Annual Report: Update on California's Physician Workforce

by Healthforce Center at UCSF

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Abstract / Overview
The California Revenue and Taxation Code 30130.57 requires the University of California to annually review physician shortages by specialty across the state and by region. This report satisfies that requirement. It provides California policymakers with up-to-date information about the state's physician workforce and the pipeline of trainees in the state's medical schools and graduate medical education (GME) programs, often referred to as residency programs. This report focuses on the five specialties for which the CalMedForce program, established pursuant to Proposition 56, provides grants for residency training: family medicine, internal medicine, pediatrics, obstetrics/gynecology, and emergency medicine. This report also provides an overview of trends in use of behavioral health services and psychiatry residency programs in California.

Acknowledgements

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Contents

Key Findings

California continues to face major physician workforce challenges, which are occurring within a changing health care landscape. To obtain a license to practice medicine in California, physicians must complete one year of graduate medical education (GME), often referred to as residency, following medical school graduation (two years for international medical graduates), and must complete an additional 24 months of residency to renew their license. Physicians must complete three or more years of residency to be eligible for board certification in a medical specialty.

Proposition 56, which was approved by voters in 2016, increased California's state tobacco tax and allocated a portion of revenue ($40 million) annually to the University of California (UC) to "sustain, retain, and expand" California's residency training programs. UC contracted with Physicians for a Healthy California to administer a statewide GME grant program, also known as CalMedForce, that provides grants to residency programs in five specialties (emergency medicine, family medicine, general internal medicine, general pediatrics, and obstetrics/gynecology) and combined programs in these specialties (e.g., medicine-psychiatry). CalMedForce is also authorized to fund residency programs in other specialties in which shortages exist but has not done so due to high demand for funding from specialties specifically referenced in Proposition 56.

This annual report provides updated information from a previous report in this series regarding medical school and GME programs in California and new information about the location of residency programs in the specialties that CalMedForce funds and rates at which physicians in these specialties sub-specialize. The report also describes trends in use of mental health and substance use disorder services and residency training for psychiatrists.

Medical School

- California has twelve medical schools that award Doctor of Medicine (MD) degrees and three that award Doctor of Osteopathic Medicine (DO) degrees.
    - Six of the MD-granting medical schools are part of the University of California (i.e., public), five are private, not-for-profit and one is for-profit.
    - All of the DO-granting medical schools are private (two not-for-profit, one for-profit).
- A total of 1,782 students graduated from California medical schools during the 2020-2021 academic year.
- Most of California's medical schools are located in large metropolitan areas in Northern and Southern California.
- The number of graduates of California medical schools increased by 36 percent between 2009 and 2021 due to the opening of new medical schools and increases in class size at some existing schools.
- In 2020-2021, 48 percent of California's medical school graduates were male and 52 percent were female.
- The numbers of Black and Latinx medical school graduates are increasing but the percentage of graduates who are Latinx is smaller than the percentage of Californians who are Latinx.
- California has a lower ratio of medical students per 100,000 population than 42 of the 46 states that have one or more medical schools.

- Among the 46 states that have one or more medical schools, California ranked 37th in the percentage of students who matriculate at an in-state medical school.

Graduate Medical Education

- California ranks 26th with regard to the ratio of medical residents per 100,000 population.
- California had 1,099 ACGME-accredited residency and fellowship programs during the 2020-2021 academic year, including the following programs in specialties that are eligible for CalMedForce grants
    - 68 family medicine residency programs
    - 43 internal medicine residency programs
    - 16 pediatrics residency programs
    - 21 obstetrics/gynecology residency programs
    - 23 emergency medicine residency programs
- Most residency programs are located in large metropolitan areas in Northern and Southern California.
    - Family medicine is the only specialty that has residency programs in the Northern and Sierra region.
- Between 2011-2012 and 2020-2021, the number of first-year residents increased in all of the specialties in which CalMedForce provides grants but rates of growth varied substantially, ranging from 5 percent in pediatrics to 76 percent in emergency medicine.
- National data indicate that the percentage of female residents in the specialties CalMedForce funds ranges from 36.9 percent in emergency medicine to 84.6 percent in obstetrics/gynecology. (California data not available.)
- National data indicate that Blacks and Latinx are underrepresented among all specialties CalMedForce funds relative to their share of the U.S. population. (California data not available.)
- California retains larger shares of physicians who complete medical school and/or residency than any other state in the nation.

Retention of Residency Program Graduates in Primary Care and General Emergency Medicine

- Information about the rates at which graduates of residency programs in the specialties CalMedForce funds helps discern the impact of CalMedForce and other programs that aim to increase the primary care physician workforce.
- CalMedForce requires residency programs that apply for funding to report the percentage of graduates who provide primary care or work in an emergency department more than 50 percent of the time. Data submitted by programs that applied for funding in 2021 indicate that:
    - The median percentage of graduates retained in primary care or general emergency medicine ranged from 46 percent in pediatrics to 83 percent in family and community medicine.
    - Rates of retention varied widely across residency programs within specialties.

  - The widest variation occurred among programs in internal medicine, where the rate of retention in primary care ranged from 8 percent to 80 percent.
- These findings are consistent with findings from national studies of retention in primary care.

Trends in Use of Behavioral Health Services and Psychiatry Training

- Use of behavioral health services increased in the United States and California from the mid-2000s to the late 2010s.
- The limited literature on the impact of the COVID-19 pandemic on use of behavioral health services suggests that the pandemic resulted in further increases in use of behavioral health services.
- Studies of Californians have found higher rates of unmet need for behavioral health services among Asians, Latinx, undocumented persons, persons with limited English proficiency, persons without college education, and adults who are uninsured or ineligible for public health insurance.
- The number of psychiatry residents trained in California has increased substantially since the early 2010s but the increase may not be sufficient to fully alleviate unmet need.

Conclusions

California has opened new medical schools and residency programs, which has enabled the state to make progress toward increasing the number of physicians who practice in specialties that CalMedForce funds. California also leads the nation in the percentages of physicians who complete medical school and/or residency in the state and remain in California to practice.

However, challenges remain due to low ratios of medical students and residents per capita and a workforce that is not well-distributed geographically relative to the state's population. In addition, physicians remain much less racially/ethnically diverse than California's population and rates of retention in primary care vary widely across graduates of California residency programs in primary care specialties.

The data analyses and literature reviews conducted for this report suggest the following recommendations for CalMedForce.

- Refine methods for collecting data about retention of graduates of residency programs in primary care to better differentiate graduates who are subspecialists or hospitalists from graduates who remain in primary care but provide patient care less than 50 percent of their work hours.

- Advocate for additional resources to fund new psychiatry residency programs or expansion of existing programs to help reduce unmet need for behavioral health services in California and prioritize funding programs based at hospitals or clinics that serve populations with high levels of unmet need for behavioral health services.

Introduction

California continues to face major physician workforce challenges. Previous reports have found that California has fewer primary care physicians than it needs and that the state's physicians are unevenly distributed relative to the state's population (Coffman, Calimlim, and Fix, 2021; Coffman, Fix, and Ko, 2018). California continues to have fewer medical students (MD and DO) and residents per capita than the United States overall. Although the number of graduates of medical schools and residency programs is growing in California and in other states, the number of new graduates practicing in California will not be adequate to replace all physicians who will reach retirement age during the coming decade. Moreover, despite some progress in increasing the racial/ethnic diversity of medical students (Pfeffinger et al., 2021), the state's physician workforce still does not reflect the racial/ethnic diversity of the state's population.

These challenges are occurring within a changing health care landscape. Californians are older, more racially/ethnically and linguistically diverse, and more likely to have chronic health conditions. Technological advances and financial incentives are increasing the share of health care services delivered on an outpatient basis and in patients' homes. The disparate impact of the COVID-19 pandemic across racial/ethnic groups has brought attention to the large racial/ethnic disparities in health status and access to care. The pandemic has also led to an increase in need for mental health and substance use disorder services.

In the state of California, physicians who graduate from U.S. medical schools are required to complete one year of graduate medical education (GME), often referred to as residency, following medical school graduation to obtain a license to practice medicine, and international medical graduates are required to complete two years of residency training. To renew their initial license, physicians must complete an additional two years of residency (three years total). The three years of training must include two years of continuous training in the same residency program. Physicians must complete three or more years of training to be eligible for board certification in a medical specialty. Those who wish to subspecialize must complete additional years of fellowship. Most residency and fellowship positions are in programs accredited by the Accreditation Council for Graduate Medical Education (ACGME), although some fellowship programs are not ACGME-accredited.

Proposition 56, which was approved by voters in 2016, increased California's state tobacco tax and allocated a portion of revenue ($40 million) annually to the University of California (UC) to "sustain, retain, and expand" California's residency training programs. UC contracted with Physicians for a Healthy California to administer a statewide GME grant program, also known as CalMedForce. Under the terms of Proposition 56, CalMedForce must provide grants to residency programs in five specialties: emergency medicine, family medicine, general internal medicine, general pediatrics, and obstetrics/gynecology. Combined residency programs that include these specialties, such as medicine-pediatrics and medicine-psychiatry, are also eligible to apply for CalMedForce grants. CalMedForce is also authorized to fund residency programs in other specialties in which shortages exist but has not expanded outside of the five specialties due to high demands for funding within the existing specialties. Grantees are selected based on their ability to expand California's physician workforce with emphasis on their ability to meet the needs of medically underserved populations.

This annual report provides updated information from a previous report in this series regarding medical school and GME programs in California. The report also presents new information regarding two topics that are important for understanding California's physician workforce challenges:

- The geographic distribution of residency programs in the specialties CalMedForce funds in relation to the distribution of the state's hospitals and community health centers.
- The rates at which physicians in these specialties subspecialize.

- The report also examines trends in utilization of behavioral health services by the growing numbers of Californians who have mental health conditions and/or substance use disorders and trends in psychiatry residency training.

Medical School

This chapter provides updated information from *The State of California's Physician Workforce* report, regarding medical schools in California and their graduates.

Medical Schools in California

California has 12 medical schools that award Doctor of Medicine (MD) degrees, six of which are part of the University of California (i.e., public) and six of which are private. California also has three medical schools that award Doctor of Osteopathic Medicine (DO) degrees, all of which are private. Seven of the private medical schools are not-for-profit (five MD, two DO) and two are for-profit (one MD, one DO).

Table 1. Medical Schools in California by Ownership Type and Number of Graduates

Medical School	Number of Graduates, 2020-2021
MD-granting Medical Schools	
Public	
University of California, Davis	105
University of California, Irvine	106
University of California, Los Angeles	204
University of California, Riverside	57
University of California, San Diego	140
University of California, San Francisco	173
Private not-for-profit	
California University of Science and Medicine	----
Kaiser Permanente Bernard J. Tyson	----
Loma Linda University	167
Stanford University	104
University of Southern California	192
Private for-profit	
California NorthState University	94
Total MD-granting Medical Schools	**1,342**
DO-granting Medical Schools	
Private not-for-profit	
Touro University	122
Western University of Health Sciences	318
Private for-profit	
California Health Sciences University	----
Total – DO-granting Medical Schools	**440**
Total – All Medical Schools	**1,782**

Sources: American Association of Colleges of Osteopathic Medicine (AACOM). Graduates by Osteopathic Medical College and Gender 2000-2021; Association of American Medical Colleges (AAMC). FACTS: Enrollment, Graduates, and MD/PHD Data, FACTS: Enrollment, Graduates, and MD/PhD Data, FACTS Table B-2.2: Total Graduates by U.S. Medical School, Sex, and Year, 2016-2017 through 2019-2021.

Of these 15 medical schools, 12 had graduates during the 2020-2021 academic year, the most recent year for which data are available for both MD- and DO-granting schools. These medical schools had a total of 1,782 graduates of which 1,342 received an MD degree and 440 received a DO degree, a nine percent increase over the 1,633 graduates in 2018-2019, of which 1,172 received an MD degree and 440 received a DO degree. Three medical schools are new schools that did not have any students ready to graduate in 2020-2021.

Geographic Distribution of California Medical Schools

Table 2 displays the number of medical schools in each of California's regions. Most of the state's medical schools are in the Los Angeles and San Francisco metropolitan areas. Los Angeles County has the largest number of medical schools of any region (four schools; three that grant MD degrees and one that grants DO degrees). Two regions—the Central Coast and the Northern and Sierra regions—do not have any medical schools. Figure 1 displays the exact locations of the state's medical schools.

Table 2. Medical Schools in California by Region

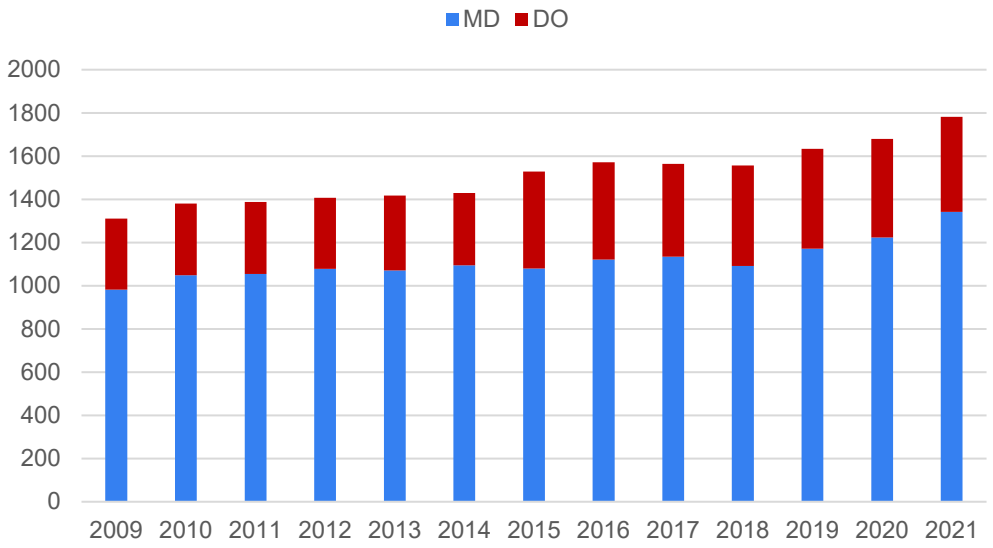
Region	MD-granting Medical Schools	DO-granting Medical Schools
Central Coast		
Greater Bay Area	Stanford University University of California, San Francisco	Touro University
Inland Empire	California University Science and Medicine Loma Linda University University of California, Riverside	
Los Angeles County	Kaiser Permanente Bernard J. Tyson University of California, Los Angeles University of Southern California	Western University of Health Sciences
Northern and Sierra		
Orange County	University of California, Irvine	
Sacramento Area	California NorthState University University of California, Davis	
San Diego Area	University of California, San Diego	
San Joaquin Valley		California Health Sciences University

Figure 1. Map of Medical Schools in California

Trends in Numbers of Graduates of California Medical Schools

As Figure 2 illustrates, the number of graduates of California medical schools increased by 36 percent between 2009 and 2021. This was due to the opening of two new MD-granting medical schools (California NorthState University and the University of California, Riverside), larger graduating classes at some MD-granting medical schools and increases in enrollment at DO-granting medical schools. Overall, the number of graduates of MD-granting schools increased by 37 percent and the number of graduates of DO-granting schools increased by 34 percent between 2009 and 2021.

