Factors Influencing Rural Health

Chapter 2

The Task Force began its work by broadly examining different areas that influence health, including the community and environment in which a person lives, their health behaviors, and access to and availability of health services. The Task Force recognized that within each of these broad areas, there are multiple factors that can directly—or in conjunction with other factors—influence health outcomes. After spending the first three months reviewing a broad array of issues that influence health, the Task Force identified nine areas that it believed had the greatest potential to impact health outcomes. Within the community and environment, the Task Force looked at strategies to increase jobs and economic security; improve educational outcomes; and foster strong, collaborative leadership to improve rural health. For health behaviors, the Task Force focused on strategies to support healthy eating and active living (to reduce overweight and obesity), improve mental health and emotional well-being, and reduce substance abuse and dependence (including tobacco, alcohol, and illegal substances). Finally, within the context of availability and affordability of health services, the Task Force focused on strategies to expand health insurance coverage and access to safety net services; recruit and retain health professionals in rural communities; and create new models of care that expand health care access and improve health care quality.

The Task Force identified nine areas that it believed had the greatest potential to impact health outcomes.

Community and Environment

Jobs and Economic Security

Income is directly related to health. Increased income corresponds to better health outcomes, with the greatest impact on health for those with lower incomes.[1] A person's income or wealth is generally a proxy for their social conditions and community and economic opportunities.[2] It is these factors more generally, rather than money specifically, that impact health.

Wealthier people have greater opportunities to live healthier lifestyles. They often have the financial resources to live in safe and healthy communities with access to better schools, places to exercise and play, and grocery stores that offer fresh fruits and vegetables. In addition, higher income individuals more often have health insurance coverage.

Conversely, people who have low incomes have more limited opportunities for healthful living. They may live in poor housing in unsafe communities. They may have limited access to grocery stores or outdoor recreational facilities. In addition, poor individuals are much more likely to be uninsured.[3] People in lower socioeconomic levels may experience greater stress and/or lack a sense of control.[4] These factors also affect health. Rural residents are more likely to live in poverty (20.8%) than are urban residents (16.8%).[a] To improve the health

a Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

of its residents, North Carolina needs to help increase the economic security of the population, especially among low-income North Carolinians.

Improve Educational Outcomes

Academic achievement and education are strongly related to health. In general, those with less education have more chronic health problems and shorter life expectancies. In contrast, people with more years of education are more likely to live longer, healthier lives. This education-health link is one that seems to result from the overall amount of time spent in school rather than from any particular content area studied or the quality of education.[5]

Children who live in poverty lag behind more affluent children in cognitive, language, and socio-emotional skills as early as three years of age.[6] Gaps in behavioral and academic skills at the start of schooling have an impact on both short- and long-term achievement. High quality child care and preschool programs can help low-income children start school on more equal footing.[7] High quality child care has also been shown to have longer term effects, including higher graduation rates and lower crime rates.[8]

High school students in the most economically distressed Tier 1 communities are less likely to graduate than are those in Tier 3 counties.

Children in poverty are also less likely to perform as well as those with higher incomes once they reach school age.[7] In North Carolina, 677,000 students are enrolled in rural schools, as compared to a median of 131,129 rural students per state among all 50 states. Of these 677,000 rural students, 46% of them live below the poverty line.[9]

Adults who have not finished high school are more likely to be in poor or fair health than college graduates. High school students in rural and urban areas are about equally likely to graduate from high school (82.7%; 95% CI: 81.7-83.7) and 83.0% (95% CI: 82.3-83.6) respectively in the 2012-2013 school year.[10] However those in the most economically distressed Tier 1 communities are less likely to graduate (80.9%; 95% CI: 79.6-82.3) than are those in Tier 3 counties (83.6%; 95% CI: 82.8-84.3).[b]

People ages 25-64 who dropped out of high school face mortality rates about twice as high as those with some college education. They are also more likely to suffer from the most acute and chronic health conditions, including heart disease, hypertension, stroke, elevated cholesterol, emphysema, diabetes, asthma attacks, and ulcers.[5] College graduates live, on average, five years longer than those who do not complete high school. In addition, people with more education are less likely to report functional limitations and are also less likely to miss work due to disease.[5]

Foster Strong, Collaborative Community Leaders

Local leadership is integral to the success of any health initiative in a rural community. Rural health outcomes will not be improved remotely from Raleigh.

b Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

Local leaders need to be enlisted since they understand the specific challenges facing the community in which they live and they know how to work effectively in their communities. A one-size-fits-all approach to improving rural health outcomes is insufficient since rural communities can vary widely in terms of their health needs and barriers to care.[11] Local leaders should help define community health needs, identify suitable interventions, and assist with implementation.

In addition to health professionals, there are many other community leaders that positively impact the health of a community, including leaders from the faith, education, business, government, and nonprofit sectors. Community leaders can complement the work of health professionals by focusing on other factors that influence health including education, jobs, housing, community, and environment. They can help create a community environment that supports healthy lifestyles.[12] They can also help support the provision of health care services more directly by helping with recruitment and retention of health professionals, creation of new clinics, or support for existing health care organizations.[13]

Local leaders should help define community health needs, identify suitable interventions, and assist with implementation.

