

Health Care Workforce Needs in Wyoming: Advancing the Study

Occasional Paper No. 6

Fall 2011



**Research & Planning
Wyoming DWS**



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Wyoming Department of Workforce Services

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"Your Source for Wyoming Labor Market Information"

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Occasional Papers and Selected Health Care-Related Products from Research & Planning

Occasional Papers

Occasional Paper No. 1: Evaluation of Federal Training & Education Programs (issued October 2004)

<http://doe.state.wy.us/LMI/Occasional/No1/toc.htm>

Occasional Paper No. 2: An Analysis of Wyoming Unemployment Insurance Monetary Eligibility, 1993 and 2003 (issued January 2005)

<http://doe.state.wy.us/LMI/Occasional/No2/toc.htm>

Occasional Paper No. 3: Workforce Development Training Fund Evaluation at the Macro and Micro Levels (issued May 2005)

<http://doe.state.wy.us/LMI/Occasional/No3/toc.htm>

Occasional Paper No. 4: Outlook 2010 Revisited: Wyoming's Labor Market at Mid-Decade (issued May 2006)

<http://doe.state.wy.us/LMI/Occasional/occ4.pdf>

Occasional Paper No. 5: ARRA Labor Market Dynamics (issued May 2011)

<http://doe.state.wy.us/LMI/occasional/occ5.pdf>

Selected Health Care-Related Products

Nurses in Wyoming: Demand, Retention, & Supply (issued March-November 2008)

Part I: Nursing Demand

http://doe.state.wy.us/LMI/nursing_demand_08.pdf

Part II: Nursing Retention

http://doe.state.wy.us/LMI/nursing_retention_08.pdf

Part III: Vacancies and Recruitment and Retention Strategies

http://doe.state.wy.us/LMI/nurse_vacancies_retention.pdf

Electronic Medical Records Employment Impacts (published December 2010 in *Wyoming Labor Force Trends*)

<http://doe.state.wy.us/LMI/1210/a1.htm>

Benefits Time Series: Can We Determine If Employers Are Dropping Health Coverage? (published December 2010 in *Wyoming Labor Force Trends*)

<http://doe.state.wy.us/LMI/1210/a2.htm>

Need a Nurse? Examining Labor Sources for Health Care (published December 2007 in *Wyoming Labor Force Trends*)

<http://doe.state.wy.us/LMI/1207/a1.htm>

Chapter 1: Introduction

by: Patrick Manning, Principal Economist

In this publication, the Research & Planning (R&P) section of the Wyoming Department of Workforce Services attempts to define the analytical problems faced when trying to understand the health care workforce impacts of an aging population and rapidly changing technology, in the context of national health care initiatives, such as the Patient Protection and Affordable Care Act (Public Law 111-148). The chapters in this publication focus on labor market and population dynamics. This publication is intended to improve understanding of current human resources in the health care delivery system, project the demand and replacement need for health care providers, and propose a method for measuring health care provider shortages at the state and local level.

The purpose of this publication is to set the stage for ongoing conversations regarding research about the major factors that influence the health care workforce and its delivery system in Wyoming.

The research in this publication was made possible by the participation of the

Wyoming state licensing boards listed in Table 5a (see page 38), and their executive directors, who made licensed occupation data available to R&P.

The landscape of health care in Wyoming and in the U.S. is changing considerably. The Patient Protection and Affordable Care Act, changes in demographics, and the transition to electronic health care information mandated by the Health Information Technology for Economic and Clinical Health Act (Public Law 111-5. 123 STAT. 226) will all have an impact on the health care industry and the demand for health care services. As the baby boom generation – those born between 1946 and 1964 – grows older, the number of Americans age 65 and older is projected to more than double, from 40.2 million in 2010 to 88.5 million in 2050. In 2010, 13% of the U.S. population was 65 or older. By 2030, this percentage will increase to 19% (Vincent and Velkoff, 2010). This growth will increase the demand for geriatric services, changing the composition of health care needs. For example, will the U.S. have the appropriate mix of geriatric services relative to pediatric and OB/GYN services?

An Important Distinction: Jobs Worked and Persons Working

It is important to note that the information in this publication is presented in two distinct ways: jobs worked and persons working. Chapter 3, for example, focuses on *jobs worked*, as identified by the Occupational Employment Statistics (OES) survey. Chapter 5, meanwhile, focuses on the *persons working*, which allows for discussion of the demographics of persons working in these health care-related occupations.

Note also that recent changes to the Standard Occupational Classification (SOC) system have affected how some health care occupations are classified for data collection and estimation purposes in the OES program. Beginning in 2010, advanced practice nurses, nurse anesthesiologists, nurse midwives, and the traditional category of nurse were collected through the OES survey. R&P estimates for these new categories in OES to be released in 2013.

Shortages in health care occupations could lead to issues of delayed treatment and a decreased quality of care.

In addition to issues that face the nation as a whole, Wyoming faces issues that affect many other largely rural and/or sparsely-populated states, such as effective health care delivery to populations in remote areas. Wyoming is also prone to large shifts in economic activity due to the boom-and-bust nature of the mining and oil & natural gas extraction industries in the state. This activity leads to large fluctuations in population in various areas, most recently in the northeast and southwest portions of the state.

Chapter 2 examines the demographic and geographic issues that influence the demand for health care in Wyoming. Figure 2-1 (see page 11) shows population changes in Wyoming from 1960 to 2010. These changes result in high levels of migration to and from the state; for example, from 2008 to 2009, there were 28,685 in-migrants and 22,263 out-migrants, which accounts for roughly 5% of the state's population (see Table 2-1, page 12).

Chapter 2 also discusses the challenges Wyoming faces as a result of having the second lowest population density of all the states (see Table 2-2, page 13). Generally, Wyoming experiences a shortage of health care professionals. For example, the majority of counties have a shortage of primary care physicians. This chapter also discusses the lack of trained health care providers needed to serve a growing elderly population. Lastly, the impacts of age and educational attainment on an individual's level of health literacy, and therefore the individual's health outcomes, are examined.

Chapter 3 examines the current health care workforce in Wyoming and sub-state regions and compares it to the nationwide staffing patterns to assess shortages in various health care occupations. Table 3-2 (see page 24) summarizes U.S. employment for health care occupations, the rate per 10,000 residents and compares these rates to Wyoming and sub-state areas to assess excess and shortages of these occupations. For example, assuming that Wyoming should exhibit the same rate as the nationwide rate, Wyoming needs 60 more substance abuse and behavioral disorder counselors.

Chapter 4 examines the projected demand for health care and the possible resultant shortage of providers. As the population ages, which leads to an increase in demand for health care due to the higher incidence of chronic illnesses, health care professionals themselves will be retiring and will need to be replaced in the workforce. This chapter discusses the labor projections for selected health care occupations using 2010 as a baseline and estimating the need for these occupations in 2020. In total, 5,681 new jobs will be required by 2020 (see Table 4-1, page 29). Even greater is the replacement need for workers who will leave the workforce over this period. It is estimated that 22,365 workers will be needed to meet this replacement need. The advancing age of Wyoming's population will create a demand for occupations that help care for the elderly; for example, 537 more personal & home care aides will be required. Where will Wyoming find these workers? Table 4-2 (see page 34) shows that currently, in many cases, Wyoming colleges are not providing enough graduates to meet the annual projected demand. For example, a shortfall of 222 registered nurses annually is projected. This chapter includes a more detailed analysis as well as the methodology

and limitations of these projections.

Chapter 5 compares and contrasts the demographics of selected health professions and the commuting behavior of the individuals who work in these professions. In a larger sense this chapter serves to demonstrate R&P's abilities and resources to conduct this and future analyses by synthesizing information from many databases including: data provided to R&P by Wyoming professional licensing boards (see Appendix A online); the Wyoming wage records database; demographic data (from the U.S. Census Bureau and the Wyoming drivers' license database); the Quarterly Census of Employment and Wages; and the Workers' Compensation tax file. There are two components to the analysis. Part I generated basic statistical and demographic information for each licensed profession. Part II analyzed the wage and commuting behavior of those professionals who worked in Wyoming in third quarter 2010 and in all of the preceding four quarters. Commuting behavior is especially important for a state like Wyoming as individuals often travel long distances between their residence and place of employment. The professions displayed in the demographic tables were chosen to represent a wide variety of occupations and contained a sufficient number of individuals for analysis. These professions included chiropractors, dental hygienists, physical therapists, radiation technologists, and registered nurses. The average age in all these professions exceeded 40 years of age. Dental hygienists (5.8%) had the greatest proportion of workers who were less than 25 years old, while dentists (34.1%) had the greatest proportion of workers over 55 (see Table 5-1, page 42). In regard to gender distribution, registered nurses (93.7%) demonstrated the greatest proportion of females, while dentistry (84.6%) was the most male-dominated of these occupations

(see Table 5-2, page 43). Dentists (\$35,765) had the highest quarterly wages of these professions and also had the longest commute of 47.9 miles (see Table 5-3, page 43). Chiropractors had the shortest commuting distance of 6.3 miles. Not surprisingly, those working in the Casper and Cheyenne metropolitan statistical areas (MSAs) had shorter commuting distances on average than those workers who traveled to less densely populated areas (see Table 5-7, page 47). The inverse relationship between population density and average commuting distance is shown in Figure 5-2 (see page 48).

The ultimate purpose of this research is to generate a reliable data series over time containing relevant data such as demographic data, wage progression, and retention rates of these health care professionals that can be used to model future supply and demand dynamics.

Ongoing Research

R&P has ongoing research efforts that involve the health care sector and other sectors. The New Hires Survey is a project started in spring 2010 and is ongoing; initial results are discussed in Chapter 4. The purpose of this survey was to determine the job title, knowledge, skills, and abilities of newly hired workers. This survey has yielded useful information in terms of the demographic characteristics of these newly hired workers as well as statistics related to job tenure and wage progression. Additionally, R&P will be able to determine what jobs are in demand. This information can then be used to assess the dynamics of the job market so that people have more information regarding the job market in which they are (or will be) competing. This

information can aid educational institutions in designing curriculum, students assessing career options, those currently unemployed, those looking to relocate, and others.

Projections conducted by R&P (some of which are discussed in Chapter 4) are updated on a regular basis. Any given projection is a snapshot in time, meaning that the estimate is only as good as the information available at the time. Therefore, projections must be updated by R&P as new information becomes available.

Future Research

There are many issues that will be affecting the health care sector in coming years that are not directly addressed by this paper. One of the goals of the Patient Protection and Affordable Care Act is to provide health insurance for virtually all Americans. How can this be achieved in the most cost-effective manner? Insurance coverage, along with other components of the act, has been the subject of fierce debate since the law's introduction and passage. One possible positive development for those seeking insurance is the creation of health information exchanges that may provide more purchasing power to individuals and small groups (PWC U.S. Health Research Institute, 2011).

The Health Information Technology for Economic and Clinical Health (HITECH) Act is another example of legislation that will have a substantial impact on health care information. The transition to electronic medical records may create efficiencies that would aid health care in rural communities.

As stated earlier, an issue for consideration for further research is the impact of an aging population on other sectors of the economy. Will investment in infrastructure, such as nursing homes and managed care facilities, be sufficient to keep up with demand? Will it provide a much-needed stimulus to the construction sector that has been in a period of low activity since the most recent economic downturn began? Many more challenges will present themselves over the coming decades and will require critical research.

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Chapter 2: Demographics and Health Care

by: Lisa Knapp, Research Analyst

The topic of health care access, especially in areas with small populations, is becoming increasingly important. Many factors affect access to quality health care including population demographics, geography, changing laws, and the supply of health care providers. This chapter looks at the demographic and geographic issues that influence the need for health care in Wyoming. The information in this chapter is presented in terms of the number of persons living in Wyoming.

A low population density, an aging population, and a history of a boom and bust economy that relies heavily on migration combined with specialized health care needs of older people creates a unique environment for the provision of health care services.

Wyoming Population

Wyoming’s population is unique compared to the rest of the nation. Much of the state’s economy depends on the extraction of natural resources, and that industry tends to revolve around a boom and bust cycle in which the population can rapidly grow or decline depending on the economy. This is evident in Figure 2-1, which shows Wyoming’s population between 1960 and 2010. This history of rapid population change is associated with caution in making infrastructure investments, including those that involve building or expanding health care facilities.

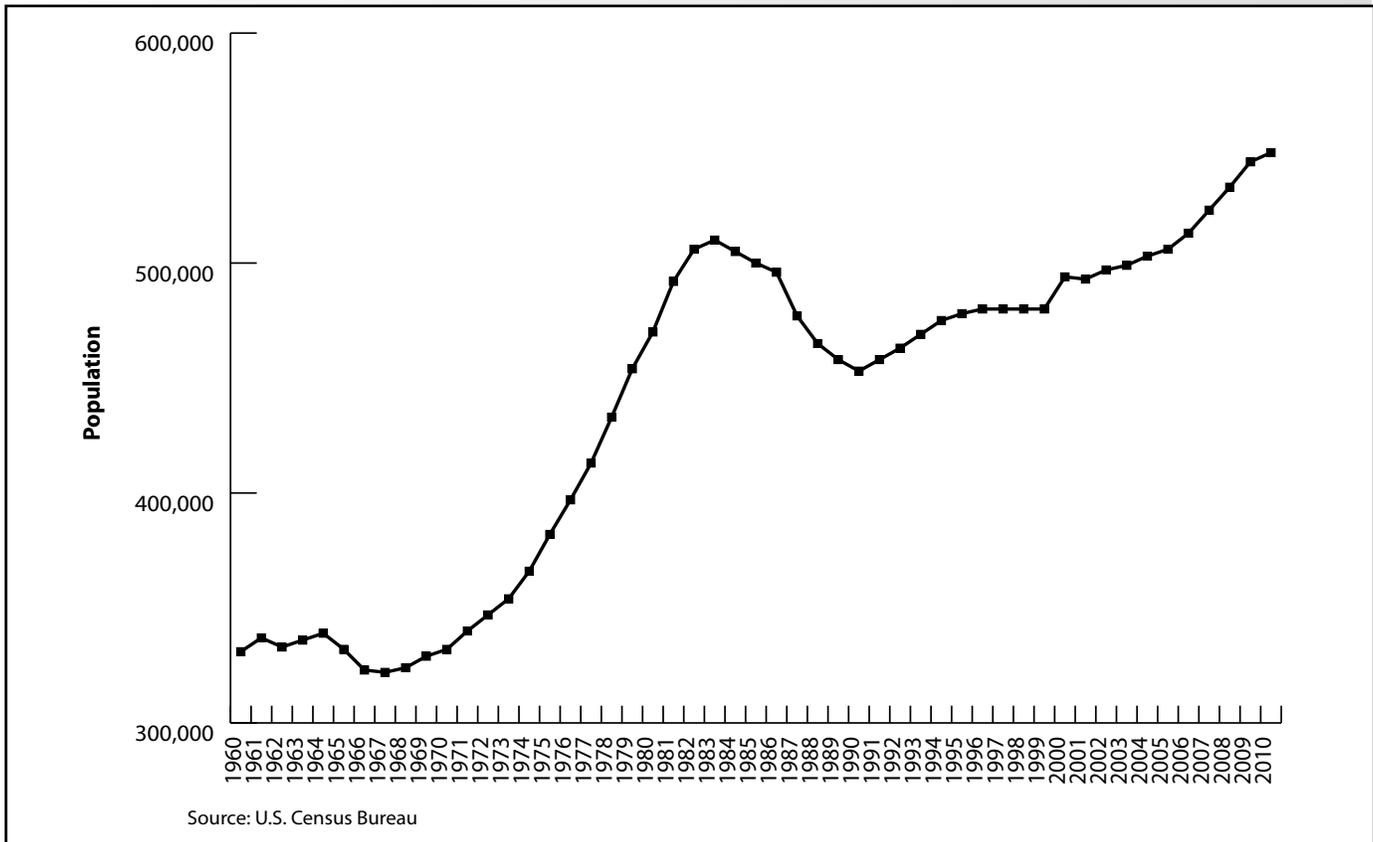


Figure 2-1: Wyoming Population (in Thousands), 1960-2010

Wyoming’s population is also influenced by migration. Jones (2005) found that there is a high rate of out-migration among the state’s youth. Because of Wyoming’s boom and bust economy and reliance on energy extraction, there is a high rate of in-migration of workers looking for work. Table 2-1 shows in-migration to Wyoming by state of origin for 2008 to 2009. During that time, there were 28,685 in-migrants and 22,263 out-migrants, a net migration rate of 11.4 in-migrants per 1,000 Wyoming residents. A large percentage of in-migrants came from Colorado (11.6%), California (7.1%), Utah (8.0%), Montana (6.0%), and Texas (4.9%). Migration patterns mean that health care services need to be sensitive to rapid, localized population change, and also to diverse needs and expectations of in-migrants.

Health Care in Rural Settings

Several complex and unique issues are associated with health care access in sparsely populated, semi-arid areas of the West. Defining what is rural can be problematic; a number of definitions exist. In 2010, the U.S. Department of Commerce defined rural as areas that are not urban. Urban, in turn, is defined in

two ways: *urbanized areas*, which have a population of 50,000 or more people, and *urban clusters*, which have more than 2,500 people but no more than 50,000.

More important than defining rural and urban, however, is the idea of population density, which refers to the average number of people per square mile. As shown in Table 2-2 (see page 13), in 2010 Wyoming ranked 51 out of 52 states and territories for population density. While the U.S. as a whole has a population density of 87.4 people per square mile, Wyoming only has 5.8 people per square mile. Additionally, due to a state economy based on extraction, the population tends to be distributed unevenly with a concentration around a small number of service centers, most notably Casper and Cheyenne – the state’s two metropolitan statistical areas (MSAs) – and the eight other cities with populations of 10,000 people or more. These population centers are illustrated in Figure 2-2 (see page 13). This figure demonstrates the distance between larger service centers and how much of the state does not have easy access to a larger population service center.

Health care in rural areas is often provided by critical access hospitals, which are

Table 2-1: Wyoming Number and Percent of In-Migrants by State of Origin, 2008-2009

State	N	%
Colorado	3,325	11.6
Utah	2,292	8.0
California	2,045	7.1
Montana	1,709	6.0
Texas	1,393	4.9
Idaho	1,368	4.8
Michigan	1,282	4.5
South Dakota	1,219	4.2
Nebraska	1,173	4.1
Arizona	1,098	3.8
Washington	883	3.1
Nevada	814	2.8
Florida	771	2.7
Oregon	674	2.3
Foreign	616	2.1
Minnesota	502	1.8
Missouri	453	1.6
New Mexico	445	1.6
Illinois	444	1.5
North Carolina	396	1.4
Kansas	393	1.4
Ohio	387	1.3
Georgia	369	1.3
Wisconsin	358	1.2
Oklahoma	348	1.2
Pennsylvania	316	1.1
Iowa	302	1.1
Indiana	295	1.0
North Dakota	291	1.0
Virginia	285	1.0
Alaska	278	1.0
Tennessee	272	0.9
Louisiana	227	0.8
New York	224	0.8
Arkansas	168	0.6
Alabama	151	0.5
Kentucky	143	0.5
Maryland	141	0.5
South Carolina	129	0.4
Mississippi	108	0.4
Hawaii	104	0.4
Massachusetts	102	0.4
Connecticut	75	0.3
Maine	73	0.3
New Jersey	64	0.2
West Virginia	50	0.2
New Hampshire	47	0.2
Vermont	42	0.1
Rhode Island	15	0.1
District of Columbia	14	0.0
Delaware	12	0.0
Total In-Migrants	28,685	100.0
Total Out-Migrants	22,263	

Source: Internal Revenue Service (<http://www.irs.gov/taxstats/article/0,,id=212683,00.html>).

