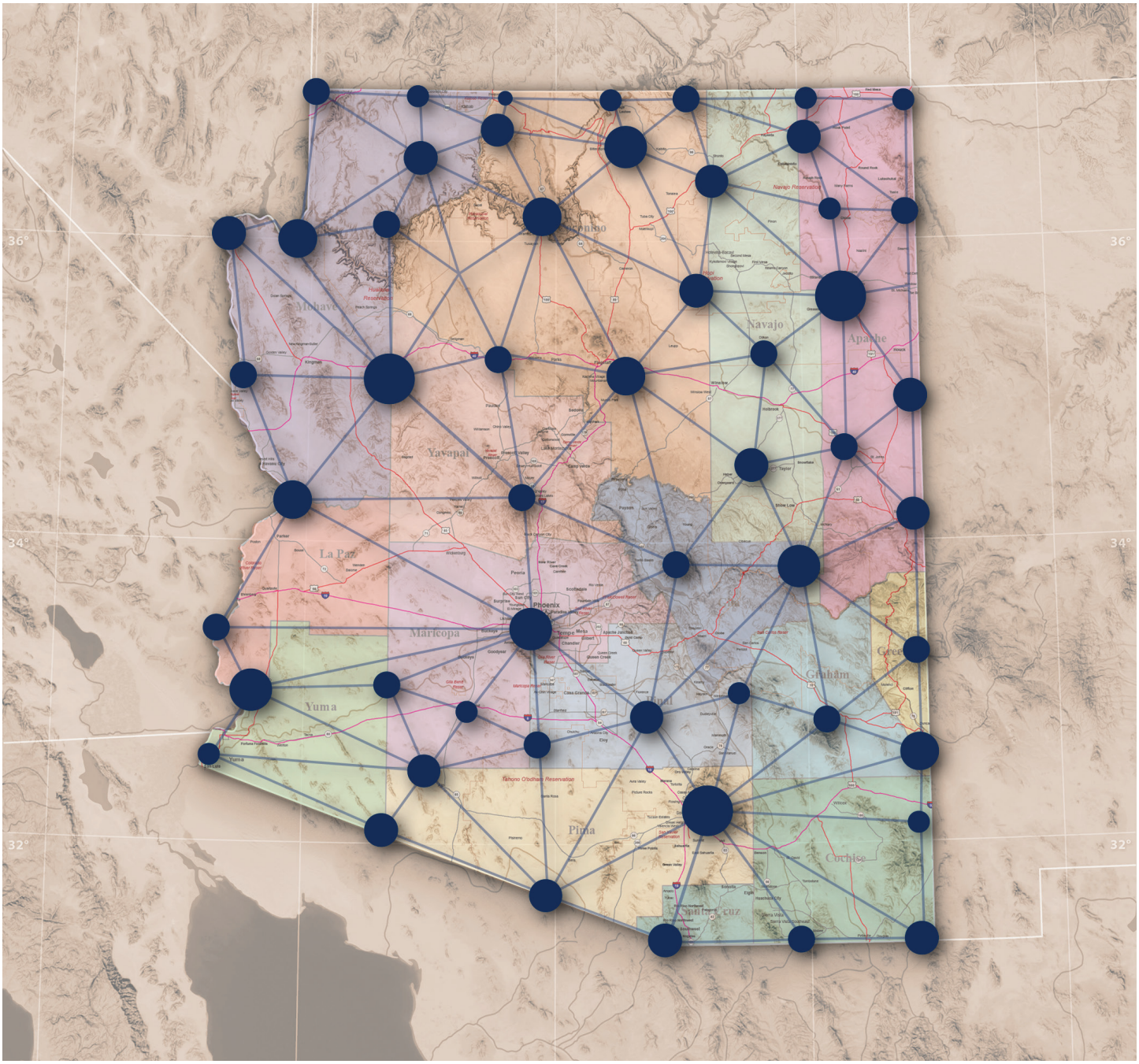
Arizona Primary Care Physician Workforce Report

OCTOBER 2019



THE UNIVERSITY OF ARIZONA
MEL & ENID ZUCKERMAN COLLEGE OF PUBLIC HEALTH
Center for Rural Health

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Executive Summary: Arizona Primary Care Physician (PCP) Workforce 2019

Overview

- The Association of American Medical Colleges estimates that Arizona ranks **31st of 50 states for total physicians with active licenses at 235.8 per 100,000 population** and **42nd for total active PCPs at 77.9 per 100,000 (U.S. is 91.7).**

Need

- The Health Resources and Services Administration (HRSA) estimates Arizona needs **558 PCPs to meet current need.**
- The Robert Graham Center estimates Arizona will need **1,941 PCPs by 2030.**
- Since 2013, **423,000 Arizonans gained health insurance coverage.**

558

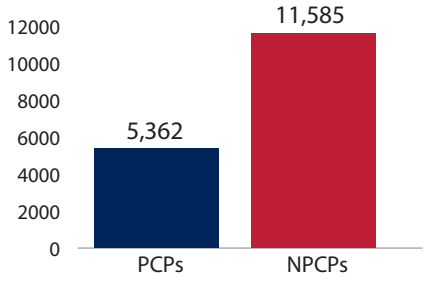
1,941

Primary Care Physicians needed now and by 2030

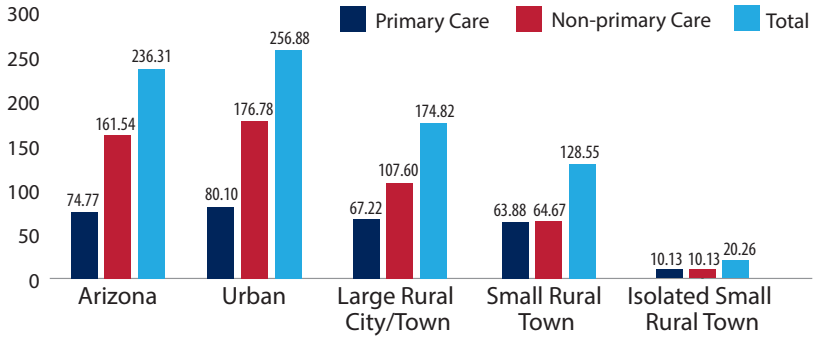
Distribution

- Arizona meets **40% of its PCP need**.
- There are just over **two times** the number of specialist physicians (11,585) compared to primary care physicians (5,362) with active licenses in Arizona.
- The ratio of PCPs in Arizona is **74.8 per 100,000**.
- The ratio of Non-Primary Care Physicians (NPCPs) in Arizona is **161.5 per 100,000 population.**
- Physician practices are concentrated in urban areas; **92% of Arizonans live in urban areas** using the Rural-Urban Commuting Area (RUCA) definition; **95.3% of physicians practice in urban areas.**
- The **ratio of PCPs is highest (80.1 per 100,000) in urban areas** and **lowest (10.1 per 100,000) in isolated small rural towns.** This is also true for NPCs.

Physicians with Active Licenses: PCPs vs. NPCPs



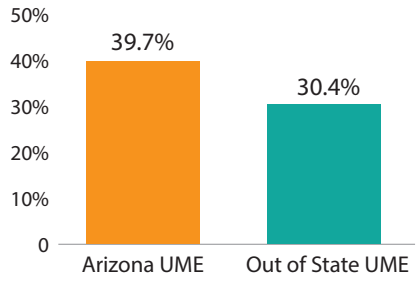
Arizona Physicians per 100,000 by Location



Education

- **13.6% (2,299)** of Arizona's licensed physicians attended Undergraduate Medical Education (UME – osteopathic (DO) or allopathic (MD) medical school) in Arizona.
- Of Arizona UME graduates, **39.7% are PCPs.**
- Of UME graduates from other states or countries, **30.4% are PCPs.**

Undergraduate Medical Education of AZ PCPs: AZ vs. Out of State



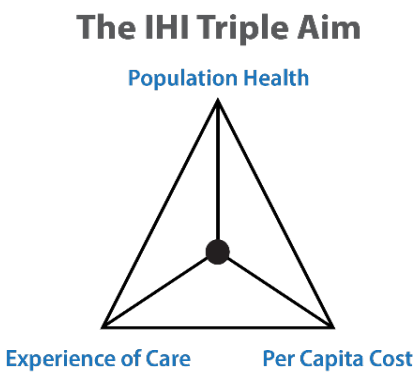
Introduction

The Institute of Medicine (now the National Academies of Science) report "Primary Care: America's Health in a New Era" defines primary care as "the provision of integrated, accessible health services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community" (Donaldson, Yordy, Lohr, & Vanselow, 1996; Starfield, 1998). Primary care can include:

- care provided by certain clinicians (e.g., family medicine physicians),
- a set of activities (e.g., immunizations),
- a level or type of health care setting (e.g., community health centers),
- a set of attributes (e.g., accessible, comprehensive),
- a strategy for health system organization (Shi, 2012).