Figure 2. Graduates of California Medical Schools (MDs and DOs), 2009 to 2021



Sources: AACOM. Graduates by Osteopathic Medical College and Gender 2000-2021; AAMC. FACTS: Enrollment, Graduates, and MD/PHD Data, FACTS Table B-2.2: Total Graduates by U.S. Medical School, Sex, and Year, 2010-2011 through 2015-2016; AAMC. FACTS: Enrollment, Graduates, and MD/PHD Data, FACTS Table B-2.2: Total Graduates by U.S. Medical School, Sex, and Year, 2016-2017 through 2020-2021.

The number of graduates of California medical schools will continue to increase over the next several years as the three newest medical schools in the state begin to graduate their first classes. The California University of Science and Medicine graduated its first class of 62 students in 2022 (CUSM, 2022). In 2024, the California Health Sciences University will graduate its first class of 79 students (California Health Sciences University College of Osteopathic Medicine, 2020) and the Kaiser Permanente Bernard J. Tyson School of Medicine will graduate its first class of 50 students (Association of American Medical Colleges, 2020). If all of these students complete medical school within the typical length of time (four years), the total number of graduates from California medical schools will increase by 11 percent between 2021 and 2024.

Two additional universities are seeking accreditation for MD-granting medical schools (LCME, 2022). The Charles R. Drew University of Medicine and Science College of Medicine (CDU), a Historically Black College and University and a Hispanic-Serving Institution, is a candidate for accreditation by the Liaison Committee on Medical Education (LCME), the organization that accredits MD-granting medical schools. CDU has trained medical students for many years in partnership with the University of California, Los Angeles (UCLA), with UCLA awarding students' degrees. It is seeking accreditation to establish an independent medical school that would provide the full four-year medical school curriculum and award its own degrees. As a candidate for LCME accreditation, CDU has completed a self-study and data collection instrument that the LCME has approved favorably. The next step toward accreditation is a survey visit with LCME representatives. The American University of Health Sciences has

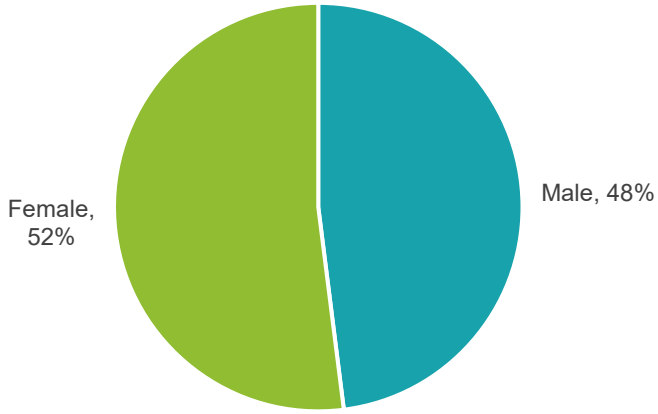
applied for LCME accreditation but has yet to advance to candidate status. CDU is a private not-for-profit university and the American University of Health Sciences is a private for-profit university; both universities are located in Los Angeles County.

Demographic Characteristics of Graduates of California Medical Schools

Gender

Nationwide, the percentage of medical school graduates who are female has increased substantially over the past 40 years, rising from 25 percent in 1980-1981 to 50 percent in 2020-2021 (AAMC 2019, 2021). Among all physicians (MDs and DOs) graduating from California medical schools during the 2020-2021 academic year, 48 percent were male and 52 percent were female. The percentage of female graduates was larger than in 2018-2019 (49 percent). However, the percentage of female graduates varied widely across medical schools, ranging from a low of 44 percent at Loma Linda University to a high of 66 percent at the University of California, Davis.

Figure 3. California Medical School Graduates by Gender, 2020-2021 (n = 1,782)



Sources: AACOM. Graduates by Osteopathic Medical College and Gender 2000-2021; AAMC. AAMC. FACTS: Enrollment, Graduates, and MD/PHD Data, FACTS Table B-2.2: Total Graduates by U.S. Medical School, Sex, and Year, 2016-2017 through 2020-2021.

Race/Ethnicity

Graduates of California's medical schools in the 2020-2021 academic year are somewhat more diverse than the state's physicians but not nearly as diverse as the state's population. Most notably, Latinx constituted 39 percent of California's population in 2020 but only 9 percent of medical school graduates in 2020-2021. The total numbers of Black and Latinx graduates increased between 2018-2019 and 2020-2021. The number of Latinx graduates increased by 41 percent, from 118 to 166 graduates, and the number of Black graduates increased by 26 percent, from 76 to 96 graduates (AACOM, 2020, 2022; AAMC, 2020, 2022). Public (i.e., University of California) and private not-for-profit MD-granting medical schools had higher percentages of Black graduates than DO-granting schools. Public MD-granting medical schools had a higher percentage of Latinx graduates than private MD-granting medical schools and DO-granting medical schools. The private for-profit MD-granting medical school had the lowest percentages of Black and Latinx graduates.

Table 3. California Population and Medical School Graduates by Race/Ethnicity, 2020-2021 (n = 1,782)

	California Population	Public MD-granting Medical Schools	Private Not-for-Profit MD-granting Medical Schools	Private Not-for-Profit DO-granting Medical Schools	Private For-Profit MD-granting Medical Schools	All Medical Schools
American Indian/Alaska Native, non-Hispanic	1%	1%	0%	0%	0%	1%
Asian, Pacific Islander, non-Hispanic	15%	31%	36%	35%	53%	35%
Black, non-Hispanic	5%	6%	8%	2%	1%	5%
Latinx	39%	14%	7%	6%	2%	9%
White, non-Hispanic	35%	31%	32%	26%	40%	33%
Other		12%	11%	10%	12%	11%
Two or more races	4%	12%	11%	10%	12%	11%
Unknown		3%	7%	8%	1%	5%

Note: Unknown includes non-resident aliens because medical schools do not report the race/ethnicity of non-resident aliens. The private for-profit DO-granting medical school (California Health Sciences University College of Osteopathic Medicine) and two of the private not-for-profit MD-granting medical schools (California University of Medicine and Science and Kaiser Permanente Bernard J. Tyson) are not included because they do not have any graduates yet.

Sources: AACOM, Annual Osteopathic Medical School Questionnaires, 1999-200 through 2020-21 academic years; AAMC, Table B-6.2: Total Graduates by U.S. Medical School and Race/Ethnicity (Alone or In Combination), 2020-2021. U.S. Census Bureau, Decennial Census, 2020.

The numbers of medical school graduates from underrepresented racial/ethnic groups will increase in coming years due to a large increase in the persons from these groups matriculating at California's medical schools. Between 2017 – the year in which most 2021 graduates entered medical school – and 2021, the number of American Indian, Black, and Latinx matriculants at MD-granting medical schools in California increased by 46 percent, from 318 to 463 persons (AAMC, 2022).

Ratio of Medical Students per Capita in California

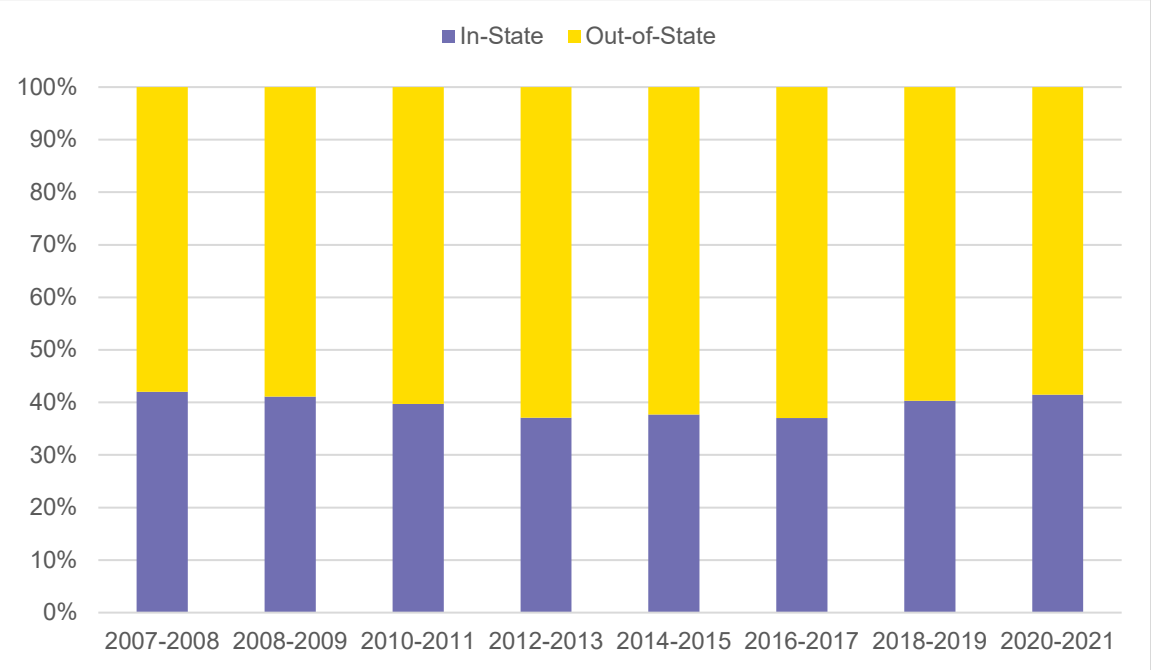
California has a lower ratio of medical students (MD and DO) per capita than the United States overall. In the 2019-2020 academic year, California ranked 43rd among the 46 states with medical schools in the ratio of medical students per 100,000 population (AAMC, 2022). During that academic year, California had 21.1 medical students per 100,000 population whereas the U.S. overall had 37.9 medical students per 100,000 population.

In-State vs. Out-of-State Enrollment of Californians Attending Medical School

The number of seats in California medical schools is low relative to the number of applicants. For example, 7,940 Californians applied to MD-granting medical schools in 2021-2022 but there were only 1,553 seats in MD-granting medical schools in California (AAMC 2022; AAMC 2022). As a consequence, a large share of Californians who pursue careers in medicine attend medical schools in other states or countries. Only 41.5 percent of the 2,706 Californians who entered an MD-granting medical school in 2020-2021 enrolled in schools in California (AAMC, 2022). Among states that have at least one MD-granting medical school, California ranked 37th in the percentage of student who matriculate at an in-state medical school. The data displayed in Figure 4 indicate that the

percentage of Californians matriculating at an in-state medical school in 2020-2021(41.5 percent) is similar to the percentage who matriculated at an in-state medical school in 2007-2008 (42.0 percent) and is somewhat higher than the percentage who attended an in-state medical school from 2012-2013 to 2016-2017 (37.0 percent to 37.7 percent). Nationwide 60.2 percent of students who entered an MD-granting medical school in 2020-2021 entered a school in their state of legal residence. (Data about matriculation at an in-state medical school are not available for people who matriculate at DO-granting medical schools.)

Figure 4. Percentage of Californians Attending Medical School In-State and Out-of-State MD-granting Medical Schools, 2007-2008 to 2020-2021



Source: AAMC, State Physician Workforce Data Report, 2007, 2009, 2011, 2013, 2015, 2017, 2019, and 2022.

It is also important to note that medical schools in California enroll both Californians and non-Californians. Among MD-granting schools, the percentage of matriculants in 2021-2022 who were residents of California ranged from 32 percent at Stanford to 99 percent at the University of California, Riverside (AAMC, 2022).

Graduate Medical Education

Following medical school, physicians are required to complete residency to obtain additional clinical education to prepare them to practice independently and become eligible for licensure. In the state of California, physicians are required to complete one year of residency training (two years for international medical graduates) following medical school graduation to obtain a license to practice medicine. Physicians must complete a total of three years of residency training, including two years of continuous training within the same program, to renew their medical license. In some specialties, physicians also need additional years of residency to be eligible for board certification. Physicians who wish to become sub-specialists complete additional years of fellowship training after they complete residency (e.g., cardiologists complete a residency in internal medicine followed by a fellowship in cardiology.) The Accreditation Council for Graduate Medical Education (ACGME) accredits training programs for graduates of MD and DO-granting medical schools in approximately 182 specialties and subspecialties (ACGME, not dated).

Most residency positions in the United States are filled through the National Residency Matching Program (NRMP), often referred to as the "Match." The purpose of the "Match" is to provide a uniform process by which applicants and residency programs can select one another. "Matches" are made by comparing rank order lists compiled by applicants and residency program directors. Each year, residency programs indicate to the "Match" the number of positions available for first-year residents (i.e., Post Graduate Year 1 positions) and for physicians who have already completed one year of residency (i.e., Post Graduate Year 2 positions). Physicians completing MD- or DO-granting medical schools in the U.S. are eligible to participate in the "Match" as are graduates of international medical schools (IMGs) who have been certified by the Educational Commission for Foreign Medical Graduates, an organization responsible for reviewing and assessing the credentials of IMGs who seek admission to U.S. residency programs. The percentage of available positions filled in the "Match" is an indicator of interest in the specialty among medical school graduates.

Ratio of Medical Residents per Capita

California has a lower ratio of medical residents per capita than the United States overall. In 2020, among the 50 states that had residency programs, California ranked 26th in the ratio of residents per 100,000 population (AAMC, 2022). California had 32.5 medical residents per 100,000 population in 2020, whereas the U.S. overall had 43.8 medical residents per 100,000 population.

Ratio of First Year Residency Positions in California to Graduating Medical Students

During the 2019-2020 academic year, 1,679 persons graduated from MD and DO granting medical schools in California. A total of 3,138 first-year (PGY-1) residency positions were available in California during the subsequent academic year (i.e., the year in which these graduates would enter residency). The ratio of medical school graduates to first-year residency positions was 1.9. In other words, there were 1.9 first-year residency positions in California for each medical school graduate.

However, it is important to keep in mind that residency positions are allocated through the National Resident Matching Program. Medical students can choose to rank residency programs throughout the United States and residency programs are free to rank any graduates of U.S. or international medical schools who apply to them. Some graduates of California medical schools will complete residency in other states and may or may not choose to return to California to practice.

