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.

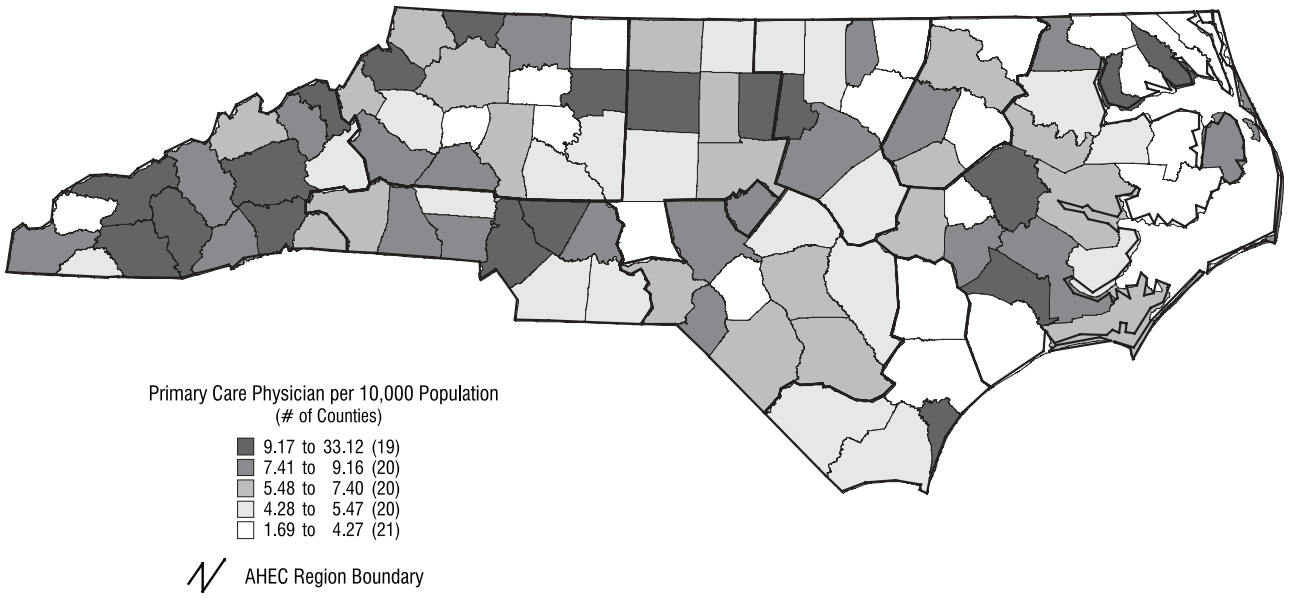
There is wide variation in the ratio of physicians to population in different areas of the state. Orange and Durham counties, home to the University of North Carolina Health Care System and Duke University Health System, respectively, had the highest primary care physician per population ratios in 2005 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]

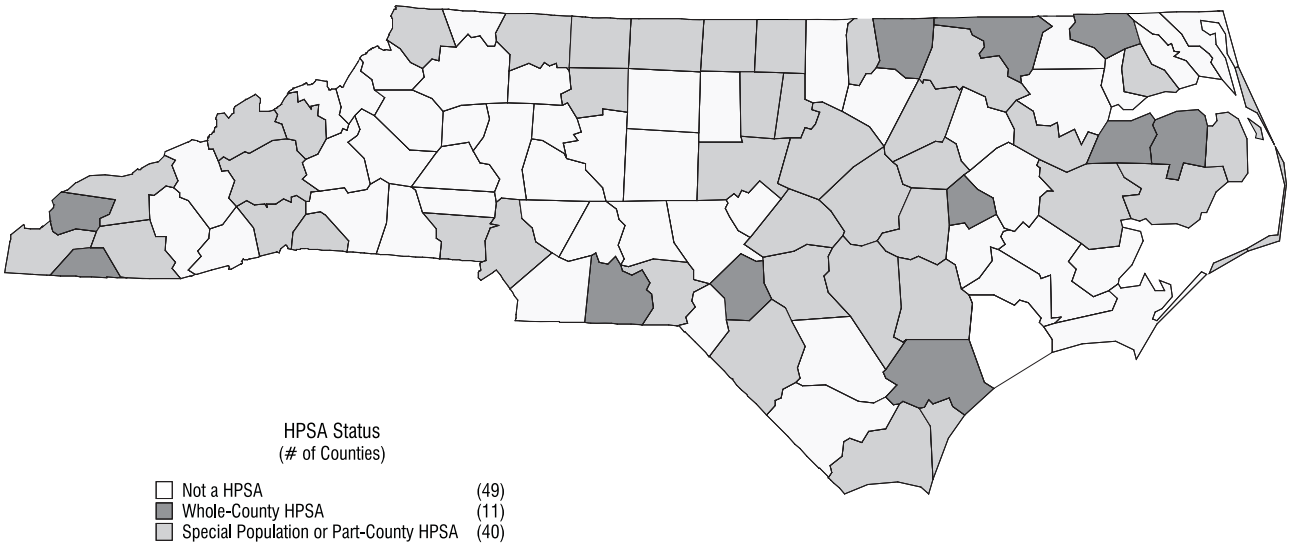
c Areas that are designated HPSAs must define and justify a rational service area for the delivery of health services (often a county), have a sufficiently low provider-to-population ratio, and show evidence that nearby resources are overutilized, too distant, or otherwise inaccessible. For primary care 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