Involving community leaders in supporting the local health care system can also contribute to the local economy. The health care industry is one of the top five employers in 64 of North Carolina's rural or economically depressed counties. For every one worker employed in the health care industry, an additional 0.72 workers are employed in the state's workforce. The most recent data from 2008 also shows that for every $1 produced by the health care industry, an additional $0.89 is generated in the state's economy.[14]

In addition, community leaders bring other valuable skills necessary to the health of a community, including collaboration, cultural competence, communication, relationship building, and expanded professional networks.[15] The deliberate cultivation of local community leaders is critical to ensure successful implementation of the Rural Health Task Force strategies. Leadership development programs can foster emerging leaders by identifying, engaging, training, and supporting community members who have the time, energy, and passion to pursue community change.[16] In North Carolina, leadership development programs have succeeded by providing skills, knowledge, inspiration, and support to residents who are invested in and committed to their community's well-being and take action once they have a clear understanding of a strategy's function and benefit.[22] Without buy-in from community leaders, strategies are unlikely to be effective or sustainable in the long term.

Health Behaviors

Promote Healthy Eating and Active Living (HEAL) to Reduce Overweight and Obesity

Overweight and obesity pose significant health concerns for both children and adults. Excess weight is not only a risk factor for several serious health conditions, but it also exacerbates existing conditions. North Carolina is the

16th most overweight/obese state in the nation.[17] In 2012, two-thirds (68.4%) of North Carolina adults were overweight [Body Mass Index (BMI) of 25 or greater] or obese (BMI of 30 or greater). Adults in rural and urban areas had similar rates of overweight or obesity in 2012 (68.7%; 95% CI: 66.7-70.7) as those in urban areas (67.1%; 95% CI: 65.6-68.6).[c] Between 1990 and 2010, the prevalence of overweight in North Carolina grew just slightly from 33.5% to 37.1%. However, the obesity rate increased rapidly during that time period. In 1990, 12.9% of adults in North Carolina were obese; by 2010, 27.8% of adults in North Carolina were obese, an increase of 14.9%.[18] Obesity can be prevented. In adition to genes and metabolism, behaviors and environment affect body weight.

Adults in rural areas are less likely than adults in urban areas to get the recommended level of physical activity.

Physical activity is a key component of a healthy lifestyle and an important part of preventing obesity.[19] The health and financial benefits of high levels of physical activity have been demonstrated by numerous studies.[20] Regular physical activity reduces the risk of premature death by reducing the risk of coronary heart disease, stroke, high blood pressure, type 2 diabetes, and colon cancer. In addition, it protects against feelings of depression and helps build healthy bones, muscles, and joints. Regular physical activity is also an important part of reaching and maintaining a healthy weight.[21]

The current recommendations are for adults to have at least 30 minutes of moderate intensity physical activity, such as walking, five days per week or at least 20 minutes of vigorous intensity physical activity, such as jogging, three days per week. Additionally, adults should incorporate muscle strengthening activities twice a week.[22] Adults in rural areas (43.8%; 95% CI: 40.6-47.0) are less likely than adults in urban areas (47.4%; 95% CI: 45.6-49.2) to get the recommended level of physical activity (2009).[23]

Good nutrition is a cornerstone of optimal health. An optimal diet is one that includes the recommended consumption of fruits and vegetables, foods high in fiber (e.g. whole grains), and adequate sources of calcium and important nutrients. Healthy diets are also low in saturated and trans fats, cholesterol, added sugars, and salt. A healthy diet can help protect against osteoporosis, heart disease, hypertension, type 2 diabetes, and certain cancers. Managing calorie intake, while consuming adequate nutrients, is important to avoid overweight and obesity.[24]

Only one in five (20.6%) adults in North Carolina consumed five or more servings of fruits or vegetables a day in 2011.[25] Again, those in rural areas are less likely to consume fruits and vegetables (18.8%; 95% CI: 16.5-21.0) than adults in urban areas (21.6%; 95% CI: 20.3-22.9) (2009).[23] In general, data on the specific dietary patterns of North Carolinians are limited.

c Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

Improve Mental Health and Emotional Well-Being

Many people with mental health or substance abuse problems are reluctant to admit they have a problem and thus are unlikely to seek care directly from treatment professionals. Even among those who are aware of their conditions, the associated cost or stigma often prevents them from reaching out to health care providers for treatment. Therefore, primary care settings are optimal for providing appropriate screening, early intervention, and referral if necessary.

The Substance Abuse and Mental Health Services Administration (SAMHSA) conducts a household survey of drug use and health each year to determine the mental health status of respondents.[26] In 2006, a large proportion of North Carolinians reported serious psychological distress in the prior year, including 17% of 18-25 year olds and 11% of people older than age 26.[27] Serious psychological distress is a nonspecific indicator of mental health problems such as anxiety or mood disorders.[28,29] In addition, approximately 7% of North Carolinians age 12 or older reported having had a diagnosable major depressive episode.[27] Currently data are not available to compare these rates between rural and urban populations in North Carolina.

