



Health Care Workforce Distribution and Shortage Issues in Rural America

Executive Summary

Background: The quality and functionality of a health care delivery system depend on the availability of medical personnel and infrastructure to provide needed services.ⁱ Rural communities generally have fewer physicians, nurses, specialists, and other health care workforce, and the small population size and scale makes the loss or shortage of a single health provider likely to have far-reaching impacts.ⁱⁱ Twenty percent of our nation's population is rural, and rural counties are more likely to report fair to poor health (19.5 percent rural counties compared to 15.6 percent urban counties).ⁱⁱⁱ Rural Americans tend to be older and less well insured;^{iv} and chronic disease prevalence, infant and maternal morbidity, mental illness, environmental and occupational injuries, and obesity are higher in rural communities.^{v,vi,vii} Rural communities tend to be poorer than urban communities, and rural workers command lower wages and are more likely to be unemployed.^{viii} Rural communities are often located in remote areas, have small and dispersed populations, and possess unstable economic infrastructures.

In addition, the ethnic minorities, including African American, Asian, American Indian, Hispanic, and 'Other' are increasing in number in rural communities. Recent census data further indicate that persons of minority background are increasing at a higher rate in rural areas than in urban areas. Hispanics (Latinos) are the fastest growing population in the nation, and as a group, they make up the youngest segment of the population.

These factors can make it difficult for rural communities to maintain local hospital facilities and attract and retain health personnel. This can lead to rural Americans requiring extensive travel time and incurring great costs in order to obtain basic health care. Further, near-retirement primary care physicians (age 56 or older) constitute a larger proportion of the rural workforce (25.5 percent urban, 27.5 percent rural, and 28.9 percent remote rural), making it likely that rural workforce shortages will increase in the years ahead.^{ix} The workforce shortage puts tremendous pressure on the existing rural workforce.^x Rural physicians, compared to their urban counterparts, tend to work longer hours and see a greater number of patients.^{xi} Due to the shortage of specialists, rural physicians are required to not only perform a greater number and greater variety of procedures than are urban physicians, but they also must achieve and maintain a broad range of competencies despite isolation from learning opportunities and colleagues.^{xii}

Issue: The population of rural America constitutes about 20 percent^{xiii} of the total population, or nearly 62 million people living outside metropolitan statistical areas.^{xiv} In 2005, only 11.4 percent of physicians practiced in rural locations.^{xv} In recent years,

shortages of non-physician providers including nurses, midlevel providers, dentists, pharmacists, radiology and laboratory technicians, and mental health professionals have also become more apparent. Problems with the distribution of physicians and other health professionals, as well as recruitment and retention issues in general, are ongoing for rural areas, especially those that compete with urban areas to maintain an adequate workforce. The National Rural Health Association (NRHA) believes that it is essential for rural areas to have an adequate and able workforce to deliver needed health care services.

Rural Workforce Shortages Across All Health Providers

The health care labor shortage in the United States has been widely documented and is expected to last for the foreseeable future. The increase in population is partially responsible for the health care labor shortage. As the health care workforce ages, the U.S. population is expected to rise by 18 percent by 2030, and the population over the age of 65 is expected to increase three times that rate.^{xvi}

In addition to the shortage of health professionals, maldistribution is another prevalent obstacle rural Americans face in accessing timely and appropriate primary health care services.^{xvii} Workforce shortages are especially serious in remote frontier communities, many of which are located in the Western region of the United States. As of June 30, 2011, the number of non-metropolitan primary medical health professional shortage areas (HPSAs) was 4,148, representing 65 percent of the primary care HPSAs and nearly 34.5 million people. These HPSAs would require an additional 3,959 practitioners to remove the HPSA designations and 8,851 to achieve target population-to-practitioner ratios of 2,000:1.