Primary care, public health and population health are connected. Primary care provides services that support population health. Primary care assures timely preventive and acute care, and the early identification and appropriate management of chronic conditions. The World Health Organization defines public health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, n.d., para. 1, 1948). The Institute of Medicine says "Public health is what we, as society, do collectively to assure the condition in which people can be healthy (IOM 1988).

Figure 1. IHI Triple Aim



The Triple Aim calls for a redesign of primary care services and system integration to improve a costly U.S. health system that is out-performed by other developed countries. An integrated primary care system could improve health outcomes at lower per capita costs (Berwick, 2012; Levine, Landon, & Linder, 2019; Shi, 2012; Starfield, Shi, & Macinko, 2005).

This report focuses on the primary care allopathic and osteopathic physician workforce. Other primary care components - family nurse practitioners, physician assistants, providers, activities, settings, attributes, and delivery strategies will be covered in future reports.

Goals of the Report

This report uses publicly available physician data with the goals of:

- establishing a 2019 Arizona physician distribution and baseline,
- reporting physicians with active licenses in Arizona who graduated from Arizona UME,
- identifying limitations of the data,
- using data to guide policy recommendations to increase the primary care physician workforce, including strategies for recruitment and retention, and
- informing future efforts to improve the consistency and accuracy of health workforce data collection.

This report aims to provide data on the distribution of the physician workforce and the differences in the distribution of physicians by training location and specialty. This data can assist in efforts to ensure that Arizona develops programs and policies that build a health care system that addresses the needs of all communities.

Primary Care Physician Workforce

The Association of American Medical Colleges (AAMC) publishes an annual snapshot of the physician workforce by state using American Medical Association (AMA) Physician Masterfile data. AMA data includes active allopathic and osteopathic physicians working 20 hours a week or more. AAMC primary care data includes any physician with a self-reported primary specialty of family medicine, general practice, geriatric medicine (family practice), geriatric medicine (internal medicine), internal medicine, medicine-pediatrics, pediatrics, adolescent medicine (pediatrics) (Association of American Medical Colleges, 2017 ,p.3).

Arizona ranks 31st at 235.8 total physicians (MD, DO) per 100,000 population (State median is 257.6) and 42nd at 77.9 primary care physicians per 100,000 (State Median is 90.8). See Figures 2 and 3. (Association of American Medical Colleges, 2017).

Figure 2. Active Physicians per 100,000 population from the 2017 AAMC State Physician Workforce Report

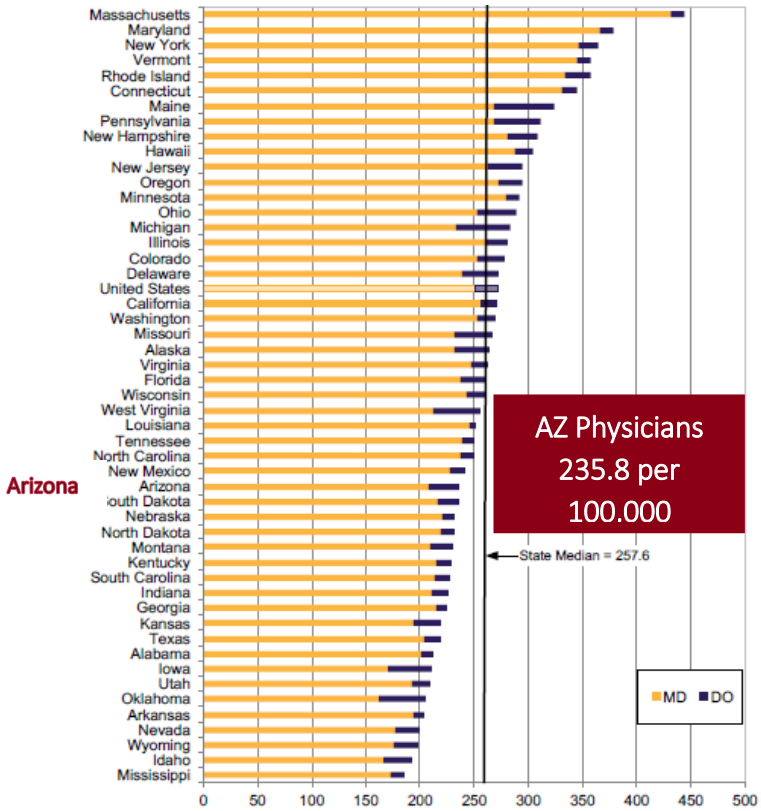


Figure 3. Active Primary Care Physicians per 100,000 population
from the 2017 AAMC State Physician Workforce Report

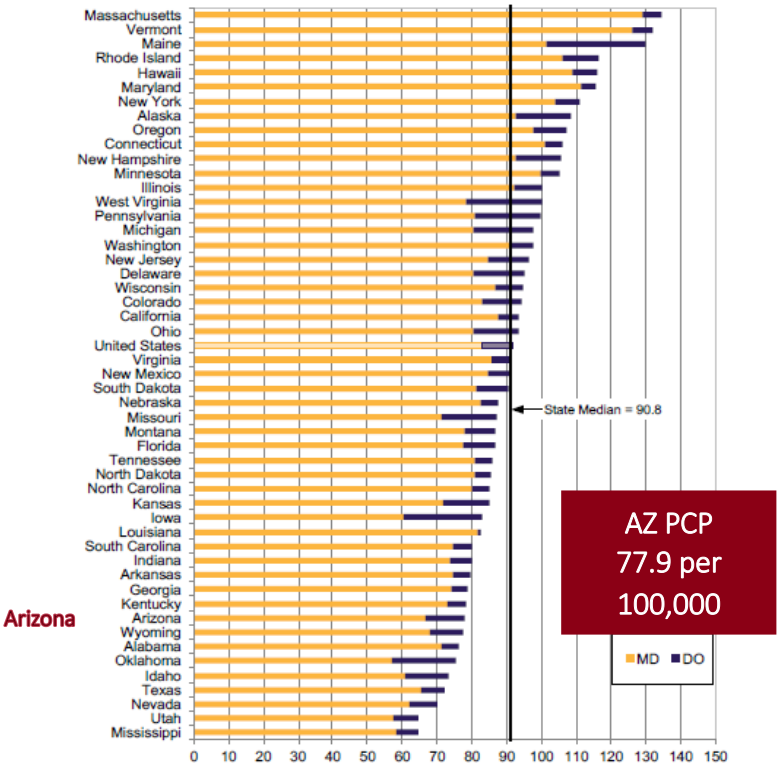


Table 1. Physicians per 100,000 Population, AAMC Physician Workforce Report 2017

	Active Physicians	Rank	Active Primary Care Physicians	Rank
Arizona	235.8	31st	77.9	42nd
U.S. Overall	236.8	na	91.7	na

The Medical and Osteopathic UME and GME Physician Education Pipeline

Undergraduate Medical Education (UME) is a component of the medical and osteopathic physician education pipeline in the U.S. After receiving an undergraduate degree (e.g., Bachelor of Science), students apply to a four-year undergraduate medical or osteopathic school (UME). Graduate Medical Education (GME) follows also known as residency and fellowship training. Arizona UME enrollment increased by 110.9% and GME by 37% from 2006-16, growth rates higher than the national average.