In 2006, 17% of 18-25 year olds and 11% of people older than age 26 reported serious psychological distress in the prior year.

Mental health disorders can have a profound effect on an individual, including his or her interpersonal relations, functioning in schools or in the workplace, and overall sense of well-being.[28] Having a current mental health problem is one of the most common circumstances surrounding suicide (47.5%) with a history of treatment for mental illness (46.7%), or a depressed mood (46.3%) following closely behind.[30] According to the Youth Risk Behavior Surveillance survey of North Carolina high school students, between 2005 and 2009, 25.6%-27.4% of students reported feeling so sad or hopeless for at least two weeks over the past year that they stopped doing some usual activities and 12.5%-15.6% considered attempting suicide.[30] Suicide rates per 100,000 population are similar in rural areas (13.4; 95% CI: 12.0-13.6) and urban areas (12.8; 95% CI: 12.0-14.8).[d]

Emerging research has also shown the impact of mental illness—particularly depression—on the use and cost of health services. People that are depressed or have anxiety disorders have more unexplained medical symptoms than do people without these mental health problems. Depression has been associated with a 50% increase in medical costs for other chronic illnesses, even after controlling for the type and severity of physical illness. Depression has also been linked to longer lengths of stay in the hospital, even after controlling for severity of medical illness, and it has been linked to higher mortality rates for people who have diabetes or heart disease.[31]

Depression also makes it more difficult to treat or manage chronic conditions, as people who are depressed are less likely to take their medications as prescribed

d Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

or to otherwise follow their treatment regimens.[31] People who are depressed are also more likely to engage in risky health behaviors including smoking, overeating, and sedentary lifestyles.

Ideally, people who have a mental illness can be treated by health professionals in an outpatient or community setting. However when community resources are lacking or people are unwilling to seek mental health or substance abuse services, they sometimes end up in the emergency department. People in rural areas are far more likely to visit the emergency department for mental health-related visits (126.4 per 10,000 population; 95% CI: 125.1-127.7), compared to those in urban areas (95.6 per 10,000 population; 95% CI: 94.8-96.3).[e]

People in rural areas are far more likely to visit the emergency department for mental health-related visits compared to those in urban areas.

Reduce Substance Abuse and Dependence, Including Tobacco, Alcohol, and Illegal Substances

People with substance abuse problems or dependence are at risk for premature death, co-morbid health conditions, and disability. Furthermore, substance abuse carries additional adverse consequences for the individual, his or her family, and society at large. People with addiction disorders are more likely than people with other chronic illnesses to end up in poverty, lose their job, or experience homelessness.

Addiction to drugs or alcohol contributes to the state's crime rate as well as to family upheaval and motor vehicle fatalities. Approximately 90% of the criminal offenders who enter the prison system have substance abuse problems.[32] More than two out of five youth in the state's juvenile justice system are in need of further assessment or treatment services for substance abuse.[33] Substance abuse is also one of the primary causes for motor vehicle fatalities, contributing to more than one-quarter (26.8%) of all crash-related deaths.[34] In addition, alcohol or drug use is a major contributor to family disintegration. Nationally, parental use of alcohol or drugs contributes to more than 75% of cases in which children are placed in foster care.[35] The direct and indirect costs of alcohol and drug abuse in North Carolina totaled more than $12.4 billion in 2004.[36]

The 2010-2011 SAMHSA survey results showed that approximately 548,000 (7.0%) of North Carolinians age 12 or older reported alcohol or illicit drug dependence or abuse.[37] A large majority of these—431,000 North Carolinians—reported alcohol dependence or abuse, and 210,000 people reported illicit drug dependence or abuse. A much higher number of people reported drug use (692,000) or binge alcohol use (1.5 million).[37] Unfortunately, data are not available on rural and urban differences in alcohol or illegal drug dependence or abuse. But available data on alcohol-related traffic crashes suggest that alcohol dependence or abuse may be a bigger problem in rural areas (5.8%; 95% CI: 5.6-6.0) compared to urban areas (5.1%; 95% CI: 5.0-5.2).[f]

e Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

f Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

Recently, overdose death rates have skyrocketed in North Carolina. Since 1999, the number of these deaths has increased by more than 300%, from 297 deaths in 1999 to 1,140 deaths in 2011.[38] The majority of these overdose deaths involve prescription opioid pain relievers (like methadone, oxycodone, and morphine). In fact, opioid analgesics are now involved in more drug deaths than cocaine and heroin combined.

