Healthforce Center at UCSF

Research Report

California's Primary Care Workforce: Current Supply, Characteristics, and Pipeline of Trainees

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Acknowledgments

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Introduction

Health care stakeholders are concerned that the supply, distribution, and demographic characteristics of primary care clinicians in California are not adequate to meet the state's needs. In recent years, this concern has stemmed largely from the expansion of Californians' access to health insurance under the Affordable Care Act (ACA). The expansion of eligibility for Medi-Cal and the establishment of Covered California, the state's health insurance exchange, have resulted in a large increase in the number of Californians with health insurance. [1] Although the fate of the ACA is uncertain, other sources of concern about primary care clinician supply in California persist, including population growth, aging of the population, expanding burden of chronic disease, and the needs of low-income people and racial/ethnic groups that have been historically underserved by the health professions. Stakeholders need current information about California's primary care workforce and the pipeline of trainees to make informed decisions about primary care training and workforce policy.

This report is the first in a series of three reports from Healthforce Center at the University of California, San Francisco that will provide information to help policymakers, consumers, and leaders of health care delivery organizations and educational institutions understand California's primary care workforce needs. This report describes the supply, distribution, and characteristics of California's primary care clinicians as well as trainees in the educational pipeline. Forthcoming reports in this series will forecast the future supply and demand for primary care clinicians, and assess primary care workforce development initiatives in other states. Collectively, these reports will enable stakeholders to assess the adequacy of the current primary care workforce, anticipate future gaps in the primary care workforce, and identify effective policies for addressing these needs. For purposes of these reports, primary care clinicians are defined as encompassing allopathic physicians (MDs), osteopathic physicians (DOs), nurse practitioners (NPs), and physician assistants (PAs) who provide primary care. Primary care specialties are defined as family/general practice, general internal medicine, general pediatrics, and obstetrics/gynecology. Obstetrician/gynecologists (OB/GYNs) are not always included in the definition of "primary care physicians (PCPs)" in workforce research. We chose to include them since a large number of women of child-bearing age visit their OB/GYN more frequently than their PCP and since some services that OB/GYNs provide, such as screening for asymptomatic disease, fall within the scope of what is typically considered primary care.

This report is divided into seven chapters. Chapter 1 addresses the supply of primary care clinicians. Chapter 2 presents information about the geographic distribution of primary care clinicians and Chapter 3 describes the demographic characteristics of primary care clinicians. Chapter 4 presents information about primary care trainees. Chapter 5 discusses of the adequacy of the supply and distribution of primary care clinicians in California. Chapter 6 describes limitations of the sources of data used to prepare this report. Chapter 7 presents conclusions and implications for the state's ability to meet future primary care workforce needs. Information about sources of data and analysis methods are contained in a technical appendix at the end of the report.

[1] A. Adams. Two Years After ACA Implementation: Coverage Gains Continued and Fewer Affordability Concerns Cited. Oakland, CA: California Health Care Foundation, 2016. http://www.chcf.org/aca-411/insights/two-years-coverage-gains

Chapter 1: Supply of Primary Care Clinicians

How many clinicians provide primary care in California? At first glance this seems like a simple question. In reality, the answer to this question is complicated due to the limitations of existing sources of data. To obtain a full picture of the supply of allopathic physicians (MDs), osteopathic physicians (DOs), nurse practitioners (NPs), and physician assistants (PAs) who provide primary care in California, this report pools data from several different sources. Data from the California Department of Consumer Affairs (DCA), the umbrella agency for licensing boards in California, are used to provide head counts of persons with active California licenses in these professions. Information on the numbers of MDs, DOs, NPs, and PAs in California's labor force is drawn from the Bureau of Labor Statistics Occupational Employment Statistics (OES). This survey also collects data on physicians' specialties which are used to compare primary care physicians to non-primary care physicians and to compare physicians in different primary care specialties (i.e., family/general practice, general internal medicine, general pediatrics, and obstetrics/gynecology).

The DCA and OES data are useful for making direct comparisons across professions but they omit some variables that are important for estimating the supply of primary care clinicians. For example, neither the DCA nor the OES datasets contain information on whether NPs or PAs are providing primary care. The OES has information on physicians' specialties but only includes physicians who are employees; it does not include physicians in solo practice or partnerships. Due to the limitations of the DCA and OES datasets, analyses of data from these sources are augmented with analyses of data from other, profession-specific sources. Data on primary care MDs were obtained from the Medical Board of California (MBC), which is required by law to administer a survey to MDs every two years in conjunction with licensure renewal. This survey asks MDs to provide information about their specialties, number of hours worked, professional activities, practice location, and demographic characteristics. For NPs, data were obtained from a survey conducted by the California Board of Registered Nursing in 2010.[2] A limited amount of data for PAs was obtained from the National Commission on Certification of Physician Assistants (NCCPA).[3]

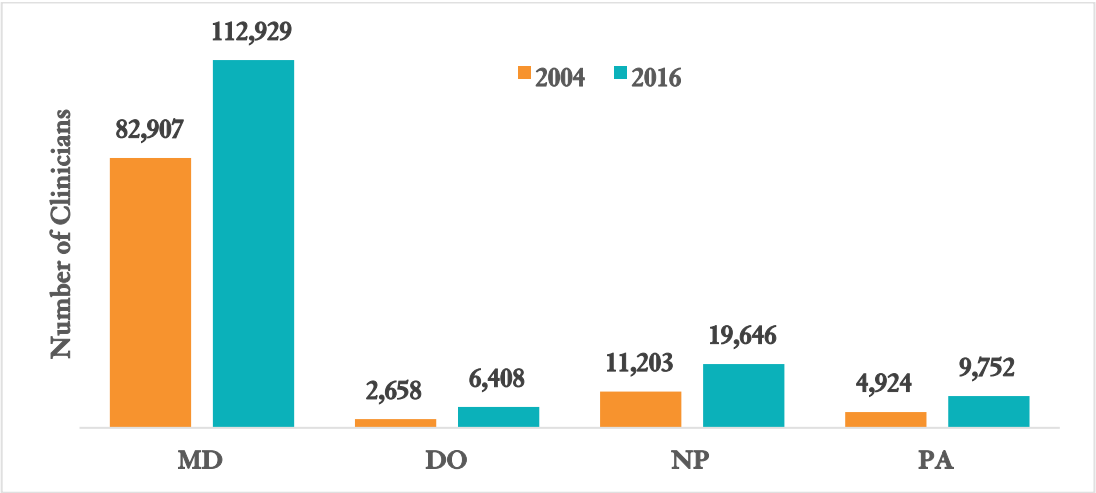
Total Clinician Supply

The total numbers of licensed MDs, DOs, NPs, and PAs in California grew substantially over the last decade. Based on DCA data, the total number of MDs, DOs, NPs, and PAs in California increased by 46% from 2004 to 2016, growing from 101,692 to 148,735 over this time period. (Figure 1.1). MDs had by far the largest number of licensed professionals in both time periods and also experienced the largest increase in the absolute number of licensed professionals (+ 30,022). However, the rate of growth in the DO, NP, and PA, workforces in California outpaced the rate of growth of the MD workforce during this time period. Whereas the number of licensed MDs grew by 36%, the number of licensed DOs grew by 141% and the numbers of licensed NPs and PAs grew by 75% and 98%, respectively. As a consequence of these changes, the percentage of NPs and PAs among clinicians in these four professions increased from 16% to 20%. (See Figure 1.2.)

[2] A new survey of nurse practitioners is currently being fielded but findings will not be published until late 2017.

[3] The California Osteopathic Medical Board began fielding a survey similar to the MBC survey in mid-2016 and findings will be available in the future.

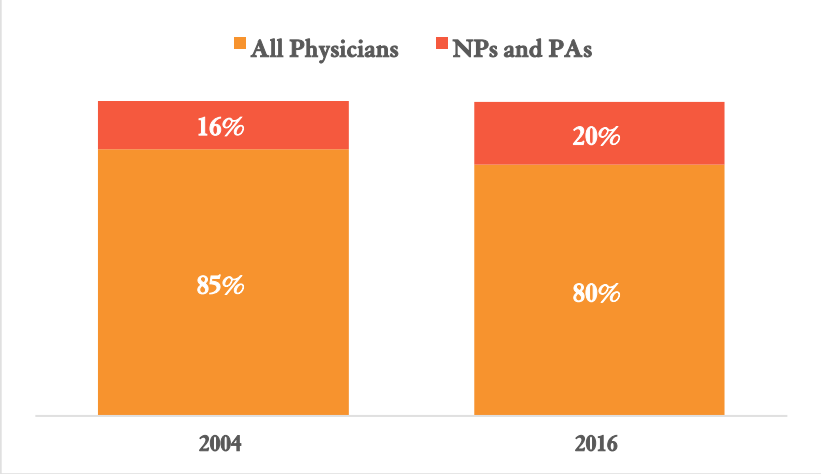
Figure 1.1: Change in the Number of Clinicians by Profession in California from 2004 to 2016



Source: California Department of Consumer Affairs, 2016; special request, private tabulation. See technical appendix for additional detail.

Note: Counts include all licensees with current and active license, not just those who provide primary care.

Figure 1.2: Changes in the Composition of the Clinician Workforce in California from 2004 to 2016



Source: California Department of Consumer Affairs, 2016; special request, private tabulation.

Note: Counts include all licensees with current and active license, not just those who provide primary care. "All Physicians" includes both allopathic (MD) and osteopathic (DO) physicians.

A major limitation of the DCA data is that they include all persons with active licenses regardless of whether they are practicing their profession. The OES data provide better estimates of the numbers of clinicians in the workforce because they only include clinicians who are employed. Table 1.1. presents estimates from the OES of the numbers of primary care physicians (MDs and DOs), NPs, and PAs employed in California in 2005 and 2015. As noted previously, for this project primary care specialties are defined as family/general practice, general internal medicine, general pediatrics, general practice, geriatrics, and obstetrics/gynecology. Although physicians in other specialties may provide primary care to some of their patients, a standard approach to estimating primary care physician supply is to identify the numbers of physicians in primary care specialties.

The OES estimates suggest that the total number of employed primary care physicians (MDs and DOs) and PAs in California increased substantially between 2005 and 2015. Between 2005 and 2015, the number of employed PAs in California rose more rapidly than the number of employed primary care physicians (69% vs. 54%), but the total number of employed PAs remained one-third of the number of employed physicians. Among primary care physicians, family physicians and general practitioners had the largest numbers of employed physicians in both 2005 and 2015 and experienced the largest increase in the number of employed physicians. General internists had the smallest increase in the number of employed physicians. Change over time in employment of NPs could not be assessed because OES did not report an estimate of the number of NPs employed in California in 2005.

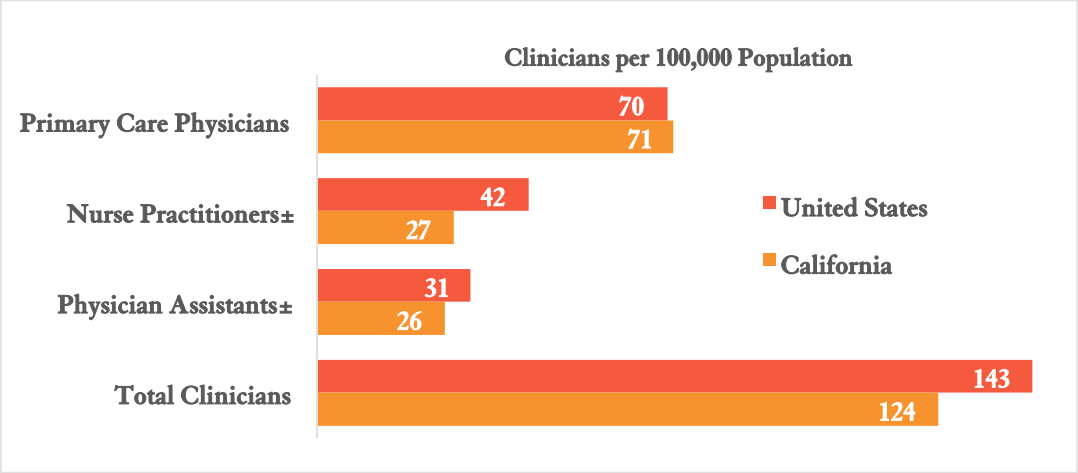
Table 1.1. Employment of Primary Care Clinicians in California, 2005 and 2015

	2005		2015		
	Number of Clinicians	% of All Clinicians**	Number of Clinicians	% of All Clinicians	% Growth
Family and General Practitioners*	9,660	40%**	16,400	34%	70%
General Internists*	4,610	19%**	5,150	11%	12%
General Pediatricians*	2,290	10%**	4,010	8%	75%
Obstetrician/ Gynecologists*	1,500	6%**	2,300	5%	53%
Primary Care Physicians	18,060	75%**	27,860	57%	54%
Nurse Practitioners±	Not Reported	Unable to calculate due to lack of NP estimate for 2005	10,720	22%	Unable to calculate due to lack of NP estimate for 2005
Physician Assistants±	5,920	25%**	10,010	21%	69%
Total	23,980**	100%**	48,590	100%	Unable to calculate due to lack of NP estimate for 2005

Source: Bureau of Labor Statistics, Occupational Employment Statistics, 2005 and 2015.
*The BLS OES data do not distinguish between MD and DO physicians. The data also understate the number of practicing physicians because they only include employed physicians. Physicians who are in solo practice or in partnerships are excluded.
± Includes all NPs and PAs regardless of whether they provide primary care.
** Does not include NPs.
Note: "Primary Care Physicians" consists of physicians in the primary care specialties listed in this table.

Figure 1.3. compares ratios of employed primary care clinicians per 100,000 population in California and the United States (US) in 2015. Converting numbers of primary care clinicians to ratios of primary care clinicians to population creates standardized metrics that can be used to compare clinician supply across geographic areas. In 2015, the ratios of employed primary care physicians (MDs and DOs) to population were similar in California and the US. In contrast, ratios of employed NPs and employed PAs to population were substantially lower in California than the US overall, which led to a lower overall per-capita supply of primary care physicians, NPs, and PAs in the state than in the US nationwide. Across these professions, California had a ratio of 124 clinicians per 100,000 population, whereas the US had a ratio of 143 clinicians per 100,000 population.

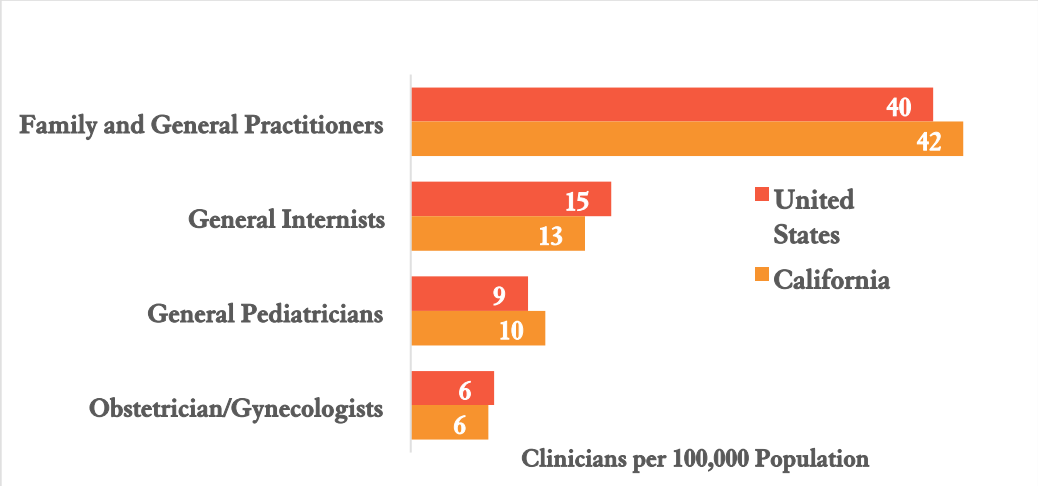
Figure 1.3. Ratios of Employed Clinicians to Population California vs. the United States, 2015



Source: Bureau of Labor Statistics, Occupational Employment Statistics, 2015. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015.
± Includes all NPs and PAs regardless of whether they provide primary care.
Note: The BLS OES data do not distinguish between MDs and DOs. The data also understate the number of practicing physicians because they only include employed physicians. Physicians who are in solo practice or in partnerships are excluded.

Figure 1.4. displays ratios of employed primary care physicians (MDs and DOs) per 100,000 population by specialty in California and the United States in 2015. California had slightly higher ratios of general pediatricians and family and general practitioners to population than the United States overall. Conversely, the United States overall had slightly lower ratios of general internists and obstetrician/gynecologists to population than California.

Figure 1.4. Ratios of Employed Primary Care Physicians per 100,000 Population, California vs. the United States, 2015

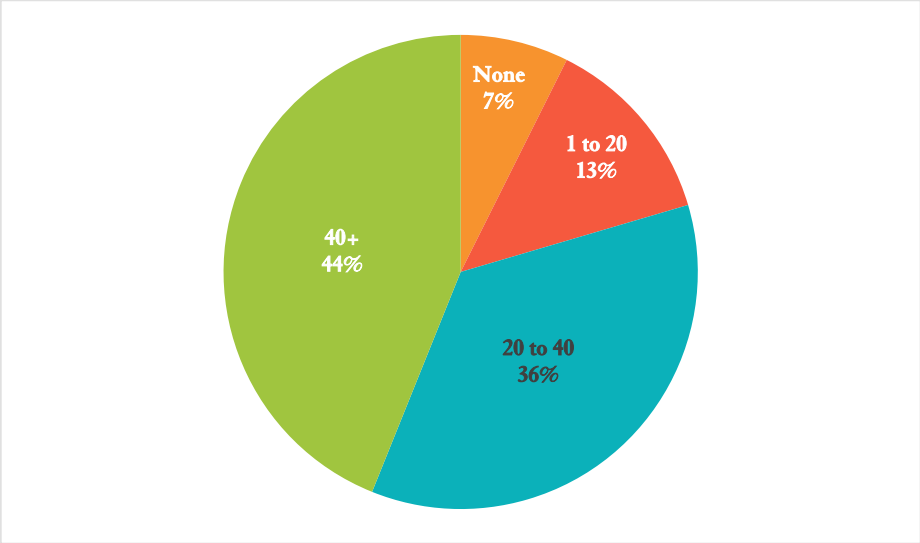


Source: Bureau of Labor Statistics, Occupational Employment Statistics, 2015. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015.
Note: The BLS OES data do not distinguish between MDs and DOs. The data also understate the number of practicing physicians because they only include employed physicians. Physicians who are in solo practice or in partnerships are excluded.

Allopathic Primary Care Physician (MD) Supply

Data from the Medical Board of California's (MBC) mandatory survey of MDs provide more precise estimates of the numbers of MDs in California who provide primary care than the OES data. One of the most important questions on the MBC survey concerns the amount of patient care that MDs provide. Figure 1.5. below shows that 93% of active primary care MDs provide at least one hour of patient care per week. Eighty percent provide at least 20 hours of patient care per week and 44% provide at least 40 hours of patient care per week. Only seven percent of active primary care MDs provide no patient care at all. The distribution of hours worked by MDs in specialty practice is largely similar to that of primary care MDs, except a larger proportion of specialist MDs provide 40 or more hours of patient care per week (49% of specialists compared to 44% of PCPs).

Figure 1.5: Primary Care MDs in California by Hours of Patient Care per Week, 2015



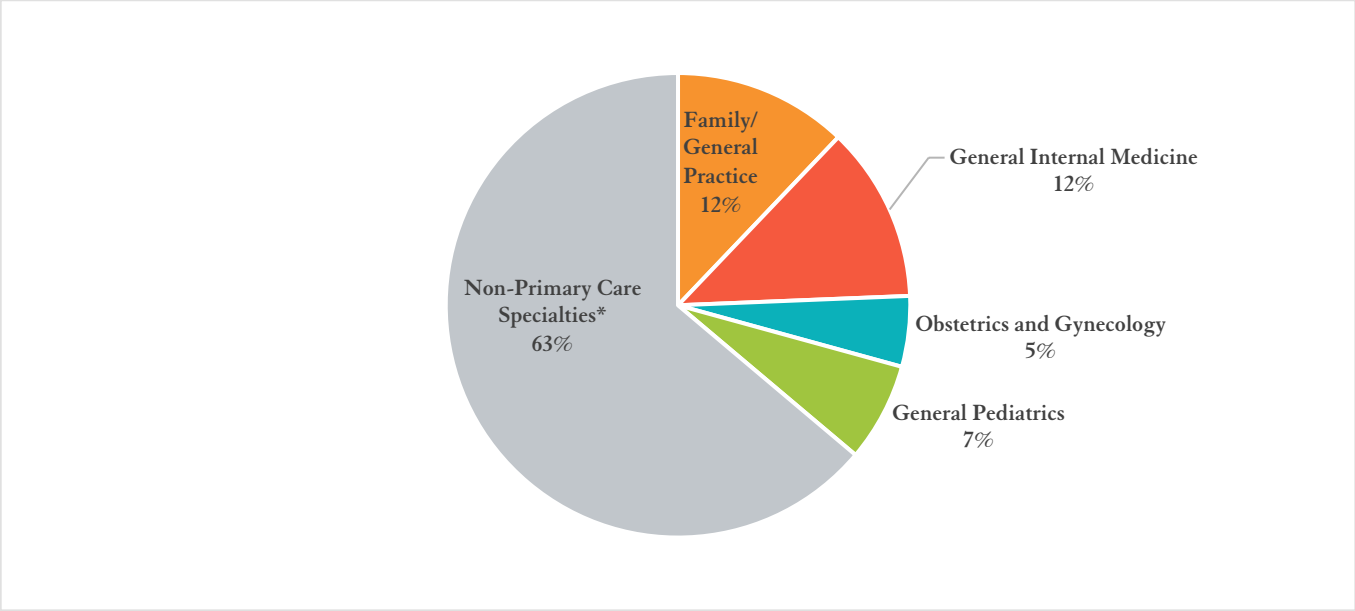
Source: 2015 Medical Board of California Mandatory Survey
Note: Excludes inactive physicians and residents/fellows

The remainder of this subsection presents findings for MDs who provide at least 20 hours of patient care per week. This definition is consistent with previous reports on the supply and distribution of physicians in California.[4] The specification of patient care hours is an important feature of this report because some other studies include physicians that spend considerably less time on patient care in their estimates of physician supply.

According to responses to the Medical Board's 2015 survey, there were 22,429 licensed MDs in primary care specialties who had completed training and provided patient care in California at least 20 hours per week. These primary care MDs accounted for 36% of all MDs in California who provide patient care at least 20 hours per week. (Figure 1.6.). Family physicians and general internists each account for 12% of MDs and general pediatricians and obstetrician/gynecologists account for 7% and 5% of MDs, respectively.

[4] K. Grumbach, A. Chattopadhyay, and A.B. Bindman. Fewer and More Specialized: A New Assessment of Physician Supply in California. Oakland, CA: California HealthCare Foundation, 2009.

Figure 1.6 Distribution of Active MDs by Specialty, 2015



Source: 2015 Medical Board of California Mandatory Survey.
Note: *Non-Primary Care Specialties consists of the specialties not listed explicitly in the figure (i.e. all specialties except Family and General Medicine, General Internal Medicine, General Pediatrics, and Obstetrics and Gynecology.)

A comparison of estimates of numbers of primary care MDs in California who provide patient care at least 20 hours per week in 2008 and 2015 suggests that the total number decreased over this time period from 24,937 to 22,429 physicians. (See Table 1.2.) This decrease in the number of primary care MDs providing patient care at least 20 hours per week led to a reduction in the ratio of primary care physicians to population from 68 to 57 primary care physicians per 100,000 population. The data also suggest that there are substantial differences in trends across specialties. The numbers of family physicians (including general practitioners) and obstetrician/gynecologists grew slightly, whereas the numbers of general internists and general pediatricians decreased.[5]

[5] These findings should be interpreted with caution because the Medical Board changed the response options to questions regarding physician specialties in 2014. Some of the differences observed may be due to differences in the response options selected by similarly trained physicians in 2008 and 2015.

Table 1.2. Numbers of MDs in Primary Care Specialties Providing Patient Care at least 20 Hours per Week and Ratios per 100,000 Population in California, 2008 and 2015

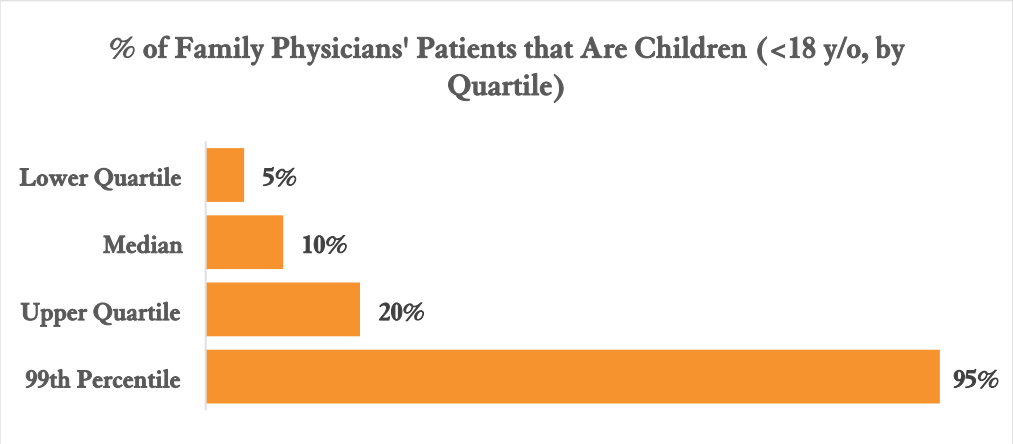
	Number		Ratio per 100k Population	
	2008	2015	2008	2015
Family Physicians	7,422	7,543	20	19
General Internists	9,342	7,546	25	19
General Pediatricians	5,102	4,221	14	11
Obstetrician/Gynecologists	3,071	3,119	8	8
Primary Care MDs	*24,937*	*22,429*	*68*	*57*
All MDs	66,480	61,198	181	156

Source: K Grumbach, A Chattopadhyay, AB Bindman. Fewer and More Specialized: A New Assessment of Physician Supply in California. Oakland, CA: California Health Care Foundation, 2009; Medical Board of California, Survey of Licensees, May 2015; private tabulation. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2013 and April 1, 2010 to July 1, 2015, Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2008.