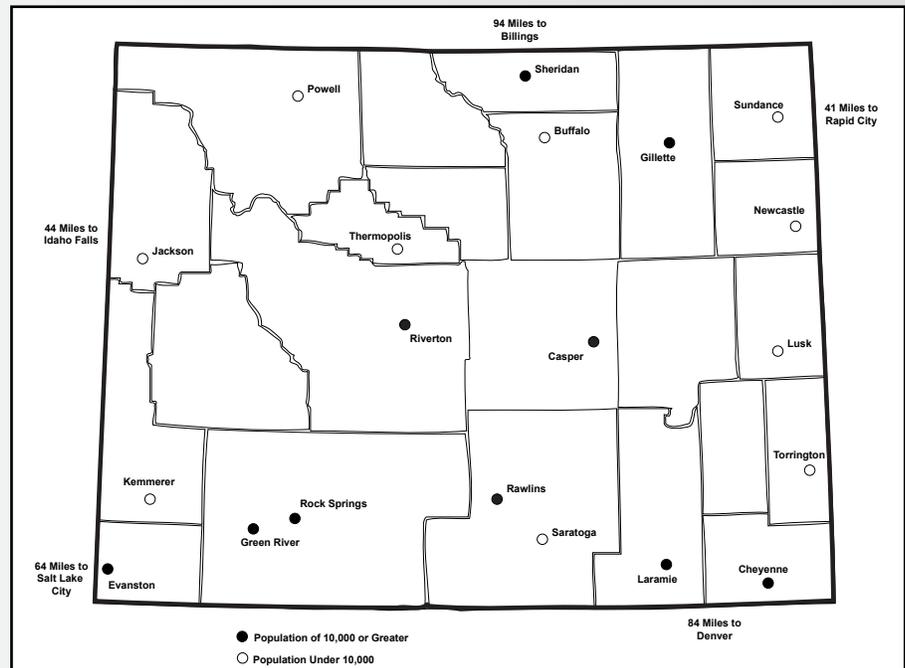
Table 2-2: Density Rank and People per Square Mile by State, 2010

State	Density Rank	People Per Square Mile
District of Columbia	1	9,856.5
New Jersey	2	1,195.5
Puerto Rico	3	1,088.2
Rhode Island	4	1,018.1
Massachusetts	5	839.4
Connecticut	6	738.1
Maryland	7	594.8
Delaware	8	460.8
New York	9	411.2
Florida	10	350.6
Pennsylvania	11	283.9
Ohio	12	282.3
California	13	239.1
Illinois	14	231.1
Hawaii	15	211.8
Virginia	16	202.6
North Carolina	17	196.1
Indiana	18	181.0
Michigan	19	174.8
Georgia	20	168.4
South Carolina	21	153.9
Tennessee	22	153.9
New Hampshire	23	147.0
Kentucky	24	109.9
Wisconsin	25	105.0
Louisiana	26	104.9
Washington	27	101.2
Texas	28	96.3
Alabama	29	94.4
Missouri	30	87.1
West Virginia	31	77.1
Vermont	32	67.9
Minnesota	33	66.6
Mississippi	34	63.2
Arizona	35	56.3
Arkansas	36	56.0
Oklahoma	37	54.7
Iowa	38	54.5
Colorado	39	48.5
Maine	40	43.1
Oregon	41	39.9
Kansas	42	34.9
Utah	43	33.6
Nevada	44	24.6
Nebraska	45	23.8
Idaho	46	19.0
New Mexico	47	17.0
South Dakota	48	10.7
North Dakota	49	9.7
Montana	50	6.8
Wyoming	51	5.8
Alaska	52	1.2

United States 87.4
 Source: U.S. Census Bureau (<http://2010.census.gov/2010census/data/apportionment-dens-text.php>).

small, rural hospitals that generally provide emergency services, out-patient care, and limited in-patient services. This may pose problems for older citizens and those with multiple medical conditions who require specialized care

as they may not be able to travel to a hospital that provides specialized services. In Wyoming, as of June 2008, there were 14 critical access hospitals across the state (Wyoming Department of Health, N.D.) while in



		Population Less than 10,000									
		Buffalo	Jackson	Kemmerer	Lusk	Newcastle	Powell	Saratoga	Sundance	Thermopolis	Torrington
Population of 10,000 or greater	Casper	112	284	288	104	170	239	148	197	130	144
	Cheyenne	290	432	343	140	220	417	127	265	309	84
	Evanston	403	190	50	430	495	388	250	522	280	425
	Gillette	70	411	423	157	76	228	283	61	193	208
	Green River	332	190	72	344	401	317	165	437	209	340
	Laramie	260	383	294	166	246	384	79	290	276	132
	Rawlins	229	284	194	221	287	286	42	314	178	217
	Riverton	178	164	175	224	288	163	164	309	55	264
	Rock Springs	319	177	86	329	395	304	150	422	196	325
	Sheridan	35	324	388	250	180	123	294	165	158	290

Population source: U.S. Census Bureau, Population Division.
 Distance source: Wyoming Department of Transportation.

Figure 2-2: Distances in Miles Between Wyoming Cities with Populations of 10,000 or Greater and Cities with Populations of Less than 10,000, 2009

2011, there were 28 hospitals in the state, including those with critical access status (Wyoming Hospital Association). Lack of access to specialized care in these low-population rural areas means that people may need to travel to large urban centers such as Denver, CO; Salt Lake City, UT; and Billings, MT for the care they need (see Figure 2-3). Competition between small, local health care providers and larger urban hospitals produces unique constraints on and helps shape Wyoming’s health care delivery system.

Both where one lives and where one works are relevant to where they consume both goods and services. Being able to measure both is an important part of understanding health care needs in Wyoming. Wyoming is one of few states that have the capacity to measure commuting by demographic and income grouping.

A persistent problem in Wyoming is the shortage of health care professionals. The Wyoming Office of Rural Health (2009) identified several areas that are considered medically underserved across the state. According to the report, there are 18 geographic areas and 19 sub-county areas that have a shortage of primary care providers; one geographic

area and 11 sub-county areas that have a shortage of dentists; and 23 geographic areas and 11 sub-county areas that have a shortage of mental health professionals. Thirteen counties have shortages of primary care physicians, including Sweetwater, Carbon, and Washakie counties.

Telemedicine and electronic medical record keeping are two methods of increasing healthcare access in rural settings. Telemedicine refers to the use of electronic communications such as video conferencing, remote monitoring of vital signs, and nursing call centers to provide health care (American Telemedicine Association, N.D.). Electronic

records refer to medical records that are stored or transmitted electronically rather than on paper. Use of electronic medical records should lead to quicker access to test results, easier transfer of medical data between doctors or other health care professionals, fewer medical errors, and lower administrative costs than are mandated by the Affordable Care Act starting in 2012. A recent study by the U.S. Department of Agriculture (Jones, Parker, Ahearn, Mishra, & Variyam, 2009) found that smaller rural hospitals, including critical access hospitals, have been slower to adopt telemedicine practices than larger, more urban hospitals. Also, especially in the case

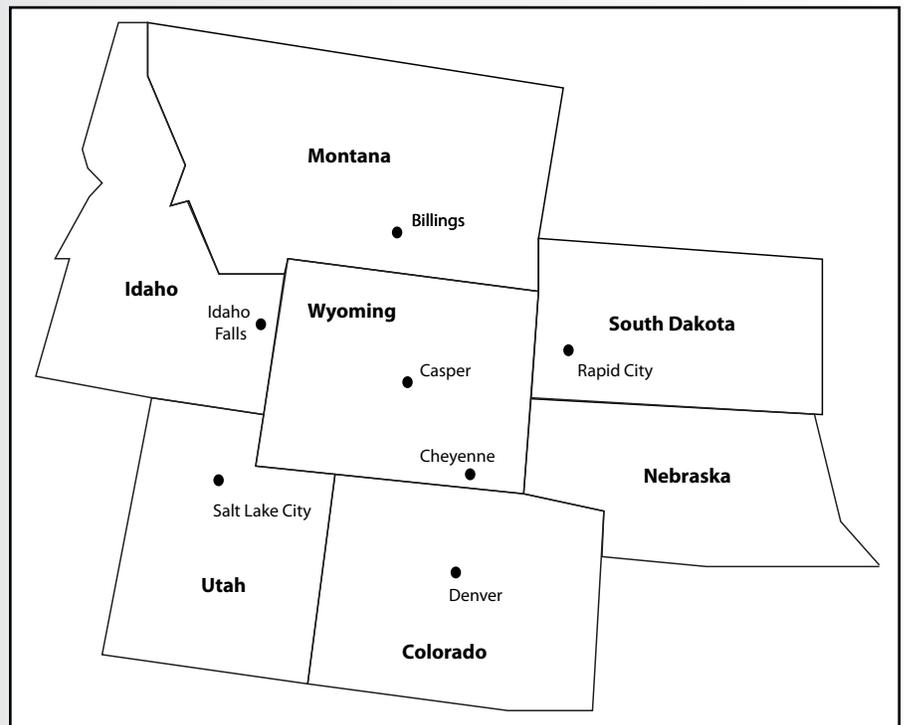


Figure 2-3: Wyoming and Surrounding States

of electronic medical records systems, these systems can be cost prohibitive to set up and maintain for smaller hospitals (Vogel, 2011).

Health Care for Aging Populations

Patients age 65 and older are more likely to have at least one chronic illness, such as diabetes, hypertension, or heart disease that needs medical management. A large number of those over 65 have a combination of two or more (National Academy of Sciences, 2008). Older adults also have a higher rate of doctor visits than their younger counterparts, as well as more hospital stays, and a greater usage of nursing homes (National Academy of Sciences, 2008). However, they are less likely to utilize preventative medical services (National Center for Health Statistics, 2007).

Combined with an increase in chronic and other illnesses, elderly patients face a shortage of health care providers trained in geriatric medicine. According to the Alliance for Aging Research (N.D.), there are fewer than 9,000 physicians trained specifically in geriatric medicine, and that number is expected to drop significantly due to retirement. Similarly, less than 1% of physician assistants, pharmacists, and registered nurses, as well as only 4% of social workers are certified or trained in geriatric medicine (National Academy of Sciences, 2008). Chapters 3 and 4 of this publication show that there is already a shortage of health care providers in Wyoming. By using the licensed occupation data mentioned in Chapter 5, future research could determine if there is also a lack of providers trained specifically to deal with elderly populations.

Currently, approximately 12% of both the nation's population and Wyoming's population

is 65 or older, but this is expected to increase to nearly 20% by 2030 as the baby boom generation (those born between 1946 and 1964) continues to age (Vincent & Velkoff, 2010). Additionally, the number of those age 80 or older is expected to double in the same period. This is due in part to positive changes in personal health behavior, such as smoking cessation, along with improvements in health care technologies that have turned once fatal diseases into manageable chronic illnesses (National Academy of Sciences, 2008).

In 2010, 12.4% of Wyoming's population was age 65 or older (see Table 2-8, page 21). As shown in Table 2-3 (see page 16), there was a 21.5% increase in those age 65 and older throughout the state between 2000 and 2010. The biggest increase occurred in the southwest region (33.5%), particularly in Teton County (66.0%) and Sublette County (46.1%). The large increase in Teton County may be due to the comparatively high cost of living compared to the rest of the state, with more wealthy retirees able to afford the high cost of living. In comparison, there was a 21.6% increase for people in this age group in the northwest region, a 21.8% increase in the northeast region, and an 18.2% increase in the Central-Southeast region. While there was a 23.0% increase in people age 65 and older between 2000 and 2010 in the Laramie County/Cheyenne MSA, there was only an 11.5% increase in this population for the Natrona County/Casper MSA region during the same period.

Table 2-4 (see page 16) contains overall population change in the state by county for all ages between 2000 and 2010. During this time, the Northeast region and the Southwest region experienced the greatest change in population (22.8% and 19.2%, respectively), while the Northwest region had the smallest growth of the regions (8.3%). A comparison between Tables 2-3 and 2-4 shows that the population of those age 65 and older

is growing faster than the population in general. For example, the population change for all ages in the Northwest region was 8.3% but for those age 65 and older it was 21.6%. The Southwest region grew by 19.2% for all ages and by 33.5% for those age 65 and older. In the Central-Southeast region, the population increased by 8.3% while the population of those age 65 and older

increased by 18.2%. Only the Casper MSA region showed little difference in growth for the general population and those age 65 and older; there was an increase of 13.4% for all ages but only an 11.5% percent increase for those age 65 and older.

Tables 2-5 (see page 18) and 2-6 (see page 19) show the average covered employment

Table 2-3: Percent Change by Wyoming County Between 2000 and 2010, Age 65 and Older

	Age 65+, 2000	Age 65+, 2010	Rate of Change, 2000- 2010
Northwest Region	12,709	15,451	21.6
Park	3,740	4,942	32.1
Big Horn	1,925	2,108	9.5
Washakie	1,316	1,508	14.6
Hot Springs	978	1,088	11.2
Fremont	4,750	5,805	22.2
Southwest Region	8,162	10,895	33.5
Sublette	711	1,039	46.1
Teton	1,264	2,098	66.0
Lincoln	1,800	2,241	24.5
Uinta	1,378	1,874	36.0
Sweetwater	3,009	3,643	21.1
Northeast Region	9,071	11,051	21.8
Sheridan	4,121	4,548	10.4
Johnson	1,275	1,588	24.5
Weston	1,771	2,616	47.7
Campbell	868	1,150	32.5
Crook	1,036	1,149	10.9
Central-Southeast Region	9,976	11,796	18.2
Converse	1,329	1,776	33.6
Carbon	1,920	2,044	6.5
Niobrara	451	513	13.7
Albany	2,646	3,166	19.7
Platte	1,458	1,797	23.3
Goshen	2,172	2,500	15.1
Cheyenne MSA	9,351	11,505	23.0
Laramie	9,351	11,505	23.0
Casper MSA	8,424	9,392	11.5
Natrona	8,424	9,392	11.5
Wyoming	57,693	70,090	21.5

Source: Wyoming Department of Administration and Information, Economic Analysis Division.
 2000: http://eadiv.state.wy.us/demog_data/pop2000/ProfilePDFsWY/C2K-Profiles.html
 2010: http://eadiv.state.wy.us/demog_data/pop2010/Profile/2010Profiles_WY.html

Table 2-4: Rate of Population Change by Wyoming County Between 2000 and 2010

	2000	2010	Rate of Change, 2000- 2010
Northwest Region	86,222	93,341	8.3%
Park	25,786	28,205	9.4%
Big Horn	11,461	11,668	1.8%
Washakie	8,289	8,533	2.9%
Hot Springs	4,882	4,812	-1.4%
Fremont	35,804	40,123	12.1%
Southwest Region	96,099	114,571	19.2%
Sublette	5,920	10,247	73.1%
Teton	18,251	21,294	16.7%
Lincoln	14,573	18,106	24.2%
Uinta	19,742	21,118	7.0%
Sweetwater	37,613	43,806	16.5%
Northeast Region	79,864	98,109	22.8%
Sheridan	26,560	29,116	9.6%
Johnson	7,075	8,569	21.1%
Weston	5,887	7,083	20.3%
Campbell	33,698	46,133	36.9%
Crook	6,644	7,208	8.5%
Central-Southeast Region	83,457	90,417	8.3%
Converse	12,052	13,833	14.8%
Carbon	15,639	15,885	1.6%
Niobrara	2,407	2,484	3.2%
Albany	32,014	36,299	13.4%
Platte	8,807	8,667	-1.6%
Goshen	12,538	13,249	5.7%
Cheyenne MSA	81,607	91,738	12.4%
Laramie	81,607	91,738	12.4%
Casper MSA	66,533	75,450	13.4%
Natrona	66,533	75,450	13.4%
Wyoming	493,782	563,626	14.1%

Source: Wyoming Department of Administration and Information, Economic Analysis Division.
 2000: http://eadiv.state.wy.us/demog_data/pop2000/ProfilePDFsWY/C2K-Profiles.html
 2010: http://eadiv.state.wy.us/demog_data/pop2010/Profile/2010Profiles_WY.html

by age group and county for the mining industry and all industries for 2000 to 2009 as well as the percent change in number of jobs. The numbers are based on worker place of residence, since where a worker lives is most likely where he or she will seek the most medical care.

These tables illustrate how the geographic distribution of jobs can vary. For example, employment in mining (see Table 2-6) increased by 43.8% in the Southwest region and by 57.2% in the Northeast region. Specifically, there were increases of 135.6% in Sublette County, 171.1% in Teton County, 172.6% in Sheridan County, and 148.6% in Johnson County, which are all counties where a large share of the mining activity in the state takes place, or counties bordering areas of mining activity where workers reside. In comparison, the number of people working in mining only increased by 15.9% for the Northwest region and 29.3% in the Casper MSA region. Table 2-5 shows the percent change in the number of workers across all industries by region. Again, this table shows that the most growth took place in the counties with or adjacent to heavy mining activity, such as Sublette County (69.9%), Campbell County (29.0%), and Johnson County (27.1%). As noted earlier, health care systems in the state need to be responsive to the boom and bust nature of Wyoming's economy. These tables help to show that population growth tends not to be uniform across the state but concentrated in certain areas.

Although the median age in most counties in Wyoming increased in most counties from 2000 to 2010, counties with considerable economic expansion saw a decline in the median age (see Table 2-7, page 20). The median age for Wyoming in 2010 was 36.8 years, a 0.6 year increase from 2000, when it was 36.2 years. The median age decreased in three counties with strong ties to the natural

resources & mining industry: Sublette (39.8 to 38.3, or -1.5), Sweetwater (34.2 to 32.8, or -1.4), and Campbell (32.2 to 31.9, or -0.3). This is likely due to younger workers being drawn to areas of economic expansion.

Table 2-8 (see page 21) shows the proportion of the population age 65 and older compared to those younger than 65 by county for 2000 and 2010. Between these two periods, the proportion of those age 65 and older increased from 11.7% to 12.4% statewide. This proportion increased from 14.7% to 16.6% in the state's Northwest region, from 8.5% to 9.5% in the Southwest region, and from 12.0% to 13.0% in the Central-Southeast region. In the Northeast region of the state, this proportion decreased very slightly from 11.4% to 11.3% during the decade. The proportion of people in this age group increased from 16.8% to 18.1% in Big Horn County, from 20.0% to 22.6% in Hot Springs County, from 18.7% to 20.7% in Niobrara County, and from 14.5% to 17.5% in Park County.

Education and Health Care

Poor health literacy is another factor that impedes the provision of comprehensive health care. Health literacy refers to a patient's ability to understand and process health information and use that knowledge to make good health decisions (AQHA, N.D.). Low health literacy can lead to poor health outcomes including increased chronic disease, greater risk of hospitalization, and a lower usage of preventative medical services (Berkman, et al., 2004). Studies have found that people with low health literacy have between 29% and 52% higher hospitalization rates than those with higher health literacy rates (Baker, et al., 2007).