Tobacco use is also a major cause of health related problems. Cigarette smoking leads to one-third of all cancer cases and 90% of all lung cancer cases.[39] In North Carolina, 22.1% (95% CI: 20.4-23.9) of adults living in rural counties are current smokers as compared to 20.3% (95% CI: 19.1-21.5) in urban counties.[g,40] In addition to cancer, smoking causes lung diseases such as emphysema and chronic bronchitis, and increases the risk of heart disease among smokers and those who are around them. It is estimated that secondhand smoke exposure caused nearly 34,000 heart disease deaths annually (from 2005-2009) among adult nonsmokers in the United States.[41] In North Carolina, rural and urban exposure to secondhand tobacco smoke are similar [11.7% rural (95% CI: 8.2-15.2) and 7.5% urban (95% CI: 6.0-9.0)].[h]

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Youth are particularly susceptible to the influence of tobacco, drugs, or alcohol, as these substances affect the developing brain. Repeated exposure to tobacco, drugs, or alcohol can alter brain chemistry and microanatomy, making it harder for people to weigh the trade-offs of short-term pleasure derived from tobacco, drug, or alcohol use versus the longer term consequences to the individual and his/her family by the use or misuse of these substances.[42] Use and misuse of alcohol and other drugs is particularly problematic for people under the age of 25, as the brain does not fully form until that age.[43] According to the 2011 North Carolina Youth Risk Behavior Survey, one in five high school students has taken a prescription drug without a doctor's prescription.[44] Additionally, 45% of North Carolina high school students have tried smoking a cigarette (rural/urban breakdown not available).[45]

Access to and Availability of Services

Maximize Individuals' Insurance Opportunities and Access to the Safety Net

In 2011-2012, 20.2% of nonelderly North Carolinians, or 1.6 million people, were uninsured.[46] People in rural areas are about equally as likely to be uninsured as are those in urban areas (20.8% versus 19.5% respectively).[47] However, more than one in four nonelderly residents is uninsured in some rural counties (e.g. Alleghany, Avery, Duplin, Jackson, and Robeson).[48] People who lack health insurance coverage have a harder time affording necessary care. Lack of coverage adversely affects health. Those without insurance are less likely to get

g Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

h Eleanor Howell, MS, State Center for Health Statistics, North Carolina Department of Health and Human Services, email communication, April 17, 2014

preventive screenings and ongoing care for chronic conditions. Consequently, the uninsured have a greater likelihood than people with coverage of being diagnosed with severe health conditions (such as late stage cancer), being hospitalized for preventable health problems, or dying prematurely.[49]

Uninsured North Carolinians report that the main reason they do not have health insurance is because they cannot afford the premiums.[40] Rising health care costs over the past decade have led to decreases in the number of employers offering health insurance and the number of employees who can afford the co-premiums when health insurance is offered.[49]

Uninsured North Carolinians report that the main reason they do not have health insurance is because they cannot afford the premiums.

Beginning in 2014, under the implementation of the Patient Protection and Affordable Care Act (ACA, also known as health reform), individuals and families have new options for purchasing health insurance. Most people are required to have health insurance or pay a penalty. Many North Carolina families are eligible for subsidies through the Health Insurance Marketplace to help them purchase private coverage if they do not have access to affordable employer-based coverage, do not qualify for public coverage, and have incomes between 100-400% of the federal poverty level (FPL).[i] Individuals with incomes below 100% of FPL are not eligible for subsidies in the Marketplace. Current Medicaid eligibility guidelines are very restrictive for nonelderly adults. Coverage is generally limited to disabled adults with incomes up to 100% of the federal poverty guideline (FPG), or parents of dependent children with incomes less than 50% of FPG. Childless, nondisabled, and nonelderly adults are not eligible for Medicaid. The ACA gives states the option to expand Medicaid to cover more low-income adults (those with incomes up to 138% of FPG),[j] However North Carolina has decided not to expand Medicaid.[k] Therefore, health insurance remains unaffordable for many with the lowest incomes.

There are certain health care providers, including community and migrant health centers, rural health centers, public health departments, free clinics, and hospitals that have a mission or legal obligation to provide health care services to the uninsured.[50] However, these organizations are not able to meet all of the health care needs of the uninsured. In addition, funding to some of these organizations has been, or is likely to be, reduced in the future, which will make it increasingly difficult to serve all of the uninsured. Thus, it is important to help those who can gain affordable coverage to purchase it, and to target

i The penalty is $95/year or 1% of income (whichever is greater) in 2014. The penalty amount increases to $695/year or 2.5% of income by 2016. Certain individuals are exempt from the mandate including, but not limited to, those who are not required to pay taxes because their incomes are less than 100% of the federal poverty guideline, those who qualify for a religious exemption, American Indians, and those for whom the lowest cost plan would exceed 8% of their income.

j As originally passed, the Affordable Care Act required states to expand Medicaid to all individuals with family incomes below 138% of the federal poverty guideline, or lose federal funding. In June 2012, the Supreme Court ruled this was unduly coercive to the states and changed it to an optional expansion of Medicaid.

k North Carolina Session Law 2013-5.

the safety net resources to people who are unable to obtain affordable health insurance coverage in the Health Insurance Marketplace.

Improve Recruitment, Retention, and Distribution of Key Health Professionals

Many rural communities experience shortages of key health professionals. Primary care professionals are the entry point into the health care system and provide a wide range of services including preventive care, chronic disease management, urgent care, and some mental health care.[51] The primary care workforce is experiencing increasing demand due to aging baby boomers requiring more care, overall growth in the population, and increasing numbers of people living with chronic illnesses. Additionally, demand is expected to increase in 2014 due to people gaining insurance coverage as a result of the Affordable Care Act.[52] Despite overall growth in the primary care workforce in the last 30 years, many of North Carolina's rural counties, or parts thereof, face persistent primary care shortfalls.[53]

North Carolina has 66 counties that are designated as primary care shortage areas, 22 counties that are designated as behavioral health shortage areas, and 69 counties that are designated as dental shortage areas.