Physicians: The Association of American Medical Colleges projects a shortage of 124,000 full-time physicians by 2025.^{xviii} The Council on Graduate Medical Education projects a shortage of 85,000 physicians in 2020, which is approximately 10 percent of today's physician workforce.^{xix} Given the broader physician workforce shortages, the impacts in rural areas are likely to be more dramatic. In 2005, the ratio of physicians to population in urban counties was 136 percent higher than that in rural counties.^{xx} Compared to almost 20 percent of the total population residing in rural areas, only 11.4 percent of all physicians practice in rural areas.^{xxi} Rural areas continue to have a disproportionately smaller share of physicians and, within rural areas, distribution is even more inconsistent.^{xxii} In addition, the percentage of minority students enrolled in public medical institutions has stagnated over time (Lakhan and Laird, 2009). This given the recent census data on minorities in rural areas, this fact will likely add to the workforces shortage.

Registered Nurses: The average age of registered nurses (RNs) is increasing and the size of the RN workforce will plateau as large numbers of RNs retire. Currently more than 51 percent of registered nurses are at least 40 years old and 40 percent are at least age 50.^{xxiii} As demand is expected to increase over the next twenty years, a large

and prolonged nursing shortage is expected.^{xxiv} There are 19,400 RN vacancies in long-term care settings, according to the American Health Care Association, and 116,000 open positions in hospitals, as reported by the American Hospital Association. In 2005, the ratio of hospital-based RNs to urban population was 130 percent of the rural ratio.^{xxv} The number of working RNs per capita has remained lower in rural areas than in urban areas from 1980 to 2004, and the salaries of RNs who live in rural areas remain lower than urban-residing RNs.^{xxvi}

Mental Health Professionals: Lower access to mental health services is directly related to lower availability or supply of mental health providers.^{xxvii} Rural hospitals generally provide fewer inpatient psychiatric services than urban hospitals.^{xxviii} HRSA has qualified 2,289 non-metropolitan mental health HPSAs, requiring 1,269 practitioners to remove designations. In addition, 4,424 practitioners would be needed to achieve target ratios of 10,000:1 (these ratios are the numbers required to provide adequate health care service to populations).^{xxix}

Pharmacists: The availability of pharmaceutical services within rural areas can also have far-reaching effects upon the access and quality of health care of rural residents. There are many instances where an independent pharmacy is the lone provider of pharmaceutical services to a rural community.^{xxx} The Rural Policy Research Institute (RUPRI) recently performed a study that monitored and tracked independent rural pharmacies from March 2003 through December 2010. A total of 258 rural communities with a single retail pharmacy in May 2006 had no retail pharmacy in December 2010, and nine communities with more than one pharmacy in May 2006 had none in December 2010. An additional 176 rural communities went from having more than one retail pharmacy in May 2006 to only one retail pharmacy in December 2010. There are several identifiable causes behind the closing of independent rural pharmacies, including population loss, private insurance policies, Medicare prescription drug discount cards and drug benefits, and Medicaid restrictions.^{xxxi}

Dentists: Perhaps the most severe instance of rural health care workforce shortage is reflected in the dearth of rural practicing dentists. In 1998, rural counties had 29 dentists per 100,000 people, compared to 43 per 100,000 in urban counties; in the same year, 247 counties did not have a single dentist.^{xxxii} By 2004, the ratio of rural practicing dentists to rural residents was a mere 23:100,000.^{xxxiii} In 2005, the ratio of dentists to urban population was 150 percent of the rural ratio.^{xxxiv} A more recent study of rural dental practices in four states found that vacancy rates for dental hygienists varied greatly (from 6 percent to 35 percent), as did dental assistant vacancy rates (from 4 percent to 12 percent).^{xxxv} HRSA has qualified 2,985 non-metropolitan dental HPSAs, requiring 4,161 practitioners to remove the designations and 5,623 to achieve the target ratios of 3,000:1.^{xxxvi}

Allied Health Occupations: Allied health professionals include occupational therapists, physical therapists, radiation therapists, respiratory therapists, pharmacy technicians, radiation technicians, respiratory technicians, dental hygienists, speech pathologists, laboratory technicians, and laboratory technologists. The national average

wage of the eleven allied health professions was lower in nonmetropolitan areas compared to metropolitan areas, with rural hourly wages 12 percent lower, on average.^{xxxvii} Demand for allied health services is projected to increase substantially, given the aging population, and there is empirical evidence of allied health shortages, which will likely affect rural areas most acutely.

