10 million in funding. The number of new positions could be increased further if hospitals helped match some of the residency costs.

ll The North Carolina Division of Medical Assistance provides funding to reimburse for the costs of both direct graduate medical education and indirect medical education in hospitals and other settings. GME payments are included as part of the hospital's per diem rate.

mm For example, Minnesota uses its GME funding to support dental students and residents, doctors of pharmacy students and residents, PAs, and chiropractic students.

Osteopathic Association (AOA), necessary for osteopathic residencies. There are only two residency programs in North Carolina that have dual accreditation: Wilmington and Fayetteville. Osteopathic students can do their residencies in an ACGME accredited residency program, but they may not be able to continue some of the skills they learned in their undergraduate medical school (eg, manipulation).[nn] Many osteopathic students would prefer to do their residencies in jointly accredited residency programs so it is easier for them to take both sets of board examinations.[oo] By offering more jointly accredited programs, North Carolina may be able to attract more osteopathic trained medical students into North Carolina residency programs.

Recommendation 2.10.

NC residency programs should consider seeking joint accreditation by the American Osteopathic Association along with existing accreditation by the Accreditation Council for Graduate Medical Education.

Improving the practice environment to encourage more physicians to move to North Carolina and to keep existing North Carolina physicians in practice in the state: Other strategies to increase the number of providers in North Carolina include increasing the number of providers recruited to practice in North Carolina from out of state, decreasing attrition from the practice, or encouraging providers who left the practice to reenter the practice. North Carolina is a net importer of physicians: most North Carolina physicians either attended medical schools or completed their residencies out of state. Historically, the state has been able to attract physicians to relocate to North Carolina to set up practice; however, that may become more difficult in the future as more states actively recruit physicians to address their provider shortages.

Historically, the state has been able to attract physicians to relocate to North Carolina to set up practice; however, that may become more difficult in the future as more states actively recruit physicians to address their provider shortages.

One strategy is to encourage retired providers or those on inactive status to reenter practice. Between 2003 and 2004, 193 physicians who had retired or become inactive reentered the practice.[pp] Improving the practice environment for physicians may lead to less out-migration or fewer providers leaving the profession. Physician salary, the complexity of the healthcare system, the malpractice environment, hours of practice, and community factors all affect provider satisfaction and the desire to remain in the profession and/or practice location. Changing some of these underlying conditions could also increase the overall supply of physicians in the state. Similar strategies could be employed for nonphysician clinicians.

---

nn Many of the ACGME primary care residency programs in North Carolina are trying to accommodate the interests of the osteopathic residents by offering short courses that focus on skills taught in osteopathic schools such as manipulation.

oo The American Osteopathy Association conducted a survey of graduates of osteopathy medical schools. More than 80% of DO graduates indicated that they would prefer to attend a jointly accredited AOA/ACGME residency program. Murphy M. Presented at: Primary Care and Specialty Supply Task Force Steering Committee Meeting, North Carolina Institute of Medicine; February 13, 2006; Cary, NC.

pp 138 of these physicians were inactive in 2003 and became active in 2004; 48 moved from retired status to active status; 52 physicians did not have business hours or an active practice listed in 2003 but listed one in 2004. (Note: there is overlap between some of these categories).

Physician salaries:
The average salary of North Carolina physicians is higher than the national average and generally ranks in the top 20 states.[qq] According to the 2006 Geographic Practice Cost Indices (GPCI), used to determine variations in costs for physician services for Medicare based on geographic location, North Carolina physicians' practice expenses (including office staff, renting office space, and supplies and equipment) were 8% below the national average.[18]

North Carolina's malpractice environment can affect a physician's willingness to set up practice:
One commonly cited factor contributing to a potential decline in the provider supply is the medical malpractice environment. Practitioners are concerned that supply is inhibited by high malpractice insurance premiums and/or especially litigious environments that discourage training in certain specialties (eg, OB/GYN), encourage relocation to other states with more provider-friendly medical liability environments, hasten retirement and/or transition to other professions, and lead to the cessation of specific medical services (eg, delivering babies).

The American Medical Association (AMA) lists North Carolina as one of the states "in crisis" with respect to medical malpractice liability, although it does not provide data on how this determination was made.[rr] Other evidence suggests that North Carolina does not have a more adverse malpractice environment than other states. For example, information from the National Practitioner Data Bank shows that North Carolina has average per capita malpractice awards and settlements.[ss] Further, the Medicare Geographic Practice Cost Indices (GPCI) noted that professional liability insurance for North Carolina physicians was 36% lower than the national average.[18] It should be noted, however, the "average" malpractice environment in North Carolina may be more positive than that experienced by specific providers practicing in certain specialties, located in certain geographic areas, or covered by certain carriers. In other words, certain subsets of providers may face more acute malpractice pressures than the above "average" data suggest. While evidence on the underlying malpractice environment is mixed, the perception that North Carolina has a worse malpractice environment than other states could potentially discourage practitioners from moving to this state to practice and may accelerate other practitioners to leave practice.[tt] The Task Force was not able to fully consider

---

qq Family practice physicians in North Carolina average $145,875 annually, compared to $138,235 nationally. North Carolina internists earn, on average, $165,045 annually compared to $157,495 nationally. Similarly, OB/GYNs earn $180,995 in North Carolina compared to $175,380 nationally. Occupational Employment Statistics, Bureau of Labor Statistics, US Department of Labor. May 2004 and November 2004 values averaged.

rr According to the AMA, "In crisis states, patients continue to lose access to care. In some states, obstetricians and rural family physicians no longer deliver babies. Meanwhile, high-risk specialists no longer provide trauma care or perform complicated surgical procedures." Available at: http://www.ama-assn.org/ ama/noindex/category/ 11871.html. Accessed December 2006.

ss For example, the average per capita award in 2002-2003 in North Carolina was $9.39 compared to $7.92 (TN), $8.68 (VA), $9.87 (SC), $13.45 (GA), and $12 (US). National Practitioner Data Bank Public Use Data File, Practitioner Data Banks Branch, Office of Workforce Analysis and Quality Assurance, Bureau of Health Professions, Health Resources and Services Administration, US Department of Health and Human Services. Accessed December 31, 2005.

tt Evidence on the extent to which medical malpractice affects provider supply is also mixed. US Government Accountability Office. Medical Malpractice: Implications of Rising Premiums on Access to Health Care. GAO-03-836 (August 2003).

all the different complexities of malpractice reform.[uu] However, until either the reality or the perception of the malpractice crisis is addressed, it will continue to be an issue that underlies some dissatisfaction with the practice environment.

North Carolina should mount an aggressive outreach and marketing campaign to extol the virtues of practicing in North Carolina. Salaries are comparable, but costs of practice are generally lower. Of the 89 geographic locations measured by the GPCI, only 29 locations had lower practice expenses and only 20 locations had lower liability insurance than North Carolina in 2006.[18]

Recommendation 2.11.

The NC Office of Rural Health and Community Care in collaboration with the Community Practitioner Program of the NC Medical Society, NC Area Health Education Centers Program, and professional medical societies should conduct marketing and outreach campaigns that emphasize positive aspects of healthcare practice in North Carolina.

The data listed above suggest that North Carolina currently offers physicians a positive work environment. North Carolina also provides a positive practice environment for PAs, NPs, and, to a slightly lesser extent, CNMs. In a national study of PAs, NPs, and CNMs, North Carolina was considered to have the most positive practice environment for PAs and the 10th most favorable practice environment for NPs, but only the 24th most favorable practice environment for CNMs.[19] Despite the overall positive work environment for physicians, NPs, PAs, and CNMs, North Carolina cannot afford to rest on past accomplishments. As health professional shortages become more acute across the country, other states are likely to increase their recruitment efforts as well as take steps to improve the regulatory and practice environment. North Carolina should remain vigilant in maintaining and improving the practice environment for physicians, NPs, PAs, and CNMs.

Recommendation 2.12.

The NC General Assembly should help maintain and improve the positive regulatory environment for all licensed health professionals including physicians, nurse practitioners, physician assistants, and certified nurse midwives.

Alterations to the regulatory environment should lead to:

a) more out-of-state licensed health professionals migrating to North Carolina;

b) fewer practicing licensed health professionals leaving North Carolina;

c) licensed health professionals retiring later in their careers;

---

uu When the NC Institute of Medicine studies an issue, it strives to have all relevant stakeholders participate in the study. The Task Force examining primary care and specialty supply was not properly constituted to fully study the issue of malpractice reform, as trial lawyers and other individuals representing patients injured by medical negligence were not part of this study.

d) more licensed health professionals treating underserved populations in underserved communities;

e) more licensed health professionals offering a full scope of services (within their scope of practice); and

f) greater quality and efficiency of healthcare offered to North Carolinians.

Possible options for the NC General Assembly to consider include, but are not limited to: ensuring adequate provider reimbursement, providing practice supports to help practitioners provide quality care in an increasingly complex healthcare environment, addressing rising malpractice costs, and addressing any other barriers that discourage physicians or other licensed health professionals from continuing to provide services in North Carolina.[vv]

Another strategy is to encourage retired physicians, NPs, PAs, or CNMs or those on inactive status to reenter practice. Between 2003-2004, 193 physicians who had retired or become inactive reentered practice.[ww] The North Carolina Medical Board currently has a process to validate the competence of physicians or PAs seeking licensure after two or more years out of active clinical practice.[20] Physicians and PAs who have applied for reentry have spent between 2-22 years out of practice. Applicants who are interested in resuming practice must develop reentry plans which the Board must approve. The reentry plan must include diagnostic, remedial education, and reassessment elements. However, it has been very difficult for applicants to develop appropriate reentry plans. Many applicants need to participate in a postgraduate training program or set up an alternative method of demonstrating clinical competence. However, there are limits on training slots available for mini-residency training. Reentry applicants also have difficulty obtaining liability coverage for the residency training or mentorship. Applicants who took a hiatus from practice directly out of a residency program face particular problems if they were never licensed.

The North Carolina Board of Nursing has a reentry process for NPs who have been inactive for five or more years.[xx] NPs who have been inactive for at least five years must complete a NP refresher course approved by the Board of Nursing. The refresher course must include didactic and clinical learning experiences and an evaluation of student competencies. The Midwifery Joint Committee does not have a similar process to validate the competence of CNMs who have been out of practice for any length of time. The American College of Nurse-Midwives (ACNM) developed a flexible, individualized pilot program for nurse midwives who would like to reenter practice, which includes continuing education and a clinical refresher depending on the length of time out of practice. Each nurse midwife is individually evaluated and a unique reentry plan is developed. The nurse midwife

vv The Task Force did not specifically address the issue of whether the NC General Assembly should remove the requirement for physician supervision from the practice acts governing PAs, NPs, or CNMs.

ww 138 of these physicians were inactive in 2003 and became active in 2004; 48 moved from retired status to active status; 52 physicians did not have business hours or an active practice listed in 2003, but listed one in 2004. (Note: there is overlap between some of these categories).

xx 21 NCAC 36.0808(d).

is responsible for identifying the site or clinical preceptor to assist with carrying out the plan.[21]

The North Carolina Medical Board should continue its efforts, in conjunction with other organizations, to facilitate reentry of PAs into practice. The Midwifery Joint Committee should develop its own rules to govern reentry of inactive CNMs into practice. Inactive practitioners from other states might be interested in moving to North Carolina if a streamlined process is created that facilitates reentry of competent practitioners into practice.

Recommendation 2.13.

The North Carolina Midwifery Joint Committee should follow licensure reentry procedures established by the American College of Nurse-Midwives to enable inactive practitioners otherwise in good standing to reenter practice.

The complexity of the healthcare billing system requires more highly trained practice managers to ensure that outstanding balances are collected. The managerial skill required to successfully operate a practice has increased rapidly over the past few decades. Most practices have patient populations with multiple insurers, requiring the practice to navigate a vast array of reimbursement forms and procedures to receive appropriate payment for services. Few residencies provide training on the business side of practice management, which discourages physicians from opening their own practices. In general, geographically underserved and rural areas are most dependent on solo practitioners; therefore, reluctance to open a solo practice affects the most at-risk communities. In addition, the rapidly changing business environment of medicine may disproportionately affect small practices that cannot afford to invest in staff training.

One key element in the success of a medical practice is a practice manager who has the skill set to manage the business side of the practice, such as ensuring appropriate reimbursement for medical services, whether from private payers, public programs, or individual patients. Practice managers increase the long-term financial viability of practices, especially in rural and underserved areas, and could increase provider supply in these at-risk communities.

Other organizations also can assist providers in understanding basic financial and clinical management systems needed to successfully manage a healthcare practice. Historically, the NC Office of Rural Health and Community Care (ORHCC) has worked with rural practices and federally qualified health centers to provide technical assistance to both new and current practices through improving billing and management systems, increasing financial performance, and maximizing the chance of long-term provider retention in the community. However, ORHCC funding is limited, and, as a result, their staff are able to reach only approximately 40 practices per year.

The NC Medical Society Foundation is developing a practice management program (PractEssentials) to provide technical assistance to physicians, NPs, and PAs who

receive support through the Community Practitioner Program.[yy] The goal of PractEssentials is to help providers in medically underserved areas develop and maintain financially viable practices.

Recommendation 2.14. (Priority Recommendation)

In order to improve practice management across the state:

a) The University of North Carolina system, NC community colleges, and NC independent colleges and universities should offer courses that will increase the supply of practice managers across the state, particularly in underserved areas, and improve the skills of existing practice managers.

b) The NC Area Health Education Centers Program, NC Office of Rural Health and Community Care, Community Practitioner Program, NC community colleges, and NC independent colleges and universities should develop a continuing education curriculum for existing practitioners and staff to enhance the business skills needed to maintain a viable practice.

c) North Carolina foundations should consider funding start-up programs to community colleges and other organizations to enhance the skills of practice managers and providers and programs targeted to underserved areas.

yy The Community Practitioner Program (CPP) provides financial assistance to physicians, PAs, and family NPs in return for healthcare service in an underserved community. It is run through the NC Medical Society Foundation. CPP funds help support approximately 50 providers per year. More information is available at: www.ncmsfoundation.org. Accessed April 28, 2006.

References

1. Smith C, Cowan C, Heffler S, Catlin A, and the National Health Accounts Team. National health spending in 2004: Recent slowdown led by prescription drug spending. *Health Aff.* January/February 2006;25(1):186-196.
2. Laurant M, Reeves D, Hermens R, Braspenning J, Grol R, Sibbald B. Substitution of doctors by nurses in primary care. In: Cochrane Database of Systemic Reviews 2004. (4)CD001271;pub2.
3. Phillips RL, Harper DC, Wakefield M, Green LA, Fryer GE. Can nurse practitioners and physicians beat parochialism into plowshares? *Health Aff.* September/October 2002;21(5):133-142.
4. Herrmann LL, Zabramski JM. Tandem practice model: A model for physician-nurse practitioner collaboration in a specialty practice, neurosurgery. *J Am Acad Nurse Pract.* June 2005;17(6)213-218.
5. Geriatrics Interdisciplinary Advisory Group. Interdisciplinary care for older adults with complex medical needs. *J Am Geriatr Soc.* May 2006;54(5):849-852.
6. Kornblatt S, Cheng S, Chan S. Best practice: The on lok model of geriatric interdisciplinary team care. *J Gerontol Soc Work.* 2002;40(1/2):15-22.
7. Gans D, Kralewski J, Hammons T, Dowd B. Medical groups' adoption of electronic health records and information systems. *Health Aff.* September/October 2005;24(5):1323-1333.
8. The Carolinas Center for Medical Excellence. *Doctor's Office Quality-Information Technology.* Cary, NC: The Carolinas Center for Medical Excellence. Available at: http://www.mrnc.org/doqit/. Accessed April 28, 2006.
9. Cost estimates from the North Carolina Medical Society Foundation. September 2006.
10. Michener JL. US plans to increase the medical workforce. Presented at: Primary Care and Specialty Supply Task Force Steering Committee Meeting, North Carolina Institute of Medicine; February 13, 2006; Cary, NC.
11. Council on Graduate Medical Education. *Physician Workforce Policy Guidelines for the United States, 2000-2020.* Sixteenth Report. January 2005.
12. Association of American Medical Colleges. *AAMC Statement on the Physician Workforce.* Washington, DC: Association of American Medical Colleges; June 2006. Available at: http://www.aamc.org/workforce/workforceposition.pdf. Accessed July 10, 2006.
13. Health Professions Data System. Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. Data from the NC Medical Board. July 2006.
14. *Task Force on the North Carolina Nursing Workforce Report.* May 2004. Durham, NC: North Carolina Institute of Medicine.
15. Bacon T. Presented at: Primary Care and Specialty Supply Task Force Steering Committee, North Carolina Institute of Medicine. March 8, 2006. Durham, NC.
16. Dorner F, Burr R, Tucker S. The geographic relationships between physicians' residency sites and the locations of their first practices. *Academic Medicine.* September 1991;66(9):540-544.
17. Henderson TM. *Direct and Indirect Graduate Medical Education Payments by State Medicaid Programs.* Washington, DC: Association of American Medical Colleges; November 2006.
18. Federal Register. Geographic practice cost indices by Medicare carrier and localities. 2006;70(223). Addendum D. Available at: http://www.cms.hhs.gov/physicianfeesched/downloads/pfs112105.pdf?agree=yes&next=Accept. Accessed May 31, 2006.
19. National Center for Health Workforce Analysis. *A Comparison of Changes in the Professional Practice of Nurse Practitioners, Physician Assistants, and Certified Nurse Midwives: 1992 and 2000.* Rockville, MD: Bureau of Health Professions, Health Resources and Services Administration. Available at: http://bhpr.hrsa.gov/healthworkforce/reports/scope/scope1-2.htm. Accessed September 15, 2006.
20. Minutes: North Carolina Reentry Summit Meeting, November 14, 2006. North Carolina Institute of Medicine.
21. QuickInfo: Reentry to Midwifery Practice. American College of Nurse-Midwives. Available at: http://www.midwife.org/siteFiles/education/Reentry_2.07.pdf. Accessed February 23, 2007.

Acute Provider Shortages in Certain Areas of North Carolina

Chapter 3

Some areas of North Carolina have an abundance of health professionals while others lack sufficient providers, forcing individuals to travel long distances for healthcare. Healthcare providers tend to congregate around academic health centers or around major hospitals in metropolitan areas.[a] However, while there may be an abundance of healthcare providers around these large hospitals, there also are many areas of the state where health professionals are in very short supply. Shortages typically exist in rural areas, but pockets of low provider supply also are found in some low-income areas of larger cities. This chapter focuses on how the state can address maldistribution of healthcare providers and refers to recommendations described in Chapter 2 that could ameliorate the maldistribution problem. In addition, this chapter includes other recommendations that focus specifically on addressing maldistribution issues. Chapter 4 focuses on shortages of specific specialties. In nearly all cases, deficiencies in supply of individual specialties are primarily of a *geographic* nature: a specialty is in sufficient supply but is poorly distributed. Solutions aimed at particular specialties also are addressed in Chapter 4.

Because healthcare providers tend to congregate around academic health centers or around major hospitals in metropolitan areas, there are many areas of the state where health professionals are in very short supply.

Overall, North Carolina has more than 17,800 physicians. The ratio of all physicians per 10,000 population reached 20.7 in 2005. This ratio is lower than the average of 22.77 per 10,000 for the US but is consistent with ratios for states that border North Carolina.[1] North Carolina has 7,660 primary care physicians or 8.8 primary care physicians per 10,000 population compared to a national average of 9.43. North Carolina is slightly ahead of neighboring states in primary care-to-population ratio.

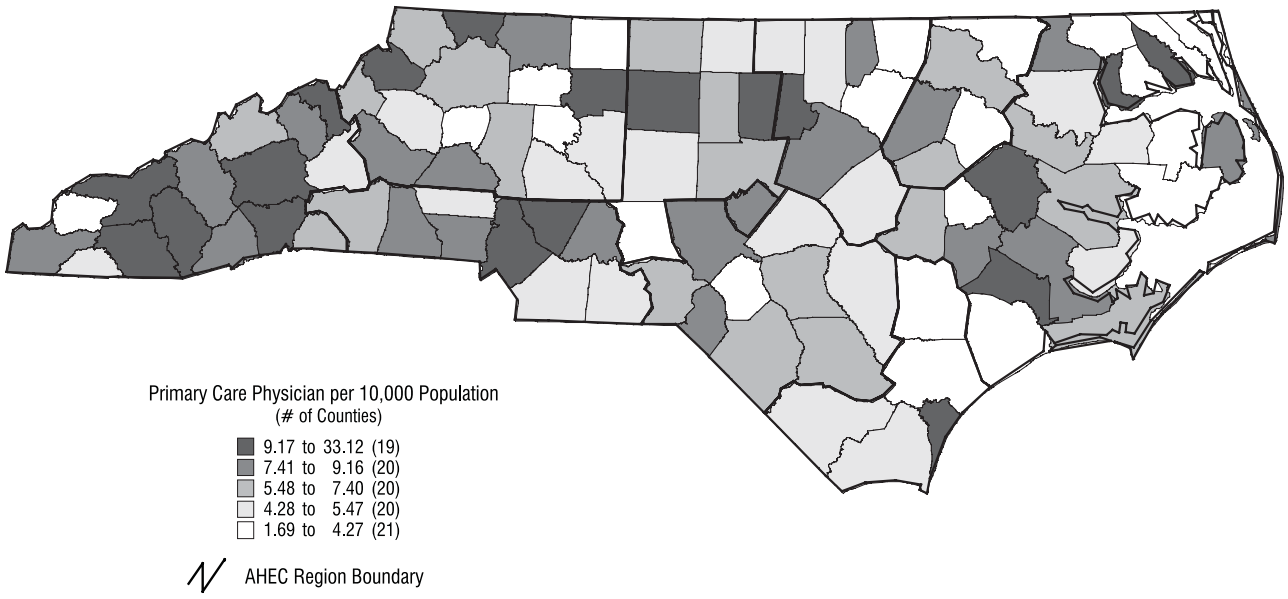
There is wide variation in the ratio of physicians to population in different areas of the state. Orange and Durham counties, home to the University of North Carolina Health Care System and Duke University Health System, respectively, had the highest primary care physician per population ratios in 2005 with 33.7 and 22.5 per 10,000 population. By contrast, Gates and Camden counties, neither of which have hospitals, had the lowest primary care physician per population ratios with 0.9 and 1.1 per 10,000 population. Eight of the 10 counties with the lowest ratios of primary care physicians per 10,000 population are located in eastern North Carolina.[b]

The Bureau of Health Professions in the US Department of Health and Human Services has designated certain communities, population groups, or medical facilities as Health Professional Shortage Areas (HPSAs). HPSA designations

a North Carolina has five academic medical centers: Brody School of Medicine at East Carolina University, Duke University School of Medicine, University of North Carolina at Chapel Hill School of Medicine, Wake Forest University School of Medicine, and Carolinas Medical Center in Charlotte. Each of these entities is a major healthcare center that employs and attracts a multitude of healthcare providers in the surrounding area. Similarly, there are other metropolitan areas across the state that are served by major hospitals and likewise have many healthcare providers.

b According to the 2005 NC Health Professions Data Book, the 10 counties with the smallest primary care physicians per 10,000 ratios were Gates, Camden, Warren, Perquimans, Currituck, Hyde, Hoke, Pender, Tyrrell, and Northampton. Hoke and Warren are the only counties located west of Interstate 95, traditionally considered the boundary of eastern North Carolina.

Map 3.1
Primary Care Physicians per 10,000 Population by County, North Carolina, 2004



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2004.

