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# The Status of the Healthcare Workforce in the State of Nebraska

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# Executive Summary

Although rural-urban disparities in access to healthcare workforce have been a long-standing policy and population health issue in Nebraska, a comprehensive workforce analysis has not been conducted in the state since 2009 when a report titled "A Critical Match: Nebraska's Health Workforce Planning Project" was released. Since then, there have been substantial healthcare policy, economic, demographic and other changes both within Nebraska and nationally. Using the most recent data on Nebraska's healthcare workforce, we characterize the distribution and demographic profile of physicians, nurses, pharmacists, and allied health and other professionals across the state. Our report provides a definitive picture of where Nebraska currently stands in terms of its workforce capacity to provide healthcare services and its progress in improving this capacity since the 2009 "Critical Match" report.

Using data provided by the University of Nebraska Medical Center Health Professions Tracking Service (HPTS) and State of Nebraska licensure data, we examine the following health professions:

- Physicians and Physician Assistants
- Advanced Practice Registered Nurses,
  Registered Nurses and Licensed Practical Nurses
- Dentists and Dental Hygienists
- Pharmacists and Pharmacy Technicians
- Physical Therapists
- Occupational Therapists
- Emergency Medical Technicians
- Medical Nutrition Therapists
- Respiratory Care Practitioners
- Speech-Language Pathologists
- Audiologists
- Medical Nutrition Therapists
- Medical Radiographers
- Chiropractors
- Podiatrists
- Optometrists



The following are selected key findings from our study:

- There are 253 physicians per 100,000 population—an 11% increase over the prior 10 years
- 13 out of 93 counties in Nebraska do not have any primary care physician
- The number of registered nurses increased 61% in 10 years, from 17,335 to 27,922
- There are now 1,148 nurse practitioners in Nebraska; this compares to 767 reported in the 2009 "Critical Match" study
- The number of dentists per 100,000 population has decreased slightly from 57.1 to 56.5 over the last 10 years

- Compared to the 2009 "Critical Match" report, there are nearly 400 more pharmacists and 1,200 more pharmacy technicians now
- Nebraska currently has nearly 1,400 paramedics available—over 70% more than 10 years ago
- There are substantial gaps in the distribution of allied health professionals across Nebraska, particularly in north central Nebraska which has virtually no occupational therapists, speech language pathologists, or medical nutrition therapists

Based on our findings, we provide a number of recommendations to help monitor and address workforce challenges in the State of Nebraska and, in particular, within its rural communities. These recommendations include:

1. Existing pipeline programs and educational initiatives that incentivize health professionals to practice in rural communities should be supported and enhanced.
2. Subsidize investments in telecommunications and other infrastructure capacity to support telehealth adoption and utilization in rural areas.
3. Undertake annual reporting of Nebraska's healthcare workforce distribution whenever updated data are available in order to help policymakers, pipeline programs and other stakeholders address persistent or emerging gaps in the supply of healthcare to Nebraskan communities.
4. Perform forecasting of population health needs and anticipated supply of healthcare professionals in Nebraska whenever updated data are available.

# I. Introduction

Ensuring access to healthcare in rural communities has been a long-standing challenge for state and federal policymakers, including within Nebraska. Eighty-seven out of 93 counties in Nebraska are entirely or partly rural, and about one in four Nebraskans live in rural areas.[1,2] The State of Nebraska has instituted a number of initiatives to increase the supply of healthcare professionals to rural areas. These have included, for example, the Nebraska Area Health Education Center (AHEC) Program, which promotes the recruitment and training of healthcare professionals to serve in rural areas, engages students to undertake healthcare careers, and fosters training and continuing education opportunities in Nebraska.[3] The State of Nebraska Student Loan and Loan Repayment Programs provide low-interest and forgivable loans to medical, dental, physician assistant and mental health students if they agree to practice in shortage areas within the state for a specified length of time.[4] Investments in telehealth technologies also have promise in reducing barriers to accessing care for rural residents.[5] Despite these and other efforts, substantial challenges still exist in recruiting healthcare professionals in rural Nebraska, which has led to persistent rural-urban disparities in access to care and health outcomes.[6]

To inform initiatives and policies to address these challenges, timely and accurate data on the healthcare workforce in Nebraska are needed. In 2009, Mueller and colleagues produced a study of Nebraska's healthcare workforce, titled "A Critical Match: Nebraska's Health Workforce Planning Project."[7] At that time, the report was the most comprehensive review of the status of the health professions within the State of Nebraska, and provided the groundwork for workforce planning efforts. Data used in that report were from 2007-2008 and are now ten years old. Since then, there have been substantial changes in state and federal health policies, economic growth, demographics, population health, and many other factors that are likely to have impacted the evolution and distribution of the healthcare workforce across Nebraska. Therefore, our report utilizes recent data to provide an updated analysis of Nebraska's health professionals, and identify counties within Nebraska that are experiencing shortages of these professionals. We also compare our findings to those presented by Mueller and colleagues(2009) in order to highlight trends in the supply of specific healthcare professions over the prior decade.



1 Federal Office of Rural Health Policy. Health Resources & Services Administration. List of Rural Counties And Designated Eligible Census Tracts in Metropolitan Counties. Available at: https://www.hrsa.gov/ruralhealth/resources/forhpeligibleareas.pdf. Accessed January 15, 2018.

2 US Census Bureau. Nebraska: 2010. Population and housing unit counts. Available at: https://www.census.gov/prod/cen2010/cph-2-29.pdf. Accessed January 15, 2018.

3 Nebraska Area Health Education Centers. What is AHEC? Available at: https://www.unmc.edu/familymed/education/ahec/what-is-ahec.html. Accessed January 15, 2018.

4 Office of Rural Health. Nebraska Department of Health & Human Services. Nebraska Student Loan Program. Available at: http://dhhs.ne.gov/publichealth/RuralHealth/Pages/StudentLoanProgram.aspx. Accessed January 15, 2018.

5 Behavioral Health Education Center of Nebraska. Telehealth. Available at: https://unmc.edu/bhecn/telehealth/index.html. Accessed January 15, 2018.

6 Office of Health Disparities and Health Equity. Nebraska Department of Health & Human Services. Health Disparities Report. September 2015. Available at: http://dhhs.ne.gov/Reports/Health%20Disparities%20Report%20-%202015.pdf. Accessed January 15, 2018.

7 Mueller K, Nayar P, Shaw-Sutherland K, Nguyen A, Xu L, Vanosdel N, Hummel D. "A Critical Match". Nebraska's Health Workforce Planning Project. Final Report. September 2009. Nebraska Center for Rural Health Research. College of Public Health, University of Nebraska Medical Center. Omaha, NE.

# II. Data Source and Methods

Data on licensed healthcare professionals in the State of Nebraska are provided by the University of Nebraska Medical Center Health Professions Tracking Service (HPTS).[8] HPTS extends licensing data available from the State of Nebraska Department of Health and Human Services (DHHS) by identifying licensed professionals who are actively practicing and compiling data on professional work hours for several professions at each practice site. Regular and consistent data collection efforts ensure that HPTS data are up-to-date and accurate. In our study, we utilized HPTS data from June 2017 to examine actively practicing physicians, advanced practice registered nurses, physician assistants, dentists, pharmacists, physical therapists, and occupational therapists. Advanced practice registered nurses (APRN) were stratified by nurse practitioners, certified nurse midwives, clinical nurse specialists, and certified registered nurse anesthetists. All providers are licensed in the State of Nebraska. Providers with available work hour data were determined to be actively practicing if their professional work hours were reported to be non-zero. Work hours and practice sites were available for physicians, APRNs, physician assistants, dentists, and pharmacists. Full-time equivalence (FTE) is defined as 40 work hours per week. Providers reporting work hours exceeding 40 hours per week were capped at 40 hours. Work hours for some providers may include on-call hours.

In addition to the above HPTS data, State of Nebraska licensure data were obtained for the following professions:

- Registered nurses
- Licensed practical nurses
- Dental hygienists
- Pharmacy technicians
- Emergency medical technicians
- Medical nutrition therapists
- Respiratory care practitioners
- Speech-language pathologists
- Audiologists
- Medical nutrition therapists
- Medical radiographers
- Chiropractors
- Podiatrists
- Optometrists

Unlike the HPTS data on actively practicing providers, not all of these licensed providers may be actively practicing. Location data for licensed providers were based on addresses supplied by the State of Nebraska medical licensure database. Note that visiting specialties or part-time providers with rotating schedules may provide services in more than one community.

The analyses consist of examining the number and demographic characteristics of providers in addition to the mapping of their geographical distribution across counties in Nebraska. Geographical mapping utilized location data for providers who reported a Nebraska-based

8 Health Professions Tracking Service (HPTS). Key products and services. Available at: https://www.unmc.edu/publichealth/hpts/index.html. Accessed January 15, 2018.

address; licensed providers with an out-of-state address were excluded from the mapping analysis. Demographic characteristics include age, sex and race/ethnicity. Race/ethnic categories are White, Black/African-American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, and Other. US Census Bureau 2016 population estimates for the State of Nebraska were used to adjust workforce data for county and state population size.[9] The 2016 Census data were the most recent available for the state. STATA 15.0 (StataCorp, College Station, TX) was used for statistical analyses, and the ArcGIS Pro geographic information system (Esri, Redlands, CA) was used for geographical analyses.



9 US Census Bureau. Quick Facts. Nebraska population estimates. July 1, 2016. Available at: https://www.census.gov/quickfacts/NE. Accessed January 15, 2018.

# III. Distribution and Characteristics of Professionals

## PHYSICIANS

Data provided by HPTS show that there are currently 4,827 physicians (including 762 residents and fellows) actively practicing in the State of Nebraska (Table 1). This translates into a rate of 253.1 physicians per 100,000 population in the year 2017. In their report on Nebraska's workforce, Mueller and colleagues reported that there were 4,056 physicians (including residents), resulting in 228.5 physicians per 100,000 population in 2007.8 Thus, our data suggest that there has been a modest improvement in the per-capita number of physicians over the last decade.

There are 104 medical specialties and an additional 39 surgical specialties in the HPTS database. Based on these specialties, we specifically examined the primary care fields of family medicine, general practice, internal medicine, obstetrics and gynecology, and pediatrics. In addition, we present results for general surgeons in Nebraska. There are 1,794 primary care physicians, and family medicine/general practice account for nearly half of primary care physicians. General surgeons account for 172 physicians in Nebraska, and an additional 2,861 physicians are in other medical specialties.

**Table 1. Number, rate per 100,000 population, total work hours, and full-time equivalence (FTE) by specialty of physician**

| | N | RATE PER 100,000 | HOURS* | FTE |
|---|---|---|---|---|
| Primary care | 1,794 | 94.1 | 66,746 | 1,669 |
| Family medicine/general practice | 894 | 46.9 | 33,338 | 833 |
| Internal medicine | 395 | 20.7 | 14,827 | 371 |
| Obstetrics & gynecology | 214 | 11.2 | 7,890 | 197 |
| Pediatrics | 291 | 15.3 | 10,691 | 267 |
| Other specialties | | | | |
| General surgery | 172 | 9.0 | 6,535 | 163 |
| Other | 2,861 | 150.0 | 105,507 | 2,638 |
| Total | 4,827 | 253.1 | 178,788 | 4,470 |

*Physicians include medical doctors (MD), doctors of osteopathy (DO), physicians with bachelors of medicine and surgery (MBBS), residents and fellows. Total professional work hours were capped at 40 hours per week. Work hours may include on-call hours.

In 2007, nearly 40% of physicians were 51 years old or older.[8] We found that the age distribution of physicians in 2017 is similar but slightly older to that in 2007, with 40.7% of physicians aged more than 50 years old (Table 2). Eighteen percent of physicians in Nebraska are currently more than 60 years old, and thus likely to retire in the near future. There is now a greater proportion of female physicians than in the past, accounting for 31.4% of physicians versus 26.0% in 2007 (Table 2).[8] The race/ethnic distribution of physicians in Nebraska is predominantly white, non-Hispanic (87.3%), followed by Asian (7.8%), Hispanic/Latino (2.6%) and Black/African-American (1.6%). This distribution does not reflect the population in the

State of Nebraska. For example, in the Nebraskan population, 79.6% are white, non-Hispanic, and Hispanics account for 10.7% of the state's population in 2016 (refer to Table A1 in Appendix A).[10]

**Table 2. Sex, race/ethnicity and age distribution of physicians**

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 1,509 | 31.4 |
| Male | 3,305 | 68.6 |
| **Race/ethnicity**** | | |
| White | 3,085 | 87.3 |
| Black/African American | 58 | 1.6 |
| Hispanic/Latino | 91 | 2.6 |
| Asian | 276 | 7.8 |
| American Indian/Alaska Native | 5 | 0.1 |
| Native Hawaiian/Other Pacific Islander | 3 | 0.1 |
| Other | 18 | 0.5 |
| **Age in years***** | | |
| ≤ 30 | 463 | 9.6 |
| 31-35 | 623 | 12.9 |
| 36-40 | 654 | 13.6 |
| 41-45 | 602 | 12.5 |
| 46-50 | 518 | 10.7 |
| 51-55 | 555 | 11.5 |
| 56-60 | 526 | 10.9 |
| 61-65 | 483 | 10.0 |
| 66-70 | 258 | 5.4 |
| >70 | 139 | 2.9 |

* Sex was not reported for 13 physicians.
** Race/ethnicity was not reported for 1,291 physicians.
*** Age was not reported for six physicians.



Location (primary and satellite) data for providers were utilized to determine the number of providers per 100,000 population for each county in Nebraska. The distributions for primary care and other physician types are presented in Figures 1 to 7. There are 13 out of 93 counties that do not have any active primary care physicians (family medicine, general practice, internal medicine, OB/GYN, pediatrics) (Figure 1). All counties except Douglas and Lancaster have been designated by the State of Nebraska to be shortage areas for at least one type of primary care specialty (refer to Appendices B, C, and D). For example, 58 out of 93 counties are designated shortage areas for family physicians. Outside of Scotts Bluff and Dawes counties, much of western Nebraska either has no primary care physicians or has relatively low numbers of physicians relative to population size. Low numbers of primary care physicians are also concentrated in northeast Nebraska and various counties in southern Nebraska.

10 US Census Bureau. Quick Facts. Nebraska population estimates.

Distributions are similar for family medicine/general practice physicians (Figure 2), although family medicine and general practice physicians are the predominate specialty throughout the state in comparison to internal medicine, OB/GYN and pediatrics (Figures 3-5). In fact, the majority of Nebraska's counties do not have any internal medicine (71 counties) or pediatric physicians (77 counties). Forty-four counties do not have any OB/GYN physicians. Interestingly, general surgeons are distributed across more counties than any of these primary care physician specialties except family medicine (Figure 6); only 32 counties do not have a practicing general surgeon. Results for the distribution of all surgeon types are similar to general surgeons (Figure 7).