Note: Geriatricians included with General Internists and General Practitioners included with Family Physicians for the purposes of these calculations

Family physicians are trained to care for patients of all ages, whereas general pediatricians and general internists are trained to care for children and adults, respectively. Estimating the extent to which family physicians care for children is important for assessing the adequacy of the supply of pediatric primary care provides. Figure 1.7. below displays data on the proportion of active patient care family physicians' patients that are children, or less than 18 years of age. The median percentage is 10%. This estimate indicates that children and adolescents accounted for 10% or less of patients in half of family physicians' practices in California. Seventy-five percent of active patient care family physicians had 5% or more patients aged less than 18 years and 25% had 20% or more patients aged less than 18 years. These findings suggest that most family physicians primarily treat adults but that some have substantial numbers of children in their practices.

Figure 1.7. Provision of Care to Pediatric Patients by Active Patient Care Family Medicine Physicians in California, 2015



Source: 2015 Medical Board of California Mandatory Survey.
Note: This figure uses the same definition of "active patient care" used in other sections of the report (i.e. "active patient care physicians are those that provide at least 20 hours of patient care per week).

Osteopathic Primary Care Physician (DO) Supply

Data regarding the number and proportion of DOs in California in primary care specialties are not available, but national data are available from the American Osteopathic Association. If the specialty distribution of DOs in California is consistent with the distribution of DOs in the US overall, DOs are much more likely to practice in primary care specialties than MDs. As illustrated in Table 1.3. during the past 20 years, over 60% of DOs nationwide have practiced in primary care specialties. In contrast, only 36% of MDs in California in 2015 practiced in primary care specialties. The distribution of DOs across primary care specialties has changed substantially over the past 20 years. The percentage of DOs in family or general practice decreased from 45% in 1994 to 37% in 2014, whereas the percentage in general internal medicine increased from 7% to 15% during this time period.

Table 1.3. Percentage of Active DOs in Primary Care Specialties in the United States, Select Years

	1994	2005	2014
Family and General Practice	45%	46%	37%
General Internal Medicine	7%	8%	15%
Pediatrics and Adolescent Medicine	3%	3%	6%
Obstetrics/Gynecology	3%	3%	5%
Primary Care, Total	61%	62%	63%

Source: American Osteopathic Association, Osteopathic Medical Profession Report, 2005 and 2014 (data from AOA Physician Masterfile, as of May 31, 1994, May 31, 2005, and May 31, 2014 for years 1994, 2005, and 2014 respectively).

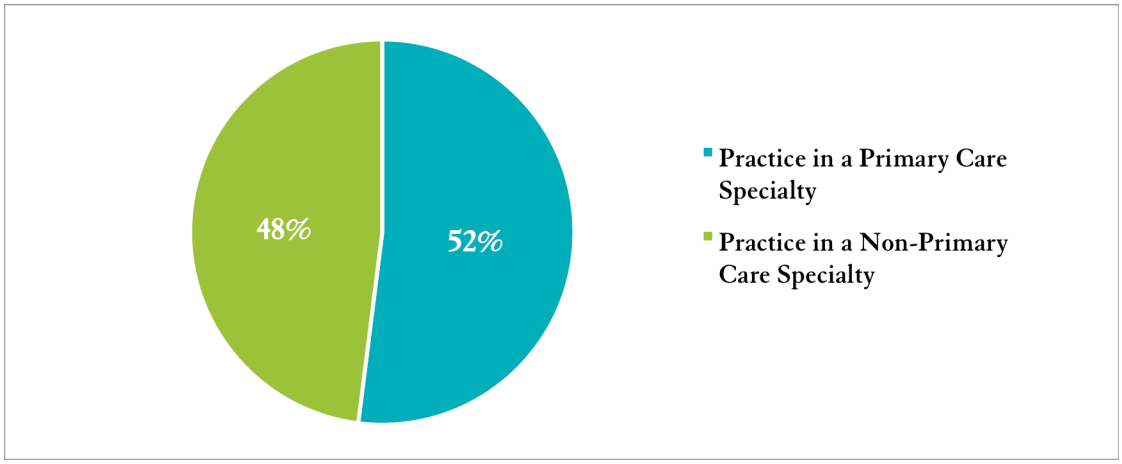
Primary Care Nurse Practitioner Supply

Several methods have been used to estimate the number and proportion of NPs who provide primary care.[6] One method examines the type of education program that a NP completes, which is consistent with the method typically used to identify primary care physicians. This method has been criticized because some NPs do not practice in the specialty in which they were trained. Another method involves identifying NPs who practice in settings in which they are likely to provide primary care, such as community clinics and physician offices. Two additional methods rely on self-reported data from NPs about their clinical specialties and whether they provide primary care. The use of self-reported data on whether an NP practices in a primary care specialty is consistent with the method the NCCPA uses to estimate the percentage of PAs who practice predominantly in primary care specialties.

[6] Spetz, E. Fraher, Y Li, T Bates. How Many Nurse Practitioners Provide Primary Care? It Depends on How You Count Them. Medical Care Research and Review. 2015;72(3):359-375.

Figure 1.8. displays estimates of the percentage of NPs providing primary care in California that are derived from responses to a survey conducted for the California Board of Registered Nursing in 2010. Although these data are not current, at present they are the best data available to estimate the percentage of California NPs who provide primary care.[7] These estimates suggest that 52% of California NPs report that they practice in a primary care specialty. This percentage is lower than the percentage of DOs in primary care (63%) but higher than the percentages of MDs and PAs (36% and 26%, respectively).

Figure 1.8. Percentage of California NPs Practicing in a Primary Care Specialty, 2010



Source: J. Spetz, E. Fraher, Y Li, T Bates. How Many Nurse Practitioners Provide Primary Care? It Depends on How You Count Them. *Medical Care Research and Review*. 2015;72(3):359-375.

Primary Care Physician Assistant Supply

Information about the number of PAs in California is available from three sources: DCA (derived from data collected by the California PA licensing board), OES, and the National Commission on Certification of Physician Assistants (NCCPA). DCA data indicate that 9,752 PAs were licensed by the state and located in California in 2015. The OES estimates suggest that there were 10,010 employed PAs in California in 2015, while the NCCPA reported that there were 8,196 certified PAs in California in 2015. One possible explanation for the difference between the DCA and OES estimates is that the DCA data are from a census of licensed PAs, whereas OES creates estimates of numbers of PAs based on a sample survey that may overestimate the number of PAs in California. An explanation for the difference between the DCA and NCCPA estimates is that California law permits PAs to be licensed without being nationally certified if they meet certain conditions for licensure. A spokesperson for the PA Board of California estimates that less than 10% of licensees are not NCCPA certified.[8]

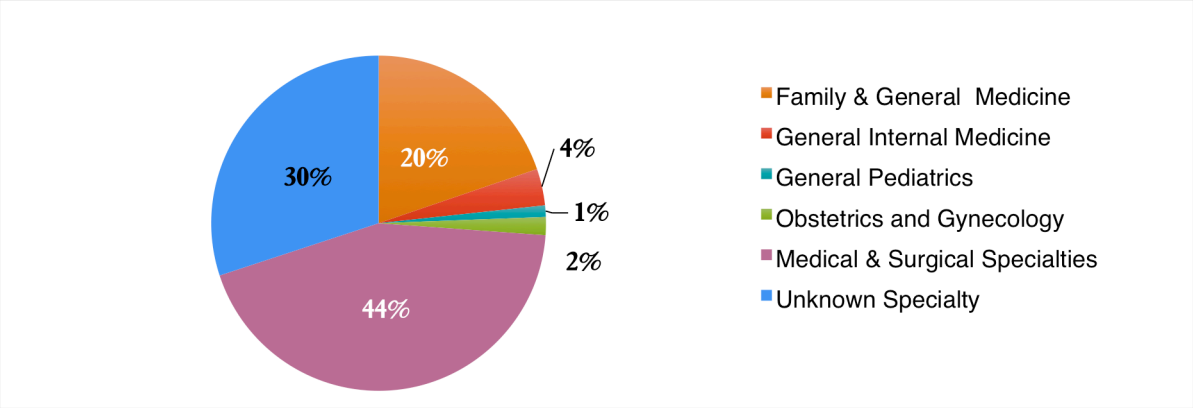
[7] The California Board of Registered Nursing has funded a new survey of nurse practitioners that is currently being conducted. Findings are expected to be published by the end of 2017.

[8] Physician Assistant Board of California, personal communication, January 2017.

The PA profession was developed in 1960 in response to primary care clinician shortages and family medicine remains the largest single PA specialty.[9] However, flexibility to move between specialties is a hallmark of the PA profession that allows PAs to respond to changes in the labor market. Half of all clinically active PAs change specialties sometime in their career.[10] Market forces including salaries and job availability have drawn many PAs into specialty practice. In 2014 only 21% of PA jobs openings in California, and 19% of PA job openings nationally, were in primary care fields.[11]

Career flexibility among PAs adds a layer of complexity to counting the number of PAs in who provide primary care. The California PA licensing board does not collect specialty data on California PAs at the state level, nor does the OES collect data on the specialties of PAs at the national level. The NCCPA collects data about the predominant specialty in which certified PA practice. These data reveal that 26% of certified PAs in California (2,143 PAs) practiced predominately in a primary care specialty (family medicine, general internal medicine, general pediatrics, or obstetrics/gynecology), while 44% practiced in a medical or surgical specialty. The remaining 30% did not declare the specialty in which they practice. (Figure 1.9.) The largest single primary care specialty among California PAs was family medicine representing 80% of PAs who reported that they practiced predominantly in a primary care specialty. In contrast, family physicians account for only 33% of primary care MDs and only 58% of primary care DOs.

Figure 1.9. Distribution of Physician Assistants by Specialty, California, 2016



Source: The National Commission on Certification of Physician Assistants, Limited Data from 2015 Profile of Certified Physician Assistant, 2016. special request, private tabulation.
Note: N=5,733 of 8,196 certified California PAs (response rate to specialty questions = 70%)

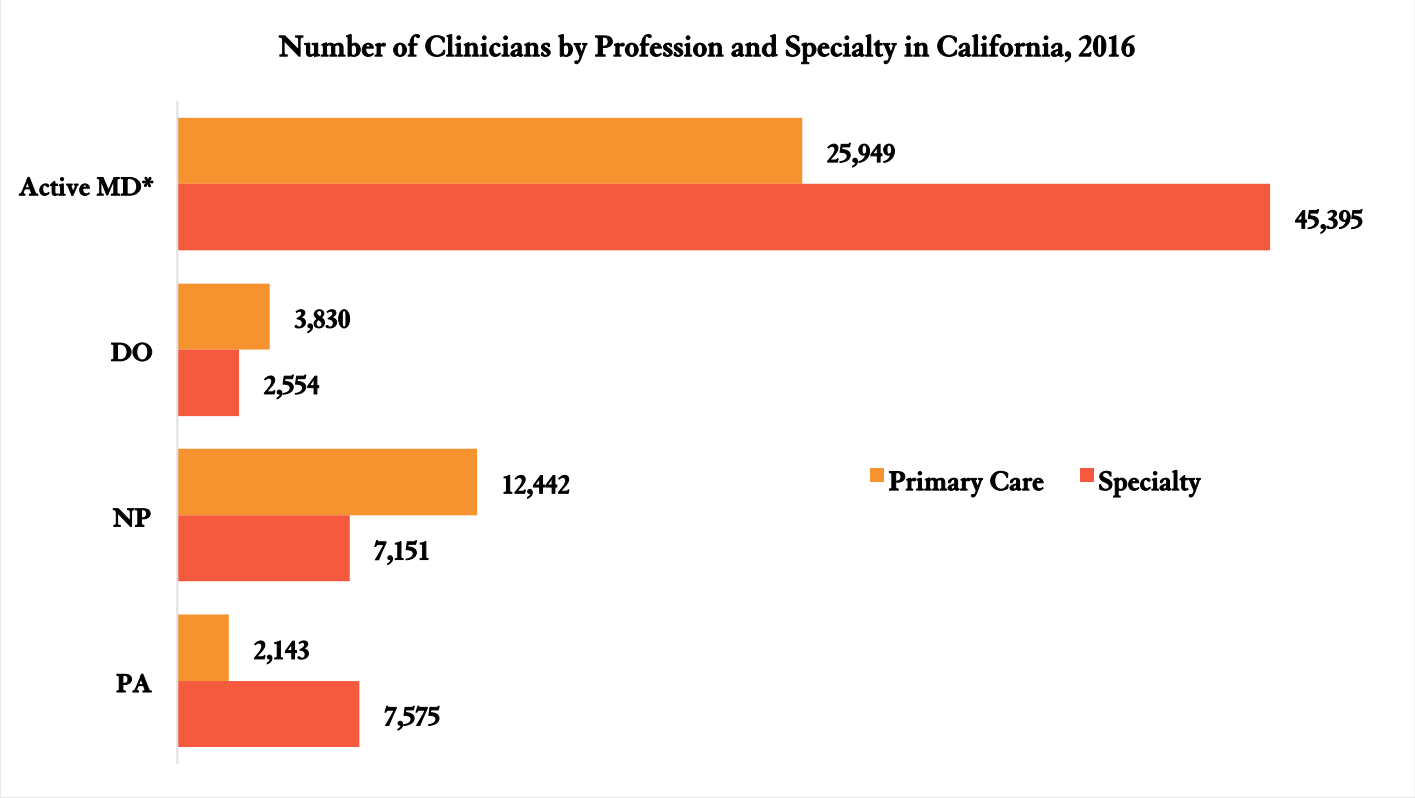
Summary

Figure 1.10. presents best estimates of the numbers and percentages of MDs, DOs, NPs, and PAs who provide primary care in California, drawing from all of the available sources of data. These estimates suggest that California had 44,364 primary care clinicians in 2016, composed of 25,949 primary care MDs, 3,830 primary care DOs, 12,442 primary care NPs, and 2,143

[9] Mittman DE, Cawley JF, Fenn WH. Physician Assistants in the United States. BMJ 2002;31(7362):485-487.
[10] R.S. Hooker, J.F. Cawley, W. Leinweber. Career Flexibility of Physician Assistants and the Potential for More Primary Care. Health Affairs (Millwood). 2010;29(5):880-886.
[11] P. Morgan, K. Himmerick, B. Leach, P. Dieter, C. Everett. Scarcity of Primary Care Positions May Divert Physician Assistants into Specialty Practice. Medical Care Research and Review. 2017;74(1):109-122. Special request, private tabulation for state level analysis.

primary care PAs. For MDs, this figure includes all MDs who provide patient care not just those who provide 20 hours or more per week to better align the estimates with estimates of numbers of DOs, NPs, and PAs. While MDs make up the greatest number of licensed primary care clinicians, only 36% of MDs who provide patient care more than 20 hours per week are primary care physicians. The percentage of PAs in California who provide primary care is also small (22%). In contrast, approximately 60% of DOs and 64% of NPs provide primary care.

Figure 1.10. Number of Clinicians by Profession and Specialty in California, 2016



Source: California Department of Consumer Affairs, 2016; special request, private tabulation. Medical Board of California, Survey of Licensees, May 2015; private tabulation of active MDs. Medical Board of California, Survey of Licensees, May 2015; private tabulation of primary care and specialty practice in 2016. American Osteopathic Association, Osteopathic Medical Profession Report, 2014. J. Spetz, E. Fraher, Y Li, T Bates. How Many Nurse Practitioners Provide Primary Care? National Commission on Certification of PAs, Profile Data 2016, special request, private tabulation. See technical appendix for additional detail.

*Includes all active MDs providing at least one hour of patient care per week except those not practicing in California and those not in Two-Year Cohort (see technical appendix for more information on this exclusion).

Chapter 2: Geographic Distribution of Primary Care Clinicians

California is such a large and geographically diverse state that statewide estimates of the supply of primary care clinicians mask substantial variation in supply across the state. This chapter presents data on the distribution of allopathic physicians (MDs), osteopathic physicians (DOs), nurse practitioners (NPs), and physician assistants (PAs) across nine regions of the state. The boundaries of these regions are consistent with the boundaries of regions used by the California Health Interview Survey (CHIS). A list of counties in each of the CHIS regions appears in the technical appendix.

Data on the location of licensed MDs, DOs, NPs, and PAs were obtained from the California Department of Consumer Affairs (DCA), the umbrella agency for California's licensing boards. An important limitation of DCA's data is that they do not include information about clinicians' specialties. In addition, the DCA data only indicate the number of active license holders and not the number of license holders who provide patient care. For MDs, DCA estimates for the total number of MDs by region are augmented with data from the Medical Board of California's (MBC) mandatory survey on the numbers of primary care MDs in each region. For PAs, data from the National Commission on Certification of Physician Assistants (NCCPA) were used to determine the number of primary care PAs in each region. Similar sources of data were not available to estimate numbers of primary care DOs and NPs by region.

Geographic Distribution of All MDs, DOs, NPs, and PAs

Table 2.1. lists the numbers of licensed MDs, DOs, NPs, and PAs in each of the nine CHIS regions in 2016. Across the nine regions, the Greater Bay Area had the largest total number of clinicians in the four professions followed closely by Los Angeles County. The Greater Bay Area has the largest number of MDs and NPs but Los Angeles County has the largest numbers of DOs and PAs. The Northern and Sierra region had the smallest numbers of clinicians in all four professions.

Table 2.1. Number of Licensed MDs, DOs, NPs, and PAs by Region of California, 2016

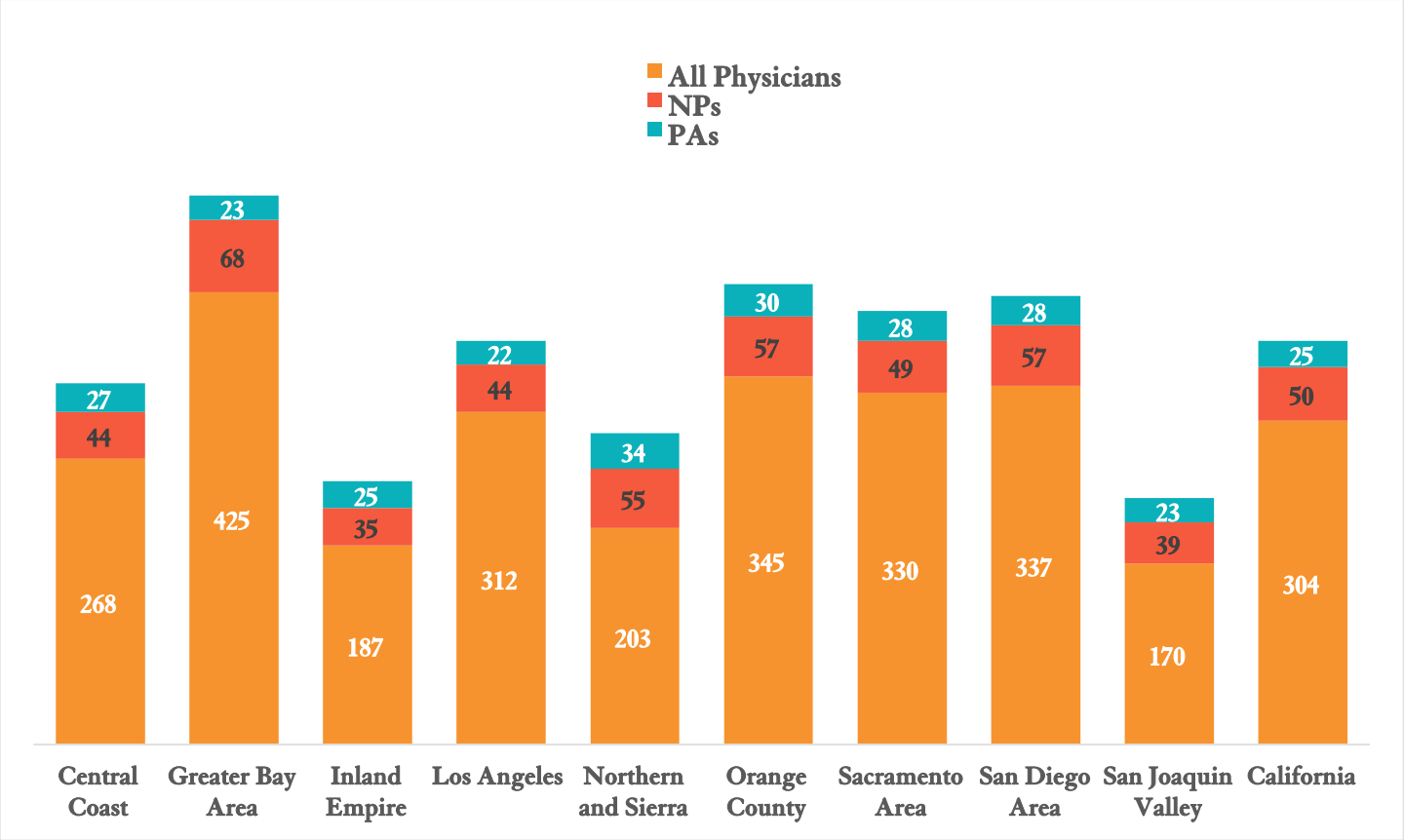
Region	MDs	DOs	NPs	PAs	All Clinicians
Central Coast	5,918	370	1,023	638	7,949
Greater Bay Area	31,469	1,023	5,216	1,720	39,428
Inland Empire	7,416	969	1,573	1,134	11,092
Los Angeles	30,282	1,479	4,514	2,250	38,525
Northern and Sierra	2,596	266	780	476	4,118
Orange County	10,262	686	1,797	951	13,696
Sacramento Area	7,136	378	1,103	641	9,258
San Diego Area	11,037	678	1,981	962	14,658
San Joaquin Valley	6,526	535	1,606	946	9,613
California	**112,642**	**6,384**	**19,593**	**9,718**	**148,337**

Source: California Department of Consumer Affairs, 2016; special request, private tabulation.
Note: Counts include all licensees with current and active license, regardless of whether they provide primary care.

Some variation in clinician supply across regions of California is to be expected because the population of the state's regions varies substantially. Most notably, Los Angeles County was home to 10.2 million people in 2016, whereas the 25 counties that make of the Northern and Sierra region were home to only 1.4 million people.[12] To facilitate comparison of the supply of clinicians relative to population across regions, Figure 2.1. presents ratios of licensed physicians (MDs and DOs combined), NPs, and PAs per 100,000 population by region in 2016. These ratios indicate that provider capacity in these professions varies substantially across regions of California. The ratio of licensed clinicians in all four professions ranges from a low of 232 in the San Joaquin Valley to a high of 516 in the Greater Bay Area. Regions that encompass large metropolitan areas, such as the Greater Bay Area, Los Angeles, Orange, and San Diego regions, generally have the highest ratios of MDs, DOs, and NPs to population and the Inland Empire and San Joaquin Valley regions have the lowest ratios. In contrast, the Northern and Sierra region has the highest ratio of PAs to population while Los Angeles has the lowest ratio.