Primary Care Physicians include active or unknown activity status, in-state, non-federal, non-resident-in-training allopathic and osteopathic physicians indicating a primary specialty of Family Practice, General Practice, Internal Medicine, Ob/Gyn, or Pediatrics.

qualify communities as eligible for certain federal subsidies and interventions aimed at increasing health profession supply and access to care.[2] The federal government has separate HPSA definitions and designations to show shortages of primary care physicians, dentists, and mental health providers. For example, certain counties, or parts thereof, will be designated HPSAs if they have more than 3,500 people per primary care provider.[c] Population groups can be designated HPSAs if they have specific access barriers and there is a high ratio of people in that population group to practitioners serving the population.[d] Facility designations are limited to prisons or Community Health Centers.[e,3]

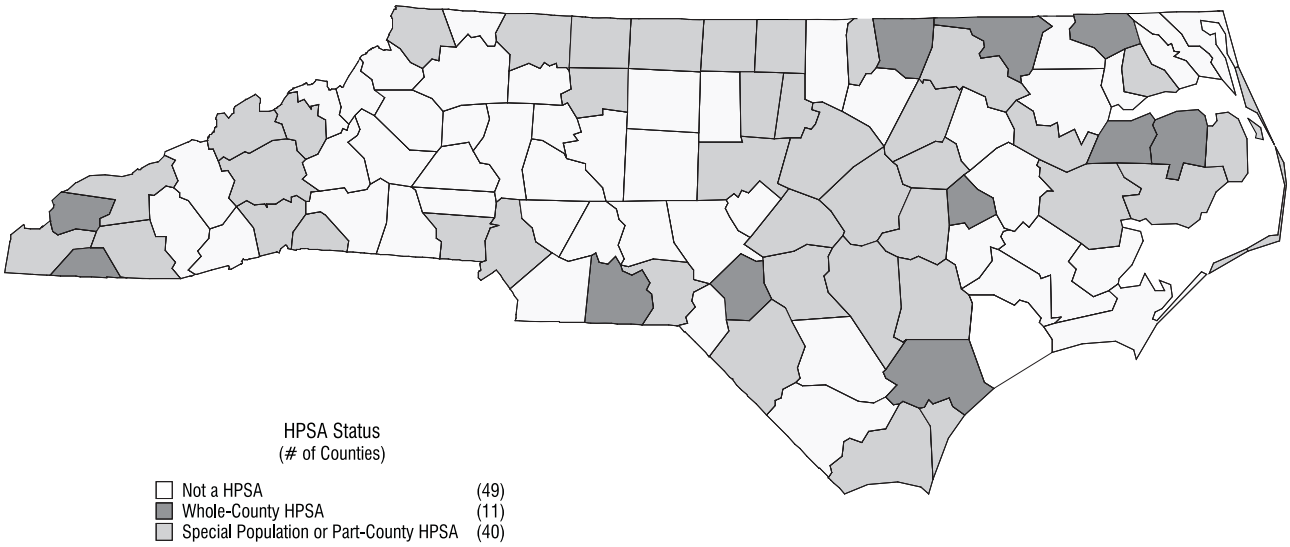
c Areas that are designated HPSAs must define and justify a rational service area for the delivery of health services (often a county), have a sufficiently low provider-to-population ratio, and show evidence that nearby resources are overutilized, too distant, or otherwise inaccessible. For primary care professionals, areas with more than 3,500 people per primary care provider can qualify as HPSAs, although the standard is lower for certain "high need" areas. An area is designated as "high need" if the area has more than 100 births per year per 1,000 women aged 15–44, has more than 20 infant deaths per 1,000 live births, or has more than 20% of the population (or of all households) with incomes below the poverty level.

d In North Carolina, most of the "population" HPSA designations are low-income populations; however, there also are some migrant farm worker (MFW) HPSAs in the state.

e Facility designations are for those facilities that serve an underserved area or population and have insufficient capacity to adequately serve the needs of that area or population. Bureau of Health Professions. *Health Professional Shortage Area Primary Medical Care Designation Criteria: Relevant Excerpts from 42 Code of Federal Regulations (CFR).* Criteria for designation of areas having shortages of primary medical care professionals. October 1, 1993;34-48. Washington, DC: US Department of Health and Human Services. Chapter 1, Part 5, Appendix A. Available at : http://bhpr.hrsa.gov/shortage/hpsacritpcm.htm. Accessed Sept 30, 2006.

Most of North Carolina's whole-county HPSAs are rural, and many are located east of Interstate 95. Partial-county HPSAs are more common and can be found throughout the state, including urban and rural counties. The majority of partial-county HPSAs are special population designations focused on access barriers for low-income or migrant populations. Although rural areas may be more likely to be designated a HPSA, four of the five North Carolina counties with academic health centers are designated currently as partial-county HPSAs.[f,4]

Map 3.2
North Carolina Health Professional Shortage Areas, 2005



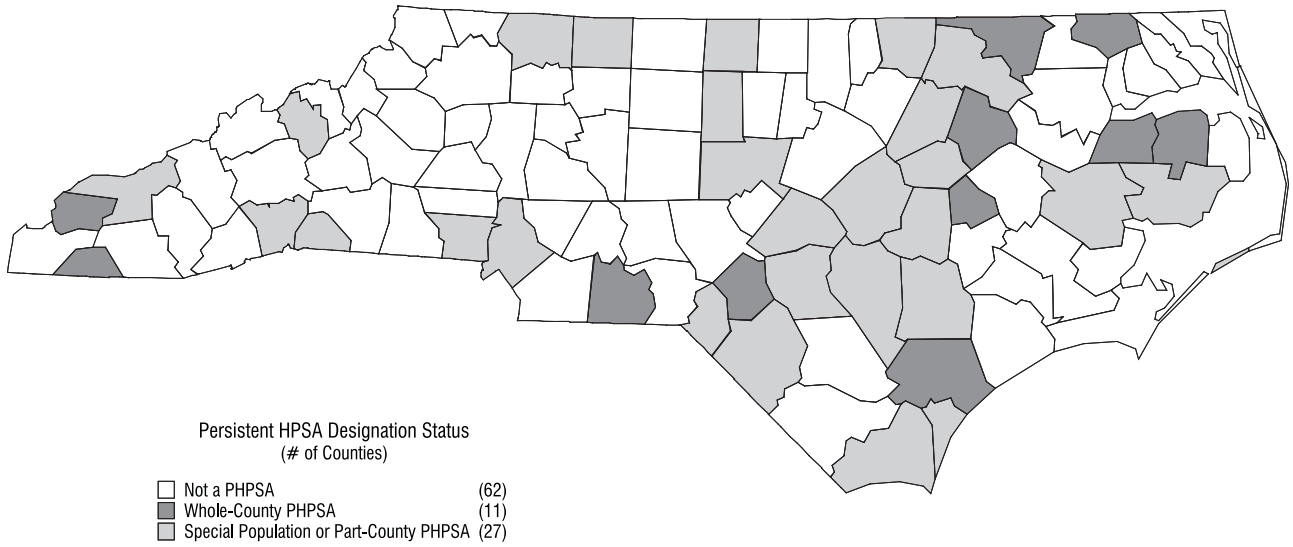
Source: Bureau of Health Professions, Shortage Designation Branch, 2005.

In the long run, areas of greatest concern are those repeatedly designated HPSAs. Populations with lower physician supply may be less able to address healthcare needs in a timely manner. In fact, many studies find that areas with lower primary care supply have higher mortality rates.[5,6,7,8,9] Counties designated HPSAs in six of the last seven years can be considered "persistent health professional shortage areas" (PHPSAs). In North Carolina, these counties tend to be disproportionately rural and poor. Whole-county PHPSAs are more likely to be rural than non-PHPSAs and have a higher percent of the population living below the poverty line (15.2% for whole, 10.4% for non-PHPSAs).[10] Map 3.3 illustrates the 2005 North Carolina PHPSAs. The majority of whole-county PHPSAs are located in eastern North Carolina. The central area of the state has fewer whole-county PHPSAs but does have a number of partial-county PHPSAs.

Rural areas face more critical shortages than most urban areas. For example, Perquimans, Hyde, and Currituck counties (all in the east) have ratios at or below

f Forsyth county has a Low Income Population HPSA, and Durham, Mecklenburg, and Orange counties have Facility HPSAs.

Map 3.3
Persistent Health Professional Shortage Areas in North Carolina, 2005



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

Persistent HPSAs are those designated as HPSA by the Health Resources and Services Administration (HRSA) from 1999 to 2005 or in 6 of the last 7 releases of HPSA definition.

Providers choose their location of practice for a variety of reasons, but two significant factors include economic potential and lifestyle preferences.

1.9 per 10,000 population.[11] The growth in nurse practitioners (NPs) and physician assistants (PAs) is important because they provide a significant amount of care in rural areas compared to their physician counterparts. Between 1998 and 2003, 53% of the 464 primary care providers gained in rural North Carolina counties were either NPs or PAs. The proportion of primary care providers in rural areas who are NPs and PAs has increased over time. In 1998, 22% of primary care providers in rural areas were either NPs or PAs, but this increased to 28% in 2003. NPs and PAs are an even larger proportion of primary care providers in whole-county PHPSAs. In 2005, they accounted for 36% of total primary care providers in whole-county HPSAs compared to 33% of primary care providers in counties not designated as HPSAs.[12]

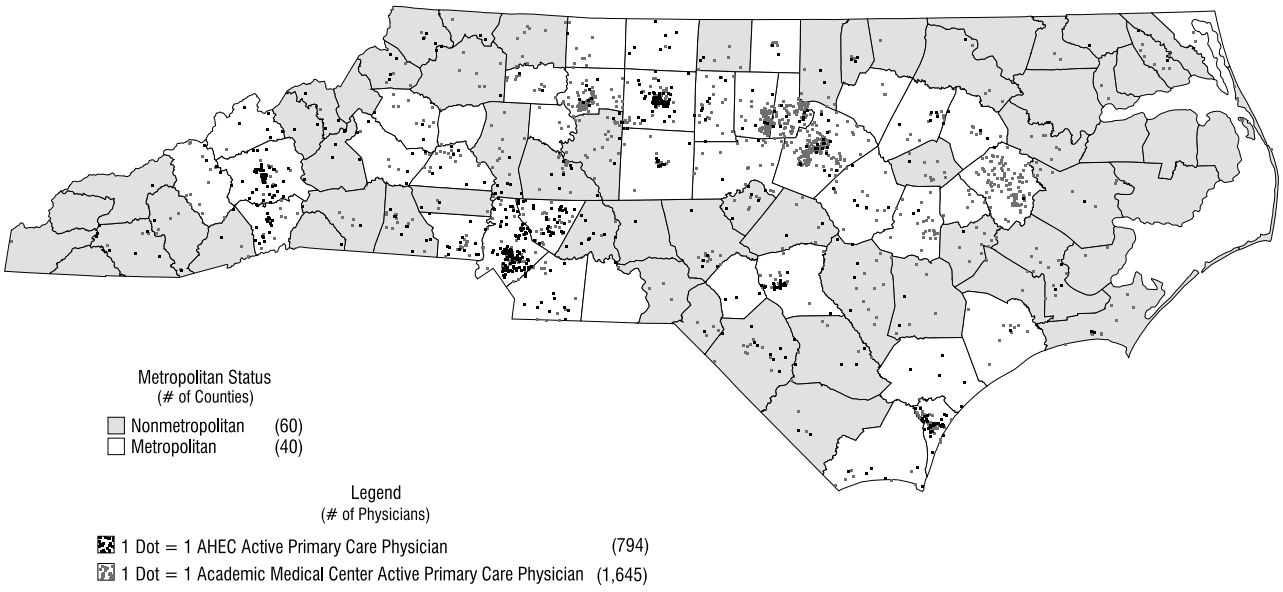
Along with the relative lack of primary care providers in many rural communities, rural residents may have additional barriers to accessing needed services. Rural communities are much less likely to offer a full array of specialty services. Lack of public transportation, coupled with greater travel distances to obtain care, also can create access barriers for rural residents. These barriers are particularly problematic for lower income individuals who may lack their own private transportation and the financial resources to pay for needed transportation.

Providers choose their location of practice for a variety of reasons, but two significant factors include economic potential and lifestyle preferences. In an economic sense, a physician's practice is a private business that needs to be financially sustainable. In HPSAs, sustaining a practice may be difficult because population density in

rural areas may not provide enough volume to ensure sufficient revenues to cover minimum operating expenses. In addition, many rural areas have higher than average numbers of uninsured individuals who may be unable to pay for the services provided; full-county PHPSAs and partial-county PHPSAs have uninsured rates approximately 1.5 percentage points and 1.1 percentage points higher, respectively, than non-PHPSAs.[13] These factors discourage providers from practicing in those areas. High population density, higher-income residents, and proximity to major medical centers provide income potential that draws physicians to places where the physician supply may be fully adequate.

Provider location also is influenced by lifestyle and family preferences. Urban areas offer many more cultural and recreational opportunities as well as more options for schooling and employment for spouses. Rural areas also provide amenities that are desirable, but these may not be valued as greatly by professionals seeking to advance their careers and build families. Providers' backgrounds play a major role in their preferences for where they want to practice. For example, a provider who has no prior exposure to rural life may find life in rural parts of North Carolina challenging. The vast majority of medical residency programs are located in metropolitan and suburban areas. Physicians make strong professional and social connections in those communities while they train and tend to cluster around those academic medical centers when they go into full practice. (See Map 3.4.)

Map 3.4
Distribution of Active Primary Care Physicians Who Graduated from a North Carolina AHEC Residency Program or Academic Medical Center Program, North Carolina, 2003



Data are for active, in-state, non-federal, non-resident-in-training physicians indicating primary care specialties of FP, GP, IM, Ob/Gyn or Pediatrics, who were licensed as of October 2003 with residency graduation dates from 1972 and later. Internship data were used if residency data were missing.

Source: NC Health Professions Data System with data derived from the North Carolina Medical Board, 2005; NC Area Health Education Centers Program, 2003; US Census Bureau, 2004.

Core Based Statistical Areas are current as of the December 2003 update. Nonmetropolitan counties include micropolitan and counties outside of CBSAs.

National research has shown that physicians who are most likely to practice in rural communities have a rural background, have a spouse who was raised in rural areas, are male, are white, or have expressed an interest in rural practice. In attracting physicians to rural areas, it is important that the community is a good fit for the physician and that the physician is well integrated into the community.[14] Strategies for addressing maldistribution, particularly as it affects rural, low-income, and other underserved populations, should consider these factors.

Classical economic theory suggests that as the number of providers per population increases in a given area, the market eventually encourages providers to locate outside of that area.[15] As a result, one option for addressing the issue of maldistribution is to increase the overall supply of providers. However, if current projections of a slowdown in growth of physician supply holds, and providers become more scarce, the opposite may occur, and practitioners may flow away from underserved areas.

Potential solutions should focus on developing a "pipeline" into professional medical practice for young North Carolinians with those characteristics that make them more likely to serve the underserved; recruiting more providers to work in rural and underserved communities through financial incentives; and retaining providers in underserved communities by improving practice patterns.

Recommendation 3.1

The NC Department of Public Instruction, NC Community College System, University of North Carolina, NC Area Health Education Centers Program, and other related programs should collaborate to create more intensive programs and to coordinate and expand existing health professions pipeline programs so underrepresented minority and rural students likely to enter health careers are offered continued opportunities for enrichment programs in middle school, high school, and college and then receive continued support in medical and other health professions schools.

Another more targeted approach on this continuum would be to focus efforts on college students and graduates with interests in medical school. Potential medical students who have characteristics consistent with likely service to or interest in rural medicine or with serving underserved populations could be offered assistance with medical school applications and MCAT preparation courses. By selecting individuals likely to locate in underserved areas, there is greater likelihood that supply in underserved areas will be increased. Additionally, medical school programs should make a more direct effort to include such individuals in medical school classes. East Carolina University's Brody School of Medicine is a good example of a program that has a specific mission to train healthcare professionals interested in serving underserved populations. It is not necessary that all medical students trained in North Carolina have this focus, but North Carolina medical schools should ensure they admit a meaningful cohort of students who are interested in or likely to serve in underserved areas or with underserved populations.

Recommendation 3.2.

Duke University School of Medicine, Brody School of Medicine at East Carolina University, University of North Carolina at Chapel Hill School of Medicine, Wake Forest University School of Medicine, and North Carolina residency programs should create targeted programs and modify admission policies to increase the number of students and residents with expressed interest in serving underserved populations and/or practicing in rural areas of North Carolina. Targeted programs should be designed to provide intensive and longitudinal educational and clinical opportunities to practice with medically underserved populations in medically underserved areas of the state.

Enhanced state funding should be targeted to medical schools and residency programs that increase the production of physicians who practice in North Carolina's underserved areas or with underserved populations. (See Recommendations 2.8 and 2.9.)

Direct economic incentives can be used to recruit providers to practice in underserved communities.

Recruitment through economic incentives:
Direct economic incentives can be used to recruit providers to practice in underserved communities. There are four main direct incentive mechanisms: scholarship, loan, loan repayment, and direct incentive (payments for capital costs or as income guarantees). Incentive mechanisms can be applied at different points along the pathway into community-based practice, including incentives for medical school students and residents as well as for new or established practicing providers. These incentives may or may not be tied to specific service obligations in return for financial incentive. (See Table 3.1.)

Table 3.1
Direct Incentive Mechanisms for Physician Recruitment[16,17]

Program Type	Who is eligible for the program	Required or optional service	How funds are used	Six year retention rate
Scholarship	Medical Students	Required	Training	30%
Loan	Medical Students	Optional	Training	65%
Loan Repayment	Practicing Providers	Required	Repay loans	69%
Direct Incentive	Practicing Providers	Required	Anything	57%

Source: Pathman et al, 2000; Pathman et al, 2004.

These four mechanisms are recruitment tools—they place physicians in underserved locations. The goal is for providers to have sufficiently positive experiences that retention is improved as providers remain in locations after financial incentives expire. In general, loan repayment programs tend to have the best retention and be the most efficient program to manage. One study found that the largest federal program of this type, the National Health Service Corps, increased supply in underserved communities by approximately 10%.[18] Although most of these programs deal exclusively with physicians, there has been a rapid increase in nursing incentive programs as well. For example, inventory of nursing incentive programs in an eight state region found over 80% of existing programs were instituted after 1988.[19]

North Carolina currently has two state-managed incentive programs:

- The Office of Rural Health and Community Care (ORHCC) manages a program to recruit providers to underserved areas that provides either loan repayment or a high-needs service bonus for those who have little or no loans.[g] Approximately 75% of all loan repayment and high-needs service bonus recipients fulfill their obligation. The maximum grant is $70,000 (plus 39% tax subsidy) over four years for physicians and dentists and $30,000 (plus 39% tax subsidy) over three years for PAs and NPs. In 2006, 52 grants were awarded. At the beginning of state fiscal year (SFY) 2007, 32 candidates were awaiting contracts due to inadequate funds in SFY 2006. The Office was able to contract with these candidates. In doing so, all SFY 2007 loan repayment and high-needs service bonus funds have been committed.[20] The state should appropriate additional funding to increase the number of providers recruited into underserved areas.
- The NC Student Loan Program for Health, Science, and Mathematics, managed by the NC State Education Assistance Authority, provides an in-school loan option for North Carolina residents.[21] This option is an additional incentive to encourage students to pursue practice in underserved areas. However, the maximum amount a student can borrow is $34,000 total for all four years. In 2004-2005, $261,635 was disbursed to 31 students pursuing medical degrees. For the past five years, the program has experienced an increase in eligible applicants, but the program is too new to track its success in keeping providers in North Carolina.

The NC Medical Society Foundation Community Practitioner Program is a private incentive program that pays up to one-half of the medical education debt of physicians, NPs, and PAs who agree to serve at least five years in an underserved area.[22] The program has had tremendous success after the participants complete their commitment. Nearly two-thirds of participants remain in the community after the five-year commitment. Nearly three-quarters remain in rural or economically distressed communities and over 80% remain in North Carolina.[23] The average grant is $50,000.

ORHCC, in the NC Department of Health and Human Services, has been an effective resource for communities in their efforts to recruit healthcare professionals. It has assisted rural communities in recruiting healthcare providers since its founding in 1973. Expanding the capabilities of ORHCC could increase both the number of providers looking to practice in rural areas as well as the ability of communities to offer attractive packages that meet the interests and capabilities of potential physicians. The market for physicians and other healthcare providers is national in scope, and the ability to increase provider supply in rural and underserved locations is enhanced if the appeal and visibility of rural underserved

g Personal communication with John Price, Assistant Director at the Office of Rural Health and Community Care, Raleigh, NC. September 2006.

communities is increased. Therefore, the NC General Assembly should appropriate $65,600 to ORHCC to expand the number of ORHCC staff who recruit practitioners into health professional shortage areas.

Recommendation 3.3. (Priority Recommendation)

The NC General Assembly should appropriate $1,915,600 to the NC Office of Rural Health and Community Care (ORHCC). Of this amount:

a) $350,000 should be appropriated to provide technical assistance to communities to help identify community needs and practice models that can best meet these needs and to provide technical assistance to small practices or solo practitioners practicing in medically underserved communities or serving underserved populations;

b) $1.5 million should be appropriated to pay for loan repayment and financial incentives to recruit and retain physicians, physician assistants, nurse practitioners, and certified nurse midwives to rural and underserved communities; and

c) $65,600 should be appropriated to expand the number of ORHCC staff who recruit practitioners into health professional shortage areas.

ORHCC should place a special emphasis on recruiting and retaining underrepresented minority, bilingual, and bicultural providers to work in underserved areas or with underserved populations.

Foundations also should help fund regional, multi-county demonstrations to test new models of care in rural and urban underserved areas. If successful in improving access, quality of care, and efficiency, these models should be supported by state and private insurers.

Recommendation 3.4. (Priority Recommendation)

North Carolina foundations should fund regional, multi-county demonstrations to test new models of care to serve patients in rural and urban underserved areas.

a) New models should be developed collaboratively between the NC Office of Rural Health and Community Care, NC Area Health Education Centers Program, healthcare systems, medical schools, other health professions training programs, licensing boards, and other appropriate groups and should be designed to test new models of care that focus on integration of care, management of chronic illness, and prevention. Such models should emphasize the creation of medical homes and interdisciplinary practice environments to enhance care to underserved populations.

b) New models should be evaluated to determine if they improve access, quality of care, and/or efficiency.

The State Health Plan, Division of Medical Assistance, and private insurers should modify reimbursement policies to support the long-term viability of successful models of care for underserved populations.

Retaining Providers

Retaining providers who work in underserved communities is very important. Research indicates that retention rates in underserved areas and areas with a high supply of providers are similar. However, when a provider leaves a rural or underserved area, it is often more noticeable and has a greater impact on the community than it does in a community with higher supply. Therefore, it is important to take steps to try to encourage providers to remain in underserved areas of practice. The three factors most closely associated with higher retention include a good match between the physician and community; satisfaction, especially with the community, and professional fulfillment; and ownership, or sense of control, in one's practice.[24]

When a provider leaves a rural or underserved area, it has a greater impact on the community than it does in a community with higher supply.

Programs that can help improve provider satisfaction and feelings of ownership often are related to practice patterns. Since ORHCC was first developed, it has assisted with implementation of many different types of healthcare practice models and has developed healthcare organizations that work in a variety of community settings. Examples include solo physician practices, with or without NPs and/or PAs, and multi-physician practices. The ORHCC portfolio of practice models allows the Office to tailor a practice model to particular needs and resources of the community, allowing the practice (and providers) to maximize the likelihood of a successful practice. ORHCC, in conjunction with the Community Practitioners Program, should expand technical assistance provided to communities to help identify community needs and practice models that can best meet community needs.

Another approach to improving retention in underserved communities is to introduce medical students to careers serving underserved populations or to assist medical students and residents interested in such service in acquiring the skills necessary to operate a successful practice in those communities. Studies indicate that brief exposure to rural areas in *medical school* does not seem to affect recruitment, but longer exposure (12-24 months) does increase selection of primary care as a specialty. Additionally, rural *residency* rotations appear to increase the likelihood of a physician choosing to practice in a rural area.[25] The longitudinal rural/underserved curriculum could be considered a component of Recommendation 2.9 in Chapter 2.

Physicians serving underserved communities may have difficulty covering practice costs and experience decreased efficiency, which can lead to greater provider dissatisfaction. Some of these factors can be directly addressed through policy interventions such as support for practice management systems, and others can be addressed by creating systems of care designed to increase efficiency or satisfaction with the practice environment. For example, improving the administrative skills of the practice manager and/or implementing electronic health records, coupled with automated billing systems, can improve quality and efficiency. These issues are discussed in more detail in Chapter 2. Creating systems of call coverage or hospitalists also can help improve the practice environment for physicians, particularly in rural communities where they may be solely responsible for weekend call coverage.

Hospitalists, support for call coverage, and after hours care:
One of the growing trends in hospital care across the state is use of hospitalist physicians (eg, doctors who become experts in and only provide care for hospitalized patients). This need is particularly acute in rural hospitals where services of these hospitalists help retain local primary care physicians by minimizing disruption of outpatient schedules and lowering intensity of night call. Most hospitalists receive their training from internal medicine residency programs that emphasize a comprehensive generalist approach (eg, the AHEC internal medicine residency programs).