Key Rural Workforce Policy Issues

Rural Economic Income Disparities: There are 386 persistent poverty counties in the United States, and 340 are in non-metropolitan counties.^{xxxviii} The highest poverty rates are found in rural counties that are not adjacent to metropolitan counties. The impacts on workforce distribution include lower reimbursement levels, less ability to recruit and retain health professionals, higher rates of uninsurance and underinsurance, less demand for private health care, and fewer rural training sites.

Rural Workforce Training and Development: Most future health professionals will come from urban areas as rural students often face inadequate preparation in keystone math and science topics that facilitate medical careers,^{xxxix} lower educational and socioeconomic status, fewer role models and less encouragement to pursue advanced degrees, and the need to travel to attend most health professional education programs.^{xi} A general decline in the number of medical students entering family medicine, internal medicine, and general pediatrics is having a more pronounced impact in rural locations.^{xii}

Recruitment and Retention Challenges: Lower patient densities, rural economic income disparities, the smaller number of rural health professional training sites, and lower reimbursement levels make it challenging to recruit physicians to rural communities. Non-physician providers – primarily physician assistants (PAs) and nurse practitioners (NPs) – have been major components of the rural health workforce, but the proportion of PAs entering generalist practice has declined, and the number of NPs has fallen dramatically in recent years,^{xiii} further exacerbating rural workforce shortages. Compounding general workforce shortages, female physicians are less likely than their male counterparts to choose rural practice, associated with gender-related factors such as spousal career concerns, longer hours, and inflexible work arrangements.^{xiii} Turnover is also very expensive in health care. For example, the American Organization for Nurse Executives has determined that the turnover cost per nurse is at least double the nurse's salary.^{xiv}

Reimbursement and Payment Policy: The 2007 Medicare Physician Fee Schedule that increased compensation for evaluation and management services at a rate exceeding increases for procedural services resulted in a mild increase in rural primary care physician income in a prototypical practice.^{xiv} However, persistent problems with the sustainable growth rate (SGR) formula have threatened to lower physician reimbursement levels (further decreasing access to care) and have led to calls for SGR repeal. The overall impacts of The Patient Protection and Affordable Care Act (ACA) are not yet clear, although provisions to improve workforce development strategies, to

support faculty loan repayment programs, to increase funding for the National Health Service Corps, to develop programs to train and employ alternative dental health care providers, to support community health centers and Area Health Education Centers, to field bundled payment pilots in consultation with small rural hospitals and critical access hospitals, to extend special payment policies that benefit rural providers, to add critical access hospitals and rural referral centers with disproportionate share payments above an 8% threshold to the 340B drug purchasing program, to establish floor payments on area wage indices for hospitals in frontier states, and other provisions may improve workforce shortages in rural areas.

HPSA/MUA Designations: Current designations for health professional shortage areas and medically underserved areas are inadequate in many ways. Counting only physicians provides an inadequate picture on primary care availability within rural communities. Use of high-need indicators fails to capture broader access measures. The persistence of separate federal designations for different programs creates a burden on local communities.

