Nationwide, rural populations suffer from lack of access to health care [1]. Even though 19.3% of the national population lives in rural areas [2], only 8.9% of physicians practice in those areas [3]. This maldistribution contributes to a troubling disparity in health care access between urban and rural populations; there are 380.5 physicians per 100,000 people in urban areas, while there are only 118.3 physicians per 100,000 people in rural areas [1]. Furthermore, rural populations are more likely to have worse health outcomes [4]. Compared to urban populations, rural residents are more likely to suffer from mental illness and chronic disease—such as ischemic heart disease, chronic obstructive pulmonary disease, and obesity—and rural residents have higher rates of adolescent pregnancy and higher overall mortality rates [1, 5].

National Shortage Affects Rural Western North Carolina

This disparity can be seen in rural counties in North Carolina, including those in Western North Carolina. Increasing the number of physicians practicing within the state as a whole has not improved physician shortages in rural areas. When compared to national averages, the number of physicians per capita has actually grown faster in North Carolina than in the rest of the country [6]. However, North Carolina’s overall physician-to-population ratio is misleading. As Fraher and Spero noted, “North Carolina’s physician workforce is concentrated in counties where there are academic medical centers and in urban areas” [6]. This maldistribution leaves rural counties critically underserved, including those in Western North Carolina.

To compound this issue, North Carolina is also experiencing a maldistribution of specialized physicians [6]. In Western North Carolina, physicians in 3 specialties are particularly needed: family medicine, general surgery, and psychiatry. According to the Cecil G. Sheps Center for Health Services Research and the North Carolina Institute of Medicine, Western North Carolina faces shortages in all 3 of these specialties [7].

As Figure 1 shows, each of the 16 counties in Western North Carolina is a primary care Health Professional Shortage Area (HPSA) when assessed by either population or geography [8, 9]. Further, there is an expected shortage of approximately 138 primary care providers (unpublished data).

Similarly, there is an expected shortage of at least 30 general surgeons in Western North Carolina (unpublished data), and filling general surgery positions has become an even greater challenge (see Figure 2) [10, 11]. With the growing trend towards physician urbanization has come a growing tendency toward specialization [12, 13]. As of 2008, only 20% of all surgeons practicing in North Carolina did so in a rural county, while 31% of the state’s population resided in such locales [14].

A third challenge is the need for psychiatrists in rural areas (see Figure 3). Throughout the 16 counties of Western North Carolina, an average of only 41.2% of the psychiatric services needed by adults were available in 2012 [10, 11, 15]. This figure is especially disturbing considering that the region has a suicide rate that is significantly above national benchmarks [16].

Strategies to increase the number of rural primary care physicians, general surgeons, and psychiatrists in Western North Carolina are needed. Further, access to effective health care, a healthy workforce, and lower overall health care costs are key factors to promoting growth in our region [17].

MAHEC’s Multifaceted Approach

With the passage of the North Carolina state budget in September 2015, the budget for the Mountain Area Health Education Center (MAHEC) was increased by $8 million to address the physician shortage in Western North Carolina. Spearheaded by Senator Tom Apodaca, this appropriation...
of the North Carolina General Assembly was granted with an important goal in mind: to increase the recruitment and retention of primary care providers, general surgeons, and psychiatrists in rural Western North Carolina. To achieve this goal, the entire $8 million appropriation will be used to create new general surgery and psychiatry residency training programs, to expand MAHEC’s existing Asheville Family Medicine Residency Program, to expand the School of Medicine campus at the University of North Carolina (UNC) at Asheville, to create rural teaching hubs throughout the region, and to fund new opportunities to conduct population health and rural education research.

**FIGURE 1.**
Primary Care Health Professional Shortage Areas in Western North Carolina

Source: Health Professional Shortage Area data are from the Health Resources and Services Administration Data Warehouse as of June 22, 2016. Economic tier data are from the North Carolina Department of Commerce, published December 4, 2015.