Table 2. UME Enrolled Students, AAMC Physician Workforce Report 2017

	Total UME Enrollment	Ratio per 100,000	Rank	Percent Change in Enrollment	Rank
Arizona	2,269	32.7	23rd	110.9%	4th
U.S. overall	na	35.4	na	32.8%	na

Table 3. GME Enrolled Residents & Fellows, AAMC Physician Workforce Report 2017

	Total GME Enrollment	Ratio per 100,000	Rank	Percent Change in Enrollment	Rank
Arizona	1,704	34.6	37th	37.4%	7th
U.S. overall	122,002	37.8	na	14.5%	na

Arizona retains 42% of its Arizona UME graduates (ranks 19th of all states) and 49% of its GME graduates (ranks 16th) in the state to practice (AAMC 2017).

Workforce Ratio Standards and Physician Shortages

Physician shortage data, analyses, forecasts, conclusions and recommendations vary from whether there is a physician shortage at all, to geographic and distributional physician shortages of certain providers (e.g., primary care physicians and general surgeons), to barriers to accessing needed physician services in a timely manner (e.g., for the uninsured, the elderly, those covered by Medicare and/or Medicaid, and populations living in rural and urban underserved areas).

The Agency for Healthcare Research and Quality (AHRQ) reports the patient panel size for a primary care team is 1,500 or 2,000 patients (Knox, Brach, & Schaefer, 2015). The Health Services Research Administration (HRSA) designates a primary care physician shortage as exceeding a 1:3000 to 1:3500 physician to population ratio. Other high need primary care area criteria include at least 20% of the population at or below 100% of the Federal Poverty Level (FPL); over 100 births per year per 1,000 women ages 15-44; over 20 infant deaths per 1,000 live births; and insufficient capacity (Ryan, 2016).

AHRQ Patient Panel	HRSA Shortage Threshold
1:1,500 or 1:2,000	1:3,000 or 1:3,500

Access and Coverage

Since 2013 Arizona's uninsured rate decreased from 17% to 10% with 423,000 Arizonans gaining coverage (Barnett, Jessica C., Berchick, Edward R., 2017). Enrollment in the Arizona Health Care Cost Containment System (AHCCCS), Arizona's Medicaid program, increased from 1,297,150 in December 2013 to 1,880,641 in July 2019 after Medicaid eligibility expansion in January of 2014 (Arizona Health Care Cost Containment System, 2017).

In 2017, 27.4% of Arizonans indicated they did not have a personal doctor (Centers for Disease Control and Prevention, 2017). Only 67.3% visited a doctor for a routine checkup in the past year (Centers for Disease Control and Prevention, 2017).

Eighteen percent of Arizona adults had two or more chronic diseases, 38% of high need adults (defined as a functional limitation and two or more chronic diseases) delayed needed medical care for reasons other than cost, 35% delayed care because of transportation, and 32% delayed because they could not get an appointment in time (Radley, Hayes, & McCarthy, 2017).

Physician Workforce Questions:

Data, analysis and recommendations are intended to inform policy, programmatic, and education interventions to improve access to high quality primary care for all Arizonans. Arizona's population continues to grow and more have coverage through Medicaid, Medicare, private and employer sponsored health insurance. This report aims to answer:

1) What is the current number and physician to population ratio of primary care and other physicians in Arizona, by county, by rural versus metropolitan areas?
2) How many physicians practicing in Arizona completed their undergraduate medical or osteopathic education UME education in Arizona?

Methods

Data Source

The primary source is generated with data from the Arizona Medical Board and the Arizona Board of Osteopathic Examiners. These boards provide a single point-in-time data snapshot of physician licensee information in Arizona. Physicians in Arizona are required to renew their license every two years based on the licensee's birth date or by December 31. Appendix A lists the data elements in the publicly available Data.

Data Cleaning

In this report, "Arizona physicians" means physicians licensed in Arizona as of January 2019, with an active license code, a valid zip code and an estimated age of less than 80 years old. To protect personally identifiable information, the publicly available data does not include dates of birth. An age estimate was generated using the licensee's reported graduation year from their undergraduate medical education program (or license date if the graduation year was missing). The board data does not provide information on how many hours a physician works (i.e., full time equivalents (FTE), part time, or direct patient care FTE).

Approaches to Defining Primary Care Physicians and Practitioners Vary

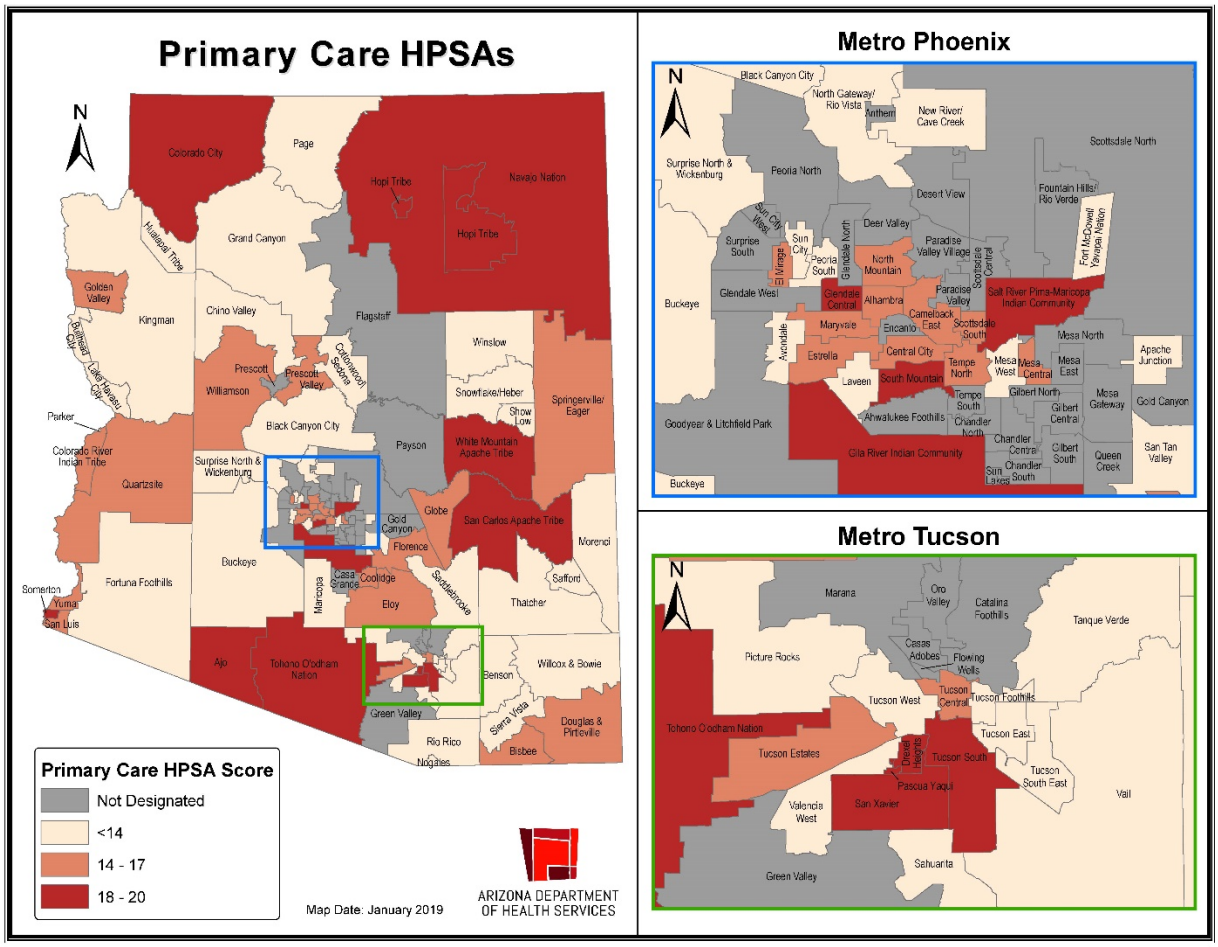
Approaches to categorizing physician specialties as Primary Care (PC) or Non-Primary Care (NPC) varies. For the purposes of this report, Primary Care Physicians (PCPs) are allopathic (MD) and osteopathic (DO) physicians with self-designated specialties in family medicine, general practice, general internal medicine and general pediatrics; secondary specialties listed with general internal medicine and general pediatrics; and preventive medicine with a secondary specialty of family medicine/family practice, general practice, internal medicine, and pediatrics. See Appendix B for a complete list of PCP specialties used for this report. This report does not include Obstetrics and Gynecology physicians in its PCP classification. This report's PCP categorization approach is informed by health workforce research at the University of North Carolina Cecil G. Sheps Center for Health Services Research (Ricketts, 2019).