Number of Programs

California had 1,099 ACGME-accredited residency and fellowship programs during the 2020-2021 academic year, an increase of 40 programs from 2019-2020. These programs consisted of 472 residency programs that provide physicians with an initial training experience in a specialty following completion of medical school and 627 subspecialty residency programs that provide subspecialty training to physicians who wish to subspecialize within their specialty (ACGME, 2021). For example, a physician who completes a residency in internal medicine may complete a subspecialty fellowship in cardiology, critical care, or another subspecialty of internal medicine. Of the 472 residency programs that enroll physicians immediately after medical school, the ACGME considers 449 to be "pipeline programs" because physicians who complete these programs are eligible for board certification in their specialties. Twenty-three are programs that provide physicians with one or more years of preliminary training prior to entering a residency program in a specialty. (Some programs in some specialties, such as anesthesiology, dermatology, and surgery, only admit physicians who have completed preliminary training.) Between 2019-2020 and 2020-2021, the number of programs that lead to initial board eligibility increased by four percent (17 programs) and the number of subspecialty programs increased by four percent (23 programs). The number of preliminary training programs decreased from 31 to 23 programs.

Among specialties in which CalMedForce funds single specialty or combined residency programs, the ACGME's online directory of residency programs indicates that in 2022, California had 72 family medicine residency programs, 52 internal medicine residency programs, 17 pediatrics residency programs, 4 medicine/pediatrics residency programs,[1] 23 obstetrics/gynecology residency programs, and 25 emergency medicine residency programs, all of which are accredited (ACGME, 2022). Rates of growth in numbers of residency programs have varied across these five specialties. Between 2020 and 2022, the number of family medicine residency programs participating in the "Match" increased by five programs, the number of internal medicine residency programs increased by two programs, and the number of emergency medicine residency programs increased by four programs. Pediatrics and obstetrics/gynecology each added one residency program. The number of medicine/pediatrics residency programs participating in the "Match" did not change (NRMP, 2020; NRMP 2022).

Geographic Distribution of Residency Programs

California's residency and fellowship programs are not distributed evenly across the state. The majority are concentrated in large metropolitan areas in Northern and Southern California. Table 4 lists the numbers of residency programs in specialties CalMedForce funds that offered positions in the "Match" in 2022 by region. (A map that displays the regions and a list of counties in each region can be found in Appendix A.) Family medicine was the only CalMedForce specialty that has residency programs in all 10 regions of California. The Central Coast region has no residency programs in emergency medicine. The Northern and Sierra region has no residency programs in internal medicine, pediatrics, obstetrics/gynecology, or emergency medicine. In addition to the residency programs listed in Table 4, California has one family medicine-preventive medicine residency program in the Inland Empire, two medicine-preventive medicine residency programs (one in the Greater Bay Area and one in Los Angeles County), one medicine-emergency medicine program in Los Angeles County, two pediatrics-anesthesiology programs (one in the Greater Bay Area and one in the Inland Empire), four pediatrics-genetics residency programs (two in the Greater Bay Area, one in Los Angeles County, and one in Orange County), two psychiatry-family medicine programs (one in the Sacramento area and one in the San Diego area), and two psychiatry-medicine programs (one in Orange County and one in the Sacramento area).[2]

[1] Medicine/Pediatrics residency programs are four-year residency programs that prepare physicians for board certification as both internists and pediatricians.

[2] The ACGME also tracks combined residency programs in emergency medicine/family medicine, emergency medicine/pediatrics, and family medicine/internal medicine but there are none of these types of residency programs in California.

Table 4. Number of Residency Programs by Region in CalMedForce Specialties, 2022

	Emergency Medicine	Family Medicine	Internal Medicine	Medicine/ Pediatrics	Obstetrics/ Gynecology	Pediatrics
Central Coast	0	4	3	0	1	1
Greater Bay Area	3	10	10	0	6	4
Inland Empire	7	13	10	1	4	1
Los Angeles County	3	17	13	2	6	5
Northern and Sierra	0	6	0	0	0	0
Orange County	1	2	2	0	1	1
Sacramento Area	2	4	2	0	1	1
San Diego Area	3	5	5	1	2	2
San Joaquin Valley	6	11	7	0	2	2
All Regions	25	72	52	4	23	17

Note: Medicine/Pediatrics residency programs are four-year residency programs that prepare physicians for board certification as both internists and pediatricians.

Source: ACGME, Program Search.

Eleven new programs in CalMedForce specialties participated in the "Match" for the first time in 2021 and four new programs participated for the first time in 2022. Three new family medicine programs participated in 2021 – one in the Inland Empire, one in Los Angeles County, and one in the Sacramento area. Four new emergency medicine programs opened in 2021, two in the Inland Empire and two in the San Joaquin Valley. One new obstetrics/gynecology residency program opened in the Inland Empire in 2022. One new pediatrics residency program opened in the Central Coast in 2022. Four new internal medicine programs opened in 2021 – one in the Central Coast, one in the Inland Empire, one in Los Angeles County, and one in the San Joaquin Valley. Two new internal medicine programs opened in 2022, one in Los Angeles County and one in the Sacramento area. One internal medicine program in the Inland Empire that participated in the "Match" in 2019 and 2020 did not participate in 2021 and 2022. The absence of this program from the "Match" in 2021 and 2022 yielded a net increase of five internal medicine residency programs participating in the "Match" between 2020 and 2022.

The following pages display a series of maps that illustrate the locations of residency programs in the specialties that CalMedForce funds in relation to the locations of general acute care hospitals and community health clinics. Historically, all residency programs were sponsored by hospitals, which provide both inpatient and outpatient services. Since the Affordable Care Act established the teaching health center program, several types of outpatient clinics that serve low-income persons, including federally qualified health centers and tribal health centers, have been eligible to sponsor residency programs. Mapping the locations of residency programs in CalMedForce specialties, hospitals, and community health clinics can help policymakers and medical education leaders identify areas of the state that do not have residency programs but which have hospitals and community health clinics that could potentially sponsor them. Distributing residency programs more evenly across the state is

important because many physicians practice in close proximity to the communities in which they complete residency. The zip codes of general acute care hospitals were used to map their location. Zip codes of the primary sites of community health clinics were used to map their locations.

The maps indicate that most of California's hospitals are in the Los Angeles and San Francisco metropolitan areas. While community health clinics are more evenly distributed throughout the state, there are also large concentrations in the Los Angeles and San Francisco metropolitan areas. The maps also show that there are many areas in the state that have hospitals or community health clinics but no residency programs in CalMedForce specialties.

Figure 5 plots the locations of emergency medicine residency programs and hospitals and clinics. Despite the presence of hospitals and clinics, there are no emergency medicine residency programs in the Central Coast and Northern and Sierra regions. Depending on the volume of emergency department visits, some hospitals in these regions may be able to sponsor emergency medicine residency programs or partner with larger hospitals to operate a rural tracks residency program sponsored by hospitals located in a metropolitan area, such as the Greater Bay Area or Sacramento area.

Figure 5. Emergency Medicine Residency Programs, Hospitals, and Clinics

Figure 6 indicates that family medicine residency programs are more evenly distributed across California than residency programs in other CalMedForce specialties. There is at least one family medicine residency program in every region. There may be additional opportunities for hospitals and community health clinics in larger communities in rural areas, such as Chico, El Centro, and San Luis Obispo, to sponsor family medicine residency programs that include rotations at hospitals and clinics in smaller rural communities.

Figure 6. Family Medicine Residency Programs, Hospitals and Clinics

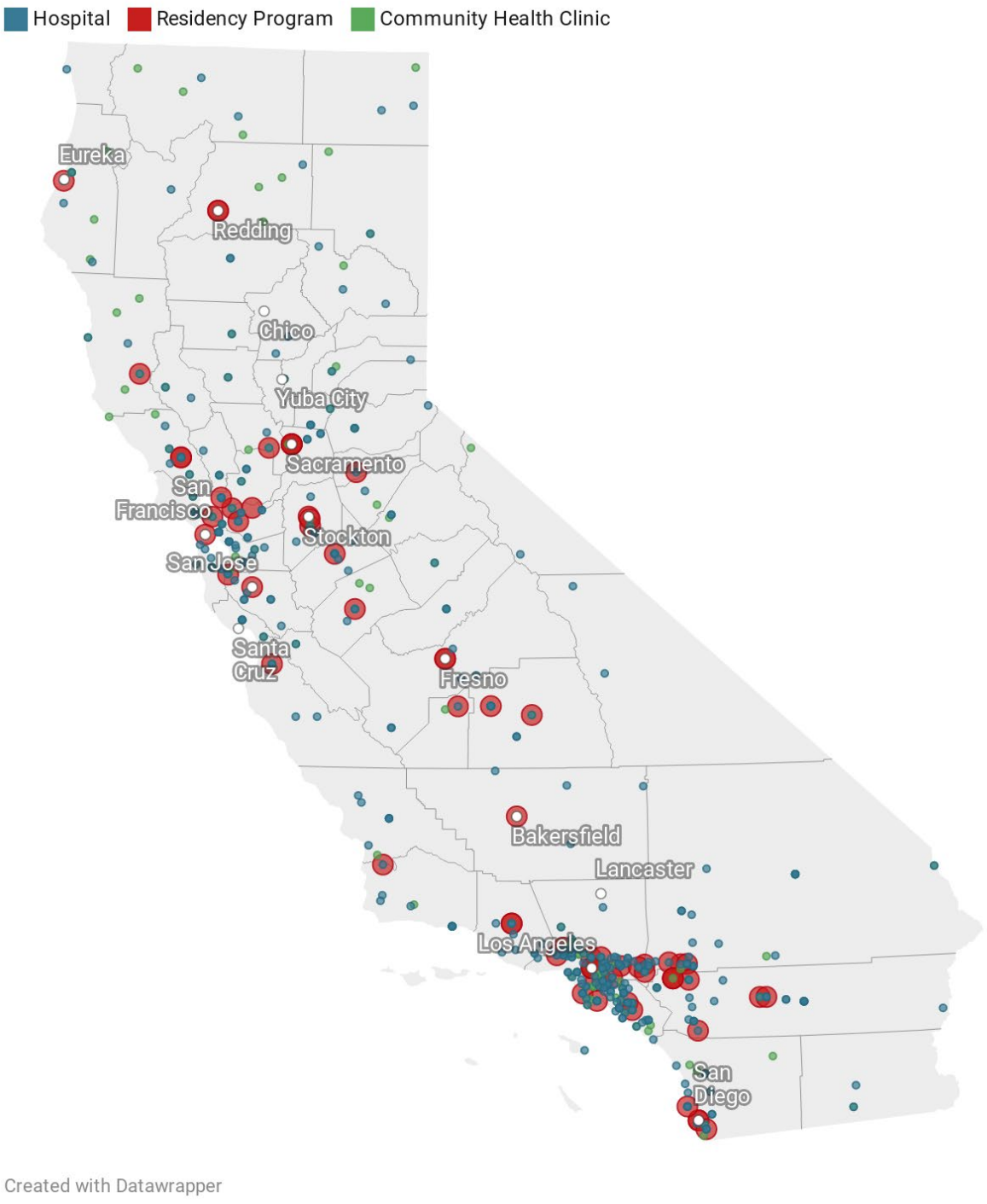


Figure 7 displays locations of internal medicine residency programs relative to hospitals and clinics. There are no internal medicine residency programs in the Northern and Sierra region and fewer programs in the San Joaquin Valley than emergency medicine and family medicine programs. There may be opportunities to develop new internal medicine residency programs in these regions or rural tracks within residency programs sponsored by hospitals or community health clinics in Fresno, Sacramento, or other metropolitan areas.

Figure 7. Internal Medicine Residency Programs, Hospitals and Clinics

Figure 8 illustrates that all of the medicine/pediatrics programs in California are located in large, metropolitan areas in the Southern part of the state. Hospitals and community health clinics in the Greater Bay Area and Sacramento regions probably have sufficient volumes of both adult and child patients to support medicine/pediatrics residency programs. However, demand for medicine/pediatrics residency programs may not be as strong as demand for residency programs in either of these specialties individually or family medicine, because they take longer to complete but typically do not yield a commensurate increase in income.