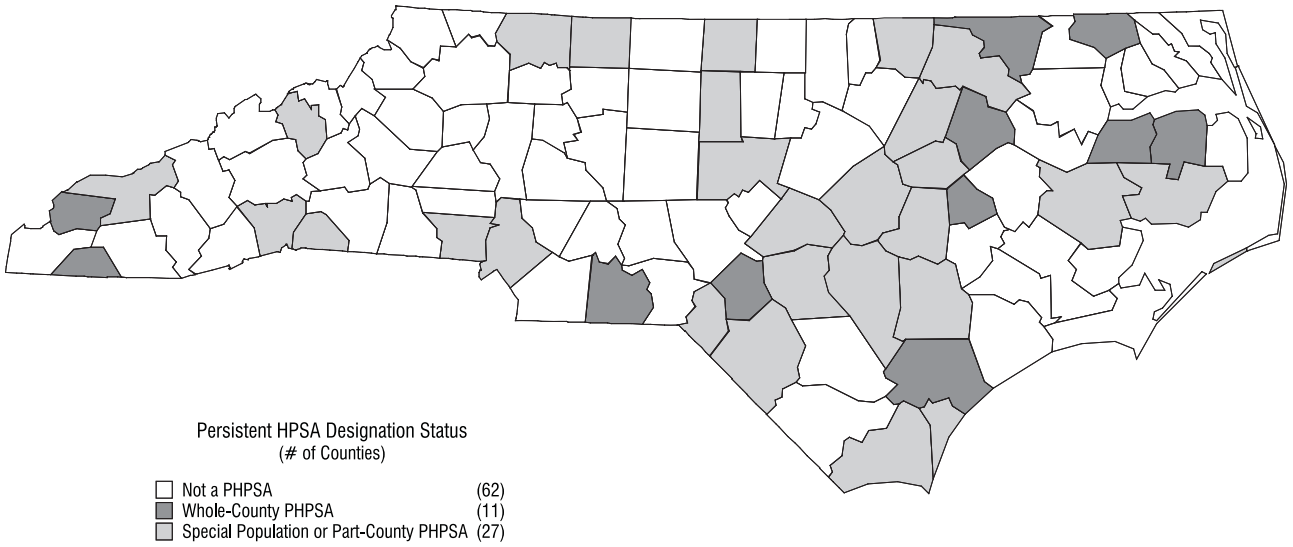
Source: Bureau of Health Professions, Shortage Designation Branch, 2005.

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.

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]

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

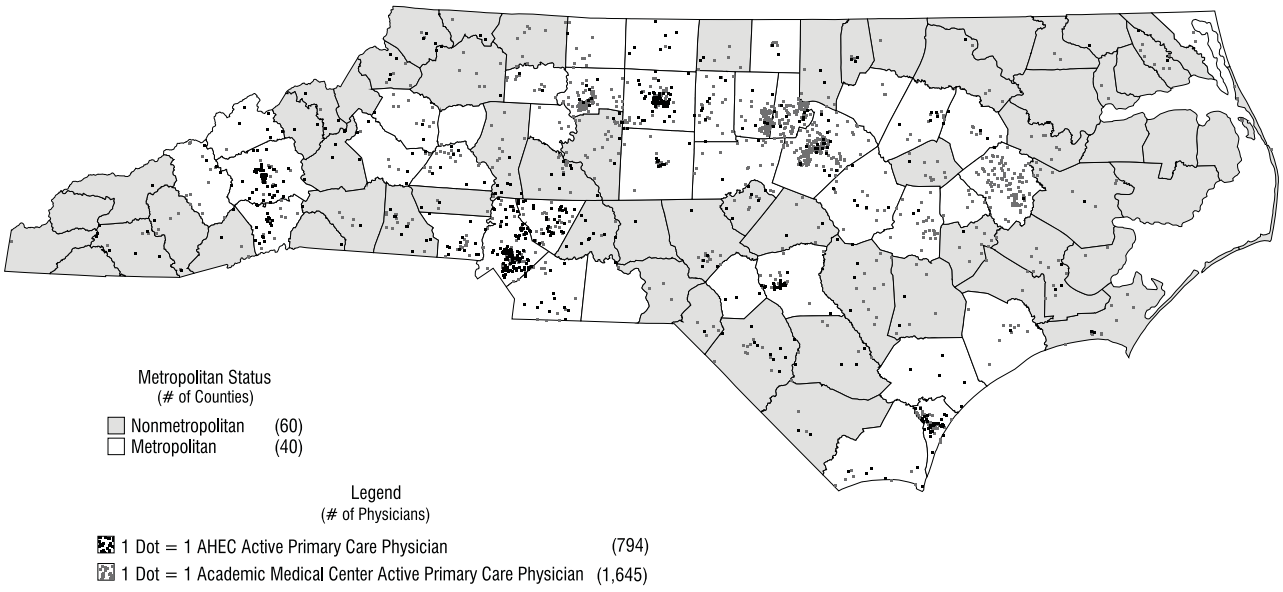
Along with the relative lack of primary care providers in many rural communities, rural residents may have additional barriers to accessing needed services. Rural communities are much less likely to offer a full array of specialty services. Lack of public transportation, coupled with greater travel distances 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



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.

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.

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]

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