There are many parts of the state that currently lack sufficient numbers of primary care providers, dentists, and mental health professionals to meet population needs. These communities are called health professional shortage areas (HPSAs). North Carolina has 66 counties (or parts of counties) that are designated as primary care shortage areas, 22 counties (or parts thereof) that are designated as behavioral health shortage areas, and 69 counties (or parts thereof) that are designated as dental shortage areas.[l,54] Of those designated communities, 48 of the primary care HPSAs, 20 of the behavioral health HPSAs, and 56 of the dental HPSAs are in rural counties. In addition, 16 rural counties lack general surgeons, who play an important role in meeting the health needs in a community, and are integral to the sustainability of many rural hospitals. North Carolina must find ways to expand the health workforce in underserved areas. It will take specific incentives and strategies to accomplish this goal.

Direct economic incentives can be used to recruit providers to practice in underserved communities. There are four main direct incentive mechanisms: scholarships, loans, loan repayment, and direct incentives such as payments for capital costs or as income guarantees. Incentive mechanisms may be tied to specific service obligations.[55] The federal government provides scholarships or loan repayment to certain types of health care practitioners in return for practicing in a health professional shortage area through the National Health Service Corps (NHSC). NHSC funding can be used to recruit primary care, mental health, and dental professionals into rural and underserved communities that are designated as HPSAs. North Carolina has fewer practitioners receiving NHSC loan repayment than it should based on its size.[56] In addition to federal funding, there is some funding available from the state and from the North

l The HPSAs designated as Single County, Geographical Area, and Population Group were counted on August 15, 2013.

Carolina Medical Society Foundation for loan repayment for individuals who commit to practice in a HPSA. The Office of Rural Health and Community Care manages the state loan repayment program. In addition, the Office helps eligible health professionals apply for the federal and state loan repayment programs. The capacity to recruit and retain health professionals in rural and underserved areas across the state is critical to meet the health needs of North Carolinians.

In addition to financial incentives, broad support for health professionals and their families can help with recruitment and retention. Higher retention of health professionals is associated with several variables including a good match between the physician and community, physician satisfaction with the community, professional fulfillment, and ownership or sense of control in one's practice.[57] Local leaders can help support health professionals and their families both professionally and with acclimation to the community.[13] Mentoring and professional development, along with social engagement with the community and local leaders, may also help recruit and retain more health providers in rural communities in North Carolina.

Table 2.1
Ratio of Health Care Professionals to Population (Professionals per 10,000 population)

Indicator	State	Rural	Urban
All Physicians	22.1	13.71	25.56
Primary Care Physicians	7.8	6.11	8.47
Nurse Practitioners	4.1	2.9	4.6
Physician Assistants	4.0	2.86	4.5
Psychiatrists	1.0	0.52	1.21
General Surgeons	0.63	0.54	0.66
Dentists	4.3	3.04	4.89

Source: Calculations based on 2011 Health professionals state and county totals. North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill. (2011).[57]

Twenty-four rural counties in North Carolina have no general surgeons, three counties have no dentists, and 13 have no psychiatrists.

Support New Models of Care That Expand Access to Health Services

Residents in rural North Carolina are less likely to have access to health care services than those in urban areas. There are fewer health professionals of all types (e.g. primary care, oral health, and mental health) in rural areas of the state.[53] Twenty-four rural counties in North Carolina have no general surgeons, three counties have no dentists, and 13 have no psychiatrists. Most of North Carolina's counties have a local hospital in the county that provides outpatient and emergency care as well as inpatient care for those with more complex needs; however 17 rural counties do not have a hospital in the county.[58] Rural hospitals are typically smaller than urban hospitals and have fewer specialists or specialty health services. In addition to hospitals, communities are served by health clinics, health departments, and independent health care practitioners. Rural health systems are typically more financially fragile than urban health systems due to smaller patient populations, higher percentages of uninsured patients, payment differences, and other factors.[59] Many rural hospitals are consolidating with larger health systems.

North Carolina has a long history of engaging in efforts to strengthen and improve health care services in rural areas and improve rural residents' access to care. These efforts have helped recruit health professionals to rural communities, open rural health centers, and improve the quality of care in rural health systems.[60] While much has been done historically, new models are needed to fill gaps in available resources. There is an ongoing need to develop and implement innovative models of care to improve the quality, efficiency, and availability of health care services. New models that focus on improving population health and expanding access to needed services are particularly important in those rural areas that lack sufficient numbers of health care professionals, but that experience higher rates of many illnesses.

While much has been done historically, new models are needed to fill gaps in available resources.