At the federal level the Health Services Resources Administration (HRSA) includes Obstetrics and Gynecology physicians for Health Professional Shortage Area (HPSA) designations. (U.S. Government Accountability Office, 2006).

Arizona Revised Statutes (ARS) define a PCP as a "physician who is a family practitioner, general practitioner, pediatrician, general internist, or obstetrics and gynecologist" (Arizona Revised Statutes, Title 36 Public Health and Safety § 36-2901).

The Arizona Department of Health Services (ADHS) developed Primary Care Areas (PCAs) as the state rational service areas (Arizona Department of Health Services, n.d.). The ADHS PCP definition for federal shortage designation purposes includes Family Practice, General Practice, Internal Medicine, Obstetrics and Gynecology, Pediatrics physicians (MD and DO) (Arizona Department of Health Services, 2019). The current map of Arizona PCAs is on the following page and included in Appendix C.

Figure 4. ADHS Primary Care HPSAs



Geography

Physicians seeking an Arizona license to practice must complete the licensure application and provide a practice address and zip-code. This information is updated with license renewal every two years based on their birth date. Using practice location data (i.e., zip code of practice location) has limitations: physicians can practice at multiple locations, practice location addresses can change during the two-year license interval, physicians can move out of state or retire, and data is not collected on FTE clinical effort by practice sites.

This report uses Rural-Urban Commuting Area (RUCA) codes to assess the number and ratio of providers by urban-rural geography. RUCA codes use U.S. Census Tract data and provide standardized, national rurality classification. The University of Washington (UW) aggregates 33 individual RUCA codes into groups. This report uses the UW Urban, Large Rural City or Town, Small Rural Town, and Isolated Small Rural Town group nomenclature. Practice location zip-codes are mapped to RUCA codes using the UW zip-code to RUCA approximation (Rural Health Research Center, b).

Limitations

There are limitations to the data and analyses in this report. Major limitations include variances in primary care and primary care physician definitions, the absence of data on clinical full time equivalent primary care physicians by area, and the exclusion and or absence of FTE data for other primary care providers. These limitations can be addressed with legislation passed in the 2018 and 2019 Arizona legislative sessions that will collect data for specified licensed health professionals at the time of initial licensure and subsequent renewals by licensing boards starting in 2021 housed at the Arizona Department of Health Services.

Other limitations include categorization of physician specialty as PCP or NPC. The data used for this categorization is the physician self-reported "Area of Interest" in their initial license application and two-year renewals. Licensure data does not include additional information on how a physician spends their time, what type of care they provide, in what setting, or at what clinical, direct patient care effort level (e.g., full-time or part-time). Licensure data excludes physicians working in federal facilities like the Veterans Administration (VA), Indian Health Service (IHS), and Public Law 638 Indian Self-Determination sites who are not required to be licensed in the state. Physician practice locations and direct patient care effort (full time, part time, no time) may change over a two-year license renewal cycle. Aggregating zip-codes by RUCA codes is useful for showing differences by geographic grouping across Arizona, but does not provide the granular detail that would be provided in an analysis by rational service area.

Arizona Demographic Overview

Arizona's population increased 12.2% (vs. 6.0% in U.S.) since 2010. Table 4 (U.S. Census Bureau, 2018).

Table 4. Arizona Population Overview				
	1990	**2000**	**2010**	**2018**
U.S.	**248,710,000**	**281,421,906**	**307,000,000**	**327,167,434**
Arizona	3,665,000	5,130,000	6,596,000	7,171,646
Arizona % of U.S.	1.5	1.8	2.1	2.2

Primary Care and Non-Primary Care Physicians by State and County

The January 2019 physician licensure snapshot includes physicians with an active license in Arizona with a valid zip code and an estimated age 80 years or younger. There are 16,947 active Arizona physicians with a valid zip code younger than age 80 years. The physician to 100,000 population ratio is 236.3. See Tables 5 and 6.

Table 5. Arizona Physician Total			
	MD	**DO**	**Total Physicians**
Arizona	14,571	2,376	16,947
		Ratio Per 100,000	236.3

There are 5,362 (31.6%) PCP and 11,585 (68.4%) non-primary care Arizona physicians. The PCP per 100,000 population is 74.8 and the ratio for NPCP per 100,000 is 161.5 (Table 6).

Table 6. Arizona Primary Care and Non-Primary Care Physicians, total (percent)			
	PCP	**NPCP**	**Total Physicians**
Arizona	**5,362 (31.6)**	**11,585 (68.4)**	**16,947**
Ratio Per 100,000	74.8	161.5	236.3

Primary Care and Non-Primary Care by Rural-Metro Designation

The following tables present the PC and NPC physician totals and ratios per 100,000 population by Rural Urban Commuting Areas (RUCA). The U.S. Department of Agriculture (USDA), HRSA, and the WWAMI Rural Health Research Center at the University of Washington developed the RUCA codes. RUCA codes account for "the density of population, urbanization and daily commuting." (Hall, Kaufman, & Ricketts, 2006). The integration of commuting information into a rural designation can be useful for "health studies because the communities to which persons flow (for employment) may also be the places where they receive health care." (Hall et al., 2006).

This analysis uses the zip-code to RUCA approximation version 3.0 updated in 2014 based on the 2010 Census provided by the USDA Economic Research Service (USDA, 2016). The RUCA codes include 10 primary and 21 secondary codes and WWAMI provides recommended groupings for the codes. Current RUCA primary and secondary codes are listed in Appendix D. The primary codes are described in Table 8. The groupings used for this analysis and examples of cities/towns where zip-codes are located in Arizona are listed in Table 9 (Rural Health Research Center, a).

Most physicians are in Maricopa and Pima counties: 14,702 of Arizona's 16,941 (86.8%) physicians.