Impact of Health Reform: The Patient Protection and Affordable Care Act (ACA) strives to make significant progress on access to health care, but its impacts on rural workforce shortage and distribution issues are still unclear. For example, consumer operated and oriented plans and community health insurance plans (as well as provisions targeted to lower income households) may create new options for rural residents – with concomitant impacts on rural workforce – but reaching rural residents and making information on coverage options available through the internet may be challenging in some rural communities. Payments to rural providers may be impacted by payment adjustments for health care acquired conditions in both Medicare and Medicaid program regulations. There may be new programs in maternal, infant, and early childhood home visiting programs. Quality measure development, new care delivery models, and public reporting of data may facilitate rural workforce improvements and help recruitment and retention, or they may present additional data collection and presentation challenges for rural providers with limited resources. Various mandated studies and pilots may increase payment levels for rural providers, and several provisions specify that certain proportions of grants must be awarded to rural and frontier areas. Of particular interest will be the work of the National Health Care Workforce Commission (Section 5101), the State health care workforce development grants (Section 5102), various grants and loan programs for various health professional groups (Sections 5201 through 5208), and various education, training, and access improvement opportunities (Sections 5301 through 5509), which all have specified rural components.

Recommendations and Solutions

Training Future Health Care Workers: The NRHA supports the recent efforts made possible through the ACA to establish teaching health centers. The teaching health center program draws upon current Federally Qualified Health Centers to establish medical residency training programs. The ultimate goal of the program is to train

residents in community health centers with the goal that residents will continue to serve at these sites as physicians. The NRHA encourages the Health Resources and Services Administration to establish these health centers in rural sites or in locations that allow for rural rotations whenever possible. The NRHA calls for additional training sites for all health care professionals, including behavioral and oral health providers, in rural areas. According to an Institute of Medicine (IOM) report, once students are trained in rural areas, they are more likely to remain in rural areas. The NRHA fully supports the recent awards from the Department of Health and Human Service's Bureau of Health Professions for the recent \$71.3 million dollars awarded to strengthen the nursing workforce. Such awards include funding for advanced education nursing traineeships, nurse faculty loan program, nursing workforce diversity and much more.^{xlvi} The NRHA calls for additional funding opportunities for other health professions and for funding to sustain these worthwhile programs that will result in a strong nursing workforce now and into the future.

Increasing Pay, Benefits, and Flexibility: Many physicians do not choose to come to rural practices due to the lack of resources offered and the many expectations of a rural doctor. If critical access hospitals can have hospitalist programs to provide in-patient care, the after-hours duties of the rural physician are eliminated. Flexible hours and increased pay are also major incentives to attract physicians to rural practices. Rural health care providers need to be poised and ready to offer competitive pay and benefits to individuals seeking rural practice. Offering a strong financial incentive package to potential providers in an extremely competitive job market will go a long way to attract physicians to rural practice. These same incentives for pay, benefits and job flexibility hold true for all other health care providers, including allied health care providers. Having other physicians or providers with whom to share call coverage is another way to attract providers to rural practice.

Scope of Practice Changes: Ensuring that state-specific scope of practice laws allow non-physician primary care providers to diagnose, order tests, write prescriptions and make referrals could increase the capacity of primary care, especially in rural areas by increasing their reach and allowing non-physician primary care practitioners to practice at the top of their licensure. Non-physician providers are trained to treat patients with low-acuity illnesses and provide care to those with chronic diseases, as well as referring patients with more complex issues to physicians. This flexibility allows physicians the time to treat those with the more complex issues while ensuring all patients are seen in a timely and an efficient manner.^{xlvii}

3RNet: The National Rural Recruitment and Retention Network assists health professionals find positions in rural and underserved area. The group also assists organizations that become members in recruiting and retaining qualified professionals to their rural and underserved areas. The health professions that are served by 3RNet span the continuum of professionals and are located nationwide. NRHA encourages organizations to review options that 3RNet may offer in recruitment and retention.