Figure 8. Medicine/Pediatrics Residency Programs, Hospitals and Clinics

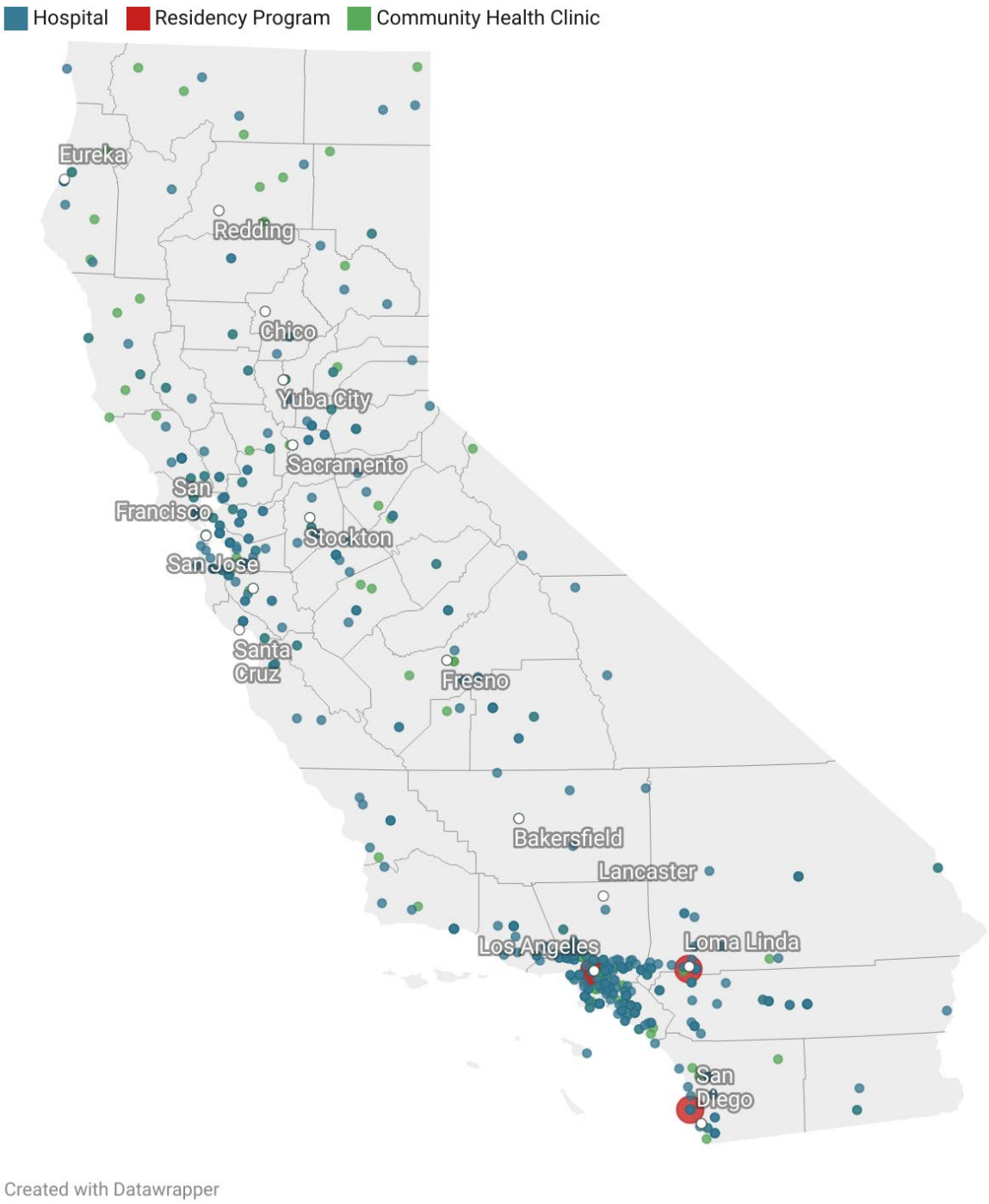
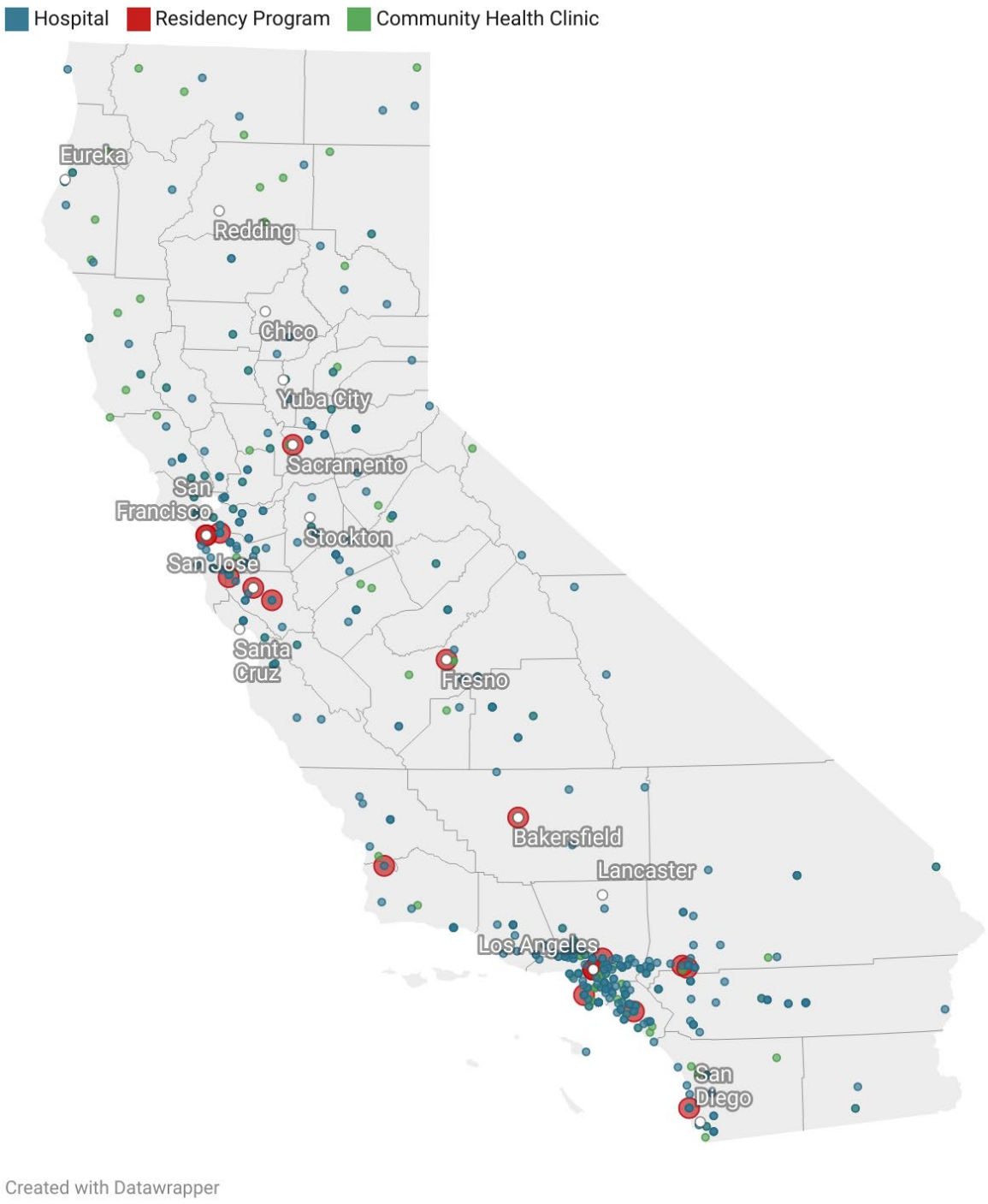


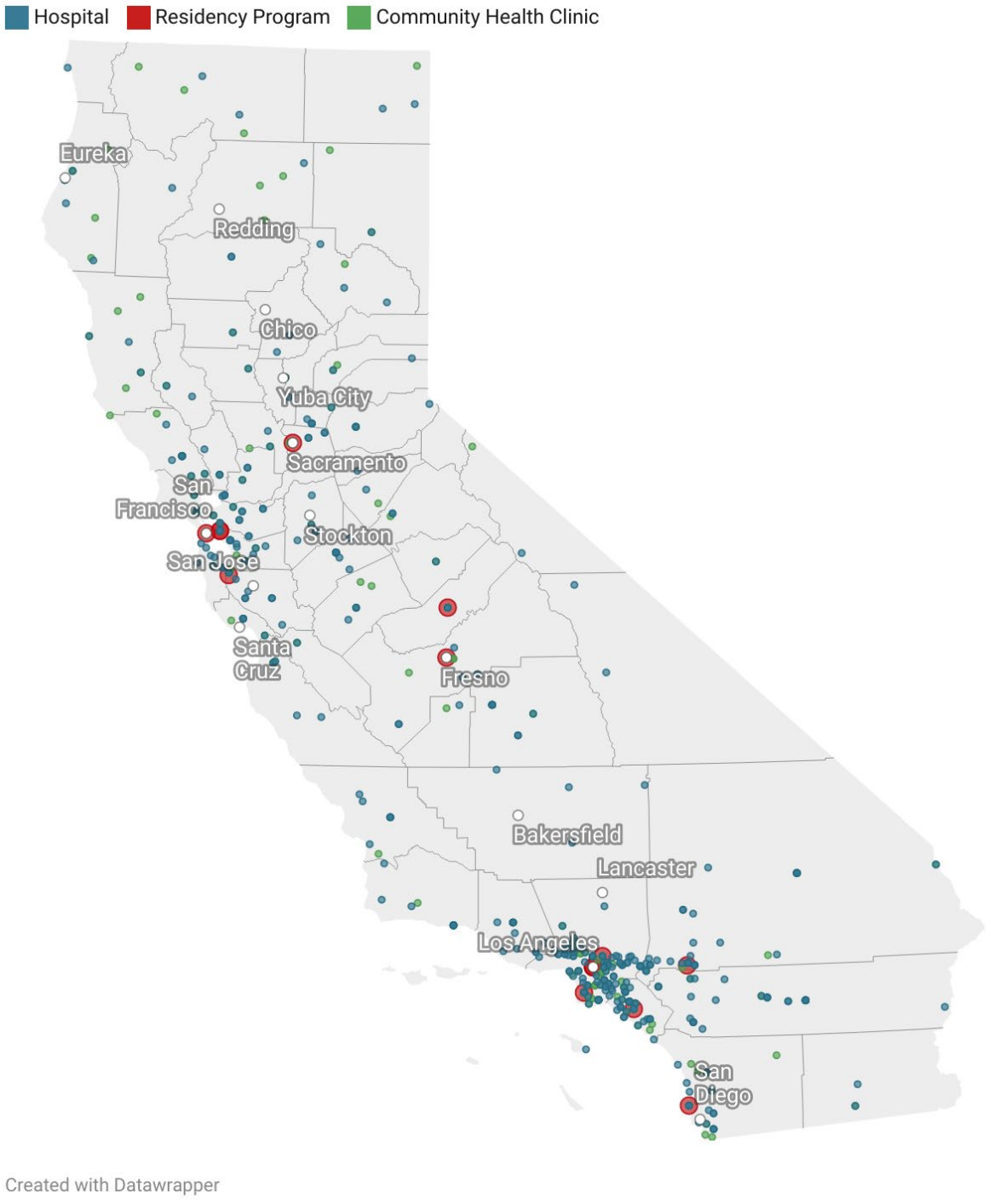
Figure 9 displays locations of obstetrics/gynecology residency programs and hospitals and clinics. Most obstetrics/gynecology programs are located in the Greater Bay Area and urban areas of Southern California. There are no programs in the Northern and Sierra region, only two in the San Joaquin Valley, and one in the Central Coast. Due to the need for a high volume of patients who need obstetrics/gynecology services, it may not be feasible to establish a program in the Northern and Sierra region. A rural track within a program located in a metropolitan area (e.g. Sacramento) is likely to be a more realistic option.

Figure 9. Obstetrics/Gynecology Residency Programs, Hospitals and Clinics



Similarly, Figure 10 indicates that pediatrics residency programs are concentrated in the Greater Bay Area and urban areas of Southern California. There are no programs in the Northern and Sierra regions. Establishing new pediatrics residency programs in these regions is likely to be difficult because there are no children's hospitals in these regions. Pediatrics residents need to complete rotations in pediatric specialty care, which is provided primarily by children's hospitals. Establishing a rural track within a pediatrics residency program based in the Greater Bay Area or Sacramento may be a more realistic option.

Figure 10. Pediatrics Residency Programs, Hospitals and Clinics

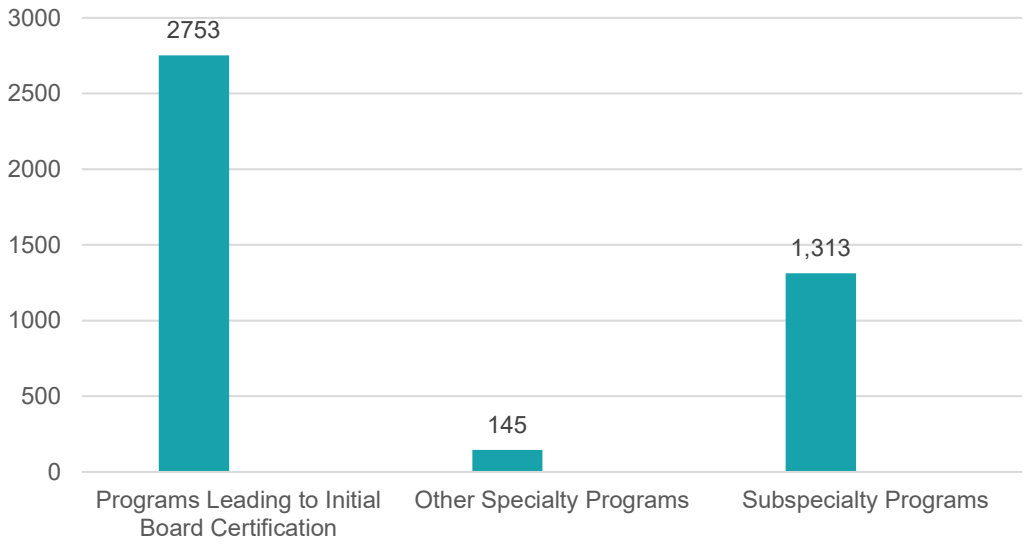


Number of Residents and Fellows

During the 2020-2021 academic year, a total of 13,646 residents and fellows were enrolled in ACGME-accredited programs in California. Of these residents and fellows, 10,945 (80 percent) were enrolled in programs leading to eligibility for initial board certification, 176 (1 percent) were enrolled in other specialty residency programs that provide preliminary training, and 2,525 (19 percent) were enrolled in subspecialty fellowship programs (ACGME, 2021). Between 2019-2020 and 2020-2021, the total number of residents and fellows enrolled in ACGME-accredited programs in California grew by 3 percent.

During the 2020-2021 academic year, 4,211 persons graduated from ACGME-accredited residency and fellowship programs in California, of whom 2,753 (66 percent) graduated from programs leading to initial board certification and 1,313 (31 percent) graduated from subspecialty fellowship programs. Between 2019-2020 and 2020-2021, the total number of graduates from ACGME-accredited programs in California grew by 3.5 percent.

Figure 11. California Residency Program Graduates by Type of Program, 2020-2021



Source: ACGME. Data Resource Book, Academic Year, 2020-2021, Tables D.7 to D. 9.

Table 5 lists the numbers of first-year residents entering programs leading to initial board certification in California during the 2020-2021 academic year. The number of first-year residents in individual specialties ranged from a low of 5 in nuclear medicine to a high of 777 in internal medicine. Among other specialties in which CalMedForce funds residency programs, there were 551 first-year family medicine residents, 300 first-year pediatrics residents, 119 first-year obstetrics/gynecology residents, and 245 first-year emergency medicine residents. Between 2019-2020 and 2020-2021, internal medicine had the largest increase in the number of first-year residents (4 percent), followed by family medicine (3 percent), emergency medicine (2.5 percent), and obstetrics/gynecology (2 percent). The number of first-year pediatrics residents did not change during this time period.