References

1. Braveman P, Egerter S. *Overcoming Obstacles to Health: Report From the Robert Wood Johnson Foundation to the Commission to Build a Healthier America*. Princeton, NJ: Robert Wood Johnson Foundation; 2008. http://www.rwjf.org/content/dam/farm/reports/reports/2008/rwjf22441. Accessed June 8, 2009.

2. Adler NE, Rehkopf DH. US disparities in health: Description, causes, and mechanisms. *Annu Rev Public Health*. 2008;29:235-252.

3. NCIOM Health Access Study Group. North Carolina Institute of Medicine. *Expanding access to health care in North Carolina: A report of the NCIOM Health Access Study Group*. Morrisville, NC. Published March; 2009.

4. Lantz PA, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J. Socioeconomic factors, health behaviors, and mortality: Results from a nationally representative prospective study of US adults. *JAMA*. 1998;279(21):1703-1708.

5. Cutler D, Lleras-Muney A. National Bureau of Economical Research. *Education and Health: Evaluating Theories and Evidence*. NBER Working Paper 12352. Cambridge, MA: National Bureau of Economic Research; 2006. http://www.nber.org/papers/w12352. Accessed May 15, 2009.

6. Fiscella K, Kitzman H. Disparities in academic achievement and health: The intersection of child education and health policy. *Pediatrics*. 2009;123:1073-1080.

7. Rouse C, Brooks-Gunn J, McLanahan S. Introducing the issue: school readiness closing racial and ethnic gaps. *Future Child*. 2005;15(1):5-13.

8. HighScope Educational Research Foundation. HighScope Perry Preschool Study. HighScope Educational Research Foundation website. http://www.highscope.org/Content.asp?ContentId=219. Published 2009. Accessed June 2, 2009.

9. The Rural School and Community Trust. *Why Rural Matters 2009: North Carolina*. The Rural School and Community Trust website. http://files.ruraledu.org/wrm09/North_Carolina.pdf. Accessed March 21, 2014.

10. Accountability Services Division, North Carolina Department of Public Instruction. Cohort graduation rates. North Carolina Department of Public Instruction website. http://www.ncpublicschools.org/accountability/reporting/cohortgradrate. Accessed March 21, 2013.

11. Crane S. Rural physicians and community leadership: skills for building health infrastructure in rural communities. *NC Med J*. 2006;67(1):63-65.

12. Rhodes J. Pitt County: Celebrating our community and our community's wellness. Trust for America's Health website. http://healthyamericans.org/assets/files/TFAH2012InvstgAmrcsHlthPitt.pdf. Published March 2012.

13. P Mattessich PW, Rausch EJ. *Collaboration to Build Healthier Communities: A Report for the Robert Wood Johnson Foundation Commission to Build a Healthier America*. Princeton, NJ: Robert Wood Johnson Foundation; 2013. http://www.rwjf.org/content/dam/farm/reports/surveys_and_polls/2013/rwjf406479. Accessed July 16, 2014

14. North Carolina Office of Rural Health and Community Care. Health care and North Carolina's economy. North Carolina Office of Rural Health and Community Care website. http://www.ncdhhs.gov/orhcc/data/01opening_text.pdf. Accessed July 16, 2014.

15. Reinelt C, Foster P, Sullivan S. *Evaluating Outcomes and Impacts: A Scan of 55 Leadership Development Programs*. Brookline, MA: Development Guild/DDI, Inc.; 2002. http://www.wkkf.org/knowledge-center/resources/2006/08/evaluating-outcomes-and-impacts-a-scan-of-55-leadership-development-programs.aspx. Accessed July 16, 2014.

16. Chapin Hall Center for Children at the University of Chicago. *Leadership Development in the Program for the Rural Carolinas*. Durham, NC: The Duke Endowment; 2004. http://www.dukeendowment.org/sites/

default/files/media/images/stories/downloads/issues/Program%20for%20the%20Rural%20Carolinas/LeadershipDevelopmentintheProgramfortheRuralCarolinas.pdf. Accessed July 16, 2014.

17. United Health Foundation. America's Health Rankings: North Carolina Obesity. http://www.americashealthrankings.org/NC/Obesity/2013. Published 2013. Accessed February 25, 2014.

18. Division of Nutrition, Physical Activity and Obesity, National Center for Chronic Disease Prevention and Health Promotion. Overweight and Obesity. North Carolina: State Nutrition, Physical Activity, and Obesity Profile. http://www.cdc.gov/obesity/stateprograms/fundedstates/pdf/north-carolina-state-profile.pdf. Published September 2012. Accessed July 18, 2013.

19. Devlin L, Plescia M. The public health challenge of obesity in North Carolina. *NC Med J*. 2006;67(4):278-282.

20. Centers for Disease Control and Prevention. Physical activity and health. Centers for Disease Control and Prevention website. http://www.cdc.gov/physicalactivity/everyone/health/index.html. Accessed March 21, 2014.

21. Centers for Disease Control and Prevention. How much physical activity do you need? Centers for Disease Control and Prevention website. http://www.cdc.gov/physicalactivity/everyone/guidelines/index.html. Accessed March 21, 2014.