**FIGURE 2.**
General Surgeon Health Professional Shortage Areas in Western North Carolina

Source: Physician data are from the North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill, using data derived from the North Carolina Medical Board Annual Licensure file. Data are up to date as of October 1, 2014. Data include active, licensed North Carolina physicians practicing in state who are not residents-in-training or employed by the federal government. Population data are from the United States Census 2014 Annual Estimates of the Resident Population.
Expansion and New Residencies

The growth of UNC Asheville’s School of Medicine campus will expand opportunities for students to spend time in rural teaching hubs. Additionally, new support will be given to the medical school to accelerate interprofessional training and practice in primary care, which includes integrated behavioral health, clinical pharmacy, and public health.

At least 50% of residents practice within 100 miles of the location where they complete their training [18]. By creating new residencies and expanding existing programs in Buncombe County, Western North Carolina communities will see a benefit for years to come. MAHEC’s track record for serving Western North Carolina is strong; for more than 40 years, it has trained physicians, pharmacists, and dentists to serve the region. Every county has been a beneficiary of MAHEC’s training programs, and more than 60% of the graduates of the UNC Asheville Family Medicine Residency program have remained in Western North Carolina.

The $8 million appropriation from the North Carolina General Assembly is supporting expansion of the Asheville Family Medicine Program—to 12 residents per class in 2016 and to 13 residents per class in 2017. Additionally, over the next 2 years, MAHEC will be developing the infrastructure for residency training programs in surgery and psychiatry, moving through the steps of accreditation and developing the curriculum for these new programs. Students in all 3 residency programs will have significant portions of their training in rural areas outside of Buncombe County. By 2022, MAHEC will have added more than 40 residents.

Rural Teaching Hubs

The more exposure a learner has to rural communities during his or her training, the more likely that learner will practice in a rural setting (unpublished data). With the expansion of the Asheville Family Medicine Residency Program and the UNC Asheville School of Medicine campus—as well as the creation of the new general surgery and psychiatry residencies—MAHEC is developing rural teaching hubs to train this myriad of learners. We are currently recruiting community providers in Mitchell, Yancey, and McDowell counties to staff the first rural teaching hub; these providers will serve as rural preceptors for family medicine, general surgery, psychiatry, and pharmacy residents, as well as medical and pharmacy school students. By expanding MAHEC’s reach into these hubs, we hope to facilitate positive learning experiences for our medical students and residents, thereby increasing the likelihood of graduates practicing in our region’s most needy communities.

Additional Innovative Programs

In addition to the creation of new residencies and rural teaching hubs, the $8 million appropriation will also fund innovative programs and the purchase of new equipment that will help MAHEC train Western North Carolina’s future rural physicians. For example, a state-of-the-art surgical simulation lab will be built at MAHEC’s Biltmore campus, which will be used by a variety of medical learners, from 3rd-year medical students to senior-level surgery and family medicine residents. In addition to the simulation lab,
MAHEC is developing an ultrasound curriculum that will allow our graduates to take point-of-care ultrasound skills into rural practices.

The $8 million appropriation will also support new population health and rural education research. As MAHEC’s presence in rural communities increases, we plan to conduct population health interventions and to research effective clinical-community connections that will benefit all of North Carolina. MAHEC is also developing research projects about rural, longitudinal, and interdisciplinary medical education with an intended national audience.

Conclusion

We know that the problem of recruiting and retaining rural physicians is complex. Thanks to the $8 million appropriation from the North Carolina General Assembly, MAHEC is able to implement a multifaceted approach to tackle the issue. This initiative has the potential to make a substantial health and economic impact in the region. For example, 1 rural primary care physician creates 23 jobs, which generate $1.5 million in total revenue annually [19]. One rural general surgeon creates 26 jobs, which generate $2.7 million in total revenue annually [20].

With support from long-standing relationships with UNC, particularly the School of Medicine, and with hospitals within Western North Carolina, MAHEC plans to make positive changes that will benefit the region for years to come.

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