J1 Visa Waivers: One program that has successfully helped decrease the health care workforce distribution issues is the use of J1 Visa Waivers to waive the two-year home residency requirement so a physician may stay in the United States and practice in a Health Professional Shortage Area or a Medically Underserved Area, they are sponsored by an interested federal government agency. NRHA encourages the continuance and expansion of this program to decrease the effects of the looming health care workforce shortages.^{xlviii}

Telemedicine Expansion: The use of telemedicine will help build capacity and increase recruitment and retention of health care providers in rural areas. Telemedicine accomplishes these goals by allowing physicians to more easily connect with and monitor their patients, allowing non-physician providers to practice in more areas while still being advised by physicians, increasing the availability of specialists and supporting newly graduated providers that have been recruited into rural areas. Telemedicine also provides support by specialist physicians in a quicker time frame than transfers. Telemedicine may also help physicians avoid transferring patients from smaller rural areas when they have access to specialists through telemedicine technologies.^{xlix}

Using Information Technology and Telehealth: The NRHA supports the recent formation of the Telehealth Network Grant Program to establish pilot projects through HRSA's Office of Rural Health Policy that will demonstrate the value and cost effectiveness of telehealth resources. These four projects will be models to determine how telehealth networks benefit hospitals, primary care facilities, and communities as a whole. The NRHA also encourages the establishment and strengthening of telehealth resource centers. These resource centers are integral to ensuring the dissemination and growth of telehealth programs throughout the country. Along with the establishment and strengthening of telehealth, rural health care is already in need of educated clinical informaticists. For this reason, NRHA also encourages an increased emphasis on education and development in this field.

Changes to the National Health Service Corps: The NRHA approves of the recent growth and expansion of the National Health Service Corps (NHSC) which provides scholarships and loan repayment to physicians and other health care professionals that agree to work in a rural or underserved area. Through this recent growth, additional providers are earning loan repayment while they practice in underserved areas. Today, over 8,000 physicians, dentists and other NHSC primary health care clinicians are working in underserved communities throughout the country including rural and frontier areas.ⁱ More than 7 million people, many of whom have no health insurance, rely on NHSC clinicians to keep them healthy and treat their medical, dental and mental health conditions.ⁱⁱ More than 75 percent of these clinicians report that they plan to stay in the practice where they were fulfilling their commitment for loan repayment.ⁱⁱⁱ As part of the NHSC, the State Loan Repayment Program provides funding to individual states to establish their own loan repayment program. These state funds are mainly used as matching funds for local community funding to assist in the loan repayment for health care professionals who agree to practice in an underserved area.

Reimbursement and Payment Policy Reform: Reimbursement models need to be adjusted to better reflect the realities of rural settings, e.g. the hospital wage index should include a more granular rurality adjustment. Another suggestion is to reimburse facilities located in counties with per capita income in the lowest 20 percent for all U.S. counties on the basis of a wage index equal to the median wage index for all counties to facilitate recruitment in chronically distressed communities. Geographic disparities in physician payment should be reduced. At this point in time, urban facilities receive higher Medicare reimbursement rates than rural facilities.

Health Professional Training: The Bureau of Health Professions, along with the Health Resources and Services Administration of the U.S. Department of Health and Human Services, supports training opportunities that encourage students to seek health care careers in underserved communities. Area Health Education Centers (AHECs) work with academic health centers in rural areas to recruit students to health careers. AHECs also provide training opportunities for current clinicians and clinical opportunities to health professionals, medical and nursing students. AHEC legislation from the 1970s dictates that state program offices must be in medical schools (either MD or DO) unless there is no medical school in the state or an existing medical school chooses not to sponsor an AHEC. In either of those cases, AHECs can be sponsored by a school of nursing. Program offices must establish regional centers to perform the local academic or community efforts in health workforce development targeting medically underserved and health professions shortage areas (as well as recruitment of minority and economically and educationally disadvantaged students). The regional centers can be free-standing or hosted by a community entity, but they must represent the entire region in program provision in a “grow your own” type of approach to attract students from high-need areas and to educate and train them with the hope that they will return to high need areas to practice. The NRHA fully endorses these efforts and requests continued funding to the AHECs to address the health care workforce needs in each respective state. Further, the NRHA supports state loan repayment programs for all allied health workers. When states are able to afford such programs, these opportunities enable health care providers to more easily attract health care professionals to rural and frontier areas in exchange for having their student loans repaid.