**Figure 1. Number of active primary care physicians per 100,000 population by county, Nebraska**

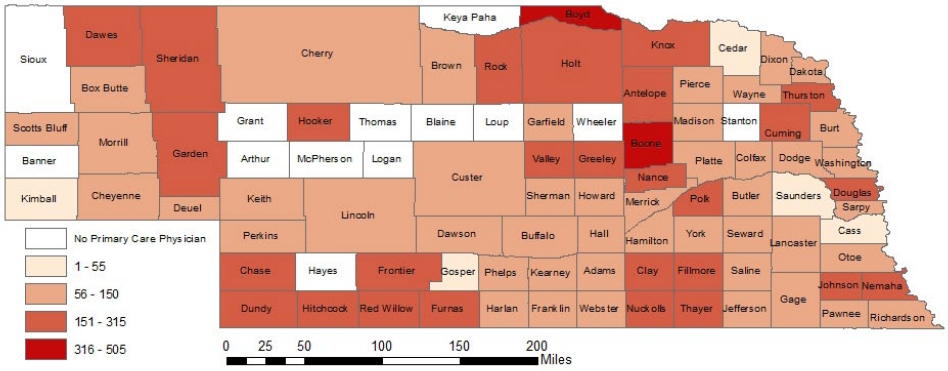
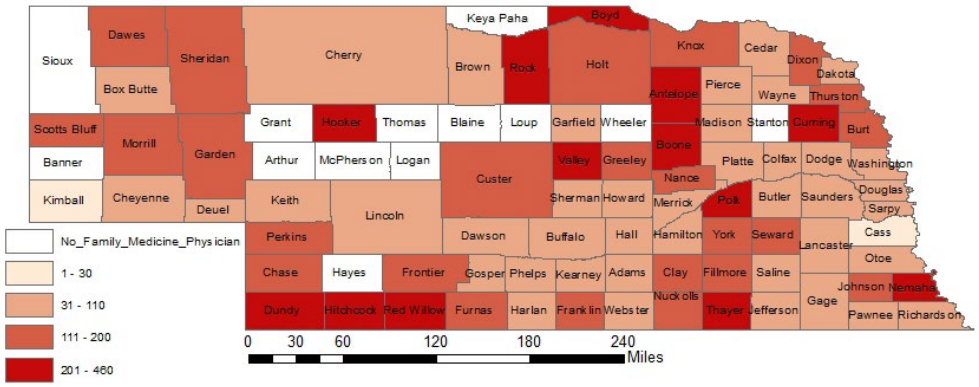
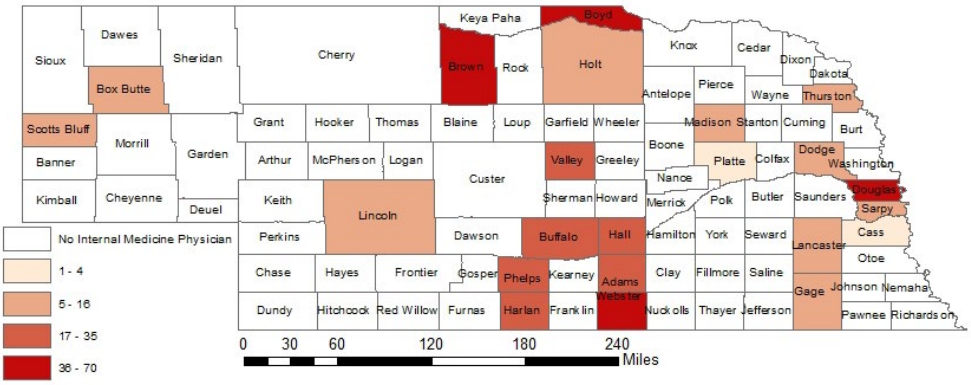


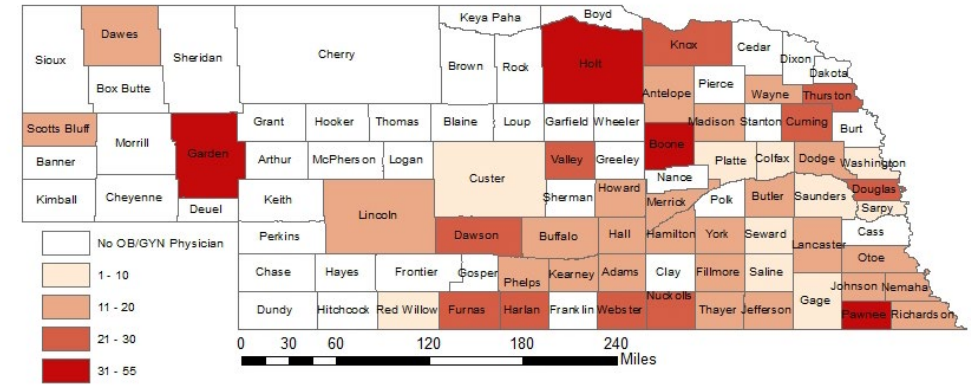

**Figure 2. Number of active family medicine physicians per 100,000 population by county, Nebraska**



## Figure 3. Number of active internal medicine physicians per 100,000 population by county, Nebraska




## Figure 4. Number of active OB/GYN physicians per 100,000 population by county, Nebraska




* OB/GYN, Obstetrics and Gynecology



## Figure 5. Number of active pediatric primary care physicians per 100,000 population by county, Nebraska

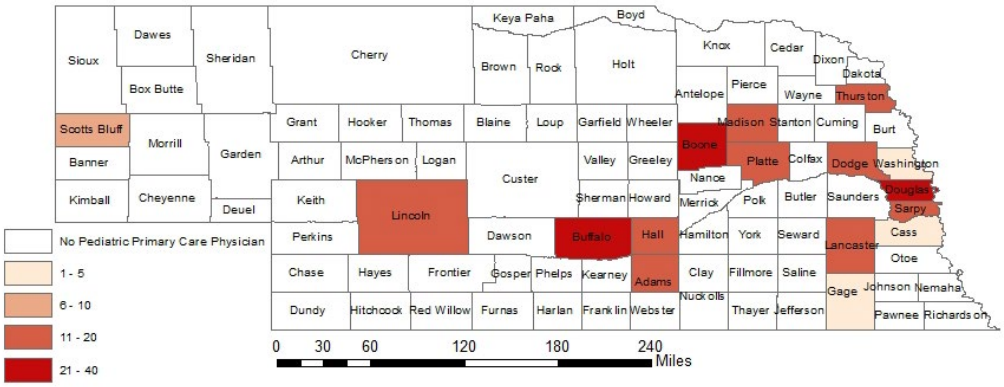


**Figure 6. Number of active general surgeons per 100,000 population by county, Nebraska**

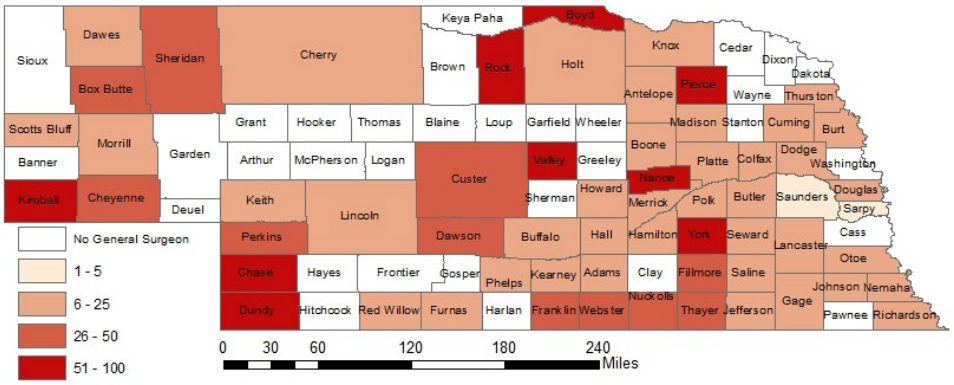
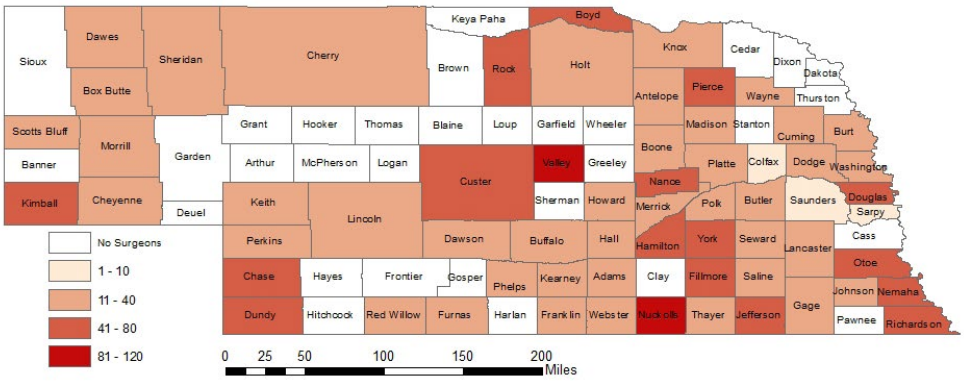



**Figure 7. Number of active surgeons per 100,000 population by county, Nebraska**




## PHYSICIAN ASSISTANTS

Since 2007, there has been a large increase in the number of active physician assistants (PA) in the state. There are 908 PAs (or 47.3 PAs per 100,000 population) versus 598 (33.5 PAs per 100,000 population) in 2007—a 52% difference in number of PAs. PAs currently provide a total of 35,878 work hours, equating to 897 FTE PAs.[11] Half of the PAs are 40 years old or younger, and over 70% of PAs are female (Table 3). For race/ethnicity, 96.7% of PAs are white non-Hispanic. Analysis of the distribution of PAs by county showed that 16 counties in Nebraska do not have an active PA (Figure 8).



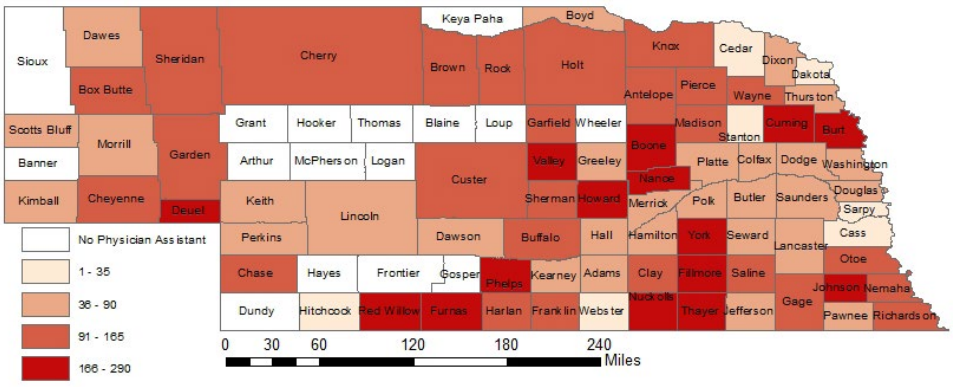
11 Mueller K, Nayar P, et al. "A Critical Match".

## Table 3. Sex, race/ethnicity and age distribution of physician assistants

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 649 | 71.5 |
| Male | 259 | 28.5 |
| **Race/ethnicity*** | | |
| White | 741 | 96.8 |
| Black/African American | 3 | 0.4 |
| Hispanic/Latino | 11 | 1.4 |
| Asian | 8 | 1.0 |
| American Indian/Alaska Native | 2 | 0.3 |
| Native Hawaiian/Other Pacific Islander | 1 | 0.1 |
| Other | 0 | 0.0 |
| **Age in years**** | | |
| ≤ 30 | 162 | 17.9 |
| 31-35 | 178 | 19.6 |
| 36-40 | 140 | 15.4 |
| 41-45 | 127 | 14.0 |
| 46-50 | 106 | 11.7 |
| 51-55 | 65 | 7.2 |
| 56-60 | 53 | 5.8 |
| 61-65 | 59 | 6.5 |
| >65 | 17 | 1.9 |

* Race/ethnicity was not reported for 142 physician assistants.
** Age was not reported for one physician assistant.

## Figure 8. Number of active physician assistants per 100,000 population by county, Nebraska



## NURSE PROFESSIONALS

### Advanced Practice Registered Nurses

Advanced practice registered nurses (APRN) include nurse practitioners (NP), certified nurse midwives (CNM), clinical nurse specialists (CNS), and certified registered nurse anesthetists (CRNA). In 2017, there were 1,148 nurse practitioners (NP), 36 certified nurse midwives (CNM), 49 clinical nurse specialists (CNS), and 308 certified registered nurse anesthetists (CRNA) (Table 4). The number of NPs rose from 767 to 1,148 in 2007-2017—a 50% increase.[12] For CNMs, the increase was from 22 to 36 professionals.[13]

**Table 4. Number, rate per 100,000 population, total work hours, and full-time equivalence (FTE) by type of advanced practice registered nurse (APRN)**

| | N | Rate per 100,000 | Hours* | FTE |
|---|---|---|---|---|
| Nurse Practitioner (NP) | 1,148 | 60.2 | 40,645 | 1,016 |
| Certified Nurse Midwife (CNM) | 36 | 1.9 | 1,381 | 35 |
| Clinical Nurse Specialist (CNS) | 49 | 2.6 | 1,810 | 45 |
| Certified Registered Nurse Anesthetist (CRNA) | 308 | 16.2 | 11,758 | 294 |
| Total | 1,541 | 80.8 | 55,594 | 1,390 |

* Total professional work hours were capped at 40 hours per week. Work hours may include on-call hours.

Tables 5 to 8 present the age distribution of APRN professionals by type. There are substantial differences in age across APRNs. Only 10.7% of nurse practitioners are above the age of 60 (Table 5); this compares to one-third of clinical nurse specialists who are older than 60 years (Table 7). The percentage of females across APRNs ranges from 51% for CRNAs to 100% of CNMs. Interestingly, CRNAs were reported to be only 39.8% female in 2007.[14] The percentages of APRNs who are white non-Hispanic are 96.5%, 98.0%, 97.8% and 87.0% for NPs, CRNAs, CNSs and CNMs, respectively.



12 Mueller K, Nayar P, et al. "A Critical Match".
13 Ibid.
14 Ibid.

## Table 5. Sex, race/ethnicity and age distribution of active nurse practitioners (NP)

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 1,097 | 95.6 |
| Male | 51 | 4.4 |
| **Race/ethnicity*** | | |
| White | 788 | 96.5 |
| Black/African American | 9 | 1.1 |
| Hispanic/Latino | 10 | 1.2 |
| Asian | 8 | 1.0 |
| American Indian/Alaska Native | 2 | 0.2 |
| Native Hawaiian/Other Pacific Islander | 0 | 0.0 |
| Other | 0 | 0.0 |
| **Age in years**** | | |
| ≤ 30 | 76 | 6.6 |
| 31-35 | 235 | 20.5 |
| 36-40 | 197 | 17.2 |
| 41-45 | 181 | 15.8 |
| 46-50 | 119 | 10.4 |
| 51-55 | 107 | 9.3 |
| 56-60 | 108 | 9.4 |
| 61-65 | 86 | 7.5 |
| >65 | 37 | 3.2 |

* Race/ethnicity was not reported for 331 NPs.
** Age was not reported for two NPs.