Table 7. Arizona Physicians by Type and County, total (percent)

	PCP (% of total PCPs)	NPCP (% of NPCPs)	Total Physicians (% of total physicians)	Ratio PCP:NPCP
Arizona	**5,362**	**11,585**	**16,947**	**1:2.16**
Apache	19 (0.4)	30 (0.3)	49 (0.3)	1:1.58
Cochise	87 (1.6)	64 (0.6)	151 (0.9)	1:0.74
Coconino	123 (2.3)	265 (2.3)	388(2.3)	1:2.15
Gila	27 (0.5)	38 (0.3)	65(0.4)	1:1.41
Graham	21 (0.4)	11 (0.1)	32(0.2)	1:0.52
Greenlee	9 (0.2)	0 (0)	9 (0.1)	NA
La Paz	7 (0.1)	9 (0.1)	16 (0.1)	1:1.29
Maricopa	3,503 (65.3)	8,003 (69.1)	11,506 (67.9)	1:2.28
Mohave	122 (2.3)	284 (2.5)	406 (2.4)	1:2.33
Navajo	75 (1.4)	68 (0.6)	143 (0.8)	1:0.91
Pima	965 (18.0)	2,204 (19)	3,169 (18.8)	1:2.28
Pinal	120 (2.2)	115 (1.0)	235 (1.4)	1:0.96
Santa Cruz	23 (0.4)	14 (0.1)	37 (0.2)	1:0.61
Yavapai	150 (2.8)	296 (2.6)	446 (2.6)	1:1.97
Yuma	111 (2.1)	184 (1.6)	295 (1.7)	1:1.66

*Data Suppressed <10

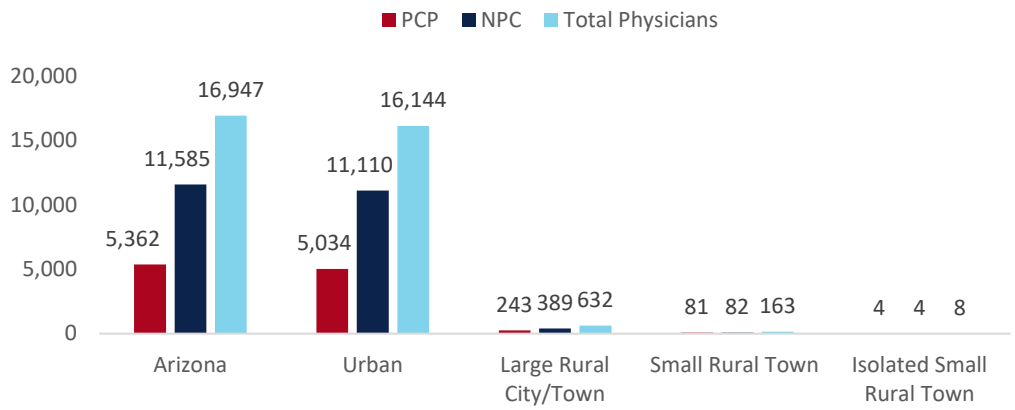
Table 8. Primary RUCA Codes

Code	Classification Description
1	Metropolitan area core: primary flow within an urbanized area (UA)
2	Metropolitan area high commuting: primary flow 30% or more to a UA
3	Metropolitan area low commuting: primary flow 10% to 30% to a UA
4	Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)
5	Micropolitan high commuting: primary flow 30% or more to a large UC
6	Micropolitan low commuting: primary flow 10% to 30% to a large UC
7	Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)
8	Small town high commuting: primary flow 30% or more to a small UC
9	Small town low commuting: primary flow 10% to 30% to a small UC
10	Rural areas: primary flow to a tract outside a UA or UC

Table 9. RUCA Codes and Example Locations		
Description	**Codes**	**Example Location**
Urban focused	1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, and 10.1.	Glendale (1.0), Casa Grande (1.1; 2.1), Marana (2.0), Saint David (3.0), Florence (4.1), Tubac (5.1), Page (7.1), Teec Nos Pos (8.1), Williams (10.1)
Large Rural City/Town (Micropolitan) focused	4.0, 4.2, 5.0, 6.0	Show Low (4.0), Ganado (5.0),
Small Rural Town Focused	7.0, 7.2, 8.0, 8.2, 9.0	Sedona (7.0), Morenci (7.2)
Isolated Small Rural Town	10.0, 10.2, 10.3	Ash Fork (10.0), McNeal (10.2), Second Mesa (10.3)

Table 10 shows PCP and NPCP physician totals by RUCA group. Most Arizona physicians are urban: 16,144 of 16,947 (95.3%). American Community Survey 2017 five-year estimates for zip-code population, 92% of Arizona's population live in urban RUCA code areas. The ratio of urban PCPs to NPCPs is 1:2.2.

Table 10. Arizona Primary Care and Non-Primary Care Physicians by RUCA, total (percent)				
	PCP	**NPCP**	**Total Physicians**	**Total Population**
Arizona	**5,362 (31.6)**	**11,585 (68.4)**	**16,947**	**7,171,646[1]**
Urban	5,034 (31.2)	11,110 (68.9)	16,144	6,284,744
Large Rural City/Town (micropolitan)	243 (38.4)	389 (61.5)	632	361,520
Small Rural Town	81 (49.7)	82 (50.3)	163	126,798
Isolated Small Rural Town	4 (50.0)	4 (50.0)	8	39,494

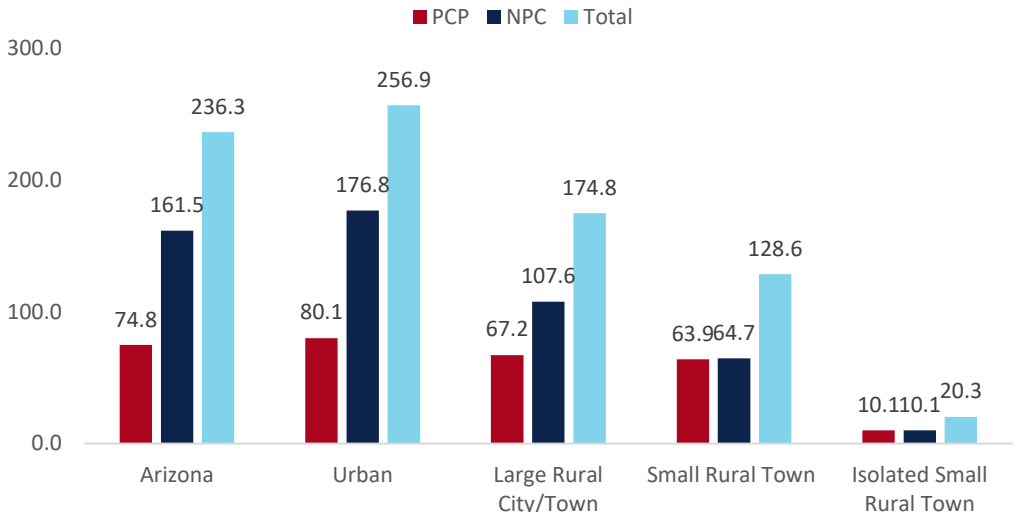


Graph 1. Total Physicians, PC & NPC by RUCA

Table 11 provides the ratio of physicians per 100,000 population. There are 236.3 physicians per 100,000 population in Arizona. In urban areas the ratio is 256.9 physicians per 100,000 population. The ratio of PCP and NPCPs is highest in urban and lower in other areas. In urban, large rural city/towns, and small rural towns there are more NPCPs than PCPs per 100,000 population.

[1] For state level population the Census 2018 annual estimates of the resident population is used. For sub-state analysis at the zip code level, the ACS 2017 5-year estimates are used. The total state population at the time of the ACS 2017 5-year estimated was 6,809,946, a difference of 361,700. It is possible that the ratio of physicians to population is over-estimated.

Table 11. Arizona Primary Care and Non-Primary Care Physicians Ratio per 100,000 population by RUCA			
	PCP	NPCP	Total
Arizona	**74.8**	**161.5**	**236.3**
Urban	80.1	176.8	256.9
Large Rural City/Town (micropolitan)	67.2	107.6	174.8
Small Rural Town	63.9	64.7	128.6
Isolated Small Rural Town	10.1	10.1	20.3



Graph 2. Ratio per 100,000 Population of all Physicians, PC & NPC by RUCA

Primary Care and Non-Primary Care by Location and Age

Table 12 lists the age of PCPs and NPCPs by geography. The average (mean) age of physicians for Small Rural and Isolated Small Rural towns is older than the state average.

Table 12. Arizona Primary Care and Non-Primary Care Physicians Mean Age by RUCA			
	PCP	NPCP	Total
Arizona	**48.29**	**50.25**	**49.63**
Urban	48.3	50.21	49.61
Large Rural City/Town (micropolitan)	47.72	50.56	49.47
Small Rural Town	49.14	53.57	51.37
Isolated Small Rural Town	48.75	59.5	54.13

Primary Care and Non-Primary Care by Location and Medical School

Allopathic and osteopathic physician training typically involves a bachelor degree (e.g. B.S.) of four years, followed by undergraduate medical education (UME) in a medical or an osteopathic school of four years, and then graduate medical education (GME) - also called residency and fellowship training, before a physician can practice in a state. GME training duration varies by specialty – but is typically three years for primary care specialties (e.g., family medicine, general internal medicine, general pediatrics), with four to seven or more years for subspecialty training and certification (e.g., for medical, pediatric and surgical subspecialties). Increasingly, state physician licensing boards and institutional / hospital credentialing committees require board certification eligibility and/or completion as a condition of practice.