Because they are so new, data on the optimal number of hospitalists and their exact impact on physician retention and quality of care is quite limited. Nevertheless, anecdotal evidence suggests both urban and rural hospitals are employing hospitalists in increasing numbers. Many people believe they are an essential component in stabilizing a hospital medical staff, creating a more attractive environment for ambulatory primary care physicians, and possibly improving the quality of care in the inpatient setting. It will be important to monitor continued growth in the use of hospitalists and its impact on recruitment and retention in underserved areas.

The services of hospitalists help retain local primary care physicians by minimizing disruption of outpatient schedules and lowering intensity of night call.

In addition to the problem with call coverage, physicians who are sole providers in the community face pressure to not take extended vacations or be away from the community. *Locum tenens* programs place a physician temporarily in the community while the local physician is on vacation. These opportunities to "recharge" can increase satisfaction of the physician and potentially prolong his or her stay in the community. Several *locum tenens* programs have been introduced in North Carolina. However, these programs encountered obstacles that forced them to end. Some of the problems included difficulties faced by *locum tenens* physicians who had to travel extensively and practice in a brand new environment with a different administrative and service structure at each location. Additionally, one program offered free *locum tenens* services, which made it difficult to sustain the necessary funding. New Mexico has developed a viable *locum tenens* program through the University of New Mexico. Since its formation, the program has received widespread support from faculty and residents, whose participation also was strongly encouraged and supported by the University's administration.[26] Between 1993 and 1997, 111 residents and 35 faculty members provided *locum tenens* services throughout New Mexico, which allowed residents to choose their *locum tenens* sites and compensated faculty for services rendered. Partial funding is provided for the program through a state appropriation, which helps cover meal and mileage costs for physicians providing *locum tenens* services, but the majority of program costs are covered through payments to the program for the *locum tenens* services. Practice sites pay an hourly fee that is approximately $10-20 greater than the wages paid to the physicians providing the services. Fees are on a sliding scale based upon type of service provided. Practice sites also cover costs of accommodations for those providing *locum tenens* services.[h] The important lessons learned from successful programs are to find physicians appropriate to provide *locum tenens* support and to support mechanisms that work.

h Additional information regarding New Mexico's program provided through a conversation with Mary Turner, Program Coordinator for the *Locum Tenens* Program, June 26, 2006.

The state should explore other financial incentives to recruit and retain providers in underserved areas. Some physicians would be interested in practicing in underserved communities but do not have the financial support to start a new practice in those areas. Providing help with the up-front costs of developing a new practice could be provided as an incentive to encourage providers to serve in underserved communities. The state also should consider use of tax credits or increased Medicaid, State Health Plan, or NC Health Choice reimbursement to encourage practitioners to locate in underserved areas or serve underserved populations. In addition, other types of support may be necessary to retain physicians in rural areas, including *locum tenens* or help with call coverage through the use of hospitalists.

Physicians and other healthcare practitioners enhance the economic well-being of rural and underserved communities in addition to providing positive health benefits.

Recommendation 3.5. (Priority Recommendation)

The NC General Assembly should explore financial incentives or other systems to encourage providers to establish and remain in practice in underserved areas or with underserved populations. Financial incentives may include, but not be limited to, tax credits or increased reimbursement. Other strategies to encourage providers to locate and practice in underserved areas or with underserved communities may include, but not be limited to, help with call coverage or use of hospitalists.

Economic development effects:

Provider supply helps increase access to care, which can lead to better health outcomes.[8,27,28,29] In addition, healthcare is a major industry in North Carolina, responsible for 6% of the value of all goods and services produced[30] and 11% of total wages and employment.[31] Healthcare, as a percentage of the state's economy has steadily grown over the last 7 years. For underserved communities, recruiting a provider may have community effects beyond the direct effect on population health. According to the US Census Bureau, in 2002 (the latest year available) 61,834 North Carolinians worked in 4,459 physician offices operating in the state with an annual payroll of over 3.5 billion dollars.[32] With approximately 17,000 physicians, simple estimates suggest that for every physician there are *at least* 2.5 other employees (although certainly this varies considerably depending on the size of the practice). This is similar to the AMA's estimate of 3.1 FTE nonphysician employees per physician.[33] In addition, physicians help support other healthcare institutions in a community. For example, hospitals rely on physicians to provide essential health services. In many rural communities, hospitals are one of the largest employers in the community. Without physicians and other healthcare practitioners, many of these healthcare institutions would close. Thus, physicians and other healthcare practitioners enhance the economic well-being of rural and underserved communities in addition to providing positive health benefits.[34]

References

1. North Carolina Health Professions 2004 Data Book. NC Health Professions Data System. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. Available at: http://www.shepscenter.unc.edu/hp/2004_HPDS_DataBook.pdf. Accessed June 12, 2006.
2. Shortage Designation. Bureau of Health Professions, Health Resources and Services Administration, US Department of Health and Human Services. Available at: http://bhpr.hrsa.gov/shortage/. Accessed June 12, 2006.
3. Bureau of Health Professions. *Health Professional Shortage Area Primary Medical Care Designation Criteria: Relevant Excerpts From 42 Code Of Federal Regulations (CFR)*. Criteria for designation of areas having shortages of primary medical care professionals. October 1, 1993;34-48. Washington, DC: US Department of Health and Human Services. Chapter 1, Part 5, Appendix A. Available at: http://bhpr.hrsa.gov/shortage/hpsacritpcm.htm. Accessed Sept 30, 2006.
4. HPSA Database. Health Resources and Services Administration. Available at http://hpsafind.hrsa.gov/HPSASearch.aspx. Accessed June 16, 2006.
5. Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations' health: assessing the evidence. *Health Aff.* 2005, Suppl Web Exclusive, w5-97-w5-107.
6. Shi L, Macinko J, Starfield B, Xu J, Politzer R. Primary care, income inequality, and stroke mortality in the United States: A longitudinal analysis, 1985-1995. *Stroke.* 2003;34(8)1958-1964.
7. Shi L, Macinko J, Starfield B, et al. Primary care, infant mortality, and low birth weight in the states of the USA. *J Epidemiol Community Health.* 2004;58(5)374-380.
8. Shi L, Macinko J, Starfield B, et al. The relationship between primary care, income inequality, and mortality in US States, 1980–1995. *J of the Am Board of Fam Pract.* 16(5):412-422.
9. Shi L, Starfield B, Kennedy B, Kawachi I. Income inequality, primary care, and health indicators. *J of Fam Pract.* 1999;48(4):275-284.
10. Area Resource Files, Claritas, U.S. Office of Management and Budget.
11. NC Health Professions Data System. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. 2005.
12. Fraher EP. The supply of primary care physician assistants and nurse practitioners in underserved North Carolina. *J Physician Assistant Educ.* 2006;17(1):39-42.
13. Holmes M, Ricketts T. *County-level Estimates of the Number of Uninsured in North Carolina: 2004 Update*. Chapel Hill, North Carolina: University of North Carolina at Chapel Hill; 2005. Available at: http://www. unc.edu/~gholmes/ui/NorthCarolinaUninsured2004.pdf. Accessed September 30, 2006.
14. Pathman, D. Presented at: Task Force on Primary Care and Specialty Supply Steering Committee Meeting, North Carolina Institute of Medicine; March 8, 2006; Cary, North Carolina.
15. Rosenthal MB, Zaslavsky A, Newhouse JP. The geographic distribution of physicians revisited. *Health Serv Res.* 2005;40(6 Pt 1):1931-52.
16. Pathman, DE, Taylor DH Jr, Konrad TR, et al. State scholarship, loan forgiveness, and related programs: The unheralded safety net. *JAMA.* 2000;284(16):2084-92.
17. Pathman DE, Konrad TR, King TS, Taylor DH, Koch GG. Outcomes of states' scholarship, loan repayment, and related programs for physicians. *Medical Care.* 2004;42:560-568.
18. Holmes GM. Increasing physician supply in medically underserved areas. *Labour Economics.* 2005;12(5):697-725.
19. Thaker SI, Pathman DE, Mark BA, Ricketts TC. Service-Linked Scholarships, Loans and Loan-Repayment Programs for Nurses in the Southeast. Working paper. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.
20. Price J, Radford A. Presented at: Task Force on Primary Care and Specialty Supply Steering Committee Meeting.; March 8, 2006; Cary, North Carolina. Personal correspondence with Andrea Radford. July 26 2006.
21. College Foundation of North Carolina. NC Student Loan Program for Health, Science, and Mathematics. Available at: http://www.cfnc.org/paying/loan/career/career_hsm.jsp. Accessed June 26, 2006.
22. NC Medical Society. NCMS Foundation Receives Multi-Million Dollar Grant to Boost Access to Care. 2005. Available at: http://www.ncmedsoc.org/pages/news_highlights/news_detail.html?id=144. Accessed June 26, 2006.

23. Strand J. Presented at: Task Force on Primary Care and Specialty Supply Steering Committee Meeting, North Carolina Institute of Medicine; March 8, 2006; Cary, North Carolina.

24. Pathman DE. Task Force on Primary Care and Specialty Supply Steering Committee Meeting, North Carolina Institute of Medicine; March 8, 2006; Cary, North Carolina.

25. Pathman DE, Steiner BD, Jones BD, Konrad TR. Preparing and retaining rural physicians through medical education. *Acad Med.* July 1999;74(7):810-20.

26. Larson L, Derksen D, Garland J, et al. Academic models for practice relief, recruitment, and retention at the University of New Mexico Medical Center and East Carolina University School of Medicine. *Acad Med.* January 1999;74(1):S136-140.

27. Robst J, Graham GG. The relationship between the supply of primary care physicians and measures of health. *Eastern Econ J.* Summer 2004. Available at: findarticles.com/p/articles/mi_qa3620/is_200407/ai_n9452295. Accessed November 16, 2006.

28. Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations' health: Assessing the evidence. *Health Aff.* 2005;W5:98-107.

29. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q.* 2005;83(3):457-502.

30. Gross Domestic Product by State. U.S. Bureau of Economic Analysis, Department of Commerce. Available at: http://bea.gov/regional/gsp/. Custom query performed April 16, 2007.

31. North Carolina Employment Security Commission, Employment and Wages by North American Industry Classification System (NAICS). Data for third quarter 2006. Available at: http://eslmi23.esc.state.nc.us/ew/ EWYear.asp?Report=1. Calculations based on custom query performed April 16, 2007 at website:

32. US Census Bureau, County Business Patterns. Available at: http://www.census.gov/epcd/cbp/view/cbpview.html. Accessed April 11, 2007.

33. Lewin Group - Consultant Report Methodology. Available at: http://www.futurefamilymed.org/x28858.html. Accessed April 11, 2007.

34. McKethan A. Critical connections between health care and economic development in North Carolina. North Carolina Medical Journal. 2007;68(3):208-9.

Examining Provider Need by Specialty Area

Chapter 4

Examining the overall supply of physicians and nonphysician clinicians can mask shortages in particular specialty areas and overlook the importance of having an appropriate mix of practitioners. The NC IOM Task Force on Primary Care[a] and Specialty Supply examined the overall supply of medical practitioners as well as the supply of specialty providers to determine if there are critical shortages.[b] The Task Force noted the need to ensure that North Carolina has an appropriate mix of provider types, especially with respect to primary care and specialty care, which are critical to cost-effectiveness and quality of care for the entire population.[1] The Task Force examined the supply of primary care providers, providers who deliver babies, general surgeons, and psychiatrists.

North Carolina needs to have an appropriate mix of provider types, especially with respect to primary and specialty care, which are critical to cost-effectiveness and quality of care for the entire population.

The Task Force was unable to explore supply issues related to every specialty. For example, the Task Force was unable to fully explore the adequacy of providers trained to address the needs of our aging population or to fully explore all the pediatric subspecialties. North Carolina's elderly population is growing rapidly, and individuals over the age of 65 make more office visits to providers than younger individuals. However, data limitations prevent accurate assessment of the supply of physicians who care for geriatric patients. Licensure data identify the physician's primary and secondary specialties but do not give any information on the type of patients the physician typically sees in practice. In 2005 there were 293 physicians who reported a primary or secondary specialty of geriatrics or family practice/geriatric; however, the number of physicians actually providing care to the elderly is higher. Older individuals may comprise a large percent of the patient population of family physicians, internists, and other primary care physicians, but the data do not capture this information. Similarly, the Task Force realized that the number of child-related specialty providers may be limited across the state, but it was not able to analyze all potential shortage areas. For this reason, in Chapter 2 the Task Force recommended support and expansion of the health workforce research center at the Cecil G. Sheps Center for Health Services Research. (Recommendation 2.1.) The workforce center could do a more comprehensive evaluation of potential shortage areas and identify needs for new data collection.

Available data indicate the overall supply of many provider types is probably sufficient to meet the current needs of the state's population. However, there is significant geographic maldistribution, which leads to the undersupply or insufficient mix of provider types in some areas.

---

a Throughout this document, primary care providers are defined as those who indicate a primary specialty of general practice, family practice, internal medicine, obstetrics/gynecology, or pediatrics. Providers who choose a sub-specialty as their primary specialty are not included in these data.

b The licensure data used in this analysis are derived from the NC Health Professions Data System (HPDS). The HPDS is maintained by the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. The system was initiated in 1975 to collect and disseminate timely and reliable data on licensed health professionals in North Carolina. Data on 18 health professions are collected with the cooperation of the independent health professional licensing boards. Data on physicians, physician assistants, and nurse practitioners are provided by the NC Medical Board. Data on certified nurse midwives are provided by the NC Midwifery Joint Committee. Support for the HPDS is provided by the NC Area Health Education Centers Program and the University of North Carolina Office of the Provost (Health Affairs).

Primary Care Providers

What is Primary Care and Who Provides It?

Primary care providers (PCPs) provide preventive, primary, and acute medical services that can address most of a person's healthcare needs. Primary care providers serve as the entry point into the healthcare system for most patients. Good primary care should be comprehensive, accessible to the patient, coordinated, and accountable and should provide for continuous care.[2] Primary care visits account for approximately one-half of all visits to physician offices.[3]

Primary care providers include physician assistants (PAs), nurse practitioners (NPs), certified nurse midwives (CNMs), and doctors both of allopathic medicine (MDs) and osteopathic medicine (DOs) who are family practitioners, general practitioners, internists, pediatricians, and obstetrician/gynecologists. Table 4.1 illustrates growth of primary care provider professionals between 2000 and 2005.

Table 4.1
North Carolina Primary Care* Provider Growth, 2000-2005

Active in Profession (October)[c]	2000	2001	2002	2003	2004	2005	Percent Change (2000-2004)	Percent Change (2004-2005)
North Carolina Population	8,078,429	8,198,279	8,312,755	8,422,375	8,540,468	8,683,242	5.7%	1.7%
Total Primary Care Providers (physicians, NPs, PAs, CNMs)	8,480	9,022	9,434	9,650	9,916	10,226	16.9%	3.1%
Total Primary Care Physicians	6,696	6,908	7,125	7,265	7,401	7,660	10.5%	3.5%
Total Primary Care Allopathic Physicians (MD)	6,567	6,764	6,942	7,086	7,195	7,424	9.6%	3.2%
Total Primary Care Osteopathic Physicians (DO)	129	144	163	179	206	236	59.7%	14.6%
Family Practice	2,713	2,224	2,294	2,347	2,376	2,452	-12.4%	3.2%
General Practice	199	176	164	151	142	141	-28.6%	-0.7%
Internal Medicine	2,203	2,313	2,395	2,481	2,542	2,652	15.4%	4.3%
Obstetrics/Gynecology	919	937	955	960	981	988	6.8%	0.7%
Pediatrics	1,202	1,258	1,317	1,326	1,360	1,427	13.1%	4.9%
Primary Care Nurse Practitioners (NP)	826	1,016	1,144	1,198	1,259	1,287	52.4%	2.2%
Primary Care Physician Assistants (PA)	791	926	972	991	1,061	1,081	34.1%	1.9%
Certified Nurse Midwives (CNM)	167	172	193	196	195	198	16.8%	1.5%

* Primary care providers include those who indicate a primary specialty of general practice, family practice, internal medicine, obstetrics/gynecology, or pediatrics.
Source: NC Health Professions Data System. North Carolina State Demographics: Annual North Carolina Population Growth.

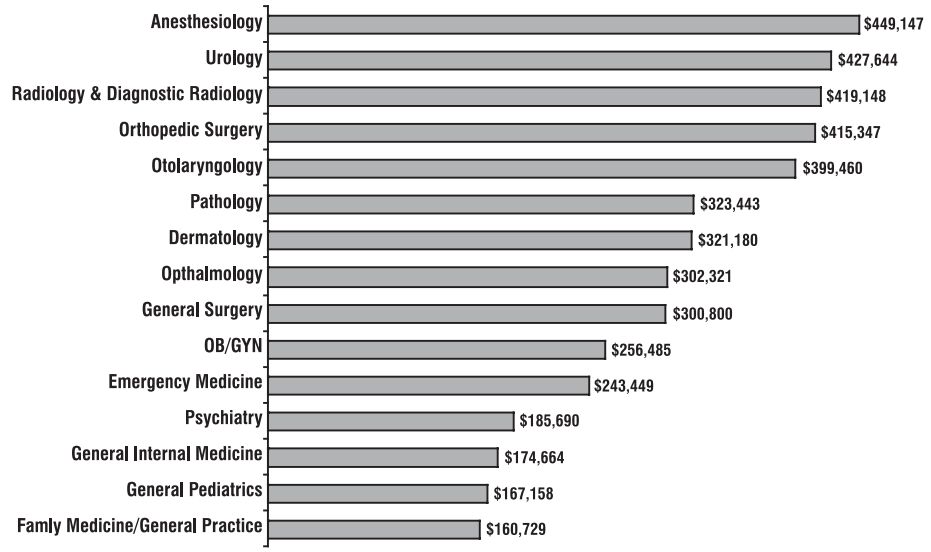
c Data are for in-state professionals and include physicians with an unknown activity status because these individuals are generally new graduates who have not yet secured employment at the time of data collection.

Primary care provider growth is occurring in the areas of internal medicine, obstetrics/gynecology, and pediatrics, and among NPs and PAs. However, evidence indicates that fewer providers of all types, including physicians, PAs, and NPs, are going into primary care than in the past. For example, between 1997 and 2005, the number of medical student graduates choosing primary care residencies dropped 50%.[4] Instead, students are moving into specialty areas. Similar trends are experienced among NPs and PAs.[5]

One reason for declining interest in primary care is that primary care physicians experience increased demands with lower overall reimbursement. The number of and need for recommended preventive and chronic care treatment services has increased to the point that it is impossible for physicians to provide all recommended care to their patient mix in a regular workday. A primary care practice serving a panel of 2,300 patients has to work more than seven hours a day to provide all recommended evidence-based preventive services to patients, plus more than 10 hours a day to provide all recommended services to patients with chronic illnesses.[5] Although the scope of care has increased, primary care provider reimbursement has decreased in inflation-adjusted dollars. Between 1995 and 2003, inflation-adjusted salaries decreased 7.1% for all physicians, but 10.2% for primary care physicians.[6] Primary care physicians are paid less for their services than are specialists, as insurers generally pay more for procedures and less for cognitive and diagnostic skills. (See Chart 4.1.) The median income of specialists is approximately twice that of primary care providers. In 1992, the Centers for Medicare and Medicaid Services developed a Resource-Based Relative Value Scale (RBRVS) fee schedule to assign payment rates for medical services in an effort to more fairly and accurately value all physician services. Despite these adjustments, which increased the relative value of physician evaluation and management work, some services continue to be undervalued while others are overvalued.[7] Many consider primary care services to be some of those most undervalued.

One reason for declining interest in primary care is that primary care physicians experience increased demands with lower overall reimbursement.

Chart 4.1
Median Physician Salary by Specialty, 2006



Source: Cohen J. Presented at: Primary Care and Specialty Summit, North Carolina Institute of Medicine; December 21, 2006. Citing MGMA Physician Compensation and Production Survey 2001-2006.

Trends away from primary care could impact population health.[8] Primary care is very important for preventing disease, increasing quality of care, and reducing costs. Evidence indicates that unnecessary hospitalization rates are higher in communities with limited access to primary care providers. Studies also show quality of care is higher and expenditures are lower in states with higher generalist-to-population ratios compared to those with higher specialist-to-population ratios.[4,8]

One way to encourage greater interest in primary care is to decrease payment inequities. To address payment inequities, the Task Force recommended:

Recommendation 4.1. (Priority Recommendation)

a) **The State Health Plan, Division of Medical Assistance, and private insurers should enhance payments to primary care providers to recognize the value of diagnostic and cognitive skills, particularly those payments that incentivize primary care providers to create comprehensive primary care homes that include lifestyle interventions, preventive health services, chronic disease management, and case management through use of case managers.**

b) **Reimbursement levels for primary care services through Medicaid, NC Health Choice, State Health Plan, and private insurers should be continually evaluated to ensure they are adequate to meet the costs of care across the state, particularly in underserved areas.**

As physicians continue to specialize and move away from primary care, the growth of NPs and PAs, who are more likely to work in primary care, is very important to the provision of primary care services. However, NPs and PAs are not necessarily complete replacements for primary care physicians because the scope of allowable activities for PAs and NPs is based, in part, on the services and tasks negotiated in the practice agreement with the supervising physician.[d] Thus, NPs and PAs may not be able to provide the full range of services provided by a physician. As a result, federal workforce programs calculate NPs and PAs as 0.50 the full-time equivalent (FTE) of a physician. Other research suggests that a more accurate FTE is in the range of 0.75.[e,9] The FTE for an individual NP or PA will vary by provider based on a number of factors including the provider's scope of practice, patient population/acuity, healthcare setting, supervisory agreement with the physician, and specialty.

The FTE also is related to the environment in which an NP or PA practices. The National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, conducted an analysis of professional practice environments for NPs and PAs in each state. It found that, as of 2000, North Carolina had the most favorable practice environment for PAs and was the 10th most favorable practice environment for NPs.[10] Therefore, it is likely that the FTE for PAs and NPs in North Carolina would be on the higher end of the spectrum across the country.

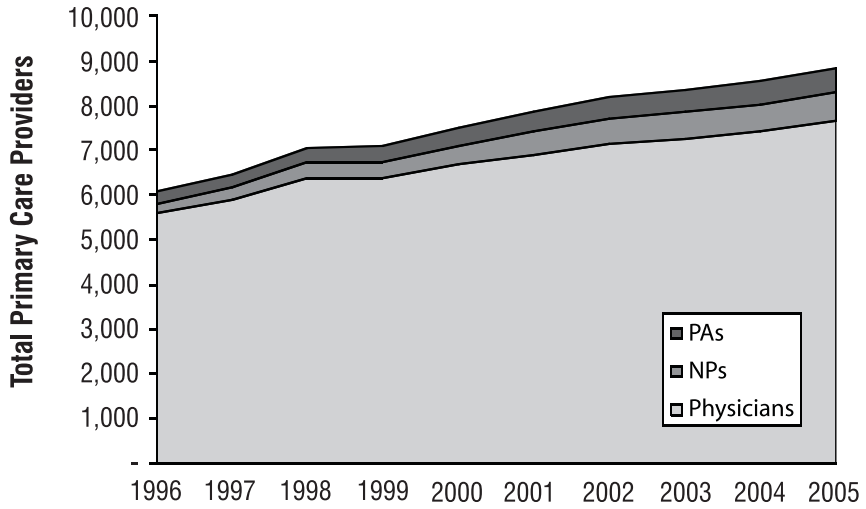
---

d As with other healthcare providers, PAs or NPs may only provide the services that are consistent with their education, training, skills, and competence.

e The study was done for PAs, but in North Carolina NPs' scope of practice is substantially similar to that of PAs; therefore, the research is being extrapolated to NPs as well.