(Text continued on page 20)

Table 2-5: Average Number of Workers and Percentage by Age and Wyoming County, All Industries, 2000-2009 (Based on Place of Residence)

	2000						2009						% Change, 2000 - 2009		
	Younger than Age 65		Age 65 and Older		Age Unknown		Total	Younger than 65		Age 65 and Older		Unknown		Total	
	N	%	N	%	N	%		N	%	N	%	N			%
Northwest Region	38,757	97.2	1,120	2.8	0	0.0	39,876	40,493	94.8	2,204	5.2	33	0.1	42,730	7.2
Park	11,823	97.1	349	2.9	0	0.0	12,172	12,601	94.8	676	5.1	11	0.1	13,288	9.2
Big Horn	4,056	96.2	159	3.8	0	0.0	4,214	4,366	94.4	256	5.5	3	0.1	4,626	9.8
Washakie	4,161	97.1	124	2.9	0	0.0	4,285	4,000	94.6	223	5.3	4	0.1	4,227	-1.4
Hot Springs	2,235	96.6	79	3.4	0	0.0	2,314	2,179	92.2	183	7.7	2	0.1	2,363	2.1
Fremont	16,482	97.6	410	2.4	0	0.0	16,892	17,346	95.2	867	4.8	13	0.1	18,226	7.9
Southwest Region	51,855	98.4	846	1.6	2	0.0	52,703	56,877	97.1	1,639	2.8	73	0.1	58,589	11.2
Sublette	2,627	97.6	65	2.4	0	0.0	2,692	4,403	96.2	164	3.6	8	0.2	4,575	69.9
Teton	11,991	98.3	212	1.7	0	0.0	12,203	12,754	97.1	348	2.6	28	0.2	13,130	7.6
Lincoln	5,957	98.1	116	1.9	0	0.0	6,073	6,595	96.4	237	3.5	6	0.1	6,839	12.6
Uinta	10,046	98.5	155	1.5	1	0.0	10,202	10,121	97.1	289	2.8	12	0.1	10,422	2.2
Sweetwater	21,235	98.6	298	1.4	1	0.0	21,533	23,005	97.4	601	2.5	19	0.1	23,624	9.7
Northeast Region	40,038	97.9	846	2.1	1	0.0	40,885	48,403	96.6	1,687	3.4	40	0.1	50,130	22.6
Sheridan	11,881	97.4	316	2.6	0	0.0	12,198	12,968	95.4	612	4.5	10	0.1	13,589	11.4
Johnson	3,016	96.2	119	3.8	0	0.0	3,135	3,751	94.1	233	5.9	1	0.0	3,986	27.1
Campbell	20,179	98.7	261	1.3	1	0.0	20,440	25,803	97.9	534	2.0	24	0.1	26,360	29.0
Crook	2,198	97.0	68	3.0	0	0.0	2,266	2,670	94.7	149	5.3	2	0.1	2,821	24.5
Weston	2,765	97.1	82	2.9	1	0.0	2,847	3,211	95.1	160	4.7	4	0.1	3,375	18.5
Central-Southeast Region	36,316	97.6	888	2.4	0	0.0	37,205	76,563	96.0	3,150	3.9	68	0.1	39,449	6.0
Converse	5,534	97.8	125	2.2	0	0.0	5,660	6,483	96.0	268	4.0	4	0.1	6,754	19.3
Carbon	7,359	97.6	179	2.4	0	0.0	7,538	7,123	95.5	333	4.5	5	0.1	7,461	-1.0
Niobrara	882	95.4	42	4.6	0	0.0	925	930	92.3	77	7.6	1	0.0	1,007	8.9
Albany	14,448	98.3	245	1.7	0	0.0	14,693	15,016	96.7	488	3.1	25	0.2	15,528	5.7
Platte	3,711	96.9	121	3.1	0	0.0	3,831	3,749	93.8	244	6.1	4	0.1	3,997	4.3
Goshen	4,382	96.1	177	3.9	0	0.0	4,559	4,424	94.1	275	5.8	4	0.1	4,702	3.1
Casper MSA	34,922	97.7	835	2.3	2	0.0	35,758	38,840	96.3	1,466	3.6	25	0.1	40,331	12.8
Natrona	34,922	97.7	835	2.3	2	0.0	35,758	38,840	96.3	1,466	3.6	25	0.1	40,331	12.8
Cheyenne MSA	36,748	97.9	784	2.1	0	0.0	37,532	40,090	96.4	1,434	3.4	44	0.1	41,567	10.8
Laramie	36,748	97.9	784	2.1	0	0.0	37,532	40,090	96.4	1,434	3.4	44	0.1	41,567	10.8
Unknown Region	20,545	64.8	222	0.7	10,923	34.5	31,690	13,453	31.0	317	0.7	29,670	68.3	43,439	37.1
Unknown	20,545	64.8	222	0.7	10,923	34.5	31,690	13,453	31.0	317	0.7	29,670	68.3	43,439	37.1
Total	259,181	94.0	5,541	2.0	10,928	4.0	275,649	275,877	87.2	10,431	3.3	29,927	9.5	316,236	14.7

Table 2-6: Average Number of Workers and Percentage by Age and Wyoming County, Mining Industry, 2000-2009 (Based on Place of Residence)

	2000							2009							Percent Change, 2000 – 2009
	Younger than Age 65		Age 65 and Older		Age Unknown		Total	Younger than 65		Age 65 and Older		Unknown		Total	
	N	%	N	%	N	%		N	%	N	%	N	%		
Northwest Region	2,317	98.2	43	1.8	0	0.0	2,361	2,673	97.7	63	2.3	1	0.0	2,737	15.9
Park	680	98.1	14	1.9	0	0.0	694	669	97.8	15	2.2	0	0.0	684	-1.4
Big Horn	472	97.7	11	2.3	0	0.0	483	497	97.0	15	3.0	0	0.0	512	6.0
Washakie	201	98.5	3	1.5	0	0.0	204	230	98.4	4	1.6	0	0.0	234	14.6
Hot Springs	172	97.2	5	2.8	0	0.0	177	210	96.2	8	3.8	0	0.0	218	23.1
Fremont	792	98.7	11	1.3	0	0.0	802	1,067	98.0	21	1.9	1	0.1	1,089	35.7
Southwest Region	5,096	99.7	14	0.3	0	0.0	5,110	7,284	99.1	60	0.8	6	0.1	7,349	43.8
Sublette	374	100.0	0	0.0	0	0.1	375	870	98.5	11	1.2	3	0.3	883	135.6
Teton	9	97.4	0	0.0	0	0.0	10	26	100.0	0	0.0	0	0.0	26	171.1
Lincoln	440	99.0	5	1.0	0	0.0	444	613	98.5	10	1.5	0	0.0	623	40.1
Uinta	979	100.0	0	0.0	0	0.0	979	1,132	99.5	5	0.5	1	0.0	1,138	16.3
Sweetwater	3,294	99.7	9	0.3	0	0.0	3,303	4,644	99.2	35	0.7	2	0.0	4,681	41.7
Northeast Region	5,523	99.4	31	0.6	0	0.0	5,555	8,616	98.6	114	1.3	4	0.0	8,734	57.2
Sheridan	188	100.0	0	0.0	0	0.0	188	508	99.0	5	1.0	0	0.0	513	172.6
Johnson	130	100.0	0	0.0	0	0.0	130	315	97.7	8	2.3	0	0.0	322	148.6
Campbell	4,443	99.5	21	0.5	0	0.0	4,464	6,569	98.7	83	1.2	3	0.0	6,655	49.1
Crook	218	100.0	0	0.0	0	0.0	217	374	100.0	0	0.0	0	0.0	374	72.2
Weston	545	98.1	11	1.9	0	0.0	556	850	97.7	19	2.2	1	0.1	870	56.6
Central-Southeast Region	1,437	99.1	9	0.6	0	0.0	1,446	2,106	98.2	32	1.5	0	0.0	2,141	48.1
Converse	804	99.5	4	0.5	0	0.0	807	1,292	98.9	14	1.1	0	0.0	1,306	61.7
Carbon	451	98.9	5	1.1	0	0.0	456	550	96.9	18	3.1	0	0.0	568	24.6
Niobrara	28	100.0	0	0.0	0	0.0	28	40	100.0	0	0.0	0	0.0	40	43.8
Albany	56	100.0	0	0.0	0	0.0	56	105	100.0	0	0.0	0	0.0	105	87.9
Platte	85	100.0	0	0.0	0	0.0	85	98	100.0	0	0.0	0	0.0	98	14.7
Goshen	14	100.0	0	0.0	0	0.0	13	25	100.0	0	0.0	0	0.0	25	86.8
Casper MSA	2,197	97.9	46	2.1	0	0.0	2,243	2,823	97.3	76	2.6	1	0.0	2,900	29.3
Natrona	2,197	97.9	46	2.1	0	0.0	2,243	2,823	97.3	76	2.6	1	0.0	2,900	29.3
Cheyenne MSA	121	100.0	0	0.0	0	0.0	121	149	96.6	5	3.1	1	0.3	154	27.8
Laramie	119	98.8	0	0.0	0	0.0	121	149	96.6	5	3.1	1	0.3	154	27.8
Unknown Region	1,025	100.0	0	0.0	479	31.8	1,505	1,368	33.8	8	0.2	2,669	66.0	4,044	168.7
Unknown	1,025	67.9	0	0.0	479	31.8	1,505	1,368	33.8	8	0.2	2,669	66.0	4,044	168.7
Total	17,701	96.5	158	0.9	480	2.6	18,338	25,010	89.1	369	1.3	2,681	9.6	28,059	53.0

(Text continued from page 17)

The National Assessment of Adult Literacy found that while 53% of the nation’s adults had at least an intermediate level of health literacy, older persons had a lower level of health literacy, especially those 65 and older. Health literacy is also affected by educational attainment; those with a lower level of educational attainment also have a lower level of health literacy (Kutner, Greenberg, Jin, Paulson, 2006).

In Wyoming 91.1% of the population age 25 and older has at least a high school diploma, compared to 84.6% of the nation’s population of the same age (see Table 2-9, page 22). However, only 23.2% of these people in Wyoming have a bachelor’s degree or higher, compared to 27.5% of people 25 years old or older in the U.S. While a greater proportion of the state’s population age 25 and older have at least a high school diploma, the comparably lower percentage holding a bachelor’s degree or greater might have an adverse effect on the health literacy across the state. Also, as noted, age has a negative effect on health literacy and, as demonstrated earlier, there is a relatively large proportion of people age 65 or older in the state that is expected to increase. The large number of residents age 65 or older and relatively low number of people in Wyoming with a bachelor’s degree could result in low health literacy.

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Table 2-7: Median Age by County and Rate of Change in Wyoming, 2000 and 2010

	Median Age, 2000	Median Age, 2010	Rate of Change, 2000-2010
Northwest Region			
Park	39.8	43.6	3.8
Big Horn	38.7	41.8	3.1
Washakie	39.4	41.8	2.4
Hot Springs	44.2	48.6	4.4
Fremont	37.7	38.5	0.8
Southwest Region			
Sublette	39.8	38.3	-1.5
Teton	35.0	36.9	1.9
Lincoln	36.8	37.4	0.6
Uinta	31.4	33.9	2.5
Sweetwater	34.2	32.8	-1.4
Northeast Region			
Sheridan	40.6	41.9	1.3
Johnson	43.0	44.8	1.8
Campbell	32.2	31.9	-0.3
Weston	40.2	43.6	3.4
Crook	40.7	42.3	1.6
Central-Southeast Region			
Converse	37.5	39.0	1.5
Carbon	38.9	38.9	0.0
Niobrara	42.8	46.1	3.3
Albany	26.7	26.8	0.1
Platte	41.2	47.5	6.3
Goshen	40.0	43.6	3.6
Cheyenne MSA*			
Laramie	35.3	37.0	1.7
Casper MSA*			
Natrona	36.4	36.8	0.4
Wyoming	36.2	36.8	0.6

Source: Wyoming Department of Administration and Information, Economic Analysis Division.

2000: http://eadiv.state.wy.us/demog_data/pop2000/ProfilePDFsWY/C2K-Profiles.html.

2010: http://eadiv.state.wy.us/demog_data/pop2010/Profile/2010Profiles_WY.html.

* MSA -- Metropolitan Statistical Area.

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Table 2-8: Age Group by County in Wyoming, 2000 and 2010

	Population Under Age 65				Population Age 65 and Older				Population Total	
	2000		2010		2000		2010		2000	2010
	N	%	N	%	N	%	N	%	N	N
Northwest Region	73,513	85.3	77,890	83.4	12,709	14.7	15,451	16.6	86,222	93,341
Park	22,046	85.5	23,263	82.5	3,740	14.5	4,942	17.5	25,786	28,205
Big Horn	9,536	83.2	9,560	81.9	1,925	16.8	2,108	18.1	11,461	11,668
Washakie	6,973	84.1	7,025	82.3	1,316	15.9	1,508	17.7	8,289	8,533
Hot Springs	3,904	80.0	3,724	77.4	978	20.0	1,088	22.6	4,882	4,812
Fremont	31,054	86.7	34,318	85.5	4,750	13.3	5,805	14.5	35,804	40,123
Southwest Region	87,937	91.5	103,676	90.5	8,162	8.5	10,895	9.5	96,099	114,571
Sublette	5,209	88.0	9,208	89.9	711	12.0	1,039	10.1	5,920	10,247
Teton	16,987	93.1	19,196	90.1	1,264	6.9	2,098	9.9	18,251	21,294
Lincoln	12,773	87.6	15,865	87.6	1,800	12.4	2,241	12.4	14,573	18,106
Uinta	18,364	93.0	19,244	91.1	1,378	7.0	1,874	8.9	19,742	21,118
Sweetwater	34,604	92.0	40,163	91.7	3,009	8.0	3,643	8.3	37,613	43,806
Northeast Region	70,793	88.6	87,058	88.7	9,071	11.4	11,051	11.3	79,864	98,109
Campbell	22,439	84.5	24,568	84.4	4,121	15.5	4,548	15.6	26,560	29,116
Sheridan	5,800	82.0	6,981	81.5	1,275	18.0	1,588	18.5	7,075	8,569
Johnson	31,927	94.7	43,517	94.3	1,771	5.3	2,616	5.7	33,698	46,133
Crook	5,019	85.3	5,933	83.8	868	14.7	1,150	16.2	5,887	7,083
Weston	5,608	84.4	6,059	84.1	1,036	15.6	1,149	15.9	6,644	7,208
Central-Southeast Region	73,481	88.0	78,621	87.0	9,976	12.0	11,796	13.0	83,457	90,417
Converse	10,723	89.0	12,057	87.2	1,329	11.0	1,776	12.8	12,052	13,833
Carbon	13,719	87.7	13,841	87.1	1,920	12.3	2,044	12.9	15,639	15,885
Niobrara	1,956	81.3	1,971	79.3	451	18.7	513	20.7	2,407	2,484
Albany	29,368	91.7	33,133	91.3	2,646	8.3	3,166	8.7	32,014	36,299
Platte	7,349	83.4	6,870	79.3	1,458	16.6	1,797	20.7	8,807	8,667
Goshen	10,366	82.7	10,749	81.1	2,172	17.3	2,500	18.9	12,538	13,249
Cheyenne MSA*	72,256	88.5	80,233	87.5	9,351	11.5	11,505	12.5	81,607	91,738
Laramie	72,256	88.5	80,233	87.5	9,351	11.5	11,505	12.5	81,607	91,738
Casper MSA*	58,109	87.3	66,058	87.6	8,424	12.7	9,392	12.4	66,533	75,450
Natrona	58,109	87.3	66,058	87.6	8,424	12.7	9,392	12.4	66,533	75,450
Wyoming Total	436,089	88.3	493,536	87.6	57,693	11.7	70,090	12.4	493,782	563,626

Source: Wyoming Department of Administration and Information, Economic Analysis Division.

2000: http://eadiv.state.wy.us/demog_data/pop2000/ProfilePDFsWY/C2K-Profiles.html.

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* MSA -- Metropolitan Statistical Area.

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Table 2-9: Educational Attainment, US and WY, Population Age 25+, 2005-2009

	Total		Male		Female	
	U.S.	WY	U.S.	WY	U.S.	WY
Population 25 years and over	197,440,772	339,475	95,194,537	169,532	102,246,235	169,943
Less than 9th grade	6.4%	2.7%	6.6%	2.9%	6.1%	2.4%
9th to 12th grade, no diploma	9.1%	6.3%	9.5%	6.5%	8.7%	6.0%
High school graduate (includes equivalency)	29.3%	31.9%	29.2%	33.6%	29.4%	30.3%
Some college, no degree	20.3%	26.6%	19.8%	25.2%	20.8%	28.0%
Associate's degree	7.4%	9.3%	6.7%	8.2%	8.1%	10.4%
Bachelor's degree	17.4%	15.6%	17.6%	15.2%	17.3%	16.0%
Graduate or professional degree	10.1%	7.7%	10.7%	8.4%	9.6%	7.0%
Percent high school graduate or higher	84.6%	91.1%	83.9%	90.6%	85.2%	91.6%
Percent bachelor's degree or higher	27.5%	23.2%	28.3%	23.6%	26.8%	22.9%

Source: U.S. Census Bureau.
 United States: <http://tinyurl.com/79e4uqm>.
 Wyoming: <http://tinyurl.com/7rqlb3h>.

Chapter 3: State and Local Health Care Shortages

by: Tony Glover, Workforce Information Supervisor

Much literature suggests that a shortage of health care workers exists nationally. This chapter looks at the current health care workforce in Wyoming and sub-state regions and compares it to a national staffing pattern. The estimates presented in this section are correspondingly conservative. The information in this chapter is presented in terms of *jobs worked*.

The Occupational Employment Statistics (OES) program collects occupational employment and wage data on jobs worked by industry and place of work. Data are collected from employers in all 50 states, the District of Columbia, Guam, Puerto Rico, and

the Virgin Islands, and are comparable across areas and nationally. This analysis combines national data on employment in health care-related occupations and Wyoming specific statewide (all industry), and sub-state region employment data for the same occupations with census population counts from the Decennial Census (see Table 3-1).

Health care-related occupations in this analysis were selected based on the description in the Patient Protection and Affordable Care Act in Section 5101 i (1) and include “all health care providers with direct patient care and support responsibilities such as physicians, nurses, nurse practitioners... .” The OES program collects

data on occupations by a Standard Occupational Classification (SOC) code and a complete list of SOCs and occupational titles are in the first two left hand columns of Table 3-2 (see page 24) and are listed in SOC code order. SOC codes with a non-zero value for the last character are called detailed occupations and refer to a specific occupation. SOC codes with a zero as the last character are roll-up occupations and summarize data about several similar occupations. For example, counselors (SOC 21-1010) summarizes data for the four detailed occupations of substance abuse (SOC 21-1011), marriage (SOC 21-1013), mental health (SOC 21-1014), and rehabilitation (SOC 21-1015) counselors.

The column titled “U.S. Employment” in Table 3-2 is the total employment for the specific occupation in the U.S. in 2009. The column titled “U.S. Rate per 10,000” is calculated by dividing the U.S. total employment by the U.S. population from Table 3-1 and multiplying it by 10,000. The result is the employment per 10,000 persons. For example,

(Text continued on page 25)

Table 3-1: Population

Area	Abbreviated	Pop 2000	Pop 2010	% Change
United States	U.S.	281,424,602	312,471,327	11.0%
Wyoming	WY	493,782	563,626	14.1%
Cheyenne MSA ¹	Cheyenne	81,607	91,738	12.4%
Casper MSA ¹	Casper	66,533	75,450	13.4%
Central Southeast	CSE	83,457	90,417	8.3%
Northeast	NE	79,864	98,109	22.8%
Northwest	NW	86,222	93,341	8.3%
Southwest	SW	96,099	114,571	19.2%

¹Metropolitan Statistical Area.
Source: U.S. Census Bureau.