Table 5. California First-Year Residents by Specialty, 2020-2021

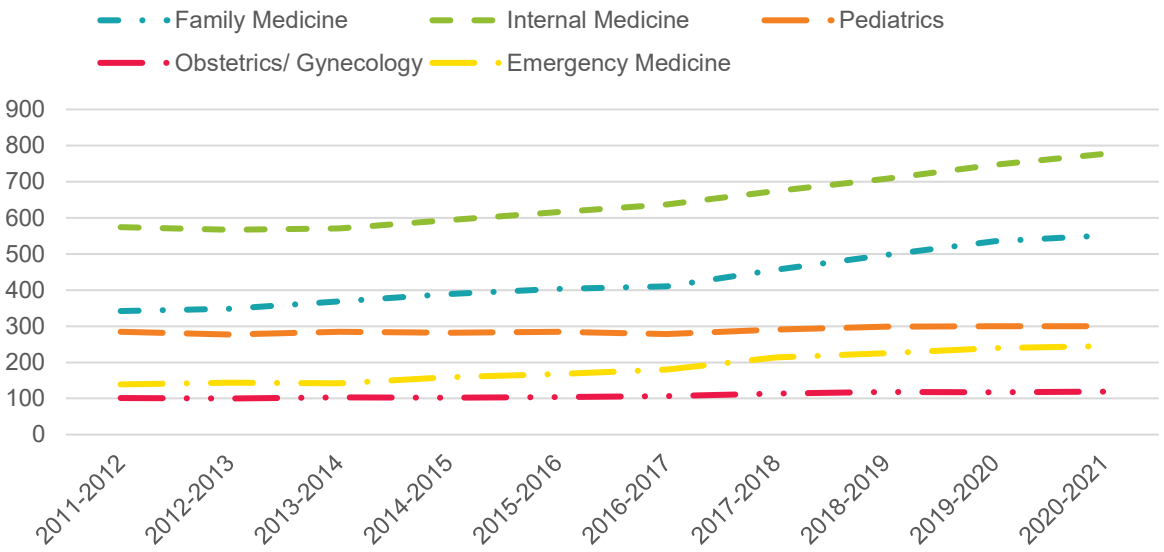
(CalMedForce Specialties in Bold)

Specialty	Number of First-Year Residents
Anesthesiology	165
Child Neurology	15
Dermatology	45
Emergency Medicine	**245**
Family Medicine	**551**
General Surgery	116
Internal Medicine	**777**
Internal Medicine/Pediatrics	**30**
Interventional Radiology – independent	12
Interventional Radiology – integrated	16
Medical Genetics	7
Neurological Surgery	22
Neurology	73
Nuclear Medicine	5
Obstetrics/Gynecology	**119**
Ophthalmology	45
Orthopedic Surgery	76
Otolaryngology	36
Pathology	56
Pediatrics	**300**
Physical Medicine and Rehabilitation	30
Plastic Surgery	1
Plastic Surgery – integrated	19
Preventive Medicine	22
Psychiatry	193
Radiation Oncology	26
Radiology - diagnostic	102
Thoracic Surgery - integrated	6
Urology	32
Vascular Surgery - integrated	8
All Specialties	3,138

Source: ACGME. Data Resource Book, Academic Year, 2019-2020, Tables C.29 to C.31.

Figure 12 displays trends in the numbers of first-year residents entering residency programs in the five specialties eligible for CalMedForce grants from the 2011-2012 academic year to the 2020-2021 academic year (latest year for which data are available). The number of first-year residents has increased in all five specialties but the rate of increase varied substantially across them, which is consistent with trends in growth in the numbers of residency programs in these specialties. Emergency medicine had the largest increase in the number of first-year residents (76 percent), followed by family medicine (61 percent), and internal medicine (35 percent). The numbers of first-year residents in obstetrics/gynecology and pediatrics residency programs grew more slowly, rising by 18 percent and 5 percent, respectively.

Figure 12. Residents Entering Residency Programs in CalMedForce Specialties, 2011-2012 to 2020-2021



Source: ACGME. Data Resource Book, Academic Years, 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021.

Percentages of First-Year Residency Positions Filled in the National Residency Matching Program

Table 6 displays the percentages of first-year residency positions in California that were offered and filled in the "Match" in 2021 and 2022. In the vast majority of specialties, 100 percent of positions offered were filled in the "Match." In 2021, general surgery and interventional radiology were the only specialties in which less than 90 percent of offered positions were filled, and in 2022, general surgery was the only specialty with a match rate of less than 90 percent. In 2022, match rates for CalMedForce specialties ranged from 95 percent (family medicine) to 100 percent (medicine/pediatrics).

Table 6. Percentages of California First-Year Residency Positions Filled in the National Residency Matching Program by Specialty, 2021 and 2022

(CalMedForce Specialties in Bold)

Specialty	Percentage of First-Year Positions Filled	
	2021	2022
Anesthesiology	100%	100%
Child Neurology	100%	100%
Dermatology	No positions offered	100%
Emergency Medicine	**99%**	**97%**
Family Medicine	**99%**	**95%**
General Surgery	80%	82%
Internal Medicine	**98%**	**96%**
Internal Medicine/Anesthesiology	100%	100%
Internal Medicine/Pediatrics	**100%**	**100%**
Internal Medicine/Preventive Medicine	100%	100%
Internal Medicine/Psychiatry	100%	100%
Interventional Radiology	83%	100%
Neurological Surgery	100%	100%
Neurology	94%	91%
Obstetrics/Gynecology	**98%**	**98%**
Orthopedic Surgery	100%	100%
Otolaryngology	100%	100%
Pathology	96%	98%
Pediatrics	**100%**	**98%**
Pediatrics/Anesthesiology	100%	100%
Pediatrics/Medical Genetics	100%	100%
Physical Medicine and Rehabilitation	100%	100%
Plastic Surgery	100%	100%
Psychiatry	100%	100%
Psychiatry/Family Medicine	100%	100%
Radiation Oncology	No PGY-1 positions offered	No PGY-1 positions offered
Radiology - Diagnostic	100%	100%
Radiology - Diagnostic/Nuclear	100%	100%
Thoracic Surgery - integrated	100%	100%
Vascular Surgery - integrated	100%	100%

Note: Bolding indicates specialties in which CalMedForce funds residency programs. Nuclear Medicine, Ophthalmology, and Urology are omitted from this table because the NRMP did not report data on the rate at which first-year residency positions in this specialty were filled in the "Match."

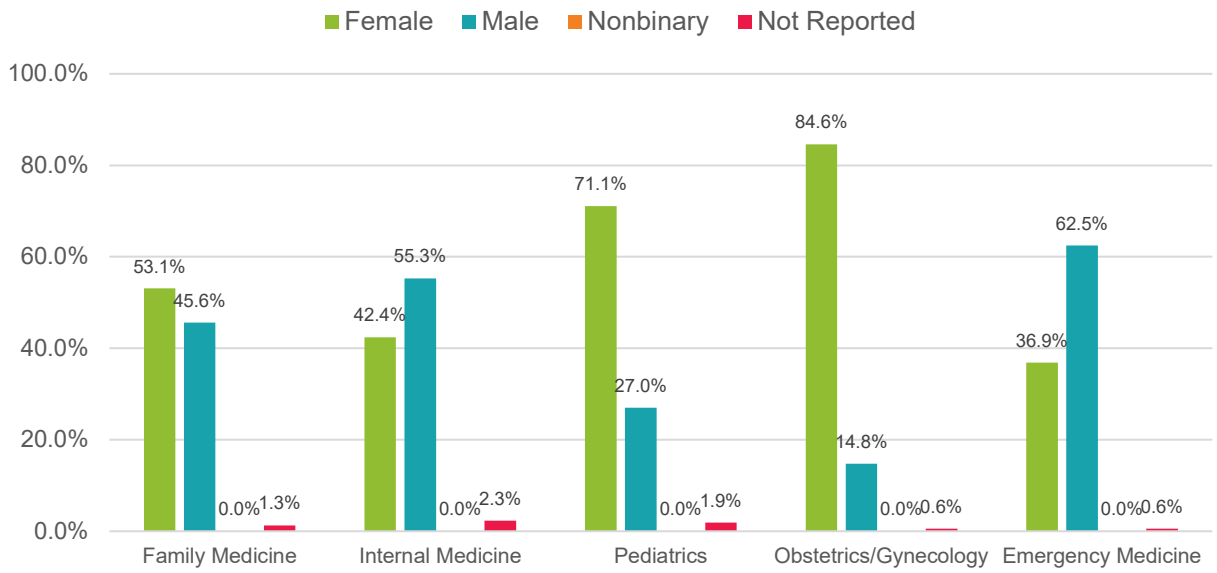
Source: NRMP, 2021 NRMP Main Residency Match®: Match Rates by Specialty and State. NRMP, 2022 NRMP Main Residency Match®: Match Rates by Specialty and State.

Demographic Characteristics

Gender

National data indicate that 45.5 percent of persons enrolled in ACGME-accredited residency and fellowship programs in 2020-2021 were female. (Data specific to California are not available.) Across residency programs that enroll physicians immediately after medical school, the percentage of residents who are female ranged from a low of 16.7 percent in orthopedic surgery to a high of 84.6 percent in obstetrics/gynecology. Figure 13 displays the percentages of male, female, and nonbinary residents in the five specialties in which CalMedForce funds residency programs. Findings for 2020-2021 are similar to findings for 2019-2020.

Figure 13. Residents in CalMedForce Specialties by Gender, United States, 2020-2021



Note: One family medicine resident was classified as nonbinary. In the other four specialties, no residents were classified as nonbinary.

Source: ACGME. Data Resource Book, Academic Year, 2020-2021, Table C.21.

Race/Ethnicity

National data indicate that Black and Latinx trainees are underrepresented among residents and fellows enrolled in ACGME-accredited programs. (Data specific to California are not available.) During the 2020-2021 academic year, 5.6 percent of residents and fellows were Black, whereas 13.4 percent of the U.S. population was Black. Latinx accounted for 5.4 percent of residents and fellows compared to 18.5 percent of the U.S. population (U.S. Census Bureau, 2021). The race/ethnicity of 4 percent of residents and fellows was unknown.

Table 7 displays national data regarding the percentages of residents by race/ethnicity in the specialties in which CalMedForce funds residency programs. (California specific data are not available.) Across these specialties, the percentage of residents who were Black ranged from 5.1 percent of emergency medicine residents to 8.0 percent of obstetrics/gynecology residents. The percentage of residents who were Latinx ranged from 4.7 percent of emergency medicine residents to 6.8 percent of pediatrics residents. Findings for 2020-2021 cannot be directly compared to 2019-2020 because ACGME added a new response option—multiple race/ethnicity—in 2020-2021.

Table 7. Residents in CalMedForce Specialties by Race/Ethnicity, United States, 2020-2021

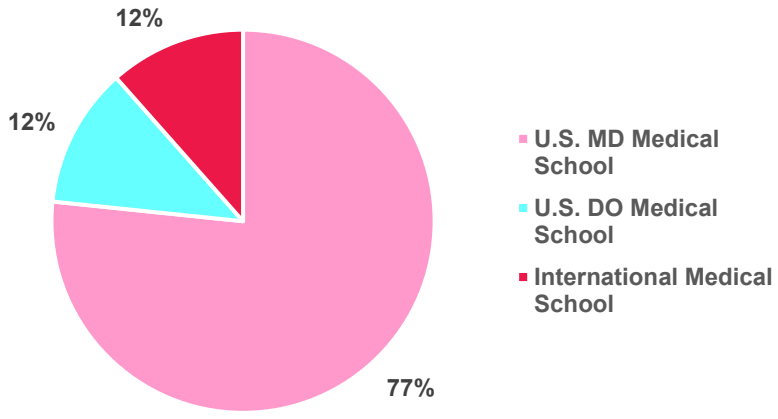
	Family Medicine	Internal Medicine	Pediatrics	Obstetrics/ Gynecology	Emergency Medicine
American Indian, Alaska Native, Native Hawaiian or Pacific Islander	0.3%	0.1%	0.1%	0.1%	0.1%
Asian	22.5%	33.5%	21.3%	15.3%	14.8%
Black	7.5%	5.9%	6.4%	8.0%	5.1%
Latinx	5.9%	5.6%	6.8%	6.4%	4.7%
White	49.8%	36.8%	50.7%	58.5%	62.9%
Multiple Race/Ethnicity	7.8%	6.0%	7.0%	8.3%	8.1%
Other	2.1%	3.1%	2.1%	1.8%	2.4%
Unknown	4.0%	9.1%	5.5%	1.6%	1.7%

Source: ACGME. Data Resource Book, Academic Year, 2020-2021, Table C.23.

Type of Medical School Attended

Figure 14 displays the distribution of residents and fellows enrolled in ACGME-accredited programs in California during the 2020-2021 academic year by type of medical school attended. Most residents and fellows (77 percent) attended an MD-granting medical school located in the United States. Twelve percent attended a DO-granting medical school in the U.S. and 12 percent attended an international medical school. California had a higher percentage of residents and fellows who are graduates of U.S. MD-granting medical schools than the U.S. overall (77 percent versus 60 percent) and lower percentages of U.S. DO graduates and international medical graduates. The distribution of California residents and fellows by type of medical school attended did not change between 2019-2020 and 2020-2021.

Figure 14. California Residents and Fellows by Type of Medical School Attended, 2020-2021



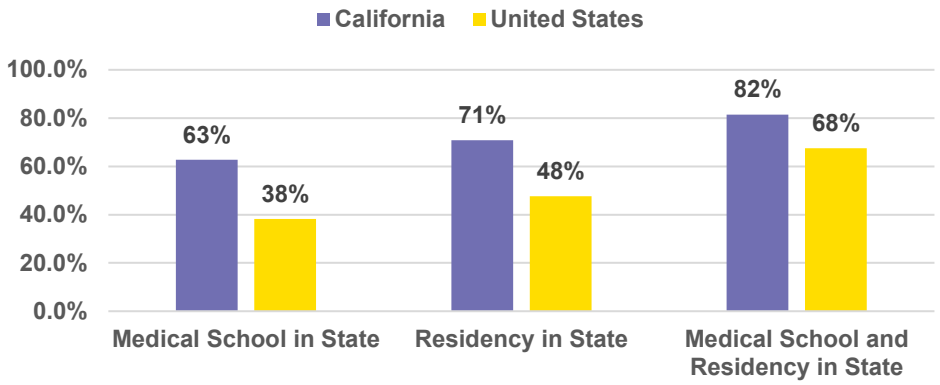
Note: Percentages do not sum to 100 percent due to rounding.

Source: ACGME. Data Resource Book, Academic Year, 2020-2021

Retention of Physicians Educated in California

California retains larger shares of physicians who complete medical school and/or residency than any other state in the nation. Among physicians practicing in 2020, 63 percent of physicians who graduated from a California medical school practiced in California, whereas nationwide only 38 percent practiced in the state in which they completed medical school. The high rate of retention of medical school graduates reflects UC medical schools' policy of prioritizing admission of California students. California retained 71 percent of physicians who completed residency in the state compared to 48 percent nationwide. Physicians who complete both medical school and residency in California are even more likely to practice in California (82 percent). Rates of retention of medical school and residency graduates in California in 2020 were similar to rates of retention in prior years.

Figure 15. Retention of Medical Students and Residents, California vs. United States, 2020



Source: AAMC, 2021 State Physician Workforce Data Report, Tables 4.1 and 4.3, 4.4.

Retention of Residency Program Graduates of in Primary Care and General Emergency Medicine

A major goal of the CalMedForce program, funded by Proposition 56, is to improve access to medical care for California's diverse population, especially in underserved areas of the state. To achieve this goal, the program provides funding to residency programs in five specialties: emergency medicine, family medicine, internal medicine, obstetrics/gynecology, and pediatrics and combined programs that train physicians in two of these specialties or one of these specialties plus another specialty (e.g., medicine-pediatrics, medicine-psychiatry). Most of these specialties are considered primary care specialties, because physicians in these specialties provide comprehensive, coordinated care to patients for a wide variety of conditions on an ongoing basis. Physicians in these specialties also provide "first contact" care to people with acute medical needs, which involves assessing patients' conditions and referring them to physicians in other specialties if they need specialized care.