Depending on the equivalency used, NPs and PAs account for a varying portion of the primary care workforce in North Carolina. Based on the federal designation of 0.50 FTE, primary care NPs and PAs accounted for approximately 13% of total primary care providers in 2005. (See Chart 4.2.) On the other hand, using a research-based FTE such as 0.75, NPs and PAs accounted for approximately 19% of primary care providers in 2005. (See Chart 4.3.) Regardless of the FTE used, NPs and PAs account for an increasing percentage of primary care providers in the state and play an important role in providing primary care services. While they are critically important providers of care,

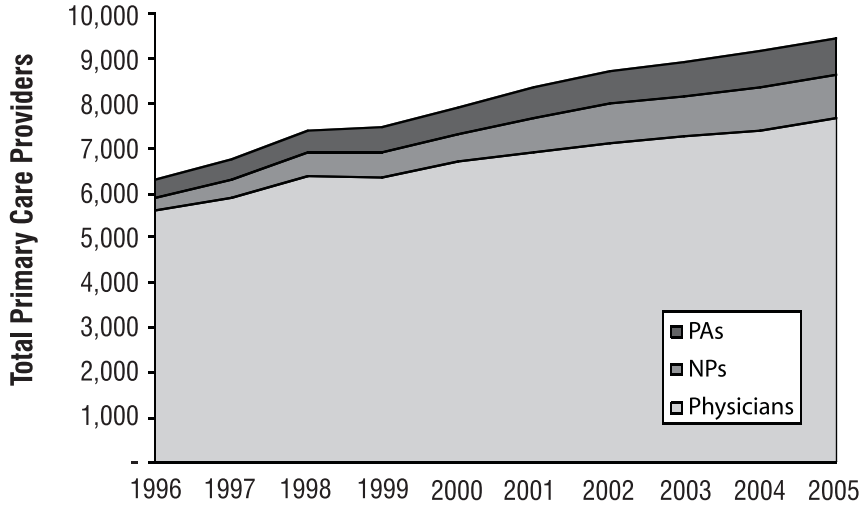
Chart 4.2
Total North Carolina Primary Care Workforce: Physicians, PAs, NPs Adjusted to Federal FTE Weight (50%)



Source: NC Health Professions Data System. FTE is full time equivalent.

NPs and PAs account for an increasing percentage of primary care providers in the state and play an important role in providing primary care services.

Chart 4.3
Total North Carolina Primary Care Workforce: Physicians, PAs, NPs Adjusted to Research-Based FTE Weight (75%)



Source: NC Health Professions Data System. FTE is full time equivalent.

it is unlikely they can completely fill the needs left by a decreasing growth rate in primary care physician supply. The state health professional workforce research center recommended in Chapter 2 would be a valuable entity for evaluating the supply and relative work of these different types of primary care providers. Furthermore, it could use that information to analyze the need for specific primary care provider types.

Primary Care Physicians

While recent data indicate overall primary care physician supply has experienced moderate annual growth (generally between 2-5%), there is a risk that this growth rate will fall below the population's growth rate in the near future. In recent years, the difference between North Carolina primary care physicians' growth rates and the state's population growth rate has narrowed. For the past five years the growth of primary care physicians has slowed, from a rate of 5.2% (between 1999-2000) to 1.9% (between 2003-2004).[11] Provisional data suggest that annual growth in primary care providers increased to 3.5% this year; however, because the North Carolina Medical Board has adopted a new registration system, it is unclear whether this is a one-year aberration or the beginning of an upward trend in primary care. North Carolina's annual population growth rate remained relatively stable throughout 2000 and 2004 (approximately 1.4%) but increased to 1.7% between 2004 and 2005.[11]

Regardless of aggregate state population and provider growth rates, county-level data indicate that over the past ten years North Carolina experienced an increase in the number of counties in which provider-to-population ratios declined. Table 4.2 illustrates between 2001 and 2005 30 counties experienced a decrease in primary care providers-to-population ratios compared to 11 counties between 1996 and 2000. Fourteen of the 30 counties with a decrease in primary care providers per population are persistent shortage areas, meaning they have been designated as primary care health profession shortage areas in six of the past seven years.

Table 4.2
Change in Primary Care Providers (Physicians, NPs, and PAs) per 10,000 Population (Number of counties)

	1996-2000		2001-2005	
County Type	Loss	Gain	Loss	Gain
Rural				
Not PHPSA*	4	35	12	27
Whole-County PHPSA	3	7	5	5
Part-County PHPSA	3	13	5	11
Urban				
Not PHPSA	1	22	4	19
Whole-County PHPSA	0	1	0	1
Part-County PHPSA	0	11	4	7
Total	11	89	30	70

*PHPSA is a persistent health professional shortage area, meaning the area has been designated as a health professional shortage area (HPSA) by the federal government for six of the previous seven years.

Source: NC Health Professions Data System.

There are a number of strategies that could be introduced in North Carolina to try to impact these changes in the primary care provider-to-population ratios. Some strategies focus on increasing the overall supply of providers; other strategies focus specifically on increasing primary care or other needed provider types. Some of these ideas are outlined in Chapter 2. They include increasing enrollment at North Carolina medical schools (see Recommendation 2.4); targeting state financial support to North Carolina health professions schools that produce the greatest proportion of professionals who meet healthcare needs of the state (see Recommendation 2.8); developing a new state-supported medical school (see Recommendation 2.5); and developing new primary care residency positions (see Recommendation 2.9).

Doctors of Osteopathy (DOs):
Osteopathic medicine is a field of medicine that includes additional training in the study of the body's musculoskeletal system and in hands-on diagnosis and treatment. Osteopaths often use a treatment method called manipulation, which involves gentle application of force to the body to promote movement of tissue, prevent abnormal movement, and release compressed bones and joints.[12] Osteopathic medicine emphasizes achieving wellness through health education, injury prevention, and disease prevention.[13] In North Carolina, 55% of all active DOs have a primary care specialty compared to 43% of all active physicians. Therefore, osteopathic physicians could play an important role in providing primary care services in North Carolina. In 2005, DOs accounted for only 3.1% of primary care physicians practicing in the state. Nonetheless, osteopathic medicine is growing rapidly, and between 1995 and 2005 the number of practicing DOs increased 298% (108 to 430). During that time, 69 counties experienced an increase in the DO-to-population ratio, and only seven counties experienced a decrease. The other 24 counties had no DO in either year.

Osteopathic physicians could play an important role in providing primary care services in North Carolina.

There are only 26 osteopathic physician training programs across the country, and none are located in North Carolina.[14] Doctor of Osteopathy programs will soon produce over 3,500 medical graduates per year, but only approximately 50 of those students will be from North Carolina. Strategies to expand the DO population in North Carolina, particularly those practicing primary care, include financially supporting North Carolina osteopathic students to train in other states in exchange for returning to practice in North Carolina, developing an osteopathic training program in North Carolina, and developing joint American Osteopathic Association-approved primary care residency positions in the state. (See Recommendations 2.5, 2.6, and 2.10.)

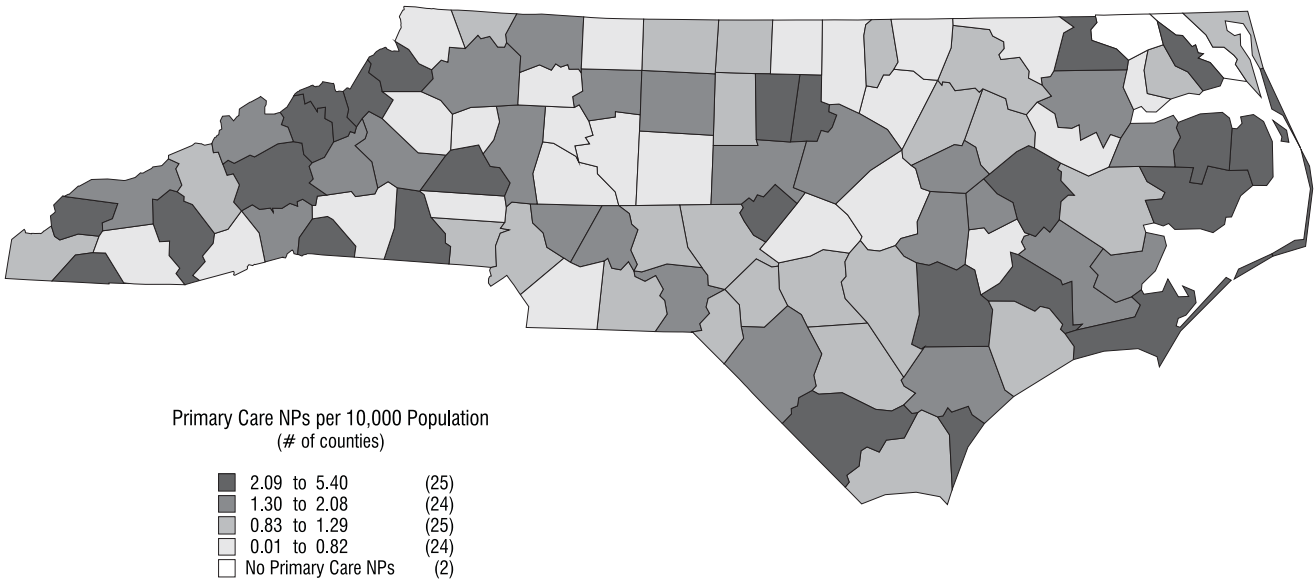
Nurse Practitioners and Physician Assistants

The numbers of NPs and PAs have increased over the last decade. Between 2001 and 2005, both the number of NPs and the number of PAs practicing in North Carolina grew by 32%.[15,16] In 2005, there were 2,440 NPs and 2,674 PAs practicing in the state. The supply of both professions has grown faster than the population in recent years.

Nurse Practitioners:
Between 2001 and 2005, 63 of North Carolina's counties experienced an increase in the NP-to-population ratio. Thirty-six counties saw a decrease in the ratio while

one had no NP in either year. Two counties, Camden and Gates, have no NP practicing in the area, while Mecklenburg (243), Durham (235), and Wake (199) counties have the most total NPs. The greatest concentrations of NPs per 10,000 population are located along the western and eastern borders of the state and in the very center. (See Map 4.1.) The counties with the highest NP-to-10,000 population ratios are Durham, Orange, and Hyde counties. According to an analysis of practice environments by the National Center for Health Workforce Analysis, North Carolina has the tenth most favorable practice environment for NPs.[f,10]

Map 4.1
Primary Care Nurse Practitioners per 10,000 Population, North Carolina, 2005



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2005.

Counts include active, instate, nurse practitioners indicating a primary specialty of family practice, general practice, internal medicine, ob/gyn or pediatrics.

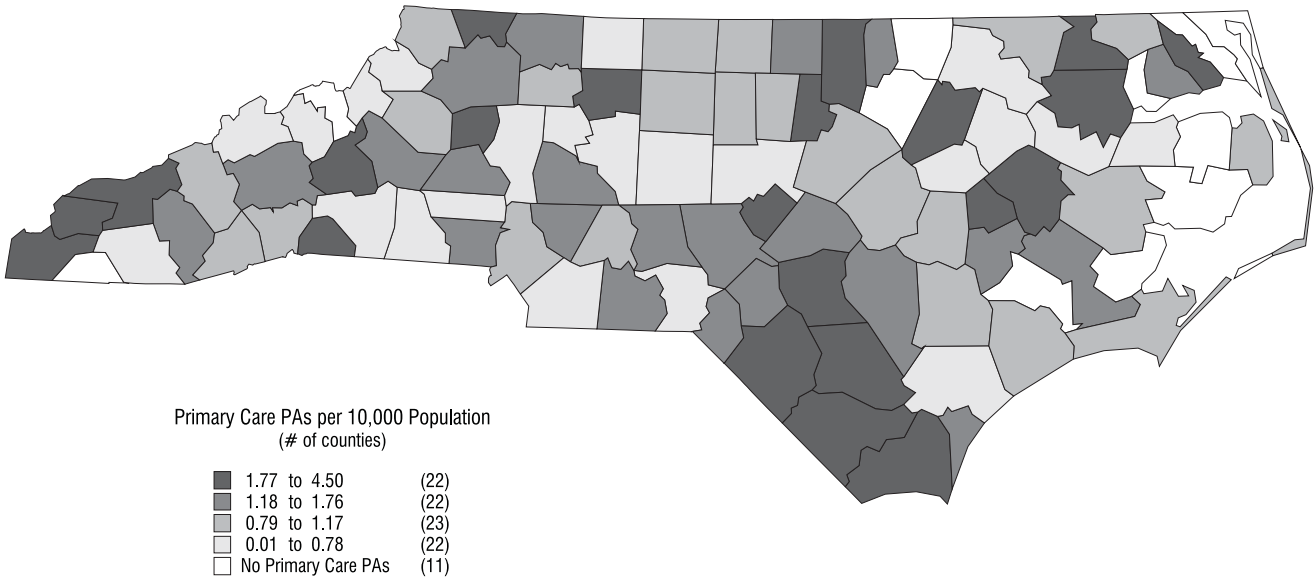
Physician Assistants:
The 7.0% (+176) increase in PAs from 2004 to 2005 continues a pattern of growth. In 2005, 52 counties increased their PA-to-population ratio, and 44 counties decreased their PA-to-population ratio. An additional four counties had no PAs in either year. The counties with the largest PA-to-10,000 population ratios are widely distributed across the state. (See Map 4.2).

Currently, PAs view North Carolina as having a regulatory environment conducive to practice. In a national study that examined practice environments for PAs, North Carolina was considered to have the most positive practice environment for

f The factors that keep North Carolina from being one of the most favorable practice environments for NPs, according to the National Center for Health Workforce Analysis, include not having a specific NP licensure, language mentioning a collaborative relationship with a physician, regulation by the Board of Nursing with another entity, the necessity to have a written practice agreement, and periodic review of records by a physician.

PAs.[g,17] Further, the authors found that a positive practice environment was strongly correlated with supply of PAs. Legislators and regulators should be vigilant so as to avoid regressive moves to restrict practice unless there is compelling evidence that such moves are needed to protect the citizens of North Carolina.

Map 4.2
Primary Care Physician Assistants per 10,000 Population, North Carolina, 2005



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2005.

Counts include active, instate physician assistants indicating a primary specialty of family practice, general practice, internal medicine, ob/gyn or pediatrics.

NPs and PAs offer a valuable opportunity to more quickly increase the number of primary care providers in North Carolina. Training NPs and PAs takes between two and three years, on average, compared to more than four years for medical school and approximately three years of residency training for a physician. Thus, compared to training physicians, it is less costly to train NPs and PAs, and it is possible to see a more rapid increase in the available provider population. Furthermore, NPs and PAs provide a significant amount of care in rural areas compared to their physician counterparts. Between 2001 and 2005, almost half (47%) of the 264 primary care providers gained in rural North Carolina counties were either NPs or PAs. NPs and PAs comprised 26% of total primary care providers in rural counties in 2001 and 28% in 2005. In 2005, they accounted for 42% of total primary care providers in whole-county persistent health professional shortage areas (PHPSAs) compared to 23% of primary care providers in counties not designated as PHPSAs.

g The authors examined the states' legal, reimbursement, and prescriptive authority for PAs in establishing the rating system for PAs' practice environment. North Carolina, Oregon, and Montana were the only states that were rated as having an excellent practice environment.

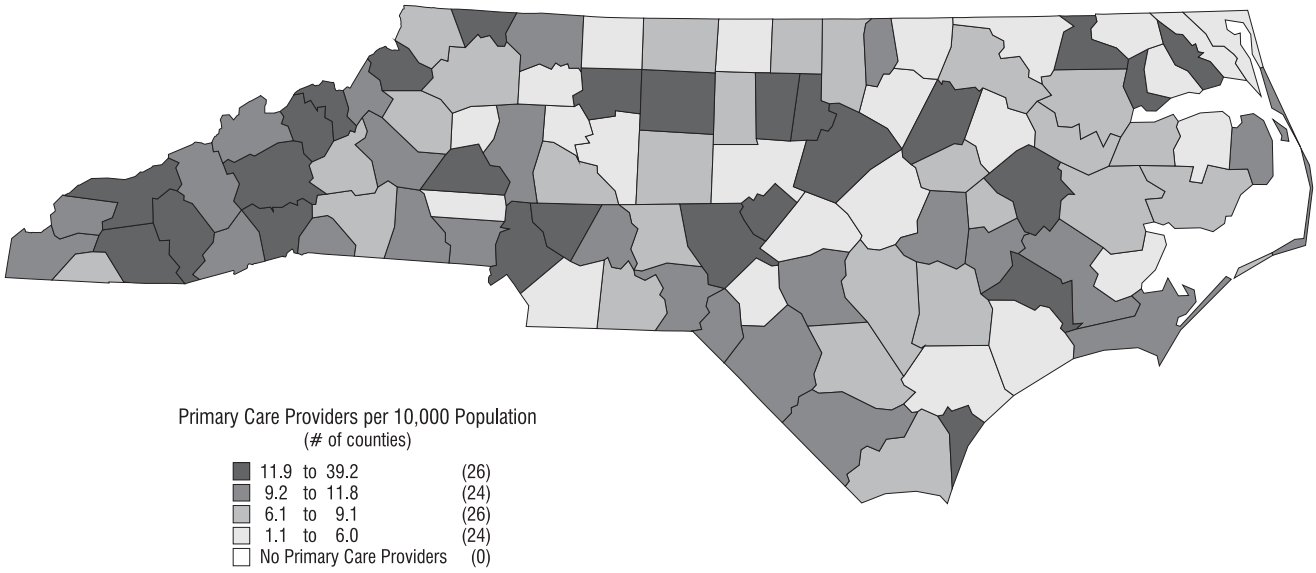
Strategies for increasing the supply of NPs and PAs include increasing student enrollment in North Carolina NP and PA programs, developing a new PA training program in North Carolina, and maintaining or improving the regulatory environment for NPs and PAs. (See Recommendations 2.7, 2.8, and 2.12.)

Obstetrician-Gynecologists and Certified Nurse Midwives:
Many obstetrician-gynecologists (OB-GYNs) and CNMs serve as primary care providers for women. Increasing their supply also can help address primary care shortages. Strategies to increase the supply of OB-GYNs and CNMs are discussed more fully in the section below on Providers Delivering Babies.

Primary Care Provider Distribution Is a Major Challenge Currently Facing the State

While the current supply of primary care providers may be adequate to meet the health-care needs of most North Carolinians, providers are not well distributed across the state. Maldistribution of healthcare providers has historically been a problem in North Carolina and in the rest of the nation, particularly in rural areas. The problem appears to be getting worse after several years of improvement. Fifty-eight counties have primary care provider-to-10,000 population ratios below the state average (9.8 per 10,000 population). Map 4.3 illustrates ratios are typically larger in urban areas, but there also are large proportions in some less-populated areas, especially in the western part of the state.[16]

Map 4.3
Total Primary Care Workforce: Physicians, Physician Assistants, and Nurse Practitioners, North Carolina, 2005



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2005.

Counts include active, instate, nonfederal, non-resident-in-training physician assistants, nurse practitioners, and physicians indicating a primary specialty of family practice, general practice, internal medicine, ob/gyn or pediatrics.

Although there were increases in the primary care provider-to-population ratio in health professional shortage areas (HPSAs)[h] between 1979 and 2001, beginning in 2002 that ratio leveled off. The most recent (2005) data indicate a slight drop in whole-county HPSA primary care provider-to-population ratios. Rural areas face more critical shortages than most urban areas. For example, in 2005 all 11 of the whole-county HPSAs in the state were rural.[11]

The most significant immediate problem with primary care provider supply is distribution of providers across the state. Strategies to address such maldistribution are outlined in Chapters 2 and 3. They include using new state financial support for health professions training programs to encourage or reward programs producing providers who serve in underserved communities in North Carolina (Recommendations 2.8 and 2.9); increasing funding for loan repayment or other financial incentives to recruit and retain providers in underserved areas (Recommendations 3.3 and 3.5); and providing funding to support *locum tenens* programs or other systems of support to help providers establish and remain in practice in underserved areas (Recommendations 2.14 and 3.5).

Ensuring that women have continuous and early prenatal care is critical to the well-being of the infant and mother.

Providers Who Deliver Babies[i]

There were 119,773 live births in North Carolina in 2004.[18] The number of births grew in the mid-1990s but then held relatively stable at approximately 120,000 for the last five years. By 2020, state demographers expect approximately 135,000 live births per year.[19] Ensuring that women have continuous and early prenatal care is critical to the well-being of the infant and mother. Women need access to physicians and other clinicians who are trained to deliver babies and who can address any complications that might arise during delivery.

Most births occur in hospitals and are attended by physicians, generally obstetrician-gynecologists (OB-GYNs) or family physicians. In 2004, 89.4% of births in North Carolina hospitals were attended by physicians, and 10% were attended by CNMs.[18] The number of births attended by CNMs has increased steadily since 1990, when only approximately 2% of all births were attended by midwives.[20]

There has been steady growth in the number of OB-GYNs over the last five years (2000-2004); however, not all OB-GYNs deliver babies. The percentage of OB-GYNs delivering babies increased gradually over the same time period until 2003 when both the number and percentage of OB-GYNs who reported delivering babies declined. (See Table 4.3.) There has been a more precipitous drop in the number of family physicians who report delivering babies. Between 2003 and 2004, the number of family physicians delivering babies declined by 12% (from 232 in 2003

h The Bureau of Health Professions in the US Department of Health and Human Services has designated certain communities, population groups, or medical facilities as Health Professional Shortage Areas (HPSAs). Certain counties, or parts thereof, will be designated as HPSAs if they have more than 3,500 people per primary care provider. Population groups can be designated as HPSAs if they have specific access barriers, and there is a high ratio of people in that population group to practitioners serving the population. For more information on HPSA designations, see Chapter 3.

i Data for providers delivering babies will be based on 2004 data collected by the NC Health Professions Data System. 2005 data had too many missing values to be reliable for comparing changes in the numbers and percentages of providers delivering babies compared to previous years.

to 205 in 2004). Of the 101 physicians who stopped providing deliveries between 2003 and 2004, 56 (56%) were family physicians.[21] Family physicians who offer delivery and prenatal services are extremely valuable in rural areas, where they provide over a quarter of the prenatal (33%) and delivery services (26%) available in rural communities.[11] Recently, some advocates have recommended removing obstetrical training from family physician training, but such a move could have a strong negative impact on the prenatal and delivery services available in rural communities.

While the overall supply of providers who offer prenatal care and deliveries may currently be adequate, there is a maldistribution issue.

Table 4.3
North Carolina Providers Delivering Babies, 2000-2004

	2000	2001	2002	2003	2004
Total Live Births	**120,245**	**118,112**	**117,307**	**118,292**	**119,773**
OB-GYNs total	919	937	954	960	981
OB-GYNs delivering	651	701	742	750	748
% OB-GYNs delivering	70.8%	74.8%	77.8%	78.1%	76.2%
Family Physicians (FPs)	2,173	2,224	2,293	2,327	2,040
FPs delivering	212	227	228	232	205
% FPs delivering	9.8%	10.2%	9.9%	10.0%	10.0%
Total Physicians delivering	863	928	970	982	953
Births/physicians	139.3	127.3	120.9	120.5	125.7
CNMs	167	172	193	196	195

Source: NC Health Professions Data System.

At this point, it is unclear whether the one-year decline in physicians delivering babies is the beginning of a trend or a one-year aberration. Providers who deliver babies have experienced a significant increase in malpractice premiums in recent years. For example, between 2001 and 2002, premiums for OB-GYNs increased 15%.[22] Increased liability insurance costs may deter some providers from offering delivery services. North Carolina state government used to offer payments to help rural practitioners who delivered babies offset some of their malpractice costs through a program called the Rural Obstetrical Care Incentive (ROCI) Program. This program, which ran from 1988 through 2001, had a beneficial impact on retention of rural providers who deliver babies.[23]

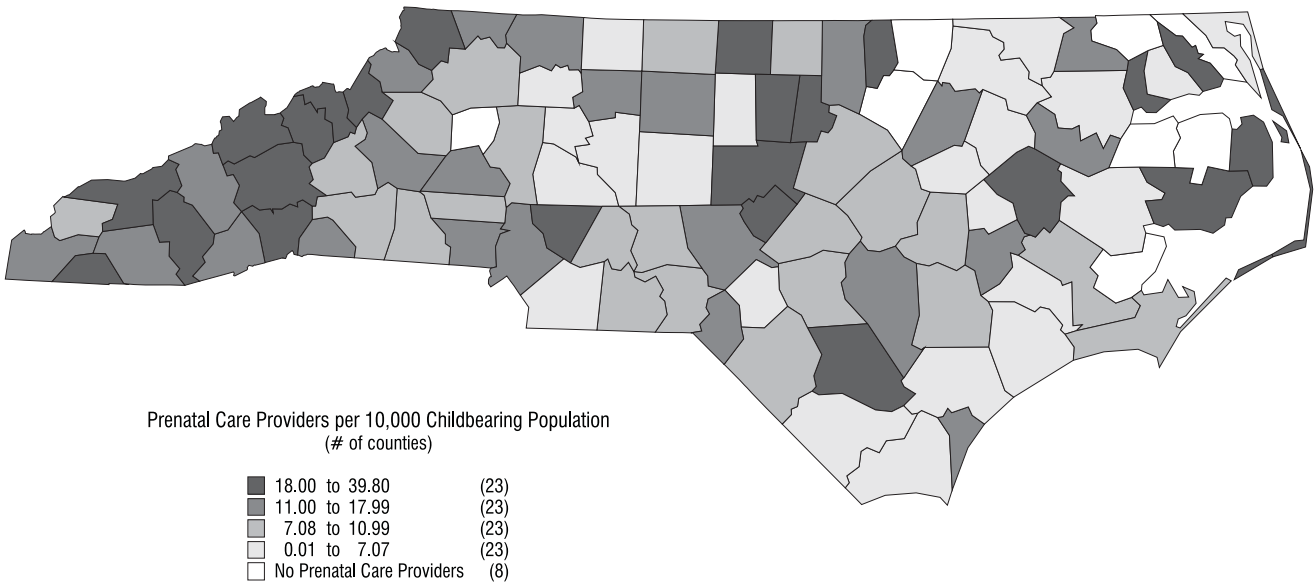
CNMs also are licensed to provide prenatal, intrapartum, postpartum, newborn, and family planning services. In 2004, there were 195 CNMs licensed to practice in North Carolina. CNMs practice in a variety of settings, including private practice, health departments, federally qualified health centers, hospitals, and university settings. Most CNMs provide prenatal care, but not all CNMs deliver babies.[j] Under state law, a CNM must have a supervising physician in order to practice;[24] thus CNMs can deliver babies only in communities where they have arrangements

j CNMs are not required to report on their licensure file whether they deliver babies. However, in a survey of CNMs in the state, 10% of CNMs (14) who responded to the survey (137) reported they did not attend births. Most midwives who attend births deliver 80 or fewer babies per year. Personal correspondence from Francie Likis, CNM, doctoral candidate at the University of North Carolina at Chapel Hill, April 3, 2006.

with supervising physicians. High malpractice costs also are an issue for CNMs who deliver babies. CNMs face a number of challenges with respect to their practice environment in North Carolina. A study by the National Center for Health Workforce Analysis of the most favorable professional practice environments for CNMs in each state found North Carolina ranked 24th among states.[k,10] This ranking is less favorable than the practice environment for PAs (top rank) or NPs (tenth).