Acknowledgement: Portions of this issue brief draw upon the Workforce Competencies Project: Final Report by Atlas Research and Georgetown University (2009).

-
- ⁱ Chen FM, Fordyce MA, Andes S, Hart LG. (2008). U.S. Rural Physician Workforce: Analysis of Medical School Graduates from 1988-1997. WWAMI: The Rural Health Working Paper Series. 113.
- ⁱⁱ National Advisory Committee on Rural Health and Human Services. (2008) The 2008 Report to the Secretary: Rural Health and Human Services Issues. U.S. Department of Health and Human Services, April.
- ⁱⁱⁱ National Rural Health Association. (2011). HPSA & MUA Negotiated Rulemaking. July 7.
- ^{iv} Larson, EH. (2003). State of the health workforce in rural America: Profiles and comparisons. Seattle, WA: WWAMI Rural Health Research Center.
- ^v National Advisory Committee on Rural Health and Human Services. (2008) The 2008 Report to the Secretary: Rural Health and Human Services Issues. U.S. Department of Health and Human Services, April.
- ^{vi} National Rural Health Association. (2011). HPSA & MUA Negotiated Rulemaking. July 7.
- ^{vii} Office of Rural Health Policy. (2005). Mental health and rural America, 1994-2005: An overview and annotated bibliography / U.S. Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy.
- ^{viii} Office of Rural Health Policy. (2005). Mental health and rural America, 1994-2005: An overview and annotated bibliography / U.S. Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy.
- ^{ix} Doescher MP, Fordyce MA, Skillman SM. (2009). Policy brief: the aging of the primary care workforce: are rural locations vulnerable? Seattle, WA: WWAMI Rural Health Research Center, University of Washington. June.
- ^x Curran V, Rourke J. (2004). The role of medical education in the recruitment and retention of rural physicians. *Medical Teacher*. 26(3):265-72.
- ^{xi} Larson, EH. (2003). State of the health workforce in rural America: Profiles and comparisons. Seattle, WA: WWAMI Rural Health Research Center.
- ^{xii} Curran V, Rourke J. (2004). The role of medical education in the recruitment and retention of rural physicians. *Medical Teacher*. 26(3):265-72.
- ^{xiii} USDA, State Fact Sheets: United States. Updated July 11, 2011. www.ers.usda.gov/StateFacts/US.HTM, downloaded July 21, 2011
- ^{xiv} Rosenblatt, Roger A., Chen, Frederick M. et. al. The future of Family Medicine and Implications for Rural Primary Care Physician Supply. WWAMI Rural Health Center, August 2010. http://depts.washington.edu/uwrhrc/uploads/RHRC_FR125_Rosenblatt.pdf, downloaded July 22, 2011.
- ^{xv} Rosenblatt, Roger A., Chen, Frederick M. et. al. The future of Family Medicine and Implications for Rural Primary Care Physician Supply. WWAMI Rural Health Center, August 2010. http://depts.washington.edu/uwrhrc/uploads/RHRC_FR125_Rosenblatt.pdf, downloaded July 22, 2011.
- ^{xvi} USDA, State Fact Sheets: United States. Updated July 11, 2011. www.ers.usda.gov/StateFacts/US.HTM, downloaded July 21, 2011
- ^{xvii} Rural Information Center Health Service. Rural health statistics. www.nal.usda.gov/ric/.
- ^{xviii} Association of American Medical Colleges. (2008). The complexities of physician supply and demand: Projections through 2025.
- ^{xix} Council on Graduate Medical Education. (2005). U.S. likely to face a shortage in 2020.
- ^{xx} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. *American Journal of Public Health* 95(1):42-8.
- ^{xxi} Fordyce MA, Chen FM, Doescher MP, Hart LG. (2007). 2005 Physician supply and distribution in rural areas of the United States. WWAMI: The Rural Health Working Papers Series. 116.