However, not all physicians who complete residency programs in CalMedForce specialties provide primary care services. After completing residency, some enroll in subspecialty fellowship programs and then practice as specialists (e.g., cardiologists, gastroenterologists). Others become hospitalists who care exclusively for people who are hospitalized. Assessing the extent to which graduates of residency programs in primary care specialties are retained in primary care is important for discerning the impact of CalMedForce and other programs that aim to increase the primary care physician workforce.

This chapter presents data the CalMedForce program has collected regarding rates of sub-specialization among graduates of the residency programs that apply for CalMedForce grants. The chapter also summarizes recent literature on rates of retention in primary care among physicians in CalMedForce specialties nationwide so that findings regarding CalMedForce can be interpreted within the context of national trends.

Data Analysis

Data that CalMedForce requires residency programs to submit when they applied for grants in 2021 were analyzed to estimate the rates at which graduates of residency programs that apply for CalMedForce grants are retained in primary care or general emergency medicine (i.e., provide primary care or general emergency medicine). CalMedForce requires applicants to provide information about residents who graduated in the previous five years. For purposes of these analyses, physicians are considered to be retained in primary care or general emergency medicine if they provide primary care or work in an emergency department more than 50 percent of the time. Table 8 displays the results of these analyses.

The median percentages of graduates retained in primary care or general emergency medicine varied widely across the five specialties in which CalMedForce funds residency programs, ranging from 46 percent for pediatrics programs to 83 percent for family medicine residency programs. Rates of retention in primary care and general emergency medicine varied widely across residency programs within each specialty. The widest variation occurred among programs in internal medicine, where the rate of retention in primary care ranged from 8 percent to 80 percent.

This approach to estimating retention in primary care has several important limitations. First, data were self-reported by residency program faculty and staff and were not validated. Second, the data do not indicate precisely what types of services are provided by graduates who are not retained in primary care. Some most likely complete subspecialty fellowships and go on to practice as specialists. Others are likely to be practicing as hospitalists. Still, others may be providing patient care less than 50 percent time because they have substantial responsibilities for administration, teaching, or research. CalMedForce may wish to reconsider the metrics it uses to better distinguish sub-specialists from physicians who provide patient care on a part-time basis because they have non-patient care responsibilities. For example, the question about the percentage of hours graduates devote

to providing patient care could be separated from the question about whether graduates provide primary care or work in an emergency department.

Table 8. Rates of Retention in Primary Care Among Graduates of Residency Programs Funded by CalMedForce by Specialty, 2017-2021

		Provide Primary Care or Practice in ED > 50% Time			
Specialty	**# of Programs**	**Mean %**	**Median %**	**Minimum %**	**Maximum %**
Combined Programs (Med/Peds, Peds/Anesthesia)	3	33%	45%	0%	53%
Emergency Medicine	13	74%	78%	50%	85%
Family Medicine	42	81%	83%	40%	100%
Internal Medicine	17	57%	58%	8%	80%
Obstetrics/Gynecology	8	63%	64%	43%	95%
Pediatrics	14	50%	46%	22%	84%

Source: CalMedForce grantee data, private tabulation.

Literature Review

A search of the PubMed index of peer-reviewed journals in the health care field identified seven studies published over the last 10 years that address rates of retention of physicians in CalMedForce specialties in primary care. No studies of retention in general emergency medicine were identified.

These studies have used three different methods to estimate rates of retention in primary care. Two studies analyzed data from surveys of graduates of residency programs in primary care specialties regarding their career plans (Leyenaar et al., 2018; West and Dupras, 2012) and one examined physicians' responses to a survey that asked whether they provide primary care (Donnelly et al., 2015). Two studies analyzed data on the entry of residency program graduates into subspecialty fellowship programs (Rayburn et al., 2012; Rayburn and Xierali, 2021). Two studies analyzed data from multiple sources to track the career trajectories of a cohort of recent graduates of residency programs (Chen et al., 2013; Deutchman et al., 2020). One of these studies (Deutchman et al., 2020) compared three different methods for estimating retention in primary care.

Table 9 summarizes the findings from these studies. Studies of the career intentions of graduates of internal medicine and pediatrics graduates suggest that 21.5 percent of graduates in internal medicine and 55.8 percent of graduates in pediatrics plan to become primary care physicians (West and Dupras, 2012; Leyenaar et al., 2018). The most recent study of obstetrician/gynecologists found that 75 percent of physicians who graduated from residency programs in this specialty in 2020 were retained in general obstetrics/gynecology (i.e., did not enter a subspecialty fellowship program). Among studies that examined the actual career trajectories of family medicine, internal medicine, and pediatrics combined suggest that 22.3 percent to 25.2 percent of physicians who complete residency programs in these specialties provide primary care (Chen et al., 2013; Deutchman et al., 2020). Chen and colleagues (2013) also found that rates of retention among graduates of general internal medicine residency programs varied widely across sponsoring institutions, ranging from 8.3 percent to 95.2 percent. They also concluded that the true rate of retention in primary care is probably lower because their data did not permit them to exclude hospitalists. Collectively, findings from these studies indicate that many physicians who complete residency programs in primary care specialties are not retained in primary care. Additional details about findings from these studies can be found in Appendix B.

Table 9. Summary of Literature on Retention of Residency Program Graduates in Primary Care

Study	Specialty(ies)	Population Studied	Data Source(s)	Findings
Chen et al., 2013	Family medicine, general internal medicine, general pediatrics, medicine-pediatrics, family medicine geriatrics, internal medicine geriatrics	8,977 physicians who graduated from medical school from 2006 to 2008 who were tracked from three to five years after completing residency	Data from multiple sources, including the American Medical Association, Physician Masterfile, National Provider Identifier file, Medicare claims, and National Health Service Corps	25.2 percent of graduates are primary care physicians
Deutchman et al., 2020	Family medicine, internal medicine, pediatrics	17,509 graduates of 20 medical school campuses affiliated with 14 universities who graduated from 2003 to 2014	Data from the National Resident Matching Program and medical schools	22.3 percent of graduates provide primary care; 17.1 percent of graduates match into family medicine, medicine/pediatrics, medicine-primary, and pediatrics-primary programs; and 41.2 percent match into the aforementioned programs plus categorical internal medicine and pediatrics programs
West and Dupras, 2012	General internal medicine	16,781 physicians graduating from internal medicine residency programs from 2009 to 2011	Survey	21.5 percent planned to practice as general internists; graduates of medicine-primary care residency programs were more likely to plan to practice general internal medicine than graduates of medicine-categorical programs
Rayburn et al., 2012	Obstetrics/ Gynecology	14,217 graduates of accredited obstetrics/gynecology residency programs who took the American Board	Data from the American Board of Obstetrics and Gynecology and the National Residency Match Program for	The percentage of OB/GYN residents entering subspecialty fellowship programs increased from 7 percent to 19.5 percent of graduates

Study	Specialty(ies)	Population Studied	Data Source(s)	Findings
		of Obstetrics and Gynecology written exam for the first time	academic years 2000–2012	
Rayburn and Xierali, 2021 (update to Rayburn et al., 2012)	Obstetrics/ Gynecology	Graduates of accredited obstetrics/gynecology residency programs who took the American Board of Obstetrics and Gynecology written exam for the first time (number not reported)	Data from the American Board of Obstetrics and Gynecology and the National Residency Match Program for academic years 2000–2020	The percentage of OB/GYN residents entering subspecialty fellowship programs increased from 8 percent to 25 percent of graduates
Leyenaar et al., 2018	Pediatrics	5,969 graduates of pediatrics residency programs between 2006 and 2015	Survey	55.8 percent planned to practice as general pediatricians; 10.3 percent planned to practice as hospitalists and 33.9 percent planned to enter subspecialty fellowship programs
Donnelly et al., 2015	Medicine-pediatrics	1,321 physicians who completed medicine-pediatrics residency programs and self-identified as medicine-pediatrics physicians	Survey	63 percent of respondents reported that they are primary care physicians; 23 are hospitalists and 20 percent are subspecialists

Utilization of Behavioral Health Services

The COVID-19 pandemic created major disruptions in the lives of all Americans. Many persons contracted COVID-19 and/or experienced grief over the death of a family member or friend who contracted COVID-19. Many more experienced anxiety, stress, and financial hardship, which can exacerbate symptoms of mental illness and substance use disorder.

This chapter presents findings from a review of literature and data regarding trends in use of behavioral health services in the United States and California. The chapter begins with a brief summary of literature on national trends in demand for behavioral health services prior to the COVID-19 pandemic, which provides context for a subsequent discussion of national findings regarding the impact of the pandemic. The discussion of national trends is followed by a discussion of data on use of behavioral health services in California, including data on unmet need for behavioral health services and racial/ethnic disparities in use of these services in California. The final section of this chapter discusses trends in residency training for psychiatrists in California.

The literature review indicates that numbers of visits for behavioral health services increased among adolescents and adults between the mid-2000s and late 2010s (prior to the COVID-19 pandemic). The pandemic is associated with further increases in use of behavioral health services and unmet need for services. Studies that have examined use of behavioral health services in California in the 2010s found large increases in nonfatal emergency department (ED) visits for substance use disorders (SUD) and high rates of unmet need for behavioral health services, especially among specific racial/ethnic groups, age groups, and low-income persons. The number of psychiatry residents trained in California has increased since the early 2010s but the increase will not be sufficient to fully alleviate unmet need. These findings suggest that CalMedForce should consider funding new psychiatry residency programs or support expansion of existing programs, prioritizing funding psychiatry residency programs that serve populations with high levels of unmet need. Exploring new state funding opportunities to include psychiatry would be required.

National Trends in Use of Behavioral Health Services

Before the COVID-19 Pandemic

Findings from analyses of national survey data on utilization of behavioral health services prior to the COVID-19 pandemic indicate that utilization increased among both adolescents and adults from the mid-2000s to the late 2010s. An analysis of responses to the National Survey on Drug Use and Health (NSDUH) found that the mean number of visits by adolescents for mental health services increased between 2005 and 2018, as did the percentage of adolescents treated in an outpatient mental health setting (Mojtabai and Olfson, 2020). Two studies of college students found that the prevalence of mental health needs increased among college students from the mid-2000s to the mid-2010s and that this increase was accompanied by an increase in the use of behavioral health services (Lipson et al., 2019; Xiao et al., 2017). Analyses of data from NSDUH and the Medical Expenditure Panel Survey (MEPS) found that outpatient visits to general medical providers for behavioral health needs and visits to specialty mental health providers increased among adults between 2004 and 2015 (Germack et al., 2020; Olfson et al., 2019). Use of medications prescribed to treat mental health conditions also increased significantly between 2004 and 2018 (Brody and Gu, 2020; Olfson et al., 2019).

Impact of the COVID-19 Pandemic

Multiple national studies have found that the COVID-19 pandemic is associated with a large increase in the prevalence of behavioral health conditions, utilization of behavioral health services, and unmet need for behavioral health services. Findings from these studies are summarized in Table 10. Seven studies documented that the prevalence of behavioral health conditions has increased since the COVID-19 pandemic began (Breslau et al., 2021; Coley and Baum, 2022; Czeisler et al., 2020; Czeisler et al., 2021; Ettman et al., 2020; Ettman et al., 2021; Vahratian et al., 2021). The largest increases in prevalence occurred among young adults and adults with less than a high school education (Vahratian et al., 2021). Younger adults, women, Blacks, Latinx, essential workers, people with disabilities, people with low incomes, and people with a high school education or less were more likely to experience symptoms of anxiety or depression during the COVID-19 pandemic (Breslau et al., 2021; Coley and Baum, 2022; Czeisler et al., 2020; Czeisler et al., 2021; Ettman et al., 2020; Ettman et al., 2021). Consistent with this increase in the number of Americans who need behavioral health services, four national studies have documented that the COVID-19 pandemic accelerated the increase in utilization of behavioral health services that began during the previous decade (Coley and Baum, 2022; Milani et al., 2021; Vahratian et al., 2021; Yard et al., 2021). In addition, three studies that analyzed data from the U.S. Household Pulse Survey reported that many persons with symptoms of anxiety disorder or depression had unmet need for behavioral health services during the pandemic (Coley and Baum, 2022; Nagata et al., 2021; Vahratian et al., 2021). Women, young adults, persons with low incomes, persons who did not have health insurance, and people who lost their job during the pandemic were more likely to report unmet need for behavioral health services (Coley and Baum et al., 2022; Nagata et al., 2021).

Table 10. Summary of Literature on the Impact of the COVID-19 Pandemic on Behavioral Health

Topic	Study	Time Period	Population Studied	Data Source(s)	Findings
Prevalence of behavioral health conditions	Breslau et al., 2021	February 2019 and May 2020	Adults aged 20 or older	Rand American Life Panel	The number of people who experienced serious psychological distress (SD) during the first 30 days of the pandemic was equal to the number experiencing SD during the 12 months from March 2018 to February 2019
	Coley and Baum, 2022	April to November 2020	Adults aged 18 or older	U.S. Household Pulse Survey	The prevalence of anxiety and depression rose between April and November 2020
	Czeisler et al., 2020	April to June 2019 vs. April to June 2020	Adults aged 18 or older	COVID-19 Outbreak Public Evaluation Initiative Survey	The prevalence of anxiety rose threefold and the prevalence of depression increased fourfold between April to June 2019 and April to June 2020
	Czeisler et al., 2021	April to June 2020 vs. August to September 2020	Adults aged 18 or older	COVID-19 Outbreak Public Evaluation Initiative Survey	The elevated prevalence of anxiety and depression observed between April and June 2020 persisted in August and September 2020
	Ettman et al., 2020	2017 to 2018 vs. March to April 2020	Adults aged 18 or older	COVID-19 and Life Stressors Impact on Mental Health and Well-being study	The prevalence of depression was higher during March to April 2020 than in 2017 to 2018
	Ettman et al., 2021	March to April 2020 vs. March to April 2021	Adults aged 18 or older	COVID-19 and Life Stressors Impact on Mental Health and Well-being study	The elevated prevalence of depression observed during March to April 2020 persisted through March to April 2021