While the overall supply of providers who offer prenatal care and deliveries may currently be adequate, there is a maldistribution issue. Currently 13 counties in the state have no physicians reporting a practice location[l] that provides prenatal care services. Eight of these counties have no providers (physician, CNM, PA, NP) who report providing prenatal care on their licensure files. (See Map 4.4.) Community members in these counties have access to some prenatal care through their local health departments, but delivery services would not be available in these counties. Even in counties with prenatal providers, there is wide variation in the ratio of providers to women of childbearing age.

Map 4.4
Prenatal Care Providers per 10,000 Childbearing Population, North Carolina, 2004



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from North Carolina Medical Board and North Carolina Board of Nursing, 2004.

Counts include active, in-state, non-federal, non-resident-in-training physicians, PAs, and NPs who report providing prenatal care, and also includes CNMs. Counts for physicians, PAs, and NPs include primary, secondary, and other practice location. Childbearing age: 15-44.

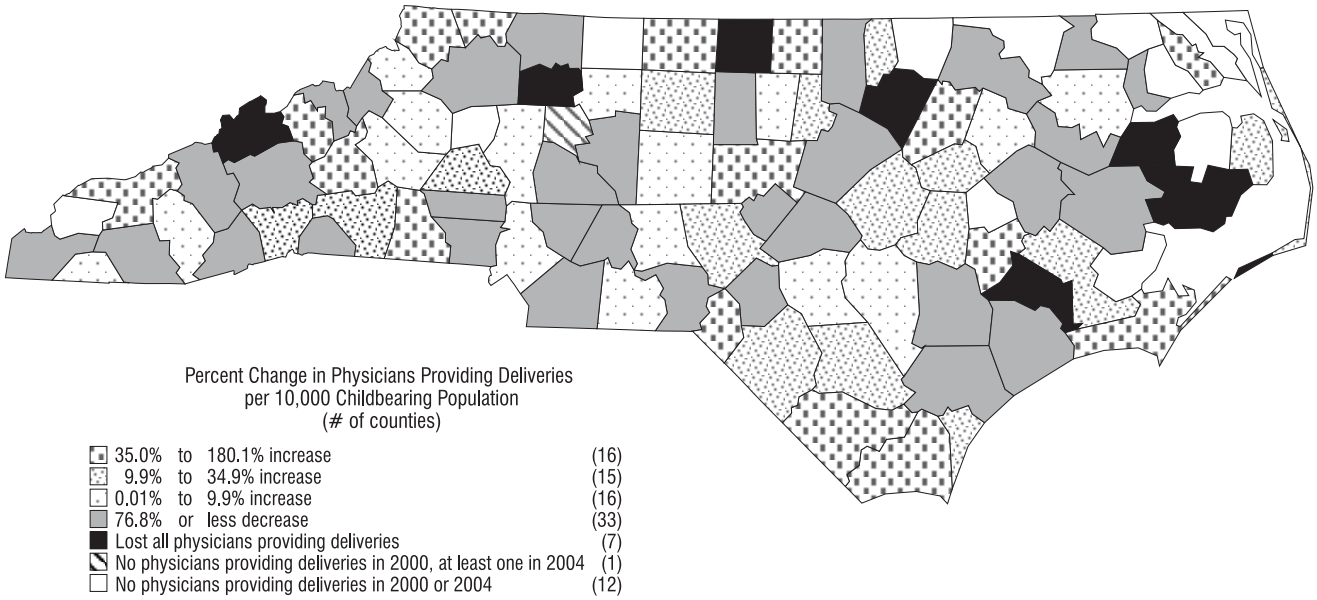
k According to a study conducted by the National Center for Health Workforce Analysis in 2000, some of the factors restricting the positive practice environment for CNMs in North Carolina include regulation involving the Board of Medicine, a restricted scope of practice, the inability to practice autonomously, and the inclusion of physician supervisory language in practice statutes.

l These data include physicians' reports of primary, secondary, and tertiary practice locations.

There is even more of a maldistribution issue for physicians who deliver babies. There are currently 19 counties without physicians who report delivering babies; 12 of these counties have not had a physician deliver a baby in the last five years.[m] More than one-half of all North Carolina counties (52) had either a decline in the ratio of physicians delivering babies to women of childbearing years over the last five years (40 counties) or no physicians providing deliveries in either 2000 or 2004 (12 counties). Almost two-thirds (63%) of counties with no physicians delivering babies in 2004 were health professional shortage areas as were 45% of other counties that experienced a decrease in the ratio of physicians providing deliveries to the population.[n] However, loss of physicians delivering babies appears to have a minimal impact on average distance traveled to deliver babies.[25]

Strategies for increasing access to prenatal care and delivery services can be targeted either to increasing overall supply of providers offering obstetrics/gynecology services

Map 4.5
Percent Change in Physicians Performing Deliveries per 10,000 Childbearing Population, North Carolina, 2000-2004



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2000-2004.

Counts include active, in-state, non-federal, non-resident-in-training physicians who report providing obstetric deliveries. Counts include primary, secondary, and other practice location. Childbearing age: 15-44 years.

m The counties with no physicians providing deliveries in 2000 or 2004 include Alexander, Camden, Currituck, Gates, Graham, Greene, Northampton, Pamlico, Perquimans, Stokes, Tyrrell, and Warren. The counties that had at least one physician delivering babies in 2000 but none in 2004 include Caswell, Franklin, Hyde, Jones, Madison, Washington, and Yadkin.

n Fifteen of the 33 counties (45%) that experienced a loss in the ratio of physicians providing deliveries per childbearing population; four of the seven counties (57%) that had at least one physician providing deliveries in 2000 but none in 2004; and eight of the 12 counties (67%) that had no physicians delivering babies in either 2000 or 2004 were health professional shortage areas in 2005.

or addressing unequal distribution of such providers across the state. Given the maldistribution of providers, it is important to encourage use of CNMs in low-provider areas. In this effort, it is important to support a more positive practice environment for CNMs across the state. Strategies for addressing the maldistribution issue include providing more funding to the Office of Rural Health and Community Care to expand their efforts to place providers in underserved areas (Recommendation 3.3), changing admission policies in medical schools and other health professions programs to accept more students from underserved areas and offer students training opportunities in these communities (Recommendations 2.9 and 3.2), and creating other incentives or practice support to assist providers who establish practice in underserved communities (Recommendation 3.5). Other recommendations follow below.

Recommendation 4.2.

The NC OB/GYN Society, NC Area Health Education Centers Program, East Carolina University Nurse Midwifery program, NC Academy of Family Physicians, and North Carolina medical schools should change the practice environment to encourage acceptance of certified nurse midwives into practice.

Recommendation 4.3.

The NC General Assembly should appropriate $206,000 annually to expand the East Carolina University Nurse Midwifery program by 30%.

Recommendation 4.4. (Priority Recommendation)

The NC General Assembly should appropriate $2 million to provide malpractice premium subsidies (similar to the Rural Obstetrical Care Incentive Program) for physicians and certified nurse midwives who provide delivery services in medically underserved areas.

General Surgeons

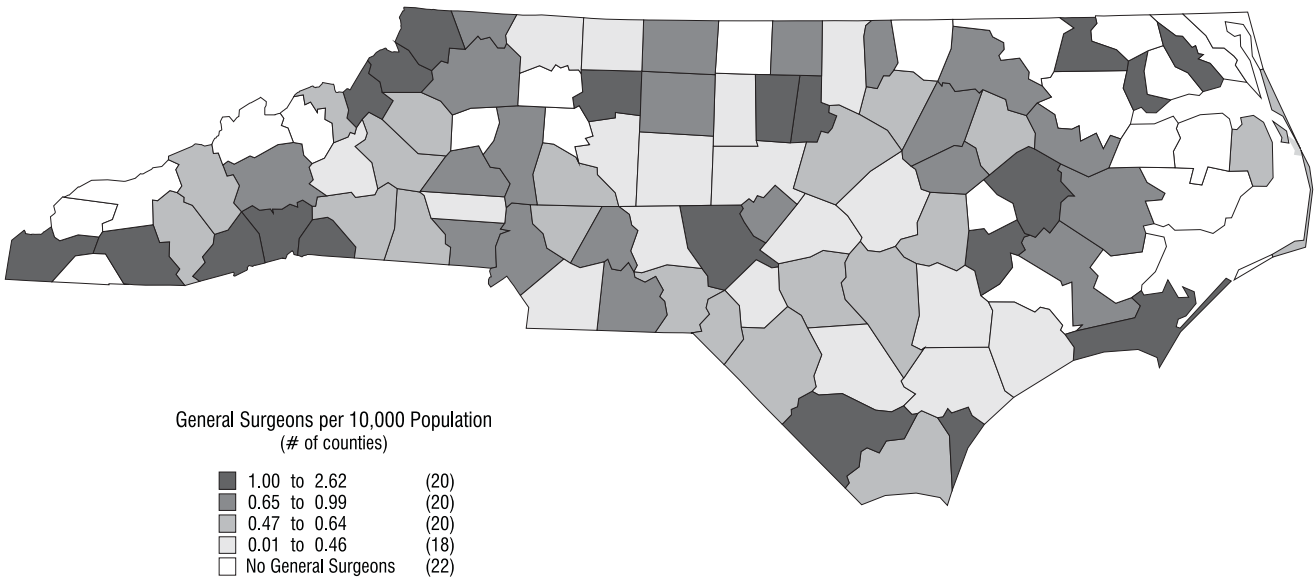
Population growth and, particularly, aging of the population are increasing demand for all medical services including surgeries. Older individuals use more medical services than younger populations. Therefore, increased life expectancy and retirement of the baby boomer generation will have, beginning in 2011, a profound effect on need for surgical services in the future. Research indicates that utilization rates of surgical services will surpass overall population growth rates.[26] Traditionally, general surgeons have provided a significant amount of needed surgical care, including care in the following nine content areas: alimentary tract surgery, surgery of the abdomen, breast/skin/soft tissue surgery, head/neck surgery, vascular surgery, endocrine surgery, surgical oncology, management of trauma, and care of critically ill patients with underlying surgical conditions.[27]

North Carolina has more general surgeons per 10,000 population (0.75) than the nation as a whole (0.60) or the south (0.64). However, access to surgeons varies drastically in different areas of North Carolina. In 2005, North Carolina had 22 counties with no surgeons,[o] while another 35 counties had below the state average

o The counties with no general surgeons include Alexander, Bertie, Bladen, Camden, Caswell, Clay, Currituck, Gates, Graham, Greene, Hyde, Jones, Madison, Northampton, Pamlico, Perquimans, Swain, Tyrrell, Warren, Yadkin, and Yancey.

of 0.62 general surgeons to 10,000 population. The majority of the counties with no surgeons or fewer than 0.62 surgeons per 10,000 population are found in the eastern and western parts of the state. (See Map 4.6.)

Map 4.6
General Surgeons per 10,000 Population, North Carolina, 2005



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2005.

Counts include active, instate, non-federal, non-resident-in-training physicians indicating a primary specialty of general surgery.

Between 1995 and 2005, 47 North Carolina counties experienced a decline in the number of general surgeons per population, and another four lost all general surgeons. Eighteen counties had no surgeons in either year. Only 31 counties experienced an increase in the ratio. More recent trends from the last five years (2000-2005) indicate an even more alarming development, with 53 counties experiencing a reduction of general surgeons and five counties losing all general surgeons. Seventeen counties had no general surgeons in either year. Only 25 counties had an increase in general surgeon supply. (See Table 4.4 and Map 4.7.)

A number of different issues may be contributing to the decline in general surgeons in North Carolina and across the nation, including decreased interest in general surgery as a career; increased demand for specialists; less interest in surgery than other medical specialties among women who now represent an increasing percentage of the physician workforce; and aging of the general surgery workforce. Surgical training programs have had limited success attracting women. Between the academic years 1996-1997 and 2001-2002, women accounted for almost 43% of US medical graduates, but in academic year 2002-2003 they accounted for only 25% of general surgery residents.[27]

General surgery is not only less attractive to women, it is losing popularity among both genders. In 1987, 7.8% of medical students across the country chose general

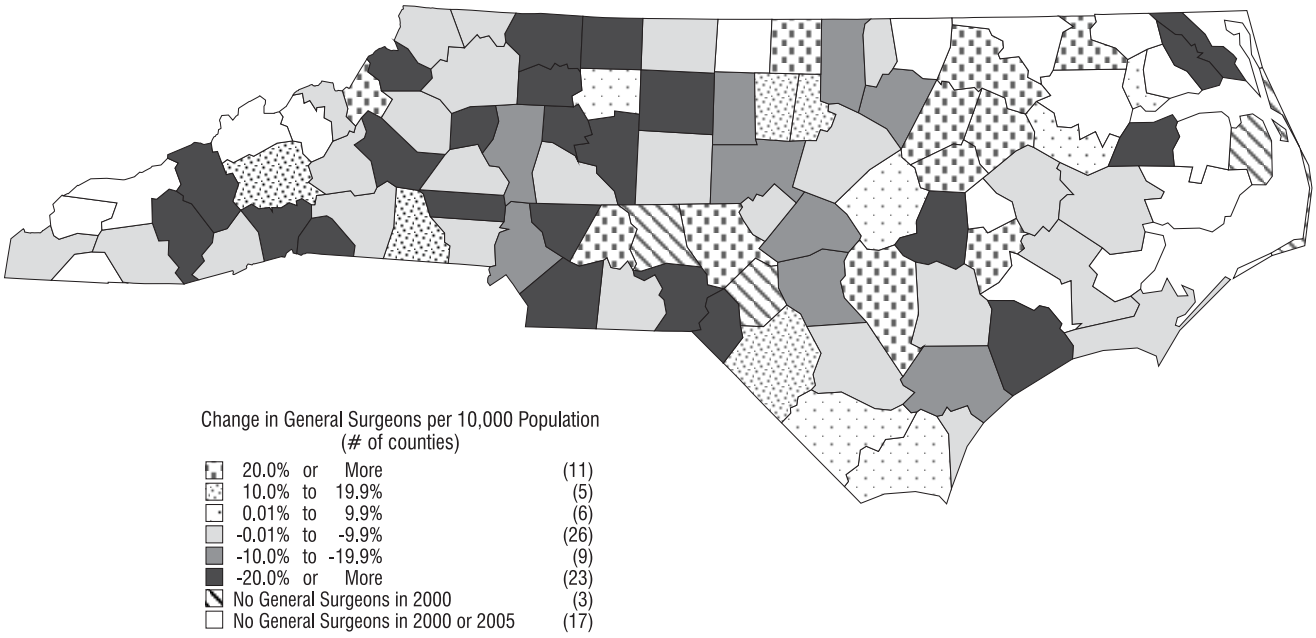
surgery as a career compared to only 5.8% in 2002.[28] In addition, the general surgical residency attrition rate reached 20% in 2000. This decline in general surgery interest may reflect medical students' perceptions that general surgeons have poorer quality of life because of relatively long work hours and intensive training.[26,27] In fact, data indicate general surgery residents traditionally work more hours per week than residents in

Table 4.4
Percent Change in General Surgeons per 10,000 Population, North Carolina (Number of counties)

Percent of Change	Number of counties 1995-2005	Number of counties 2000-2005
20% or More	19	11
10% to 19.9%	6	5
0.01% to 9.9%	5	6
-0.01% to -9.9%	14	26
-10% to -19.9%	11	9
-20% or More	22	18
Lost all General Surgeons (decrease)	4	5
No General Surgeons in initial year (increase)	1	3
No General Surgeons either year (no change)	18	17

Source: NC Health Professions Data System.

Map 4.7
Percent Change in General Surgeons per 10,000 Population, North Carolina, 2000-2005



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2000 & 2005.

Counts include active, instate, non-federal, non-resident-in-training physicians indicating a primary specialty of general surgery.

other specialties.[28] There also is increased demand for specialists as a result of foci on healthcare quality and standards.[27] Technical developments in surgery also may influence medical student career choice away from general surgery.[28] A trend is growing among general surgeons toward progressive specialization during the fellowship following residency training. Progressive specialization occurs when physicians voluntarily narrow their scope of practice within the course of their training.

A decline in general surgeons will likely have the largest negative impact on rural areas. Aging of the general surgery population is of greatest concern to small/isolated rural areas because general surgeons aged 50 years or older, a group likelier to retire sooner, are significantly more likely to live in those areas compared to urban areas.[29] Furthermore, general surgeons are integral to the sustainability of many rural hospitals. General surgeons generate valuable revenue for rural hospitals, and many hospital administrators see general surgery as a key component of a rural hospital's financial viability.[30] Certain aspects of rural practice pose challenges for general surgeons, including changing referral patterns, limited reimbursement, rural hospital closures, and recruitment difficulties. Fortunately, some of the reduction in general surgery interest by US allopathic medical students is offset by international medical graduates (IMGs).[28] In fact, IMG general surgeons are more likely to work in rural areas than in urban areas.[29]

Certain aspects of rural practice pose challenges for general surgeons, including changing referral patterns, limited reimbursement, rural hospital closures, and recruitment difficulties.

Strategies for addressing overall supply and maldistribution issues related to general surgeons in North Carolina include those focused on overall supply and maldistribution issues. Related to overall supply, state funding should support academic health centers that increase the number of providers who obtain qualifications for and practice in shortage specialties such as general surgery and report their data to the Health Workforce Policy Board. (See Recommendation 2.8.) Additionally, funding could be provided to expand the number of general surgery residency positions. (See Recommendation 2.9.) Special consideration should be given to funding a track in an existing residency program that focuses on training general surgeons for rural practice. To improve distribution, strategies include providing more funding for loan repayment programs to general surgeons in underserved areas or developing a *locum tenens* program to give general surgeons time off. (See Recommendations 3.3 and 3.5.)

Psychiatrists[p]

Nationally, in a given year almost one-third of nonelderly adults experience a mental disorder.[31] A sizable number of children also have behavioral or emotional disorders. Nearly 15% of North Carolina children exhibit a behavioral disorder such as attention deficit disorder, anxiety, or depression.[32] Despite the widespread need, most individuals with serious mental problems do not receive treatment. Factors limiting access to needed services include the stigma attached to mental illness and inadequate supply or maldistribution of mental health professionals who are able to treat people using both medications and psychotherapy. Some people who need mental health services are unable to afford care because they lack health

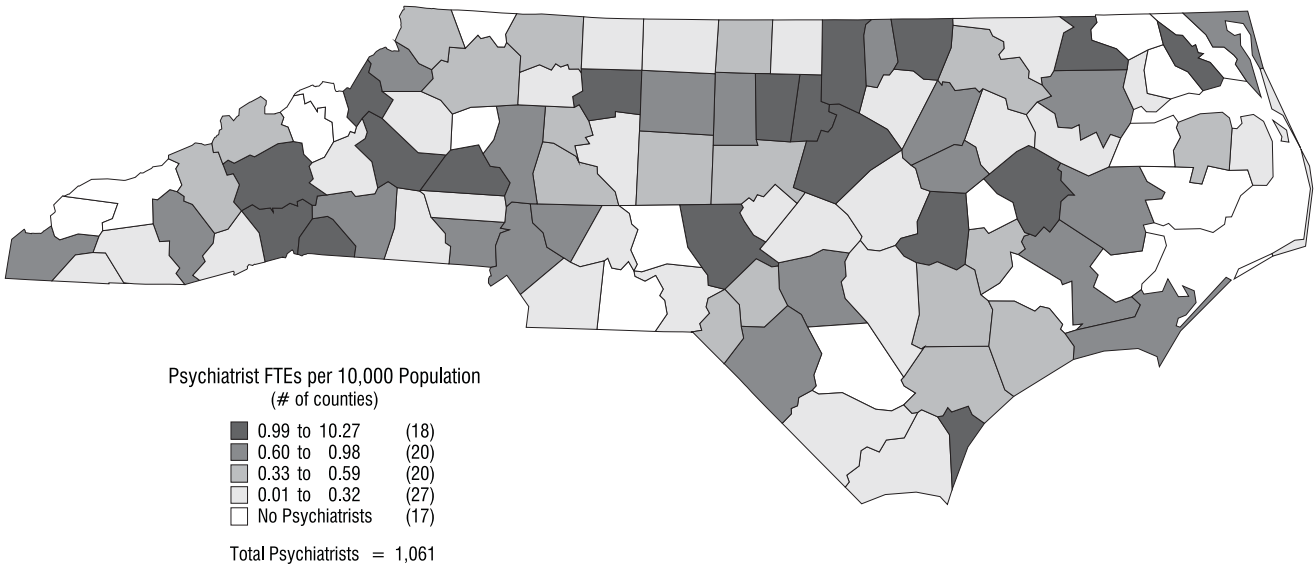
p Excerpted, with permission, from: Fraher E, Swartz M, Gaul K. The Supply and Distribution of Psychiatrists in North Carolina: Pressing Issues in the Context of Mental Health Reform. 2006. Available at: http://www.shepscenter.unc.edu/hp/Psychiatrist_Brief.pdf. Accessed May 2, 2006.

insurance coverage or, if insured, they may have less comprehensive coverage for mental and behavioral health services than they have for other health services.

Many types of health professionals treat mental health disorders, including, but not limited to, psychiatrists, psychologists, primary care providers, social workers, and clinical nurse specialists. While these practitioners are all trained to treat people with mental disorders, certain patients need consultation and treatment by psychiatrists, who are able to treat people using medicine and psychotherapy. Psychiatrists are generally among the lowest paid of physician specialties, which may discourage some physicians from choosing to specialize in psychiatry. (See Chart 4.1.)

North Carolina has a higher psychiatrist-to-population ratio than most other states in the south with the exception of Virginia.[33] North Carolina has 2.4 psychiatrists per 10,000 population. Between 1995 and 2004, the ratio of psychiatrist-to-population remained relatively steady. However, psychiatrists are not evenly distributed throughout the state. In 2004, there were 17 counties with no psychiatrists,[q] and another 27 counties with ratios low enough (0.33 or below) to be designated as mental health professional shortage areas.[24] Psychiatrists are most heavily located close to the state's four mental health hospitals, in counties with major medical centers, and in large metropolitan areas. (See Map 4.8.)

Map 4.8
Psychiatrist Full-Time Equivalents per 10,000 Population, North Carolina, 2004



Source: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the North Carolina Medical Board, 2004.