## Table 6. Sex, race/ethnicity and age distribution of active certified nurse midwives (CNM)

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 36 | 100.0 |
| Male | 0 | 0.0 |
| **Race/ethnicity*** | | |
| White | 20 | 87.0 |
| Black/African American | 2 | 8.7 |
| Hispanic/Latino | 1 | 4.3 |
| Asian | 0 | 0.0 |
| American Indian/Alaska Native | 0 | 0.0 |
| Native Hawaiian/Other Pacific Islander | 0 | 0.0 |
| Other | 0 | 0.0 |

| | N | % |
|---|---|---|
| **Age in years** | | |
| ≤ 30 | 1 | 2.8 |
| 31-35 | 8 | 22.2 |
| 36-40 | 9 | 25.0 |
| 41-45 | 5 | 13.9 |
| 46-50 | 5 | 13.9 |
| 51-55 | 2 | 5.6 |
| 56-60 | 2 | 5.6 |
| 61-65 | 3 | 8.3 |
| >65 | 1 | 2.8 |

*Race/ethnicity was not reported for 11 CNMs.

## Table 7. Sex, race/ethnicity and age distribution of active clinical nurse specialists (CNS)

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 48 | 98.0 |
| Male | 1 | 2.0 |
| **Race/ethnicity*** | | |
| White | 45 | 97.8 |
| Black/African American | 0 | 0.0 |
| Hispanic/Latino | 0 | 0.0 |
| Asian | 0 | 0.0 |
| American Indian/Alaska Native | 1 | 2.2 |
| Native Hawaiian/Other Pacific Islander | 0 | 0.0 |
| Other | 0 | 0.0 |
| **Age in years** | | |
| 31-35 | 2 | 4.1 |
| 36-40 | 4 | 8.2 |
| 41-45 | 5 | 10.2 |
| 46-50 | 4 | 8.2 |
| 51-55 | 7 | 14.3 |
| 56-60 | 11 | 22.4 |
| 61-65 | 11 | 22.4 |
| >65 | 5 | 10.2 |

*Race/ethnicity was not reported for 3 CNSs.

## Table 8. Sex, race/ethnicity and age distribution of active certified registered nurse anesthetists (CRNA)

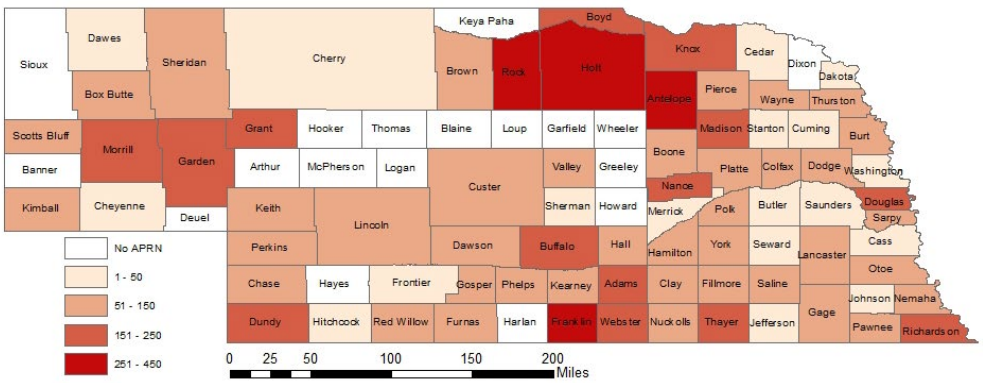
| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 158 | 51.3 |
| Male | 150 | 48.7 |
| **Race/ethnicity*** | | |
| White | 192 | 98.0 |
| Black/African American | 0 | 0.0 |
| Hispanic/Latino | 2 | 1.0 |
| Asian | 2 | 1.0 |
| American Indian/Alaska Native | 0 | 0.0 |
| Native Hawaiian/Other Pacific Islander | 0 | 0.0 |
| Other | 0 | 0.0 |
| **Age in years** | | |
| ≤ 30 | 7 | 2.3 |
| 31-35 | 45 | 14.6 |
| 36-40 | 59 | 19.2 |
| 41-45 | 40 | 13.0 |
| 46-50 | 35 | 11.4 |
| 51-55 | 27 | 8.8 |
| 56-60 | 38 | 12.3 |
| 61-65 | 36 | 11.7 |
| >65 | 21 | 6.8 |

* Race/ethnicity was not reported for 112 CRNAs.

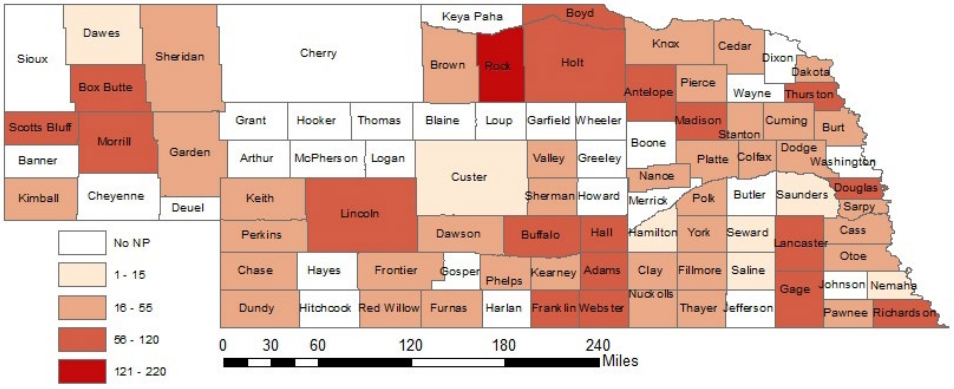
Figure 9 identifies 18 out of 93 counties with no active APRNs. Thirty-seven counties have either no NPs or very low density of NPs practicing in a county (Figure 10).



## Figure 9. Number of active advanced practice registered nurses (APRN) per 100,000 population by county, Nebraska



## Figure 10. Number of active nurse practitioners (NP) per 100,000 population by county, Nebraska




### Registered Nurses and Licensed Practical Nurses

Data on the supply of registered nurses (RN) and licensed practical nurses (LPN) for Nebraska are provided below. In 2017, there were 27,922 RNs and 5,600 LPNs licensed in the state (Table 9). These correspond to rates per 100,000 population of 1,464.1 and 293.6 for RNs and LPNs, respectively. In contrast to physicians, growth in the number of RNs has been substantial since 2007.[15] The number of RNs increased over 60%, rising from 17,335 to 27,922 in 2017. For LPNs, the increase was from 5,184 to 5,600 in the same period.

## Table 9. Number and rate per 100,000 population by type of nurse professional*

| | N | Rate per 100,000 |
|---|---|---|
| Registered Nurse (RN) | 27,922 | 1,464.1 |
| Licensed Practical Nurse (LPN) | 5,600 | 293.6 |
| Total | 33,522 | 1,757.7 |

* Hours and FTE are not available for RN or LPN.

Tables 10 and 11 present the demographic distribution of RNs and LPNs. Males account for 6.4% of RNs and 3.4% of LPNs. The age distribution of RNs skews substantially younger (Table 10) compared to LPNs (Table 11). Nearly 20% of RNs are 30 years old or younger; for LPNs, this percentage is 13.4%. Race/ethnic data were not available for RNs or LPNs.



15 Mueller K, Nayar P, et al. "A Critical Match".

**Table 10. Sex and age distribution of registered nurses (RN)**

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 26,089 | 93.6 |
| Male | 1,786 | 6.4 |
| **Age in years**** | | |
| ≤ 30 | 5,215 | 18.7 |
| 31-35 | 4,018 | 14.4 |
| 36-40 | 3,285 | 11.8 |
| 41-45 | 2,842 | 10.2 |
| 46-50 | 2,481 | 8.9 |
| 51-55 | 2,960 | 10.6 |
| 56-60 | 3,066 | 11.0 |
| 61-65 | 2,710 | 9.7 |
| >65 | 1,301 | 4.7 |

* Sex was not reported for 47 RNs.
** Age was not reported for 44 RNs.

**Table 11. Sex and age distribution of licensed practical nurses (LPN)**

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 5,410 | 96.6 |
| Male | 190 | 3.4 |
| **Age in years*** | | |
| ≤ 30 | 750 | 13.4 |
| 31-35 | 707 | 12.6 |
| 36-40 | 705 | 12.6 |
| 41-45 | 571 | 10.2 |
| 46-50 | 566 | 10.1 |
| 51-55 | 642 | 11.5 |
| 56-60 | 703 | 12.6 |
| 61-65 | 632 | 11.3 |
| >65 | 317 | 5.7 |

* Age was not reported for seven LPNs.

The geographical distributions of the number of nurse professionals per 100,000 population are available below. All counties in Nebraska have RNs, and only four (Arthur, McPherson, Keya Paha, Wheeler) do not have an LPN (Figures 11 and 12). The distribution of RNs and LPNs varies substantially across the state. For example, the highest concentrations of RNs are in Scotts Bluff county and eastern Nebraska. Most counties in western Nebraska have 1,000 or fewer RNs per 100,000 population, and eleven counties (primarily in western Nebraska) have rates of 600 or fewer RNs per 100,000 population.

**Figure 11. Number of registered nurses (RN) per 100,000 population by county, Nebraska**

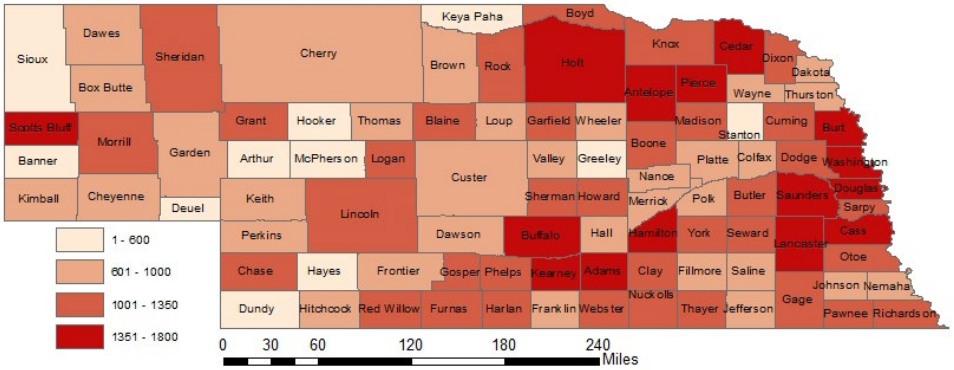
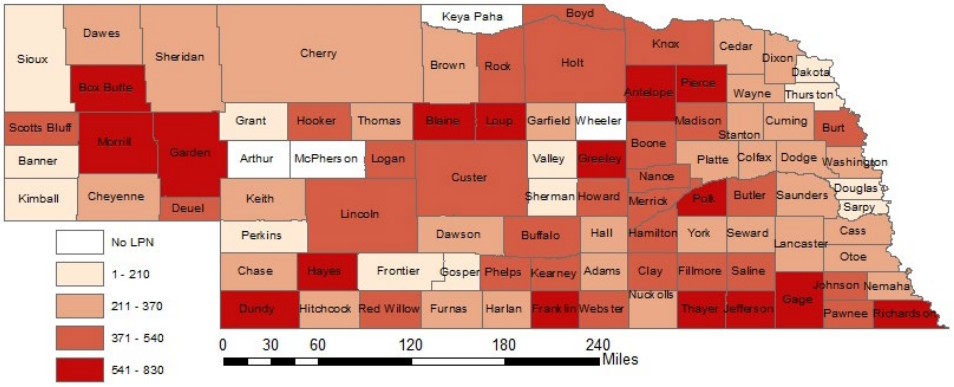



**Figure 12. Number of licensed practical nurses (LPN) per 100,000 population by county, Nebraska**






## DENTAL HEALTH PROFESSIONALS

There are 1,077 licensed dentists who are actively practicing in the State of Nebraska, corresponding to a rate of 56.5 dentists per 100,000 population (Table 12). The most common dental primary specialties were general dentistry, orthodontics, pediatrics, and endodontics. There are 854 general dentists in the state. All other specialties account for 223 dentists. Dental hygienists number 1,366 in the state, or 71.6 dental hygienists per 100,000 population (Table 12). There have been increases in the number of dentists and dental hygienists since 2007.[16] However, the increase in number of dentists has not kept pace with population growth in Nebraska. The rate of dentists to each 100,000 population decreased slightly from 57.1 in 2007 to 56.5 in 2017. On the other hand, the rate improved by 23% among dental hygienists

16 Mueller K, Nayar P, et al. "A Critical Match".

for this time period, increasing from 58.2 in 2007 to 71.6 in 2017.[17] Although there was nearly an equal number of dentists and dental hygienists in 2007, the ratio of hygienists to dentists is now 1.3.[18]

### Table 12. Number, rate per 100,000 population, total work hours, and full-time equivalence (FTE) by type of dental professional

| Type | N | Rate per 100,000 | Hours* | FTE |
|---|---|---|---|---|
| Dentist | 1,077 | 56.5 | 37,933 | 948 |
| General dentist | 854 | 44.8 | 30,011 | 750 |
| Other dentist | 223 | 11.7 | 7,922 | 198 |
| Dental hygienist | 1,366 | 71.6 | N/A | N/A |
| Total | 2,443 | 184.6 | N/A | N/A |

* Hours and FTE are not available for dental hygienists. Total professional work hours for dentists were capped at 40 hours per week.

Dental hygienists are also almost exclusively female (98.8%) while only 24.8% of dentists are female (Tables 13 and 14). However, Mueller and colleagues reported that 16.9% of dentists were female in 2007, so the percentage of female dentists has increased substantially since then. Dentists are likely to be white non-Hispanic (94.4%), with only 2.4% Asian, 1.9% Hispanic and 0.6% Black/African-American (Table 13). Race/ethnicity data are not available for dental hygienists.

### Table 13. Sex, race/ethnicity and age distribution of active dentists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 267 | 24.8 |
| Male | 810 | 75.2 |
| **Race/ethnicity*** | | |
| White | 908 | 94.4 |
| Black/African American | 6 | 0.6 |
| Hispanic/Latino | 18 | 1.9 |
| Asian | 23 | 2.4 |
| American Indian/Alaska Native | 2 | 0.2 |
| Native Hawaiian/Other Pacific Islander | 2 | 0.2 |
| Other | 3 | 0.3 |

17 Ibid.
18 Ibid.

| | N | % |
|---|---|---|
| **Age in years** | | |
| ≤ 30 | 81 | 7.5 |
| 31-35 | 130 | 12.1 |
| 36-40 | 130 | 12.1 |
| 41-45 | 120 | 11.1 |
| 46-50 | 84 | 7.8 |
| 51-55 | 92 | 8.5 |
| 56-60 | 135 | 12.5 |
| 61-65 | 145 | 13.5 |
| >65 | 105 | 9.8 |

* Race/ethnicity was not reported for 115 dentists.

### Table 14. Sex and age distribution of dental hygienists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 1,349 | 98.8 |
| Male | 17 | 1.2 |
| **Age in years*** | | |
| ≤ 30 | 370 | 27.4 |
| 31-35 | 222 | 16.4 |
| 36-40 | 177 | 13.1 |
| 41-45 | 138 | 10.2 |
| 46-50 | 124 | 9.2 |
| 51-55 | 138 | 10.2 |
| 56-60 | 102 | 7.5 |
| 61-65 | 64 | 4.7 |
| >65 | 18 | 1.3 |

*Age was not reported for 13 dental hygienists.



The geographical distributions of general dentists and dental hygienists in Nebraska, in terms of number of dental professionals per 100,000 population, are provided in Figures 13 and 14. Fifteen counties have no practicing general dentists, and 20 counties have no dental hygienists. As illustrated below, several counties in central Nebraska are experiencing particularly acute shortages of general dentists.