[12] California Department of Finance, Demographic Research Unit. Population Estimates for Cities, Counties, and the State, January 1, 2015 and 2016. http://www.dof.ca.gov/Forecasting/Demographics/

Figure 2.1. Ratio of Licensed Professionals per 100,000 Population in Primary Care Professions by Region of California, 2016

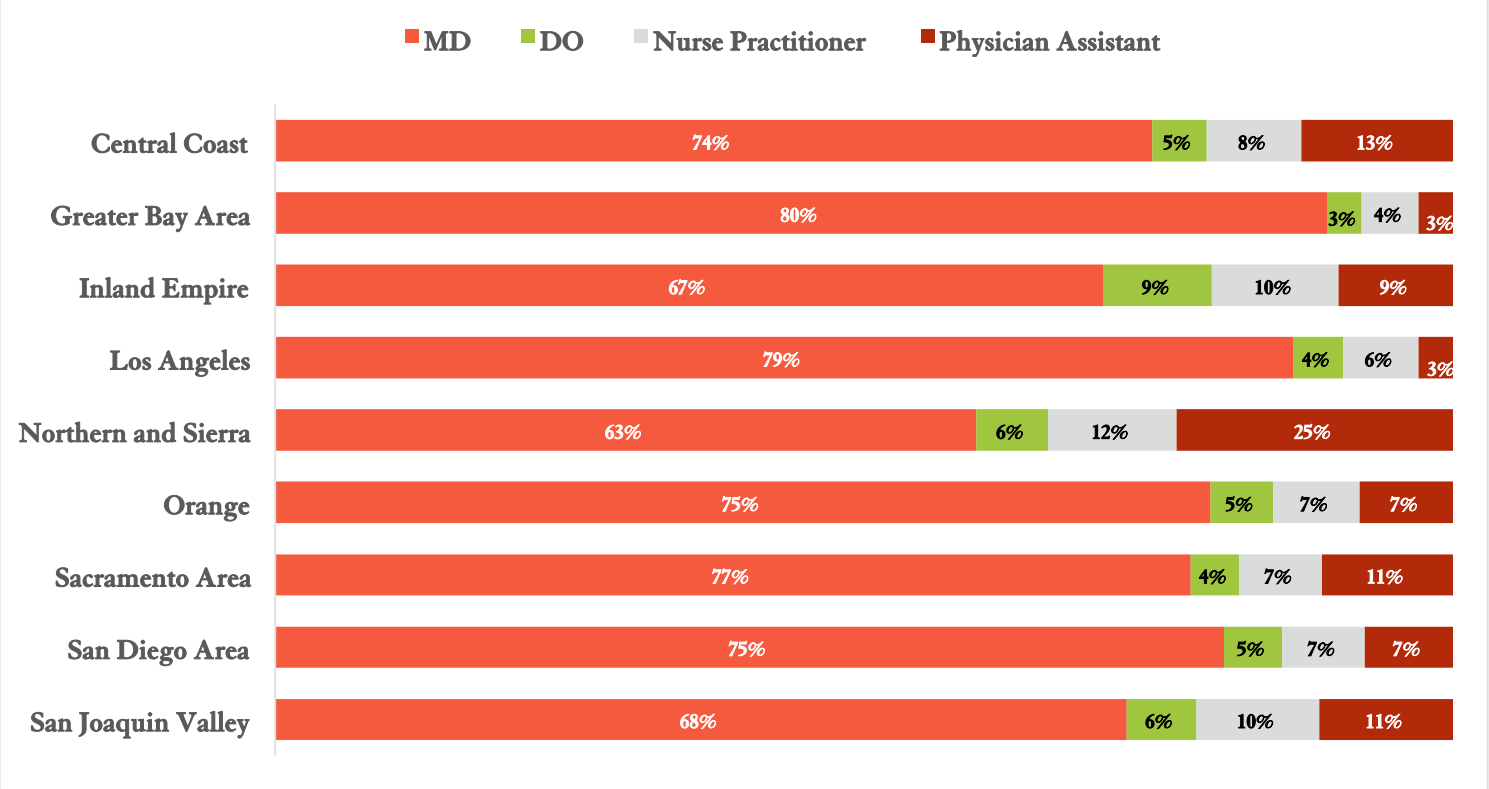


Source: California Department of Consumer Affairs, 2016; special request, private tabulation. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July1, 2015. Note: Counts include all licensees with current and active license, regardless of whether they provide primary care.

Another way of assessing geographic distribution is to compare the proportions of MDs, DOs, NPs, and PAs among licensees in these four professions by region. As Figure 2.2. illustrates, the percentages of clinicians in each profession varies substantially across regions. In 2016, the proportion of clinicians who are MDs ranges from a low of 63% in the Northern and Sierra Counties to a high of 80% in the Greater Bay Area. Conversely, NPs and PAs account for the highest proportions of clinicians in the Northern and Sierra region and the lowest proportions in the Greater Bay Area and Los Angeles regions. NPs and PAs constitute a higher percentage of the workforce in regions with low ratios of primary care physicians to population. This finding is consistent with previous research that suggests that NPs and PAs fill gaps in access to care in underserved areas of California.[13]

[13] Grumbach K, Hart LG, Mertz E, Coffman J, Palazzo L (2003). Who is Caring for the Underserved? A Comparison of Primary Care Physicians and Non-physician Clinicians in California and Washington. Annals of Family Medicine. 1(1):97-104.

Figure 2.2. Licensed MDs, DOs, NPs, and PAs by Proportion of the Workforce in Regions of California, 2016

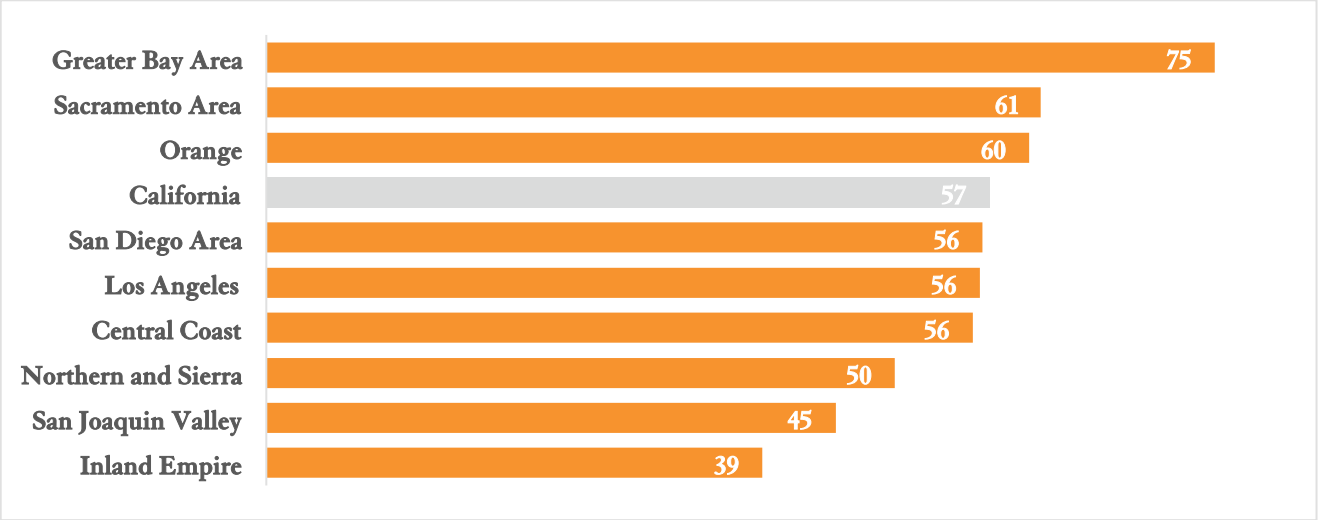


Source: California Department of Consumer Affairs, 2016; special request, private tabulation.
Note: Counts include all licensees with current and active license, not just those who provide primary care.

Geographic Distribution of Primary Care MDs

Figure 2.3. displays ratios of primary care MDs per 100,000 population in each of the CHIS regions. These estimates only include primary care MDs who provide patient care at least 20 hours per week. These ratios range from a low of 39 primary care MDs per 100,000 population in the Inland Empire to a high of 75 per 100,000 in the Greater Bay Area. Six of the nine CHIS regions fall below the statewide ratio of 57 primary care MDs per 100,000 population, including both predominantly urban and predominantly rural regions. Regions with low ratios of primary care MDs to population are generally poorer and more rural than areas with high ratios of primary care MDs to population.

Figure 2.3. Active Patient Care Primary Care MDs* per 100,000 Population, by Region of California, 2015



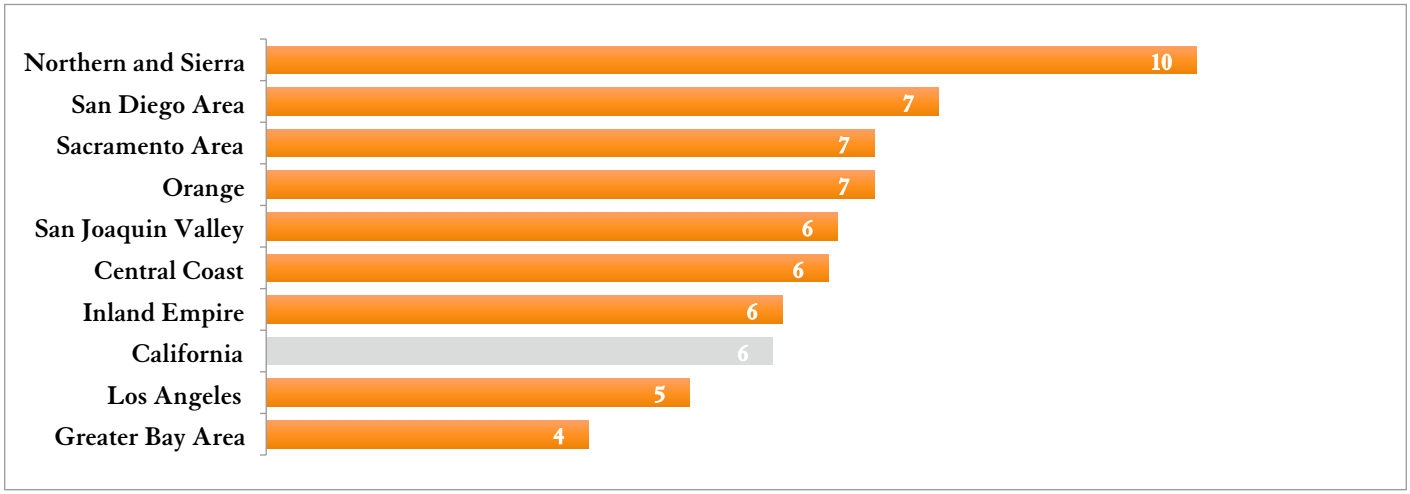
Sources: Medical Board of California, Core License File, May 2015; private tabulation. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July1, 2015.
*Includes Family Physicians, General Internists, General Pediatricians, General Practitioners, Geriatricians, and Obstetrician/Gynecologists
Note: Includes active MDs, excludes residents and fellows as well as MDs who do not provide at least 20 hours of patient care per week.

Geographic Distribution of Physician Assistants

Figure 2.4. displays NCCPA data on the distribution of primary care PAs relative to the population in the various regions of California. The Greater Bay Area and the Los Angeles area, the regions of the state with the largest urban cores, had the lowest ratios of primary care PAs per 100,000 population (4 per 100,000 persons and 5 per 100,000 persons, respectively). The most rural region of the state, the Northern and Sierra region, had the highest ratio of PAs per 100,000 population (10 per 100,000 population). These findings are consistent with previous studies that have found that PAs expand access to care in rural areas.[14]

[14] Grumbach K, Hart LG, Mertz E, Coffman J, Palazzo L (2003). Who is Caring for the Underserved? A Comparison of Primary Care Physicians and Non-physician Clinicians in California and Washington. Annals of Family Medicine. 1(1):97-104.

Figure 2.4. Licensed Primary Care Physician Assistants Per 100,000 Population in California, by Region, 2016



Source: The National Commission on Certification of Physician Assistants, Limited Data from 2015 Profile of Certified Physician Assistant, 2016. Special request, private tabulation. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015.

Chapter 3: Characteristics of Primary Care Clinicians

Demographic Characteristics

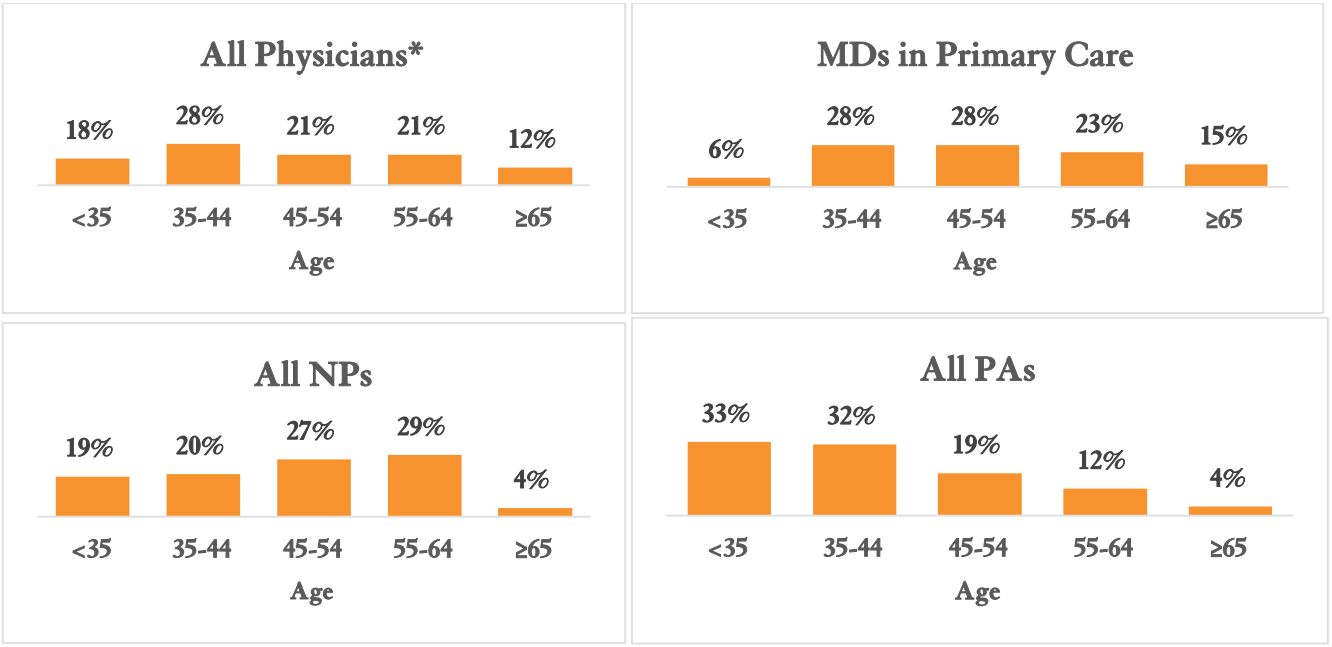
Assessment of demographic characteristics of primary care clinicians is important to anticipate whether future supply will be sufficient to meet future demand. Findings from comparisons of the age, gender, and race/ethnicity of allopathic and osteopathic physicians (MDs and DOs combined), nurse practitioners (NPs) and physician assistants (PAs) are presented. These estimates are derived from the American Community Survey, Public Use Microdata Sample (ACS PUMS). This data source was chosen because all professions are represented in the same source, which facilitates direct comparisons across professions. However, an important limitation of the ACS PUMS is that estimates are for each profession as a whole, not specifically for primary care clinicians. Specialty-specific data for MDs were obtained from the Medical Board of California's mandatory survey. Similar data are not available for DOs, NPs, and PAs who provide primary care.

Age

Figure 3.1. displays 2015 estimates of the percentages of physicians (MDs and DOs), NPs, and PAs by age group regardless of specialty as well as estimates for primary care MDs. The estimates indicate that physicians are older than NPs and PAs. The percentage of physicians aged 65 or older is three times as large as the percentages of NPs and PAs who are aged 65 or older. Many physicians over age 65, as well as many currently aged 55 to 64 years, will retire within the next 10 years or reduce the number of hours of patient care they provide. In contrast, PAs had the youngest workforce. Sixty-five percent of PAs were under age 45 versus 39% of NPs and 46% of physicians.

The percentage of MDs who are younger than 35 years old differs substantially between the ACS PUMS and the Medical Board data presented here. The most likely explanation is that the ACS PUMS includes all physicians regardless of whether physicians have completed training, whereas these Medical Board data are only for MDs who have completed residency and provide patient care at least 20 hours per week. The ACS also includes DOs, who may be younger than MDs because the number of osteopathic medical schools in the US has grown substantially over the past decade.

Figure 3.1. Age Distribution of Clinicians in California, 2015



Source: American Community Survey, Public Use Microdata Sample, 2015, private tabulation. Medical Board of California, core license file and mandatory survey, 2015; private tabulation. May not sum to 100% due to rounding.
*Includes allopathic and osteopathic physicians and surgeons. Also, does not distinguish between primary care physicians (PCPs) and physicians in non-primary care specialties.

Table 3.1. displays data from the Medical Board of California on the age distribution of primary care MDs by specialty in 2015. Fifteen percent of primary care MDs were aged 65 years or older and an additional 23% were aged 55 to 64 years. Across primary care specialties, family physicians had the largest percentage of MDs aged 55 years or older (44%) and general internists had the smallest percentage (33%).

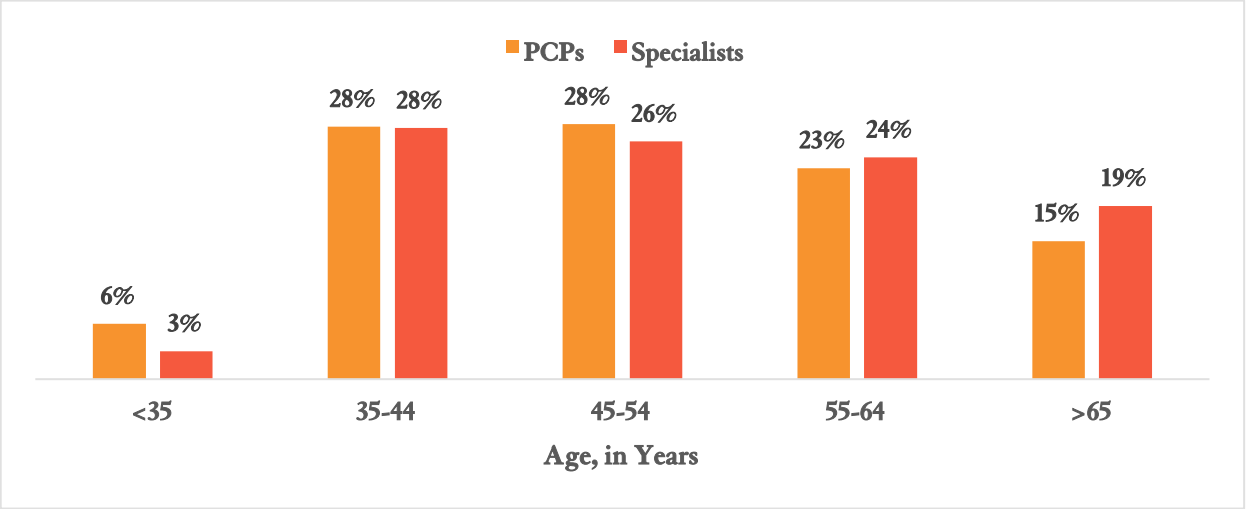
Table 3.1. Age Distribution of Active Patient Care Primary Care MDs, California, 2015

	Less Than 35 years	35-44 years	45-54 years	55-64 years	65 years or older
Family Physicians	5%	26%	26%	25%	19%
General Internists	7%	29%	31%	22%	11%
General Pediatricians	7%	30%	26%	22%	15%
Obstetrician/Gynecologists	4%	26%	28%	24%	17%
Primary Care MDs	6%	28%	28%	23%	15%

Sources: Medical Board of California, core license file and mandatory survey, 2015; private tabulation.
Note: Geriatricians included with General Internists and General Practitioners included with Family Physicians for the purposes of these calculations.

Figure 3.2. below compares the age distribution of MD physicians who have completed training in primary care specialties with the age distribution of MD physicians in other specialties. It appears that there are more primary care MDs younger than 35 years of age than non-primary care MDs. This is likely due to do the longer length of time required to complete training in non-primary care specialties. Primary care residency programs are typically three years long, whereas residency programs in non-primary care specialties typically require at least four years of training. In some cases, such as surgical subspecialties, seven or more years of training are required. The percentage of non-primary care MDs are over age 65 years is higher than the percentage of primary care MDs. Differences between primary care MDs and specialist MDs are less robust for other age brackets.

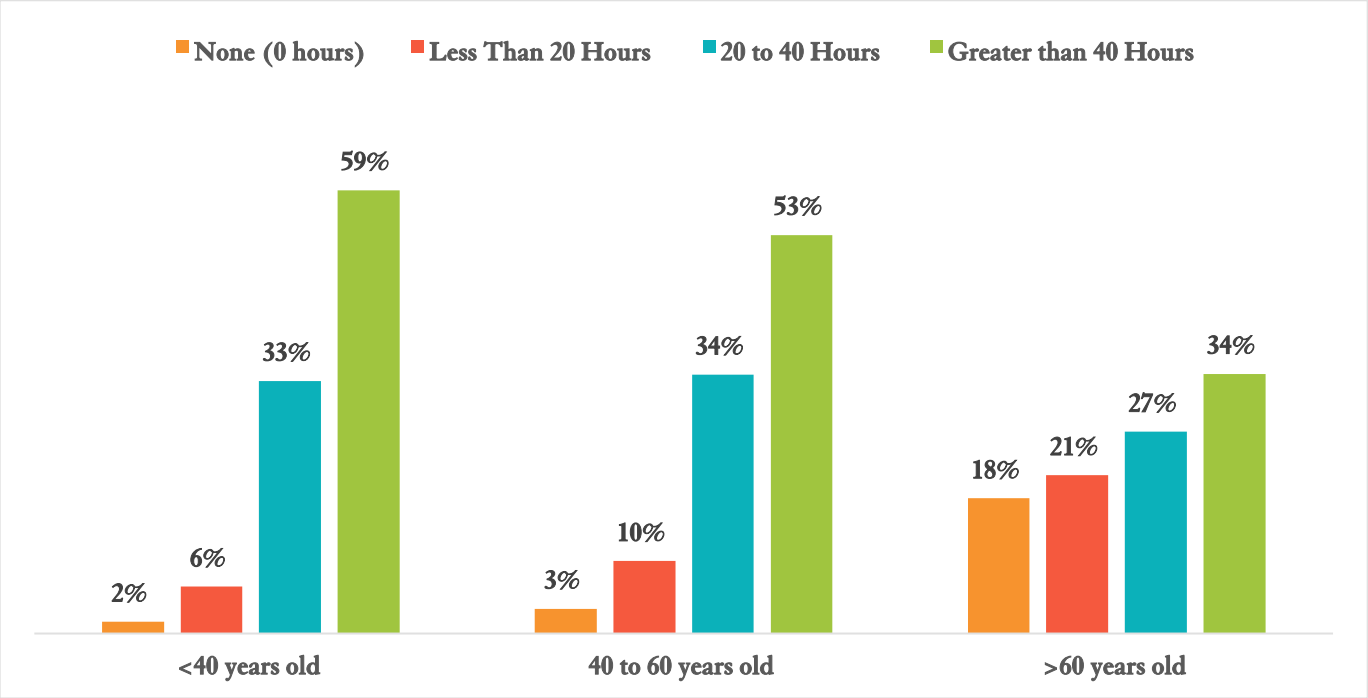
Figure 3.2. Age Distribution of Primary Care vs. Specialist MDs in California, 2015



Source: Medical Board of California, Mandatory Survey, 2015. Percentages exclude N=237 physicians who indicated "Unknown" as their specialty.
Note: "PCPs" includes Family Medicine, General Internal Medicine, Obstetrics/Gynecology, and Pediatrics. General Practitioners and Geriatricians were included with Family and Internists per the algorithm described in the technical appendix. All other physician specialties counted towards "Specialists".

The large percentage of physicians aged 55 years or older is cause for concern because older physicians provide fewer hours of patient care than younger physicians. Figure 3.3. below shows the change in hours worked by MDs as they get older. Among physicians age 60 years or younger, most physicians provide patient care at least 20 hours per week (92% of physicians under age 40 years and 87% of physicians age 40 to 60 years). In contrast, among physicians over age 60 years, only 61% provide patient care at least 20 hours per week. Similarly, while well over half of younger and middle-aged MDs provide more than 40 hours of patient care week, only one-third of MDs over age 60 provide as many hours of patient care per week. Eighteen percent of physicians over age 60 do not provide any patient care.

Figure 3.3. Patient Care Hours Worked per week, by Age, Allopathic Physicians in California, 2015

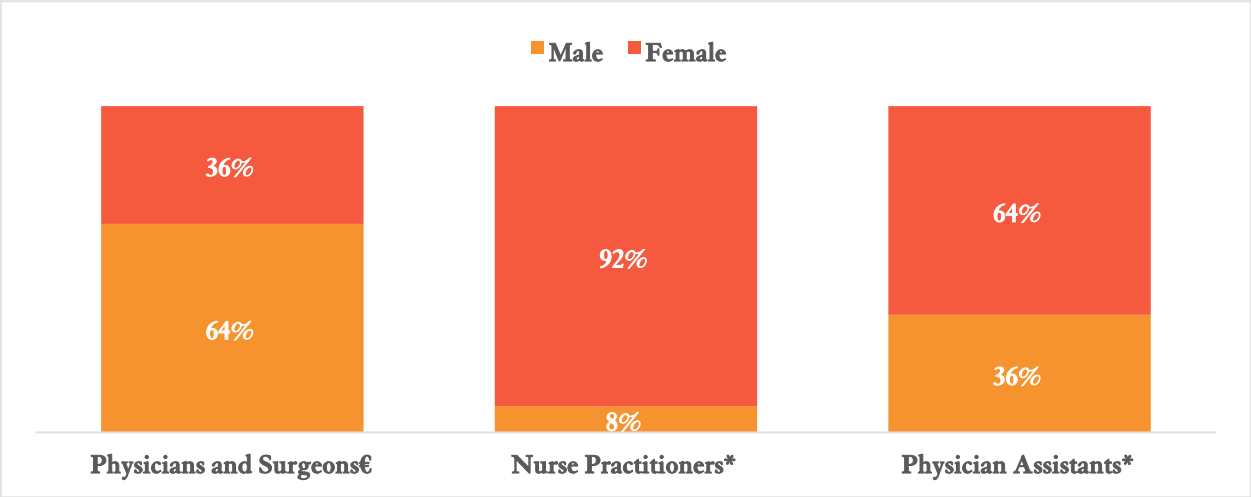


Source: 2015 Medical Board of California Mandatory Survey and core license file.
Note: Excludes inactive physicians and residents/fellows.