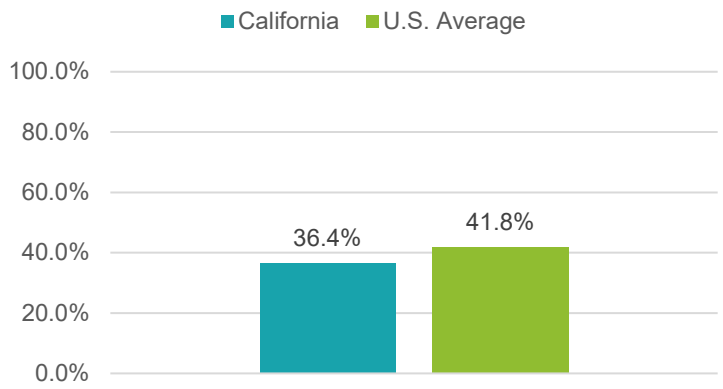
Topic	Study	Time Period	Population Studied	Data Source(s)	Findings
	Vahratian et al., 2021	August 2020 to January 2021	Adults aged 18 or older	U.S. Household Pulse Survey	Percentages of adults experiencing symptoms of anxiety and/or depression increased from August to December 2020
Utilization of behavioral health services	Coley and Baum, 2022	April to November 2020	Adults aged 18 or older	U.S. Household Pulse Survey	Use of counseling and prescription medications for mental health conditions increased between April and November 2020
	Milani et al., 2021	January 2018 to March 2021	Adults aged 18 or older	Clinformatics Data Mart	Prescriptions for medications used to treat anxiety and depression increased
	Vahratian et al., 2021	August 2020 to January 2021	Adults aged 18 or older	U.S. Household Pulse Survey	Use of counseling and prescription medications for mental health conditions increased between August and December 2020
	Yard et al., 2021	January 2019 to May 2021	Adolescents and young adults aged 12 to 25 years	National Syndromic Surveillance Program	Emergency department visits for suicide attempts increased among girls aged 12 to 17 years but not among boys aged 12 to 17 years and young adults aged 18 to 25 years
Unmet need for behavioral health services	Coley and Baum, 2022	April to November 2020	Adults aged 18 or older	U.S. Household Pulse Survey	Prevalence of unmet need for counseling increased between August and November 2020
	Nagata et al., 2021	December 2020	Adults aged 18 or older	U.S. Household Pulse Survey	25 percent of adults who screened positive for anxiety or depression reported unmet need for mental health counseling
	Vahratian et al., 2021	August 2020 to February 2021	Adults aged 18 or older	U.S. Household Pulse Survey	The percentage of adults reporting unmet need for counseling increased from August to December 2020

Use of Behavioral Health Services in California

Rates of Utilization for Behavioral Health Services in California

Data from surveys conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA) provide insights into use of behavioral health services in California prior to the COVID-19 pandemic. Figure 16 presents estimates from the NSDUH on the percentage of youth aged 12 to 17 years with a major depressive episode who received treatment for depression during the past year. During the period from 2016 to 2019, 36.4 percent of youth with depression received treatment during the past year, a lower percentage than the national average of 41.8 percent.

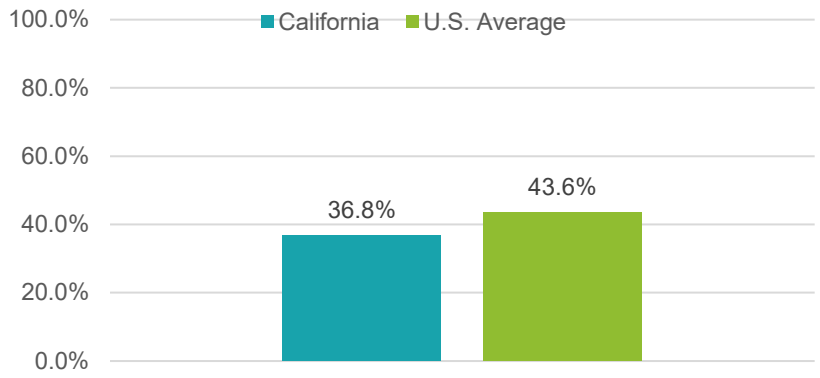
Figure 16. Treatment for Major Depression Among Youth in California and the U.S., 2016-2019



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2008–2010 and 2017–2019

Figure 17 displays estimates of the percentage of adults aged 18 or older who had any mental illness and received treatment from 2017 to 2019. Similar to findings for adolescents with major depression, a lower percentage of California adults with any mental illness received treatment than the national average (41.2 percent vs. 43.6 percent).

Figure 17. Treatment for Adults with Any Mental Illness in California and the U.S., 2017-2019

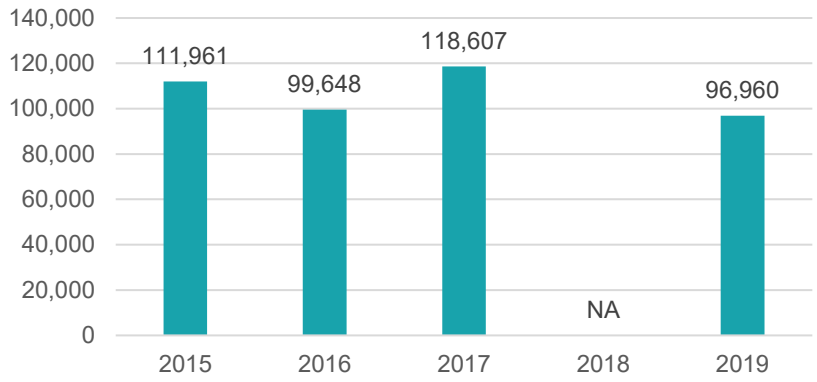


Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2016–2019.

Need for SUD treatment increased among Californians during the 2010s, as indicated by trends in nonfatal ED visits for opioids (heroin plus other opioids) and amphetamines. Data from the California Overdose Surveillance Dashboard indicate that nonfatal ED visits for opioids increased by 176 percent between 2010 and 2020, from 5,666 ED visits to 15,664 visits (Valentine and Brassil, 2022). Nonfatal visits for amphetamines increased by 53 percent, from 1,886 to 2,878 ED visits (Valentine and Brassil, 2022).

In contrast to the increases in ED visits for SUD, data on trends in enrollment in SUD treatment indicate that the number of Californians receiving SUD treatment decreased between 2015 and 2019. Figure 18 plots data from SAMHSA's National Survey of Substance Abuse Treatment Services (NSSATS) on the number of Californians enrolled in SUD treatment on one day in March from 2015 to 2019. SAMHSA uses these "single-day counts" to estimate use of SUD services throughout the year. The data presented in Figure 18 suggests that the number of people receiving SUD treatment decreased by 13 percent between 2015 and 2019, from 111,961 to 96,960 persons. (Data for 2018 are not available.)

Figure 18. People Enrolled in Substance Use Treatment in California (Single-Day Counts, 2015–2017 and 2019)



Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey of Substance Abuse Treatment Services, 2015–2017 and 2019.

The numbers of Californians receiving methadone and buprenorphine, two medications that can help people with opioid use disorder refrain from using opioids, increased from 2015 to 2019. The number of Californians treated with methadone increased by 10 percent, from 35,231 to 38,892 persons, and the number treated with buprenorphine increased by 211 percent from 2,922 to 9,143 persons.

Socio-economic Differences in Utilization for Behavioral Health Services in California

Three studies have identified differences in utilization of behavioral health services across socio-economic groups (Grest et al., 2022; Oretega et al., 2018; Wong et al., 2017). Characteristics of these studies and their findings are summarized in Table 11. The authors of these studies concluded that undocumented immigrants, first-generation immigrants, Asians, Latinx, and persons whose highest level of education was a high school diploma or less were less likely to obtain care from a mental health professional.

Table 11. Summary of Findings from Studies of Differences in Use of Behavioral Health Services in California

Socio-economic Characteristic	Study	Data Source	Time Period	Population Studied	Findings
Level of education	Grest et al., 2022	CHIS	2015 – 2016	42,089 adult respondents	People whose highest level of education was a high school diploma or less were less likely to use specialty behavioral health services
Immigration status	Ortega et al., 2018	California Health Interview Survey (CHIS)	2011 – 2015	51,386 non-elderly Latino(a) respondents	Undocumented immigrants were less likely than U.S.-born, naturalized, green card-holding Latinx to have seen a mental health professional in the previous year
Immigration Status	Grest et al., 2022	CHIS	2015 – 2016	42,089 adult respondents	First-generation immigrants were less likely to use specialty behavioral health services than second generation immigrants or non-immigrants
Race/Ethnicity	Wong et al., 2017	California Well-Being Survey	2013	20,724 adult respondents to CHIS with mild to moderate psychological distress	Latinx surveyed in Spanish and Asians were less likely to use mental health services than whites; rates of use were similar for whites and Latinx surveyed in English
Race/Ethnicity	Grest et al., 2022	California CHIS	2015 – 2016	42,089 adult respondents	Asians and Latinx were less likely to use specialty behavioral health services than whites

Rate of Unmet Need for Behavioral Health Services in California

Findings from the 2018-2019 NSDUH indicate 23.5 percent of adults in California with any mental illness had unmet need for treatment of their condition, compared to 24.7 percent of all adults in the U.S. who had any mental illness. California ranked 17th out of the 50 states and the District of Columbia with regard to the percentage of adults with any mental illness who did not receive treatment (Mental Health America, 2022).

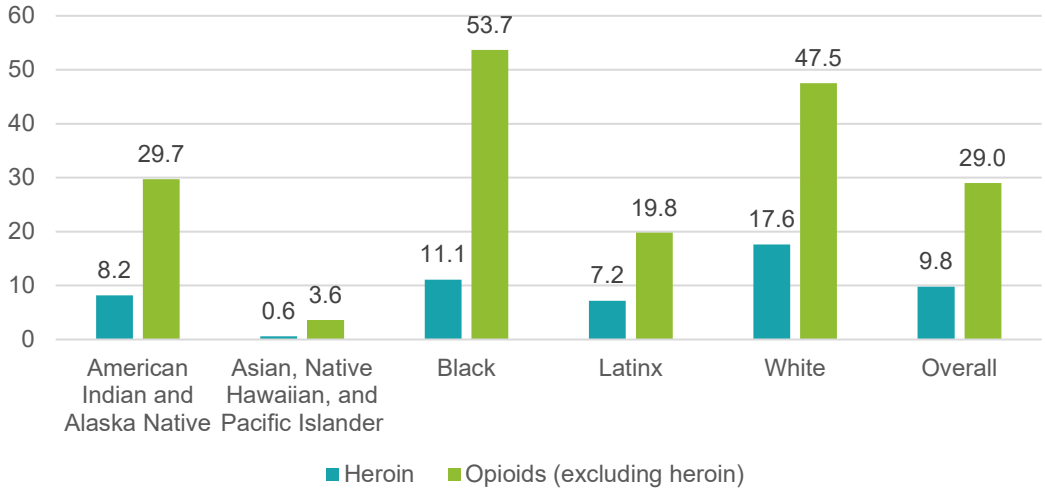
A study that analyzed data from the California Health Interview Survey (CHIS) from 2011 to 2014 found that 77 percent of California adults with mental health needs did not use a prescription medication for their condition and

did not have at least four visits with a mental health professional. Cost of treatment and mental health stigma were the reasons people cited most frequently for not obtaining care (Tran and Ponce, 2017).

Socio-economic Differences in Unmet Need for Behavioral Health Services in California

Although efforts to decrease disparities in access to behavioral healthcare across racial and ethnic groups date back decades, racial and ethnic disparities in use of behavioral health services persist across the U.S. and in California. Important markers of unmet need for SUD services include nonfatal ED visits, because these visits are primarily for treatment of overdoses. Data from the California Department of Public Health indicate that there were large racial/ethnic differences in rates of nonfatal ED visits for opioid use per 100,000 population in 2020. Black and white Californians had the highest rates (64.8 and 65.1 per 100,000 population, respectively). Asians, Native Hawaiians, and Pacific Islanders had the lowest rates. (See Figure 19.)

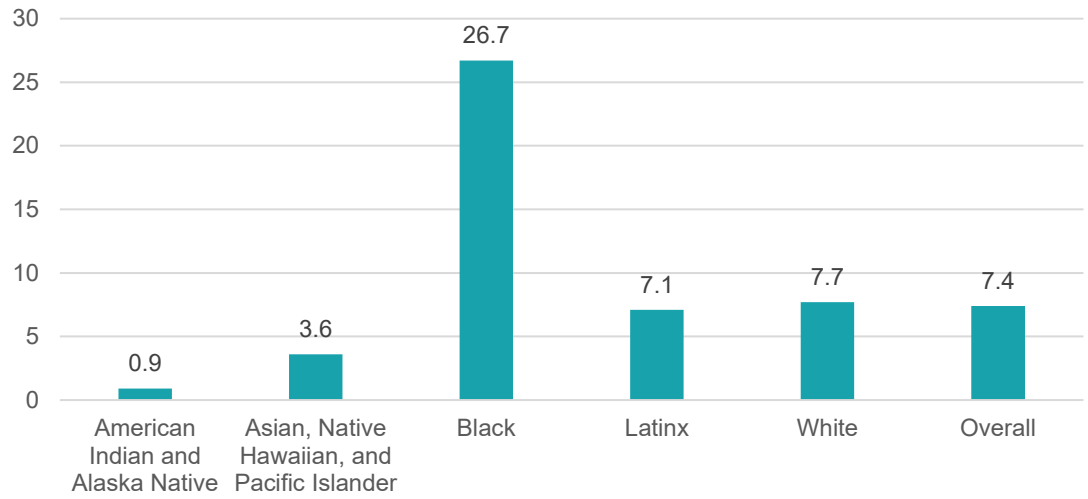
Figure 19. Nonfatal ED Visits for Opioids by Race/Ethnicity, 2020 (Rate per 100,000 Population, Age-adjusted)



Source: "California Overdose Surveillance Dashboard," California Department of Public Health.

Age-adjusted rates of ED visits for amphetamines per 100,000 population also varied by race/ethnicity. In 2020, Black Californians had the highest rate of ED visits for amphetamines (26.7 per 100,000 population). This rate was more than three times larger than the rate among whites (7.7), the racial/ethnic group with the next highest rate. (See Figure 20.)

Figure 20. Nonfatal ED Visits for Amphetamines by Race/Ethnicity, 2020 (Rate per 100,000 Population, Age-adjusted)



Source: "California Overdose Surveillance Dashboard," California Department of Public Health.

Multiple studies that analyzed data collected prior to the COVID-19 pandemic identified multiple socio-economic disparities in unmet need for behavioral health services. Major findings from these studies are described in Table 12. Collectively, these studies found that Asians, Latinx undocumented immigrants, people who do not speak English well, people who are uninsured, and people whose highest level of education is a high school diploma or less were more likely to have unmet need for behavioral health services.