**Figure 13. Number of active general dentists per 100,000 population by county, Nebraska**

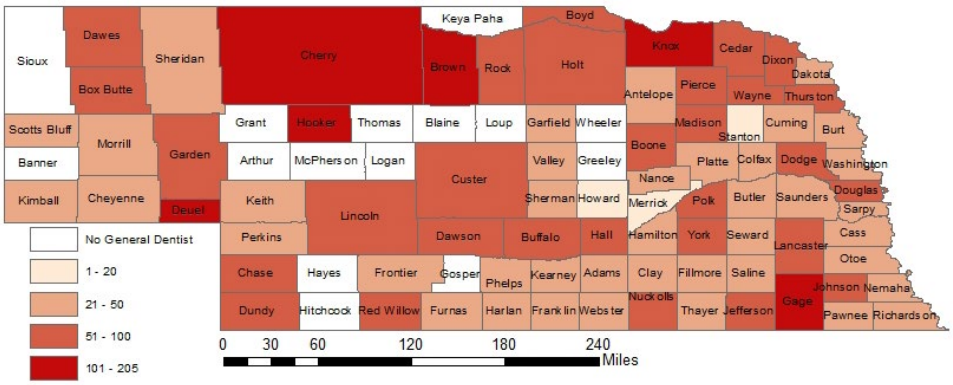
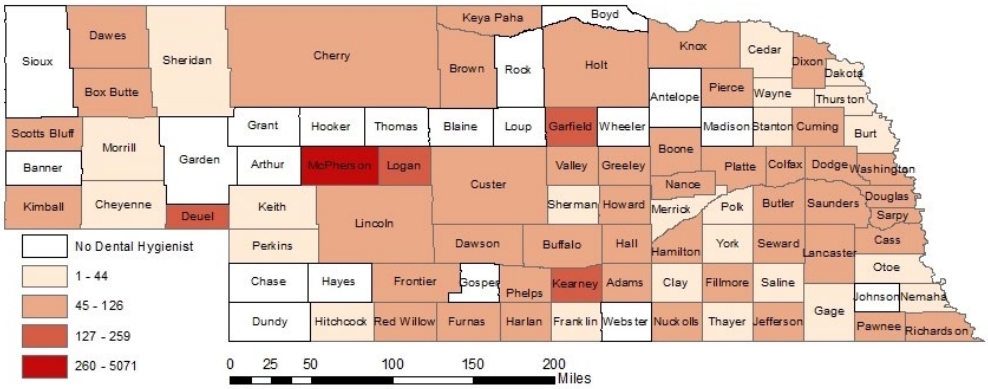



**Figure 14. Number of licensed dental hygienists per 100,000 population by county, Nebraska**






## PHARMACY PROFESSIONALS

Pharmacy professionals consist of licensed pharmacists and pharmacy technicians. Note that pharmacy professionals may work in a variety of healthcare settings outside of retail pharmacy, including hospitals. There are 2,066 pharmacists and 3,428 pharmacy technicians as of 2017, corresponding to 108.3 and 179.7 professionals per 100,000 population, respectively (Table 15). In comparison to the 2007 data reported by Mueller and colleagues, there are nearly 400 more pharmacists and 1,200 more pharmacy technicians in 2017.[19]

19 Mueller K, Nayar P, et al. "A Critical Match".

### Table 15. Number, rate per 100,000 population, total work hours, and full-time equivalence (FTE) by type of pharmacy professional

| Type | N | Rate per 100,000 | Hours* | FTE |
|---|---|---|---|---|
| Pharmacist | 2,066 | 108.3 | 72,175 | 1,804 |
| Pharmacy technician | 3,428 | 179.7 | N/A | N/A |
| Total | 5,494 | 288.1 | N/A | N/A |

* Hours and FTE are not available for pharmacy technicians. Total professional work hours for pharmacists were capped at 40 hours per week.

Tables 16 and 17 report demographic characteristics for pharmacists and pharmacy technicians, respectively. Pharmacists are predominantly middle-aged; 45.9% are between the ages of 31 and 45. Pharmacy professionals are likely to be female, who represent 59.9% of pharmacists and 80.6% of pharmacy technicians. White non-Hispanics account for 95.4% of pharmacists in Nebraska (Table 16).

### Table 16. Sex, race/ethnicity and age distribution of active pharmacists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 1,237 | 59.9 |
| Male | 828 | 40.1 |
| **Race/ethnicity*** | | |
| White | 1,639 | 95.4 |
| Black/African American | 8 | 0.5 |
| Hispanic/Latino | 22 | 1.3 |
| Asian | 47 | 2.7 |
| American Indian/Alaska Native | 1 | 0.1 |
| Native Hawaiian/Other Pacific Islander | 1 | 0.1 |
| Other | 1 | 0.1 |
| **Age in years**** | | |
| ≤ 30 | 231 | 11.2 |
| 31-35 | 366 | 17.7 |
| 36-40 | 322 | 15.6 |
| 41-45 | 258 | 12.5 |
| 46-50 | 224 | 10.9 |
| 51-55 | 188 | 9.1 |
| 56-60 | 174 | 8.4 |
| 61-65 | 161 | 7.8 |
| 66-70 | 87 | 4.2 |
| >70 | 52 | 2.5 |

*Race/ethnicity was not reported for 347 pharmacists.
**Age was not reported for three pharmacists.

## Table 17. Sex and age distribution of licensed pharmacy technicians

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 2,725 | 80.6 |
| Male | 656 | 19.4 |
| **Age in years*** | | |
| ≤ 30 | 1,607 | 47.0 |
| 31-35 | 420 | 12.3 |
| 36-40 | 337 | 9.9 |
| 41-45 | 217 | 6.4 |
| 46-50 | 241 | 7.1 |
| 51-55 | 259 | 7.6 |
| 56-60 | 190 | 5.6 |
| 61-65 | 109 | 3.2 |
| >65 | 38 | 1.1 |

*Age was not reported for 10 pharmacy technicians.

The rate of pharmacists per 100,000 population for each county in Nebraska is provided in Figure 15. Eighteen out of 93 counties (19%) have no pharmacists, and another eight counties have relatively low numbers of pharmacists per 100,000 population. Thirteen counties, primarily in west central Nebraska, have zero pharmacy technicians (Figure 16).

## Figure 15. Number of active pharmacists per 100,000 population by county, Nebraska

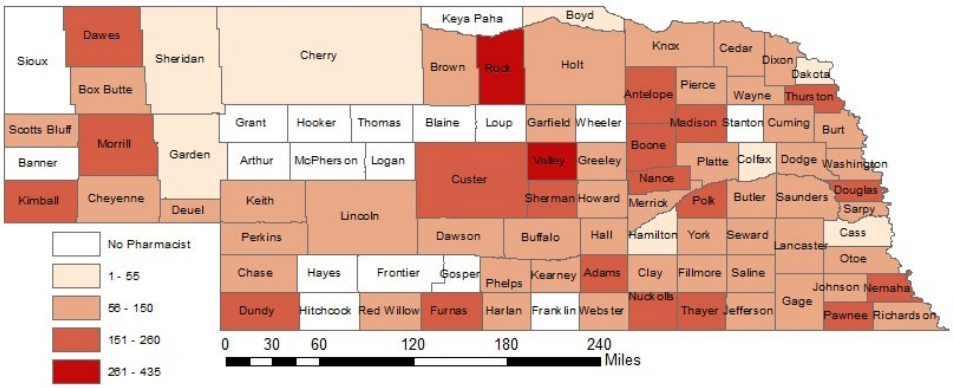
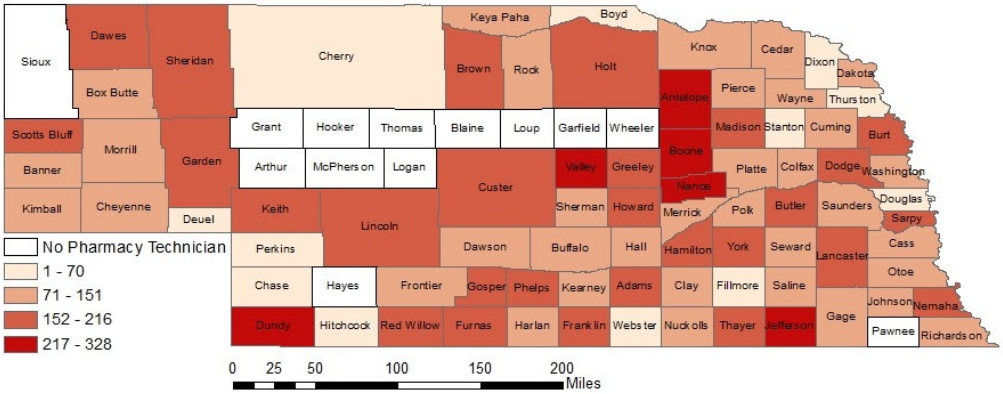


**Figure 16. Number of licensed pharmacy technicians per 100,000 population by county, Nebraska**




## EMERGENCY MEDICAL TECHNICIANS

Emergency Medical Technicians (EMT) include basic, intermediate and advanced EMTs, emergency medical services responders and instructors, and paramedics.

There is a large difference in the number of basic and intermediate EMTs. Our data indicate there are 6,961 EMTs in the State of Nebraska (Table 18); this compares to 8,451 reported by Mueller and colleagues.[20] This difference is largely driven by differences in the number of basic EMTs (5,090 vs. 6,538 in 2007), as well as differences in the designations of emergency medical professionals since the prior study. On the other hand, the number of paramedics has substantially increased from 814 in 2008 to 1,388 in 2017.

**Table 18. Number and rate per 100,000 population by type of emergency medical technician (EMT)**

| Type | N | Rate per 100,000 |
|---|---|---|
| Advanced EMT | 19 | 1.0 |
| Intermediate EMT | 54 | 2.8 |
| Basic EMT | 5,090 | 266.9 |
| Paramedic | 1,388 | 72.8 |
| Emergency medical responder | 410 | 21.5 |
| Total | 6,961 | 365.0 |

There are greater percentages of females than males for all allied health professionals except EMTs (Table 19). Among EMTs, 70.7% are males. Nearly one-fifth of EMTs are aged 30 or younger.

20 Ibid.

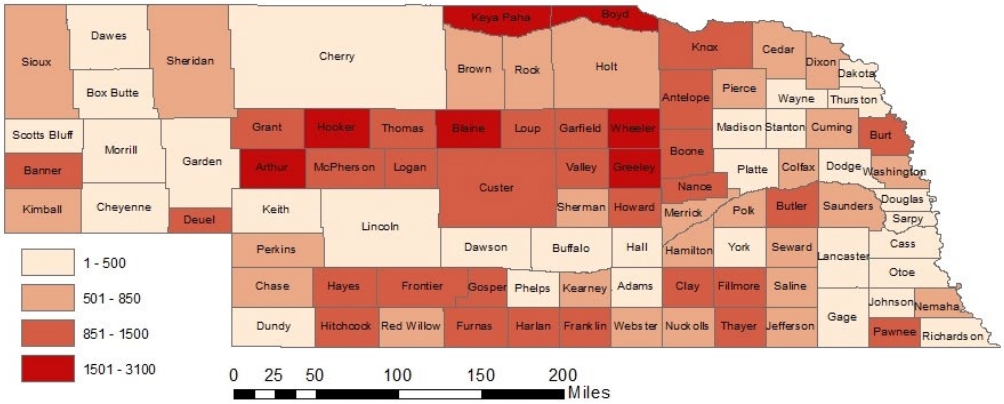
## Table 19. Sex and age distribution of licensed emergency medical technicians

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 1,523 | 29.3 |
| Male | 3,668 | 70.7 |
| **Age in years**** | | |
| ≤ 30 | 1,002 | 19.2 |
| 31-35 | 614 | 11.8 |
| 36-40 | 623 | 12.0 |
| 41-45 | 634 | 12.2 |
| 46-50 | 633 | 12.2 |
| 51-55 | 597 | 11.5 |
| 56-60 | 493 | 9.5 |
| 61-65 | 337 | 6.5 |
| >65 | 278 | 5.3 |

*Sex was not reported for 43 EMTs.
**Age was not reported for 23 EMTs.

Figure 17 presents the number of EMTs per 100,000 population for each county in Nebraska. All counties have at least one EMT; however, the distribution of EMTs varies substantially across the state with the lowest concentrations of EMTs found in the southeastern, south central, and western counties.

## Figure 17. Number of licensed emergency medical technicians (EMT) per 100,000 population by county, Nebraska



## OTHER ALLIED HEALTH PROFESSIONALS

HPTS provided data on number and age distribution for actively practicing occupational therapists and physical therapists, and licensed medical nutrition therapists, respiratory care practitioners, speech language pathologists, audiologists, and medical radiographers. The number and rate per 100,000 population for each profession is provided in Table 20. Rates vary from 8.4 audiologists per 100,00 population up to 111.2 medical radiographers per 100,000. In comparison to 2008 data, there are increased numbers of medical nutrition therapists (490 to 660 in 2017), speech language pathologists (559 to 844), and audiologists (134 to 161).[21] However, the other professions have exhibited small decreases in rates of professionals per population since 2008.

**Table 20. Number and rate per 100,000 population by type of allied health professional**

| Type | N | Rate per 100,000 |
|---|---|---|
| Occupational therapist | 787 | 41.3 |
| Physical therapist | 1,367 | 71.7 |
| Medical nutrition therapist | 660 | 34.6 |
| Respiratory care practitioner | 1,367 | 71.7 |
| Speech language pathologist | 844 | 44.3 |
| Audiologist | 161 | 8.4 |
| Medical radiographer | 2,120 | 111.2 |
| Total | 7,306 | 383.1 |

The percentage of males ranges across professions from 34.1% for physical therapists to 3.7% for speech language pathologists (Tables 21-27). Race/ethnicity was available for occupational and physical therapists. These data indicate that 95.7% of physical therapists and 97% of occupational therapists are white non-Hispanic (Tables 21 and 22, respectively). In terms of age, speech language pathologists and medical radiographers are the youngest allied health professionals; 29.0% of speech language pathologists and 28.6% of medical radiographers are below the age of 31 (Tables 25 and 27). Medical nutrition therapists and physical therapists have older demographic distributions. For example, only 20.8% of medical nutrition therapists are 30 years old or younger (Table 23).



21 Mueller K, Nayar P, et al. "A Critical Match".

## Table 21. Sex, race/ethnicity and age distribution of physical therapists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 901 | 65.9 |
| Male | 466 | 34.1 |
| **Race/ethnicity*** | | |
| White | 719 | 95.7 |
| Black/African American | 3 | 0.4 |
| Hispanic/Latino | 9 | 1.2 |
| Asian | 17 | 2.3 |
| American Indian/Alaska Native | 0 | 0.0 |
| Native Hawaiian/Other Pacific Islander | 1 | 0.1 |
| Other | 2 | 0.3 |
| **Age in years** | | |
| ≤ 30 | 243 | 17.8 |
| 31-35 | 237 | 17.3 |
| 36-40 | 225 | 16.5 |
| 41-45 | 214 | 15.7 |
| 46-50 | 178 | 13.0 |
| 51-55 | 108 | 7.9 |
| 56-60 | 84 | 6.1 |
| >60 | 78 | 5.7 |

*Race/ethnicity was not reported for 616 physical therapists.