Table 3-2: Selected Health Care Workforce Occupations by Wyoming Area and Need Relative to National Staffing Standard

		Positive Numbers Indicate Need and Negative Numbers Indicate an Excess U.S.								
SOC Code	SOC Title	U.S. Employment (2009)	Rate per 10,000	WY Need	Cheyenne MSA Need	Casper				
						MSA Need	CSE Need	NE Need	NW Need	SW Need
19-3031	Clinical, Counseling, & School Psychologists	100,700	3.2	-61	-6	7	-29	-4	-23	-5
21-1010	Counselors	332,780	10.6	94	25	13	8	43	-24	37
21-1011	Substance Abuse & Behavioral Disorder Counselors	77,940	2.5	60	23	5	15	13	-14	20
21-1013	Marriage & Family Therapists	33,050	1.1	39	10	8	10	11	--	--
21-1014	Mental Health Counselors	110,300	3.5	17	--	13	-15	18	10	-6
21-1015	Rehabilitation Counselors	111,490	3.6	-22	-6	-13	--	--	-20	21
21-1020	Social Workers	609,060	19.5	-187	-27	-123	--	30	-54	--
21-1021	Child, Family, & School Social Workers	276,100	8.8	-135	-41	-59	4	26	-34	-28
21-1022	Medical & Public Health Social Work	143,080	4.6	56	36	-18	--	26	-17	30
21-1023	Mental Health & Substance Abuse Social Workers	119,960	3.8	-68	32	-60	9	-12	-4	-30
21-1029	All Other Social Workers	69,920	2.2	-40	-54	14	-14	-10	--	26
29-1011	Chiropractors	26,250	0.8	-15	4	--	--	--	-11	-8
29-1020	Dentists	104,290	3.3	-70	-16	--	10	-11	-15	-22
29-1021	Dentists, General	87,700	2.8	-35	--	-4	4	-5	-9	-17
29-1022	Oral & Maxillofacial Surgeons	5,330	0.2	-9	--	--	--	-5	--	-10
29-1023	Orthodontists	5,580	0.2	-8	--	-4	--	--	-6	--
29-1024	Prosthodontists	670	0.0	2	--	--	--	--	--	--
29-1029	Dentists, All Other Specialists	5,010	0.2	-20	-19	--	--	--	--	--
29-1031	Dietitians & Nutritionists	53,510	1.7	22	--	--	--	4	7	12
29-1041	Optometrists	26,480	0.8	-25	--	--	5	-5	-13	-9
29-1051	Pharmacists	268,030	8.6	-4	-33	-14	--	20	-14	42
29-1060	Physicians & Surgeons	592,410	19.0	56	-13	-96	83	--	37	67
29-1061	Anesthesiologists	34,820	1.1	15	11	9	9	-14	--	6
29-1062	Family & General Practitioners	97,820	3.1	-247	-9	-162	-6	-38	-21	-9
29-1063	Internists, General	50,070	1.6	42	-7	13	12	8	4	14
29-1064	Obstetricians & Gynecologists	19,940	0.6	-10	6	5	--	-16	--	-5
29-1065	Pediatricians, General	30,100	1.0	-6	-20	8	--	6	4	--
29-1066	Psychiatrists	22,690	0.7	6	-6	--	--	--	6	--
29-1067	Surgeons	43,230	1.4	-21	5	-29	--	4	5	-6
29-1069	All Other Physicians & Surgeons	293,740	9.4	277	7	57	66	46	39	65
29-1071	Physician Assistants	81,420	2.6	-30	-5	-29	5	9	-16	8
29-1081	Podiatrists	9,310	0.3	7	-5	--	--	--	--	4
29-1111	Registered Nurses	2,655,020	85.0	--	-301	-183	127	58	19	281
29-1120	Therapists	518,970	16.6	-312	-154	-67	30	-26	-78	5
29-1122	Occupational Therapists	100,300	3.2	-22	-28	-8	12	--	--	5
29-1123	Physical Therapists	180,280	5.8	-109	-43	--	11	-23	-36	-16
29-1124	Radiation Therapists	16,590	0.5	--	5	--	--	--	-9	-4
29-1126	Respiratory Therapists	109,270	3.5	-52	-37	-37	12	--	--	17
29-1127	Speech-Language Pathologists	112,530	3.6	-127	-51	-27	-8	-8	-33	--
29-1181	Audiologists	12,860	0.4	8	--	--	4	--	--	4
29-1199	All Other Health Diagnosing & Treat Pract.	31,390	1.0	21	--	-7	10	--	9	12
29-2010	Clinical Laboratory Technologists & Technicians	320,910	10.3	-60	-112	0	-30	48	21	24
29-2011	Medical & Clinical Laboratory Technologists	164,430	5.3	29	8	12	-7	23	-16	16
29-2012	Medical & Clinical Laboratory Technicians	156,480	5.0	-89	-120	-12	-23	25	37	8

Table continued on page 25

(Text continued from page 23)

referring to registered nurses (SOC 29-1111), there are typically 85 RNs per 10,000 members of the population. This analysis assumes that the minimum number of RNs needed anywhere is 85

per 10,000 people. Therefore, a city with a population of 5,000 people should have 43 RNs and a city of 20,000 should have 170 RNs.

The data for Wyoming and Wyoming’s

Table continued from page 24

Table 3-2: Selected Health Care Workforce Occupations by Wyoming Area and Need Relative to National Staffing Standard

SOC Code	SOC Title	Positive Numbers Indicate Need and Negative Numbers Indicate an Excess U.S.									
		U.S. Employment (2009)	Rate per 10,000	WY Need	Cheyenne MSA Need	Casper MSA Need	CSE Need	NE Need	NW Need	SW Need	
29-2021	Dental Hygienists	177,520	5.7	-32	-15	-4	12	--	-6	-16	
29-2030	Diagnostic Related Technologists & Technicians	123,330	3.9	158	30	23	26	39	13	34	
29-2031	Cardiovascular Technologists & Technicians	48,720	1.6	74	13	12	11	15	10	15	
29-2032	Diagnostic Medical Sonographers	53,010	1.7	55	10	8	10	17	--	13	
29-2033	Nuclear Medicine Technologists	21,600	0.7	29	7	--	5	7	4	6	
29-2041	Emergency Medical Technicians & Paramedics	221,760	7.1	-178	-63	15	-38	-6	--	-86	
29-2050	Health Diagnosing & Treating Practitioner Support	535,870	17.1	233	44	-25	26	90	58	56	
29-2051	Dietetic Technicians	23,890	0.8	5	6	-8	--	7	--	--	
29-2052	Pharmacy Technicians	333,500	10.7	132	--	-5	-5	54	26	64	
29-2053	Psychiatric Technicians	72,650	2.3	50	5	18	13	23	22	-29	
29-2054	Respiratory Therapy Technicians	13,570	0.4	--	4	-5	4	--	--	--	
29-2055	Surgical Technologists	92,260	3.0	46	28	-25	15	8	10	16	
29-2061	Licensed Practical & Licensed Vocational Nurses	730,290	23.4	575	40	84	137	77	103	137	
29-2081	Opticians, Dispensing	62,200	2.0	4	-16	-17	5	--	11	23	
29-2091	Orthotists & Prosthetists	5,940	0.2	5	--	--	--	--	--	--	
31-1010	Nursing, Psychiatric, & Home Health Aides	2,498,660	80.0	502	192	-112	206	106	-296	412	
31-1011	Home Health Aides	982,840	31.5	746	262	118	46	94	-70	298	
31-1012	Nursing Aides, Orderlies, & Attendants	1,451,090	46.4	-350	-89	-246	144	-9	-241	93	
31-1013	Psychiatric Aides	64,730	2.1	106	19	16	16	21	15	21	
31-2010	Occupational Therapist Assistants & Aides	34,900	1.1	29	9	--	5	9	--	10	
31-2011	Occupational Therapist Assistants	27,720	0.9	29	6	--	4	6	7	7	
31-2012	Occupational Therapist Aides	7,180	0.2	--	--	--	--	--	-5	--	
31-2020	Physical Therapist Assistants & Aides	111,860	3.6	-41	--	-6	--	-19	-13	--	
31-2021	Physical Therapist Assistants	65,960	2.1	-6	4	--	4	-15	--	9	
31-2022	Physical Therapist Aides	45,900	1.5	-35	--	--	--	-4	-11	-9	
31-9011	Massage Therapists	60,040	1.9	28	--	14	--	14	--	--	
31-9090	Miscellaneous Healthcare Support Occupations	992,960	31.8	455	70	-10	110	166	79	51	
31-9091	Dental Assistants	294,030	9.4	13	-12	-4	29	12	--	-10	
31-9092	Medical Assistants	523,260	16.7	445	64	41	75	125	98	44	
31-9093	Medical Equipment Preparers	47,310	1.5	--	12	-32	5	11	5	--	
31-9094	Medical Transcriptionists	78,780	2.5	-77	-7	-27	-12	--	-30	--	
31-9095	Pharmacy Aides	49,580	1.6	75	13	12	13	16	5	18	
39-9021	Personal & Home Care Aides	686,030	22.0	-60	-165	101	10	69	-40	-33	

sub-state regions are given as the number of jobs by occupation needed or in excess relative to the national rate per 10,000. The data were produced in this manner as much of the employment at the sub-state areas by detailed occupations are suppressed due to confidentiality. In the first row of Table 3-2, the U.S. employment of clinical, counseling, and school psychologists (SOC 19-3031) was 100,700 and the rate per 10,000 members of the population was 3.2. Using the assumption that the appropriate number of school psychologists is 3.2 per 10,000 members of the population, it appears that Wyoming is overstaffed by 61 (negative numbers represent the employment in excess of what is needed based on national staffing patterns and population ratios).

The next occupation in Table 3-2 is counselors (SOC 21-1010), which is actually a combination of the occupations 21-1011 to 21-1015. As an aggregate occupation (21-1010), it appears that Wyoming needs 94 counselors. At the detailed level, Wyoming needs 60 substance abuse, 39 marriage, and 17 mental health counselors, but has an excess of 22

rehabilitation counselors. It is important to note that some of the rehabilitation counselors could be working as substance abuse counselors; while the occupational titles are specific, there is sometimes an overlap in actual services provided.

A more dramatic example of this occurs when contrasting family and general practitioners (SOC 29-1062) with all other physicians and surgeons (SOC 29-1069). Table 3-2 shows that Wyoming is overstaffed by 247 for family practitioners but understaffed by 277 for all other physicians. At the

aggregate level physicians and surgeons (SOC 29-1060), Wyoming needs 56.

The map in Figure 3-1 shows the six sub-state regions of Wyoming used by the OES program. The geographical allocation of occupations to sub-state regions introduces additional problems in determining number of health care workers needed or in excess relative to the national rate per 10,000. For example, 127 registered nurses (SOC 29-1111) are needed in the central southeast region, according to Table 3-2, while both the Cheyenne and Casper metropolitan statistical

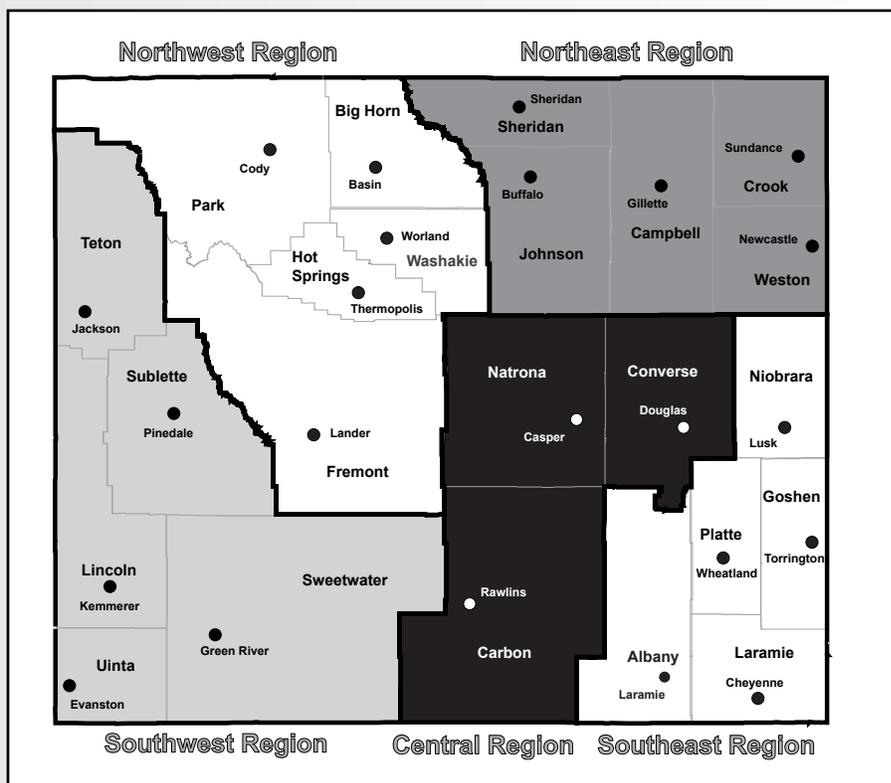


Figure 3-1: Wyoming Substate Regions

areas (MSA) show registered nurse excesses of 301 and 183, respectively. Other research conducted by R&P related to commuting patterns demonstrates that persons living in Fremont, Johnson, and Converse counties often commute to Natrona County – which includes Casper, Wyoming’s second largest city – for employment. It is possible that persons in these counties seek health care in Natrona County as well. The same scenario is relevant for the southeast corner of the state, with persons from Albany, Platte, and Goshen counties commuting to Laramie County, which includes Cheyenne, Wyoming’s largest city.

While all sub-state regions in Wyoming experienced population growth over the past decade, two of these, the northeast and southwest regions, grew at a faster pace than the balance of the state and twice as fast as the U.S. (see Table 3-1). This rapid growth was a product of the expansion of natural gas field exploration and development. Reviewing the columns titled NE Need and SW Need in Table 3-2, it becomes apparent that both regions of Wyoming have significant health care workforce shortages. It is likely that the health care infrastructure could not keep pace with the rapid population growth due to oil and gas expansion in these regions.

In conclusion, the current analysis is based on OES staffing pattern data collected at the state and national level and is therefore subject to sampling and non-sampling error. Consequently, estimation error could be expected to produce variability over time independent of change

in real need. Given this limitation, it is important to focus on repeated measures (the same study done each year) and to address dramatic changes that may be a result of the aforementioned sampling error as they arise.

Advantages of the current analysis are that it is comprehensive (all occupations), inexpensive to compile, current, and readily adaptable to other norms and standards. This research proposed that the desired state of affairs for staffing ratios of health care occupations to the population is the distribution that occurs nationally. As stated earlier, literature suggests a shortage of health care professionals exists nationally which may lead the current analysis to underestimate need. As research expands into the areas of access to care and desired staffing to population ratios for health care professionals, the current analysis could quickly be adapted to new standards at little to no cost.

The research presented in this section is exploratory in nature and future iterations will address the issues discussed in this section. One solution will come from research discussed in the last section of this occasional paper, which links state health care licensing databases with other administrative databases. In future research, it will be possible to look at access to health care professionals by the distance between health care seekers and health care services. The removal of nominal boundaries may provide a clearer understanding of what is available and where efforts should be focused to address Wyoming’s growing health care needs.

Chapter 4: Projected Demand and Health Care Shortages

by: Michael Moore, Associate Editor

The need for workers in health care-related occupations in Wyoming will grow considerably over the next 10 years. The advanced age of Wyoming's population will have a major impact on this change. As people in Wyoming age, they will require more health care. Additionally, as more people employed in health care occupations reach the traditional retirement age of 65, their departure from Wyoming's workforce will create a need to fill vacant jobs. This article looks at projected demand for selected health care occupations and how those needs will be met. The information in this chapter is presented both in terms of *jobs worked* and *persons working*.

The Research & Planning (R&P) section of the Wyoming Department of Workforce Services is able to project net growth among these occupations, and also project replacement need due to exits from Wyoming's workforce. However, these projections are constantly changing as they are influenced by a variety of factors other than the historic trend line normally used to produce industry and occupational projections. Such factors include employers offering higher wages and more benefits, substantial changes in the economy, new legislation, and new technologies and their diffusion, such as electronic medical records and voice recognition technology. It is important to note that at this time, linear projections cannot account for these types of changes, such as those caused by health care workforce-related legislation like the Health Information Technology for Economic and Clinical Health Act or the Patient Protection and Affordable Care Act of 2010.

Table 4-1 (see page 29) shows employment projections for selected health care occupations from 2010 to 2020. During this time, employment in these selected occupations will increase by 5,681 (27.3%). These are new jobs that will be added to Wyoming over this 10-year period.

While the emergence of new jobs will create substantial employment need in Wyoming's health care-related occupations, the most significant source of employment opportunities in the state will come from the need to replace current workers (Glover, 2011). In addition to the 5,681 new jobs in these selected occupations, 22,365 openings will need to be filled due to permanent exits; in many cases, employers will fill the same job several times. A permanent exit is defined as a person who was employed in Wyoming's labor market for the four quarters prior to the reference date, but is not employed in the subsequent three quarters. These exits are attributed to factors such as relocation, withdrawal from the market to care for a family member, retirements, or death. When a permanent exit occurs, this creates a need to replace that worker.

Table 4-1 shows the number of permanent exits broken into two columns: exits due to retirement, and all other exits. R&P is able to determine the number of exits due to retirement by using age data and determining when persons employed in these occupations will reach the traditional retirement age of 65. But with more people working past this age, the number of exits due to retirement is constantly changing. Although it is known that permanent exits also take place due to relocation or caring for a family

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Table 4-1: Employment Projections for Selected Health Care Occupations in Wyoming, 2010-2020

SOC Code	Title	Estimated Employment, May 2010 N	2010-2020 Employment Projections						Total Estimated Openings 2010-2020 28,046	New Hires, 2009Q4-2010Q3 N 6,266	New Hires Compared Average Annual Openings N 4,029
			Estimated Need Due to Growth		Estimated Need Due to Exits						
			Net Growth	Annual Openings	Retirement	All Other Exits	Total, All Openings	Average Annual Openings			
20-874	Total, Selected Health Care Occupations	20,874	5,681	568	3,816	18,550	22,365	2,237	28,046	6,266	4,029
19-3031	Clinical, Counseling, & School Psychologists	250	59	6	54	196	250	25	309	10	-21
21-1011	Substance Abuse & Behavioral Disorder Counselors & Mental Health Counselors	259	83	8	47	255	302	30	385	220	181
21-1013	Marriage & Family Therapists	22	8	1	4	21	25	2	33	37	34
21-1015	Rehabilitation Counselors	233	57	6	44	221	265	26	322	709	677
21-1021	Child, Family, & School Social Workers	616	149	15	127	479	606	61	755	227	152
21-1022	Medical & Public Health Social Workers	212	63	6	40	185	225	22	288	15	-14
21-1023	Mental Health & Substance Abuse Social Workers	300	93	9	52	283	335	33	428	44	1
21-1029	All Other Social Workers	161	45	5	29	125	154	15	199	35	15
29-1011	Chiropractors	67	22	2	11	60	71	7	93	0	-9
29-1021	Dentists, General	209	69	7	35	190	225	22	294	15	-14
29-1031	Dietitians & Nutritionists	80	24	2	14	69	84	8	108	0	-11
29-1041	Optometrists	78	26	3	13	69	83	8	109	0	-11
29-1051	Pharmacists	499	44	4	101	420	521	52	565	34	-22
29-1061	Anesthesiologists	50	17	2	9	40	49	5	66	0	-7
29-1062	Family & General Practitioners	430	131	13	84	348	432	43	563	58	2
29-1064	Obstetricians & Gynecologists	51	19	2	8	46	54	5	73	15	8
29-1065	Pediatricians, General	69	24	2	11	70	81	8	105	0	-10
29-1066	Psychiatrists	40	15	2	6	39	45	4	60	0	6
29-1067	Surgeons	106	34	3	19	93	112	11	146	15	41
29-1069	All Other Physicians & Surgeons	264	76	8	48	214	262	26	338	20	-14
29-1071	Physician Assistants	178	52	5	34	150	184	18	236	24	75
29-1081	Podiatrists	nd	nd	nd	nd	nd	nd	nd	nd	0	--

nd = Not discloseable.
 -- = Cannot be calculated.
 N/A = Not available.

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Table 4-1: Employment Projections for Selected Health Care Occupations in Wyoming, 2010-2020

SOC Code	Title	Estimated Employment, May 2010 N	2010-2020 Employment Projections						Total Estimated Openings 2010-2020 N	New Hires, 2009Q4-2010Q3 Compared Average Annual Openings N		
			Estimated Need Due to Growth		Estimated Need Due to Exits			Average Annual Openings				
			Net Growth	Annual Openings	Retirement	All Other Exits	Total, All Openings					
29-1111 & 29-1141	Registered Nurses	5,116	1,427	143	932	4,303	5,235	523	6,662	666	772	106
29-1121 & 29-1127	Audiologists & Speech-Language Pathologists	336	92	9	75	265	341	34	433	43	57	14
29-1122	Occupational Therapists	215	68	7	42	188	230	23	298	30	56	26
29-1123	Physical Therapists	476	161	16	82	440	522	52	683	68	100	32
29-1124 & 29-2034	Radiation Therapists & Radiologic Technologists & Technicians	nd	nd	nd	nd	nd	nd	nd	nd	nd	38	--
29-1126 & 29-2054	Respiratory Therapists & Respiratory Therapy Technicians	296	98	10	50	267	317	32	415	42	38	-4
29-2011	Medical & Clinical Laboratory Technologists	267	48	5	54	184	237	24	285	29	41	12
29-2012	Medical & Clinical Laboratory Technicians	393	102	10	74	355	429	43	531	53	8	-45
29-2021	Dental Hygienists	378	123	12	65	345	410	41	533	53	245	192
29-2031	Cardiovascular Technologists & Technicians	15	3	0	3	12	15	1	18	2	0	-2
29-2032	Diagnostic Medical Sonographers	43	9	1	8	35	43	4	52	5	0	-5
29-2033	Nuclear Medicine Technologists	10	2	0	2	7	9	1	11	1	0	-1
29-2041	Emergency Medical Tech. & Paramedics	570	137	14	104	470	573	57	710	71	113	42
29-2051	Dietetic Technicians	39	8	1	7	30	37	4	45	5	77	72
29-2052	Pharmacy Technicians	479	40	4	95	414	509	51	549	55	58	3
29-2053	Psychiatric Technicians	75	18	2	12	60	72	7	90	9	30	21
29-2055	Surgical Technologists	124	32	3	23	93	116	12	148	15	48	33
29-2061	Licensed Practical & Licensed Voc. Nurses	797	221	22	143	729	872	87	1,093	109	85	-24
29-2091	Orthotists & Prosthetists	nd	nd	nd	nd	nd	nd	nd	nd	nd	7	--
29-2099	All Other Health Technologists & Technicians	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12	--

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 -- = Cannot be calculated.
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Table 4-1: Employment Projections for Selected Health Care Occupations in Wyoming, 2010-2020

SOC Code	Title	Estimated Employment, May 2010 N	2010-2020 Employment Projections										New Hires, 2009Q4-2010Q3 Average Annual Openings	
			Estimated Need Due to Growth		Estimated Need Due to Exits				Total Estimated Openings		N			
			Net Growth	Annual Openings	Retirement	All Other Exits	Total, All Openings	Average Annual Openings	2010-2020	Annual Openings				
29-9099	All Other Healthcare Practitioners & Tech Wkr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	--
31-1011	Home Health Aides	1,220	215	22	223	1,165	1,388	139	1,603	160	68	-92		
31-1012	Nursing Aides, Orderlies, & Attendants & 31-1014 Nursing Assistants	3,201	873	87	558	2,873	3,431	343	4,304	430	1,151	721		
31-1013	Psychiatric Aides	11	1	0	2	8	10	1	11	1	15	14		
31-2011	Occupational Therapist Assistants & 31-2012 Occupational Therapist Aides	36	11	1	7	32	39	4	50	5	28	23		
31-2021	Physical Therapist Assistants	135	46	5	24	119	143	14	189	19	40	11		
31-2022	Physical Therapist Aides	125	40	4	22	112	134	13	174	17	145	128		
31-9011	Massage Therapists	83	21	2	12	94	106	11	127	13	25	12		
31-9091	Dental Assistants	nd	nd	nd	nd	nd	nd	nd	nd	nd	364	--		
31-9092	Medical Assistants	540	156	16	92	497	589	59	745	74	272	198		
31-9093	Medical Equipment Preparers	88	21	2	17	69	85	9	106	11	58	47		
31-9094	Medical Transcriptionists	232	61	6	40	216	257	26	318	32	7	-25		
31-9099	All Other Healthcare Support Workers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	153	--		
39-9021	Personal & Home Care Aides	1,400	537	54	259	1,596	1,855	185	2,392	239	556	317		

nd = Not discloseable.