Table 12. Summary of Findings from Studies of Socio-economic Disparities in Unmet Need for Behavioral Health Services in California

Socio-economic Characteristic	Study	Data Source	Time Period	Population Studied	Findings
Level of Education	Tran and Ponce, 2016	CHIS	2011 – 2014	5,315 adults respondents who reported having a mental health need	People whose highest level of education was a high school diploma or less were more likely to have unmet need for behavioral health services
Immigration status	Ortega et al., 2018	California Health Interview Survey (CHIS)	2011 – 2015	Latino(a) respondents	Undocumented Latinx were more likely than other Latinx to be unable to obtain mental health services due to concerns about cost
Immigration status	Salem et al., 2021	CHIS	2018 – 2019	23,791 female adults who were eligible for public health services (i.e., uninsured or enrolled in Medi-Cal)	Women who experienced severe psychological distress and did not have a green card were more likely to have unmet need for behavioral health services than U.S. born citizens
Insurance Status	Tran and Ponce, 2016	CHIS	2011 – 2014	5,315 adults respondents who reported having a mental health need	People who were uninsured were more likely to have unmet need for behavioral health services
Language	Tran and Ponce, 2016	CHIS	2011 – 2014	5,315 adults respondents who reported having a mental health need	People who did not speak English or did not speak it well were more likely to have unmet need for behavioral health services than people who only speak English
Race/Ethnicity	Tran and Ponce, 2016	CHIS	2011 – 2014	5,315 adults respondents who reported having a mental health need	Asian and Latinx were more likely to have unmet need for behavioral health services
Race/Ethnicity	Salem et al., 2021	CHIS	2018 – 2019	23,791 female adult respondents who were eligible for public health services (i.e.,	Asian and Latinx women were more likely to have unmet need for behavioral

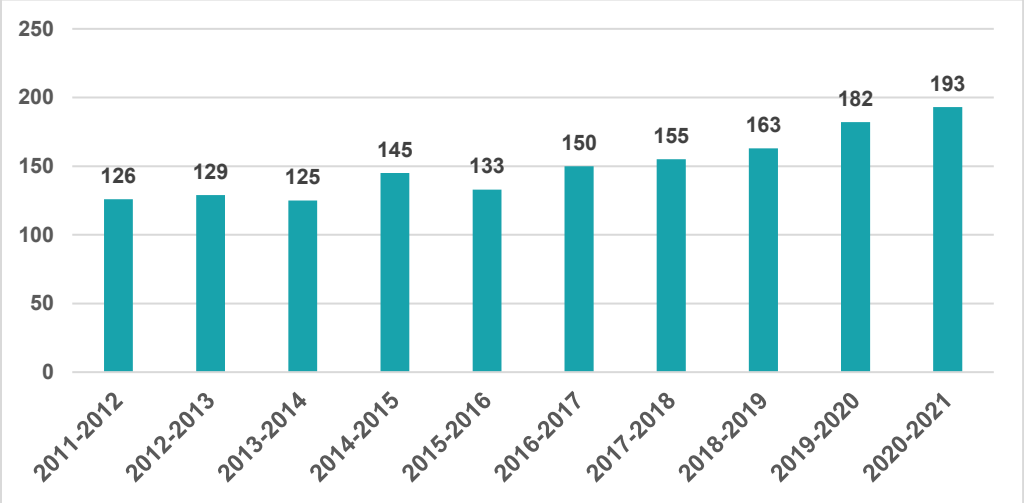
				uninsured or enrolled in Medi-Cal)	health services than white women

Trends in Psychiatry Residency and Fellowship Training in California

The high rates of unmet need for behavioral health services in California raise questions about whether the state has sufficient numbers of psychiatrists to provide services and how well they are distributed across the state. Psychiatrists play a critical role in meeting behavioral health needs because they are authorized to prescribe medications to treat behavioral health conditions and have more extensive training in behavioral health than other physicians.[3] They often collaborate with other types of behavioral health professionals as members of interdisciplinary teams.

Figure 21 plots the trend in the number of first year residents (i.e., Post-Graduate Year 1 residents) in general psychiatry residency programs in California from the 2011-2012 to the 2020-2021 academic year. The number of first year residents increased by 53 percent during this time period, from 126 to 193 residents. The growth in the number of psychiatry residents is primarily due to the opening of new psychiatry residency programs. From 2011-2012 to 2021-2022, the number of accredited general psychiatry residency tracks participating in the National Residency Matching Program (NRMP) increased from 19 to 33 tracks. The 33 tracks participating in the NRMP include 22 programs that offer a single track in general psychiatry and five programs that offer two or more tracks,[4] yielding a total of 27 accredited residency programs in general psychiatry in California in 2022.

Figure 21.
Number of 1st Year Psychiatry Residents in California, 2011-2012 to 2020-2021



Source: Accreditation Council for Graduate Medical Education, 2012-2021.

In addition to the 27 residency programs in general psychiatry, California has two combined family-medicine psychiatry residency programs and one combined medicine-psychiatry residency program.

[3] Psychiatric mental health nurse practitioners also have specialized training in behavioral health and are authorized to prescribe medications but are not discussed in this report because Proposition 56 only permits CalMedForce to fund residency programs for physicians.

[4] Loma Linda University's psychiatry residency program has two tracks (general and child), Stanford University's program has three tracks (general, public, research), UCLA three tracks (general UCLA Medical Center, general Harbor UCLA Medical Center, research), UC-San Diego's program has three tracks (general, community, research), UCSF's program has two tracks (general and research).

As Table 13 indicates, general psychiatry residency programs are not distributed evenly across California. Most programs are located in large, urban areas in Northern and Southern California. There are no general psychiatry residency programs in the Northern and Sierra region.

Table 13. Number of Psychiatry Residency Programs by Region, 2022

	General Psychiatry Residency	Family Medicine-Psychiatry Residency	Medicine-Psychiatry Residency
Central Coast	1	0	0
Greater Bay Area	6	0	0
Inland Empire	5	0	0
Los Angeles County	7	0	0
Northern and Sierra	0	0	0
Orange County	1	0	1
Sacramento Area	1	1	1
San Diego Area	2	1	0
San Joaquin Valley	4	0	0
All Regions	27	2	2

Note: A map that displays the regions and a list of counties in each region can be found in Appendix A.
Source: Accreditation Council for Graduate Medical Education, Program Search.

The state also has four accredited sub-specialty fellowships in addiction psychiatry, fourteen accredited sub-specialty fellowship programs in child and adolescent psychiatry, six accredited fellowships in consult-liaison psychiatry,[5] six accredited programs in forensic psychiatry, and four accredited fellowship programs in geriatric psychiatry. Most sub-specialty fellowship programs are located in large, urban areas in Northern and Southern California because they are co-located with general psychiatry residency programs. (See Table 14.)

Table 14. Number of Psychiatry Fellowship Programs by Region, 2022

	Addiction Psychiatry	Child and Adolescent Psychiatry	Consult-Liaison Psychiatry	Forensic Psychiatry	Geriatric Psychiatry
Central Coast	0	0	0	0	0
Greater Bay Area	1	2	2	3	2
Inland Empire	0	3	0	0	0
Los Angeles County	1	4	2	2	1
Northern and Sierra	0	0	0	0	0
Orange County	0	1	0	0	0
Sacramento Area	0	1	1	1	0
San Diego Area	1	1	1	0	1
San Joaquin Valley	1	2	0	0	0
All Regions	4	14	6	6	4

Note: A map that displays the regions and a list of counties in each region can be found in Appendix A.
Source: Accreditation Council for Graduate Medical Education, Program Search.

[5] Consult-liaison psychiatrists specialize in prevention and management of behavioral health conditions among persons with co-morbid medical conditions

Conclusion

California has made progress in increasing the number of graduates from medical schools and residency due to its addition of three new medical schools and fifteen new residency programs in specialties that CalMedForce funds. California also leads the nation in the percentages of physicians who complete medical school and/or residency in the state and who remain in California to practice.

However, challenges remain. The state continues to have a low ratio of medical students and residents per capita and a workforce that is not well-distributed geographically relative to the state's population. While graduates of California's medical schools and residency programs are somewhat more diverse than the state's physicians, they are not nearly as diverse as the state's population. In addition, rates of retention in primary care vary widely across graduates of California residency programs in primary care specialties.

Studies have documented an increase in utilization of behavioral health services in the past decade, which has accelerated since the COVID-19 pandemic began. Studies also found that there are substantial racial/ethnic disparities in use of behavioral health services.

The data analyses and literature reviews conducted for this report suggest the following recommendations for CalMedForce.

- Refine methods for collecting data about retention of graduates of applicant residency programs in primary care to better differentiate graduates who are subspecialists or hospitalists from graduates who remain in primary care but provide patient care less than 50 percent of their work hours.

- Advocate for additional resources to fund new psychiatry residency programs or expansion of existing programs to help reduce unmet need for behavioral health services in California, and prioritize funding programs based at hospitals or clinics that serve populations with high levels of unmet need for behavioral health services.

Appendix A: 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 that 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.

Appendix B: Literature Review on Retention in Primary Care

This appendix provides additional detail regarding the literature summarized in the main body of this report on rates of retention in primary care in the specialties that CalMedForce funds. A search of the PubMed index of peer-reviewed journals in the health care field identified seven studies published over the last 10 years that address sub-specialization of physicians in family medicine, internal medicine, pediatrics, medicine/pediatrics, and obstetrics/gynecology. No studies of sub-specialization in emergency medicine were identified.

Multiple Primary Care Specialties

One study assessed the percentage of physicians who graduated from medical school from 2006 to 2008 and entered high-need specialties (Chen et al, 2013). The authors analyzed data from the American Medical Association (Rodriguez et al.) Physician Masterfile, National Provider Identifier file, Medicare claims, and National Health Service Corps on a cohort of 8,977 physicians who completed residency programs at 759 sponsoring institutions. They tracked these physicians three to five years after they completed residency programs. Graduates were considered to be primary care physicians if they practiced in the following specialties: family medicine, general internal medicine, general pediatrics, medicine-pediatrics, internal medicine geriatrics, or family medicine geriatrics. Graduates of general internal medicine residency programs were classified as primary care physicians if they did not complete additional training, and as subspecialists if they completed additional training in any subspecialty except geriatrics. The authors concluded that 25.2 percent of graduates are primary care physicians, including 37.9 percent of graduates of internal medicine residency programs, but note that their estimate does not include primary care physicians who practice as hospitalists. Rates at which graduates of internal medicine residency programs at these institutions subspecialized ranged widely, ranging from 4.8 percent to 91.7 percent.

The analytic approach used by Chen and colleagues (2013) yields the most reliable findings regarding the rates at which physicians subspecialize, but it is labor intensive and requires analysis of expensive, complex datasets. Another study sought to identify a less resource-intensive approach to estimating the percentage of medical school graduates who become primary care physicians. The authors compared two methods for estimating the percentage of medical school graduates who provide primary care to the actual rates at which graduates provide primary care (Deutchman et al., 2020).

1. The Residency Match Method, which encompasses all of a medical school's graduates who match into a residency program in family medicine, internal medicine, pediatrics, or medicine/pediatrics, including both graduates who matched into internal medicine and pediatrics programs that focus on training primary care physicians (i.e., medicine-primary and pediatrics-primary programs) and graduates who matched into internal medicine and pediatrics programs that focus on preparing physicians to become subspecialists (i.e., medicine-categorical, pediatrics-categorical).
2. The Intent to Practice Primary Care Method, which includes only graduates who match in family medicine, medicine/pediatrics, medicine-primary, or pediatrics-primary programs.

The study analyzed from a convenience sample of 17,509 graduates of 20 medical school campuses affiliated with 14 universities who graduated from 2003 to 2014. They found that the Residency Match Method classified an average of 41.2 percent of medical school graduates as primary care physicians. In contrast, the Intent to Practice Primary Care Method, classified 17.1 percent of graduates as primary care physicians. To determine which of these methods would yield the most accurate estimates, the authors then calculated the rate at which medical school graduates actually provide primary care. The authors defined primary care physicians as graduates whose specialty is family medicine, general internal medicine, general pediatrics, geriatrics, or medicine/pediatrics, who did not subspecialize, and who did not work in an emergency department, hospital, hospice/palliative care or

urgent care setting. The actual percentage providing primary care was 22.3 percent, a rate much closer to the rate estimated using the Intent to Practice Primary Care Method.

Internal Medicine

One study examined the career plans of a national sample of 16,781 physicians graduating from internal medicine residency programs from 2009 to 2011 (West and Dupras, 2012). Among all graduating residents, 21.5 percent planned to practice as general internists and 78.5 percent planned to subspecialize. Graduates of medicine-categorical residency programs were less likely to be retained in primary care than graduates of medicine-primary care programs (34.7 percent vs. 47.5 percent). Men were less likely to plan to remain in primary care than women (i.e., more likely to pursue subspecialty training) and international medical graduates were less likely to plan to remain in primary care than graduates of U.S. medical schools.

Pediatrics

Another study estimated the rates at which graduates of pediatrics residency programs become hospitalists or subspecialists (Leyenaar et al., 2018). Among graduates of pediatrics residency programs who completed a survey administered by the American Academy of Pediatrics between 2006 and 2015, 10.3 percent reported that they planned to practice as hospitalists and 33.9 percent planned to enter subspecialty fellowship programs. Graduates pursuing careers as hospitalists were more likely to be female, to have children, to report that family factors limited their job selection, and to have higher levels of educational debt than graduates entering subspecialty fellowships.

Medicine Pediatrics

Medicine-pediatrics residency programs combine training in internal medicine and pediatrics and typically take four years to complete. One study presented findings from a survey of 1,321 physicians who completed medicine-pediatrics residency programs (Donnelly et al., 2015). Sixty-three percent of respondents reported that they are primary care physicians; 20 percent reported that they are subspecialists and 23 percent reported that they are hospitalists. The authors found that recent graduates were less likely to provide primary care than physicians who had been in practice for many years. Physicians who completed medical school less than 14 years before responding to the survey were more likely to report that they were subspecialists or hospitalists than physicians who completed medical school 14 or more years prior to responding to the survey.

Obstetrics/Gynecology

Two studies have assessed the rate of sub-specialization among obstetrician/gynecologists (OB/GYN). The first of these studies analyzed data from the American Board of Obstetrics and Gynecology and the National Residency Match Program for academic years 2000–2012. The authors found that the number of OB/GYN residency programs and residents did not change over this time period but the number of accredited subspecialty fellowship programs increased by 174.5 percent, and the number of positions in accredited subspecialty fellowship programs increased by 223.7 percent (Rayburn et al., 2012). The percentage of OB/GYN residents entering subspecialty fellowship programs increased from 7 percent to 19.5 percent of graduates during this time period.

A subsequent study extended analysis of trends in sub-specialization among graduates of OB/GYN residency programs through 2020 (Rayburn and Xierali, 2021). The authors found that one of every four graduates of OB/GYN residency programs entered an accredited subspecialty fellowship program in 2020, whereas in 2001 only one of every 12 graduates entered an accredited subspecialty fellowship program. As a consequence, the ratio of OB/GYNs providing a full range of OB/GYN services per 10 million adult patients in the United States has decreased from 0.95 to 0.75 over this time period. The authors note that the actual percentage of OB/GYNs who subspecialize may be larger because they did not include graduating residents who entered unaccredited fellowship programs.

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