## Table 22. Sex, race/ethnicity and age distribution of occupational therapists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 737 | 93.7 |
| Male | 50 | 6.4 |
| **Race/ethnicity*** | | |
| White | 385 | 97.0 |
| Black/African American | 4 | 1.0 |
| Hispanic/Latino | 4 | 1.0 |
| Asian | 4 | 1.0 |
| American Indian/Alaska Native | 0 | 0.0 |
| Native Hawaiian/Other Pacific Islander | 0 | 0.0 |
| Other | 0 | 0.0 |

| | N | % |
|---|---|---|
| **Age in years** | | |
| ≤ 30 | 192 | 24.6 |
| 31-35 | 136 | 17.4 |
| 36-40 | 123 | 15.8 |
| 41-45 | 130 | 16.7 |
| 46-50 | 84 | 10.8 |
| 51-55 | 64 | 8.2 |
| 56-60 | 23 | 3.0 |
| >60 | 28 | 3.6 |

*Race/ethnicity was not reported for 390 occupational therapists.
**Age was not reported for seven occupational therapists.

## Table 23. Sex and age distribution of licensed medical nutrition therapists

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 628 | 96.2 |
| Male | 25 | 3.8 |
| **Age in years** | | |
| ≤ 30 | 137 | 20.8 |
| 31-35 | 84 | 12.7 |
| 36-40 | 104 | 15.8 |
| 41-45 | 52 | 7.9 |
| 46-50 | 37 | 5.6 |
| 51-55 | 74 | 11.2 |
| 56-60 | 60 | 9.1 |
| 61-65 | 69 | 10.5 |
| >65 | 43 | 6.5 |

*Sex was not reported for seven medical nutrition therapists.

## Table 24. Sex and age distribution of licensed respiratory care practitioners

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 928 | 68.2 |
| Male | 432 | 31.8 |
| **Age in years**** | | |
| ≤ 30 | 222 | 16.3 |
| 31-35 | 195 | 14.3 |
| 36-40 | 192 | 14.1 |
| 41-45 | 166 | 12.2 |
| 46-50 | 147 | 10.8 |
| 51-55 | 166 | 12.2 |
| 56-60 | 152 | 11.2 |
| 61-65 | 97 | 7.1 |
| >65 | 25 | 1.8 |

*Sex was not reported for seven respiratory care practitioners.
**Age was not reported for five respiratory care practitioners.

## Table 25. Sex and age distribution of licensed speech language pathologists

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 807 | 96.3 |
| Male | 31 | 3.7 |
| **Age in years**** | | |
| ≤ 30 | 242 | 29.0 |
| 31-35 | 139 | 16.6 |
| 36-40 | 87 | 10.4 |
| 41-45 | 96 | 11.5 |
| 46-50 | 73 | 8.7 |
| 51-55 | 49 | 5.9 |
| 56-60 | 67 | 8.0 |
| 61-65 | 55 | 6.6 |
| >65 | 28 | 3.4 |

*Sex was not reported for six speech language pathologists.
**Age was not reported for eight speech language pathologists.

### Table 26. Sex and age distribution of licensed audiologists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 122 | 75.8 |
| Male | 38 | 23.6 |
| **Age in years** | | |
| ≤ 30 | 20 | 12.5 |
| 31-35 | 24 | 15.0 |
| 36-40 | 29 | 18.1 |
| 41-45 | 23 | 14.4 |
| 46-50 | 15 | 9.4 |
| 51-55 | 23 | 14.4 |
| 56-60 | 10 | 6.3 |
| 61-65 | 9 | 5.6 |
| >65 | 7 | 4.4 |

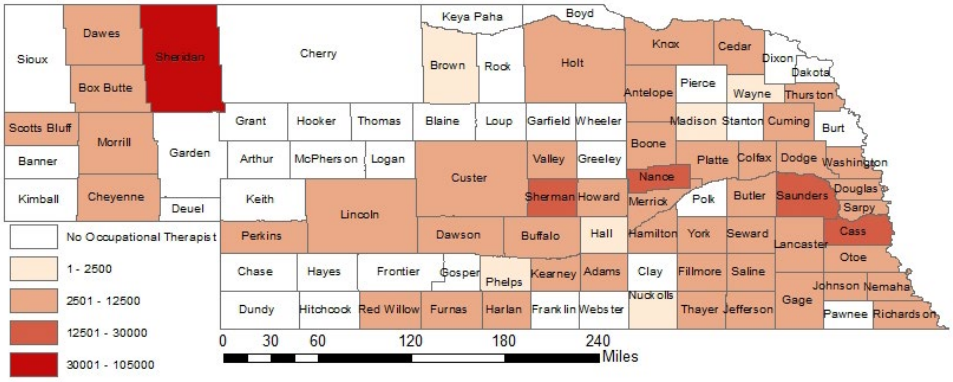
### Table 27. Sex and age distribution of licensed medical radiographers

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 1,763 | 83.3 |
| Male | 353 | 16.7 |
| **Age in years**** | | |
| ≤ 30 | 566 | 28.6 |
| 31-35 | 446 | 22.5 |
| 36-40 | 270 | 13.6 |
| 41-45 | 179 | 9.0 |
| 46-50 | 165 | 8.3 |
| 51-55 | 137 | 6.9 |
| 56-60 | 112 | 5.7 |
| 61-65 | 82 | 4.1 |
| >65 | 24 | 1.2 |

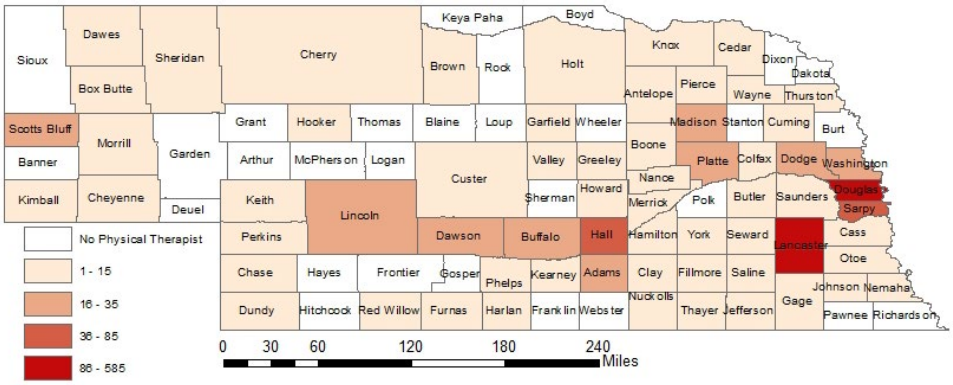
*Sex was not reported for four medical radiographers.
**Age was not reported for 139 medical radiographers.

The geographical distribution in the rate of providers to population for other allied health professions are presented below (Figures 18-24). There are substantial gaps in the distribution of allied health profession across Nebraska. For example, only 19 counties in the state have any licensed audiologists. In addition, the north central region of Nebraska has virtually no occupational therapists, speech language pathologists, or medical nutrition therapists. Of the licensed allied health professions below, licensed medical radiographers are the most consistently distributed across Nebraska, with only nine counties having no medical radiographer.

## Figure 18. Number of occupational therapists per 100,000 population by county, Nebraska

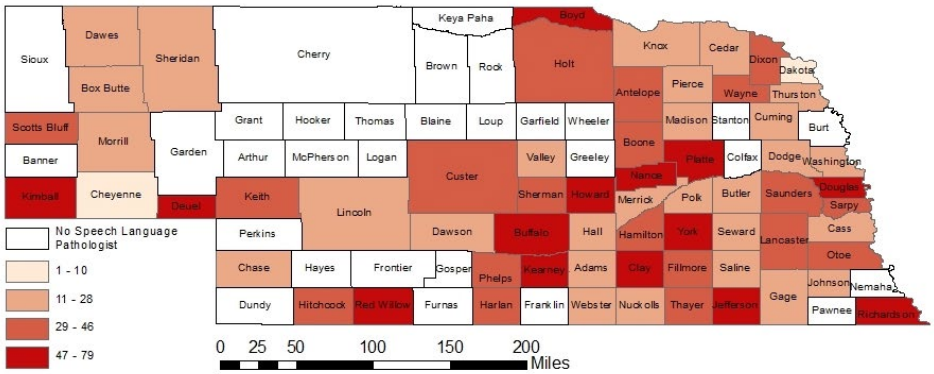



## Figure 19. Number of physical therapists per 100,000 population by county, Nebraska

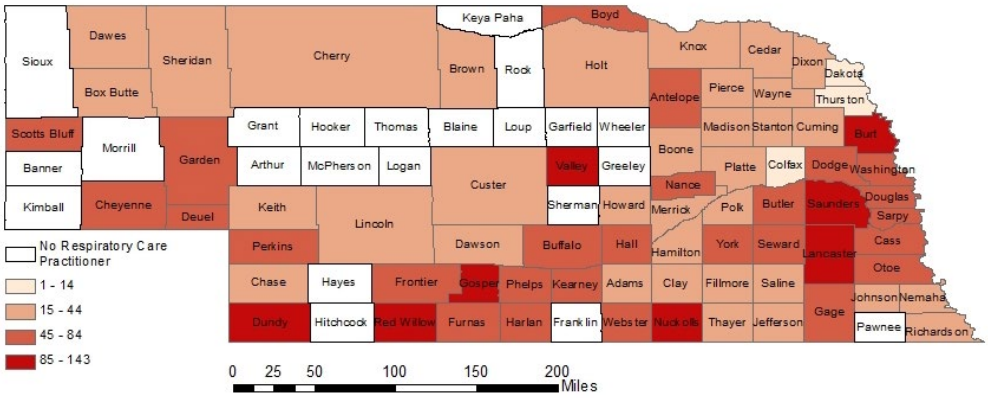




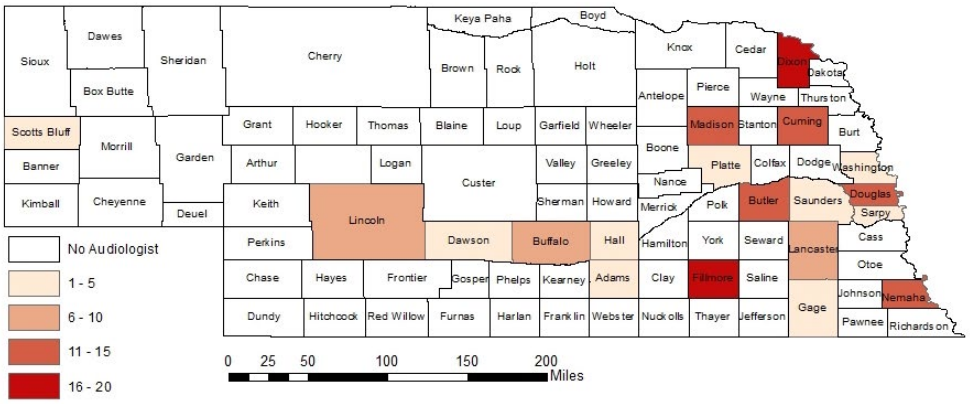

## Figure 20. Number of licensed speech language pathologists per 100,000 population by county, Nebraska



## Figure 21. Number of licensed respiratory care practitioners per 100,000 population by county, Nebraska




## Figure 22. Number of licensed audiologists per 100,000 population by county, Nebraska




## Figure 23. Number of licensed medical radiographers per 100,000 population by county, Nebraska

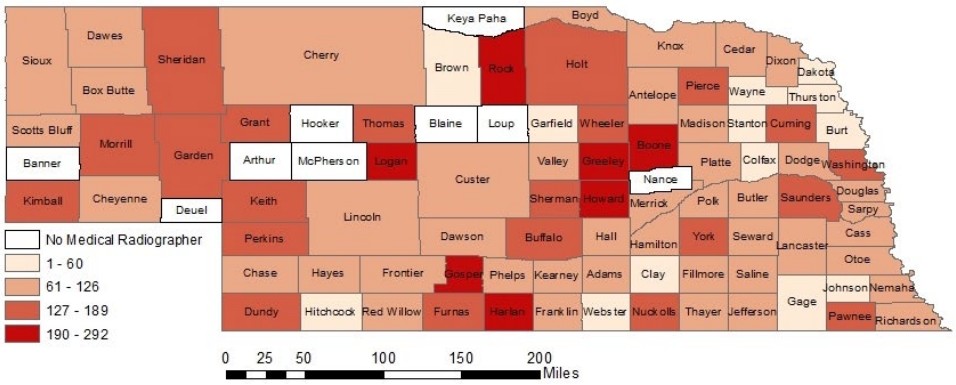
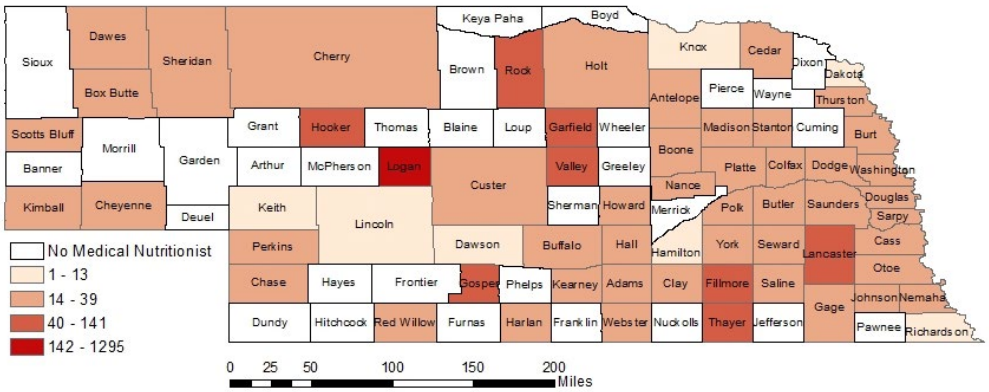


**Figure 24. Number of licensed medical nutrition therapists per 100,000 population by county, Nebraska**




## OTHER NON-PHYSICIAN CLINICIANS

Other non-physician clinicians include chiropractors, podiatrists and optometrists. Their numbers and rates per 100,000 population for the State of Nebraska are provided below (Table 28). Our data show that there are 714 chiropractors, 108 podiatrists, and 430 optometrists practicing in Nebraska. All have exhibited increases in number since the earlier study by Mueller and colleagues.[22] Mueller and colleagues reported 501 chiropractors, 90 podiatrists, and 373 optometrists in 2007.

**Table 28. Number and rate per 100,000 population by type of licensed non-physician clinician**

| Type | N | Rate per 100,000 |
|---|---|---|
| Chiropractor | 714 | 37.4 |
| Podiatrist | 108 | 5.7 |
| Optometrist | 430 | 22.5 |
| Total | 1,252 | 65.6 |

In terms of demographic distribution, chiropractors tend to be younger than either podiatrists or optometrists, with 17.8% of chiropractors aged less than 31 years old (Tables 29-31). This is followed by optometrists (10.8% less than 31 years old) and podiatrists (2.8% less than 31 years old). Chiropractors, podiatrists and optometrists are disproportionately male; the percentage of males are 73.8%, 83.2% and 63.6% for chiropractors, podiatrists and optometrists, respectively.