-- = Cannot be calculated.

N/A = Not available.

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member, these types of exits cannot currently be modeled separately.

The advanced age of Wyoming’s population will drive the demand for occupations that will help care for the elderly. Registered nurses (1,427), nursing assistants (873), personal & home care aides (537), and home health aides (215) all are projected to grow substantially over the next 10 years (see Table 4-1).

Retirement will be a major contributing factor in the need to fill jobs, especially among registered nurses. From 2010 to 2020, a projected 932 openings will be created due to the retirement of registered nurses. Figure 4-1 shows that in third quarter 2010, 1,213 registered nurses working in Wyoming were between the ages of 45 and 54, 1,024 were between the ages of 55 and 64, and 169 were 65 or older. Together, these age groups represented 59.6% of all registered nurses working in Wyoming in third quarter 2010. During the next 10 years, many of these workers will reach the traditional retirement age of 65, and these openings will need to be filled.

As previously mentioned, linear projections cannot account for change that may be caused by outside factors, such as health care workforce-related legislation, and the estimated need due to annual openings is constantly changing. Using an ongoing New Hires Survey that began in 2010, R&P is able to study this dynamic. The survey is used to compile information on new hires in Wyoming

each quarter, such as the number of new hires for a certain occupation, wages paid, benefits offered, and more (Knapp, 2011). This survey allows R&P to examine health care-related occupations in Wyoming, and compare actual new hires from fourth quarter 2009 to third quarter 2010 with occupational projections for 2010 to 2020. A new hire is defined as someone who is hired and

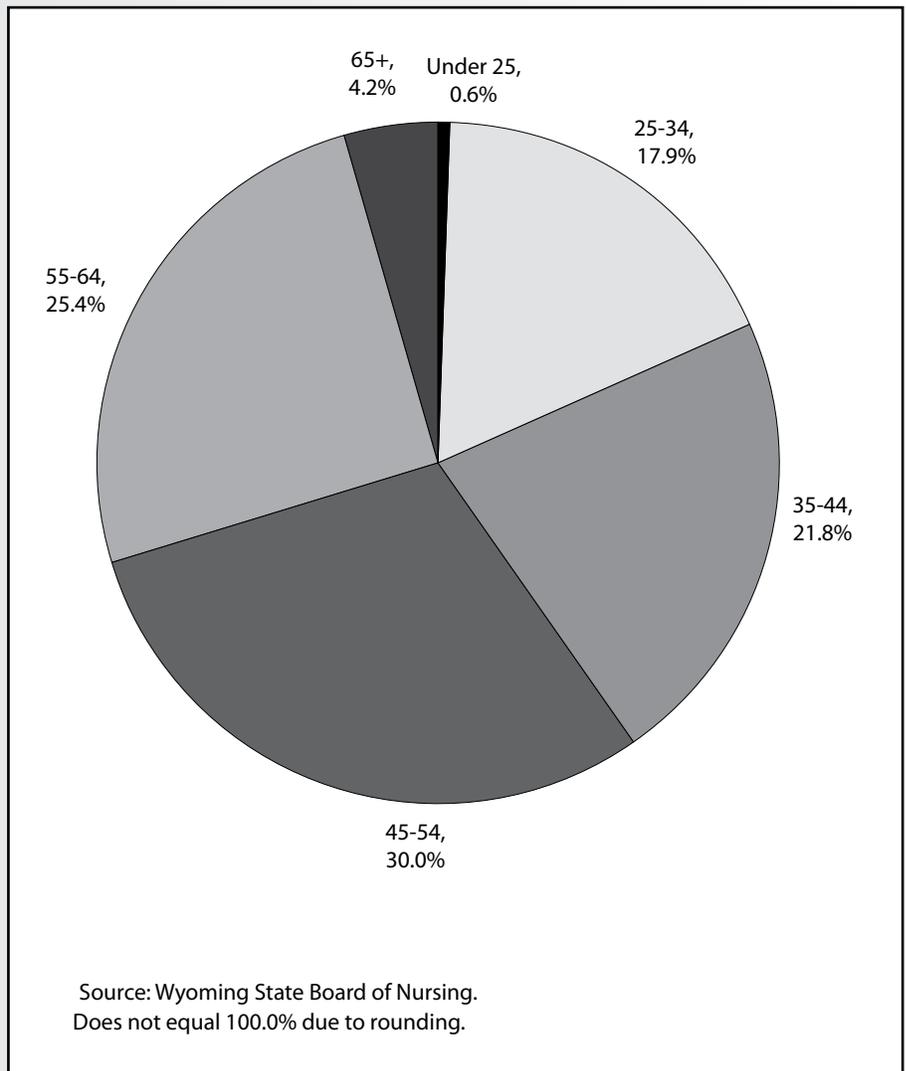


Figure 4-1: Age Distribution of Registered Nurses Working in Wyoming, 2010Q3

has not previously worked for that specific employer.

The last two columns in Table 4-1 show the number of new hires from fourth quarter 2009 to third quarter 2010 and a comparison of those numbers to average annual openings for 2010 to 2020. In many cases, the number of new hires during this period is very similar to the number of estimated annual openings. For example, there were 772 registered nurses hired in Wyoming during this period, compared to the projected 666 annual openings. Other cases illustrate how projections and replacement need due to permanent exits or turnover can underestimate actual need. For example, there were 220 substance abuse & behavioral disorder counselors hired during this period, compared to just 39 projected annual openings.

Shortage Occupations: Who Will Fill These Needs?

Table 4-2 (see page 34) compares the number of annual openings for selected health care occupations with the number of persons who completed the necessary degree program at a Wyoming college or university in 2009. Using the Occupation-to-Training Classification Crosswalks (National Crosswalk Service Center), R&P was able to link each occupation with the required degree program. R&P then used the Integrated Postsecondary Education Data System (IPEDS) Data Center (National Center for Education Statistics) to find the number of college completers for that degree program in Wyoming.

Different occupations often require completion of the same degree program. For example, child, family, & school social

workers and health care social workers both require a bachelor's degree through a social work program.

Table 4-2 shows that in many cases, Wyoming colleges are not producing enough completers to fill the number of average annual openings. For example, 52 persons completed a social work degree program in Wyoming in 2009. However, there were 170 projected annual openings within the occupations that required this degree, creating a shortage of 118. As Table 4-2 shows, this type of shortage was found in many of the selected health care occupations. Some occupations with a substantial number of shortages included registered nurses (-222), physical therapists (-66), medical & clinical laboratory technicians (-53), respiratory care occupations (-41), substance abuse and addiction counseling occupations (-39), occupational therapists (-30), medical transcriptionists (-28), and licensed practical & licensed vocational nurses (-23).

These shortages do not take into account the number of college completers who left Wyoming to work in another state, or college completers from other states who came to work in Wyoming. Also, factors such as new technologies and new legislation could create the need to fill even more openings than projected, creating an even greater difference between the number of college completers and the number of openings that need to be filled.

Many of these occupations may be impacted by new technologies; for example, what impact might voice recognition software have on medical transcriptionists? As new voice recognition software is used in a greater number of offices, it may eliminate the need for medical transcriptionists.

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Table 4-2: College Completers and Annual Openings for Selected Health Care Occupations in Wyoming, 2010-2020

CIP ¹ Code	Degree Program	SOC ² Code	Occupation	Minimum Education Required	2009 College Completers	2010-2020 Total Annual Openings	Total College Completers Compared to Estimated Average Annual Openings
420101	Psychology, General		Psychologists		122	43	79
		19-3031	Clinical, Counseling, & School Psychologists	Professional Degree		31	
		19-3032	Industrial-Organizational Psychologists	Bachelor's Degree		N/A	
		19-3039	Psychologists, All Other	Bachelor's Degree		12	
440701	Social Work		Social Work		52	170	-118
		21-1013	Marriage & Family Therapists	Master's Degree		3	
		21-1019	Counselors, All Other	Bachelor's Degree		0	
		21-1021	Child, Family, & School Social Workers	Bachelor's Degree		75	
		21-1022	Healthcare Social Workers	Bachelor's Degree		29	
		21-1023	Mental Health & Substance Abuse Social Workers	Master's Degree		43	
		21-1029	Social Workers, All Other	Bachelor's Degree		20	
450101	Social Sciences, General		Social Sciences		53	4	49
		19-3099	Social Scientists & Related Workers, All Other			0	
		19-4061	Social Science Research Assistants	Associate's Degree		4	
510204	Audiology/Audiologist & Speech-Language Pathology/Pathologist		Speech-Related Occs.		35	45	-10
		29-1127	Speech-Language Pathologists	Master's Degree		43	
		29-1181	Audiologists	N/A		2	
510601	Dental Assisting/Assistant	31-9091	Dental Assistants	OJT	0	78	-78
510602	Dental Hygiene/Hygienist	29-2021	Dental Hygienists	Associate's Degree	65	53	12
510708	Medical Transcription/Transcriptionist	31-9094	Medical Transcriptionists	Vocational Training	4	32	-28
510716	Medical Administrative/Executive Assistant & Medical Secretary	31-9092	Medical Assistants	OJT	0	75	-75
510803	Occupational Therapist Assistant	31-2011	Occupational Therapy Assistants	Associate's Degree	0	4	-4
510805	Pharmacy Technician/Assistant	29-2052	Pharmacy Technicians	OJT	2	55	-53
510904	Emergency Medical Technology/Technician (EMT Paramedic)	29-2041	Emergency Medical Technicians & Paramedics	Vocational Training	76	71	5

¹ Classification of Instructional Programs.

² Standard Occupational Classification.

N/A=Not applicable.

OJT=On-the-job training.

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Table 4-2: College Completers and Annual Openings for Selected Health Care Occupations in Wyoming, 2010-2020

CIP ¹ Code	Degree Program	SOC ² Code	Occupation	Minimum Education Required	2009 College Completers	2010-2020 Total Annual Openings	Total College Completers Compared to Estimated Average Annual Openings
510907	Medical Radiologic Technology/Science - Radiation Therapist	29-1124 29-2034	Radiation Therapy Radiation Therapists Radiologic Technologists	Associate's Degree Associate's Degree	4	5 5 N/A	-1
510908	Respiratory Care Therapy/Therapist	29-1126 29-2054	Respiratory Care Respiratory Therapists Respiratory Therapy Technicians	Associate's Degree Associate's Degree	0	41 38 3	-41
510909	Surgical Technology/Technologist	29-2055	Surgical Technologists	Vocational Training	5	15	-10
510911	Radiologic Technology/Science - Radiographer	29-2034	Radiologic Technologists	Associate's Degree	15	N/A	
510913	Athletic Training/Trainer	29-9091	Athletic Trainers	Bachelor's Degree	6	3	3
511004	Clinical/Medical Laboratory Technician	29-2012	Medical & Clinical Laboratory Technicians	Associate's Degree	0	53	-53
511009	Phlebotomy/Phlebotomist	31-9097	Phlebotomists	N/A	0	N/A	
511501	Substance Abuse/Addiction Counseling	21-1011 21-1014	Substance Abuse/Addiction Counseling Substance Abuse & Behavioral Disorder Counselors Mental Health Counselors	Bachelor's Degree Master's Degree	0	39 10 29	-39
511601	Nursing - Registered Nurse Training (RN, ASN, BSN, MSN)	29-1111 & 29-1141	Registered Nurses	Associate's Degree	444	666	-222
511613	Licensed Practical / Vocational Nurse Training	29-2061	Licensed Practical & Licensed Vocational Nurses	Vocational Training	87	110	-23
512001	Pharmacy (PharmD [USA] PharmD, BS/BPharm [Canada])	29-1051	Pharmacists	Professional Degree	51	57	-6
512306	Occupational Therapy/Therapist	29-1122	Occupational Therapists	Master's Degree	0	30	-30
512308	Physical Therapy/Therapist	29-1123	Physical Therapists	Master's Degree	2	68	-66
512399	Rehabilitation & Therapeutic Professions, Other	29-1129	Therapists, All Other	N/A	6	N/A	
513501	Massage Therapy/Therapeutic Massage	31-9011	Massage Therapists	Vocational Training	17	13	4

¹ Classification of Instructional Programs.
² Standard Occupational Classification.
 N/A=Not applicable.
 OJT=On-the-job training.

(Text continued from page 33)

Although this is considered a shortage occupation using the current occupational projections, the development and implementation of this type of technology may reduce or even eliminate the need for these positions to be filled.

Conclusion

The health care landscape will change considerably over the next 10 years. As Wyoming's population and workforce age over the next 10 years, there will be a significant need to fill jobs in the health care industry. Although the aging of the baby boom generation and new legislation make it difficult to project exact need, an analysis of projections, replacement need, college completers, and new hires provides an idea of health care needs in Wyoming over the next 10 years.

References

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Chapter 5: Commuting Impacts on Health Care

by: Douglas W. Leonard, Senior Economist

The demographic and geographic distributions of Wyoming's health care professionals have an impact on service delivery. For example, if an injured person is far from necessary services, response times may be lengthened, which may increase patient risk¹. In other instances, longer commuting distances may be more dangerous for medical professionals as they travel to and from work. In either scenario, longer travel distances are likely to have at least some impact on risk to patients and providers. Coupled with the distance issue is an aging population and an aging health care workforce. This is expected to increase demand for health care services while the supply of health professionals to provide the services fails to keep pace. The demand for health care workers for elderly Americans is expected to be especially acute (Katz & Frank, 2010; Mezy, et al., 2010; American Society for Public Administration, 2008).

This chapter compares and contrasts the demographics of selected health care professions and the commuting behavior of the people who work in those professions. Performing such an analysis serves two important functions: 1) it provides a description of health care professional employment characteristics and associated behaviors, and 2) it demonstrates Research & Planning's (R&P) ability to synthesize data from several sources to provide a robust description of worker behavior. The advantages of licensing data for analysis rest in the capacity to link them to other administrative databases on a longitudinal

basis suitable for modeling and prediction. The information in this chapter is presented in terms of *persons working*.

Data and Methodology

Licensing data were provided to R&P by Wyoming professional licensing boards. A complete listing of all data sets used and their associated professions in this analysis can be found in Appendix A. The licensing data were current as of January 1, 2011. However, because the evaluation period was third quarter 2010 (2010Q3), and R&P had no prior data, the professionals were assumed to be licensed during 2010Q3 as well. These data were combined with the Wyoming wage records database (R&P, 2011), in addition to R&P's demographic data (2011), the Quarterly Census of Employment and Wages (QCEW; R&P, 2011), and the Workers' Compensation tax file (WC; R&P, 2011).

The licensing board agreements include annual data acquisition each May and the data sets will be accumulated. The licensed professions available for analysis are shown in Table 5a (see page 38).

The analysis was performed in two parts. Part I was the generation of basic statistical and demographic data for each licensed profession. Some descriptive statistics were generated for all licensees who worked in 2010Q3 (e.g., counts, distributions by age if date of birth data were available), but the

¹See Figure 2-3 on page 14 for details on Wyoming's geography. Illustrative tables of Wyoming commuting patterns are contained in Appendix B at <http://doe.state.wy.us/LMI/>.

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Table 5a: Wyoming Licensed Professions Analyzed

Licensing Board and Occupation: Files Obtained	Licensed in Wyoming	Working in Wyoming During 2010Q3		
	N	N	Row %	Column %
Professional Teaching Standards Board				
Special Education Teachers	61	49	80.3%	0.3%
State Board of Podiatry				
Podiatrists	74	12	16.2%	0.1%
State Board of Chiropractic Examiners				
Chiropractors	200	69	34.5%	0.4%
State Board of Dental Examiners				
Dentists	479	182	38.0%	1.1%
Dental Hygienists	465	328	70.5%	2.0%
State Board of Embalming				
Embalmers	123	66	53.7%	0.4%
State Board of Optometry				
Optometrists	154	71	46.1%	0.4%
State Board of Pharmacy				
Pharmacists	1,108	470	42.4%	2.8%
Pharmacy Technicians	589	492	83.5%	2.9%
State Board of Physical Therapy				
Physical Therapists	497	312	62.8%	1.9%
Physical Therapy Assistants	372	113	30.4%	0.7%
State Board of Psychology				
Psychologists	217	100	46.1%	0.6%
State Board of Speech Pathology and Audiology				
Speech Pathologists	257	198	77.0%	1.2%
Audiologists	46	25	54.3%	0.1%
Wyoming Board of Hearing Aid Specialists				
Hearing Aid Specialists	43	12	27.9%	0.1%
Wyoming Board of Radiologic Technologists				
Radiologic Technologists	2,052	757	36.9%	4.5%
Wyoming State Board for Respiratory Care				
Respiratory Therapists	326	250	76.7%	1.5%
Wyoming State Board of Nursing				
Licensed Practical Nurses	1,592	795	49.9%	4.7%
Registered Nurses	11,075	4,921	44.4%	29.4%
Certified Nursing Assistants	8,167	5,127	62.8%	30.6%
State Board of Medicine				
Physicians	2,673	794	29.7%	4.7%
Physician Assistants	223	103	46.2%	0.6%
State Board of Mental Health				
Certified Addictions Practitioner Assistants	20	14	70.0	0.1%
Certified Addictions Professionals	59	40	67.8	0.2%
Certified Mental Health Workers	18	17	94.4	0.1%
Certified Social Workers	85	68	81.2	0.4%
Licensed Addictions Therapists	132	74	56.1	0.4%
Licensed Clinical Social Workers	483	288	59.6	1.7%
Licensed Marriage & Family Therapists	92	51	55.4	0.3%
Licensed Professional Counselors	743	487	65.5	2.9%
Provisional Addictions Therapists	ND	ND	36.4	--

Table continued on page 39

(Text continued from page 37)

bulk of the information focused on wages, turnover, and commuting distances. The commuting patterns methodology was updated by Leonard (2007). Several examples of commuting pattern output and how it is used can be found at <http://doe.state.wy.us/LMI/commute.htm>. This chapter focuses on selected professions; output tables for all the analyzed data are contained in Appendix B at <http://doe.state.wy.us/LMI>. If people were licensed in more than one profession, they would be counted in all professions in which they held licenses. This applies to both Part I and Part II of the analysis.