Psychiatrists include active (or unknown activity status), instate, nonfederal, non-resident-in-training physicians who indicate a primary specialty of psychiatry, child psychiatry, psychoanalysis, psychosomatic med, addiction/chemical dependency, forensic psychiatry, or geriatric psychiatry, and secondary specialties in psychiatry, child psychiatry and forensic psychiatry.

q The counties with zero full-time equivalent psychiatrists in 2004 include Alexander, Alleghany, Anson, Bladen, Camden, Gates, Graham, Greene, Hyde, Jones, Mitchell, Montgomery, Pamlico, Perquimans, Swain, Washington, and Yancey.

Between 1999 and 2004, nearly two-thirds of North Carolina counties either experienced a decline in the proportion of psychiatrists-to-population or had no psychiatrists. Five counties lost all their psychiatrists, 48 counties experienced a decline in the ratio of psychiatrists-to-population, and 12 counties had no psychiatrists in either 1999 or 2004. North Carolina's mental health reform also has had an impact on the provision of care to mental health patients in the public sector. Mental health services in North Carolina are coordinated by local management entities (LMEs). Between 2003 and 2005, the number of LME psychiatrists[r] per capita fell 16%. Per capita losses were higher in rural areas (20%) compared to urban areas (14%), and small population LMEs lost 44% of their psychiatrists.[35]

Between 1999 and 2004, nearly two-thirds of North Carolina counties either experienced a decline in the proportion of psychiatrists-to-population or had no psychiatrists.

In general, psychiatrists are less likely than all other physicians to locate in rural areas or in health professional shortage areas. (See Table 4.5.) In 2004, 15.6% of psychiatrists had their primary practice in a nonmetropolitan county, compared to 21.6% of physicians with other specialties. Similarly, 28.5% of psychiatrists were located in areas that were designated as health professional shortage areas compared to 37.9% of other physicians.

Table 4.5
Primary Practice Location of Psychiatrists and Non-Psychiatrist Physicians, North Carolina, 2004

	Non-metropolitan counties	Metropolitan counties	Whole-county HPSAs	Part-county HPSAs	Not a HPSA
Psychiatrists (%)	15.6%	84.4%	2.1%	26.4%	71.5%
All other physicians (%)	21.6%	78.4%	3.3%	34.6%	62.1%
Ratio of Psychiatrists per 10,000 population	0.58	1.49	0.30	0.83	1.63

Source: Fraher E, Swartz M, Gaul K. *The Supply and Distribution of Psychiatrists in North Carolina: Pressing Issues in the Context of Mental Health Reform.* 2006. Chapel Hill, NC: Cecil G. Sheps Center for Health Services Research.

In the absence of psychiatrists, primary care providers are often faced with the responsibility of diagnosing and managing the care of people with mental illness. However, seven of the 17 counties with no psychiatrists also are whole-county primary care health professional shortage areas. Viewed from another perspective, 11 of the 19 counties that have persistently (six out of the last seven years) been designated as primary care health professional shortage areas also are designated as mental health professional shortage areas.

The supply of child psychiatrists is even more limited. In 2004, 43 counties had no child psychiatrists, and another 42 counties had less than one child psychiatrist per 10,000 population age 18 and younger. Further, the supply of physicians with a primary specialty in child psychiatry has declined 24% over the past decade.

Strategies to address such shortages may target overall supply and education, distribution of providers across North Carolina, and new models of care. A strategy

r LME psychiatrists include those that are directly employed by the LME, individually contracted, or contracted through a provider agency or member of the provider community.

focused on overall supply includes targeting state funding to support academic health centers that increase the number of providers who obtain qualifications for and practice in shortage specialties such as psychiatry and report their data to the Health Workforce Policy Board. A recommendation focused on addressing maldistribution concerns includes increasing funding to the Office of Rural Health and Community Care to increase recruitment efforts to shortage areas. (See Recommendation 3.3 in Chapter 3.) Another includes increasing funding to the NC Area Health Education Centers Program to expand residency positions in child psychiatry and general psychiatry. (See Recommendation 2.9.) Residency funds should be targeted to adding residency positions as well as providing funding to create model community-based teaching sites to prepare psychiatrists to serve rural and other underserved populations. Additional funds are required to provide incentives to residents and other trainees to participate in rotations in underserved communities. Other recommendations related to these strategies are listed below.

In the absence of psychiatrists, primary care providers are often faced with the responsibility of diagnosing and managing the care of people with mental illness.

Recommendation 4.5.

North Carolina medical schools and other health professions programs, specialty societies, and the NC Area Health Education Centers Program should strengthen and expand the mental and behavioral health and psychopharmacology components of training and continuing education to increase competencies in mental and behavioral healthcare for all graduates, with a special emphasis in integrating behavioral health and primary care. Innovative approaches may include special tracks in psychology/behavioral health, better integration of behavioral health content into current curricula, postgraduate programs in behavioral health, and education for psychiatrists and other mental health in working collaboratively with primary care professionals in more integrated models of care.

Recommendation 4.6. (Priority Recommendation)

The NC General Assembly and the NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services, should provide funding to targeted rural communities to establish new models of care to serve public patients in rural and underserved communities.

a) **New models of care should be developed collaboratively with the NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services, the NC Area Health Education Centers Program, the NC Office of Rural Health and Community Care, academic healthcare institutions, and primary care and specialty societies.**

b) **Models should include psychiatrists and other mental health professionals and have close linkages to primary care providers in the service area.**

c) **To improve the professional environment in these settings, these sites should qualify for higher levels of reimbursement, have strong linkages to academic health centers, and have a strong focus on integrated care.**

Recommendation 4.7. (Priority Recommendation)

The NC General Assembly, public and private insurers, and payers (including, but not limited to, the State Health Plan, NC Division of Medical Assistance, and NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services) should pay for:

a) psychiatric consultations for primary care providers and other clinicians either through face-to-face consultations or telemedicine; and

b) services provided by primary care providers to patients who have been diagnosed with a psychiatric diagnosis.

Reimbursement levels for mental and behavioral health services through Medicaid, NC Health Choice, State Health Plan, and other payers should be continually evaluated to ensure they are adequate to meet the costs of care across the state, particularly in underserved areas.

References

1. Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff*. Web Exclusive. April 7, 2004;W4:184-197. Available at: http://content.healthaffairs.org/cgi/reprint/hlthaff.w4.184v1.pdf. Accessed August 31, 2006.
2. Estes EH. Primary care: Building a model for the new medical environment. *NC Med J*. July/Aug 2002;63(4):189-194.
3. Hing E, Cherry DK, Woodwell BA. *National Ambulatory Medical Care Survey: 2004*. Summary Table 5. Number and percent distribution of office visits with corresponding standard errors by selected visit characteristics, according to prior-visit status: United States, 2004. Centers for Disease Control and Prevention. Atlanta, GA: US Department of Health and Human Services. Available online at: http://www.cdc.gov/nchs/data/ ad/ad374.pdf. Accessed July 24, 2006.
4. Bodenheimer T. Primary care—Will it survive? *N Engl J Med*. August 31, 2006;355(9):861-864.
5. NC Health Professions Data System. *New to File and New to Practicing*. Cecil G. Sheps Center for Health Services Research. Chapel Hill, NC: University of North Carolina at Chapel Hill; September 2006.
6. Tu H, Ginsburg PB. *Losing Ground: Physician Income: 1995-2003*. Tracking Report. No. 15. Washington, DC: Center for Studying Health System Change; June 2006. Available at: http://www.hschange.org/CONTENT/851/851.pdf. Accessed September 23, 2006.
7. Medicare Payment Advisory Commission. *Report to the Congress: Medicare Payment Policy*. Washington, DC: Medicare Payment Advisory Commission; March 2006. Available at: http://www.medpac.gov/publications/congressional_reports/Mar06_TOC.pdf. Accessed October 4, 2006.
8. Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations' health: assessing the evidence. *Health Aff*. 2005; Jan-June;Suppl Web Exclusive:W5-97-W5-107.
9. Larson EH, Hart LG, Ballweg R. National estimates of physician assistant productivity. *J Allied Health*. Fall 2001;30(3):146-152.
10. National Center for Health Workforce Analysis. *A Comparison of Changes in the Professional Practice of Nurse Practitioners, Physician Assistants, and Certified Nurse Midwives: 1992 and 2000*. Bureau of Health Professions. Available at: http://bhpr.hrsa.gov/healthworkforce/reports/scope/scope1-2.htm. Accessed September 15, 2006.
11. NC Health Professions Data System. Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. 2006.
12. Doctor of Osteopathy. In: Medline Plus [database online]. Bethesda, MD: National Library of Medicine. Available at: http://www.nlm.nih.gov/medlineplus/encyclopedia.html. Accessed November 8, 2006.
13. American Association of Colleges of Osteopathic Medicine [Web site]. Available at: http://www.aacom.org/. Accessed September 6, 2006.
14. Michael M. Presented at: Primary Care and Specialty Supply Task Force Steering Committee Meeting, North Carolina Institute of Medicine; February 13, 2006; Cary, NC.
15. NC Health Professions Data System. *Annual Profiles: 2000*. Cecil G. Sheps Center for Health Services Research. Chapel Hill, NC: University of North Carolina at Chapel Hill; 2005. Available at: http://www.shepscenter.unc.edu/hp/prof00.htm. Accessed July 13, 2006.
16. NC Health Professions Data System. *Annual Profiles: 2005*. Cecil G. Sheps Center for Health Services Research. Chapel Hill, NC: University of North Carolina at Chapel Hill; 2006.
17. Wing P, Langelier MH, Salsberg ES, Hooker RS. The changing professional practice of physician assistants: 1992 to 2000. *JAAPA*. January 2004;17:37-49.
18. State Center for Health Statistics. *North Carolina Vital Statistics*. Volume 1: 1998-2004. NC Vital Facts: 1996, 1997. Available online at: http://www.schs.state.nc.us/SCHS/data/vitalstats.cfm.
19. NC State Demographics Unit. Available at: http://demog.state.nc.us/. Accessed September 25, 2006.
20. Jones-Vessey K. North Carolina live births attended by certified nurse midwives. *NC Med J*. March/April 2004;65(2):118-119.

21. Ricketts T, Fraher E, Gaul K, King J, Hadley H. Trends in physician supply in North Carolina. Presented at: Primary Care and Specialty Supply Task Force Steering Committee Meeting, North Carolina Institute of Medicine; October 2005; Durham, NC. Available at: http://www.nciom.org/projects/supply/data.html#policy_options.
22. Trends in 2002 rates for physicians' medical professional liability insurance. *Medical Liability Monitor*. October 2002.
23. Taylor DH, Ricketts TC, Berman JL, Koimaga JT. One state's response to the malpractice insurance crisis: North Carolina's rural obstetrical care incentive program. *Public Health Reports*. Sept-Oct 1992;107(5):523-529.
24. NCGS §90-178.3(b).
25. Felter K. Analysis using NC hospital discharge data. Unpublished.
26. Etzioni DA, Liu JH, Maggard MA, Ko CY. The aging population and its impact on the surgery workforce. *Annals of Surgery*. August 2003:238(2)170-177.
27. Stitzenberg KB, Sheldon GF. Progressive specialization within general surgery: Adding to the complexity of workforce planning. *J Am Coll Surg*. 2005;201(6):925-932.
28. Newton DA, Grayson MS. Trends in career choice by US medical school graduates. *JAMA* 2003;290(9):1179-1182.
29. Thompson MJ, Lynge DC, Larson EH, Tachawachira P, Hart G. Characterizing the general surgery workforce in rural America. *Arch Surg*. 2005;140:74-79.
30. Zuckerman R, Doty B, Gold M, et al. General surgery programs in small rural New York state hospitals: A pilot survey of hospital administrators. *J Rural Health*. 2006;22(4)339-342.
31. Kessler R, Demler O, Frank RG, et al. Prevalence and treatment of mental disorders, 1990 to 2003. *N Engl J Med*. June 16, 2005;352(24):2515-2523.
32. Williams J, Klinepeter K, Palmes G, Pulley A, Foy JM. Diagnosis and treatment of behavioral health disorders in pediatric practice. *Pediatrics*. 2004;114(3):601-606.
33. National Center for Health Workforce Analysis. *State Health Workforce Profiles, Highlights from the 2000 Profiles*. Rockville, MD: Bureau of Health Professions, Health Resources and Services Administration; 2004. Available at: http://bhpr.hrsa.gov/healthworkforce/reports/profiles/. Accessed July 5, 2006.
34. Bureau of Health Professions, Health Resources and Services Administration. Available at: http://bhpr.hrsa.gov/shortage/hpsaguidement/htm. Accessed September 30, 2006.
35. *Discarding Community Psychiatrists: The Third Report Card by the North Carolina Psychiatric Association*. Raleigh, NC: North Carolina Psychiatric Association; April 18, 2006. Available at: http://ncpsychiatry.org/NCPA%20Report%20Card%20III.pdf. Accessed October 5, 2006.

Underrepresented Minorities in the Health Professions

Chapter 5

Minority populations comprise almost one-third of the state's population. African Americans, American Indians, and Hispanics have lower per capita incomes and, as a result, are more likely to lack health insurance[1] or rely on publicly-funded health insurance than are whites.[2] These groups also have lower reported health status and are more likely to suffer from certain chronic health problems.[2] Despite their greater healthcare needs, they are more likely to report health access barriers. Some underserved minority groups face discrimination in healthcare settings and may be distrustful of some healthcare providers and institutions.[3,4] Fortunately, some of these issues can be ameliorated by making it easier for members of underserved minority groups to select providers with ethnic backgrounds similar to their own. Healthcare providers from underrepresented minority, ethnic, and racial groups are more likely to serve patients of their own ethnicity or race and patients with poor health.[5,6,7]

When given the option, individuals of all racial and ethnic groups are more likely to pick providers who share their racial and ethnic backgrounds.[7,8] Minority patients have lower levels of trust in providers of other racial groups.[5] Studies suggest minority patients are generally more satisfied with care received from providers of similar race and/or ethnicity (racial and ethnic concordant patient-physician relationships)[3,7,9] and are more actively involved in making decisions about their own care when visiting providers of their own race and ethnicity. In addition, patient-centered care (ie, respect for the patient's preferences and coordination of care) is emphasized more during visits in which the patient and provider are of the same race compared to when they are not.[3] The duration of visits to the physician is considered an important proxy measure for determining quality of care. Studies indicate that visits are longer for both African American and white patients when the provider and patient are of the same race/ethnicity.[4]

Not only are underrepresented providers more likely to serve patients of their own ethnicity or race, they also are more likely to practice in underserved areas.

Not only are underrepresented providers more likely to serve patients of their own ethnicity or race, they also are more likely to practice in underserved areas. North Carolina has 11 whole-county and 27 part-county persistent health professional shortage areas (PHPSAs).[a] The significant number of areas in North Carolina lacking sufficient health providers makes it particularly valuable to have providers who are willing to serve the state's minority populations and underserved communities. In North Carolina, nonwhite physicians, physician assistants (PAs), and nurse practitioners (NPs) are more likely than white providers to practice in whole-county PHPSAs.[b]

---

a The Bureau of Health Professions in the US Department of Health and Human Services has designated certain communities, population groups, or medical facilities as health professional shortage areas (HPSAs). Areas that are designated as HPSAs must define and justify a rational service area for the delivery of health services (often a county), have a sufficiently low provider-to-population ratio, and show evidence that nearby resources are overutilized, too distant, or otherwise inaccessible.

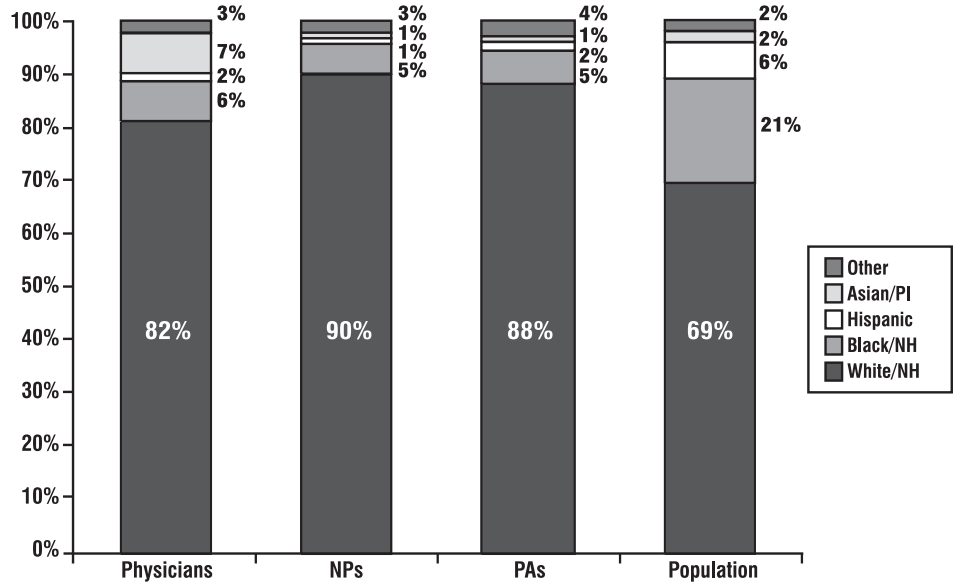
b Persistent health professional shortage areas are those that have been designated as HPSAs in six of the last seven years. An entire county or part of a county can qualify as a HPSA. Whole-county HPSAs refer to entire counties that qualify as HPSAs.

Ratio of North Carolina Minority Providers to Population

Minority populations comprise 30% of North Carolina's population, but they account for only 18% of physicians, 12% of PAs, and 10% of NPs in the state. Graph 5.1 illustrates the race of North Carolina's population compared to the race of the state's providers, including physicians, NPs, and PAs. Of the state's 8.5 million residents, 69% are white, non-Hispanic; 21% are African American or black, non-Hispanic; 6% are Hispanic; 2% are Asian or Pacific Islander; and 1% are American Indian. By comparison, whites account for 82% of the physician population (17,090), Asians 7%, African Americans 6%, and Hispanics 2%. Similarly, whites account for 90% and 88% of the NP and PA populations, respectively, while African Americans account only for 5%, and Hispanics account for 1-2% of each group.

Minority populations comprise 30% of North Carolina's population, but they account for only 18% of physicians, 12% of PAs, and 10% of NPs in the state.

Graph 5.1
Race of Population and Providers, North Carolina, 2004

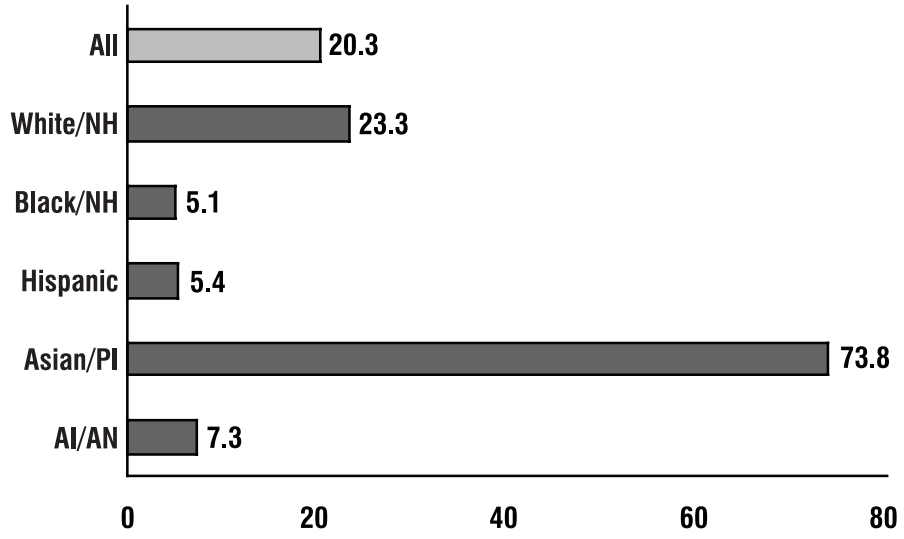


Source: NC Health Professions Data System and US Census. Other includes American Indian.

Availability of providers from a variety of ethnicities and races is important because studies indicate patients are more likely to choose providers of the same race or ethnicity[9] and are more satisfied with visits to providers of the same race or ethnicity.[4] Racial and ethnic differences in provider-patient relationships often create barriers and limit effective communication.[10] Underrepresented minority providers (African American, Hispanic, and Native American) are more likely to practice in persistent health professional shortage areas (39% for minority providers compared to 29% for white providers).

Graph 5.2 compares physician to 10,000 population ratios by race. There are only 5.1 African American, 5.4 Hispanic, and 7.3 American Indian physicians per 10,000 population compared to 23.3 white physicians per 10,000 population. The ratio of Asian physicians to population is high (73.8 per 10,000 population) due to lower numbers of Asians in the state and because a high proportion (58%) of Asian physicians in the state move to the US as international medical graduates (IMGs).

Graph 5.2
Total Physicians per 10,000 Population of the Same Race, North Carolina, 2004



Source: NC Health Professions Data System and US Census.

Evaluating the same data for physicians who practice primary care show similar results. There are 3.2 African American, non-Hispanic primary care physicians per 10,000 population, with 2.6 Hispanic and 4.7 American Indian primary care physicians per 10,000 population, compared to 9.4 white and 36.8 Asian/Pacific Islanders. Ratios of NPs and PAs to 10,000 population who practice primary care are approximately five times and four times higher, respectively, for non-Hispanic whites than they are for African Americans and Hispanics. Data indicate that American Indian provider-to-population ratios for these professions are similar to those of whites.

Minority Access to Healthcare and Health Professions Education

Historically, nonwhite individuals faced significant discrimination in access to healthcare services and inclusion in the healthcare professions. Minorities received care in segregated healthcare settings and were excluded from most medical professional training and practice opportunities. Even after the Civil Rights Act in 1965 precluded discrimination in higher education, most African American physicians were trained at Howard and Meharry. It was not until 1969 that the number of black medical students at Howard and Meharry was exceeded by the number enrolled in all other medical programs in the country. Fortunately, after targeted efforts to increase opportunities for minority students in these other medical institutions, underrepresented minorities accounted for 10% of all medical school enrollees in 1974 and 12% in 1994.[3]

Unfortunately, those numbers have since declined,[3] and with a state population that is more than 25% minority, North Carolina has a long way to go before enrollment in medical schools and NP, PA, and certified nurse midwife (CNM) programs mirror the state's population. Furthermore, to create an environment that is attractive to

minority health professional students, the faculty populations of health professions training schools need to include underrepresented minorities. Underrepresented minority faculty also may serve as better mentors to these students. Finally, it is important that these faculty members also serve as department chairs. Department chairs make important decisions regarding curricula and student populations, and minority chairs may be more sensitive to issues related to underrepresented minority student populations. They also may help place greater value on cultural diversity and diverse student bodies.

One of the most direct options for increasing underserved minority providers in North Carolina would be to develop new health professions training programs at historically minority public or private colleges and universities.

One of the most direct options for increasing underserved minority providers in North Carolina would be to develop new health professions training programs at historically minority public or private colleges and universities. Historically, minority colleges and universities educate students of all races and ethnicities, but focus on education of the African American population. North Carolina is fortunate to have a number of historically minority colleges and universities, both public and private, including Elizabeth City State University, Fayetteville State University, North Carolina A&T State University, North Carolina Central University, Winston-Salem State University, Bennett College, Johnson C. Smith University, Livingstone College, Shaw University, St. Augustine's College, and the University of North Carolina at Pembroke. Most of these schools offer strong science curricula, and there needs to be a continued effort to offer health professions training programs through these historically minority colleges and universities. North Carolina Central University offers a Bachelor of Science degree in nursing as does Winston-Salem State University. However, Winston-Salem State University is the only program in the state also to offer training programs in occupational therapy, physical therapy, and clinical laboratory science. Beyond that, the majority of historically minority colleges and universities have psychology majors, but as of 2004 there were few, if any, other health professions training programs in these schools.

One innovative new program initiated in 2005 was a partnership between Elizabeth City State University (ECSU) and the University of North Carolina at Chapel Hill (UNC Chapel Hill) School of Pharmacy. The UNC Chapel Hill/ECSU Doctor of Pharmacy Partnership Program will enroll 10 to 15 students each year.[11] The program provides instruction to students on the ECSU campus through synchronous video-teleconferencing, on-campus seminars, and ancillary web-based instruction. Students in the program will interact through computer-mediated communications with UNC Chapel Hill students, faculty, and advisors. Pharmacy training for ECSU-based students will be the same as that of UNC Chapel Hill-based students, with preferential scheduling for the ECSU students in the northeastern region of the state. Such an innovative program through a historically minority college or university will help increase the number of minority providers in the state and also may have the benefit of increasing the number of providers willing to work in underserved areas of North Carolina. Similar partnerships or satellite programs should be considered or consideration should be given to development of completely new health professions training schools at historically minority colleges or universities. (See Recommendations 2.4, 2.5, and 2.7.) These strategies would increase underrepresented minority enrollment in health professions programs and the number of practicing providers statewide. Other strategies include

increasing the enrollment of minorities in existing health professions schools (Recommendations 2.4 and 2.7), providing financial support to health professions schools that increase their production of minority healthcare professionals (Recommendation 2.8), and additional strategies listed below.