As of July 2019 there are five accredited schools of medicine in Arizona: three allopathic (M.D.) schools, two are public and one is private (Mayo Clinic); and two accredited osteopathic (D.O.) schools, both

private. The osteopathic schools have greater annual enrollment compared to the public allopathic universities; they matriculate a much lower percentage of in-state students. Other schools from outside of Arizona may send students for clinical rotations in Arizona. For example, Creighton University School of Medicine is accredited in Nebraska but has a regional campus in Phoenix where third and fourth year students (42 per year) complete their third and fourth year of training.

Table 13 shows tuition costs for 2017-18. Private school tuition is higher than resident (in-state) tuition for the public schools of medicine. Tuition cost excludes materials (e.g., books) and living expenses (e.g., rent, utilities). Only the public institutions offer a resident/in-state tuition rate.

Table 12. Enrollment (matriculants) in UME Programs in Arizona, total (percent in-state)

	2014-15	2015-16	2016-17	2017-18	2018-19
Allopathic					
University of Arizona – Tucson (est. 1969; public)	115 (65.2)	117 (73.5)	132 (66.7)	120 (77.5)	117 (73.5)
University of Arizona – Phoenix (est. 2006)	80 (68.8)	80 (83.8)	83 (72.3)	80 (81.2)	80 (72.3)
Mayo Clinic Alix School of Medicine – Arizona campus (est. 2015; public)	-	-	-	-	-
Osteopathic					
Midwestern University/Arizona College of Osteopathic Medicine (est. 1996; private)	237 (25)	240 (30)	249 (28)	242 (30)	241 (27)
A.T. Still University School of Osteopathic Medicine in Arizona (est. 2007; private)	101 (10)	103 (15)	92 (10)	103 (12)	100 (15)

Sources: Allopathic school data on public schools of medicine is available from the AAMC. The AACOM provides data on the osteopathic schools. No data available for the Mayo Clinic Alix School of Medicine at the Arizona Campus level.

Table 13. Average Tuition

	2017-18	
	Resident (in-state)	Nonresident (Out-of-state)
Allopathic		
University of Arizona – Tucson (est. 1969; public)	$33,931	$55,803
University of Arizona – Phoenix (est. 2006; public)	$33,398	$55,270
Mayo Clinic Alix School of Medicine - Arizona (est. 2015; private)	$57,170	
	2017-2018	
Osteopathic		
Midwestern University/Arizona College of Osteopathic Medicine (est. 1996; private)	$66,494	
A.T. Still University School of Osteopathic Medicine in Arizona (est. 2007; private)	$55,460	

Sources: Allopathic school data on public schools of medicine is available from the AACM. The AACOM provides data on the osteopathic schools. No data available for the Mayo Clinic Alix School of Medicine at the Arizona Campus level.

Tables 14 and 15 include the total number and percent of licensed physicians in Arizona by degree type and the state location of their UME. The UME location is grouped by UME in Arizona or UME in any other U.S. state or foreign country. Of the 16,947 physicians in Arizona, 2,299 or 13.6% received their UME training in Arizona and 14,648 or 86.4% received their UME training in another state or country.

Data by license type shows that of Arizona's UME graduates, 74.9% are MDs and 35.7% are DOs. For physician UME graduates from outside of Arizona, 87.8% are MDs and 12.2% are DOs.

Table 14. Arizona Physicians by License & UME Location, total (percent)			
	MD	DO	Total
Arizona - UME	1,708 (74.9)	591 (25.7)	2,299 (13.6)
Other State or Country - UME	12,863 (87.8)	1,785 (12.2)	14,648 (86.4)
Total	**14,571**	**2,376**	**16,947**

Most PC and NPC Arizona physicians graduated from outside of Arizona UME institutions, 14,648 of 16,947 (86.4%). Of Arizona physicians who graduated from Arizona UME, 913 or 40.9% are PCPs and 62.2% are NPCPs. Of Arizona physicians who graduated from outside of Arizona UME institutions 30.4% are PCPs and 63.6% are NPCP.

Table 15. Arizona Physicians by Primary Care & UME Location, total (percent)			
	PCP	NPCP	Total
Arizona - UME	913 (39.7)	1,386 (60.3)	2,299 (13.6)
Other State or Country - UME	4,449 (30.4)	10,199 (69.6)	14,648 (86.4)
Total	**5,362**	**11,585**	**16,947**

The majority of both PC and NPC physicians with Arizona MD licenses graduated from UME institutions outside of Arizona (12,863 of 14,571). Of the 1,708 active Arizona physicians with MD licenses who graduated from Arizona UME, 620 or 36.2% are PCPs and 1,008 or 63.8% are NPCP. This percent of physicians with MD licenses who graduated from Arizona UME institutions who are PCPs is slightly higher than the percentage of all physicians who are PCPs, 5,362 of 16,947 or 31.6% (Table 6).

Table 16. Arizona Physicians w/ MD License, total (percent)			
	PCP	NPCP	Total
Arizona - UME	620 (36.2)	1,088 (63.8)	1,708 (11.7)
Other State or Country - UME	3,688 (28.7)	9,175 (71.3)	12,863 (88.3)
Total	**4,308**	**10,263**	**14,571**

Table 17 shows that the majority of both PC and NPC physicians with DO licenses graduated from UME institutions outside of Arizona (1,785 of 2,376). Of the 591 active Arizona physicians with DO licenses who graduated from an Arizona UME institution, 310 or 49.5% are PCPs and 215 or 50.4% are NPCP.

Table 17. Arizona Physicians w/ DO License, total (percent)			
	PCP	NPCP	Total
Arizona - UME	293 (49.5)	298 (50.4)	591 (24.9)
Other State or Country - UME	761 (42.6)	1,024 (57.4)	1785 (75.1)
Total	**1054**	**1322**	**2376**

Arizona UME versus Other State or County UME - Table 18 shows data for current AZ licensed physicians by PC or NPC, location of UME (Arizona or other), and RUCA practice location. Of 16,947 licensed AZ physicians 2,299 (13.6%) graduated from AZ UME and 14,648 (86.4%) graduated from other UME. More Arizona-UME trained physicians are PCPs, 41.0% compared to 30.4% of other-UME trained physicians.

Primary Care -Of the 2,299 licensed physicians who graduated from AZ UME 913 (39.7%) are PCPs, 857 (93.9%) are in urban areas; 46 (5%) in large rural city/towns; 10 (1.1%) in small rural towns. Of AZ UME graduates, 38.9% are PCPs and 61.1% are NPCPs. Of physicians from Arizona UME programs in large rural city/towns, 59.7% are PCPs and 40.3% are NPCPs. In small rural towns 47.6% are PCPs and 52.4% are NPCPs. Of the 14,648 AZ licensed physicians who graduated from other UME locations, 4,449 (30.4%) are PCPs with 4,177 (93.9%) in urban areas; 197 (4.4%) in large rural city/towns; 71 (1.6%) in small rural towns; 4 (0.08%) in isolated small rural areas. Of AZ licensed physicians who graduated from other UME locations, the percentage of PCPs compared to NPCPs is largely weighted to NPCPs in urban and large rural/city towns.

Non-Primary Care - Of the 2,299 AZ licensed physicians graduating from AZ UME, 1,386 (62.2%) are NPCPs, 1,344 (96.9%) are in urban areas; 31 (2.2%) in large rural city/towns and 11 (0.8%) in small rural towns. Of the 14,648 Arizona licensed physicians from other UME locations, 10,199 (69.6%) are NPCPs, with 9,766 (95.8%) in urban areas; 358 (3.5%) in large rural city/towns; 71 (0.7%) in small rural towns; and 4 (0.004%) in isolated small rural areas. Table 19 uses Table 18 data standardized by 100,000 population.