Gender

Figure 3.4 presents estimates of the gender of employed California physicians (MDs and DOs), NPs and PAs in 2014. The percentages of males and females varied substantially across these professions. Ninety-two percent of NPs are female whereas 64% of PAs and 36% of physicians are female.

Figure 3.4. Gender of Employed Clinicians in California, 2014



Source: American Community Survey, Public Use Microdata Sample, 2014, private tabulation.
€Includes allopathic and osteopathic physicians and surgeons (MDs and DOs)
*Includes Physician Assistants and Nurse Practitioners in all specialties.

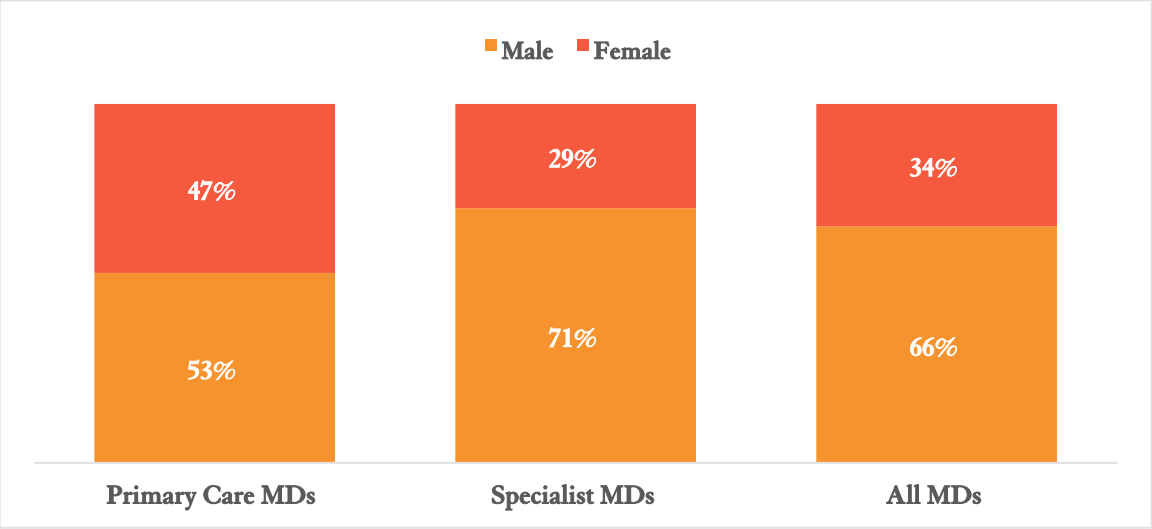
Estimates of the gender of California MDs in primary care specialties in 2015 are displayed in Table 3.2. The percentage of females varied substantially across primary care specialties, ranging from a low of 41% among family physicians and general internists to a high of 63% among general pediatricians. Figure 3.5. indicates that primary care MDs are more likely to be female than the MD workforce as a whole, and much more likely to be female than specialist MDs. The proportion of female primary care MDs is 13 percentage points and 18 percentage points higher than the proportions of females in the overall MD and specialist MD workforces, respectively.

Table 3.2. Gender of Primary Care MDs, California, 2015

	Male	Female
Family Physicians	59%	41%
General Internists	59%	41%
General Pediatricians	37%	63%
Obstetrician/Gynecologists	43%	57%
Primary Care MDs	53%	47%

Source: Medical Board of California, core license file and mandatory survey, 2015; private tabulation.
Note: Geriatricians included with General Internists and General Practitioners included with Family Physicians for the purposes of these calculations.

Figure 3.5. Gender of MDs, California, 2015



Source: Medical Board of California, core license file and mandatory survey, May 2015; private tabulation

Race/Ethnicity

Table 3.3, displays estimates of the racial/ethnic distribution of employed physicians (MDs and DOs), NPs, and PAs in 2014. African-Americans and Latinos were underrepresented in all three professions relative to their proportions of California's population and the differences were especially pronounced for Latinos. (Figure 3.4.). Whites are overrepresented in all three professions. Asian/Pacific Islanders as a whole are overrepresented among physicians and PAs, but some sub-groups of Asian/Pacific Islanders may be underrepresented. For example, the California Office of Statewide Health Planning and Development considers Asians, other than Asian Indians, Chinese, Filipinos, Japanese, Koreans, Malaysians, Pakistanis, and Thais, to be underrepresented among primary care clinicians.[15]

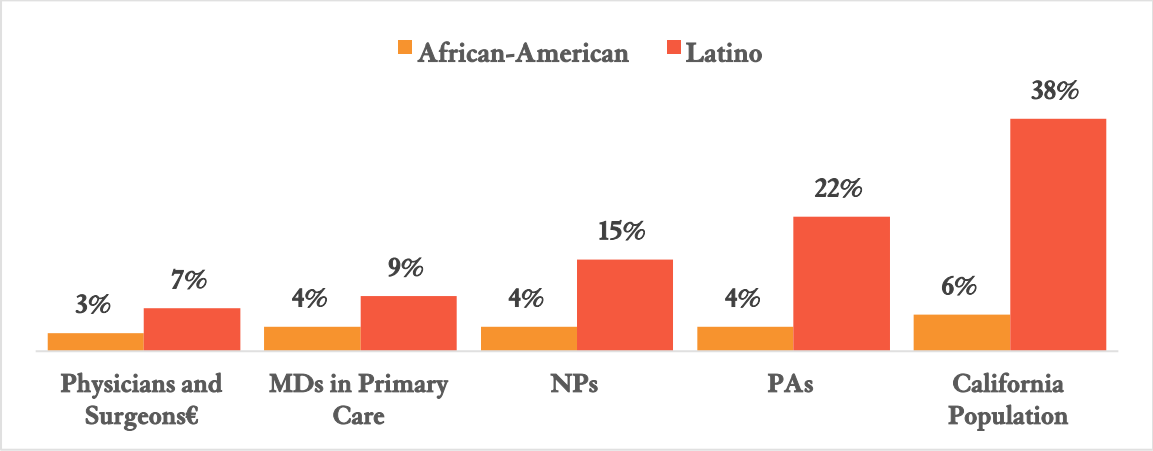
[15] California Office of Statewide Health Planning and Development. Glossary of Terms: Song-Brown Program, June 2016. http://www.oshpd.ca.gov/documents/HWDD/Song-Brown/2016/Song-Brown-Program-Glossary-of-Terms-Updated_20160629.pdf

Table 3.3. Race/Ethnicity of Employed Clinicians in California, 2014

	White	Asian/Pacific Islander	African-American	Native American	Latino	Other
Physicians and Surgeons€	55%	33%	3%	<1%	7%	3%
Physician Assistants*	49%	21%	4%	1%	22%	4%
Nurse Practitioners*	65%	13%	4%	0%	15%	3%
California Population	39%	13%	6%	<1%	38%	3%

Source: American Community Survey, Public Use Microdata Sample, 2014, private tabulation. May not sum to 100% due to rounding.
Includes allopathic and osteopathic physicians and surgeons
*Includes Physician Assistants and Nurse Practitioners in primary care.
Note: "Other" includes two or more races.

Figure 3.6. Racial/Ethnic Diversity of Clinicians Compared to the California Population, 2015



Sources: American Community Survey, Public Use Microdata Sample, 2014, private tabulation. May not sum to 100% due to rounding. Medical Board of California, Mandatory Survey, May 2015; private tabulation.
€Includes allopathic and osteopathic physicians and surgeons (MDs and DOs)

Estimates of the race/ethnicity of California MDs in primary care specialties in 2015 are displayed in Table 3.4. Relative to California's population, African-Americans and Latinos are underrepresented in all four primary care specialties, although the proportion of Latinos varies across primary care specialties. The percentage of MDs who are Latino ranges from 5% of general internists to 12% of family physicians. The percentage of Asian/Pacific Islanders also varies across primary care specialties, ranging from 36% of family physicians and obstetrician/gynecologists to 49% of general internists. Primary care MDs overall are more likely to be Latino or Asian/Pacific Islander than the overall MD workforce, but the proportion of African-American MDs in primary care is similar to the proportion among specialists and the overall MD workforce.

Table 3.4. Race/Ethnicity of Primary Care MDs in California, 2015

	White	Asian/Pacific Islander	African-American	Latino	Other
Family Physicians	32%	36%	4%	12%	4%
General Internists	28%	49%	3%	5%	4%
General Pediatricians	33%	39%	4%	9%	3%
Obstetrician/Gynecologists	38%	36%	3%	6%	3%
Primary Care MDs	27%	37%	3%	8%	3%
Specialist MDs	35%	28%	2%	4%	3%
All MDs	32%	31%	3%	5%	3%

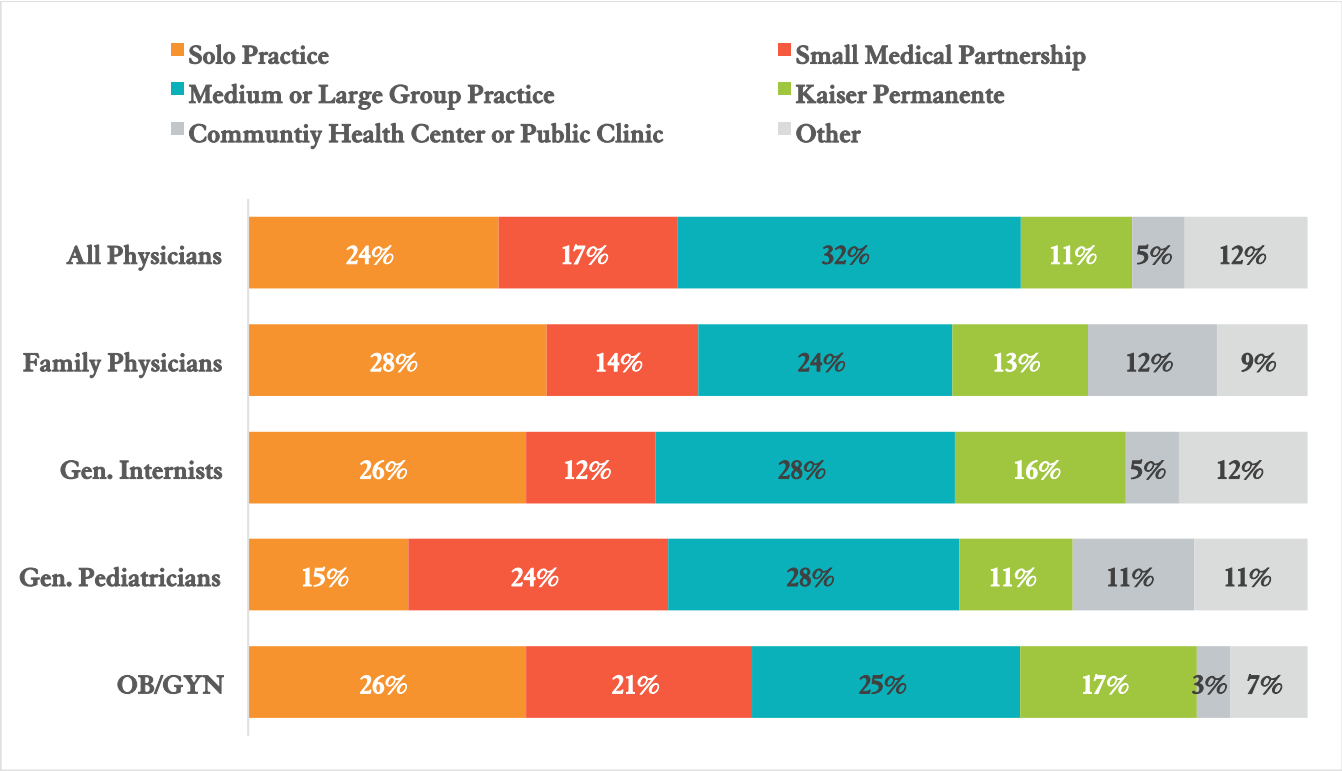
Source: Medical Board of California, Survey of Licensees, May 2015; private tabulation.
Note: Geriatricians included with General Internists and General Practitioners included with Family Physicians for the purposes of these calculations.

Practice Settings

Information about the practice settings of primary care clinicians in California comes from several surveys that do not give respondents identical response options. A supplemental survey of a sample of physicians conducted by the University of California, San Francisco (UCSF) in partnership with the Medical Board of California (MBC), is the best source of estimates of the distribution of primary care MDs across practice settings. An important strength of this survey is that responses to it can be linked to responses to another Medical Board survey that asks MDs about their primary specialties. Linking responses of these two surveys permits analysis of variation in practice setting by specialty. The best source of data on the practice settings of NPs and PAs is the American Community Survey (ACS), Public Use Microdata Sample (PUMS). Unlike the MBC supplemental survey, the ACS does not ask respondents to report their specialty.

Figure 3.7. displays findings from the 2015 UCSF/MBC supplemental survey regarding the practice settings of primary care MDs and all MDs in California. Compared to all MDs in California, MDs in most primary care specialties were more likely to be members of the Permanente Medical Group and less likely to practice in medium or large group practices outside Kaiser Permanente (defined as group practices with 10 or more physicians, including academia). Important differences also exist among the four primary care physician specialties. General pediatricians were much less likely to be in solo practices than MDs in other primary care specialties. Family physicians and general pediatricians were more than twice as likely as general internists and obstetrician/gynecologists to practice in community health centers or public clinics. General pediatricians and obstetrician/gynecologists were more likely to practice in small partnerships (defined as 2 to 9 physicians) than family physicians or general internists.

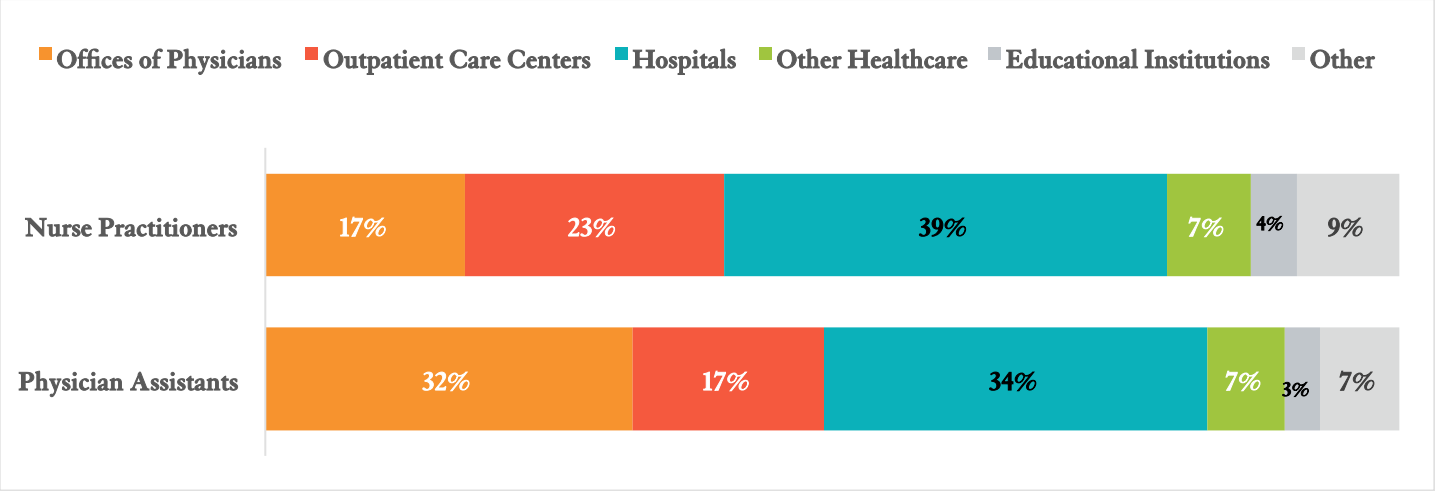
Figure 3.7. Estimates of Employment of MDs in California, by Practice Setting, 2015



Source: Supplemental survey of MDs conducted by UCSF in conjunction with the Medical Board of California, 2015.
Note: Geriatricians included with General Internists and General Practitioners included with Family Physicians per an algorithm used to derive these estimates. "Other" includes VA, military, correctional facilities, and other practice settings. The "Small Medical Partnership" category consists of partnerships containing two to nine physicians. The "Medium or Large Group Partnership" category consists of 10 physicians or more, includes academia, and excludes Kaiser Permanente/Permanente Medical Group which has its own category.

Figure 3.8. presents estimates of employment of NPs and PAs in California by practice setting from the 2014 ACS PUMS. As indicated previously, these estimates are for all employed NPs and PAs, regardless of specialty. The estimates indicate that PAs are more likely than NPs to practice in physician offices (32% vs. 17%). NPs are more likely than PAs to work in hospitals or outpatient care centers.

Figure 3.8. Employment of NPs and PAs in California, by Practice Setting, 2014



Source: American Community Survey, Public Use Microdata Sample, 2014, private tabulation.
Note: Practice Settings are based on 2012 NAICS Industry Codes. "Other" consists of dental offices for PAs and the administration of HR programs for NPs, among other less represented settings.

Federally Qualified Health Centers (FQHCs) are an important source of primary care for Medi-Cal beneficiaries, uninsured persons, and other vulnerable populations. Table 3.5. below reports data on primary care staffing and utilization in FQHCs in California. The numbers reported are from a report containing information provided by 176 recipients of federal health center program grants and do not include FQHC look-alikes. Primary care clinicians at these 176 FQHCs provided a total of 8.6 million clinic visits in 2015. FQHCs relied heavily NPs and PAs to provide primary care relative to their proportions of the primary care workforce. NPs provided 24% of clinic visits and PAs provided 18% of clinic visits; primary care physicians provided only 58% of clinic visits. Among primary care physicians, family physicians accounted for the largest percentage of clinic visits (27%) and general practitioners accounted for the smallest percentage of visits (2%). These findings are similar to findings of an analysis of data from the California Office of Statewide Health Planning and Development (OSHPD) Primary Care Clinic Annual Utilization Data, which includes FQHC look-alikes and free clinics as well as FQHCs.

Table 3.5. Staffing and Utilization of Primary Care Clinicians in Federally-Funded Health Centers in California, 2015

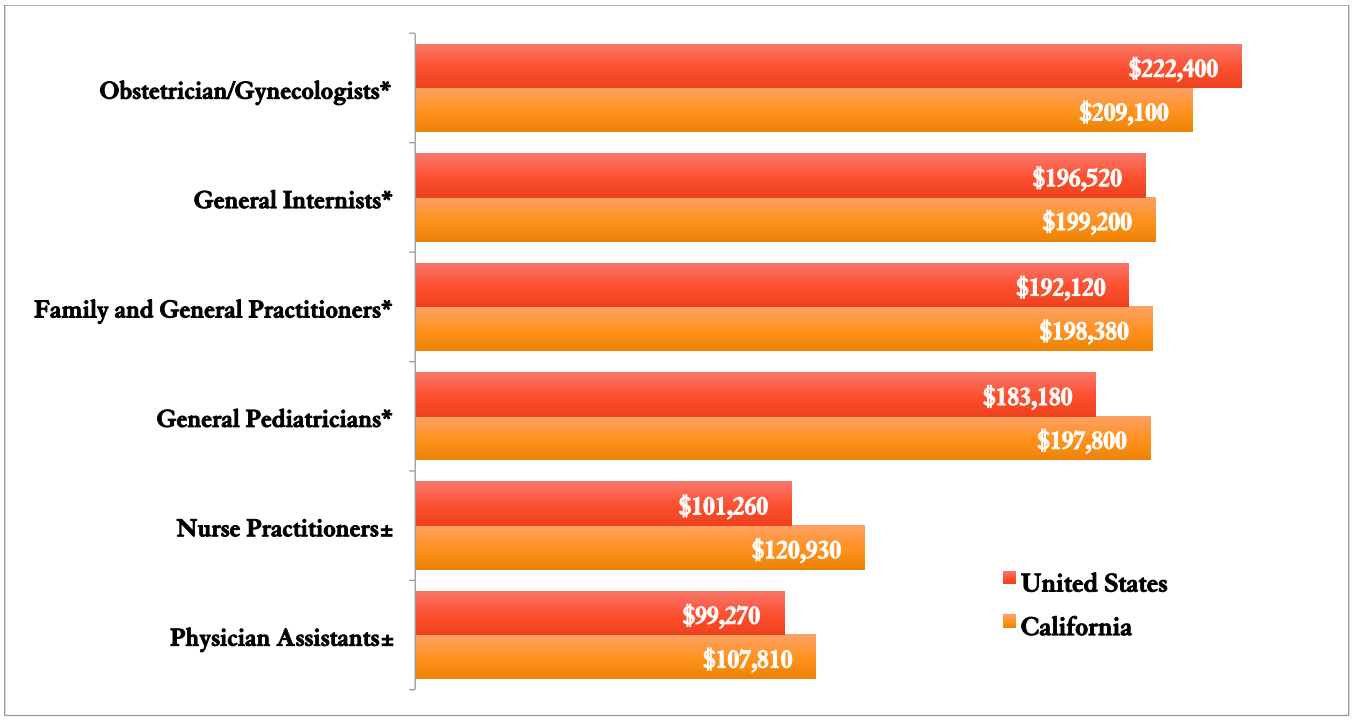
	FTEs (Number)	FTEs (Percent of all Primary Care Clinicians)	Clinic Visits (Number)	Clinic Visits (Percent of All Primary Care Clinicians)
Family Physicians	901	26%	3,058,922	27%
General Practitioners	72	2%	253,903	2%
Internists	274	8%	854,181	8%
Obstetrician/Gynecologists	197	6%	629,421	6%
Pediatricians	509	15%	1,738,634	15%
Primary Care Physicians	**1,953**	**57%**	**6,535,061**	**58%**
Nurse Practitioners	887	26%	2,711,148	24%
Physician Assistants	590	17%	2,088,067	18%
All Primary Care Clinicians	**3,430**	**100%**	**8,623,128**	**100%**

Note: Includes both allopathic and osteopathic physicians. Data reported for N=176 health centers.
Source: HRSA, 2015 Health Center Data, California Program Grantee Data, Table 5: Staffing and Utilization.

Earnings

Figure 3.9. displays OES estimates of average annual earnings for primary care clinicians in California and the United States in 2015. In both California and the United States, the average annual earnings for primary care MDs and DOs were substantially higher than average annual earnings for NPs and PAs. NPs and PAs in California earn more than the national average for their respective professions. NPs earn 19% more than the national average for all NPs and PAs earn 9% more than the national average for all PAs. This difference may reflect the higher cost of living in California and/or competition among employers for more limited supplies of NPs and PAs in California. The estimates of earnings for NPs and PAs include all employed NPs and PAs regardless of specialty. Among primary care physicians, differences between California and the United States were smaller and less consistent. Family and general practitioners, general internists, and general pediatricians had higher average annual earnings in California than the United States but obstetrician/gynecologists had lower average annual earnings. As with estimates of employment, OES estimates of earnings are only for primary care physicians who are employed by an organization and do not include primary care physicians in solo practice or partnerships.

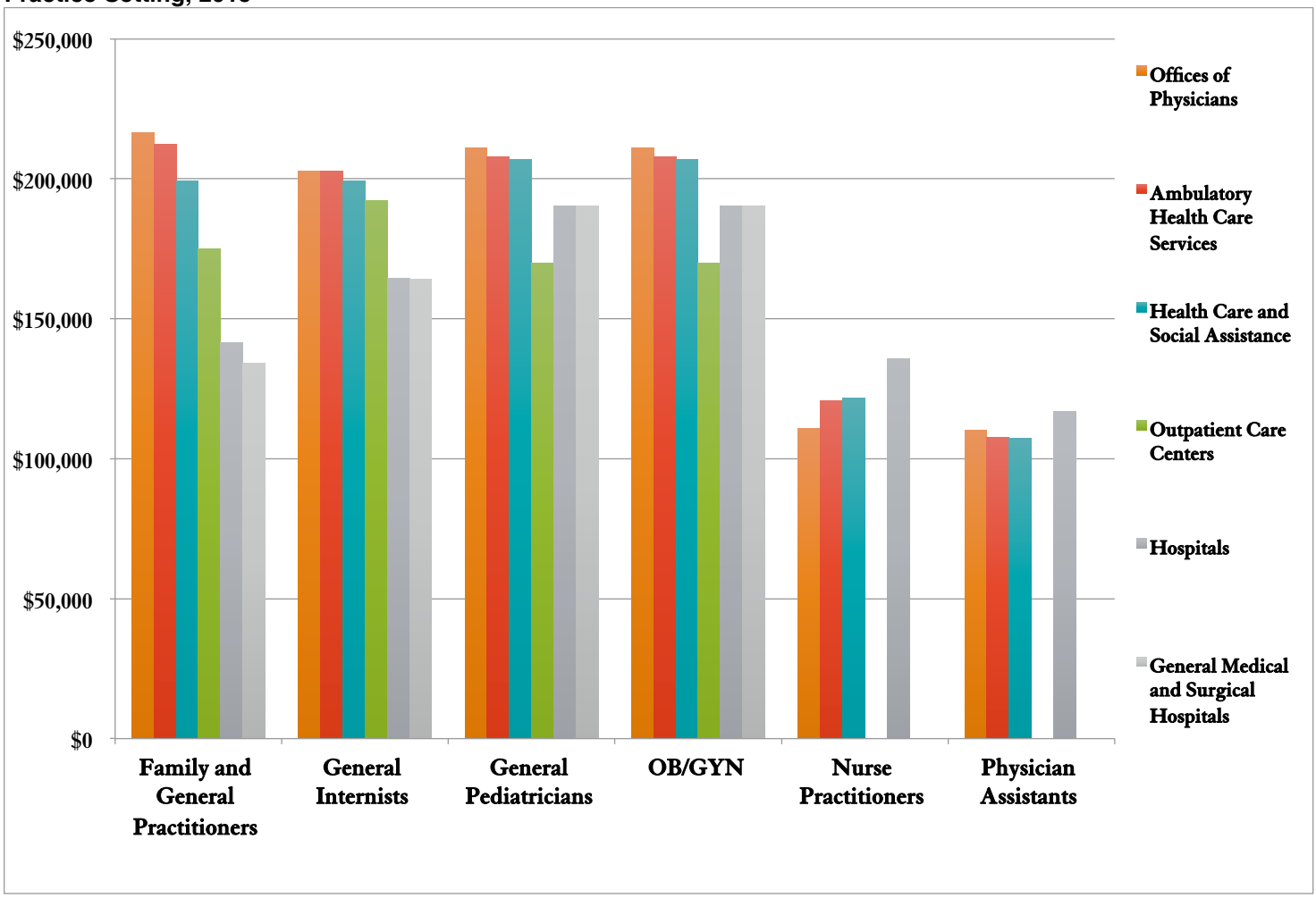
Figure 3.9. Average Annual Earnings of Employed Primary Care Clinicians in California and the United States, 2015



Source: Bureau of Labor Statistics, Occupational Employment Statistics, 2015.
Note: *The BLS OES data do not distinguish between MDs and DOs. The data only capture wages for employed physicians. Physicians who are in solo practice or in partnerships are excluded.
±Includes all NPs or PAs regardless of whether they provide primary care.