Recommendation 5.1. (Priority Recommendation)

The state and existing medical and other health professions schools should implement strategies to expand the number of underrepresented minority physicians, nurse practitioners, physician assistants, and certified nurse midwives and to decrease professional isolation.

These strategies may include but are not limited to:

a) developing minority-focused health professions schools in historically minority public or private colleges and universities;

b) creating satellite campuses with historically minority public or private colleges and universities;

c) creating and expanding minority scholarship programs, particularly in NP and PA programs;

d) developing healthcare mentorship programs in historically minority public or private colleges and universities to encourage more underrepresented minorities to consider health professions;

e) hiring faculty and chairs in health professions schools who are members of underrepresented minority groups and providing them with professional support to reduce professional isolation;

f) modifying admission policies to facilitate the enrollment of minority applicants; and

g) developing a state strategy to aggressively retain health professional graduates for residency or practice in North Carolina or to specifically attract North Carolina health professions school graduates doing residencies outside the state.

Language Barriers and Cultural Competence

Language differences create additional barriers to access to healthcare services. In North Carolina, approximately 150,000 Spanish-speaking residents do not speak English well or do not speak English at all.[12] Studies show people who do not speak English well (limited English proficiency) are not only more likely to report being in fair or poor health but also are more likely to defer needed medical care, miss follow-up appointments, and experience drug complications.[13,14] Language barriers are more likely to create communication problems leading to medical errors. Multilingual providers can help address language barriers for growing Latino or immigrant populations. Multilingual practitioners who are native speakers are more likely to understand how patients' cultural beliefs and practices can impact their health. They also can help practices meet Title VI requirements to ensure that

services are linguistically accessible.[c] The NC Office of Rural Health and Community Care (ORHCC) has placed a priority on recruiting multilingual professionals; ORHCC can offer providers a bonus if they are multilingual and agree to practice in medically underserved areas. Since July of 2001, ORHCC has recruited 88 multilingual health professionals into North Carolina.

In addition to recruiting native Spanish-speaking practitioners into the health professions and/or into practice in North Carolina, other training models can be used to teach Spanish to health professionals who are native English speakers. Successful models, developed in the state, exist to train health professionals to speak Spanish and thus improve communication between providers and patients. These models include the North Carolina Area Health Education Centers Spanish Language and Cultural Training Initiative, *A Su Salud* intermediate language tapes for healthcare professionals developed by the University of North Carolina at Chapel Hill, Wake Forest Spanish education for medical students, the NC Latino Health Resource Center, and others.

In addition to addressing language barriers, it is also important to ensure providers are trained to respect and understand cultural differences of diverse populations. Research demonstrates that cultural sensitivity training for healthcare providers improves knowledge, skills, and attitudes of providers while increasing patient satisfaction.[15,16] Thus, cultural sensitivity training has overall benefits for the provider-patient relationship. However, medical students often are not required to complete cultural diversity training.[17,18] With assistance from the American Medical Student Association, two of the four North Carolina medical schools are participating in the Achieving Diversity in Dentistry and Medicine (ADDM) contract awarded by the US Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Division of Medicine and Dentistry.[19] The University of North Carolina at Chapel Hill School of Medicine is part of the pilot testing of a cultural competency curriculum. Brody School of Medicine at East Carolina University is part of the pilot testing of an ethnogeriatrics[d] curriculum.

Additionally, the Brody School of Medicine at East Carolina University received a Pre-Doctoral Training in Primary Care grant from the Health Resources and Services Administration of the US Department of Health and Human Services. The goal of this project is to decrease health disparities for the Spanish-speaking population of eastern North Carolina. The proposed program is designed to plan, implement, and evaluate a cultural literacy/fluency curriculum that would improve the ability of medical students to deliver care to the Spanish-speaking population.[20]

Some low-cost models for improving cultural competency or at least cultural awareness are available on the Internet. For example, America's Health Insurance

c Title VI of the Civil Rights Act requires that federal fund recipients (eg, healthcare providers who receive federal Medicaid/Medicare funds) make their services linguistically accessible to people with limited English proficiency (LEP). 42 U.S.C. §2000d-1; 45 CFR §80.3(b)(2).

d Ethnogeriatrics integrates the influence of race, ethnicity, and culture on the health and well-being of older adults.

Plan's (AHIP) "Quality Interactions: A Patient-Based Approach to Cross-Cultural Care" is a free continuing medical education course for physicians. Through an interactive patient case study, physicians can improve their ability to effectively communicate with and care for patients from diverse backgrounds. This module also discusses the business, medical, and legal reasons why cultural competence is essential in the practice of medicine. Although institutional approaches such as integrating cultural competency into medical school curricula would likely be more effective and have greater impact, low-cost models offer some alternatives if no more intensive program is available.

Recommendation 5.2. (Priority Recommendation)

a) **North Carolina medical and other health professions schools including university and community college programs should:**

   i) **recruit and admit more multilingual and multicultural students into health professions classes;**

   ii) **offer and encourage students to take Spanish medical language courses as part of health professions training;**

   iii) **develop innovative programs to prepare more multilingual and multicultural graduates; and**

   iv) **build cultural sensitivity training into curricula.**

b) **North Carolina foundations should create through a competitive process a Center for Excellence to inventory, evaluate, and disseminate best practices in healthcare professional programs.**

Recommendation 5.3.

The NC Area Health Education Centers Program should work collaboratively with key partners including the Center for New North Carolinians and the Office of Minority Health and Health Disparities to:

a) **expand existing Spanish language programs to train more interpreters and practicing health professionals; and**

b) **expand cultural competency and cultural sensitivity training for all health professionals.**

Recommendation 5.4.

The NC General Assembly should create a grants program to incentivize medical schools and other health professions training programs to produce more multilingual and multicultural healthcare professionals.

For example, grants could be awarded for programs that create opportunities for intensive language training and immersion courses to produce multilingual and multicultural healthcare professionals or that offer loan forgiveness or scholarships tied to students who meet certain multilingual and cultural competency requirements.

Recommendation 5.5.

The NC Community College System should place greater emphasis on recruiting and training multilingual and multicultural medical office staff, nurses, and allied health professionals.

Other strategies include those listed in Recommendation 5.2.

North Carolina Programs to Promote Representation of Underrepresented Minorities in Healthcare Professions

Many programs throughout North Carolina are focused on promoting the representation of underrepresented minorities in healthcare professions. These programs target a variety of students including those in grades K-12, undergraduate programs, and medical schools. Two examples of such programs, which are particularly successful in reaching larger numbers of students, include the NC Health Careers Access Program (NC-HCAP) and programs conducted by the NC Area Health Education Centers (AHEC) Program.

NC-HCAP has campus-based health career centers at the University of North Carolina at Chapel Hill, Elizabeth City State University, North Carolina Central University, and the University of North Carolina at Pembroke. Campus-based activities involve identifying, recruiting, motivating, and strengthening the academic and basic skills of disadvantaged students in health training and professional health programs. NC-HCAP also offers programs in conjunction with several other campuses, school systems, organizations, and agencies. NC-HCAP offers activities for upper elementary through undergraduate students, including programs such as the Clinical Health Summer Program, health careers information and enrichment workshops, health professions forums, Inspirational Speakers in Science lecture series, NC-HCAP Ambassador Program, NC-HCAP enrichment seminars, parent workshops, and Science Enrichment Preparation program. (See Appendix B.)

The large number of students involved in precollege activities makes tracking difficult for NC-HCAP, but there is focused tracking for students involved in its undergraduate programs.[21] Since 1979, NC-HCAP has supported 935 students in college enrichment programs targeted at rising college sophomores and juniors; approximately 60% of those students now are health professionals, and approximately 39% are continuing along the pathway to becoming health professionals.[22] In the future, NC-HCAP hopes to develop a statewide directory for tracking participants in all North Carolina programs promoting health careers for underprivileged or underrepresented youth.

Unfortunately, NC-HCAP is currently struggling to support its existing programs. The federal government recently cut funding for Title VII of the Public Health Service Act, which supported programs aimed at increasing the representation of underrepresented minorities among the health profession disciplines. NC-HCAP received Title VII funds for its programs and that support was eliminated as a result of the federal cuts.

AHEC also conducts activities to increase minority representation in healthcare professions through its Health Careers and Workforce Diversity initiatives. In

2002-2003, 39,000 individuals participated in these programs.[23] See Appendix A for a list of North Carolina agencies and groups providing programs focused on promoting representation of underrepresented minorities in health professions.

Recommendation 5.6. (Priority Recommendation)

The NC Area Health Education Centers (AHEC) Program should work collaboratively with key partners to explore issues that need to be addressed in creating a statewide, uniform student tracking and evaluation system of federal and state funded programs across the educational pipeline. AHEC should report findings back to the Health Policy Workforce Board. The goal of this report should be to determine how best to:

a) evaluate existing minority health professions pipeline programs and expand the most successful programs, particularly those with a focus on intensive, longitudinal programs that work with small numbers of students over a longer period of time;

b) develop a statewide, uniform student tracking and evaluation system and program inventory of formal and informal programs across the educational pipeline which is shared by precollege and university health career advisors and counselors.

Future state funding should be tied to programs found to be the most successful in increasing underrepresented minorities in health professions.

Recommendation 5.7.

The Office of Rural Health and Community Care in collaboration with minority professional associations, such as Old North State Medical Society and other key partners, should provide practice support to underrepresented minority health professionals who choose to practice in underserved areas. Support can include, but not be limited to, creation of community mentoring programs or other strategies to support retention of underrepresented minorities in underserved areas.

References

1. Centers for Disease Control and Prevention. *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention. Available at: http://apps.nccd.cdc.gov/brfss/. Accessed July 19, 2006.
2. US Census Bureau and Bureau of Labor Statistics. *Analysis of 2004 and 2005 Annual Social and Economic Supplements, Current Population Survey.*
3. Smedley BD, Stith AY, Nelson AR, eds. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare*. Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care, Board on Health Sciences Policy, Institute of Medicine. Washington, DC: National Academy Press; 2003.
4. Cooper LA, Roter DL, Johnson RL, Ford DE, Steinwachs DM, Powe NR. Patient-centered communication, ratings of care, and concordance of patient and physician race. *Ann Intern Med*. 2003;139:907-915.
5. Moy E, Bartman BA. Physician race and care of minority and medically indigent patients. *JAMA*. 1995;273:1515-1520.
6. Komaromy M, Grumbach K, Drake M, et al. The role of black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med*. 1996;334(20):1305-1310.
7. Cooper LA, Powe NR. Disparities in patient experiences, health care processes, and outcomes: The role of patient-provider racial, ethnic, and language concordance. New York, NY: The Commonwealth Fund; July 2004. Available at: http://www.cmwf.org/publications/publications_show.htm?doc_id=231670. Accessed November 7, 2006.
8. LaViest TA, Nuru-Jeter A. Is doctor-patient race concordance associated with greater satisfaction with care? *J Health Soc Behav*. 2002;43(3):296-306.
9. Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient-physician racial concordance and the perceived quality and use of health care. *Arch Intern Med*. 1999;159:997-1004.
10. Cooper-Patrick L, Gallo JJ, Gonzales JJ, et al. Race, gender, and partnership in the patient-physician relationship. *JAMA*. 1999;282(6):583-589.
11. Pharmacy. Elizabeth City State University. Available at: http://www.ecsu.edu/academics/pharmacy/index.cfm. Accessed September 22, 2006.
12. Bureau of the Census. 2000 Summary File 3. P19. Age by Language spoken at Home by Ability to Speak English for the Population 5 Years and Over. Available online at: http://factfinder.census.gov/home/saff/main.html?_lang=en.
13. Ku L, Flores G. Pay now or pay later: Providing interpreter services in health care. *Health Aff*. 2005;24(2):435.
14. Brach C, Fraser I, Paez K. Crossing the language chasm. *Health Aff*. 2005;24(2):424.
15. Beach M, Price EG, Gary TL, et al. Cultural competence: A systematic review of health care provider educational interventions. *Medical Care*. April 2005;43(4):356-373.
16. Majumdar B, Browne G, Roberts J, Carpio B. Effects of cultural sensitivity training on health care provider attitudes and patient outcomes. *Journal of Nursing Scholarship*. Summer 2004;36(2):161-166.
17. Loudon R, Anderson P, Gill P, Greenfield S. Educating medical students for work in culturally diverse societies. *JAMA*. September 1999;282(9):875-880.
18. Lum C, Korenman S. Cultural-sensitivity training in US medical schools. *Acad Med*. March 1994; 69(3):239-241.
19. American Medical Student Association. *Achieving Diversity in Dentistry and Medicine*. Available at: http://www.amsa.org/addm/. Accessed June 29, 2006.
20. Personal communication with Sidette Boyce, MA, Curriculum Coordinator for the Predoctoral Training in Primary Care Grant, East Carolina University. September 8, 2006.
21. Personal communication with Heather Scott, NC-HCAP. June 21, 2006.
22. Personal communication with Carolyn Mayo, Director, NC-HCAP. July 21, 2006.
23. Ricketts T, Gaul K. Numbers of minority health professionals: Where do we stand? *NC Med J*. 2004;65(6):381-384.

Conclusion and Recommendations Chapter 6

Access to healthcare providers, including physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs), is very important to the health of individuals and populations. In the past 20 years, the ratio of providers-to-population has increased in North Carolina, but the rate of increase recently has slowed. In 2005, the state had 20.7 physicians to every 10,000 people, which is about average compared to all US states. However, in the future, North Carolina will face challenges in meeting the population's demands for care. The state's healthcare needs are expected to increase due to population growth, aging of the population, and an increase in the prevalence of chronic diseases. If nothing is done to change the supply of providers in North Carolina, the ratio of physicians-to-population is expected to drop 8% by 2020 and 21% by 2030. The ratio of all providers-to-population, including PAs, NPs, and CNMs, is expected to drop between 2% and 13% by 2030. The problem is projected to grow even more acutely if increased needs of an aging population (adjusted population figures) are factored into the shortfall.[a]

Table 6.1
Projected Change in Provider-to-Population Ratios, North Carolina, 2020 and 2030

	Projected Change in Provider-to-Population Ratios		Projected Change in Provider-to-Adjusted Population Ratios	
	2020	2030	2020	2030
Physicians only	-8%	-21%	-12%	-26%
All providers				
Best case	4%	-2%	-1%	-8%
Worst case	-4%	-13%	-8%	-19%

Source: NC Institute of Medicine and NC Health Professions Data System.

Although the potential shortfall is considerable, a number of policies could be used to ameliorate this deficit, if the state acts soon and plans ahead. Options to improve quality and productivity of existing practices should be identified so health professionals can provide high-quality health services to more North Carolinians. The state should concurrently examine options to develop new models of care that would reduce the need for healthcare providers and/or expand the supply of physicians, NPs, PAs, and CNMs. North Carolina needs to engage simultaneously in multiple strategies to increase supply. If new medical school slots are created but new residency slots are not, in-state retention of the expanded number of medical school graduates will be lower as many will need to leave the state for residency and are not likely to return. Similarly, initiatives to increase awareness of health careers among rural and minority middle and high school students will have little impact without also expanding available enrichment programs to help students overcome hurdles to being accepted into medical school. In addition,

a NC Institute of Medicine and the NC Health Professions Data System. (See Appendix A.)

initiatives should expand medical school support programs to help stem the higher dropout rates of minority medical students. North Carolina also should explore ways to recruit physicians and other providers into North Carolina and to encourage existing practitioners to remain in practice in North Carolina. In short, many of these policy options are interdependent. Effectiveness of any specific policy option is dependent, in part, on the success of other efforts that affect the provider production pipeline. Thus, there is no single policy option that will resolve the impending provider shortage; success requires adoption of many complementary strategies.

The wide constellation of policy levers available to address this potential problem offers the opportunity to develop solutions before the provider shortage reaches crisis proportions. Full adoption of all recommendations listed above would ensure that North Carolinians continue to have the access to quality healthcare they do today. Implementation of the recommendations would help improve provider distribution problems, ensure a more adequate supply of primary care providers and other providers in specialty shortages, and increase the number of underrepresented minorities in the profession.

North Carolina need not implement all provider supply strategies in order to maintain the current provider-to-population ratio. For example, the state does not need to increase the number of physicians, NPs, PAs, and CNMs each by 30% in order to maintain current ratios. To some extent, these are alternate strategies that depend, in part, on when other strategies are implemented. If implemented *today*, the state could maintain its current ratio over the next 25 years by:

1) increasing the yearly educational production of physicians by 20%, *or*
2) increasing the production of nonphysician clinicians by over 30%, *or*
3) increasing in-migration to produce a *net* increase of physicians by 15%, *or*
4) increasing the capacity of the health system to effectively manage the health of North Carolinians or improving the health of North Carolinians to reduce the need for health services by 15%.

The Task Force recognized that the multiple goals outlined throughout the report makes it unlikely that implementation of one Task Force recommendation would solve all future workforce problems. Instead, some combination of recommendations would be the most promising strategy. Pragmatically, the degrees of expansion outlined above are all ambitious undertakings. While a 30% increase in physician production may be infeasible, a 5% increase in all four strategies may be realistic and would maintain North Carolina's access to quality healthcare.

The longer the state waits to implement the strategies, the greater the number of providers it will need to produce on a yearly basis to address the anticipated provider shortages. The Task Force recognized that ambitious goals may be necessary to achieve the momentum needed to address the issue sufficiently. Furthermore, although North Carolina is facing a potential provider shortage in the future, it faces other provider supply issues *today*. The state must take necessary steps to ensure North Carolina has the right mix of providers in the right locations.

The following table summarizes the Task Force recommendations. Priority recommendations are highlighted in bold.

Table Legend

* Recommendations that are in bold font have been identified as priority recommendations.

** Recommendations that examine the mix of specialists are marked with a "✓". The recommendations that apply to specific provider specialties are listed as PC (primary care focused), Del (providers who deliver babies), Psych (psychiatrist or mental health providers), Surg (general surgeons), Ger (geriatrics), DOs (Doctors of Osteopathy), PA (physician assistants specifically), NP (nurse practitioners specifically), or CNM (certified nurse midwives specifically).

*** The column entitled "New Models" includes any recommendation that focuses on new models of delivering care to meet the changing healthcare needs of the population, including, but not limited to, interdisciplinary team training or greater use of telemedicine.

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Overall Provider Supply						
Rec. 2.1. (Priority Recommendation)*	✓	✓	✓	✓	✓	✓
a) The NC General Assembly should appropriate $170,000 to support and expand the health professional workforce research center charged with examining current and future needs for health professionals, which is housed within the Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. Research should be conducted at the individual practitioner level as well as the practice level. The Center will expand its current research to include analyses that: 1) identify the need for physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs) to meet the healthcare needs of the state 5, 10, and 20 years into the future; 2) identify new models of care that can improve the quality and efficiency of care offered by North Carolina providers; 3) examine the distribution of physicians, NPs, PAs, and CNMs across the state; 4) examine trends in the supply of minority health professionals in comparison to the general population and examine percentage of underrepresented minority students and residents who receive training in North Carolina but who leave the state for practice;						

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
5) examine trends in the numbers of primary care and specialty providers by specialty area; 6) examine changes in health status and sociodemographic factors that might influence future healthcare needs so as to examine the mix of healthcare professionals necessary to address the state's healthcare needs; and 7) identify barriers that affect entry into the health professional workforce or continued practice, if any. b) The NC General Assembly should create an ongoing Health Workforce Policy Board that is charged with developing strategies to address impending health professional workforce shortages. The Board will include representation from the NC Office of the Secretary, NC Department of Health and Human Services, NC Office of Rural Health and Community Care, NC Area Health Education Centers Program, five North Carolina academic health centers, NC Community College system, relevant professional associations and licensing boards, NC Hospital Association, NC Medical Society Foundation, and nonmedical public members. The Board shall identify strategies to: 1) develop new models of care that encourage quality and efficiency of healthcare services; 2) increase the overall supply of physicians, NPs, PAs, and CNMs to meet the unmet health needs of the state's growing population; 3) encourage more health professionals to practice in health professional shortage areas; 4) establish priorities for which types of provider specialties are most needed to meet the healthcare needs of the state; 5) increase the supply of underrepresented minorities in the profession; 6) ensure the mix of health professionals is appropriate to meet the changing healthcare needs of the state; and 7) address barriers that affect entry into the health professional workforce or continued practice, if any. The Health Workforce Policy Board should report its findings and proposed recommendations on an annual basis to the University of North Carolina Board of Governors, the NC State Board of Community Colleges, and the NC General Assembly.						