Note that there are a number of pharmacists in the balance of state (see page 64 in Appendix B). These are pharmacists who work for a large employer with multiple Unemployment Insurance (UI) accounts. R&P will resolve this data issue by linking these workers back to the commuter data.

Part II of the analysis also focused exclusively on those licensed professionals

working in Wyoming during the same time period (2009Q2-2010Q3). From this group of workers, R&P analyzed wage and commuting behavior for those professionals who worked in Wyoming, not only in 2010Q3 but also in all four preceding quarters (2009Q3-2010Q2). This was done so more valid comparisons could be drawn regarding worker wages and commuting behavior.

Table 5b (see page 40) shows the number and proportions of licensed professionals working at different times in Wyoming compared to the total number of registered professionals in the state. The first set of columns shows the ratios of licensed professionals who did not work at any time from second quarter 2009 (2009Q2) through third quarter 2010 (2010Q3). The combined rate for all professions in this column (see Total) was 56.8%. Conversely, the proportion of professionals working in Wyoming during all those quarters was 43.2%. Those most likely to be working during the entire

(Text continued on page 41)

Table continued from page 38

Table 5a: Wyoming Licensed Professions Analyzed

Licensing Board and Occupation: Files Obtained	Licensed in Wyoming	Working in Wyoming During 2010Q3		
	N	N	Row %	Column %
Provisional Clinical Social Workers	103	66	64.1	0.4%
Provisional Marriage & Family Therapists	15	8	53.3	0.0%
Provisional Professional Counselors	158	83	52.5	0.5%
Occupational Therapists	302	225	75.0%	1.3%
Occupational Therapy Assistants	92	70	76.1%	0.4%
Wyoming Board of Nursing Home Administrators				
Administrators, Nursing Home	64	N/A	--	--
Total	33,159	16,742	50.1%	100.0%

Source: State licensing boards.

N/A: Not available.

--: Cannot be calculated.

ND: Not discloseable.

Table 5b: Wyoming Licensed Professions by Work Status

Licensing Board and Occupation	Worked in Wyoming 2009Q2-2010Q2 AND 2010Q3				Worked in Wyoming 2010Q3		Worked in Wyoming Any Quarter 2009Q2-2010Q3		Total	
	No N	Row %	Yes N	Row %	Yes N	Row %	Yes N	Row %	N	Row %
Board of Occupational Therapy										
Occupational Therapists	104	34.4	198	65.6	225	74.5	233	77.2	302	100.0
Occupational Therapy Assistants	30	32.6	62	67.4	70	76.1	80	87.0	92	100.0
Professional Standards Teaching Board										
Special Education Teachers	20	32.8	41	67.2	49	80.3	51	83.6	61	100.0
State Board of Podiatry										
Podiatrists	18	62.1	11	37.9	12	41.4	13	44.8	29	100.0
State Board of Chiropractic Examiners										
Chiropractors	147	73.5	53	26.5	69	34.5	81	40.5	200	100.0
State Board of Dental Examiners										
Dental Hygienists	171	36.8	294	63.2	328	70.5	355	76.3	465	100.0
Dentists	317	66.2	162	33.8	182	38.0	202	42.2	479	100.0
State Board of Embalming										
Embalmers	67	54.5	56	45.5	66	53.7	73	59.3	123	100.0
State Board of Optometry										
Optometrists	87	56.5	67	43.5	71	46.1	77	50.0	154	100.0
State Board of Pharmacy										
Pharmacists	691	62.4	416	37.6	470	42.5	505	45.6	1,107	100.0
Pharmacy Interns	177	79.0	47	21.0	75	33.5	94	42.0	224	100.0
Pharmacy Technicians	136	23.1	453	76.9	492	83.5	519	88.1	589	100.0
Pharmacy Technicians In Training	108	23.8	345	76.2	368	81.2	394	87.0	453	100.0
State Board of Physical Therapy										
Physical Therapists	235	47.3	262	52.7	312	62.8	342	68.8	497	100.0
Physical Therapy Assistants	274	73.7	98	26.3	113	30.4	122	32.8	372	100.0
State Board of Psychology										
Psychologists	127	58.8	89	41.2	100	46.3	110	50.9	216	100.0
State Board of Speech Pathology and Audiology										
Speech Pathologists	87	33.9	170	66.1	198	77.0	211	82.1	257	100.0
Audiologists	24	52.2	22	47.8	25	54.3	26	56.5	46	100.0
State Board of Medicine										
Physician Assistants	135	60.5	88	39.5	103	46.2	112	50.2	223	100.0
Physicians	1,986	74.3	687	25.7	794	29.7	856	32.0	2,673	100.0
State Board of Mental Health										
Certified Addictions Practitioner Assistants	8	40.0	12	60.0	14	70.0	18	90.0	20	100.0
Certified Addictions Professionals	23	39.0	36	61.0	40	67.8	44	74.6	59	100.0
Certified Mental Health Workers	ND	ND	ND	ND	ND	ND	ND	ND	18	100.0
Certified Social Workers	27	31.8	58	68.2	69	81.2	75	88.2	85	100.0
Licensed Addictions Therapists	65	49.2	67	50.8	74	56.1	79	59.8	132	100.0
Licensed Clinical Social Workers	213	44.1	270	55.9	288	59.6	311	64.4	483	100.0
Licensed Marriage & Family Therapists	50	54.3	42	45.7	51	55.4	55	59.8	92	100.0
Licensed Professional Counselors	304	40.9	439	59.1	487	65.5	529	71.2	743	100.0
Provisional Addictions Therapists	ND	ND	ND	ND	ND	ND	ND	ND	11	100.0
Provisional Clinical Social Workers	56	54.4	47	45.6	66	64.1	72	69.9	103	100.0
Provisional Marriage & Family Therapists	ND	ND	ND	ND	ND	ND	ND	ND	15	100.0
Provisional Professional Counselors	111	70.3	47	29.7	83	52.5	102	64.6	158	100.0

Table continued on page 41

(Text continued from page 39)

period included certified social workers (68.2%), pharmacy technicians (76.9%), and pharmacy technicians in training (76.2%). Those least likely to be working during the entire period included provisional marriage & family therapists (6.7%), provisional addictions therapists (9.1%), and pharmacy interns (21.0%).

The next two column sets show the likelihood of licensed professionals to be working in Wyoming in only one quarter (2010Q3) or in any quarter from 2009Q2 to 2010Q3. As the time criterion is relaxed, the percentages of professionals working in the state generally increases. For example, only 25.7% of physicians registered in Wyoming worked in Wyoming every quarter from 2009Q2 to 2010Q3. When only looking at those who worked in 2010Q3, this percentage

increases to 29.7% (794). The percentage increases further to 32.0% (856) when studying physicians who worked at any time between 2009Q2 and 2010Q3. Similar results are shown for the other professions. The increasing proportions indicate a considerable number of licensed health professionals work for short periods of time in the state. Circumstances drawing them to Wyoming could be short-term contracts, consulting, or specialized procedures requiring expert knowledge. The issue of unused licenses requires more studies, and will be an area of future research for R&P.

Additional comparisons were generated regarding differences in commuting behavior for the same types of professionals in different regions of the state. In both sections, the commuting distances calculated were based on the location of the professionals' primary employers. A primary

Table continued from page 40

Table 5b: Wyoming Licensed Professions by Work Status

Licensing Board and Occupation	Worked in Wyoming 2009Q2-2010Q2 AND 2010Q3				Worked in Wyoming 2010Q3		Worked in Wyoming Any Quarter 2009Q2-2010Q3		Total	
	No		Yes		Yes		Yes		Total	
	N	Row %	N	Row %	N	Row %	N	Row %	N	Row %
Wyoming Board of Hearing Aid Specialists										
Hearing Aid Specialists	33	76.7	10	23.3	12	27.9	13	30.2	43	100.0
Wyoming Board of Radiologic Technologists										
Radiologic Technologists ^a	1,397	68.1	655	31.9	757	36.9	814	39.7	2,052	100.0
Wyoming State Board of Respiratory Care										
Respiratory Therapists	106	32.5	220	67.5	250	76.7	262	80.4	326	100.0
Wyoming State Board of Nursing										
Advance Practice Nurses	378	67.4	183	32.6	227	40.5	261	46.5	561	100.0
Certified Nursing Assistants	4,106	50.3	4,061	49.7	5,127	62.8	5,770	70.7	8,167	100.0
Licensed Practical Nurses	918	57.7	674	42.3	795	49.9	893	56.1	1,592	100.0
Registered Nurses	6,536	62.2	3,978	37.8	4,698	44.7	5,307	50.5	10,514	100.0
Total	19,298	57.2	14,438	42.8	17,189	51.0	19,092	56.6	33,736	100.0

Source: State licensing boards.

^aThe counts shown for this profession were based on all available records in the licensure file. The results for the remaining professions were based on only active licensees.

ND: Not discloseable.

employer is defined as the employer that paid the professional the most wages during a quarter. This also allows for more consistent measurement across professions.

registered nurses. These professions were chosen to represent a wide variety of occupations and generally had larger numbers of individuals available for analysis.

Results I: Demographics and Comparative Statistics

This portion of the results covers the basic demographic statistics for either all registered professionals or all professionals working in 2010Q3 shown in Tables 5-1 through 5-4. The difference between the two groups is that one group is all professionals contained in the licensure files, where as the second group is a subset that appeared in Wyoming’s wage records database (i.e. they were working). The professions displayed in the comparative tables were chiropractors, dental hygienists, dentists, physical therapists, radiation technologists, and

Table 5-1 shows the distribution by age in 2010Q3 for a subset of the available professions. Radiation technologists (7.4%) and dental hygienists (5.8%) had the greatest proportion of workers who were less than 25 years old. As a contrast, dentists (34.1%) and registered nurses (25.5%) had the greatest proportions of workers over 55. Where distributions by gender are concerned (see Table 5-2, page 43), registered nurses (93.7%) had the greatest proportion of females, followed by dental hygienists (77.4%) and radiation technologists (76.1%). Dentists (84.6%) was the most male-dominated of the selected professions in 2010Q3.

In Table 5-3 (see page 43), wages,

Table 5-1: Distribution of Licensed Professionals Working in Wyoming by Age, 2010Q3

Age	Chiropractors	Dental Hygienists	Dentists	Physical Therapists	Radiation Technologists	Registered Nurses	All Other	Total
<25	ND	19	0	ND	56	195	1,454	1,726
Col%	ND	5.8%	0.0%	ND	7.4%	4.0%	21.5%	12.9%
25 - 34	16	95	34	86	205	1,068	1,763	3,267
Col%	23.2%	29.0%	18.7%	27.6%	27.1%	21.7%	26.0%	24.5%
35 - 44	24	75	52	118	172	1,061	1,272	2,774
Col%	34.8%	22.9%	28.6%	37.8%	22.7%	21.6%	18.8%	20.8%
45 - 54	16	86	34	55	191	1,336	1,277	2,995
Col%	23.2%	26.2%	18.7%	17.6%	25.2%	27.1%	18.9%	22.5%
55 - 64	11	44	46	46	114	1,084	832	2,177
Col%	15.9%	13.4%	25.3%	14.7%	15.1%	22.0%	12.3%	16.3%
65+	ND	ND	16	ND	ND	174	162	377
Col%	ND	ND	8.8%	ND	ND	3.5%	2.4%	2.8%
N/A	ND	ND	0	ND	ND	3	9	22
Col%	ND	ND	0.0%	ND	ND	0.1%	0.1%	0.2%
Total	69	328	182	312	757	4,921	6,769	13,338

Source: State licensing boards.

ND: Not discloseable.

N/A=Not available.

commuting distance, average age, and turnover rates are compared for several professions. Turnover rates are made up of two components: continuous workers and turnover workers. Continuous workers are defined as those who worked for the same employer during the base quarter (2010Q3) in addition to working for that same employer in the prior quarter (2010Q2) and the following quarter (2010Q4). Any worker not classified as continuous is classified as turnover. The turnover rate is calculated by the following formula: Turnover Rate = (Turnover Workers)/(Continuous Workers + Turnover Workers). The highest turnover rate in 2010Q3 was found among registered nurses (12.1%), followed by dentists (11.5%),

and radiation technologists (11.4%). The greatest average quarterly wages were found among dentists (\$35,765), physical therapists (\$16,253), and registered nurses (\$14,264). The median (50th percentile or middle) wage followed the same pattern as the mean wages, although the amounts were different. The median wage for dentists was \$29,512, followed by physical therapists (\$16,917), and registered nurses (\$14,179). The average age in all the selected professions exceeded 40 years of age. On average, dentists were the oldest (47.9 years) followed by registered nurses (45.1 years) and chiropractors (43.6 years). Chiropractors had the shortest average estimated commute to work (6.3 miles), while physical therapists (17.5 miles)

Table 5-2: Distribution of Licensed Professionals Working in Wyoming by Gender, 2010Q3

Sex	Chiropractors	Dental Hygienists	Dentists	Physical Therapists	Radiation Technologists	Registered Nurses	All Other	Total
Female	ND	106	ND	190	576	4,613	6,029	11,544
Col%	ND	77.4%	ND	60.9%	76.1%	93.7%	89.1%	86.5%
Male	ND	ND	154	101	165	308	694	1,481
Col%	ND	ND	84.6%	32.4%	21.8%	6.3%	10.3%	11.1%
Unknown	ND	ND	ND	21	16	0	46	122
Col%	ND	ND	ND	6.7%	2.1%	0.0%	0.7%	0.9%
Total	69	137	182	312	757	4,921	6,769	13,338

Source: State licensing boards.
 ND: Not discloseable.

Table 5-3: Comparative Statistics for Selected Licensed Professionals Working in Wyoming, 2010Q3

Sex	Chiropractors	Dental Hygienists	Dentists	Physical Therapists	Radiation Technologists	Registered Nurses	All Other	Total
Turnover Rate	8.7%	8.5%	11.5%	9.0%	11.4%	12.1%	22.3%	17.1%
Mean Wages 2010Q3	\$12,783	\$11,043	\$35,765	\$16,253	\$12,615	\$14,264	\$7,029	\$10,752
Median Wages 2010Q3	\$10,795	\$11,264	\$29,512	\$16,917	\$12,636	\$14,179	\$6,315	\$9,242
Average Commuting Distance (Miles)	6.3	14.9	10.5	17.5	14.3	15.1	14.2	14.4
Average Age	43.6	41.4	47.9	42.1	42.1	45.1	38.3	41.4

Sources:
 State licensing boards.
 Wyoming wage records database.
 Commuting patterns database.

and registered nurses (15.1 miles) had the longest average commutes.

One of the greatest challenges in using administrative data for research purposes is aligning data collection efforts from program operation with detailed data analysis². A case in point is the quarterly collection of work hours reported to the unemployment insurance (UI) and workers' compensation (WC) systems (R&P, 2011). Since reporting hours worked is not required by statute, the quality of these data can and does vary from business to business and from time period to time period. Table 5-4 (see page 45) illustrates the difficulty in the use of administrative data for research purposes. The results shown for each profession are based on an estimate of full-time equivalent (FTE) hours. In this case, when a person works 520 hours in a calendar quarter, this results in a calculation of one FTE (40 hours/week * 13 weeks). For the selected professions in 2010Q3, the number of workers for whom no wage data were reported (e.g. blank values) varied from a low of 24.4% (physical therapists) to a high of 59.3% (dentists). In two professions, we observed relatively high proportions of people working at least 1.25 FTE in 2010Q3 (at least 50 hours/week). Twelve percent of radiation technologists and 10.9% of registered nurses had reported hours at or above this level. Longer hours worked in these two professions could lead to more fatigue and possibly increased errors during service delivery (Dorrian, et al., 2006). However, the results may change should employers be required to provide this information. We plan a significant effort to obtain higher quality

data from employers in the future.

Results II: Detailed Analysis

In this section the focus shifts slightly from all the people who worked in the selected professions in 2010Q3 to the subset of those who worked in those professions in 2010Q3 and in all four prior quarters (2009Q3-2010Q2). This allows for a more direct comparison of wages earned and commuting distances travelled. Table 5-5 (see Page 46) shows the professionals contained in our administrative files subdivided by whether they met the work span criterion previously defined. Several important reasons why not all professionals appear in wage records include: 1) professionals have current licenses in Wyoming but do not actively practice here, 2) the professionals are self-employed or work in businesses not required to be a part of the unemployment insurance (UI) system, 3) they died following licensure, 4) they entered the military following licensure, or 5) they retired following licensure. If these licensed professionals had no Wyoming address or if a geocode could not be assigned to the address provided, they were not included in the calculations of mean, median, and mode distance.

Although all licensed professionals are discussed in this article, the focus is on those in the "Yes" column in Table 5-5 for the remainder of the analysis. For the 17 professions analyzed (see Appendix A at <http://doe.state.wy.us/LMI>), 42.8% of those licensed worked in the five-quarter span defined earlier. The proportion of professionals meeting this criterion ranged from a low of 14.9% (podiatrists) to a high of 67.5% (respiratory therapists).

² The pending acquisition of the New Hires Directory may alleviate this problem to some degree.

Table 5-6 (see page 46) illustrates how commuting distances change over time for health care professionals. Changes in commuting distance can occur from a change in residence, a change in primary employer location, or both. The purpose of this table is to determine if health care workers are on average living closer to their primary employers. For the analyzed professions in Table 5-6, the average commuting distance declined 0.6 miles (from 13.8 miles to 13.2 miles) between 2009Q3-2010Q2 and 2010Q3. Hearing aid specialists had the longest average commute in both periods (33.3 miles and 33.2 miles respectively). Chiropractors had the shortest commute in the early period (4.4 miles) and optometrists had the shortest average

commute in the later period (3.4 miles). The average estimated commuting distance did not decline for all professions. Average distances increased for chiropractors (0.1 miles), dentists (0.5 miles), podiatrists (0.5 miles), and speech pathologists (0.8 miles).

Another way to study changes in commuting is to use median (middle) rather than mean (average) values. The location of the median value relative to the mean tells us if the distribution of distances is skewed (e.g., a number of extreme high or low values). Table 5-6 shows that for several professions, there are at least some relatively long commuting distances which skew the mean values. For example, registered nurses had a mean commuting value of 13.9

Table 5-4: Distribution of Licensed Professionals Working in Wyoming by Reported Full-Time Equivalent Hours, 2010Q3

Reported Full-Time Equivalent Hours Worked in 2010Q3	Chiropractors	Dental Hygienists	Dentists	Physical Therapists	Radiation Technologists	Registered Nurses	All Other	Total
No Hours Reported	33	117	108	76	218	1,385	1,992	3,929
Col%	47.8%	35.7%	59.3%	24.4%	28.8%	28.1%	29.4%	29.5%
<0.25	4	44	7	28	41	384	686	1,194
Col%	5.8%	13.4%	3.8%	9.0%	5.4%	7.8%	10.1%	9.0%
0.25 - 0.50	2	32	3	17	39	318	648	1,059
Col%	2.9%	9.8%	1.6%	5.4%	5.2%	6.5%	9.6%	7.9%
0.50 - 0.75	0	54	8	30	42	388	706	1,228
Col%	0.0%	16.5%	4.4%	9.6%	5.5%	7.9%	10.4%	9.2%
0.75 - 1.00	9	59	20	70	156	976	1,311	2,601
Col%	13.0%	18.0%	11.0%	22.4%	20.6%	19.8%	19.4%	19.5%
1.00 - 1.25	21	14	33	78	170	934	1,026	2,276
Col%	30.4%	4.3%	18.1%	25.0%	22.5%	19.0%	15.2%	17.1%
1.25 - 1.50	0	5	0	5	29	250	184	473
Col%	0.0%	1.5%	0.0%	1.6%	3.8%	5.1%	2.7%	3.5%
1.50 - 2.00	0	3	1	8	55	255	200	522
Col%	0.0%	0.9%	0.5%	2.6%	7.3%	5.2%	3.0%	3.9%
2.00+	0	0	2	0	7	31	16	56
Col%	0.0%	0.0%	1.1%	0.0%	0.9%	0.6%	0.2%	0.4%
Total	69	328	182	312	757	4,921	6,769	13,338

Sources:
 State licensing boards.
 Workers' Compensation wage data.

miles and a median value of 2.8 miles in 2010Q3. This means that half of the commuting distances were less than 2.8 miles, indicating at least some registered nurses commute very long distances. All the professions analyzed with the exception of optometrists (2.2 miles median, 3.4 miles mean) evidence the same type of distribution.

This portion of the analysis focuses on more detailed aspects of commuting behavior for health care professionals. First, commuting distances were analyzed for all professions combined by region of the state (see Figure 3-1, page 26 for regional breakouts). Figure 5-1 and Table 5-7 (see page 47) show that professionals living in the Central Southeast region exhibited the longest average commuting distance (17.7 miles), while those living in the Cheyenne Metropolitan Statistical Area (MSA)³ commuted the shortest average distance

³ In the case of the Cheyenne and Casper, MSAs refer to the populations of Laramie County and Natrona County, WY. For a definition of MSAs and a list of MSAs in the United States, see <http://www.census.gov/population/www/metroareas/metroarea.html>.

Table 5-5: Distribution of Licensed Professionals Working in Wyoming, 2010Q3 Worked 2009Q3-2010Q2 & 2010Q3

Profession	No		Yes		Total	
	N	Row%	N	Row%	N	Row%
Audiologists	24	52.2	22	47.8	46	100
Certified Nursing Assistants	4,109	50.3	4,058	49.7	8,167	100
Chiropractors	147	73.5	53	26.5	200	100
Dental Hygienists	171	36.8	294	63.2	465	100
Dentists	317	66.2	162	33.8	479	100
Embalmers	67	54.5	56	45.5	123	100
Hearing Aid Specialists	33	76.7	10	23.3	43	100
Licensed Practical Nurses	918	57.7	674	42.3	1,592	100
Optometrists	87	56.5	67	43.5	154	100
Physical Therapists	235	47.3	262	52.7	497	100
Physical Therapy Assistants	274	73.7	98	26.3	372	100
Podiatrists	63	85.1	11	14.9	74	100
Psychologists	128	59	89	41	217	100
Radiation Technologists	1,397	68.1	655	31.9	2,052	100
Registered Nurses	6,777	61.2	4,298	38.8	11,075	100
Respiratory Therapists	106	32.5	220	67.5	326	100
Speech Pathologists	87	33.9	170	66.1	257	100
Total	14,940	57.2	11,199	42.8	26,139	100

Sources:
State licensing boards.
Wyoming wage records database.

Table 5-6: Mean and Median Commuting Distance in Miles for Licensed Professionals Working in Wyoming, 2009Q3-2010Q3

Profession	N	Mean Distance		Median Distance	
		2009Q3 - 2010Q2	2010Q3	2009Q3 - 2010Q2	2010Q3
Audiologists	22	25.3	25.3	1.6	1.6
Certified Nursing Assistants	4,058	13.8	13.2	2.5	2.3
Chiropractors	53	4.4	4.5	1.6	1.6
Dental Hygienists	294	16.0	13.2	3.0	2.7
Dentists	162	9.7	10.2	1.9	2.0
Embalmers	56	6.0	5.6	1.1	1.1
Hearing Aid Specialists	10	33.3	33.2	4.4	4.4
Licensed Practical Nurses	674	12.4	11.9	2.5	2.4
Optometrists	67	5.8	3.4	2.2	2.2
Physical Therapists	262	13.5	11.6	2.4	2.4
Physical Therapy Assistants	98	18.7	15.7	2.8	2.6
Podiatrists	11	16.0	16.5	1.2	1.2
Psychologists	89	5.4	3.5	1.5	1.5
Radiation Technologists	655	14.2	13.5	3.1	3.0
Registered Nurses	4,298	14.3	13.9	2.9	2.8
Respiratory Therapists	220	12.6	10.4	2.7	2.6
Speech Pathologists	170	16.2	17.0	3.0	2.9
Total	11,199	13.8	13.2	2.7	2.5

Sources:
State licensing boards.
Wyoming wage records database.
Commuting patterns database.

(7.7 miles). The amount of commuting shown by these professionals is associated with the population densities in these areas. A comparison of population density

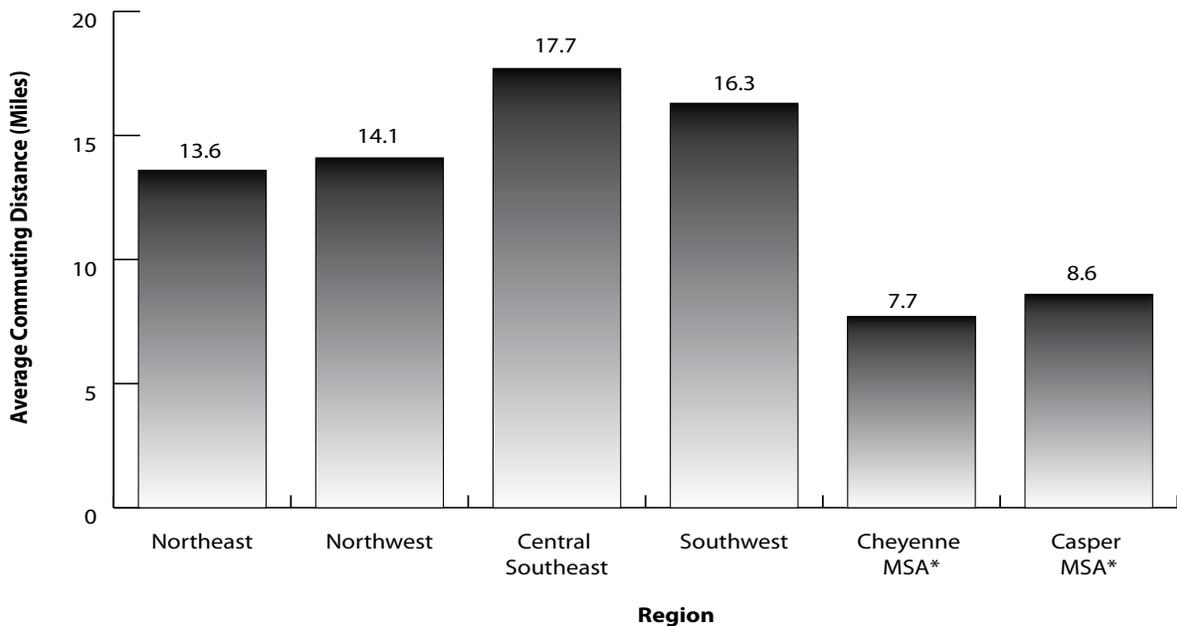
data from the 2010 Census (Census Bureau, 2011) and commuting distance is shown in Figure 5-2 (see page 48), which shows a curved relationship between commuting distance and the population density (persons per square mile) for health professionals working in the state. This is to be expected in urban areas where services and people are more concentrated. However, this presents a challenge for health care delivery in less urbanized areas. Where population densities are lower, response times may be longer for emergency services. In addition, if health care professionals incur more fatigue because of longer commuting times, treatment/procedural errors could increase. This phenomenon has been documented among nurses and physicians (Dorrian, et al., 2006; Czeisler, 2007). Although not focused on the effects of fatigue, Ecinosa & Hellinger (2008) found that the financial costs of some medical errors are quite high and can extend to well

Table 5-7: Population Density and Commuting Distance in Wyoming by Region, 2010Q3

Region	Population Density (persons per square mile)	Mean Commuting Distance
Northeast	6.4	13.6
Northwest	4.0	14.1
Central Southeast	2.8	17.7
Southwest	4.5	16.3
Casper MSA*	13.9	8.6
Cheyenne MSA*	34.2	7.7

* Metropolitan Statistical Area.

Sources:
 State licensing boards.
 U.S. Census Bureau.
 Commuting patterns database.



* Metropolitan Statistical Area.
 Sources:
 State licensing boards.
 Commuting patterns database.
 U.S. Census Bureau.

Figure 5-1: Average Commuting Distance for Licensed Health Professionals Working in Wyoming, 2010Q3

into the future beyond the treatment phase.

Thus far, the commuting behavior of health professionals has been described in terms of average values. However, the distribution of estimated commuting distances provides additional information as to why the average value results differed between regions. The statewide distribution of estimated commuting distances is shown in Figure 5-3. This figure shows that 69.1% of health professionals analyzed (living in Wyoming) had an estimated commuting distance of five

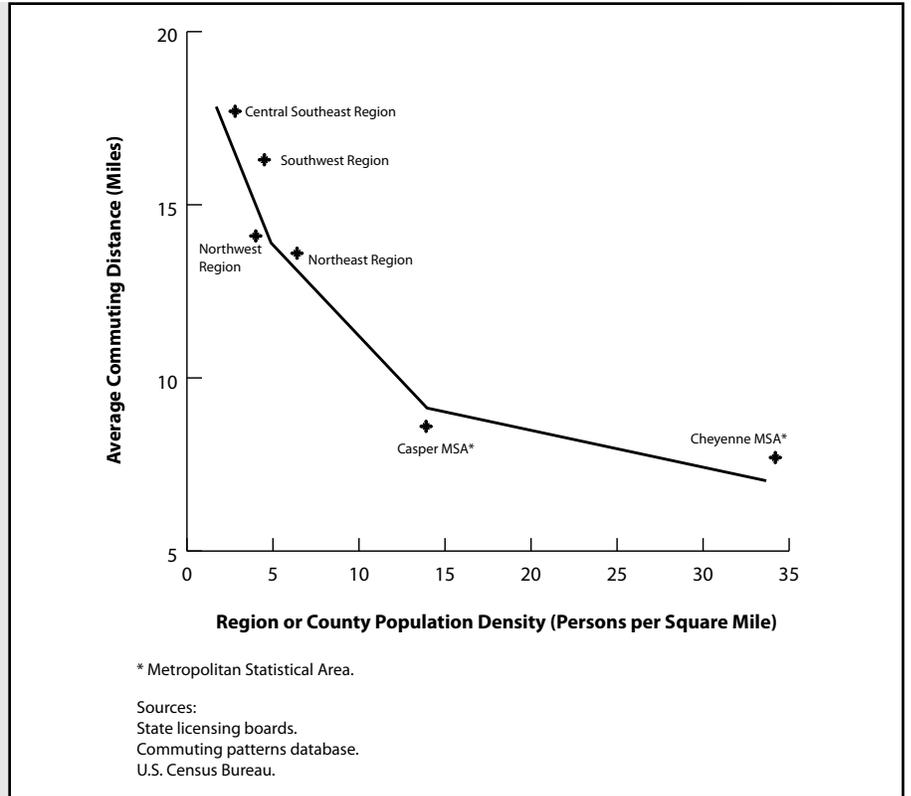


Figure 5-2: Population Density and Average Commuting Distance for Health Professionals in Wyoming, 2010Q3

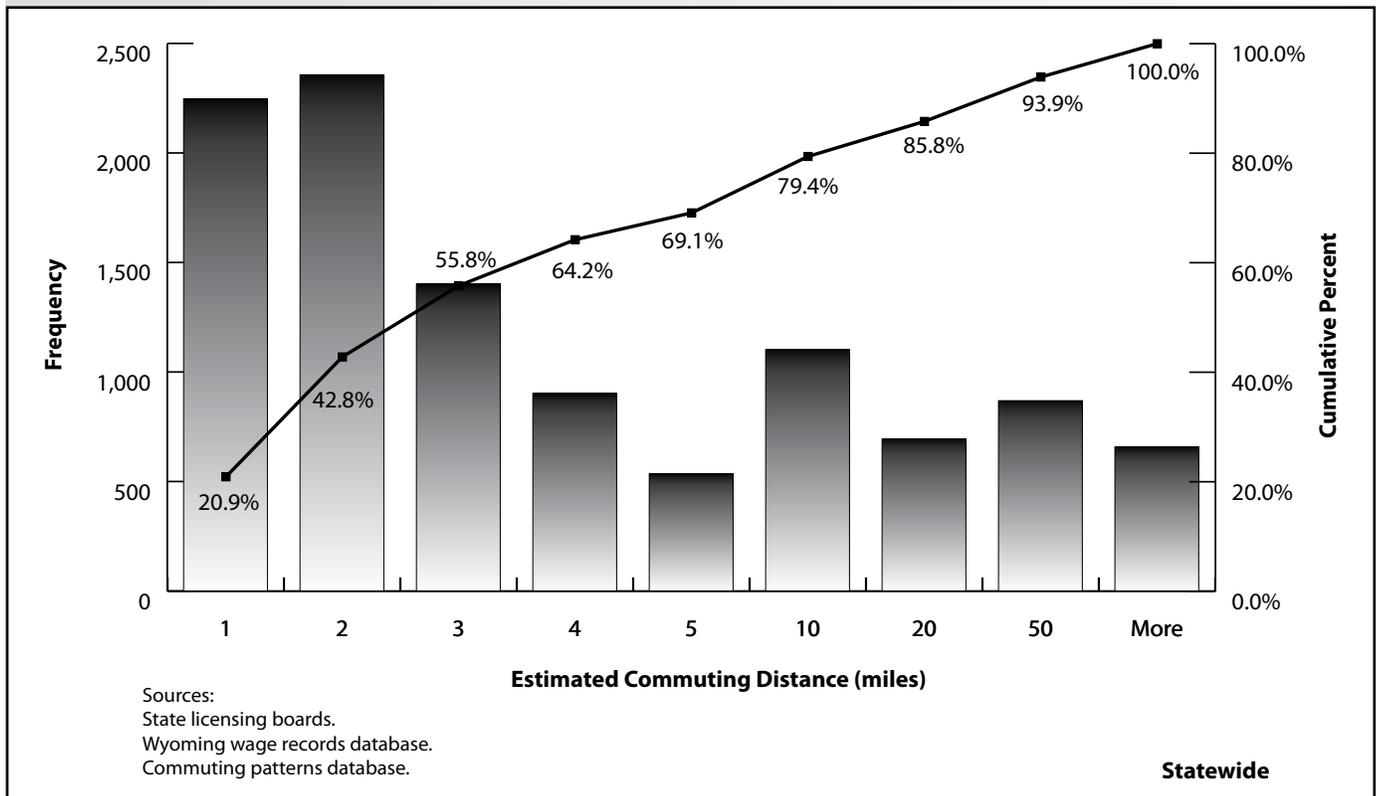


Figure 5-3: Commuting Distance for Licensed Health Professionals Living in Wyoming, 2010Q3

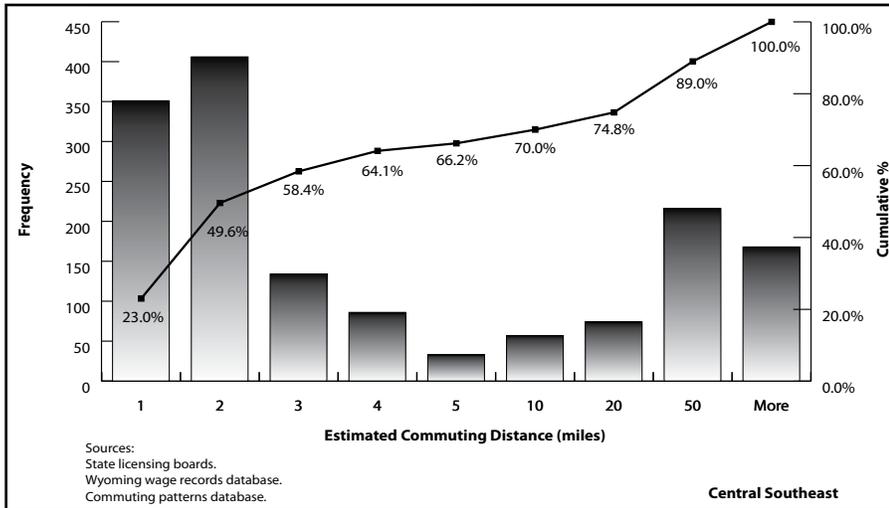


Figure 5-4: Commuting Distance for Licensed Health Professionals Living in Wyoming's Central Southeast Region, 2010Q3

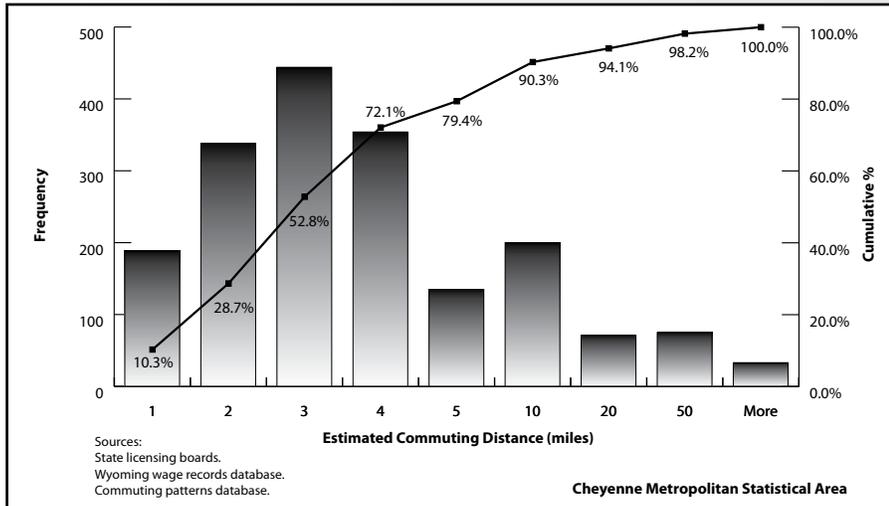


Figure 5-5: Commuting Distance for Licensed Health Professionals Living in Wyoming's Cheyenne Metropolitan Statistical Area, 2010Q3

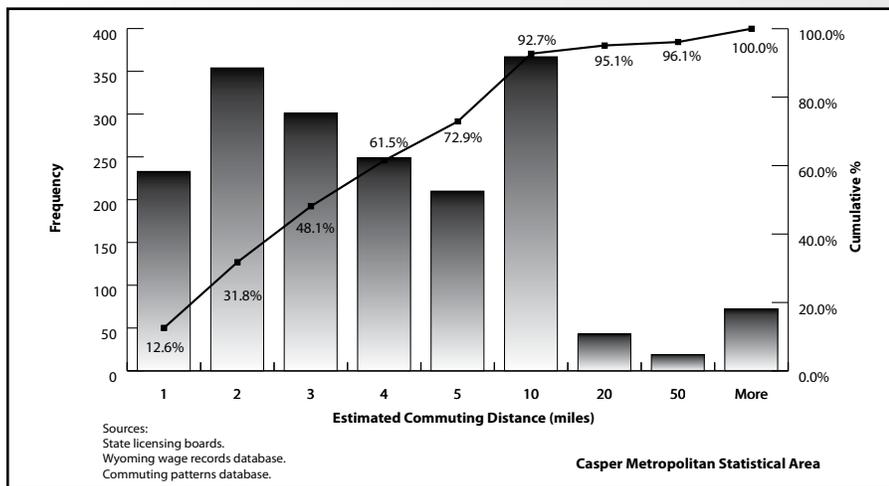


Figure 5-6: Commuting Distance for Licensed Health Professionals Living in Wyoming's Casper Metropolitan Statistical Area, 2010Q3

miles or less in 2010Q3. However, one in seven (14.2%) had commuting distances of 20 miles or greater in 2010Q3. The results for three of the regions are summarized below⁴:

Percentage commuting 5 miles or less:

- Central Southeast Region (Figure 5-4): 66.2%
- Cheyenne MSA (Figure 5-5): 79.4%
- Casper MSA (Figure 5-6): 72.9%

Percentage commuting 20 miles or more:

- Central Southeast Region (Figure 5-4): 25.2%
- Cheyenne MSA (Figure 5-5): 5.9%
- Casper MSA (Figure 5-6): 4.9%

The regional proportions of short (less than five miles) and long (more than 20 miles) commuting distances mirror what we observed in the average values. The most densely populated areas (Casper and Cheyenne) have much greater proportions of short commutes and much smaller proportions of long commutes than other areas in the state.

⁴ The remaining regions are shown in Appendix B.

Also, the reason for the Central Southeast region’s average commuting distances is found in the proportion of those traveling very long distances (more than 20 miles) to work. More than one in four health professionals in this region had an estimated commuting distance of more than 20 miles.

Commuting distances across all professions by region exhibit consistent behavior. The last level of commuting analysis involves comparing health professionals’ commuting distances across regions in the state. Regional estimated commuting distances for dentists are shown in Figure 5-7. In this case, dentists living in the northeast (13.9 miles) and southwest (13.1 miles) regions had the greatest commuting distances. Average distances for dentists living in the Cheyenne and Casper regions were the shortest at 3.1 miles and 2.8 miles,

respectively. Dental hygienists exhibit a different commuting pattern across regions than dentists (see Figure 5-8, page 51). Dental hygienists commuted the farthest if they lived in the northeast (26.5 miles). Although physical therapists commuted the farthest in the central southeast region (15.0 miles; see Figure 5-9, page 51), the shortest average distances were not found in the most densely populated areas (Casper and Cheyenne). For these professionals, the shortest average commuting distances were found in the northeast (7.3 miles) and northwest (9.9 miles) regions.

Regional commuting distances for radiation technologists (see Figure 5-10, page 52) exhibited a pattern more in line with population densities than did physical therapists. The shortest

(Text continued on page 52)

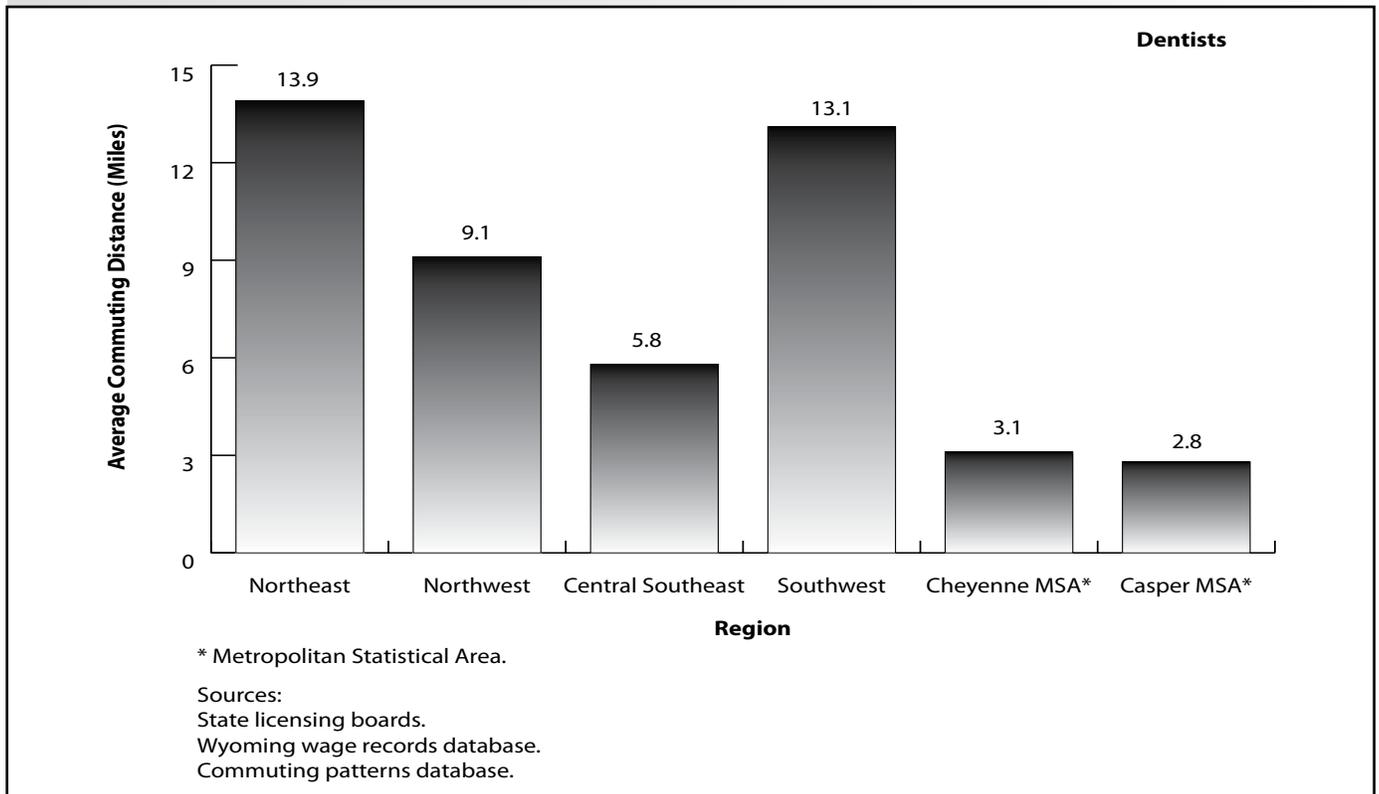


Figure 5-7: Average Commuting Distance for Dentists Living and Working in Wyoming, 2010Q3 (N=162)

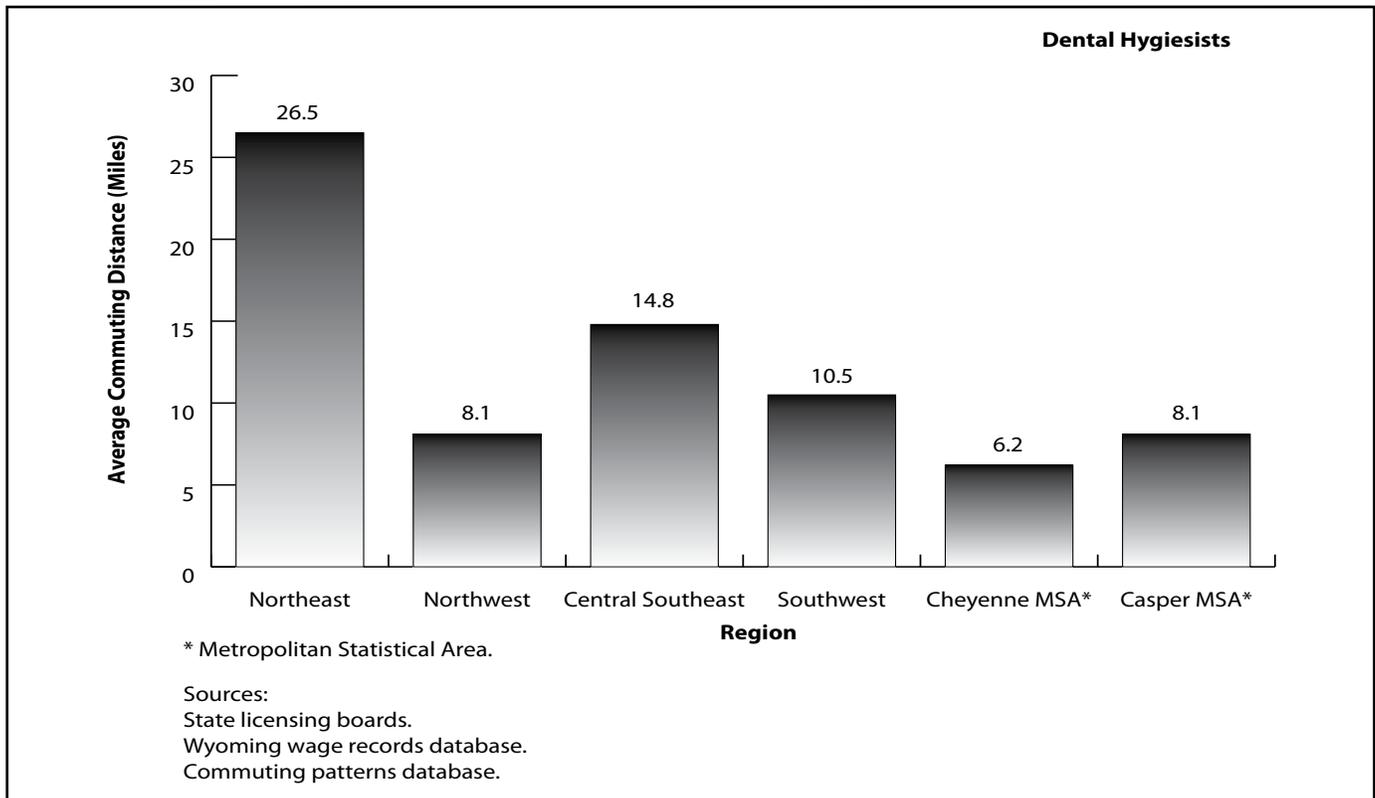


Figure 5-8: Average Commuting Distance for Dental Hygienists Living and Working in Wyoming, 2010Q3 (N=294)

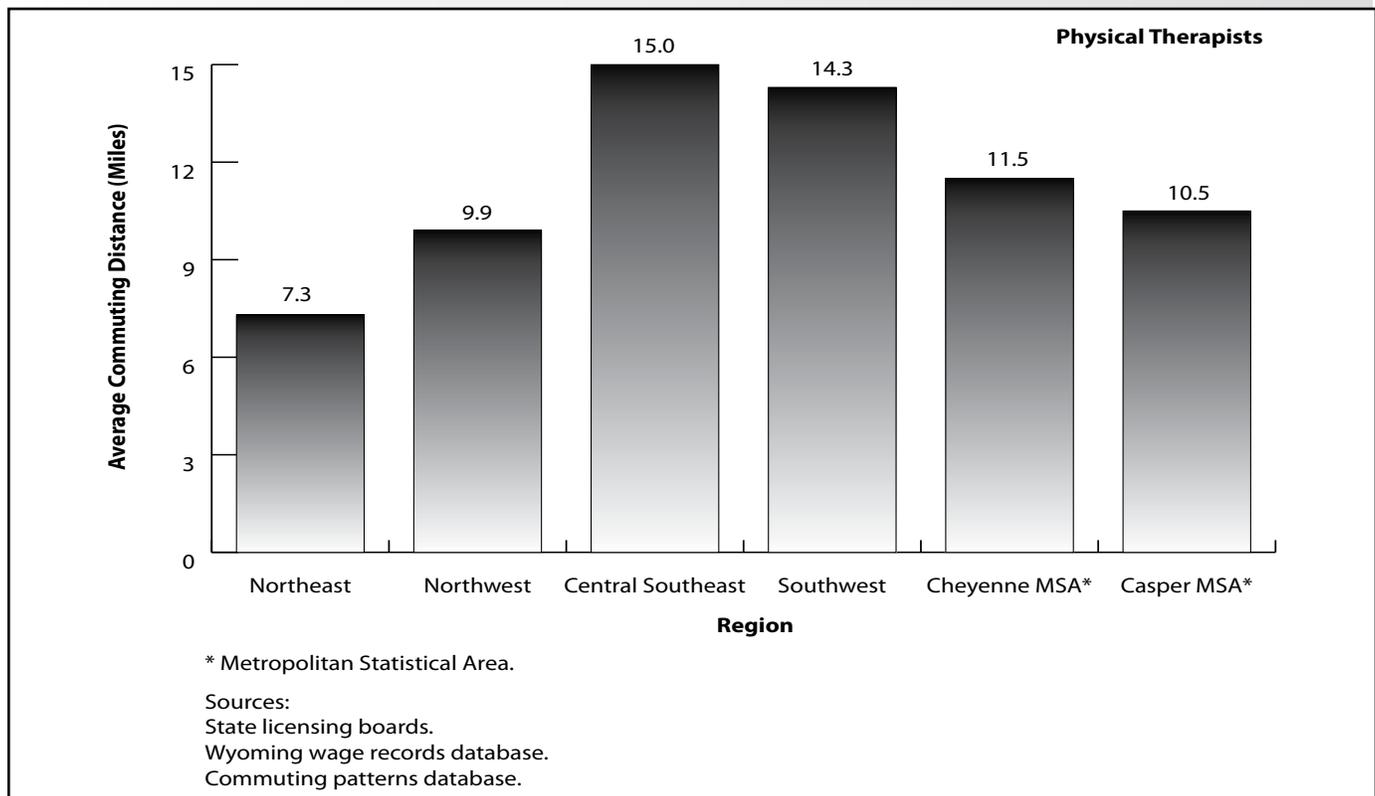


Figure 5-9: Average Commuting Distance for Physical Therapists Living and Working in Wyoming, 2010Q3 (N=262)

(Text continued from page 50)

commuting distances were found in the Casper (9.9 miles) and Cheyenne (10.7 miles) MSAs. The most telling differences in average distances can be found in Figure 5-11 (registered nurses; see page 53). In this example, the average commuting distances for those living in the MSAs (Casper and Cheyenne) were at least 5.9 miles less than in the next greatest region (northeast, 13.8 miles). The average distances in the Cheyenne and Casper MSAs were 7.9 and 7.2 miles, respectively. Population density, however, is not the only factor at play in commuting distance. At least some of the demand for medical services in the MSAs likely comes from the less densely populated areas of the state, which increases demand and further concentrates medical professionals in those areas.

Conclusion

The purpose of this research was to demonstrate R&P’s research capabilities in addition to providing a demographic, wage, and geographical baseline analysis of various health care professions in the state. Distinctive patterns in demographics and commuting behavior among different groups of health professionals emerged. Generally, health professionals concentrate in more urbanized areas. As expected, when population densities increase, commuting distances decrease. Such concentrations of professions allows for economies of scale and specialization in services. Commuting distance and distance from services centers may negatively impact service times and the ability of health care professionals to reach their places of work. Such topics

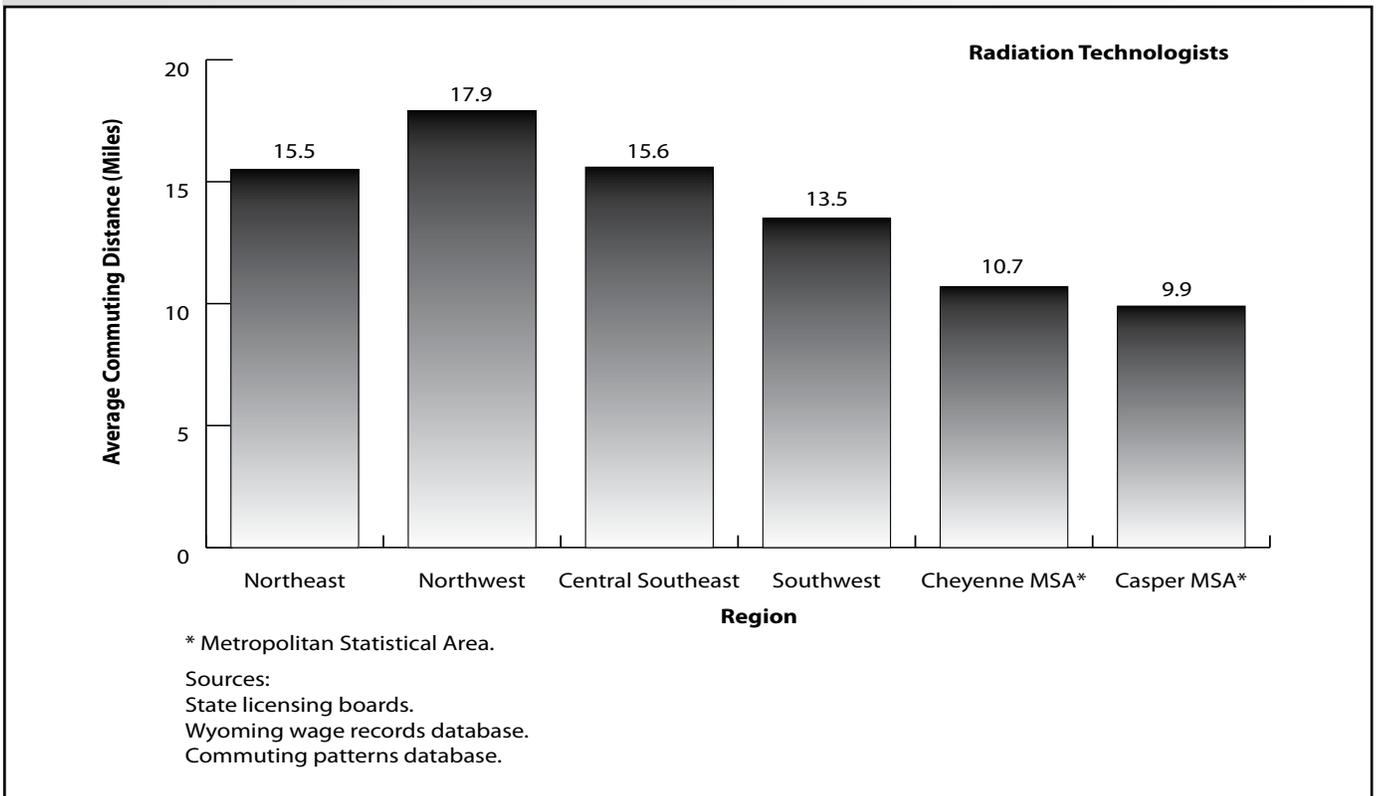


Figure 5-10: Average Commuting Distance for Radiation Technologists Living and Working in Wyoming, 2010Q3 (N=655)

could be subjects of future research.

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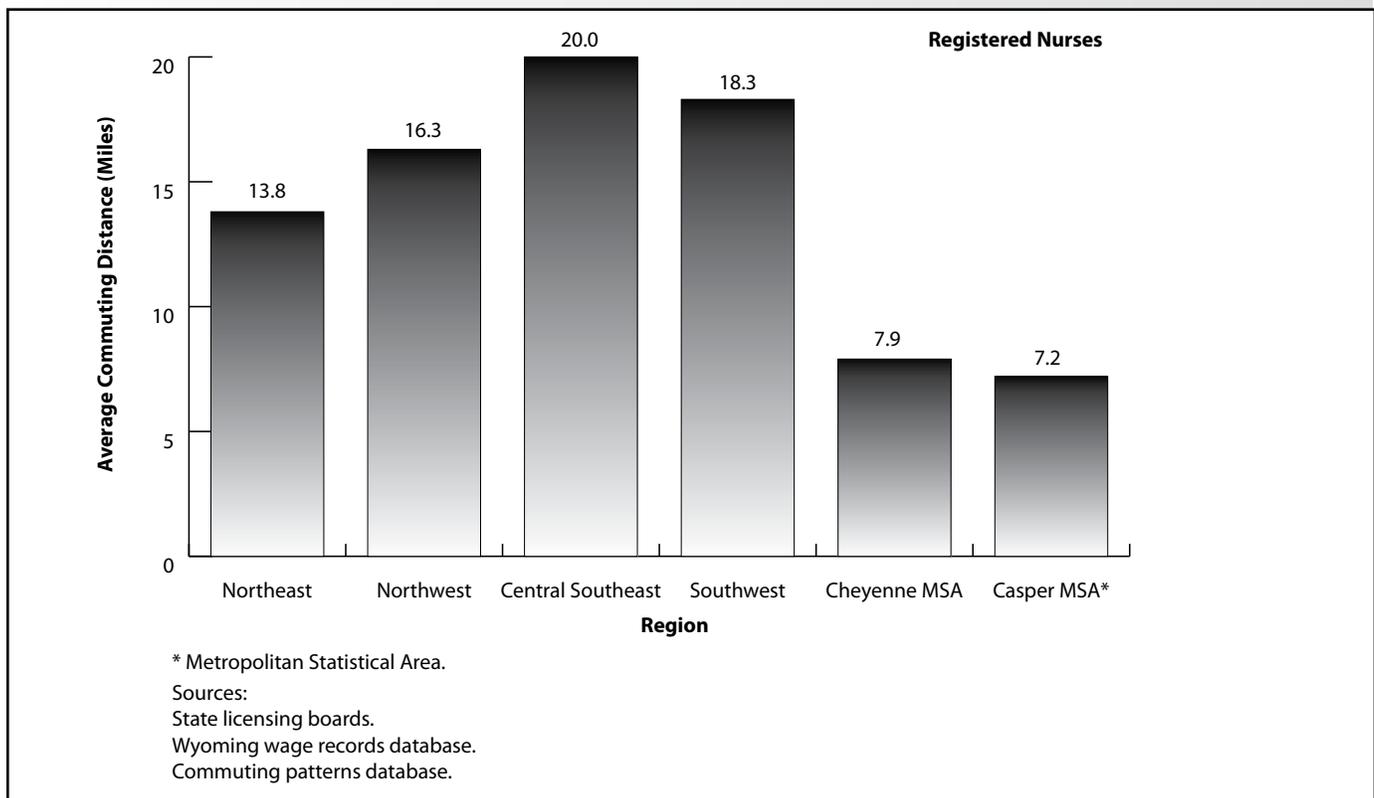


Figure 5-11: Average Commuting Distance for Registered Nurses Living and Working in Wyoming, 2010Q3

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