22 Mueller K, Nayar P, et al. "A Critical Match".

## Table 29. Sex and age distribution of licensed chiropractors

| | N | % |
|---|---|---|
| **Sex*** | | |
| Female | 186 | 26.2 |
| Male | 525 | 73.8 |
| **Age in years**** | | |
| ≤ 30 | 123 | 17.8 |
| 31-35 | 155 | 22.5 |
| 36-40 | 106 | 15.4 |
| 41-45 | 91 | 13.2 |
| 46-50 | 66 | 9.6 |
| 51-55 | 50 | 7.3 |
| 56-60 | 50 | 7.3 |
| 61-65 | 28 | 4.1 |
| >65 | 21 | 3.0 |

*Sex was not reported for three chiropractors.
**Age was not reported for 24 chiropractors.

## Table 30. Sex and age distribution of licensed podiatrists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 18 | 16.8 |
| Male | 89 | 83.2 |
| **Age in years** | | |
| ≤ 30 | 3 | 2.8 |
| 31-35 | 17 | 15.7 |
| 36-40 | 17 | 15.7 |
| 41-45 | 10 | 9.3 |
| 46-50 | 16 | 14.8 |
| 51-55 | 16 | 14.8 |
| 56-60 | 12 | 11.1 |
| 61-65 | 10 | 9.3 |
| >65 | 7 | 6.5 |

## Table 31. Sex and age distribution of licensed optometrists

| | N | % |
|---|---|---|
| **Sex** | | |
| Female | 156 | 36.4 |
| Male | 273 | 63.6 |
| **Age in years*** | | |
| ≤ 30 | 38 | 10.8 |
| 31-35 | 72 | 20.5 |
| 36-40 | 59 | 16.8 |
| 41-45 | 44 | 12.5 |
| 46-50 | 67 | 19.0 |
| 51-55 | 31 | 8.8 |
| 56-60 | 23 | 6.5 |
| 61-65 | 15 | 4.3 |
| >65 | 3 | 0.9 |

*Age was not reported for 78 optometrists.

# IV. Summary and Recommendations

The State of Nebraska has historically faced substantial challenges in maintaining access to healthcare in rural communities. Despite the importance of reducing rural-urban disparities in the state, a comprehensive study of the distribution of Nebraska's healthcare workforce has not occurred since 2009.[23] Our study uses recent data on numbers and work hours of licensed and active providers to provide a demographic profile of the current healthcare workforce. We also identify key gaps in the supply of this workforce across all counties in the state.

Our results highlight the substantial deficit in the supply of physicians across counties in Nebraska, particularly for the primary care specialties of internal medicine, OB/GYN and pediatrics. In addition, nearly one in five physicians in the state are older than age 65, and thus are likely to retire in the near future. In contrast, the number and rates of physician assistants and nurse professionals have grown substantially over the last decade and provide wide-ranging geographical coverage in Nebraska. The greater reliance on physician assistants and nurse practitioners has helped to offset the inadequate supply of primary care physicians. Legislative Bill 107 (passed in 2015) grants full practice authority to Nebraska nurse practitioners so that they are now able to provide the full scope of services for which they are trained and educated. This legislative change will significantly enhance access to care in rural and underserved areas within Nebraska.[24] However, there remains substantial variation in the rate of nurse professionals across the state, with relatively low numbers of RNs, LPNs and APRNs in west and central Nebraska.

Among other health professions, the supply of dental hygienists has increased significantly within Nebraska since 2007. There are also substantially greater numbers of pharmacists and pharmacy technicians in the state since Mueller, et al(2009). EMTs are one of the few allied health professions providing complete coverage across the state. There are large geographical differences in the number of other allied health professionals. For example, 37 counties do not have any occupational therapists, and few counties have licensed audiologists. Our findings have important implications for the agricultural communities of Nebraska where injury and hearing loss are significant risk factors.

Interestingly, several of the recommendations made in the 2009 report by Mueller and colleagues still have merit today.[25] For example, their recommendations included establishing ongoing data collection in order to monitor the status of the healthcare workforce in Nebraska, as well as increasing funding and expanding the role of pipeline programs to aid in recruitment and retention efforts. In addition, although we now have an updated profile of the healthcare workforce in Nebraska, we do not have a clear understanding of the demographic, socioeconomic, policy and other drivers that underlie the differences in workforce distribution between our report and the 2009 report. For example, the Patient Protection and Affordable Care Act has had a substantial impact on the healthcare system. Changing legislation will likely result in profound changes in the provision of healthcare services in the future, but it is unclear whether the State of Nebraska is well-positioned to adapt its healthcare workforce to these changes.



23 Mueller K, Nayar P, et al. "A Critical Match".

24 American Association of Nurse Practitioners. Nurse Practitioners Salute Nebraska for New Health Care Law. Available at: https://www.aanp.org/press-room/166-press-room/2015-press-releases/1689-nurse-practitioners-salute-nebraska-for-new-health-care-law. Accessed January 15, 2018.

25 Mueller K, Nayar P, et al. "A Critical Match".

In summary, there continue to be significant challenges in the distribution of the healthcare workforce within the State of Nebraska, although for many of the reported professions, there has been improvement in the supply of providers over the past decade. The delivery of comprehensive, high quality, team-based care for complex health conditions will be difficult in rural communities with limited or no access to key healthcare specialists and baccalaureate-prepared RNs and other nurse professionals who are needed to case-manage and care for increasingly complex patients with chronic co-morbidities. In addition to geographical disparities in access to care, future pressures include a large percentage of the physician workforce that is nearing retirement. Furthermore, the demographic composition of Nebraska's healthcare workforce is significantly non-representative of the state's population. One-fifth of Nebraskan residents are racial or ethnic minorities, and the Hispanic population is expected to triple over the coming decades.[26,27]

Based on our updated findings, we provide the following recommendations:

1. **Existing pipeline programs and educational initiatives that incentivize health professionals to practice in rural communities should be supported and enhanced.**

   These pipeline programs include AHEC pipeline programs, the Public Health Early Admissions Student Track (PHEAST), the Rural Health Opportunities Program (RHOP), the Urban Health Opportunities Program (UHOP), the Kearney Health Opportunities Program (KHOP), the Rural Pharmacy Practice Educational Initiative (RPPEI), and the UNMC Department of Family Medicine Rural Training Track (RTT). In addition, the Nebraska Loan Repayment Program and other student loan and loan repayment programs managed by the Office of Rural Health provide strong economic incentives for new clinicians and other providers to practice in rural and medically underserved areas for a minimum length of time. These programs can also help increase cultural competency for diverse patient populations by a targeted recruitment of a healthcare workforce that more closely reflects the population being served. A "Grow Your Own" approach that invests in initiatives to actively recruit and support students from rural, underserved and disadvantaged backgrounds who enroll in pre-health and health profession trainings programs is needed. With a change in priorities, future trainees in Nebraska's health profession training programs may better reflect the diversity in the changing demographics of the state. Opportunities to engage communities and providers in order to offer community- and evidence-based clinical training opportunities should be explored. Using 3D technology, augmented reality and other technologies, e-learning initiatives such as UNMC's Interprofessional Experiential Center for Enduring Learning (iEXCEL) and the iWall at the UNMC College of Nursing Scottsbluff campus have strong promise in transforming the learning environment and attracting health professions trainees to Nebraska from throughout the US.



26 US Census Bureau. Quick Facts. Nbraska population estimates.

27 Tobias M. Nebraska's Hispanic/Latino Population Could Triple by 2050. NET News. August 20, 2013. Available at: http://netnebraska.org/article/news/nebraskas-hispaniclatino-population-could-triple-2050. Accessed January 15, 2018.

2. **Subsidize investments in telecommunications and other infrastructure capacity to support telehealth adoption and utilization in rural areas.**

   A large body of literature has shown that telehealth technologies can be effective in increasing access to a range of healthcare services in remote areas without compromising the quality of these services.[28] This is especially important for the healthcare specialties and rural locations that challenge existing pipeline and loan repayment programs. Although some aspects of telehealth delivery may be low-cost to providers, other technologies such as secure remote patient monitoring or robotic technologies may be too expensive for rural critical access hospitals or clinics to support. Subsidy programs that offset telehealth investment costs and expand broadband capacity should be explored.

3. **Undertake annual reporting of Nebraska's healthcare workforce distribution whenever updated data are available in order to help policymakers, pipeline programs and other stakeholders address persistent or emerging gaps in the supply of healthcare to Nebraskan communities.**

   There is nearly a ten-year gap between the prior report on Nebraska's workforce by Mueller and colleagues and the current report.[29] In this time, there have been substantial changes in both federal and state health policies, including comprehensive health reform, as well as important demographic, technological, economic, and other developments that have impacted the provision of healthcare in the state. Responding to these developments through policy mechanisms, program planning, or other workforce-related initiatives is inefficient if the data that help shape these initiatives are not current. Thus, regular and systematic reporting on the distribution of Nebraska's healthcare workforce is recommended.

4. **Perform forecasting of population health needs and anticipated supply of healthcare professionals in Nebraska whenever updated data are available.**

   Although our report provides an illustration of the current distribution of the healthcare workforce for the state, this analysis is a single snapshot in time. It does not take into account demographic and population health trends that will re-shape and expand the need for certain healthcare professionals. Similarly, the current analysis does not examine what the state of the healthcare profession may look like based on past and current trends in providers' demographics, geographical location, specialties, retirements, and other factors. Information on the likely future intersection of these two components, population health needs and supply of professionals to meet these needs, is crucial for workforce planning in order to identify emergent shortage areas and provide a more efficient and timely allocation of resources to address these areas. In fact, the Health Resources and Services Administration (HRSA) projects that there will be a shortfall of 5,320 full-time equivalent primary care physicians within the Midwest region by the year 2025.[30] The magnitude of this shortfall for Nebraska is unknown. Thus, a forecasting model should be developed



28 For a discussion of this literature, refer to Wilson FA, Rampa S, et al. Reimbursements for telehealth services are likely to be lower than non-telehealth services in the United States. J Telemed Telecare 2017;23(4):497-500; and Wilson FA, Rampa S, et al. An exploration of telehealth delivery for mental health services based on analysis of private insurance claims data in the US. Psychiatr Serv. Epub ahead of print.

29 Mueller K, Nayar P, et al. "A Critical Match".

30 National Center for Health Workforce Analysis. Health Resources and Services Administration. National and regional projections of supply and demand for primary care practitioners: 2013-2025. November 2016. US Department of Health and Human Services. Rockville, Maryland.

and updated annually with new workforce data. This model would provide ongoing assessment of healthcare disciplines and specialties that take into consideration the new healthcare delivery models that promote team-based care, the large number of healthcare professionals who are near retirement age, and the potential demand for healthcare services due to expanded insurance coverage and an older population. A forecasting model is crucial in determining access to healthcare for Nebraskans in the future.

# Appendix A: Demographic Profile of the State of Nebraska

**Table A1. Sex, race/ethnicity and age distribution of Nebraska population in 2017, US Census Bureau[31]**

| | % |
|---|---|
| **Sex** | |
| Female | 50.2 |
| Male | 49.8 |
| **Race/ethnicity** | |
| White, non-Hispanic | 79.6 |
| Black/African American | 5.0 |
| Hispanic/Latino | 10.7 |
| Asian | 2.5 |
| American Indian/Alaska Native | 1.4 |
| Native Hawaiian/Other Pacific Islander | .1 |
| Other | .7 |
| **Age in years** | |
| < 18 | 24.8 |
| 18-64 | 60.2 |
| >= 65 | 15.0 |



31 US Census Bureau. Quick Facts. Nebraska population estimates.

# Appendix B: State of Nebraska Designated Health Professions Shortage Areas

**Table B1. State designated shortage areas for primary care specialties by county***

| County | Family Practice | Internal Medicine | Pediatrics | Obstetrics & Gynecology | General Surgery |
|---|---|---|---|---|---|
| ADAMS | | X | | X | |
| ANTELOPE | | X | X | X | X |
| ARTHUR | X | X | X | X | X |
| BANNER | X | X | X | X | X |
| BLAINE | X | X | X | X | X |
| BOONE | | X | | X | X |
| BOX BUTTE | X | X | X | X | X |
| BOYD | | | X | X | X |
| BROWN | X | | X | X | X |
| BUFFALO | | X | | | X |
| BURT | X | X | X | X | X |
| BUTLER | | X | X | X | X |
| CASS | | X | X | X | X |
| CEDAR | X | X | X | X | X |
| CHASE | X | X | X | X | |
| CHERRY | X | X | X | X | |
| CHEYENNE | X | X | X | X | |
| CLAY | X | X | X | X | X |
| COLFAX | X | X | X | X | X |
| CUMING | X | X | X | X | |
| CUSTER | X | X | X | X | X |
| DAKOTA | | X | X | X | X |
| DAWES | X | X | X | X | |
| DAWSON | | X | X | X | X |
| DEUEL | X | X | X | X | X |
| DIXON | X | X | X | X | X |
| DODGE | | X | | | X |
| DUNDY | X | X | X | X | |
| FILLMORE | | X | X | X | X |
| FRANKLIN | X | X | X | X | X |
| FRONTIER | X | X | X | X | X |
| FURNAS | X | X | X | X | X |
| GAGE | | X | X | X | X |
| GARDEN | X | X | X | X | X |

| County | Family Practice | Internal Medicine | Pediatrics | Obstetrics & Gynecology | General Surgery |
|---|---|---|---|---|---|
| GARFIELD | X | X | X | X | X |
| GOSPER | X | X | X | X | X |
| GRANT | X | X | X | X | X |
| GREELEY | X | X | X | X | X |
| HALL | | X | | X | X |
| HAMILTON | | X | X | X | |
| HARLAN | X | X | X | X | X |
| HAYES | X | X | X | X | X |
| HITCHCOCK | X | X | X | X | X |
| HOLT | | X | X | X | X |
| HOOKER | | X | X | X | X |
| HOWARD | X | X | X | X | |
| JEFFERSON | | X | X | X | |
| JOHNSON | X | X | X | X | X |
| KEARNEY | X | X | X | X | X |
| KEITH | X | X | X | X | |
| KEYA PAHA | X | X | X | X | X |
| KIMBALL | X | X | X | X | X |
| KNOX | X | X | X | X | |
| LINCOLN | | X | X | X | X |
| LOGAN | X | X | X | X | X |
| LOUP | X | X | X | X | X |
| MCPHERSON | X | X | X | X | X |
| MADISON | | X | | | |
| MERRICK | X | X | X | X | |
| MORRILL | X | X | X | X | |
| NANCE | X | X | X | X | X |
| NEMAHA | | X | X | X | X |
| NUCKOLLS | | X | X | X | X |
| OTOE | | X | X | X | X |
| PAWNEE | | X | X | X | X |
| PERKINS | | X | X | X | |
| PHELPS | X | X | X | | |
| PIERCE | X | X | X | X | |
| PLATTE | | X | | X | X |
| POLK | X | X | X | X | X |
| RED WILLOW | | X | X | X | X |
| RICHARDSON | X | X | X | X | |
| ROCK | X | X | X | X | X |
| SALINE | X | X | X | X | X |
| SAUNDERS | | X | X | X | X |

| County | Family Practice | Internal Medicine | Pediatrics | Obstetrics & Gynecology | General Surgery |
|---|---|---|---|---|---|
| SCOTTS BLUFF | | X | X | | X |
| SEWARD | | X | X | X | X |
| SHERIDAN | X | X | X | X | |
| SHERMAN | X | X | X | X | X |
| SIOUX | X | X | X | X | X |
| STANTON | X | X | X | X | X |
| THAYER | | X | X | X | X |
| THOMAS | X | X | X | X | X |
| THURSTON | X | X | X | X | |
| VALLEY | X | X | X | X | |
| WASHINGTON | | X | X | X | X |
| WAYNE | X | X | X | X | X |
| WEBSTER | X | X | X | X | X |
| WHEELER | X | X | X | X | X |
| YORK | | X | X | X | |

* Data from State of Nebraska Department of Health and Human Services Office of Rural Health Rural Health Advisory Commission.[32]

## Table B2. State designated shortage areas for dentistry and allied health specialties by county*

| County | General Dentist | Pharmacist | Occupational Therapist | Physical Therapist |
|---|---|---|---|---|
| ADAMS | | | | |
| ANTELOPE | X | | | |
| ARTHUR | X | X | X | X |
| BANNER | X | X | | X |
| BLAINE | X | X | | X |
| BOONE | | | | |
| BOX BUTTE | | | X | |
| BOYD | | X | | |
| BROWN | X | X | | |
| BUFFALO | | | | |
| BURT | X | X | | |
| BUTLER | | | | |
| CASS | | X | | |
| CEDAR | X | X | | |
| CHASE | | X | | |
| CHERRY | | X | X | |

32 Office of Rural Health. Nebraska Department of Health & Human Services. State and federal shortage areas. Available at: http://dhhs.ne.gov/publichealth/RuralHealth/Pages/ShortageAreas.aspx. Accessed January 15, 2018.

| County | General Dentist | Pharmacist | Occupational Therapist | Physical Therapist |
|---|---|---|---|---|
| CHEYENNE | X | | X | |
| CLAY | X | X | X | |
| COLFAX | X | X | X | |
| CUMING | X | | | |
| CUSTER | X | | | |
| DAKOTA | X | X | X | X |
| DAWES | X | | X | |
| DAWSON | | | | |
| DEUEL | | X | | X |
| DIXON | X | X | X | X |
| DODGE | | | | |
| DUNDY | | X | | |
| FILLMORE | X | | | |
| FRANKLIN | X | X | | |
| FRONTIER | X | X | X | X |
| FURNAS | X | | | |
| GAGE | | X | | |
| GARDEN | | X | | X |
| GARFIELD | | X | | |
| GOSPER | X | X | | |
| GRANT | X | X | | X |
| GREELEY | X | X | | |
| HALL | | | | |
| HAMILTON | X | X | X | |
| HARLAN | X | X | | |
| HAYES | X | X | X | X |
| HITCHCOCK | X | X | | |
| HOLT | | | | |
| HOOKER | | X | X | |
| HOWARD | X | | X | |
| JEFFERSON | X | | | |
| JOHNSON | | | | |
| KEARNEY | | X | X | |
| KEITH | | | X | X |
| KEYA PAHA | X | X | X | X |
| KIMBALL | X | | | |
| KNOX | X | X | | |
| LINCOLN | | | X | |
| LOGAN | X | X | X | X |
| LOUP | X | X | X | X |
| MCPHERSON | X | X | X | X |

| County | General Dentist | Pharmacist | Occupational Therapist | Physical Therapist |
|---|---|---|---|---|
| MADISON | | | | |
| MERRICK | X | | X | |
| MORRILL | X | X | | |
| NANCE | X | | | |
| NEMAHA | X | | | |
| NUCKOLLS | X | X | | |
| OTOE | | | | |
| PAWNEE | X | X | | |
| PERKINS | X | X | | |
| PHELPS | | | | |
| PIERCE | X | X | X | |
| PLATTE | | | | |
| POLK | X | X | X | |
| RED WILLOW | | | X | |
| RICHARDSON | | X | | |
| ROCK | | | X | X |
| SALINE | | X | | |
| SAUNDERS | | X | | |
| SCOTTS BLUFF | | | | |
| SEWARD | | X | | |
| SHERIDAN | X | X | X | |
| SHERMAN | X | X | | |
| SIOUX | X | X | X | X |
| STANTON | X | X | X | X |
| THAYER | X | X | X | |
| THOMAS | X | X | X | X |
| THURSTON | | | | |
| VALLEY | | X | | |
| WASHINGTON | | X | | |
| WAYNE | | X | | |
| WEBSTER | X | X | | |
| WHEELER | X | X | X | X |
| YORK | | | | |

* Data from State of Nebraska Department of Health and Human Services Office of Rural Health Rural Health Advisory Commission.[33]



33 Office of Rural Health. Nebraska Department of Health & Human Services. State and federal shortage areas.

# Appendix C: State of Nebraska Guidelines for Designated Health Profession Shortage Areas[34]

**State of Nebraska Guidelines for Designation of Family Practice Shortage Areas**

1. A service area may be a single county, a partial county, a group of contiguous counties, or an identified population group within a defined area.
2. In computing the population-to-physician ratio, physicians practicing family or general practice will be counted on a full-time equivalent (FTE) basis, with four hours counting as 0.1 FTE. Physicians will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year. Physicians will not be counted if they no longer have hospital and/or nursing home privileges in the county or service area for the area they serve.

   If the population to FTE ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. Service areas will be designated if there is no physician coverage or if the population-to-physician ratio equals or exceeds 2,000/1.
4. Service areas with a population-to-physician ratio at or between 1,500/1 - 1,999/1 will be designated if at least one of the following high need indicators is present:
   A. The proportion of the population that is 65+ ranks in the highest quartile of the state;
   B. The proportion of the population below the poverty level ranks in the highest quartile of the state;
   C. The infant mortality rate ranks in the highest quartile of the state;
   D. The low birth weight rate ranks in the highest quartile of the state;
   E. More than half of the area's physicians are over 60 years old;
   F. The area is a frontier area (fewer than six persons per square mile.)
5. Counties having a population greater than or equal to fifteen thousand inhabitants and/or included within a metropolitan statistical area as defined by the United States Department of Commerce, Bureau of the Census will not be designated. Special populations and/or facilities may be designated within these counties. Areas within a 25-mile radius of Lincoln and Omaha will not be designated.
6. Service areas designated as federal primary care Health Professional Shortage Area (HPSA) may be designated as state family practice shortage areas for purposes of the Nebraska Rural Health Incentive Programs, if requested by the community and/or clinic and approved by the Rural Health Advisory Commission.
7. The designation of an area will not be withdrawn if a student loan recipient or loan repayment applicant has chosen the area as a future practice site.



34 Office of Rural Health. Nebraska Department of Health & Human Services. Nebraska state-designated shortage area guidelines. Available at: http://dhhs.ne.gov/publichealth/RuralHealth/Documents/ShortageAreaGuidelines.pdf.

**Guidelines for Designation of Shortage Areas in General Surgery, Internal Medicine, Obstetrics/Gynecology, Pediatrics, and Psychiatry**

1. A service area may be a single county or a group of contiguous counties.
2. In computing the population-to-physician ratio, physicians practicing a particular specialty will be counted on a full-time equivalent (FTE) basis, with four hours counting as 0.1 FTE. Physicians will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year. Psychiatrists working exclusively in an inpatient setting will not be counted.

   If the population to FTE ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. Service areas will be designated as shortage areas for a particular specialty if there is no local physician coverage in that specialty or if the population-to-specialist ratio equals or exceeds:

| | |
|---|---|
| General Surgery | 10,200/1 |
| General Internal Medicine | 3,250/1 |
| Obstetrics/Gynecology | 10,000/1 |
| General Pediatrics | 9,300/1 |
| Psychiatry | 10,000/1 |

4. Except as defined in 1 above, areas within a 25-mile radius of Lincoln and Omaha will not be designated.
5. The designation of an area will not be withdrawn if a student loan recipient or loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of Physician Assistant Shortage Areas**

1. A service area may be a single county or a group of contiguous counties.
2. Service areas will be designated as physician assistant shortage areas if there is no local physician coverage or if the population-to-physician ratio equals or exceeds the guideline for the specialty of the collaborating physician.
3. Except as defined in 1 above, areas within a 25-mile radius of Lincoln and Omaha will not be designated.
4. The designation of an area will not be withdrawn if a student loan recipient or loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of Nurse Practitioner Shortage Areas**

1. A service area may be a single county or a group of contiguous counties.
2. Service areas will be designated as nurse practitioner shortage areas if there is no local physician coverage or if the population-to-physician ratio equals or exceeds the guideline for the specialty.
3. Except as defined in 1 above, areas within a 25-mile radius of Lincoln and Omaha will not be designated.
4. The designation of an area will not be withdrawn if a loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of General Dentistry**

Shortage Areas

1. A service area may be a single county, a partial county, a group of contiguous counties, or an identified population group within a defined area.
2. The designation of a service area as a General Dentistry Shortage Area will be based on the ratio of service area population to full-time equivalency (FTE) of general dentists in the service area. In computing the population-to-dentist ratio, dentists will be counted on a full-time equivalent basis, with four hours counting as 0.1 FTE. Dentists will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year.

   If the population to FTE ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. A service area is designated as a General Dentistry Shortage Area if there is no dentist in the service area or if the population-to-dentist ratio equals or exceeds 3000:1.
4. Service areas with a population-to-dentist ratio at or between 2500/1 - 2999/1 will be designated if at least one of the following high need indicators is present:
   a. Half or more of the dentists serving the area are 55 or older;
   b. The proportion of the population below the poverty level ranks in the highest quartile of the state; or
   c. The area is a frontier area (fewer than six persons per square mile).
5. Except as defined in 1 above, areas within a 50-mile radius of Lincoln and Omaha will not be designated.
6. Service areas designated as federal general dentistry Health Professional Shortage Area (HPSA) may be designated as state general dentistry shortage areas for purposes of the Nebraska Rural Health Incentive Programs, if requested by the community and/or clinic and approved by the Rural Health Advisory Commission.
7. The designation of an area will not be withdrawn if a student loan recipient or loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of Pharmacist Shortage Areas**

1. A service area may be a single county or a group of contiguous counties.
2. The designation of a service area as a Pharmacist Shortage Area will be based on the ratio of service area population to full-time equivalency (FTE) of pharmacists practicing in the service area. In computing the population to pharmacist ratio, pharmacists will be counted on a full-time equivalent basis, with four hours counting as 0.1 FTE. Pharmacists will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year.

   If the population to FTE ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. A service area is designated as a Pharmacist Shortage Area if there is no pharmacist in the service area or if the population-to-pharmacist ratio equals or exceeds 1700:1.
4. Service areas with a population-to-pharmacist ratio at or between 600/1 - 1699/1 will be designated if the proportion of the service area population 65 and older ranks in the highest quartile of the state or if more than half of the area's pharmacists are over 60 years old.
5. Except as defined in 1 above, areas within a 25-mile radius of Lincoln and Omaha will not be designated. Cities larger than 15,000 will not be designated.
6. The designation of an area will not be withdrawn if a loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of Occupational Therapy Shortage Areas**

1. A service area may be a single county or a group of contiguous counties.
2. In computing the population-to-occupational therapist (OT) ratio, OTs will be counted on a full-time equivalent (FTE) basis, with four hours counting as 0.1 FTE. OTs will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year.

   If the population-to-OT ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. A service area is designated as an Occupational Therapist Shortage Area if there is no Occupational Therapist practicing in the service area or if the population-to-OT ratio equals or exceeds 5000/1.
4. Service areas with a population-to-OT ratio at or between 4500/1 - 4999/1 will be designated if at least one of the following high need indicators is present:
   a. The area is a frontier area (fewer than six persons per square mile);
   b. The proportion of the service area population 65 and older ranks in the highest quartile of the state;
   c. The proportion of the service area Special Education students to the student population ranks in the highest quartile of the state;
   d. The proportion of the service area population below the poverty level ranks in the highest quartile of the state; or
   e. Fifty percent or more of the OTs practicing in the county are 60 or older.
5. Except as defined in 1 above, areas within a 50-mile radius of Lincoln and Omaha will not be designated.
6. The designation of an area will not be withdrawn if a loan repayment applicant has chosen the area as a future practice site.

**Guidelines for Designation of Physical Therapy Shortage Areas**

1. A service area may be a single county or a group of contiguous counties.
2. In computing the population-to-physical therapist (PT) ratio, PTs will be counted on a full-time equivalent (FTE) basis, with four hours counting as 0.1 FTE. PTs will not be counted if they are practicing under Medicare, Medicaid, or licensure sanction, or if they have documented plans to discontinue practice within one year.

   If the population to licensed PT ratio is greater than the population of the service area, the population of the service area will be entered as the ratio. The Rural Health Advisory Commission will review individual concerns about full employment of a service area.
3. A service area is designated as a Physical Therapy Shortage Area if there is no physical therapist practicing in the service area or if the population-to-PT ratio equals or exceeds 5000/1.
4. Service areas with a population-to-PT ratio at or between 4500/1 - 4999/1 will be designated if at least one of the following high need indicators is present:
   a. a) The area is a frontier area (fewer than six persons per square mile);
   b. The proportion of the service area population 65 and older ranks in the highest quartile of the state;
   c. The proportion of the service area Special Education students to the student population ranks in the highest quartile of the state;
   d. The proportion of the service area population below the poverty level ranks in the highest quartile of the state; or
   e. Fifty percent or more of the PTs practicing in the county are 60 or older.
5. Except as defined in 1 above, areas within a 50-mile radius of Lincoln and Omaha will not be designated.
6. The designation of an area will not be withdrawn if a loan repayment applicant has chosen the area as a future practice site.

# Appendix D: State-Designated Shortage Area Maps[35]

**Figure D1. State designated shortage areas for family practice**

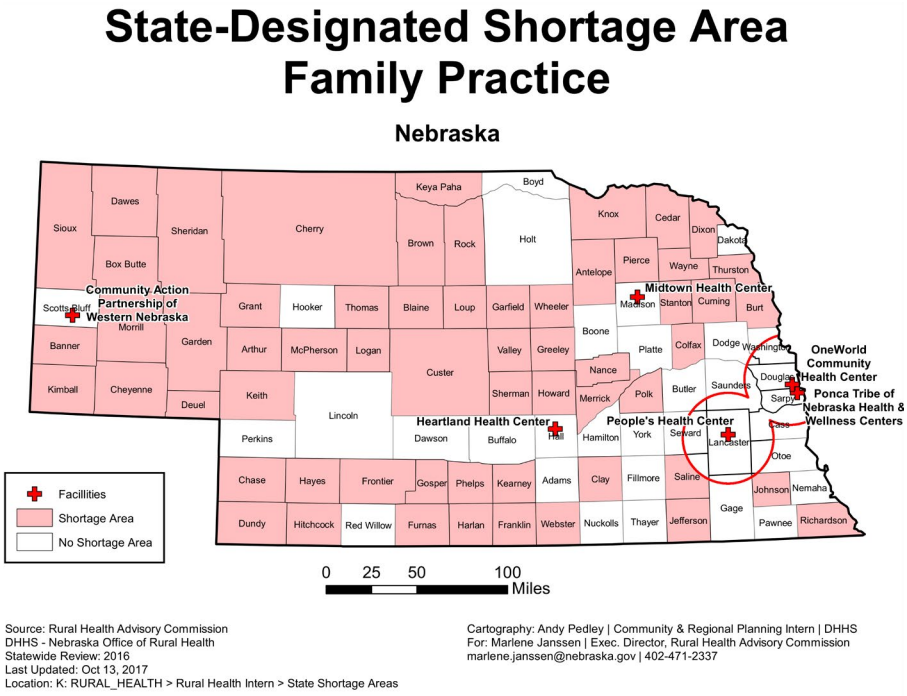
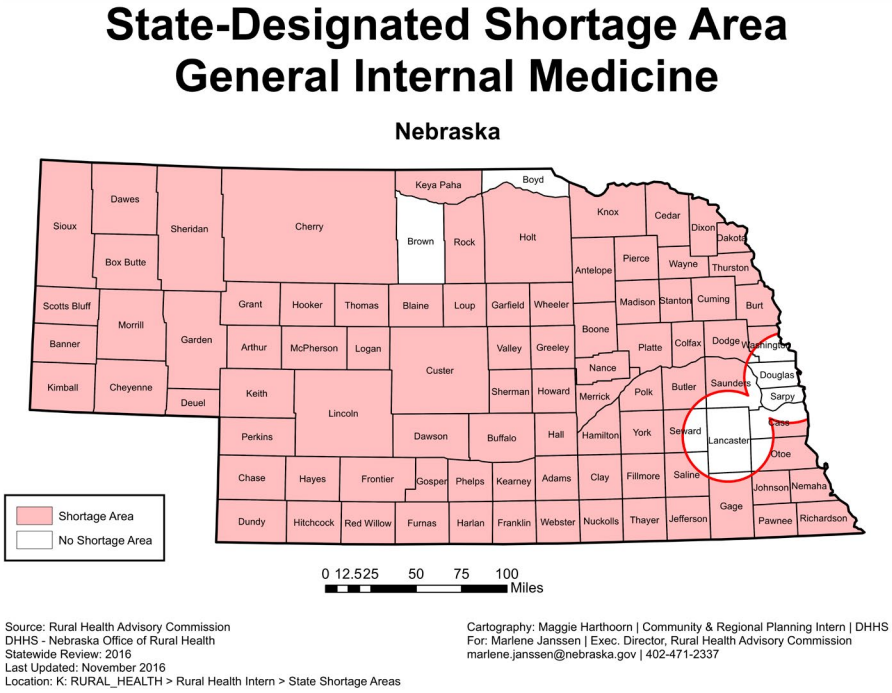


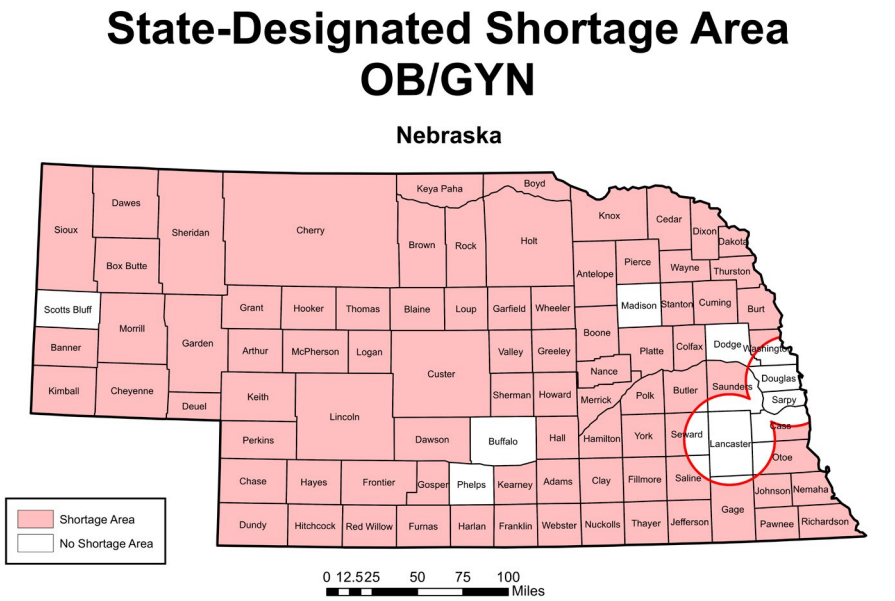

**Figure D2. State designated shortage areas for general internal medicine**






35 Office of Rural Health. Nebraska Department of Health & Human Services. State and federal shortage areas.

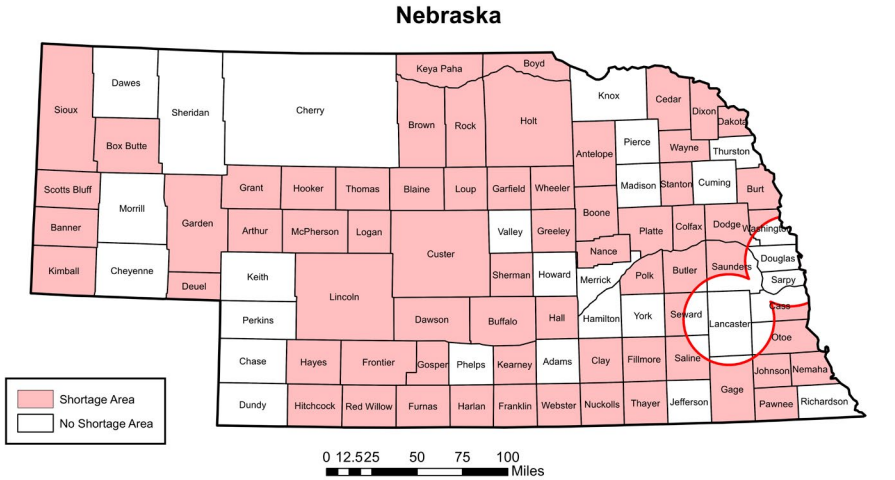
## Figure D3. State designated shortage areas for obstetrics and gynecology




Source: Rural Health Advisory Commission
DHHS - Nebraska Office of Rural Health
Statewide Review: 2016
Last Updated: November 2016
Location: K: RURAL_HEALTH > Rural Health Intern > State Shortage Areas

Cartography: Maggie Harthoorn | Community & Regional Planning Intern | DHHS
For: Marlene Janssen | Exec. Director, Rural Health Advisory Commission
marlene.janssen@nebraska.gov | 402-471-2337

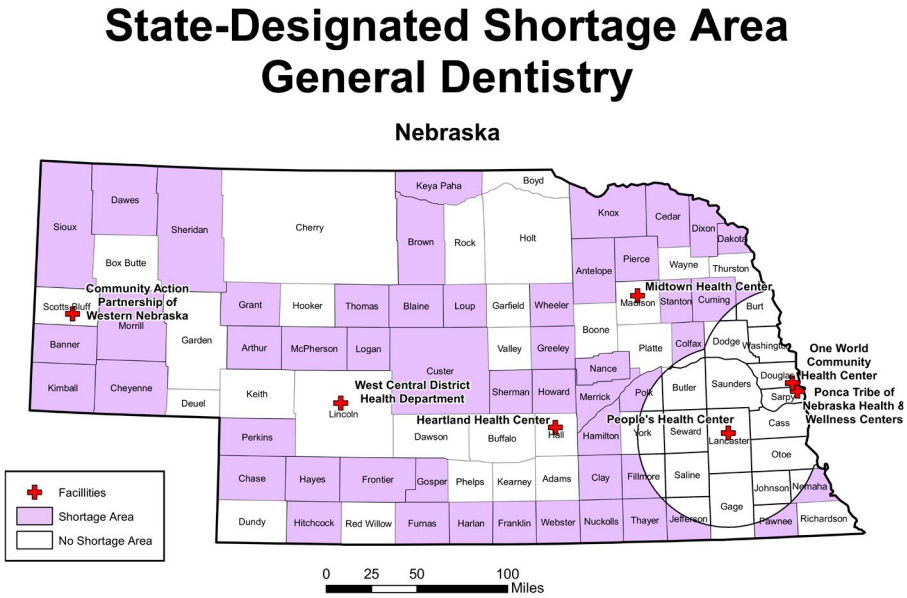
## Figure D4. State designated shortage areas for general surgery



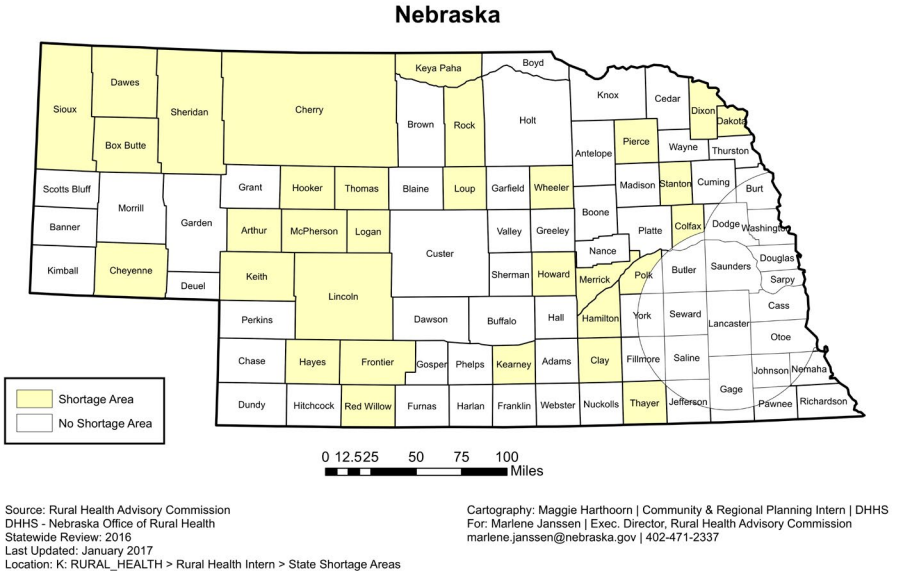

Source: Rural Health Advisory Commission
DHHS - Nebraska Office of Rural Health
Statewide Review: 2016
Last Updated: November 2016
Location: K: RURAL_HEALTH > Rural Health Intern > State Shortage Areas

Cartography: Maggie Harthoorn | Community & Regional Planning Intern | DHHS
For: Marlene Janssen | Exec. Director, Rural Health Advisory Commission
marlene.janssen@nebraska.gov | 402-471-2337

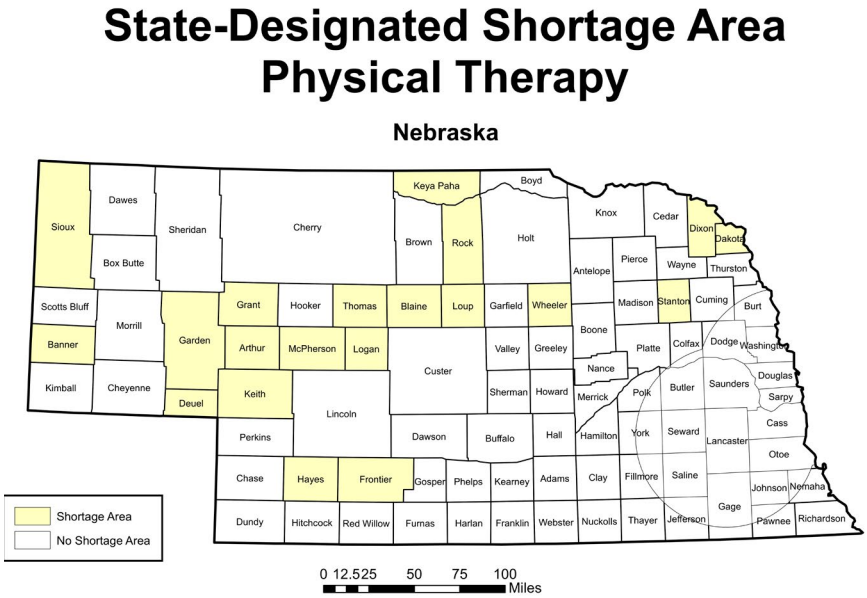
## Figure D5. State designated shortage areas for general dentistry




## Figure D6. State designated shortage areas for occupational therapy



## Figure D7. State designated shortage areas for physical therapy




Source: Rural Health Advisory Commission
DHHS - Nebraska Office of Rural Health
Statewide Review: 2016
Last Updated: January 2017
Location: K: RURAL_HEALTH > Rural Health Intern > State Shortage Areas

Cartography: Maggie Harthoorn | Community & Regional Planning Intern | DHHS
For: Marlene Janssen | Exec. Director, Rural Health Advisory Commission
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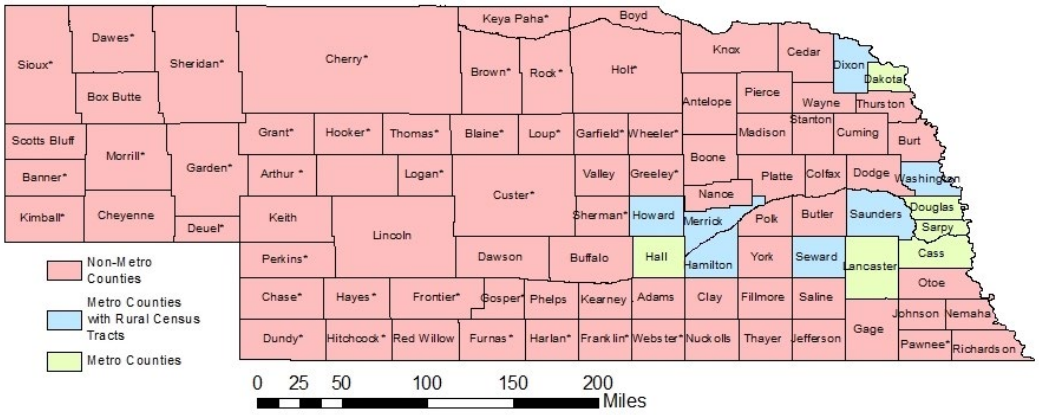
## Figure D8. State designated shortage areas for pharmacist

Source: Rural Health Advisory Commission
DHHS - Nebraska Office of Rural Health
Statewide Review: 2016
Last Updated: November 2016
Location: K: RURAL_HEALTH > Rural Health Intern > State Shortage Areas

Cartography: Maggie Harthoorn | Community & Regional Planning Intern | DHHS
For: Marlene Janssen | Exec. Director, Rural Health Advisory Commission
marlene.janssen@nebraska.gov | 402-471-2337

# Appendix E: List of Non-Metro and Metro Counties

**Figure E1. Non-metro, frontier and metro counties in Nebraska**




* County is designated as a frontier county based on 2010 US Census. Data from the National Center for Frontier Communities.[36] Metro and non-metro classification from the Health Resources and Services Administration Federal Office of Rural Health Policy.[37]

36 National Center for Frontier Communities. Mapping process and data. Available at: http://frontierus.org/mapping-process-and-data/.

37 Federal Office of Rural Health Policy. Health Resources and Services Administration. List of rural counties and designated eligible census tracts in metropolitan counties. Updated Census 2010. Available at: https://www.hrsa.gov/ruralhealth/resources/forhpeligibleareas.pdf.