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Rec. 2.2. (Priority Recommendation) In order to develop and implement new models of care: a) North Carolina foundations should help fund new models of care for improving quality and efficiency of primary and specialty care across North Carolina. New models should be evaluated to determine if they improve quality of care and/or efficiency. b) Medical schools, other health professions schools, and residency programs should incorporate successful new models of care into training curricula and ensure that students and residents have the opportunity to practice using new models. c) The State Health Plan, Division of Medical Assistance, and private insurers should modify reimbursement policies to support the long-term viability of new models that are shown to improve quality and/or efficiency.	✓				✓	
Rec. 2.3. (Priority Recommendation) The NC General Assembly should appropriate: a) $2.5 million to The Carolinas Center for Medical Excellence to increase the number of practices that receive technical assistance under the Doctor's Office Quality-Information Technology project and to expand this assistance to include pediatric offices; and b) $4.8 million to the NC Medical Society Foundation to provide grants to small or solo practitioners to purchase health information technologies to improve quality performance and practice efficiencies.	✓				✓	✓
Rec. 2.4. (Priority Recommendation) North Carolina medical schools should increase enrollment by 30% (AAMC recommendation). Expansion can be accomplished through an increase in enrollment on existing campuses or through satellite campuses. In expanding programs, medical schools should consider changing admissions criteria or using other strategies to increase the overall supply of physicians practicing in the state, increase the number of physicians who set up practice in underserved areas, increase the number of physicians who specialize in shortage specialties, increase the number of underrepresented minority physicians practicing in the state, and enhance interdisciplinary team training.	✓	✓	✓	✓	✓	
Rec. 2.5. If current medical schools are unable to increase enrollment by 30%, the NC General Assembly should consider creation of a new public allopathic or osteopathic medical school or provide incentives to encourage development of	✓	✓	✓	✓	✓	

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
a new private medical school. Specifically: a) The NC General Assembly should appropriate funds to build a new state-supported allopathic or osteopathic medical school that will focus on increasing the supply of physicians who practice in North Carolina, particularly those willing to practice in medically underserved areas or in shortage specialties. Special consideration should be given to creating a medical school that focuses on increasing the number of underrepresented minority physicians in the state, increasing the overall supply of physicians practicing in the state, increasing the number of physicians who set up practice in underserved areas, increasing the number of physicians who specialize in shortage specialties, and enhancing interdisciplinary team training. b) Alternatively, as part of state efforts to increase economic development in communities across the state, the Department of Commerce should consider incentives to attract private osteopathic or allopathic medical schools into the state.						
Rec. 2.6. The NC General Assembly should appropriate funds to pay for allocated seats for North Carolina students admitted to osteopathic schools in other states (eg, Alabama or Kentucky model) with an obligation that students return to practice in North Carolina.	✓			DO		
Rec. 2.7. (Priority Recommendation) a) The North Carolina physician assistant (PA) programs should increase student enrollment by 30%. Expansion can be accomplished through an increase in enrollment on existing campuses or through satellite campuses. In expanding programs, PA schools should consider changing admissions criteria or using other strategies to increase the overall supply of PAs practicing in the state, increase the number of PAs who set up practice in underserved areas, increase the number of PAs who specialize in shortage specialties (including but not limited to geriatrics and behavioral health), increase the number of underrepresented minority PAs practicing in the state, and enhance interdisciplinary team training. b) North Carolina nurse practitioner (NP) schools should increase student enrollment by 30%. In expanding programs, NP schools should consider changing admissions criteria or using other strategies to increase the overall supply of NPs practicing in the state, increase the number of NPs who set up practice in underserved areas, increase the number of NPs who	✓	✓	✓	PA NP CNM Ger Psych		

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
specialize in shortage specialties (including but not limited to geriatrics and behavioral health), increase the number of underrepresented minority NPs practicing in the state, and enhance interdisciplinary team training. c) The Nurse Midwifery program at East Carolina University should increase student enrollment by 30%.						
Rec. 2.8. (Priority Recommendation) a) The NC General Assembly should provide financial support to encourage or reward medical schools and other health professions schools that produce physicians, nurse practitioners (NPs), physician assistants (PAs), and certified nurse midwives (CNMs) who fill the unmet health needs of the state's population. Incentives should be provided to increase the overall supply of healthcare providers, appropriately distribute physicians, NPs, PAs, and CNMs practicing in the state, and promote interdisciplinary training. Enhanced funding should be tied to outcomes that result in: 1) increased numbers of physicians, NPs, PAs, and CNMs who set up and maintain practices in underserved areas; 2) increased numbers of physicians, NPs, PAs, and CNMs who obtain qualifications for and practice in primary care or other shortage specialties as identified by the Health Workforce Policy Board; 3) increased numbers of practicing physicians, NPs, PAs, and CNMs who are members of underrepresented minorities; or 4) greater interdisciplinary didactic and clinical team training among physicians, NPs, PAs, CNMs, nurses, and other health professionals (eg, pharmacists, social workers, allied health workers). b) In order to determine the effectiveness of various training programs in meeting the healthcare workforce needs of North Carolina, the NC General Assembly should amend NCGS §143-613 to require medical schools, PA programs, NP programs, and CNM programs to report information on an annual basis to the Health Workforce Policy Board, the Board of Governors of the University of North Carolina, and the NC General Assembly. Medical schools and NP, PA, and CNM programs shall cooperate with the Health Workforce Policy Board to identify on an annual basis the following data and information: 1) number and location of graduates in active patient care practice and number of graduates no longer in active patient care practice by year of graduation;	✓	✓	✓	✓	✓	

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
2) percentage of graduates who enter residencies in primary care specialties or other specialties that are deemed as shortage areas in North Carolina as defined by the Health Workforce Policy Board; 3) percentage of graduates who practice in federally-designated health professional shortage areas in North Carolina and in areas specified as shortage areas by the Health Workforce Policy Board; 4) number and percentage of underrepresented minorities who are enrolled in and who graduate from these schools and programs and where they practice; and 5) number of graduates who have been involved in formalized interdisciplinary didactic or clinical training programs that involve students from multiple disciplines working together as teams in patient care.						
Rec. 2.9. (Priority Recommendation) The NC General Assembly should appropriate $13 million in new funding and/or Medicaid GME funding to the NC Area Health Education Centers (AHEC) Program to support additional and expanded clinical rotations for health science students and expansion of primary care or other residency programs that meet specialty shortages. a) $3 million should be provided to develop new clinical training sites for students; to pay stipends to community preceptors who supervise and teach primary care students; and to provide housing, library, and other logistical support for students in community settings. Enhanced payments should be made to preceptors who practice in health professional shortage areas. b) $10 million should be provided to fund 100 new residency positions across the state targeted toward the high priority specialty areas of primary care, general surgery, and psychiatry or other specialty shortage areas identified by the Health Workforce Policy Board. This funding should be provided to AHEC, with AHEC then making grants to AHEC- and university-based residency programs that agree to expand residency slots and to create programs designed to graduate physicians likely to settle in rural and other underserved areas of the state.	✓	✓	✓	PC Psych Surg	✓	
Rec. 2.10. NC residency programs should consider seeking joint accreditation by the American Osteopathic Association along with existing accreditation by the Accreditation Council for Graduate Medical Education.	✓			DO		

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Rec. 2.11. The NC Office of Rural Health and Community Care in collaboration with the Community Practitioner Program of the NC Medical Society, NC Area Health Education Centers Program, and professional medical societies should conduct marketing and outreach campaigns that emphasize positive aspects of healthcare practice in North Carolina.	✓					✓
Rec. 2.12. The NC General Assembly should help maintain and improve the positive regulatory environment for all licensed health professionals including physicians, nurse practitioners, physician assistants, and certified nurse midwives.	✓					✓
Rec. 2.13. The North Carolina Midwifery Joint Committee should follow licensure reentry procedures established by the American College of Nurse-Midwives to enable inactive practitioners otherwise in good standing to reenter practice.	✓			MD DO PA CNM		
Rec. 2.14. (Priority Recommendation) In order to improve practice management across the state: a) The University of North Carolina system, NC community colleges, and NC independent colleges and universities should offer courses that will increase the supply of practice managers across the state, particularly in underserved areas, and improve the skills of existing practice managers. b) The NC Area Health Education Centers Program, NC Office of Rural Health and Community Care, Community Practitioner Program, NC community colleges, and NC independent colleges and universities should develop a continuing education curriculum for existing practitioners and staff to enhance the business skills needed to maintain a viable practice. c) North Carolina foundations should consider funding start-up programs to community colleges and other organizations to enhance the skills of practice managers and providers and programs targeted to underserved areas.	✓	✓				✓

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Maldistribution						
Rec. 3.1. The NC Department of Public Instruction, NC Community College System, University of North Carolina, NC Area Health Education Centers Program, and other related programs should collaborate to create more intensive programs and to coordinate and expand existing health professions pipeline programs so underrepresented minority and rural students likely to enter health careers are offered continued opportunities for enrichment programs in middle school, high school, and college and then receive continued support in medical and other health professions schools.		✓	✓			
Rec. 3.2. Duke University School of Medicine, Brody School of Medicine at East Carolina University, University of North Carolina at Chapel Hill School of Medicine, Wake Forest University School of Medicine, and North Carolina residency programs should create targeted programs and modify admission policies to increase the number of students and residents with expressed interest in serving underserved populations and/or practicing in rural areas of North Carolina. Targeted programs should be designed to provide intensive and longitudinal educational and clinical opportunities to practice with medically underserved populations in medically underserved areas of the state.		✓				
Rec. 3.3. (Priority Recommendation) The NC General Assembly should appropriate $1,915,600 to the NC Office of Rural Health and Community Care (ORHCC). Of this amount: a) $350,000 should be appropriated to provide technical assistance to communities to help identify community needs and practice models that can best meet these needs and to provide technical assistance to small practices or solo practitioners practicing in medically underserved communities or serving underserved populations; b) $1.5 million should be appropriated to pay for loan repayment and financial incentives to recruit and retain physicians, physician assistants, nurse practitioners, and certified nurse midwives to rural and underserved communities; and c) $65,600 should be appropriated to expand the number of ORHCC staff who recruit practitioners into health professional shortage areas.		✓	✓			✓

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
ORHCC should place a special emphasis on recruiting and retaining underrepresented minority, bilingual, and bicultural providers to work in underserved areas or with underserved populations.						
Rec. 3.4. (Priority Recommendation) North Carolina foundations should fund regional, multi-county demonstrations to test new models of care to serve patients in rural and urban underserved areas. a) New models should be developed collaboratively between the NC Office of Rural Health and Community Care, NC Area Health Education Centers Program, healthcare systems, medical schools, other health professions training programs, licensure boards, and other appropriate groups and should be designed to test new models of care that focus on integration of care, management of chronic illness, and prevention. Such models should emphasize the creation of medical homes and interdisciplinary practice environments to enhance care to underserved populations. b) New models should be evaluated to determine if they improve access, quality of care, and/or efficiency. The State Health Plan, Division of Medical Assistance, and private insurers should modify reimbursement policies to support the long-term viability of successful models of care for underserved populations.		✓		PC	✓	
Rec. 3.5. (Priority Recommendation) The NC General Assembly should explore financial incentives or other systems to encourage providers to establish and remain in practice in underserved areas or with underserved populations. Financial incentives may include, but not be limited to, tax credits or increased reimbursement. Other strategies to encourage providers to locate and practice in underserved areas or with underserved communities may include, but not be limited to, help with call coverage or use of hospitalists.		✓				

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Primary Care and Provider Specialties						
Rec. 4.1. (Priority Recommendation) a) The State Health Plan, Division of Medical Assistance, and private insurers should enhance payments to primary care providers to recognize the value of diagnostic and cognitive skills, particularly those payments that incentivize primary care providers to create comprehensive primary care homes that include lifestyle interventions, preventive health services, chronic disease management, and case management through use of case managers. b) Reimbursement levels for primary care services through Medicaid, NC Health Choice, State Health Plan, and private insurers should be continually evaluated to ensure they are adequate to meet the costs of care across the state, particularly in underserved areas.				PC		✓
Rec. 4.2. The NC OB/GYN Society, NC Area Health Education Centers Program, East Carolina University Nurse Midwifery program, NC Academy of Family Physicians, and North Carolina medical schools should change the practice environment to encourage acceptance of certified nurse midwives into practice.				CNM		
Rec. 4.3. The NC General Assembly should appropriate $206,000 annually to expand the East Carolina University Nurse Midwifery program by 30%.	✓			CNM		
Rec. 4.4. (Priority Recommendation) The NC General Assembly should appropriate $2 million to provide malpractice premium subsidies (similar to the Rural Obstetrical Care Incentive Program) for physicians and certified nurse midwives who provide delivery services in medically underserved areas.		✓		Del		
Rec. 4.5. North Carolina medical schools and other health professions programs, specialty societies, and the NC Area Health Education Centers Program should strengthen and expand the mental and behavioral health and psychopharmacology components of training and continuing education to increase competencies in mental and behavioral healthcare for all graduates, with a special emphasis in integrating behavioral health and primary care. Innovative approaches may include special tracks in psychology/behavioral health, better integration of behavioral health content into current curricula,				Psych PC	✓	

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
postgraduate programs in behavioral health, and education for psychiatrists and other mental health professionals in working collaboratively with primary care professionals in more integrated models of care.						
Rec. 4.6. (Priority Recommendation) The NC General Assembly and NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services, should provide funding to targeted rural communities to establish new models of care to serve public patients in rural and underserved communities. a) New models of care should be developed collaboratively with the NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services, NC Area Health Education Centers Program, NC Office of Rural Health and Community Care, academic healthcare institutions, and primary care and specialty societies. b) Models should include psychiatrists and other mental health professionals and have close linkages to primary care providers in the service area. c) To improve the professional environment in these settings, these sites should qualify for higher levels of reimbursement, have strong linkages to academic health centers, and have a strong focus on integrated care.		✓		Psych PC	✓	✓
Rec. 4.7. (Prioity Recommendation) The NC General Assembly, public and private insurers, and payers (including, but not limited, to the State Health Plan, NC Division of Medical Assistance, and NC Division of Mental Health, Developmental Disabilities and Substance Abuse Services) should pay for: a) psychiatric consultations for primary care providers and other clinicians either through face-to-face consultations or telemedicine; and b) services provided by primary care providers to patients who have been diagnosed with a psychiatric diagnosis. Reimbursement levels for mental and behavioral health services through Medicaid, NC Health Choice, State Health Plan, and other payers should be continually evaluated to ensure they are adequate to meet the costs of care across the state, particularly in underserved areas.		✓		Psych	✓	✓

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Underrepresented Minorities						
Rec. 5.1. (Priority Recommendation) The state and existing medical and other health professions schools should implement strategies to expand the number of underrepresented minority physicians, nurse practitioners, physician assistants, and certified nurse midwives and to decrease professional isolation.			✓			
Rec. 5.2. (Priority Recommendation) a) North Carolina medical and other health professions schools including university and community college programs should: 1) recruit and admit more bilingual and bicultural students into health professions classes; 2) offer and encourage students to take Spanish medical language courses as part of health professions training; 3) develop innovative programs to prepare more bilingual and bicultural graduates; and 4) build cultural sensitivity training into curricula. b) North Carolina foundations should create through a competitive process a Center for Excellence to inventory, evaluate, and disseminate best practices in healthcare professional programs.			✓			
Rec. 5.3. The NC Area Health Education Centers Program should work collaboratively with key partners including the Center for New North Carolinians and the Office of Minority Health and Health Disparities to: a) expand existing Spanish language programs to train more interpreters and practicing health professionals; and b) expand cultural competency and cultural sensitivity training for all health professionals.			✓			
Rec. 5.4. The NC General Assembly should create a grants program to incentivize medical schools and other health professions training programs to produce more bilingual and bicultural healthcare professionals.			✓			
Rec. 5.5. The NC Community College System should place greater emphasis on recruiting and training bilingual and bicultural medical office staff, nurses, and allied health professionals.			✓			

	Overall Supply	Maldistribution	Underrepresented Minorities	Specialty Supply**	New Models of Care***	Practice Environment
Rec. 5.6. (Priority Recommendation) The NC Area Health Education Centers (AHEC) Program should work collaboratively with key partners to explore issues that need to be addressed in creating a statewide, uniform student tracking and evaluation system of federal and state funded programs across the educational pipeline. AHEC should report findings back to the Health Workforce Policy Board. The goal of this report should be to determine how best to: a) evaluate existing minority health professions pipeline programs and expand the most successful programs, particularly those with a focus on intensive, longitudinal programs that work with small numbers of students over a longer period of time. b) develop a statewide, uniform student tracking and evaluation system and program inventory of formal and informal programs across the educational pipeline which is shared by precollege and university health career advisors and counselors. Future state funding should be tied to programs that are found to be the most successful in increasing underrepresented minorities in health professions.			✓			
Rec. 5.7. The Office of Rural Health and Community Care in collaboration with minority professional associations, such as Old North State Medical Society and other key partners, should provide practice support to underrepresented minority health professionals who choose to practice in underserved areas. Support can include, but not be limited to, creation of community mentoring programs or other strategies to support retention of underrepresented minorities in underserved areas.		✓	✓			✓

Provider Supply Projection Method

Appendix A

To project the relative supply of healthcare providers over the next 25 years, trends in physician and nonphysician supply over the past few decades were analyzed. Projections of demand for healthcare also were necessary to compute the availability of providers in North Carolina relative to the increasing population. These three projections—physicians, nonphysician clinicians, and demand—are discussed in turn below.

Physicians

The projection method for physicians was complex. There are multiple years of data on physician supply that include individual data on:

- physicians new to practice in North Carolina;
- physicians who cease practice in North Carolina;
- physicians recently completing residencies who practice in North Carolina;
- physicians recently completing undergraduate medical education who will eventually practice in North Carolina; and
- hours in direct patient care for licensed physicians in North Carolina (ie, the degree to which physicians in some age groups practice less than full time).

A baseline projection was made that assumed no changes in past patterns of entry and exit into practice in North Carolina. This involved the following steps:

1) Compute the number of active, nonfederal, nonresident physicians that practice in North Carolina by age and gender in 2004. Age is generally measured in one year increments.

2) Compute the annual percent change in the size of each age-gender cohort from 2000 to 2004. This captures the net effect of retirement and exit and entry into practice in North Carolina. For example, approximately 10% of male physicians aged 60-64 leave practice each year.

3) "Smooth" these transition rates by using regression methods to model change rates to be less variable across ages—for example, rather than a 10% growth for age 42 and 44 and a 5% decline for 43 year olds, smoothing might result in a 5% increase for all three ages. This smoothing improves the prediction power of the model by eliminating "lumpiness."

4) Calculate FTE-equivalent weights for each physician cohort by age/gender. This allows the projection to trend forward the productivity of physicians as they age as well as predict the productivity of new physician as they enter practice. For example, males 40-44 have the highest FTE equivalent while older and female physicians tend to work fewer hours per week in patient care. Thus, the projections move beyond counting "bodies" to count "potential patients consulted."

5) For each year subsequent to 2004,
   a) adjust the supply of physicians by the net growth rate in each age/gender group;
   b) age the workforce by moving the cohort in each group into the next older age group; and
   c) calculate the FTE equivalent based on age/gender cell size.

After the baseline projection is made, theoretical policy options can then be modeled. A number of policy options have been formally modeled. The first is an expansion in the size of the education pipeline (both UME and GME). Using historical patterns of physician location and sizes of training programs, there is an annual net increase of roughly 480 physicians who are trained in North Carolina (either at medical school or residency) and eventually practice in North Carolina. This increase is incorporated in the baseline model via the net growth rate. A 30% increase in education throughput, for example, would add an additional .3 * 480 or 114 physicians per year to the North Carolina supply. The increases are timed to account for the delay after implementation until increases are realized. That is, a 30% increase in 2007 assumes those physicians who were first-year residents in 2007 enter the NC workforce in 2010 and those physicians who were first-year medical students in 2007 enter the NC workforce in 2014.

The second theoretical policy option is an increase in the number of physicians who migrate into North Carolina. The average number of "new-to-file" physicians is calculated by age/gender group for the past five years. The net increases due to students and residents are netted out to leave only those physicians who are currently practicing elsewhere. Presumably most are practicing elsewhere in the United States. This serves as the baseline recruitment influx to which an increase in the recruitment rate is applied. For example, there is an average of 104 new-to-file 40-44 year old male physicians annually. A 20% increase in recruitment would increase the net supply by .2 * 104 or 21 per year. These are allocated uniformly across the five ages in the group, so a 20% increase would increase the number of 42 year old physicians by about 4 (20% * 104 /5 years in the 40-44 age group).

Nonphysician clinicians

Projections for nonphysician clinicians (NPC)—Certified Nurse Midwives (CNM), Physician Assistants (PA), and Nurse Practitioners (NP)—were more straightforward than projections for physicians due to more limited data and historical labor supply patterns. Multiple projection methods were attempted; many theoretically reasonable approaches did not yield results with face validity (eg, a 300% increase in NPC supply). The age pyramid method used for physicians was not considered due to the variability of supply trends associated with the smaller number of providers in these three groups. CNM growth was deemed reasonable since 2000—a net increase of about 7 per year. Some members of the Steering Committee deemed the growth in NPs and PAs over the 2000-2004 time frame as an aberration that would not be sustained in the long run; they advocated using average growth since 1979. Other members expected the recent growth to continue. In the end, projections

were performed using both averages. Recent growth is deemed "high" growth, and historical growth is classified as "low" growth. Users of the projection spreadsheet (see below) can chose which growth they would like to assume.

Combining NPC and physicians is problematic since there are multiple "FTE Physician" equivalents used for NPCs. Ultimately, the choice of FTE weight represents the degree to which a NPC can "substitute" a physician. Although there are widely varying opinions on this matter, two alternative weights were used here. The Health Resources and Services Administration uses .5 for NPCs when calculating provider supply when designating Health Professional Shortage Areas. This served as the default weight. Given that new models may increasingly shift primary care to NPCs, this FTE weight may be low; in this analysis we also used .75 as an alternative estimate to test for sensitivity. Again, users of the projection spreadsheet can choose which FTE they would like to use (or specify their own, for that matter). Furthermore, users can specify an assumed growth in education throughput.

Population

As outlined in the report, there are three factors likely to lead to an increase in the demand for healthcare services. The population is increasing, the population is getting older, and the prevalence of chronic disease is increasing. Estimates of the first two were obtained from NC State Demographer population projections out to 2029—projections to 2030 assumed the rate of growth from 2028 to 2029 would apply to 2029 to 2030. The effect of aging was determined by calculating the average number of office-based physician visits for the national population in 2002 (Medical Expenditure Panel Survey) and applying the same rate to each age cell in subsequent years. Note that this is likely an underestimate—other data show that the average number of visits per age group grew considerably from 1990 to 2004,[a,b] at least partially due to increasing chronic disease burden. There were some attempts to estimate the effect of increasing chronic disease on demand for healthcare services. Net increases (over and above the effect of population growth and aging) were in the single digit range; the method was deemed insufficiently tested to be included in this report. Thus, we mention the potential magnitude of, but do not formally include, chronic disease as a driver of projected demand.

Productivity

New healthcare delivery models were of great interest to the Steering Committee. With little empirical evidence to guide estimation of the net effect of new models on the demand for healthcare services, productivity factors were used to inflate the effective supply of providers. Thus, a 10% increase in productivity would increase the number of effective providers from 20,000 (for example) to 22,000. Again, the user can incorporate these assumptions into the model.

---

a Hing E, Cherry DK, Woodwell DA. *National Ambulatory Medical Care Survey: 2004 Summary*. Number 374. Hyattsville, MD: National Center for Health Statistics; 2006. Available from: http://www.cdc.gov /nchs/data/ad/ad374.pdf.

b Schappert SM. *National Ambulatory Medical Care Survey: 1990 Summary*. Number 213. Hyattsville, MD: National Center for Health Statistics

North Carolina Organizations Providing Programs to Increase Underrepresented Minority Representation in the Health Professions

Appendix B

NC Area Health Education Centers (AHEC) Program

- Area L AHEC (Programs for elementary and middle school students)
- Charlotte AHEC (Programs for middle and high school students)
- Coastal AHEC (Program for middle school students)
- Eastern AHEC (Programs for high school students)
- Greensboro AHEC (Programs for middle and high school students)
- Mountain AHEC (Programs for elementary, middle, and high school students)
- Northwest AHEC (Programs for elementary, middle, and high school students)
- Southern Regional AHEC (Programs for elementary, middle, and high school students)
- Wake AHEC (Programs for middle and high school students)

Other Programs

- NC Health Careers Access Program (NC-HCAP) (Programs for upper elementary through undergraduate students)
- NC Health Careers Opportunity Program (Programs based at universities such as UNC Pembroke and North Carolina Central University for middle school, high school, and college students)
- Medical Education Development (MED) Program (Program at UNC Chapel Hill for rising college seniors or college graduates)
- Summer Medical and Dental Education Program (SMDEP) through the Robert Wood Johnson Foundation (Program provided at Duke University and other sites for early college students)
- Student National Medical Association (SNMA) Chapters at Duke University, East Carolina University, UNC Chapel Hill, and Wake Forest University (Programs for elementary school, high school, and college students)

North Carolina Health Careers Access Program: Programs and Services[a]

Appendix C

NC-HCAP sponsors a variety of programs and activities throughout the state to promote careers in the health professions. Some of these programs are listed below. For more information, visit the NC-HCAP website at http://nc-hcap.unc.edu/.

CHSP: Clinical Health Summer Program
CHSP is a seven-week, full-time summer program geared toward disadvantaged students accepted to or enrolled in a health-related curriculum at Elizabeth City State University, North Carolina Central University, or the UNC-Pembroke. CHSP consists of full-time clinical experiences in healthcare agencies and academic enrichment experiences in healthcare agencies as well as supplementary coursework provided by NC-HCAP Careers Centers. Participants are paid at or above minimum wage.

HCIE: Health Careers Information and Enrichment Workshops
The HCIE Workshop is a hands-on outreach program designed to increase the interest, number, and motivation of disadvantaged students in upper elementary, middle, and high school who are considering a career in the health professions.

HPF: Health Professions Forum
Conducted at a North Carolina college or university campus once or twice each year, the Health Professions Forum provides disadvantaged undergraduate students with information about the health professions programs available in North Carolina and arranges opportunities for them to talk with current health science graduate students as well as graduates and representatives of health professions programs. Forums are free and open to all undergraduate students interested in a health career.

ISIS: Inspirational Speakers in Science Lecture Series
Held once each year in conjunction with the Health Professions Forum, the ISIS Lecture Series exposes undergraduate students to prominent minority health professionals and scientists who discuss how they overcame the obstacles often faced by students of color while pursuing their educational and professional goals. The ISIS Lecture is free and open to all undergraduate students interested in a health career.

NC-ARC: North Carolina Access, Retention, and Completion Initiative in the Allied Health Sciences
NC-ARC prepares disadvantaged undergraduate students at five UNC System institutions for successful matriculation into professional allied health degree programs through a series of teleconference courses offered each semester by the Department of Allied Health Sciences (DAHS) at UNC Chapel Hill as well as through a network of mentors provided to all participating students.

---

a NC Health Careers Access Program. Programs and Services. Available at: http://nchcap.unc.edu/programs.html. Accessed August 4, 2006.

North Carolina Health Careers Access Program: Programs and Services

Seminars: NC-HCAP Enrichment Seminars
NC-HCAP Enrichment Seminars are a series of seminars targeted at undergraduate students considering careers in the health professions and are held on the campus of UNC Chapel Hill throughout the fall semester.

Parental Warfare: Parent Workshops
The Parent Workshop provides parents and significant others of disadvantaged students with strategies and support to help their children develop into caring, engaging adults who are proactive in their personal, educational, and professional pursuits. Workshops are conducted in the community at Area Health Education Centers (AHEC), public schools, and various community-based organizations.

SEP: Science Enrichment Preparation Program
Held each summer on the campus of UNC Chapel Hill, the Science Enrichment Preparation (SEP) Program is an eight-week, honors-level academic program for disadvantaged undergraduate students (rising sophomores and juniors) who plan to pursue careers in healthcare.