-
- ^{xxii} Fordyce MA, Chen FM, Doescher MP, Hart LG. (2007). 2005 Physician supply and distribution in rural areas of the United States. WWAMI: The Rural Health Working Papers Series. 116.
- ^{xxiii} American Organization of Nurse Executives. 2010. AONE Guiding Principles for the Aging Workforce. Downloaded from http://www.aone.org/aone/resource/PDF/AONE_GP_Aging_Workforce.pdf on July 28, 2011.
- ^{xxiv} Buerhaus P. (2008). Journal of the American Medical Association. November 26.
- ^{xxv} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxvi} Skillman SM, Palazzo L, Hart LG, Butterfield P. (2007). Changes in the rural registered nurse workforce since 1980. Seattle, WA: WWAMI Rural Health Research Center. October.
- ²⁹ Office of Rural Health Policy. (2005). Mental health and rural America, 1994-2005: An overview and annotated bibliography / U.S. Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy.
- ^{xxvii} Office of Rural Health Policy. (2005). Mental health and rural America, 1994-2005: An overview and annotated bibliography / U.S. Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy.
- ^{xxviii} Council on Graduate Medical Education. (2005). U.S. likely to face a shortage in 2020.
- ^{xxviii} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxviii} Fordyce MA, Chen FM, Doescher MP, Hart LG. (2007). 2005 Physician supply and distribution in rural areas of the United States. WWAMI: The Rural Health Working Papers Series. 116.
- ^{xxviii} Fordyce MA, Chen FM, Doescher MP, Hart LG. (2007). 2005 Physician supply and distribution in rural areas of the United States. WWAMI: The Rural Health Working Papers Series. 116.
- ^{xxviii} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxviii} National Advisory Committee on Rural Health and Human Services. (2008) The 2008 Report to the Secretary: Rural Health and Human Services Issues. U.S. Department of Health and Human Services, April.
- ^{xxviii} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxviii} Andrilla CHA, Lishner DM, Hart LG. (2006). Rural dental practice: A tale of four states. Seattle, WA: WWAMI Rural Health Research Center. March.
- ^{xxix} Office of Shortage Designation, Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health & Human Services. Designated Health Professional Shortage Areas (HPSA) Statistics; As of July 19, 2011. [http://ersrs.hrsa.gov/ReportServer?/HGDW_Reports/BCD_HPSA/BCD_HPSA_SCR50_Smry&rs:Format=HTML3.2\[7/20/2011\]](http://ersrs.hrsa.gov/ReportServer?/HGDW_Reports/BCD_HPSA/BCD_HPSA_SCR50_Smry&rs:Format=HTML3.2[7/20/2011]).
- ^{xxx} Xu, L., Ullrich, F., Mueller, K. (2009). Loss of Community Pharmacies Since 2006: State Experiences. In RUPRI Center for Rural Health Policy Analysis. April.
- ^{xxxi} Boyle K, Ullrich BA, Mueller K. (2011). Independently owned pharmacy closures in rural America, 2003-2010. RUPRI Center for Rural Health Policy Analysis. June.
- ^{xxxii} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxxiii} National Advisory Committee on Rural Health and Human Services. (2008) The 2008 Report to the Secretary: Rural Health and Human Services Issues. U.S. Department of Health and Human Services, April.
- ^{xxxiv} Ricketts TC. (2005). Workforce issues in rural areas: A focus on policy equity. American Journal of Public Health 95(1):42-8.
- ^{xxxv} Andrilla CHA, Lishner DM, Hart LG. (2006). Rural dental practice: A tale of four states. Seattle, WA: WWAMI Rural Health Research Center. March.