22. Centers for Disease Control and Prevention. Physical activity for everyone. Centers for Disease Control and Prevention website. http://www.cdc.gov/physicalactivity/everyone/guidelines/index.html. Accessed March 21, 2014.

23. North Carolina State Center for Health Statistics. 2009 Behavioral Risk Factor Surveillance System (BRFSS) Calendar Year 2009 Results. North Carolina State Center for Health Statistics website. http://www.schs.state.nc.us/schs/brfss/2009/. Updated March 13, 2012. Accessed March 21, 2014.

24. US Department of Health and Human Services and US Department of Agriculture. *Dietary Guidelines for Americans, 2005*. Washington DC: US Government Printing Office; 2006. http://www.health.gov/dietaryguidelines/dga2005/document/pdf/DGA2005.pdf Accessed March 21, 2014.

25. North Carolina State Center for Health Statistics. 2011 BRFSS Survey Results: North Carolina, tobacco use, current smoker. North Carolina State Center for Health Statistics website. http://www.schs.state.nc.us/SCHS/brfss/2011/nc/all/_rfsmok3.html. Published 14 Sep 2012. Accessed April 5, 2013.

26. Hughes A, Sathe N, Spagnola K. *State Estimates of Substance Use from the 2006-2007 National Surveys on Drug Use and Health*. Rockville, MD: US Department of Health and Human Services; 2009. http://www.oas.samhsa.gov/2k7state/2k7State.pdf. Accessed January 28, 2011.

27. Substance Abuse and Mental Health Services Administration. 2006 state estimates of depression and serious psychological distress: North Carolina. US Department of Health and Human Services website. http://www.oas.samhsa.gov/2k6State/NorthCarolinaMH.htm. Updated December 30, 2008. Accessed July 18, 2013.

28. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2008;60:184-189.

29. Kessler RC, Andrews G, Colpe LJ, et al. Short screening sales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002;32(6):959-976.

30. Injury Epidemiology and Surveillance Unit, North Carolina Division of Public Health. *The Burden of Suicide in North Carolina*. Raleigh, NC: North Carolina Department of Health and Human Services; 2013. http://www.injuryfreenc.ncdhhs.gov/ForHealthProfessionals/2013BurdenofSuicide.pdf. Accessed July 16, 2014.

31. Katon WJ. Clinical and health services relationships between major depression, depressive symptoms, and general medical illness. Biol Psychiatry. 2003;54(3):216-226.

32. Division of Alcoholism and Chemical Dependency Programs, North Carolina Department of Correction. *Annual Legislative Report, FY 2006-2007*. Raleigh, NC: North Carolina Department of Correction; 2008. http://www.doc.state.nc.us/Legislative/2008/2006-07_Annual_Legislative_Report.pdf. Accessed March 21, 2014.

33. North Carolina Department of Juvenile Justice and Delinquency Prevention. *2007 Annual Report*. Raleigh, NC: North Carolina Department of Juvenile Justice and Delinquency Prevention; 2008. http://www.ncdjjdp.org/resources/pdf_documents/annual_report_2007.pdf. Accessed July 31, 2008.

34. The University of North Carolina Highway Safety Research Center. About the North Carolina Alcohol Facts (NCAF) website. http://www.hsrc.unc.edu/ncaf/. Accessed October 29, 2010.

35. Schneider Institute for Health Policy, Brandeis University. Substance Abuse: The Nation's Number One Health Problem. Princeton, NJ: Robert Wood Johnson Foundation; 2011. http://www.rwjf.org/content/dam/farm/reports/reports/2001/rwjf13550. Accessed December 11, 2008.http://www.rwjf.org/files/publications/other/SubstanceAbuseChartbook.pdf. Published February 2001. Accessed December 11, 2008.

36. Alcohol/Drug Council of North Carolina. 2004 North Carolina epidemiologic data. http://www.nciom.org/wp-content/uploads/NCIOM/projects/prevention/finalreport/Prevention-Chptr6.pdf. Accessed July 31, 2014.

37. Substance Abuse and Mental Health Services Administration. 2010-2011 National Survey on Drug Use and Health: Model-based estimated totals (in thousands) (50 states and the District of Columbia). US Department of Health and Human Services website. http://www.samhsa.gov/data/NSDUH/2k11State/NSDUHsaeCountTabs2011.htm. Accessed July 18, 2013.

38. North Carolina Injury and Violence Prevention Branch. Prescription and drug overdoses. North Carolina Department of Health and Human Services website. http://injuryfreenc.ncdhhs.gov/About/PoisoningOverdoseFactSheet2013.pdf. Published January 2013. Accessed July 18, 2013.

39. National Institute on Drug Abuse. Drug facts: cigarettes and other tobacco products. National Institutes of Health website. http://www.drugabuse.gov/publications/drugfacts/cigarettes-other-tobacco-products. Updated December 2012. Accessed March 25, 2014.

40. North Carolina State Center for Health Statistics. 2011 Behavioral Risk Factor Surveillance System (BRFSS) survey results: North Carolina uninsured. North Carolina Department of Health and Human Services website. http://www.schs.state.nc.us/schs/brfss/2011/nc/all/noinsure.html. Published September 14, 2012. Accessed July 23, 2014.