Table 18. Arizona Physicians Total by RUCA total (percent)

	PCP	NPCP	Total
All Physicians in Arizona			
Arizona	**5,362 (31.6)**	**11,585 (68.4)**	**16,947**
Urban	5,034 (31.2)	11,110 (68.8)	16,144
Large Rural City/Town (micropolitan)	243 (38.4)	389 (61.6)	632
Small Rural Town	81 (49.7)	82 (50.3)	163
Isolated Small Rural Town	4 (50.0)	4 (50.0)	8
Arizona – UME Physicians			
Arizona	913 (39.7)	1,386 (60.3)	2,299
Urban	857 (38.9)	1,344 (61.1)	2,201
Large Rural City/Town (micropolitan)	46 (59.7)	31 (40.3)	77
Small Rural Town	10 (47.6)	11 (52.4)	21
Isolated Small Rural Town	0	0	0
Other State or Country – UME Physicians			
Arizona	4,449 (30.4)	10,199 (69.6)	14,648
Urban	4,177 (30.0)	9,766 (70.0)	13,943
Large Rural City/Town (micropolitan)	197 (35.5)	358 (64.5)	555
Small Rural Town	71 (50.0)	71 (50.0)	142
Isolated Small Rural Town	4 (50.0)	4 (50.0)	8

Table 19. Arizona Physicians Ratio per 100,000 population by RUCA

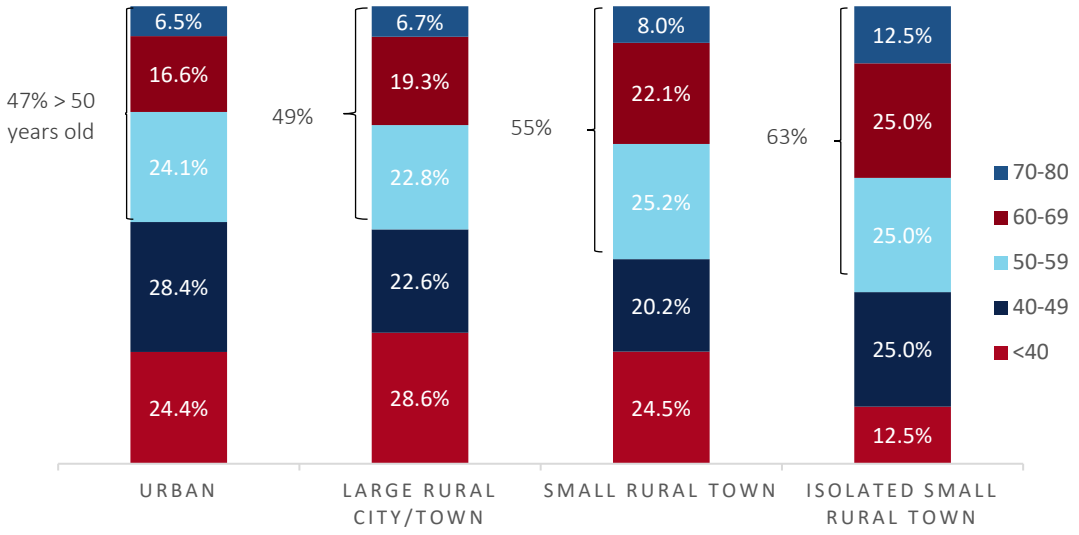
	PCP	NPCP	Total
Arizona	**74.8**	**161.5**	**236.3**
Urban	80.1	176.8	256.9
Large Rural City/Town (micropolitan)	67.2	107.6	174.8
Small Rural Town	63.9	64.7	128.6
Isolated Small Rural Town	10.1	10.1	20.3
Arizona - UME			
Arizona	12.7	19.3	31.1
Urban	13.6	21.4	35.0
Large Rural City/Town (micropolitan)	12.7	8.6	21.3
Small Rural Town	7.9	8.7	16.6
Isolated Small Rural Town	0.0	0.0	0.0
Other State or Country - UME			
Arizona	62.0	142.2	204.2
Urban	66.5	155.4	221.9
Large Rural City/Town (micropolitan)	54.5	99.0	153.5
Small Rural Town	56.0	56.0	112.0
Isolated Small Rural Town	10.1	10.1	20.3

Physician Age - Table 19 shows the mean and median physician age by Arizona county, from 47.71 (Navajo) to 55.23 (Gila). Table 20 shows the average physician age is higher in small rural towns (51.37) and isolated small rural towns (54.13) than in urban areas (49.61).

Table 19. Arizona Physicians by Age & County		
	Age (Mean)	Age (Median)
Arizona	**49.63**	**48**
Apache	49.24	49
Cochise	50.62	52
Coconino	48.07	47
Gila	55.23	56
Graham	48.66	46
Greenlee	54.00	60
La Paz	49.31	50.5
Maricopa	49.25	48
Mohave	49.43	49
Navajo	47.71	47
Pima	50.33	50
Pinal	49.21	48
Santa Cruz	51.43	52
Yavapai	54.29	55
Yuma	51.43	51

Table 20. Arizona Physicians by Age & Geography			
	Age (Mean)	Age (Median)	Range (Min, Max)
Arizona	**49.63**	**48**	**28, 80**
Urban	49.61	48	28,80
Large Rural City/Town (micropolitan)	49.47	49	28,80
Small Rural Town	51.37	51	30,79
Isolated Small Rural Town	54.13	55.5	35,72

Physicians over age 50 is higher in small rural towns and isolated small rural towns than in urban areas and large rural city/town.

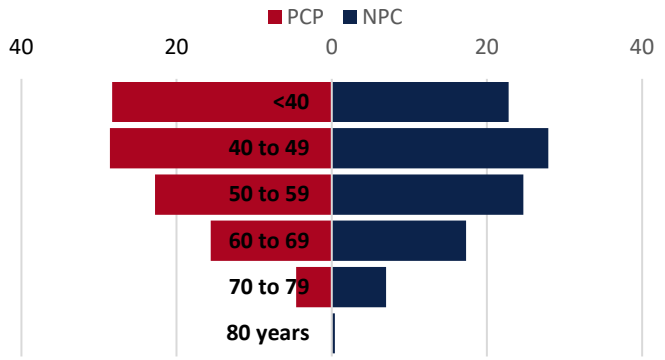


Graph 3. Percent of Physicians by Age Group and RUCA

PCP average age is similar between RUCA geographies. However, NPCP average age is higher in small rural towns (55.28) and isolated small rural towns (59.20) compared to urban (50.24) or large rural city/towns (50.41).

Table 21. Arizona Physicians by Primary Care, Age (Mean), and Geography			
	PCP	NPCP	All
Arizona	48.29	50.25	49.63
Urban	48.30	50.21	49.61
Large Rural City/Town (micropolitan)	47.72	50.56	49.47
Small Rural Town	49.14	53.57	51.37
Isolated Small Rural Town	48.75	59.5	54.13

Graph 4 is an age pyramid for PCP and NPCPs. The distribution by age range reflects the slightly younger age of PCPs in Arizona.



Graph 4. Percent of Physicians by Age Group and PCP and NPC

Conclusion

PCP and NPCP Overview

- There are 236.3 physicians per 100,000 population in Arizona.
- There are just over two times the number of NPC (11,585) compared to PC physicians (5,362).
- Physician practices are concentrated in urban areas; 92% of Arizonans live in urban areas (using the RUCA definition); 95.3% of physicians practice in urban areas.
- The ratio of PCPs in Arizona is 74.8 per 100,000.
- The ratio of NPCs in Arizona is 161.5 per 100,000.
- The ratio of PCPs is highest (80.1 per 100,000) in urban areas and lowest (10.1 per 100,000) in isolated small rural towns. This is also true for NPCPs.