Earnings of California primary care clinicians in California vary across practice settings, as Figure 3.10. indicates. In 2015 California primary care physicians who are employed in physician offices, ambulatory health care services, and health care and social assistance settings have higher annual earnings than primary care physicians employed by outpatient care centers and hospitals. In contrast, NPs and PAs who are employed by hospitals have higher average annual earnings than NPs and PAs employed in physician offices, ambulatory health care services, and health care and social assistance settings.

Figure 3.10. Average Annual Earnings of Employed Primary Care Physicians, NPs, and PAs in California by Practice Setting, 2015



Source: Bureau of Labor Statistics, OES Research Estimates by State and Industry, May 2015.

Note: *The BLS OES data do not distinguish between MDs and DOs. The data only capture wages for employed physicians. Physicians who are in solo practice or in partnerships are excluded.

±Includes all NPs and PAs regardless of whether they provide primary care.

Chapter 4: Primary Care Trainees and Training Programs

This chapter presents information about the pipeline of MD, DO, NP, and PA trainees in California and the United States. Information about the numbers of trainees in these professions and their interest in providing primary care is critical to assessing the adequacy of the future supply of primary care clinicians in California. This information was obtained from multiple sources including associations of health professions schools and accrediting bodies for medical residency programs. Details about these data sources can be found in the appendix.

Training Programs

Figure 4.1 presents information on the number of MD, DO, NP, and PA training programs in California in 2016. California has 11 allopathic (MD) medical schools, two osteopathic (DO) medical schools, 27 NP education programs, and 15 PA education programs. In addition, the state has 124 MD residency programs and 13 DO residency programs in primary care specialties. Four new PA education programs have opened within the past two years and four more programs have received provisional accreditation.[16] The number of allopathic (MD) medical schools was unchanged for many years until the University of California, Riverside Medical School began enrolling students in 2013. The state's first for-profit allopathic (MD) medical school, the California Northstate University's College of Medicine, which is located in Elk Grove, began enrolling students in 2015.[17] Kaiser Permanente is opening a new allopathic (MD) medical school in Pasadena that plans to enroll its first class of students in 2019.[18] California Health Sciences University in Clovis (near Fresno) has announced plans to establish a new osteopathic (DO) medical school.[19]

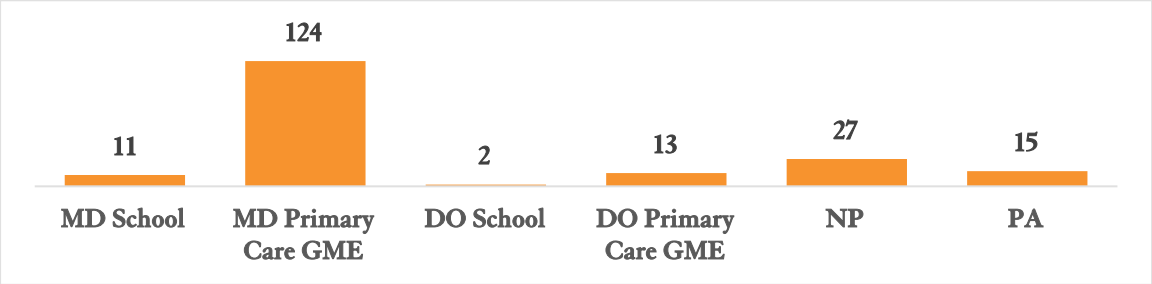
[16] Accreditation Review Commission on Education for the Physician Assistants, 2017. http://www.arc-pa.org/accreditation/accredited-programs/

[17] K. Robertson. New Medical School in Elk Grove Makes History. February 6, 2016. http://www.sacbee.com/news/local/health-and-medicine/article58753268.html

[18] Kaiser Permanente. Kaiser Permanente Selects Site for New School of Medicine in Southern California Community of Pasadena. March 10, 2016. https://share.kaiserpermanente.org/article/kaiser-permanente-selects-site-for-new-school-of-medicine-in-southern-california-community-of-pasadena/

[19] B. Anderson. Assemi Family Pitches Clovis Site for Osteopathic Medical School. Fresno Bee, November 22, 2016. http://www.fresnobee.com/news/local/article116543088.html

Figure 4.1. Number of Training Programs in Primary Care Professions in California, 2016

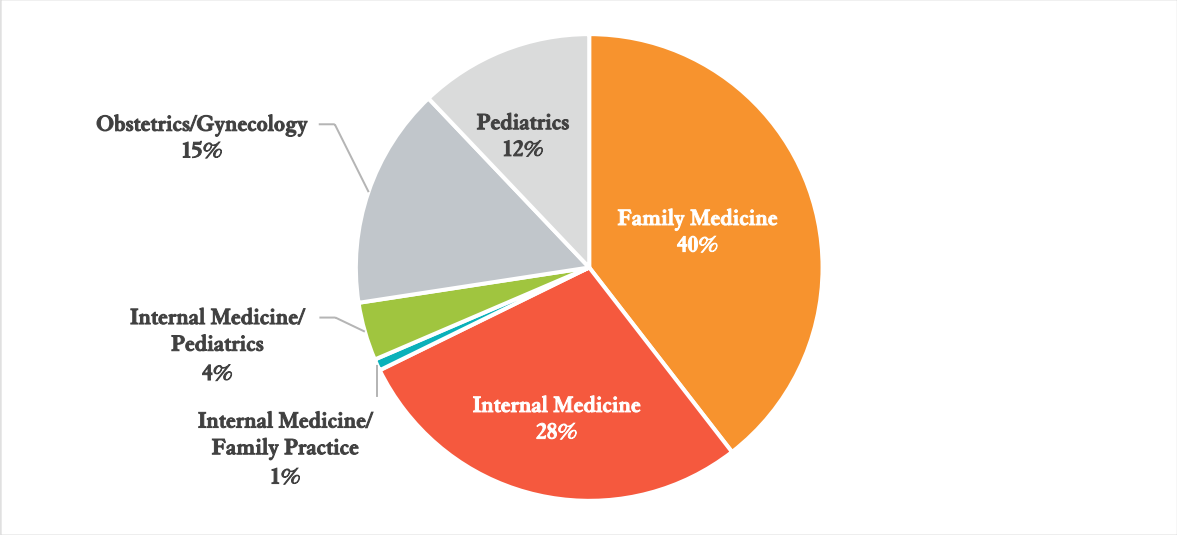


Source: Private tabulation of data from education programs' websites; Accreditation Council for Graduate Medical Education Data Resource Book, 2015-2016; American Association of Medical Colleges, "ERAS 2017 Participating Specialties & Programs" Electronic Residency Application Service (ERAS); Accreditation Review Commission on Education for the Physician Assistant, 2017.
Note: The 124 MD primary care residency programs are a count across all program statuses, which includes programs that participated in the most recent residency match as well as those that did not participate and those that are "no longer accepting" resident applications.

Figure 4.2. displays the distribution of allopathic (MD) residency programs in primary care specialties in California that are listed in the Electronic Residency Application Service's records for 2017. Forty percent of MD primary care residency programs in California (49 programs) are in family medicine and 28% of programs (35 programs) are in internal medicine. General pediatrics accounts for 12% of primary care residency programs (15 programs) and obstetrics/gynecology accounts for 15% of programs (19 programs). The remaining four percent of primary care residency programs (five programs) are combined programs in general internal medicine and general pediatrics and general internal medicine and family practice. Six of the 124 MD primary care residency programs in California are Teaching Health Centers, all of which are located in underserved parts of the state.[20]

[20] JM Coffman, M Fix, K Himmerick. Preparing Physicians to Care for Underserved Patients: A Look at California's Teaching Health Centers. Oakland, CA: California Health Care Foundation, 2016. http://www.chcf.org/publications/2016/08/preparing-teaching-health-centers

Figure 4.2. Distribution of MD Primary Care Residency Programs by Specialty, California, 2017



Source: Source: "ERAS 2017 Participating Specialties & Programs", Electronic Residency Application Services (ERAS), Association of American Medical Colleges, 2017.
Note: Allopathic (MD) residency programs will began receiving applications for fall 2017 in September 2016 and osteopathic (DO) residency programs began receiving applications in July 2016. "Family Medicine" consists of 48 Family Medicine residency programs and one Family Medicine/Preventive Medicine residency program. "Internal Medicine" consists of 34 Internal Medicine residency programs and one Internal Medicine/Preventive Medicine residency programs.

Graduates of Training Programs

Table 4.1. presents data on the numbers of graduates of MD, DO, NP, and PA training programs in California from 2011 to 2015. In 2015, there were 2,480 graduates of MD, DO, NP, and PA training programs, including 1,080 MDs, 448 DOs, 692 NPs, and 355 PAs. From 2011 to 2015, the number of graduates of MD- and DO-granting medical schools grew by 25 and 115 persons, respectively. The numbers of graduate of allopathic (MD) schools will increase over the next several years as students enrolled in the University of California, Riverside and California Northstate University medical schools begin to graduate in 2017 and 2019, respectively. The number of MD graduates will further increase in 2023 if Kaiser Permanente's medical school begins enrolling students in 2019 as planned.

The number of graduates of PA education programs increased between 2012 and 2013 and then decreased, returning to the 2012 level in 2015. The decrease in graduates was due to the closure of two PA education programs that were based at community colleges. The number of graduates will increase as the four recently accredited PA education programs begin graduating students.

Table 4.1. Number of Graduates of MD, DO, NP, and PA Training Programs in California, 2011-2015

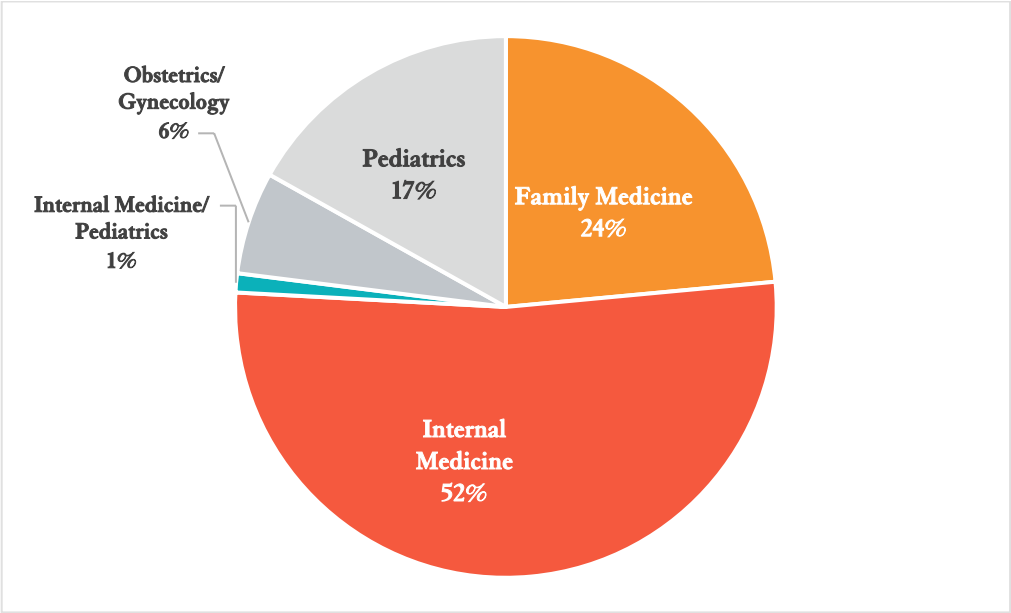
	2011	2012	2013	2014	2015
Allopathic Physicians (medical school)	1,055	1,078	1,071	1,094	1,080
Osteopathic Physicians (medical school)	333	329	347	336	448
Physician Assistants	Not Reported	355	409	394	355
Nurse Practitioners	Not Reported	Not Reported	Not Reported	623	692
All Clinicians	1,388**	1,761*	1,827*	2,446	2,480

Sources: Association of American Medical Colleges, FACTS Table B-2: Total Graduates by U.S. Medical School and Sex, 2005-2006 through 2014-2015; American Association of Colleges of Osteopathic Medicine, Graduates by College & Gender 2000-2015; Physician Assistant Education Association Program Surveys 2012-2015, private tabulation; American Association of Colleges of Nursing, Research and Data Services, 2016, private tabulation.
*Does not include Nurse Practitioners.
**Does not include Nurse Practitioners or Physician Assistants.

Filled Positions in Primary Care Residency Programs (MD and DO), 2016

Data on the number of graduates of MD and DO residency programs in California are not available but data are available on the number of first year (PGY-1) MD and DO residency positions filled in primary care residency programs. California has residency training programs in the following primary care specialties: family medicine, family medicine/preventive medicine, internal medicine, internal medicine/pediatrics, internal medicine/preventive medicine, obstetrics/gynecology, and pediatrics. In 2016, total of 1,582 first year positions were filled in primary care residency programs in California. As Figure 4.3 indicates, in 2016 internal medicine accounted for the largest percentage of filled positions in residency programs in primary care specialties (52%) and internal medicine/pediatrics accounted for the smallest percentage of filled positions (1%). There were more than twice as many filled first year internal medicine residency positions as filled first year family medicine residency positions (826 vs. 368). Although there are more family medicine residency programs in California than internal medicine residency programs, internal medicine residency programs enroll larger numbers of residents per year.

Figure 4.3. Distribution of Filled First Year Residency Positions in Primary Care Specialties, California, 2016



Source: National Residency Match Program (NRMP), "Main Match Results by State and Specialty", 2016.
Note: "Family Medicine " includes residency positions in "Family Medicine" and "Family Medicine/Preventive Medicine". "Internal Medicine " includes residency positions in "Internal Medicine" and "Internal Medicine/Preventive Medicine". These residency programs are aggregated because family medicine/preventive medicine and internal medicine/preventive medicine residency programs because persons who complete these programs include all training required for a physician to be eligible for board certification in family medicine or internal medicine.

Since physicians who complete an accredited residency program anywhere in the US are eligible for licensure in California, information about trends in residency training at the national level is also important for primary care workforce planning. The Accreditation Council for Graduate Medical Education (ACGME) collects data on the numbers of graduates of allopathic (MD) residency programs in the US. Table 4.2 displays ACGME data on the numbers of graduates of US MD residency programs in primary care specialties from the 2012-2013 academic year to the 2015-2016 academic year. During this time period, the number of graduates ranged from a high of 16,820 in 2014-2015 to a low of 14,915 in 2015-2016, a decrease of 11%. This decrease was due in large part to a 21% decrease in internal medicine residents during this time period.

Table 4.2. Number of Graduates of Allopathic (MD) Residency Programs in Primary Care Specialties, United States, 2012-13 to 2015-16

Specialty	2012-13	2013-14	2014-15	2015-16
Family Medicine	3,127	3,140	3,308	3,340
Internal Medicine	8,627	8,778	9,015	7,105
Pediatrics	2,700	2,781	2,931	2,916
Geriatrics	338	340	337	317
OB/GYN	1,232	1,230	1,229	1,237
Total	**16,024**	**16,269**	**16,820**	**14,915**

Source: Accreditation Council for Graduate Medical Education Data Resource Book, 2015-2016.
Note: Geriatrics is a subspecialty of family medicine and internal medicine. Persons who pursue residency training in geriatrics must first complete a residency program in family medicine and internal medicine.

Estimates of the number of filled first year residency positions in primary care specialties and numbers of graduates of primary care residency programs do not necessarily indicate the number of primary care physicians that these residency programs produce because some graduates of these residency programs do not go on to provide primary care. Substantial proportions of graduates of internal medicine and pediatrics residency programs later go on to complete fellowship training in a medical or pediatric subspecialty. Others practice as hospitalists who only care for persons admitted to hospitals.[21] Some obstetrician/gynecologists pursue subspecialty training in gynecologic oncology, maternal fetal medicine, or reproductive endocrinology.

Ratio of Medical School Graduates to Medical Residency Positions

Table 4.3. compares the number of graduates of California medical schools (MD and DO) with the number of medical residents for the 2015 graduating class. The data indicate there are sufficient residency openings for graduates of California's medical schools. In 2015, a total of 1,528 persons graduated from California's MD- and DO-granting medical school. There were a total of 2,580 first-year positions in both primary care and non-primary care residency programs in California during the subsequent academic year (2015-2016). These data indicate that there were 1.7 first-year residency positions in California per each graduate of a California medical school. Findings for 2014 were similar. (Data not shown.)

[21] RM Wachter, L Goldman. From Zero to 50,000 – The 20th Anniversary of the Hospitalist. New England Journal of Medicine. 375(11):1009-1011.

Table 4.3. Ratio of First-Year Residents to Medical School Graduates in California, 2015

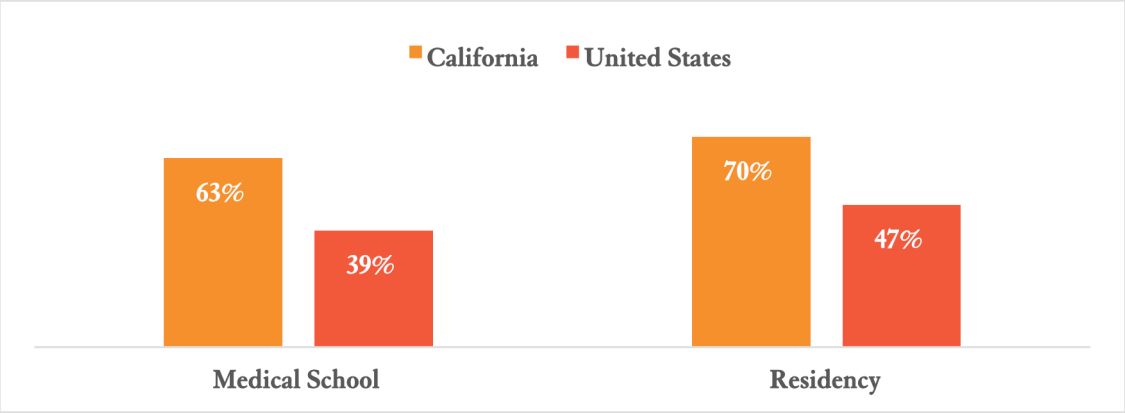
	MD Graduates	DO Graduates	Total Med School Graduates	# First-Year (PGY1) Residents	Ratio of 1st Year Residency Positions to Med School Grads
2015	1,080	448	1,528	2,580	**1.7**

Source: American Association of Medical Colleges, FACTS: Applicants and Matriculants Data, 2013-14 and 2014-15; Association of American Colleges of Osteopathic Medicine, Reports on Graduates: Graduates by Osteopathic Medical College and Gender 2000-15; Association of College of Graduate Medical Education Data Resource Book 2014-15 and 2015-16.

Retention of Graduates of California Medical Schools and Residency Programs

California retains greater percentages of graduates of its allopathic (MD) medical schools and residency programs than other states. As Figure 4.4. illustrates, 63% of persons who graduate from allopathic (MD) medical schools in California in 2014 remain in California to practice. In the US overall, only 39% of medical school graduates practice in the state in which they attended medical school. Findings for retention of graduates of allopathic (MD) residency programs are similar. In 2014, 70% of graduates of MD residency programs in California practice in California, whereas only 47% of graduates of MD residency programs nationwide practice in the state in which they were trained.

Figure 4.4. Retention of California Medical School and Residency Program Graduates, 2014



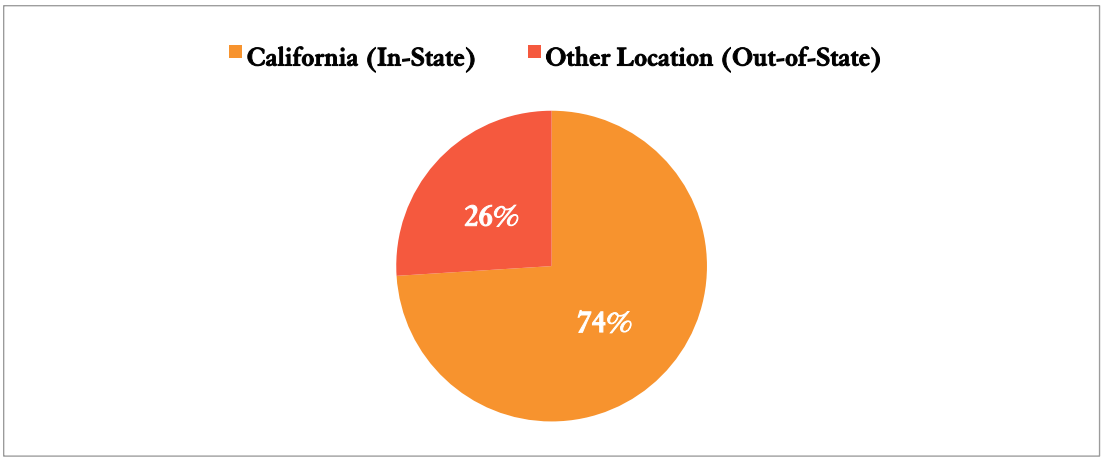
Source: Association of American Medical Colleges, 2015 State Physician Workforce Data Book, Tables 4.1 and 4.3.
Note: Values represent the percentage of students/trainees who eventually practice in same geographic area as the medical school/residency program.

Location of California Medical Students Prior to Matriculation

Medical schools in California accept students from states across the US. and from foreign countries. Figure 4.5 displays data on the most recent location of California allopathic (MD) medical school matriculants. Of the 1,232 students matriculating to California MD schools during the 2015-2016 academic year, 74 percent resided in-state prior to matriculation. The remaining

26% originated from somewhere outside the state of California, including other U.S. states and foreign countries. Findings for the 2014-2015 academic year were similar. (Data not shown).

Figure 4.5. Persons Enrolling in California Allopathic (MD) Medical Schools by Location Prior to Enrollment, 2015-16



Source: Association of American Medical Colleges, 2015 State Physician Workforce Data Book,

Medical School Type and Location for Medical Residents

Medical residency programs in California accept applicants from medical schools throughout the world. Table 4.4. presents the numbers of filled first year positions in primary care residency programs in California in 2016 by the location of the medical school persons filling these positions attended. Seventy-eight percent of first-year residency positions in primary care specialties in California were filled by graduates of U.S. allopathic (MD) medical schools. Nine percent were filled by graduates from a U.S. osteopathic (DO) medical school. Ten percent were filled by US citizens who graduated from an international medical school and 3% by citizens of other countries who graduated from an international medical school. The percentage of graduates from US medical schools varies substantially across primary care specialties, ranging from 97% for obstetrics/gynecology to 76% for family medicine. In the US overall, obstetrics/gynecology has the highest percentage of US graduates (88%) and internal medicine has the lowest (60%).[22]

[22] Accreditation Council for Graduate Medical Education Data Resource Book, 2015-16.

Table 4.4. Distribution of Residencies Filled in Primary Care Specialties, California, 2016

	# US MD Graduates	# US DO Graduates	# US Graduates Int. Med School	# Other Int. Med School Graduates	Total # Positions Filled
Family Medicine	211	70	76	11	368
Family Medicine/Preventive Medicine	1	3	0	0	4
Internal Medicine	671	55	66	34	826
Internal Medicine/Pediatrics	17	1	0	0	18
Internal Medicine/Preventive Medicine	1	0	1	0	2
Obstetrics/Gynecology	89	5	2	1	97
Pediatrics	238	16	12	1	267
Primary Care Total	**1,228**	**150**	**157**	**47**	**1,582**

Source: National Residency Match Program (NRMP), "Main Match Results by State and Specialty", 2016.
Note: These counts include only first-year residency positions, also known as "PGY-1" residencies.

Geographic Distribution of Training Programs in California

Figure 4.6. displays the geographic distribution of MD, DO, NP, and PA education programs in California. The maps indicate that most training programs in these professions are concentrated in the state's three largest metropolitan areas: Los Angeles, San Diego, and the San Francisco Bay Area. Few are located in the Inland Empire, Northern and Sierra, and San Joaquin Valley regions, the areas of the state that have the lowest supplies of primary care physicians relative to population.

Figure 4.6. Geographic Distribution of MD, DO, NP, and PA Training Programs in California, 2016

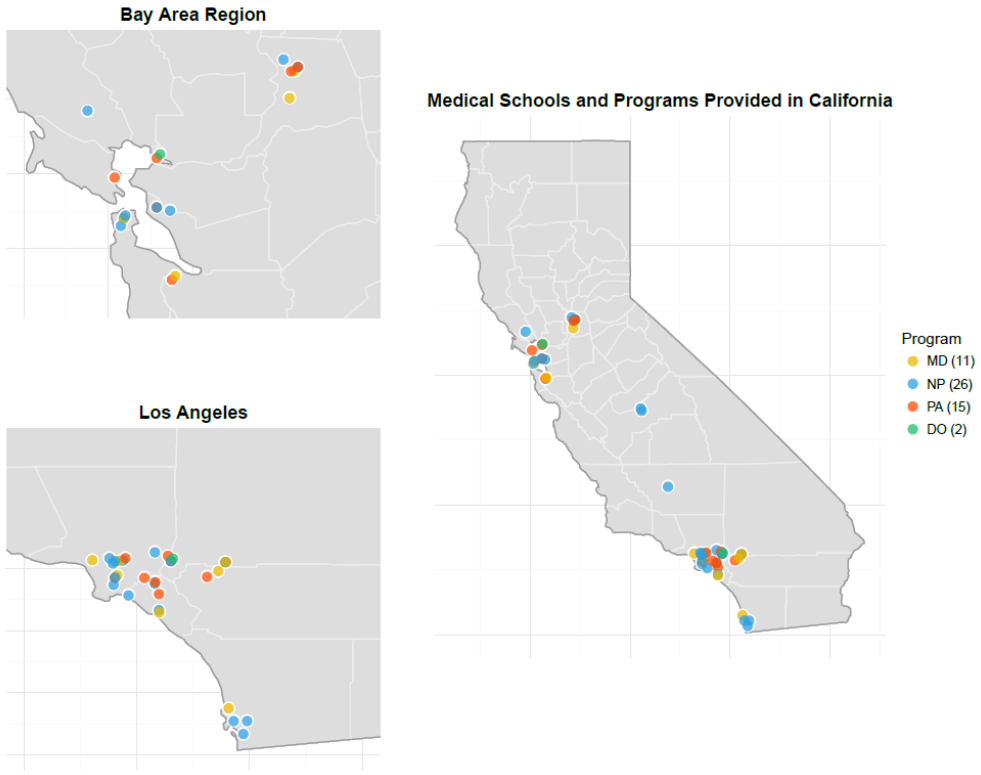
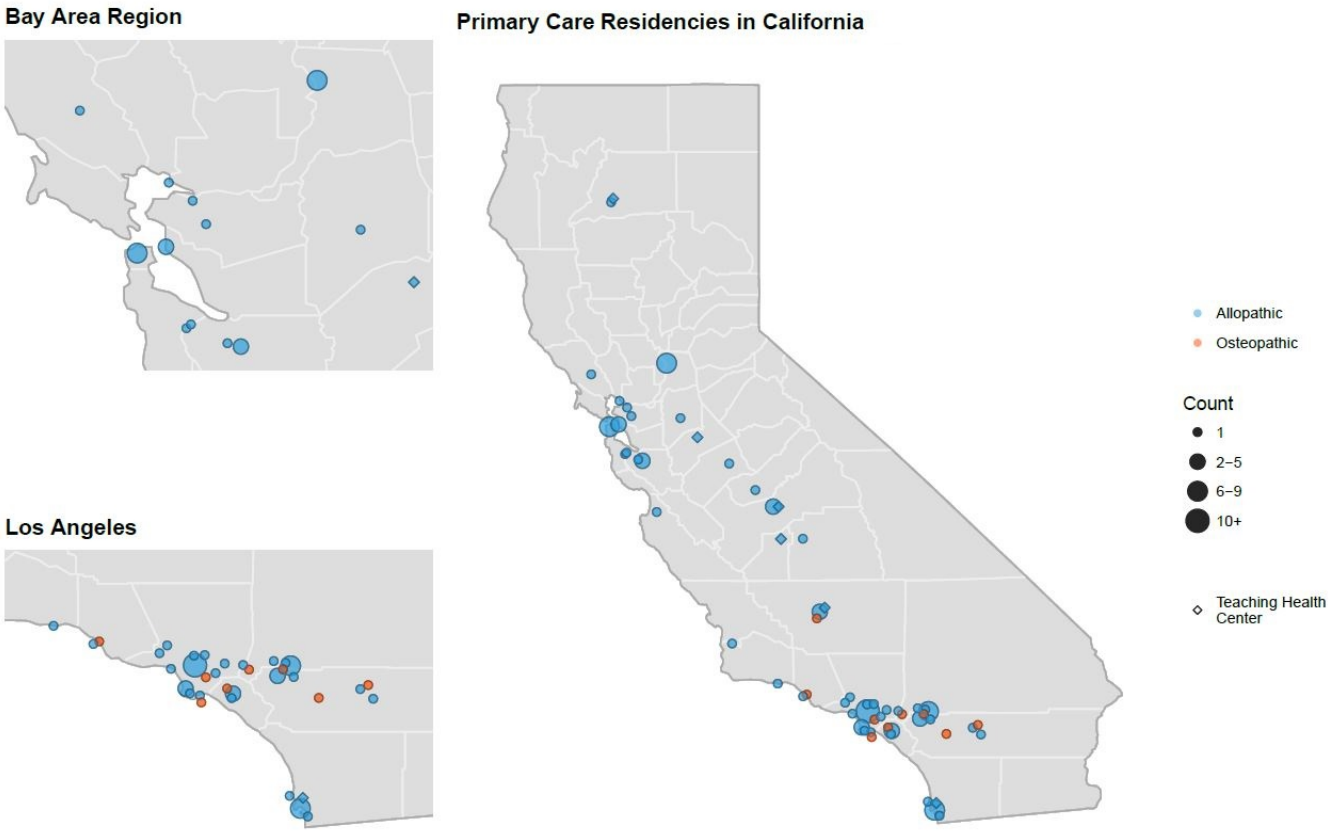


Figure 4.7. displays the distribution of allopathic (MD) medical residents across regions of California in 2017. Similar to medical schools, NP, and PA training programs, most primary care residency programs are located in the state's largest metropolitan areas. There are some primary care residency programs in regions of the state that have the lowest ratios of primary care physicians to population, including a large concentration in the western part of the Inland Empire region. The Northern and Sierra region has the lowest number of primary residency programs. The only primary care residency programs in this region, which spans a vast geographic area, are located in Redding.

Figure 4.7. Geographic Distribution of Primary Care Medical Residency Positions in California, 2017

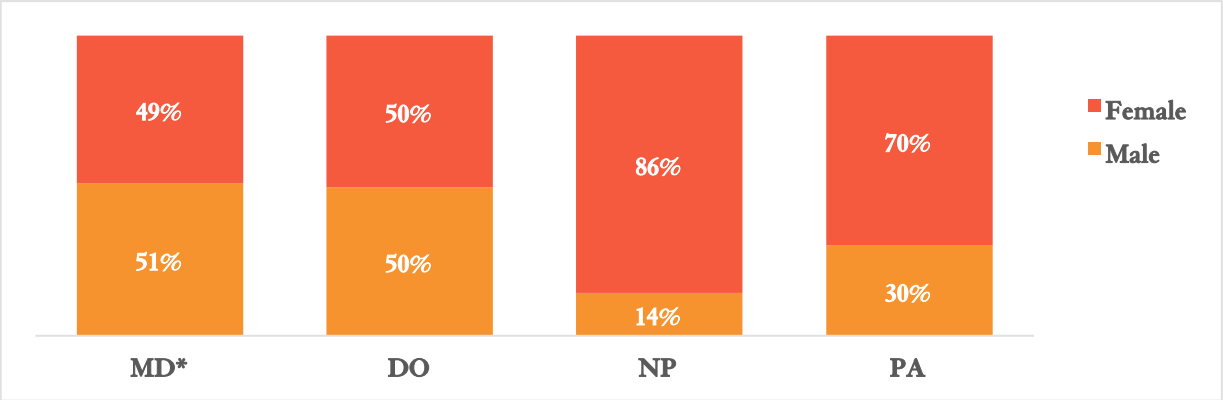


Demographic Characteristics

Gender

Figure 4.8. presents information on the gender of graduates of California MD, DO, NP, and PA training programs in 2015. Gender distribution varied substantially across the four types of training programs. Half of graduates of allopathic (MD) and osteopathic (DO) medical schools were female and half were male. In contrast, 86% of graduates of NP education programs and 70% of graduates of PA education programs were female. Data on the gender of graduates of medical residency programs in California are not available.

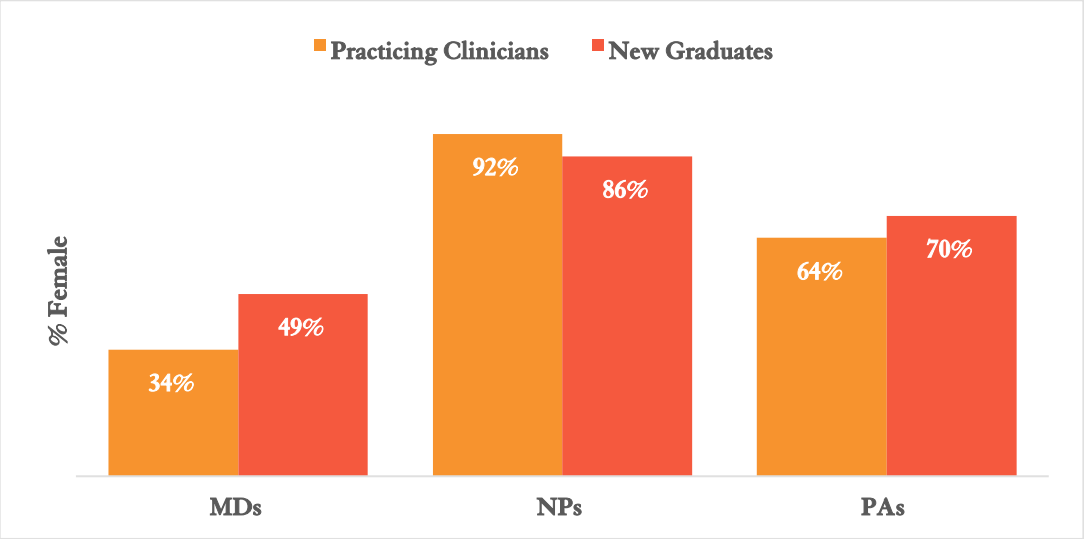
Figure 4.8. Graduates of MD, DO, NP, and PA Training Programs by Gender, California, 2015



Sources: Association of American Medical Colleges, FACTS Table B-4: Total U.S. Medical School Graduates by Race/Ethnicity and Sex, 2012-2013 through 2014-2015; American Association of Colleges of Osteopathic Medicine, "Graduates by Osteopathic Medical College and Race and Ethnicity 2000-2015"; Physician Assistant Education Association Matriculating Student Survey, 2015, private tabulation; American Association of Colleges of Nursing, Research and Data Services, 2016, private tabulation.

Figure 4.9. compares the gender of graduates of allopathic (MD) medical schools, NP education programs, and PA education programs in California in 2015 to that of Californians employed in these professions in 2014. These data provide indications of how the proportions of females and males in these professions are likely to change over time. The proportion of females among persons graduating from California's allopathic (MD) medical schools in 2015 was much larger than the percentage of MDs practicing in the state who are female (49% vs. 34%). The overwhelming proportions of NPs and graduates of NP education programs are female, but the proportion of males is higher among 2015 graduates than among NPs employed in the state in 2014 (15% vs. 8%). Differences between 2015 graduates and employed clinicians were less pronounced among PAs. Females account for 64% of PAs employed in California and for 70% of 2015 graduates of PA education programs.

Figure 4.9. Percentage of Females among Employed Professionals vs. New Graduates in Primary Care Professions, California, 2014-2015



Sources: Association of American Medical Colleges, FACTS Table B-4: Total U.S. Medical School Graduates by Race/Ethnicity and Sex, 2012-2013 through 2014-2015; Physician Assistant Education Association Matriculating Student Survey, 2015, private tabulation; American Association of Colleges of Nursing, Research and Data Services, 2016, private tabulation.

Race/Ethnicity

Table 4.5. describes the race/ethnicity of graduates of MD, DO, NP, and PA training programs in California. Across all four professions, whites constituted the largest percentage of graduates followed by Asians. In all four professions, Latinos were the most underrepresented racial/ethnic group among graduates relative to their proportion of California's population. African-Americans were underrepresented among graduates in all professions except NPs. NP education programs and osteopathic (DO) medical schools were the only education programs to report having any Native American graduates. Data on the race/ethnicity of graduates of medical residency programs in California are not available.

Table 4.5. Graduates of MD, DO, NP, and PA Training Programs by Race/Ethnicity, California, 2015

Race/Ethnicity	Allopathic (MD) Medical School	Osteopathic (DO) Medical School	Nurse Practitioner Graduates	Physician Assistant Graduates	California Population
African American	4%	<1%	16%	4%	**6%**
Asian	29%	36%	25%	30%	**13%***
Latino	7%	3%	9%	14%	**38%**
Native American	0%	<1%	1%	0%	**<1%**
White	45%	52%	39%	44%	**39%**
Other	15%	8%	9%	9%	**3%**

Sources: Association of American Medical Colleges, FACTS Table B-4: Total U.S. Medical School Graduates by Race/Ethnicity and Sex, 2012-2013 through 2014-2015; American Association of Colleges of Osteopathic Medicine, "Graduates by Osteopathic Medical College and Race and Ethnicity 2000-2015"; Physician Assistant Education Association Matriculating Student Survey, 2015, private tabulation; American Association of Colleges of Nursing, Research and Data Services, 2016, private tabulation; American Community Survey, Public Use Microdata Sample, 2014.
*Including Pacific Islanders with Asians (California population only). "Asian" category for graduates does not include Pacific Islanders (see note below).
Note: Includes all MD, DO, NP, and PA graduates regardless of specialty. "Other" includes other, multi-race/ethnicity, unknown, and non-citizen/non-resident. For California population, "other" only consists of two or more races. May not sum to 100% due to rounding. Native Hawaiians/Pacific Islanders comprised less than one percent of all graduates except Nurse Practitioners, where this group comprised one percent of the graduate population.

Table 4.6. compares the race/ethnicity of recent graduates of California MD, DO, NP, and PA training programs to the race/ethnicity of Californians working in these professions to assess whether recent graduates are more racially/ethnically diverse. The data suggest that Latinos were better represented among NPs and PAs employed in California in 2014 than among 2015 graduates of NP and PA education programs. Whites constituted a lower percentage of graduates of California NP and PA education programs in 2015 than their percentages among Californians employed in these professions in 2014, whereas the opposite is true of Asians. In contrast, whites accounted for a larger percentage of MD graduates than the percentage of whites among MDs practicing in these specialties. However, findings for practicing MDs should be interpreted with caution because 12% of MDs who responded to the Medical Board's survey did not answer the question about race/ethnicity and 16% of MDs who responded indicated that they declined to state their race/ethnicity.

Table 4.6. Race/Ethnicity of Recent Graduates of MD, DO, NP, and PA Training Programs and Practicing Professionals, California, 2014-2015

Race/Ethnicity	Allopathic Physicians, 2015	MD Graduates, 2015	Nurse Practitioners, 2014	NP Graduates, 2015	Physician Assistants, 2014	PA Graduates, 2015
Native American	0%	0%	0%	1%	0%	0%
Asian	35%	29%	13%	25%	21%	30%
African-American	3%	4%	4%	16%	4%	4%
Latino	6%	7%	15%	9%	22%	14%
Native Hawaiian/ Pacific Islander	0%	<1%%	0%	1%	0%	0%
White	37%	45%	65%	39%	49%	44%
Other	3%	15%	3%	9%	4%	9%

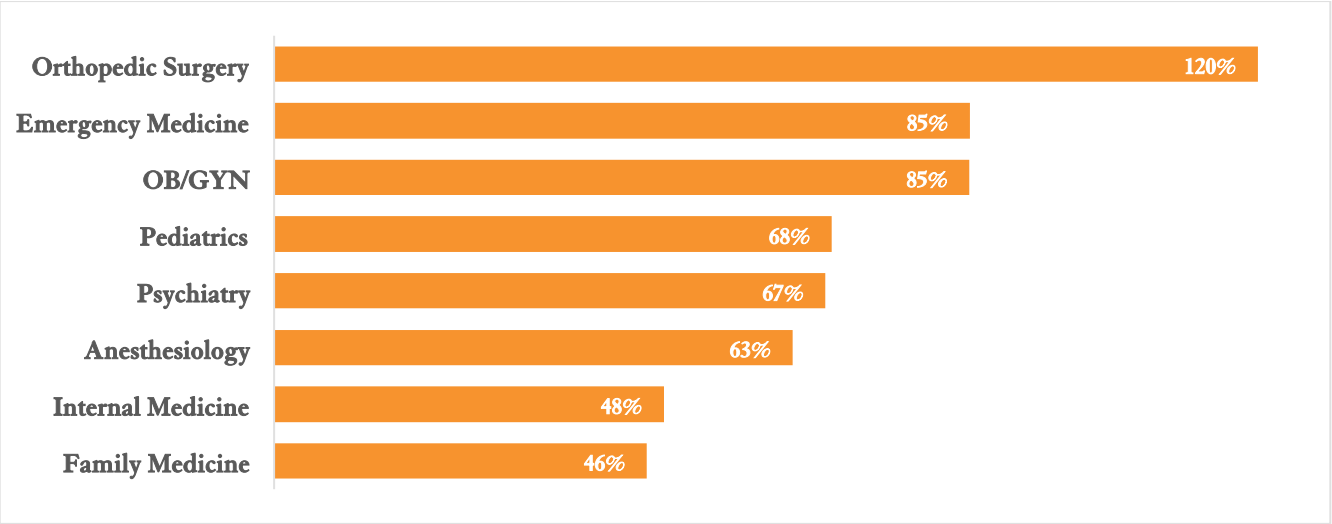
Sources: Association of American Medical Colleges, FACTS Table B-4: Total U.S. Medical School Graduates by Race/Ethnicity and Sex, 2012-2013 through 2014-2015; American Association of Colleges of Osteopathic Medicine, "Graduates by Osteopathic Medical College and Race and Ethnicity 2000-2015"; Physician Assistant Education Association Matriculating Student Survey, 2015, private tabulation; American Association of Colleges of Nursing, Research and Data Services, 2016, private tabulation; American Community Survey, Public Use Microdata Sample, 2014, private tabulation; Medical Board of California, Survey of Licensees, May 2015; private tabulation.
Note: Includes all MDs, NPs, and PAs regardless of specialty. Estimates for MDs exclude those who left this question blank in the survey (12% of respondents) and includes those who selected "Decline" (not shown, 16% of non-blank responses). May not sum to 100% due to rounding.

Interest in Primary Care

Data on interest in pursuing a career in primary care are available for graduates or matriculants of MD, DO, NP, and PA training programs. Findings for these professions cannot be compared directly because data were not collected in a uniform manner.

The strongest evidence regarding interest in primary care is available for medical school graduates. Most graduates of US medical schools participate in the National Resident Matching Program. Fourth year medical students rank specialties as their top or only choice and then rank residency programs within those specialties. Residency programs, in turn, rank fourth year medical students who have applied to their programs. The ratio of the number of fourth year US medical students applying for residency positions in a specialty to the number of available positions is a good indicator of US graduates' specialty preferences. Figure 4.10. displays these ratios for the four primary care specialties as well as select non-primary care specialties for fourth-year students from all U.S. medical schools in 2015. Orthopedic surgery is the most popular specialty and has a ratio of 1.2 US applicants per available position. For primary care specialties, ratios of US applicants to available positions ranged from a high of 0.85 for obstetrics/gynecology and emergency medicine to a low of 0.46 for family medicine. Ratios for family medicine and internal medicine are among the lowest of all specialties.

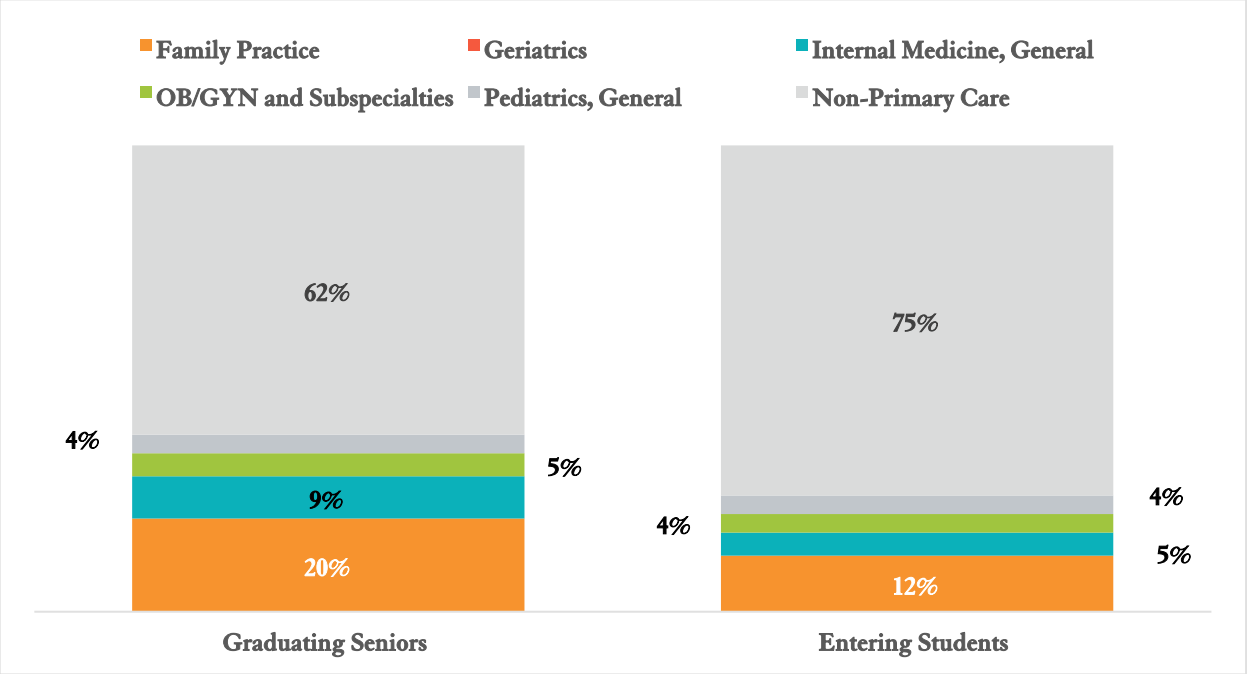
Figure 4.10. Medical Specialty Choice Compared to Available Slots among United States Medical School Seniors, 2015



Source: National Resident Matching Program, Results and Data: 2016 Main Residency Match®, Washington, DC. 2016.
Note: Percentages represent number of students selecting each specialty as their "top" or only choice as a proportion of the slots/openings available for each specialty.

The American Association of Colleges of Osteopathic Medicine conducts annual surveys of entering students and graduates of osteopathic (DO) medical schools that include questions about the specialties in which they plan to practice. Figure 4.11. presents findings from the surveys for persons entering or graduating from any DO-granting medical school in the US during the 2014-2015 academic year. These findings are similar to findings from the previous academic year. (Data not shown.) Thirty-eight percent of DO graduates plan to enter one of the four primary care specialties with family practice accounting for the largest share (20% of all graduates). Entering students were less likely to plan to specialize in primary care than graduating students (25% vs. 38%). It is unknown whether these students' preferences will change over the course of medical school.