-
- ^{xxxvi} Office of Shortage Designation, Bureau of Health Professions, Health Resources and Services Administration, U.S. Department of Health & Human Services. Designated Health Professional Shortage Areas (HPSA) Statistics; As of July 19, 2011.
[http://ersrs.hrsa.gov/ReportServer?/HGDW_Reports/BCD_HPSA/BCD_HPSA_SCR50_Smry&rs:Format=HTML3.2\[7/20/2011 1:30:24 PM\]](http://ersrs.hrsa.gov/ReportServer?/HGDW_Reports/BCD_HPSA/BCD_HPSA_SCR50_Smry&rs:Format=HTML3.2[7/20/2011 1:30:24 PM]).
- ^{xxxvii} Richardson I, Slifkin R, Randolph R, Holmes M. (2009). A rural-urban comparison of allied health average hourly wages. Rural Health Research & Policy Analysis Center. January.
- ^{xxxviii} Rosenblatt RA, Chen FM, Lisher DM, Doescher MP. (2010). The future of family medicine and implications for rural primary care physician supply. Seattle, WA: WWAMI Rural Health Research Center. August.
- ^{xxxix} Kassebaum DG, Szenas PL. (1993). Rural sources of medical students, and graduates' choice of rural practice. *Academic Medicine*. 68(3):232-236.
- ^{xl} Rosenblatt RA, Chen FM, Lisher DM, Doescher MP. (2010). The future of family medicine and implications for rural primary care physician supply. Seattle, WA: WWAMI Rural Health Research Center. August.
- ^{xli} U.S. General Accounting Office. (2008). Primary care professionals: recent supply, trends, projections and valuation of services. Report # GAO-08-472T. Washington,DC.
- ^{xlii} Rosenblatt RA, Chen FM, Lisher DM, Doescher MP. (2010). The future of family medicine and implications for rural primary care physician supply. Seattle, WA: WWAMI Rural Health Research Center. August.
- ^{xliii} Doescher MP, Ellsbury KE, Hart LG. (2000). The distribution of rural female general physicians in the United States. *Journal of Rural Health*. Spring;16(2):111-118.
- ^{xliv} American Organization of Nurse Executives. 2010. AONE Guiding Principles for the Aging Workforce. Downloaded from http://www.aone.org/aone/resource/PDF/AONE_GP_Aging_Workforce.pdf on July 28, 2011.
- ^{xlv} MacKinney AC, Mueller KJ, Charlton M. (2009). Rural primary care physician payment 2006-2009: What a difference three years doesn't make. RUPRI Center for Rural Health Policy Analysis. November.
- ^{xlvi} <http://www.hhs.gov/news/press/2011pres/07/20110729a.html>
- ^{xlvii} UnitedHealth Center for Health Reform & Modernization, July 2011. Modernizing rural health care: coverage, Working Paper 6, quality and innovation. UnitedHealth Group, Minnetonka, MN. July 2011, downloaded from http://www.unitedhealthgroup.com/hrm/UNH_WorkingPaper6.pdf on July 27, 2011
- ^{xlviii} Rural Assistance Center. J-1 Visa Waiver. Downloaded from http://www.raconline.org/topics/hc_providers/j1visa.php on Feb. 13, 2012.
- ^{xlix} UnitedHealth Center for Health Reform & Modernization, July 2011. Modernizing rural health care: coverage, Working Paper 6, quality and innovation. UnitedHealth Group, Minnetonka, MN. July 2011, downloaded from http://www.unitedhealthgroup.com/hrm/UNH_WorkingPaper6.pdf on July 27, 2011
- ^l <http://nhsc.bhpr.hrsa.gov/about/facts.htm>
- ^{li} <http://nhsc.bhpr.hrsa.gov/about/facts.htm>
- ^{lii} <http://nhsc.bhpr.hrsa.gov/about/facts.htm>

Authors: Rural Health Fellows: Elizabeth Burrows, Ryung Suh, Danielle Hamann

Approved January 2012

Updated version of Health Care Workforce Distribution and Shortage Issues in Rural America, March 2003