41. Centers for Disease Control and Prevention. Smoking and tobacco use: secondhand smoke (SHS) facts. Centers for Disease Control and Prevention website. http://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/general_facts/. Updated April 11, 2014. Accessed March 25, 2014.

42. Friedman D. Drug addiction: a chronically relapsing brain disease. *NC Med J*. 2009;70(1):35-37.

43. Weinberger DR, Elvevåg B, Giedd JN. The Adolescent Brain: A Work in Progress. Washington, DC: The National Campaign to Prevent Teen Pregnancy; 2005. https://thenationalcampaign.org/sites/default/files/resource-primary-download/brain.pdf. Accessed May 6, 2009.

44. North Carolina Injury and Violence Prevention Branch. Prescription drug abuse: 2011 NC Youth Risk Behavior Survey (YRBS). North Carolina Department of Health and Human Services website. http://www.injuryfreenc.ncdhhs.gov/DataSurveillance/YRBS/2011MSHSPrescriptionDrugUse.pdf. Published September 2010. Accessed July 18, 2013.

45. Office of Adolescent Health. North Carolina adolescent substance abuse facts. US Department of Health and Human Services website. http://www.hhs.gov/ash/oah/adolescent-health-topics/substance-abuse/states/nc.html. Updated July 19, 2013. Accessed March 25, 2014.

46. United States Census Bureau. Health insurance historical tables - HIB series. Health insurance coverage status and type of coverage by state—persons under 65: 1999 to 2012. United States Census Bureau website. http://www.census.gov/hhes/www/hlthins/data/historical/HIB_tables.html. Updated September 17, 2013. Accessed January 13. 2014.

47. North Carolina Institute of Medicine. Characteristics of Running the numbers: The uninsured in Nnorth Ccarolinians.a 2011-2012 data snapshot. North Carolina Institute of Medicine website. http://riversdeveloper.com/wp-content/uploads/2010/08/Uninsured-Snapshot_2011-2012.pdf. Accessed July 25, 2014.

48. US Census Bureau. Small Area Health Insurance Estimates. Health Insurance Coverage Estimates Percent Uninsured 2012. US Census Bureau website. http://www.census.gov/did/www/sahie/data/files/F7_SAHIE_2012_County_Population_Under_65_Uninsured.jpg. Accessed March 12, 2014.

49. Institute of Medicine of the National Academies. *America's Uninsured Crisis: Consequences for Health and Health Care*. Washington, DC: Institute of Medicine of the National Academies; 2009.

50. Silberman P, Odom CH, Smith S Jr, Dubay KL, Thompson KW, Task Force on the North Carolina Healthcare Safety Net. The North Carolina healthcare safety net, 2005: fragments of a lifeline serving the uninsured. *NC Med J*. 2005;66(2):111-119.

51. Bodenheimer T, Pham H. Primary care: current problems and proposed solutions. *Health Affairs*. 2010;29(5):799-805.

52. Schwartz MD. Health care reform and the primary care workforce bottleneck. *J Gen Intern Med*. 2011.

53. Spero J. North Carolina's rural health workforce: Challenges and strategies. Presented to: North Carolina Institute of Medicine Task Force on Rural Health; July 31, 2013; Greensboro, NC. http://www.nciom.org/wp-content/uploads/2013/04/Spero_7-31-13.pdf. Accessed July 23, 2014.

54. Health Resources and Services Administration. Find shortage areas: HPSA by state and county. US Department of Health and Human Services website. http://hpsafind.hrsa.gov/HPSASearch.aspx. Updated July 24, 2014. Accessed July 24, 2014.

55. North Carolina Institute of Medicine Primary Care and Specialty Supply Task Force. North Carolina Institute of Medicine. *Providers in Demand: North Carolina's Primary Care and Specialty Supply*. Durham, NC. North Carolina Institute of Medicine; 2007. http://www.nciom.org/projects/supply/provider_supply_report.pdf. Accessed December 10, 2008.

56. Pathman,D. Two (Among Many) Possible Health Workforce Building Approaches for NC. Presented at: North Carolina Institute of Medicine Workgroup on Health Reform: Health Professional Workforce; December 15, 2010; Morrisville, NC. http://riversdeveloper.com/wp-content/uploads/2010/10/Pathman_12-15-10.pdf. Accessed January 9, 2012.

57. North Carolina Health Professions Data System. 2011 Health professionals per 10,000 population ratios. Cecil G. Sheps Center for Health Services Research website. http://www.shepscenter.unc.edu/hp/prof2011.htm. Accessed July 23, 2014.

58. Dihoff S, Spade JS. The special role for rural hospitals in meeting the needs of their communities. *NC Med J*. January/February 2006;67(1):86-89.

59. Holmes,M. Health care costs in rural North Carolina. Presented to: North Carolina Institute of Medicine Task Force on Rural Health; July 31, 2013; Greensboro, NC.

60. Ricketts TC. State and local partnerships for meeting the healthcare needs of small and often remote rural communities. *NC Med J*. January/February 2006;67(1):43-50.