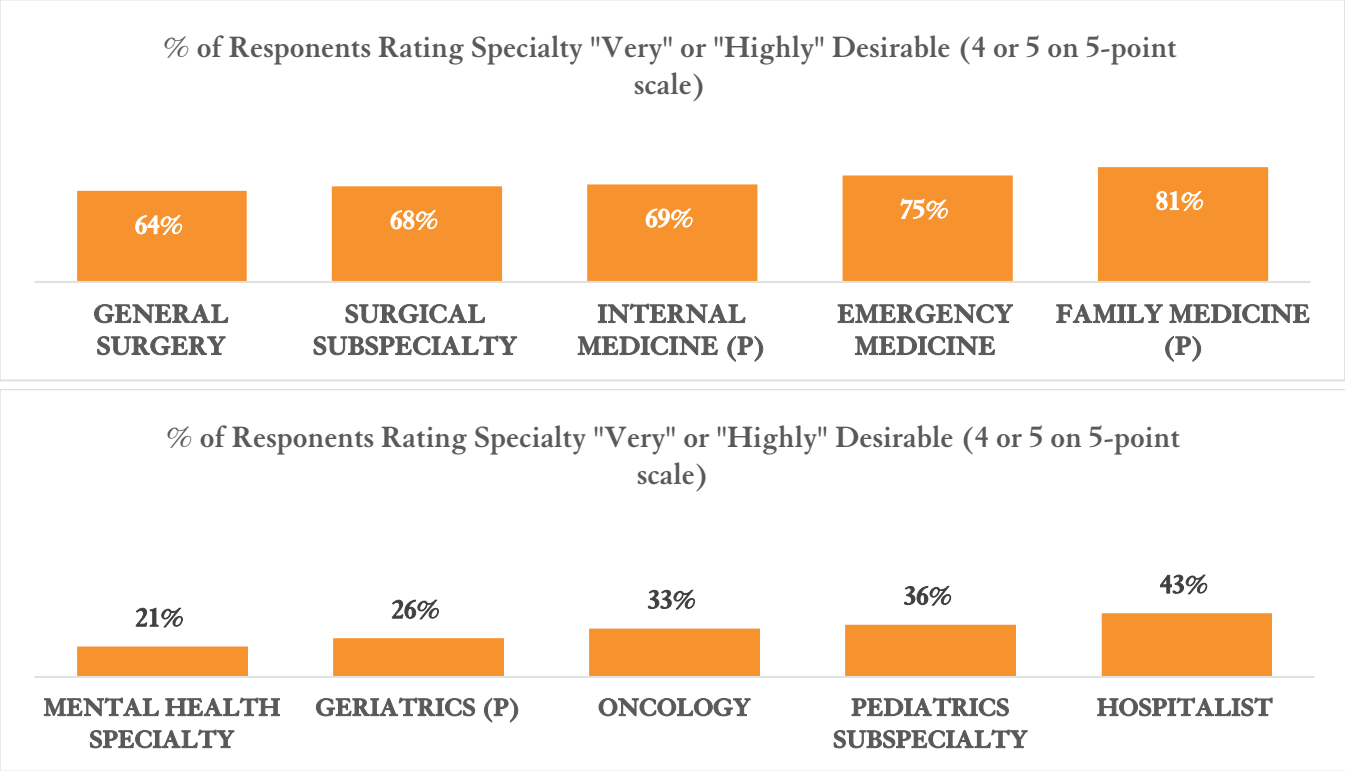
Figure 4.11. Planned Specialty Choice of Graduates of Osteopathic Medical Schools, United States, 2014-2015



Source: American Association of Colleges of Osteopathic Medicine, 2014-2015 Academic Year Entering Student Survey, 2014-2015 Academic Year Survey of Graduating Seniors.
Note: The percentage for geriatrics does not appear in the graph because no graduates or entering students indicated that they planned to practice in this specialty.

The Physician Assistant Education Association conducts an annual survey of students matriculating into PA education programs that includes a question about the desirability of particular specialties. Figure 4.12. displays findings to the 2015 survey from students entering PA education programs in California. The top graph presents the five specialties that matriculating students in California were most likely to rate as desirable and the bottom graph presents the five specialties that matriculating students in California were least likely to rate as desirable. Family medicine was rated as very desirable by a higher percentage of matriculating students than any other specialty (81%). The percentage perceiving internal medicine as very desirable (69%) was also high and compared favorably to all non-primary care specialties except emergency medicine. Geriatrics was among the least desirable specialties; only 26% of matriculating students perceive it as desirable.

Figure 4.12. Physician Assistant Students' Perception of the Desirability of Specialties, California, 2015



Source: Physician Assistant Education Association, Matriculating Student Survey, 2015.
Note: (P) signifies primary care specialties. The "Five Least Desirable Specialties' figure excludes "other specialty", which is the least desirable option when included with the other PA specialties

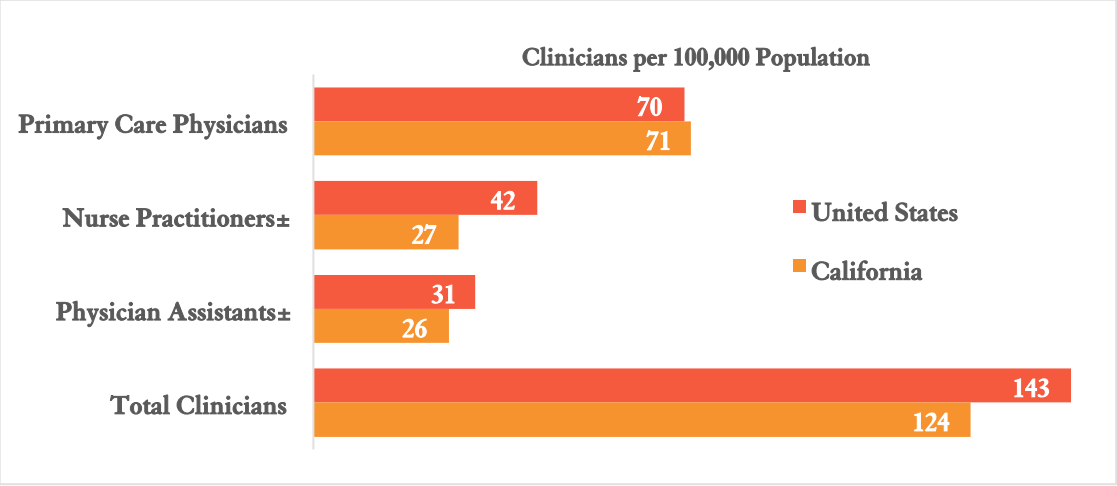
Chapter 5: Adequacy of Primary Care Clinician Supply in California

Primary care clinicians are not distributed across California in direct proportion to the population. In addition, a large percentage of primary care clinicians are at or near retirement age. These findings raise questions about the adequacy of the state's primary care workforce to meet current and future needs. This chapter assesses whether primary care clinician capacity is sufficient to meet current needs. A forthcoming report will address future supply and demand of primary care clinicians.

Neoclassical economic theory assumes that market forces create equilibrium between supply and demand for goods and services. When applied to the primary care workforce, this theory assumes that the current supply of primary care clinicians is sufficient to meet current demand. Many health workforce experts reject this assumption on the grounds that the market for health care services is imperfect. For example, people who do not have health insurance may use fewer health care services than they need because their financial resources are limited. In addition, MDs, DOs, NPs, and PAs in non-primary care specialties often earn more than their peers in primary care specialties, which may lead fewer clinicians to provide primary care than the public needs.

As an alternative, health workforce experts have developed benchmarks to which supplies of primary care clinicians at national, state, and local levels can be compared. One common approach is to compare ratios of primary care clinicians to population across geographic areas. As discussed previously the ratio of primary care physicians to population in California is similar to the national ratio, but the ratios of NPs and PAs to population are lower (35% lower for NPs and 16% lower for PAs). Together, these dynamics lead California to have a lower ratio of primary care clinicians to population than the US overall. (See Figure 5.1.) The low ratios of NPs and PAs compared to national ratios, and may represent an opportunity to expand employment of NPs and PAs in California.

Figure 5.1. Ratios of Employed Clinicians to Population California vs. the United States, 2015



Source: Bureau of Labor Statistics, Occupational Employment Statistics, 2015. U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015.
± Includes all NPs and PAs regardless of whether they provide primary care.
Note: The BLS OES data do not distinguish between MDs and DOs. The data also understate the number of practicing physicians because they only include employed physicians. Physicians who are in solo practice or in partnerships are excluded.

Other benchmarks compare supplies of primary care clinicians to a "gold standard" for an adequate ratio of primary care clinicians to population. In the 1990s, the Council on Graduate Medical Education (COGME) established a range of recommended ratios of primary care physicians to population based on staffing patterns in Kaiser Permanente and other group/staff health maintenance organizations.[23] COGME recommends a ratio of primary care physicians per population of 60 to 80 primary care physicians per 100,000 population (1,250 to 1,667 patients per primary care physician). Other organizations call for primary care physicians to have a patient panel of no more than 2,000 patients per physician which equates to a ratio of 50 primary care physicians per 100,000 population. For example, the California Health and Safety Code requires health plans licensed by the state to have provider networks that include 50 primary care physicians per 100,000 enrollees.[24]

Figure 5.2. plots the ratios of primary care MDs active in patient care to population in California overall and in the California Health Interview Survey (CHIS) regions in 2015 against the COGME benchmark and the California Health and Safety Code benchmark. Three of the nine CHIS regions had ratios of primary care MDs to population that were at or below DHCS's panel size benchmark of 50 primary care physicians per 100,000 population: Inland Empire, Northern and Sierra, and San Joaquin Valley. Seven of the nine CHIS regions had ratios of primary care MDs below the lower bound of the COGME range (60 per 100,000 population) and all had ratios below the upper bound of the COGME range (80 per 100,000 population). These findings should be interpreted with caution because they assume that primary care PAs are providing the same scope and amount of primary care as primary care physicians. As discussed previously, experts estimate that PAs can provide only 85% to 90% of the services primary care physicians can provide. It is also unknown whether primary care PAs in California perform the full range of services they are licensed to provide.

These benchmarks provide a starting point for comparisons of supply adequacy across California's nine regions but they have several important limitations. First, neither of account for the supply of primary care NPs and PAs available to supplement primary care MDs and DOs. Studies that have assessed the care provided by physicians and PAs in primary care settings have concluded that PAs can provide 85% to 90% of the services that primary care physicians provide.[25] Second, some believe the Health and Safety Code benchmark is unrealistic because the average number of patient care hours provided by physicians is decreasing, which limits the number of patients for whom the average primary care physician can care for. Finally, the benchmarks assume all areas have the same need to ensure the population has access to primary care, although aging and more chronically ill populations have greater primary care needs.

Figure 5.3. illustrates the impact of adding the supply of primary care PAs to the supply of primary care MDs.[26] All regions except the Inland Empire meet or exceed the California Health and Safety Code threshold of 50 primary care clinicians per 100,000 population. All but three regions (Inland Empire Northern and Sierra, and San Joaquin Valley) exceed the lower bound of the COGME range (60 primary care clinicians per 100,000 population). These findings should be interpreted with caution because they assume that primary care PAs are providing the same scope and amount of primary care as primary care physicians. As discussed previously, experts estimate that PAs can provide only 85% to 90% of the services primary care

[23] Council on Graduate Medical Education (1996). Patient Care Physician Supply and Requirements: Testing COGME Recommendations. Eighth Report. U.S. Department of Health & Human Services.

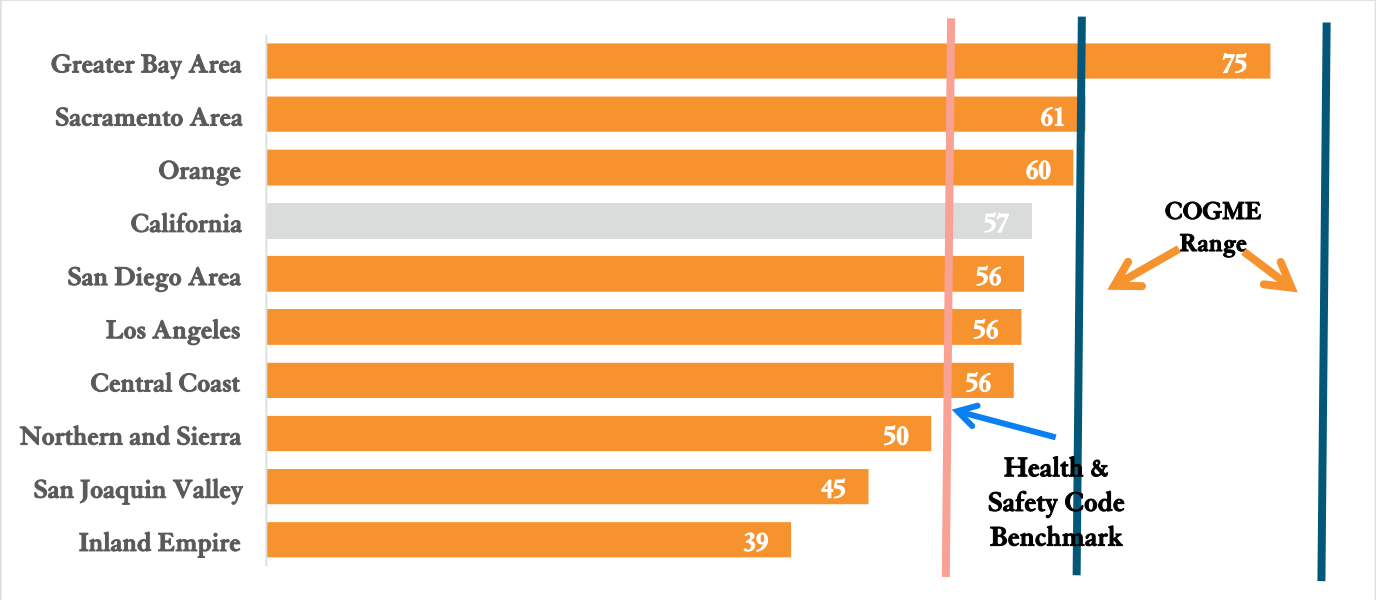
[24] California Health and Safety Code Section 1375.9

[25] RS Hooker, CM Everett. The Contributions of Physician Assistants in Primary Care Systems. Health and Social Care in the Community. 2012;20(1):20-31.

[26] Primary care NPs were not included because data are not available to determine the numbers of NPs in each region who provide primary care.

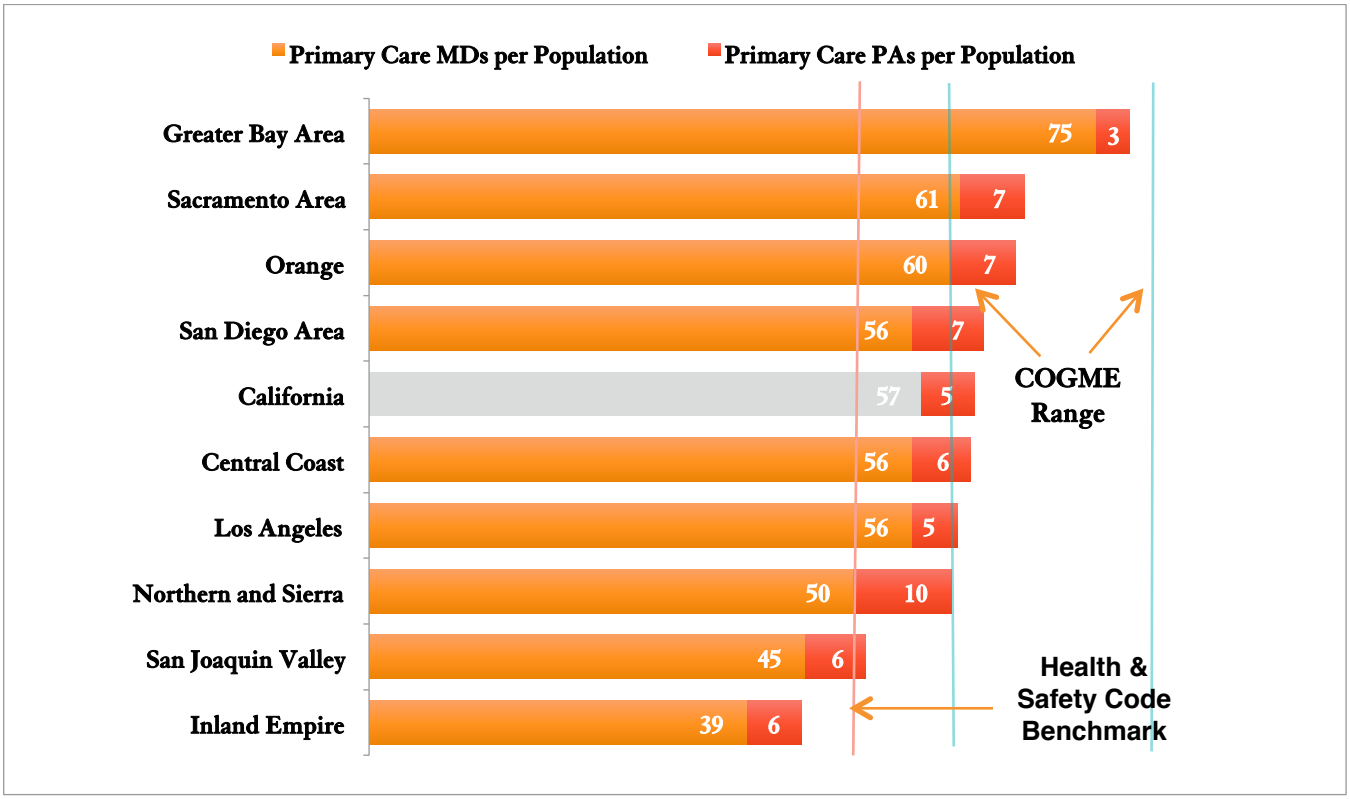
physicians can provide. It is also unknown whether primary care PAs in California perform the full range of services they are licensed to provide.

Figure 5.2. Ratios of Active Patient Care MDs in Primary Care Specialties per 100,000 Population, by Region of California Compared to Benchmarks of Adequacy of Supply, 2015



Source: Medical Board of California Mandatory Survey, 2015, private tabulation.
*Includes Family Physicians, General Internists, General Pediatricians, General Practitioners, Geriatricians, and Obstetrician/Gynecologists.
Note: Includes active MDs, excludes residents and fellows as well as physicians who do not provide at least 20 hours of patient care per week.

Figure 5.3. Ratios of Primary Care MDs Plus Primary Care PAs per 100,000 Population, by Region, 2015



Source: Medical Board of California Mandatory Survey, 2015, private tabulation.
*Primary Care includes Family Medicine, General Internal Medicine, General Pediatrics, General Practitioners, Geriatricians, and Obstetrician/Gynecologists. The National Commission on Certification of Physician Assistants, Limited Data from 2015 Profile of Certified Physician Assistant, 2016. Special request, private tabulation.
Note: Includes active MDs, excludes residents and fellows as well as physicians who do not provide at least 20 hours of patient care per week. All PAs in primary care fields are included regardless of hours of patient care per week.

To fully assess the adequacy of primary care clinician supply in California, it is important to look beyond the regional level. Some regions (and some counties) may have adequate supplies of primary care clinicians overall but have shortages in some parts of the region. For example, some regions may have sufficient numbers of primary care clinicians in cities but not in rural areas. Others may have adequate supplies in affluent areas but inadequate supplies in low-income areas.

One useful approach is to examine areas of California that government agencies designate as having shortages of primary care physicians. In California these areas are based on groups of Census tracts, an approach that enables one to distinguish rural vs. urban communities and high-income vs. low-income communities. The federal government designates areas of California as Health Professions Shortage Areas (HPSAs) if they have a ratio of primary care physicians per population greater than 1 primary care physician per 3,500 persons (28.5 primary care physicians per 100,000 population) for either (1) the entire

population of that area or (2) a specific sub-population, such as farm workers or Native Americans living on tribal lands.[27] Health care facilities, such as rural clinics and federally-qualified health centers (FQHCs) can also be designated as primary care HPSAs. While any geographic region of California meeting these criteria should theoretically receive HPSA status, some areas with supplies of primary care physicians below the 1:3,500 ratio have not been designated as HPSAs.

Figure 5.4. displays the locations of primary care HPSAs in California in 2016. The map indicates that all regions of California have primary care HPSAs regardless of the adequacy of primary care physician supply at the regional level. Most primary care HPSAs are in rural areas of the state but some primary care HPSAs are located in urban areas. In both rural and urban areas, HPSAs are often low-income communities in which large proportions of the population are enrolled in Medi-Cal or are uninsured.

Two other designations of shortage areas are the federal government's Medically Underserved Area and Population (MUA/MUP) designations[28] and California's Primary Care Shortage Area (PCSA) designations.[29] Both of these designations are determined using the ratios of primary care physicians to the population and population characteristics, such as the percentage of the population with incomes below 100% of the federal poverty level. The distribution of MUAs/MUPs and PCSAs across California is similar to the distribution of HPSAs. Note that all three of these designations use ratios of primary care physicians to population and do not take into account supplies of NPs and PAs who provide primary care.

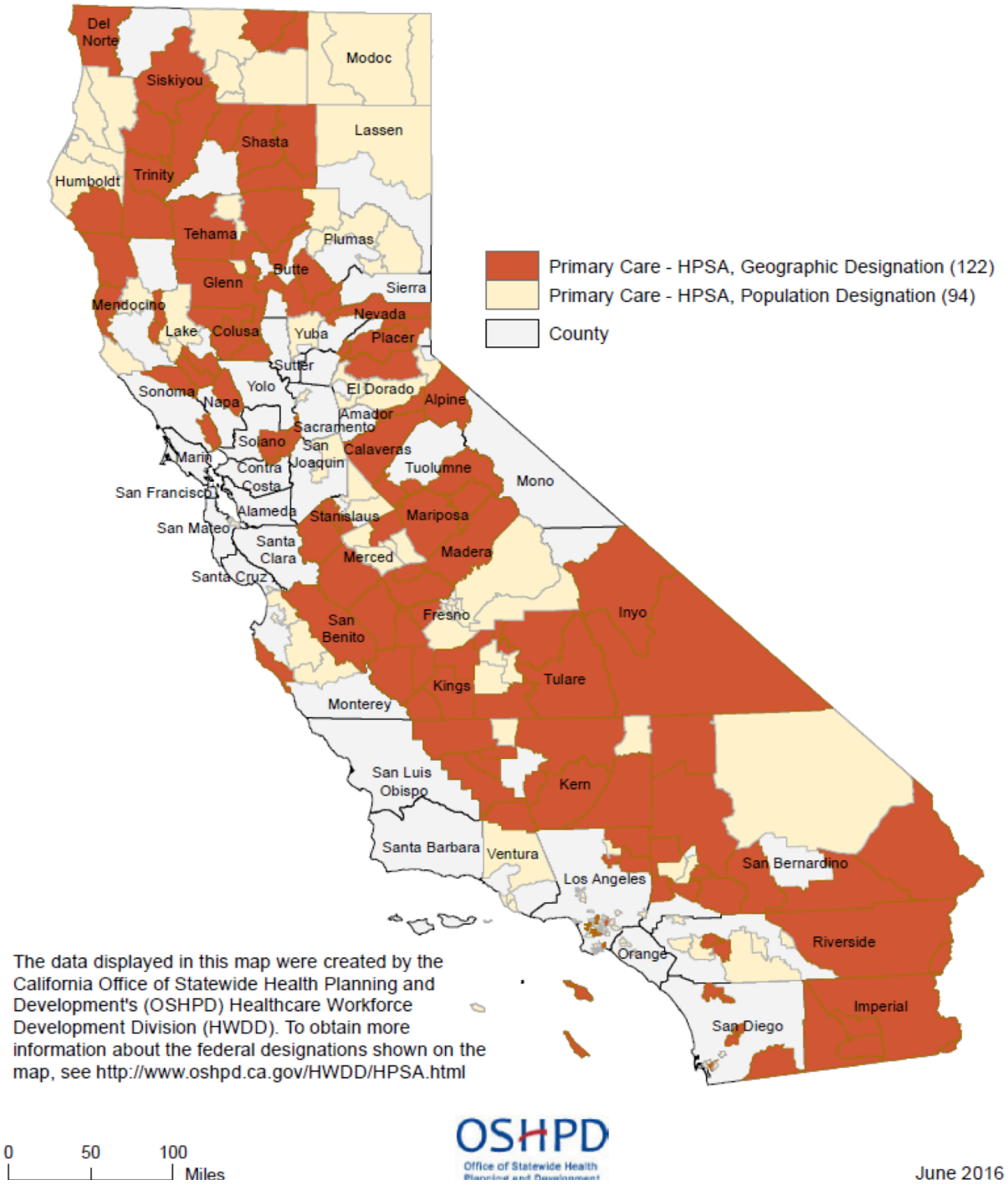
Collectively, these findings suggest that the overall supply of primary care clinicians in California is barely adequate to meet the state's needs and that this supply is not well-distributed across the state. Some rural and inner-city communities have severe shortages of primary care physicians. Most regions also have supplies of primary care physicians below recommended benchmarks. Primary care NPs and PAs add to the supplies of primary care clinicians in these regions but their numbers may not be sufficient to alleviate shortages in regions of the state that have high rates of poverty (i.e., the Inland Empire, the Northern and Sierra region, and the San Joaquin Valley).

[27] Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations. http://www.hrsa.gov/shortage/

[28] Medically Underserved Areas/Populations: Guidelines for MUA and MUP Designations. http://www.hrsa.gov/shortage/mua/index.html

[29] California Primary Care Shortage Areas. http://gis.oshpd.ca.gov/atlas/content/report/shortage/pcsa.pdf

Figure 5.4. Primary Care Health Professions Shortage Areas in California, 2016



Chapter 6: Data Limitations

As noted in various places in this report, existing sources of data on the primary care clinician workforce in California have some major limitations. Analysts must rely on multiple sources of data that do not always define terms consistently and are not always available for the same time periods. Prior to 2016, the Medical Board was the only licensing board to collect workforce data from licensees at the time of licensure renewal. Licensing boards for DOs, NPs, and PAs only recorded information about licensees' addresses and did not collect information about their labor force participation or their demographic characteristics. The lack of detail available on DOs, NPs, and PAs has limited ability to use data from California licensing boards to compare findings across primary care professions.

Data are available from other sources but they also have significant limitations. For example, the OES estimates of the number of practicing physicians and physician earnings only include MDs and DOs who are employees of medical groups, community health centers, hospitals, or other organizations. While the numbers of physicians who are employees has increased substantially over time, a large portion of physicians continue to practice in solo practices or as members of partnerships with other physicians. (See Chapter 3.) Similarly, ACS provides useful information on primary care clinicians' demographic characteristics but does not distinguish between primary care and specialist clinicians.

Professional associations collect some useful data but the amount of data available publicly and the willingness and ability of professional associations to provide private tabulations of data for this project varied substantially. For example, the American Osteopathic Association was unable to provide data within the timeframe required to produce this report. The NCCPA provided data on PAs but the level of detail was limited. The most useful data was obtained from associations of training programs for MDs, DOs, NPs, and PAs.

Having California licensing boards collect a standardized minimum dataset on each of the professions is critical to informing primary care workforce policy in California. New data collection efforts will provide additional information on DOs, NPs, PAs that can augment data already collected by the Medical Board. In 2014 the Governor approved Assembly Bill No. 2102 mandating the Board of Registered Nursing (BRN) and the Physician Assistant Board to collect demographic and practice data, including: location, specialty, hours worked, type of practice, race/ethnicity, gender, languages spoken, and educational background.[30] The boards are in the process of implementing these data collection requirements. In 2016, the California DO board began administering a licensure renewal survey modeled after the Medical Board's survey. The BRN has funded a survey of a sample of NPs is currently in the field. Findings from this survey should be available in late 2017.

[30] AB-2102 Bill Information, California Legislative Information. http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB2102

Chapter 7: Conclusion

The supply of primary care physicians in California is insufficient to meet the population's needs. Only 36% of MDs provide primary care. If OB/GYNs, who only provide a limited range of primary care services to women, are excluded, the percentage falls to 31%. Larger percentages of DOs, NPs, and PAs provide primary care, but their numbers are so small relative to MDs that they do not fully compensate for the small proportion of MDs who provide primary care. Primary care physicians are also poorly distributed across the state with smaller ratios to population in rural areas than in urban areas. The greatest shortages of primary care clinician are in the Inland Empire Northern and Sierra, and San Joaquin Valley regions. Areas surrounding the cities of San Francisco, Sacramento, and San Diego have a somewhat greater supply of primary care clinicians than other regions of the state, while the Los Angeles area lags behind other metropolitan areas.

Existing shortages of primary care clinicians are exacerbated by clinicians' demographic characteristics. One third of California's primary care MDs are age 55 or older. Older primary care physicians are much less likely to provide patient care than their younger peers and those who provide patient care work fewer hours per week. Approximately half of the primary care physician and PA workforces and most of the NP workforce are women who tend to work fewer hours per week than men. In addition, racial and ethnic minorities, particularly Latinos, are underrepresented in the primary care workforce relative to the California population.

The number of residency positions in primary care has increased, but not all primary care residents will go on to provide primary care or will stay in California following graduation. Thus, the numbers of new graduates will not be sufficient to replace all primary care physicians who are expected to retire within the next decade.

NPs and PAs mitigate some of the primary care physician shortage in California, particularly in regions with low ratios of primary care clinicians to population. Their numbers are also growing more rapidly than the number of MDs. However, the numbers of NPs and PAs remain much smaller than the number of physicians. In addition, one-third of NPs are age 55 or older, which means that like physicians, many NPs will retire or reduce their work hours within the next 10 years. Furthermore, the ratios of NPs and PAs to population in California are lower than national ratios, suggesting that NPs and PAs are not being utilized as extensively in California as in the nation overall.

The extent to which NPs and PAs will compensate for shortages of primary care physicians will depend in large part on the signals they receive from the labor market. When deciding whether to pursue careers in primary care, NPs and PAs consider compensation and numbers of job openings. NPs and PAs employed in hospitals earn higher salaries than NPs in PAs employed in outpatient settings, which may lead some NPs and PAs to pursue jobs in hospital-based specialty care settings instead of jobs in primary care settings. Scholarships and loan repayment programs that provide financial assistance to NPs and PAs in exchange for providing primary care in underserved areas of California are helpful but may not fully compensate for differences in earnings between primary care and specialty care positions. In addition, data on job openings for PAs indicate that most job openings in California are in specialty care settings. Clearer market signals are needed to substantially increase the numbers of NPs and PAs who provide primary care.

Technical Appendix

Definitions

Primary Care Clinicians

This report defines "primary care clinicians" persons in the following professions who practice in "primary care specialties": allopathic physicians (MDs), osteopathic physicians (DOs), nurse practitioners (NPs), and physician assistants (PAs).

Primary Care Specialties

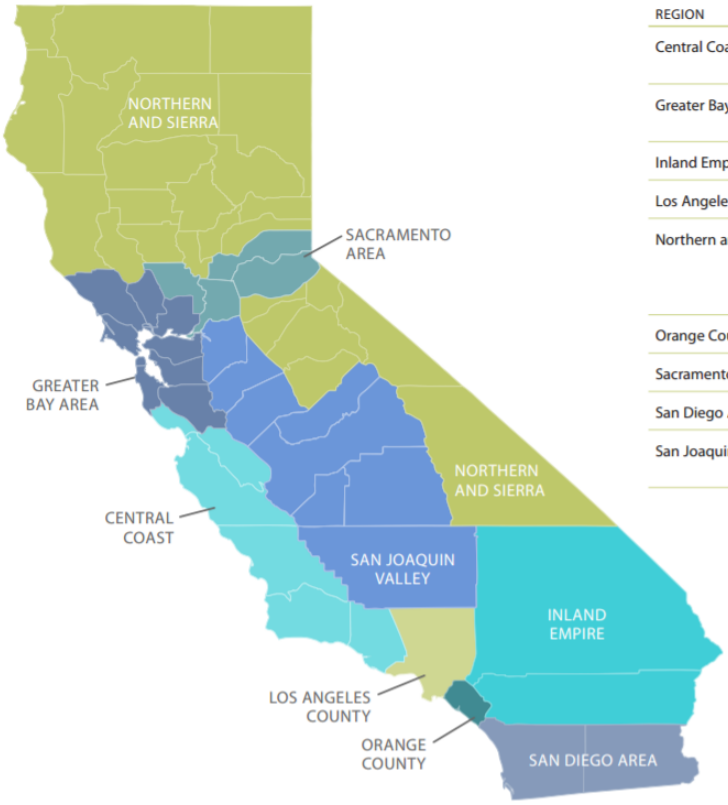
This report defines "primary care specialties" as encompassing the following specialties: family medicine/general practice, general internal medicine, general pediatrics, and obstetrics/gynecology. While obstetrician/gynecologists (OB/GYNs) are not always included in the definition of "primary care physicians (PCPs)" in workforce research, we chose to include them since a large number of women of child-bearing age visit their OB/GYN more frequently than their PCP and since some services that OB/GYNs provide, such as screening for asymptomatic disease, fall within the scope of what is typically considered primary care.

Practice Settings

The settings in which MDs, DOs, PCPs, NPs, and PAs practice could not be compared directly because the categories used to describe practice settings differ across data sources. Analyses of primary care MDs' practice settings used data from the UCSF/Medical Board of California (MBC) supplemental survey. The response options in this survey allowed respondents to be classified as practicing in the following practice settings: solo practice, medium/large group practice, community health center/public clinic, small medical partnership, Kaiser Permanente, and "other". Practice settings of NPs and PAs were derived from American Community Survey (ACS) data. For this survey, the response options were offices of physicians, outpatient care centers, hospitals, educational institutions, other healthcare, and "other."

Regions

The regions utilized in this report are the regions in the California Health Interview Survey (CHIS) administered by the UCLA Center for Health Policy Research. The CHIS regions group the state's 58 counties into nine distinct regions and are utilized for regional analysis by a number of organizations and publications. The precise breakdown of CHIS regions into California counties can be found below.



REGION	COUNTIES
Central Coast	Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Ventura
Greater Bay Area	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma
Inland Empire	Riverside, San Bernardino
Los Angeles County	Los Angeles
Northern and Sierra	Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Tuolumne, Yuba
Orange County	Orange
Sacramento Area	El Dorado, Placer, Sacramento, Yolo
San Diego Area	Imperial, San Diego
San Joaquin Valley	Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare

Source: California Physicians: Surplus or Scarcity. Oakland, CA: California Health Care Foundation, 2014.

Where possible, clinicians' primary practice addresses were utilized to determine the county and, subsequently, the region in which they are located. For some clinicians, only a residential address was available. For these clinicians, the primary residential address was utilized to assign clinicians to counties and regions. This means that some clinicians may be classified as providing care in their county of residence despite actually practicing in a different county. This may affect estimates of numbers of primary care clinicians by region because some persons may reside in a county in one region and commute to work in a county in another region. For example, some primary care clinicians who practice in the Los Angeles region may be misclassified as practicing in the Orange County region or the Central Coast region if they live in Orange County or Ventura County and only a residential address is available.

Data Sources

National Data Sources

U.S. Census Bureau

Population estimates at the national, state, and California regional levels were derived using data from the Census Bureau of the Economic and Statistics Administration. These data were used to calculate ratios of clinicians "per 100,000 population." also known as ratios of supply per capita, throughout the report and to describe the demographic and practice characteristics of primary care clinicians. The UCSF research team used the most recent data available at the time of the report's preparation. Additional information on the precise sources of Census data used can be found in the notes accompanying each table in the body of the report.

Annual Estimates of the Resident Population

Population estimates for the United States are generated by the Census Bureau's Population Estimates Program (PEP). The estimates generated by PEP are based on the most recent decennial census (2010 census, in the case of the data used in this report) and are reflective of currently available data on births, deaths, and migration.

The population estimates found in this report can be accessed using the "PEPANNRES" table, available via the American Fact Finder https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

American Community Survey

Several analyses in this report were conducted using from the American Community Survey (ACS) Public Use Microdata Sample (PUMS). PUMS data are a subsample of the responses collected through individual ACS survey instruments, and allow users to conduct a variety of analyses that are not possible using American Fact Finder data tables. Additional technical information about PUMS can be found on the "About PUMS" page as well as in the Design and Methodology Report. Learn more: http://www.census.gov/programs-surveys/acs/technical-documentation/pums/about.html

Since PUMS data are provided at the individual respondent level (i.e. each observation in the dataset represents a person's actual responses to the American Community Survey), the UCSF team was able to limit its analysis of race/ethnicity, geographic distribution, and other indicators to only those respondents who are likely to be actively practicing as primary care clinicians. Respondents with insufficient levels of education for licensure in a profession (e.g. physicians and surgeons with no more than a high school education) were excluded from analyses. Primary care clinicians who are unemployed or out of the labor force were also excluded from the analysis.

The ACS utilizes North American Industry Classification System (NAICS) codes to classify the industries in which respondents are working. The most recently available NAICS codes, which were generated in 2012, are used in this report. More information on NAICS, including technical documentation and the original purpose behind the codes, can be found at http://www.census.gov/eos/www/naics/. The NAICS codes are also utilized by the Bureau of Labor Statistics Occupational Employment Statistics (OES) program which is discussed below.

Bureau of Labor Statistics, Occupational Employment Statistics.

The Bureau of Labor Statistics (BLS) Occupational Employment Statistics program (OES) produces estimates of employment and wages at state and national levels. OES data capture employment and compensation rates for employed clinicians only. For the purposes of the OES estimates of annual wages and other data, employment is defined as "workers who can be classified as full- or part-time employees, including workers on paid vacations or other types of paid leave; workers on unpaid short-term absences; salaried officers, executives, and staff members of incorporated firms; employees temporarily assigned to other units; and employees for whom the reporting unit is their permanent duty station, regardless of whether that unit prepares their paycheck." Individuals who are self-employed, owners and partners in unincorporated firms, household workers, and unpaid family workers are not surveyed.

An important limitation of using OES data to estimate employment and wages across clinician type is that nurse practitioners (NPs) and physician assistants (PAs) are more likely to be employed than physicians are. Although increasing numbers of physicians are employed by the Permanente Medical Groups and other large, multi-specialty medical groups, a substantial proportion continue to work as solo practitioners or as members of partnerships. Thus, the OES estimates of the numbers of NPs and PAs in the labor force and their wages are more precise than OES estimates of numbers of physicians in the labor force and their wages.

The OES estimates also do not distinguish between allopathic (MD) and osteopathic (DO) physicians.

Health Resources & Services Administration (HRSA)

Health Center Program data

Data on clinicians providing patient care in community health centers that receive grants from the Health Resources and Services Administration (HRSA), also known as federally-qualified health centers (FQHCs), were obtained from the Bureau of Primary Health Care (BHPC) at HRSA. An important difference between the physician supply estimates reported in these data and other sources like the Department of Consumer Affairs Licensee Masterfile (described below) or BLS OES is that the HRSA clinician supply estimates are reported using full-time equivalent (FTE) counts rather than head counts of individuals. The number of individual primary care clinicians practicing in FQHCs in California may be higher than the HRSA FTE counts because some of these clinicians may practice in FQHCs on a part-time basis.

Data on Shortage Designations

Primary Care Health Profession Shortage Area (HPSA): "Primary Care Health Professional Shortage Areas (HPSAs) are designated by HRSA as having shortages of primary care physicians and may be geographic (a county or sub-county service area), demographic (low income population), or institutional (comprehensive health center, FQHC or other public facility)."[31]

[31] National Health Service Corps, Health Resources & Services Administration (HRSA), https://nhsc.hrsa.gov/ambassadors/hpsadefinition.html. HRSA also designates HPSAs for dental and mental health services.

These designations do not take into account supplies of NPs and PAs. A list of all primary care HPSAs in the United States can be found at https://datawarehouse.hrsa.gov/DataDownload/FRN/D_BCD_HPSA_H1_FederalRegister.pdf

Medically Underserved Area/Population (MUA/MUP): "Medically Underserved Areas/Populations are areas or populations designated by HRSA as having too few primary care providers, high infant mortality, high poverty and/or high elderly population."[32] A search tool that can be used to identify MUA/MUPs in the United States can be found at https://datawarehouse.hrsa.gov/tools/analyzers/muafind.aspx

State Data Sources

Department of Consumer Affairs Licensee Masterfile, obtained June 15, 2016.

The Department of Consumer Affairs (DCA) maintains a database of over 150 professional license types through the various licensing and certifying bodies it oversees, including licensing boards for MDs, DOs, NPs, and PAs. Through the submission of a Public Information Request Form, the UCSF research team (UCSF) obtained data on all licensees in the database as of June 15, 2016. Thus, all counts of licensees using DCA data reflect individuals whose licenses were active or current as of this date. Individuals whose license information indicated they were not practicing in California were omitted from these counts. Licensees whose license status was not "active" or "current" were also excluded from the counts reported (those who were inactive, delinquent, etc.).

There are two points to note for any analyses based on DCA data. First, these data do not allow one to ascertain whether licensees practice the profession for which they are licensed. Second, there is no information on the medical specialties of MDs, DOs, NPs, and PAs, so itis impossible to ascertain from these data the number of licensees who provide primary care versus specialty care. Due to this limitation, other sources of data are needed to generate estimates of the numbers of primary care clinicians in California.

Medical Board of California Mandatory and Supplemental Surveys.

The Medical Board of California (MBC) is the regulatory body that oversees the licensing of allopathic physicians (MDs) in California. California law[33] requires the MBC to administer a survey to MDs every two years as part of the licensure renewal process. The survey asks about licensees' professional activities in medicine, the number of hours they work, their medical specialty, the zip code of their practice, training status(i.e. whether a licensee is a resident or fellow), race/ethnicity, and languages spoken other than English.

The MBC also collaborated with UCSF on a voluntary supplemental survey that was administered in 2015, which contained questions about the settings in which MDs practice.

[32] Ibid.

[33] Business & Professions Code sections 803.1, 2425.1 and 2425.3

For the purposes of this report, the UCSF team limited its analyses to MDs who have active MBC licenses (i.e. they are not delinquent in renewing their license and have not allowed their license to lapse) and provide at least 20 hours of patient care each week. The rationale for excluding physicians who provide less than 20 hours of patient care per week is that such physicians do not make substantive contributions to the provision of primary care to Californians.

MDs were excluded based on the following criteria:

- ***"Not in 2-Year Cohort"***: This criterion removes respondents who did not renew an existing license or establish a new license (in the case of recent medical school graduates) within two years of the survey's distribution .
- ***"Residents/Fellows"***: This criterion removes respondents who identify as either residents or fellows. These physicians are considered trainees for purposes of this report because they have not completed all training required to practice in their chosen specialties.
- ***"Practicing Out-of-State":*** This criterion removes respondents who report that their primary practice location is outside the state of California regardless of their residence address. For example, physicians living on the California side of Lake Tahoe who primarily practice in the state of Nevada would be omitted from this analysis.

The MBC mandatory survey asks respondents to identify their primary and secondary specialties from among 55 "Areas of Practice" (e.g. Allergy and Immunology, Internal Medicine. The UCSF team developed an algorithm to collapse the 55 "Areas of Practice" into nine distinct categories: Facility Based Specialty, Family Medicine, General Internal Medicine, Medical Specialty, Obstetrics/Gynecology, Pediatrics, Psychiatry, Surgical Specialty, and Other. In the 2015 MBC Survey, 237 physicians (0.4%, N=61,196) could not be classified into any of these nine categories. The four used to identify primary care providers (PCPs) for this report are Family Medicine, General Internal Medicine, Obstetrics/Gynecology, and Pediatrics. The remaining five categories were aggregated to comprise non-primary care physicians.

Some of the practice settings options from the MBC survey were aggregated during the analysis of MBC data. The aggregations were done as follows: "Other" includes VA, military, correctional facilities, and other practice settings. The "Small Medical Partnership" category consists of partnerships containing two to nine physicians. The "Medium or Large Group Partnership" category consists of 10 physicians or more, includes academia, and excludes Kaiser Permanente/Permanente Medical Group, which has its own category.

California Board of Registered Nursing/UCSF

In 2010, the California Board of Registered Nursing contracted with UCSF to conduct a survey of a sample NPs and certified nurse midwives (CNMs) in California. Usable responses were received from 1,365 NPs located in California. Responses to a survey question regarding NPs' clinical specialties were used to estimate the number and percentage of NPs in California who provide primary care.

Office of Statewide Health Planning and Development (OSHPD)

Primary Care Shortage Areas (PCSAs)

The California Office of Statewide Health Planning and Development (OSHPD) designates Primary Care Shortage Areas (PCSAs). PCSAs are Medical Services Study Areas (MSSAs) that are identified as having shortages of primary care physicians based on the percentage of the population below 100% of the federal poverty level and the ratio of physicians to population. MSSAs are aggregations of census tracts that OSHPD has determined to be rationale service areas for delivery of primary care. A list of all PCSAs in California and a description of the methodology used to identify PCSAs can be found at http://www.oshpd.ca.gov/documents/HWDD/Song-Brown/2016/PCSA-Methodology-Map.pdf

Professional Association Data Sources

Allopathic Physicians (MDs)

Accreditation Council for Graduate Medical Education (ACGME)

The ACGME is a not-for-profit organization that accredits residency programs in the United States. Currently, the ACGME is only responsible for the accreditation of allopathic (MD) residencies, though they have been heavily involved in the development of the "single GME accreditation system" which will draw from both allopathic (MD) and osteopathic (DO) graduate pools.

The ACGME Data Resource Book (Book) is a compilation of information about the programs and students in accredited medical residencies across the United States. The Book includes data on several demographic characteristics as well as practice specialty of enrolled residents/fellows and residency/fellowship graduates. The UCSF research team aggregated statistics from data tables of interest across several years of the Book to generate findings on the numbers and characteristics of medical residents in California. Data are reported at the smallest geographic level possible.

Association of American Medical Colleges (AAMC)

Electronic Residency Application Service (ERAS)

The AAMC ERAS is an internet-based application system through which medical school graduates can apply to allopathic (MD) and osteopathic (DO) residency/fellowship positions across the United States. Data on the programs and residents/fellows using ERAS are published on their publically available web page, which can be accessed https://services.aamc.org/eras/erasstats/par/index.cfm

For this report, the UCSF research team aggregated data on MD and DO residencies only. Data on fellowships were not tabulated because fellowship training is not required for practice as a primary care physician. The following types of MD and DO residency programs were included as "primary care" residency programs:

Primary Care Residencies in California, 2017	
Allopathic (MD) Residencies, *N=124*	Osteopathic (DO) Residencies, *N=13*
Family Medicine	Family Medicine
Family Medicine/Preventive Medicine	Obstetrics and Gynecology
Internal Medicine	Pediatrics
Internal Medicine/Family Practice	
Internal Medicine/Pediatrics	
Internal Medicine/Preventive Medicine	
Obstetrics and Gynecology	
Pediatrics	

The residency program count included all programs regardless of their ERAS status, Programs that are not participating in the upcoming National Residency Match Program (NRMP) match (ERAS status "NP") and programs that are no longer accepting applications (ERAS status "NLA") are included with those that will be participating in the NRMP match (ERAS status "P"). Allopathic (MD) residency programs will began receiving applications for fall 2017 in September 2016 and osteopathic (DO) residency programs began receiving applications in July 2016.

FACTS

FACTS is a collection of tables that present data collected by the Association of American Medical Colleges (AAMC). These tables are publically available on the FACTS web page, available at https://www.aamc.org/data/facts/. They report data on applicants and matriculants to U.S. medical schools, enrollees and graduates (including MD-PhD students) of U.S. medical schools, and data on applicants to residency/fellowship programs through the aforementioned ERAS system.

The UCSF research team compiled data from various tables across several years to generate findings on U.S. medical school applicants, enrollees, and graduates. These findings include numerous demographic and other characteristics.

State Physician Workforce Data Book

The State Physician Workforce Data Book ("Physician Data Book") is a biennial publication of the AAMC that captures data on active physicians, residents, and fellows. The Physician Data Book captures data on both allopathic (MD) and osteopathic (DO) physicians, and was used to generate findings on measures that were not available in the Medical Board of California (MBC) data, such as the percentages of California-trained medical students and residents who practice in the state.

The Physician Data Book draws from a variety of data sources—the primary source for the data cited in this report is the "2014 American Medical Association (AMA) Physician Masterfile."

National Residency Match Program (NRMP)

The National Residency Match Program (NRMP, or "Match") is a nonprofit organization that matches graduates of U.S. and international medical schools with residency positions in the United States. The Match also performs this function for fellowship programs available to physicians wishing to subspecialize.

Data on both primary care and specialty residencies in California were obtained from the "2016 NRMP Main Residency Match: Match Rates by Specialty and State" report available at http://www.nrmp.org/wp-content/uploads/2016/04/Main-Match-Results-by-State-and-Specialty-2016.pdf. Family Medicine, Family Medicine/Preventive Medicine, Internal Medicine, Internal Medicine/Pediatrics, Internal Medicine/Preventive Medicine, Obstetrics/Gynecology, and Pediatrics were classified as primary care residency programs for the purposes of determining the number of residency positions in California. All other specialties were classified as non-primary care. Only positions filled at first-year or PGY-1 residencies were counted.

Osteopathic Physicians (MDs)

American Osteopathic Association (AOA), Osteopathic Medical Profession Report

The Osteopathic Medical Profession Report, or "Osteopathic Report", of the American Osteopathic Association was used to generate estimates of the proportion of California-based osteopathic (DO) physicians working in primary care. National data on the proportion of DOs in primary care specialties were used because California-specific data were not available. The data in the three Osteopathic Reports used for this project (1994, 2005, and 2014) are reflective of the data available in the AOA Physician Masterfile as of May 31 of each year. For example, the 2014 Osteopathic Report represents AOA Physician Masterfile data as of May 31, 2014.

American Association of Colleges of Osteopathic Medicine (AACOM)

The American Association of Colleges of Osteopathic Medicine (AACOM) collects demographic information on entrants and graduates to osteopathic (DO) medical schools. In addition, AACOM collects data on GME for graduates of osteopathic medical schools. UCSF applied a methodology similar to that described in the section of the Appendix above on data from the AAMC. Data from different tables and years were aggregated to present findings on the trainees educated in California osteopathic medical schools and residency programs.

Nurse Practitioners

American Association of Colleges of Nursing (AACN)

The American Association of Colleges of Nursing (AACN) is a national association of nursing schools that award bachelor's, master's, and/or doctoral degrees in nursing that conducts annual surveys of nursing schools that belong to the association. Data were obtained from AACN on the numbers of persons enrolled in NP education programs in California and the race/ethnicity of graduates of NP education programs in California.

Physician Assistants (PAs)

National Commission on Certification of Physician Assistants (NCCPA)

Data for all physician assistants (PAs) certified by the National Commission on Certification of Physician Assistants (NCCPA) in California. NCCPA collects the most comprehensive data on PAs in the US. These data were reported at the California Health Interview Study (CHIS) region level and are reflective of the extent to which individual respondents to NCCPA survey instruments answer specific survey questions.

The variables captured in this particular data request are "years working as a PA", age (in 5-year age groups), ethnicity (a binary indicator of Hispanic origin), race (expressed independently of ethnicity), gender, and practice specialty. PA specialties classified as "primary care" are the same as those used to identify physicians—family practice/general practice, general internal medicine, general pediatrics, and obstetrics/gynecology.

Physician Assistant Education Association (PAEA)

The Physician Assistant Education Association (PAEA) represents all of the accredited PA programs in the United States. Through their Matriculating Student Survey (MSS) and Program Survey, the PAEA collects and reports data on PA education programs and matriculants across the country. Through a private data request and analysis, the UCSF research team obtained and evaluated information on PA education programs in California as well as a representative sample of the students matriculating to these programs.

Data on PA programs (2015 PAEA Program Survey)

The UCSF research team received 2015 program-level data for PA education programs in California on numbers of PA enrollees and graduates by academic status (e.g., newly enrolled students) demographic characteristics, and region (using the PA school's location).

Data on PA matriculants (2015 PAEA Matriculating Student Survey)

The team also received the data collected in the 2015 PAEA Matriculating Student Survey (MSS) in the form of summary statistics for all students matriculating to PA programs in California. These survey results were used to describe PA education in California at the state level.

Healthforce Center at UCSF

The mission of Healthforce Center is to equip health care organizations with the workforce knowledge and leadership skills to effect positive change.

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