Education Pipeline Overview

- 13.6% (2,299) of Arizona's licensed physicians attended UME in Arizona.
- 86.4% (14,648) of Arizona's licensed physicians attended UME in another state or country.
- Of physicians who attended UME in Arizona, 74.3% (1,708) graduated from an allopathic (MD) and 25.7% (591) graduated from an osteopathic institution.
- Average in-state tuition for the public allopathic UA medical schools is $33,931 (Tucson) and $33,398 (Phoenix) per year.
- Average out-of-state tuition for the public allopathic UA medical schools is $55,803 (Tucson) and $55,270 (Phoenix) per year.
- Average tuition for the private allopathic school (Mayo) is $57,710.
- Average tuition for osteopathic schools is $66,494 (MWU-ACOM) and $55,460 (AT-SOM).
- Of Arizona UME graduates, 39.7% are PCPs and 60.3% are NPCs.
- Of UME graduates from other states or countries, 30.4% are PCPs and 69.6% are NPCs.

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Appendix A

Arizona Physician Licensure Data Disk Public Data Fields Include
License Number, Type, Status, Date, Due to Renew By, Expiration Date
Last Name, First Name, MI, Suffix
Street1 / Street 2
City, State, ZIP, Phone Number
Medical School, Graduation Date
Area of Interest

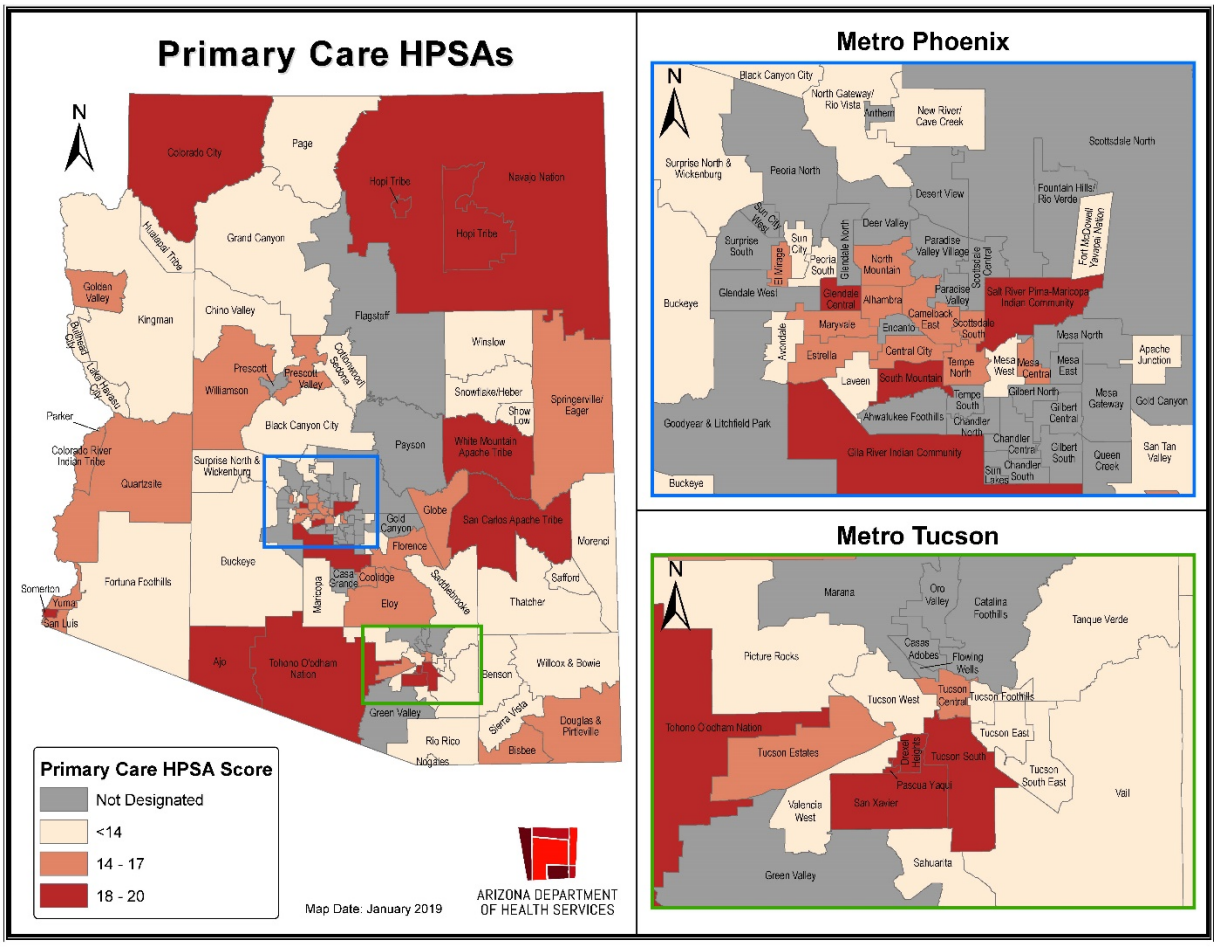
Appendix B

A two-step process was used to determine a physician's PCP category. First, 2,620 unique combinations of physician areas of interest were identified from the licensure data. Second, each combination was crosswalked to a standardized and PCP categorized specialty list. From the final list of 1,843 specialty combinations, the following were categorized as primary care.

1. Family Medicine/Family Practice (excluding Correctional Medicine)
2. General Practice (excluding Correctional Medicine)
3. Internal Medicine and Pediatrics with the following subspecialties:
    a. Adolescent Medicine
    b. Ambulatory Care
    c. Emergency Medicine (including 'Pediatric Emergency Medicine')
    d. Family Medicine
    e. General Internal Medicine including 'Other' and 'Pediatric Internal Medicine')
    f. General Pediatrics including 'Other'
    g. General Practice
    h. Geriatric Medicine (Internal Medicine only)
    i. Integrative Medicine
    j. Osteopathic Manipulative Medicine
    k. Preventive Medicine
    l. Surgical Assist
    m. Urgent Care
4. Preventive Medicine with the following subspecialties:
    a. Family Medicine/Family Practice
    b. General Practice
    c. Internal Medicine
    d. Pediatrics

Appendix c

ADHS Primary Care HPSAs.



Appendix D

Primary and Secondary RUCA codes.

Primary and Secondary RUCA Codes	
Code	Classification Description
1 Metropolitan area core: primary flow within an urbanized area (UA)	
1.0	No additional code
1.1	Secondary flow 30% to 50% to a larger UA
2 Metropolitan area high commuting: primary flow 30% or more to a UA	
2.0	No additional code
2.1	Secondary flow 30% to 50% to a larger UA
3 Metropolitan area low commuting: primary flow 10% to 30% to a UA	
3.0	No additional code
4 Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)	
4.0	No additional code
4.1	Secondary flow 30% to 50% to a UA
5 Micropolitan high commuting: primary flow 30% or more to a large UC	
5.0	No additional code
5.1	Secondary flow 30% to 50% to a UA
6 Micropolitan low commuting: primary flow 10% to 30% to a large UC	
6.0	No additional code
7 Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)	
7.0	No additional code
7.1	Secondary flow 30% to 50% to a UA
7.2	Secondary flow 30% to 50% to a UC
8 Small town high commuting: primary flow 30% or more to a small UC	
8.0	No additional code
8.1	Secondary flow 30% to 50% to a UA
8.2	Secondary flow 30% to 50% to a UC
9 Small town low commuting: primary flow 10% to 30% to a small UC	
9.0	No additional code
10 Rural areas: primary flow to a tract outside a UA or UC	
10.0	No additional code
10.1	Secondary flow 30% to 50% to a UA
10.2	Secondary flow 30% to 50% to a UC
10.3	Secondary flow 30% to 50% to a small UC

Source: USDA ERS. (2016). 2010 Rural-Urban Commuting Area (RUCA) Codes. Retrieved from: https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation/