

Registered Nurse and Advanced Practice Registered Nurse Workforce and Education in California

Registered nurses (RNs) are the largest group of health care professionals in the United States. They work in a wide range of health care settings and provide a variety of services including acute care, primary care and preventive services.

Prospective RNs can complete one of four types of educational programs: a hospital-based diploma, an associate degree, a bachelor's degree or an entry-level master's degree. RNs with associate degrees may subsequently obtain a bachelor's degree in nursing through an RN-to-bachelor's degree program. RNs with bachelor's degrees may enroll in master's degree or doctoral programs that provide additional training in specific aspects of nursing such as advanced practice nursing, nursing administration and nursing education. Those who complete a graduate program in advanced practice nursing are eligible for certification as an advanced practice registered nurse (APRN). APRNs practice in one of the following areas of specialization: clinical nurse specialist (CNS), nurse anesthetist (NA), nurse-midwife (NM) or nurse practitioner (NP).

This report is divided into two chapters. The first chapter presents information about RNs and the second chapter presents information about APRNs.

Summary

RNs

- In 2017, there were 353,048 RNs in California.
- The California RN workforce is becoming increasingly diverse in terms of race, ethnicity and gender.
- The statewide age distribution of RNs has trended slightly younger, with growth in the share of nurses under the age of 45.
- RNs are more likely to work in metropolitan areas than in rural areas, small cities or towns.
- Most graduates of California RN programs work in California after graduation.
- More than half (56.6%) of California RNs have a bachelor's degree in nursing or a graduate degree.
- Supply and demand for RNs in California is near equilibrium. However, there are regional shortages, as well as shortages of nurses with specialized skills.

APRNs

- In 2016, there were 24,528 APRNs in California.
- The majority of APRNs are NPs.
- APRNs are older and less racially diverse than the overall RN population.
- APRNs that provide primary care, such as NPs and NMs, can help mitigate shortages of primary care clinicians.

Chapter 1. Registered Nurses (RNs)

CURRENT SUPPLY OR RNs

As of April 2017, there were 415,798 RNs with active California licenses, 353,048 of whom resided in California, yielding a ratio of approximately 883 RNs per 100,000 population.¹ This ratio of RNs per 100,000 population ranked among the lowest for states nationally, as it has for many years. The implications of California's low ratio of RNs per population is unclear. While California is the only state in the nation with minimum staffing requirements in hospitals, its hospitalization rates are relatively low, and it has historically operated a strong managed care system that functions with fewer RNs than health systems in other states.

In 2016, the majority (86.2%) of active RNs residing in California worked in nursing positions. Most of these RNs (62.3%) worked full-time (defined as more than 32 hours per week), 21.2% worked part-time (32 hours or less per week), and 2.7% did not report weekly hours worked. Most working RNs (68.8%) reported providing patient care.²

RN Practice Settings

RNs practiced in a variety of environments, the most common being acute hospital (66.3%), non-hospital ambulatory care (8.2%), skilled nursing facility/extended care/rehabilitation (5.1%), home health nursing agency or service (3.4%) and case/disease management (2.1%).³

Geographic Distribution of RNs

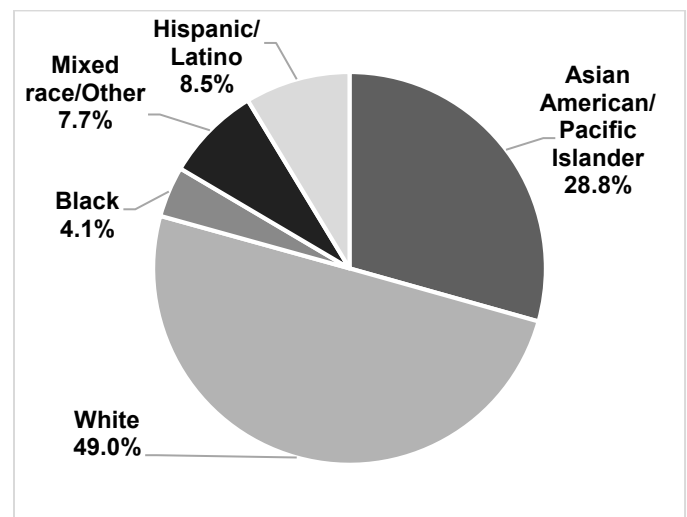
In 2016, the majority (70.6%) of RNs had a primary nursing position in a consolidated metropolitan area, defined as having a population of over one million, while 20.3% worked in large metropolitan counties with over 400,000 residents that were not part of a consolidated metropolitan area. Slightly less than 9% worked in smaller metropolitan counties. Only 0.4% worked in areas with populations less than 49,999 (including rural areas, small cities and towns).

The percentage of RNs residing in the Border, Los Angeles, Central Valley and Sierra, Inland Empire, Sacramento and San Francisco Bay Area regions who worked in nursing in 2016 ranged between 85.9 to 86.9%. RNs residing in the Northern Counties (81.1%) and Central Coast (79.5%) were less likely to be working in nursing jobs. Additionally, RNs in these regions were, on average, slightly older; their mean age was 50, compared with a mean age of 47 across other regions.⁴

Demographic Characteristics of RNs

Over the last decade, California's RN workforce has become increasingly racially diverse. In 2016, less than half (49%) of RNs reported that they were white, non-Hispanic; 28.8% were Asian/Pacific Islander, 8.5% Hispanic/Latino, 4.1% Black/African American, 2% Native American, and 7.7% mixed race/other (Figure 1). Racial diversity was more pronounced among younger age groups; 47.1% of active RNs under age 35 were white, compared to 71.6% of active RNs age 65 and older.⁵

Figure 1. Racial/Ethnic Distribution of California RNs



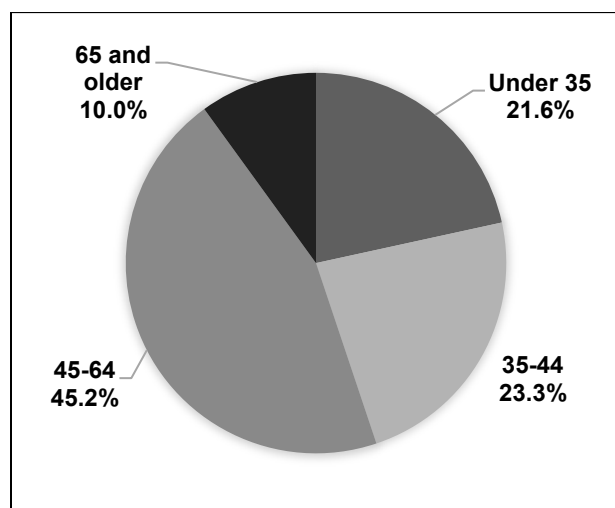
Source: 2016 Survey of Registered Nurses, California Board of Registered Nursing

Over 40% of RNs spoke at least one other language besides English (43.8%). The most common languages were Tagalog and other Filipino languages (19%) and Spanish (10.7%).⁶

While the California RN population remains predominantly female, the share of male RNs is increasing. Between 2004 and 2016, the share of male RNs increased by more than 50%, from 7.4% to 11.9%, peaking in 2008 at 14.4%.⁷

In 2016, over half (55.2%) of RNs working in California were age 45 or older (**Figure 2**). However, since 2004, the statewide age distribution of RNs has trended slightly younger, with growth in the shares of nurses in all age groups under 45. The mean age of working RNs fell from 47 in 2008 to 45 in 2016. These trends are likely attributable to an increased number of graduates from RN programs in California since 2000.⁸

Figure 2. Age Distribution of Working California RNs



Source: 2016 Survey of Registered Nurses, California Board of Registered Nursing

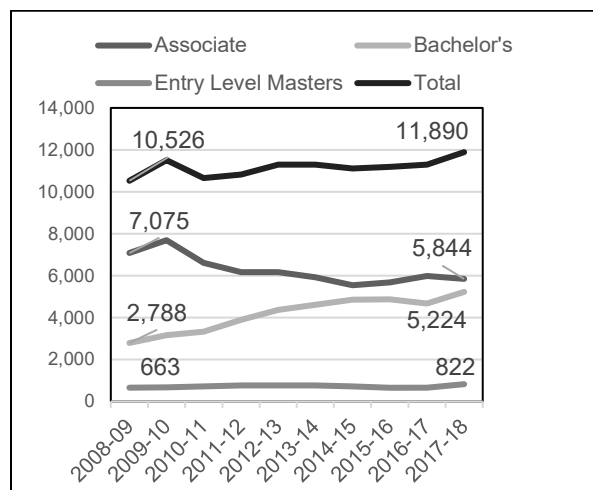
RN EDUCATION

Pre-licensure Education

There are 1,342 pre-licensure nursing education programs in the United States, 141 of which are in California, at 134 nursing schools (Some schools offer more than one program.).^{9, 10} The majority (92) of California programs are associate degree or licensed vocational nurse-to-associate degree programs; 37 are bachelor's degree programs and 12 are entry-level master's (ELM) programs.¹¹

From 2008-2009 to 2017-2018, the number of pre-licensure nursing program graduates in California increased by 13%, peaking in 2017-2018 with 11,890 graduates (**Figure 3**).

Figure 3. Pre-licensure Student Completions by Program Type by Academic Year



Source: 2017-2018 Annual School Report, California Board of Registered Nursing.

In 2016, a bachelor's degree was the most common pre-licensure education completed by RNs in California (44.5%), followed closely by an associate degree (42.7%). Over the last decade, the share of RNs receiving their pre-licensure education through associate degree and diploma programs has declined, however, the share receiving their pre-licensure education through bachelor's degree or graduate programs has increased.¹² A 2017 survey of nurse

employers found that 9% of hospitals required newly hired RNs to have a bachelor's degree, and 54.9% of hospitals preferred to hire RNs with bachelor's degrees.¹³

In 2017-18, 56.2% of new California nursing students were enrolled in public programs, and the remaining 43.8% in private programs. Although the majority (72.3%) of California nursing programs are public, the number of private programs increased over the last ten years, from 33 in 2008-2009 to 39 programs in 2017-2018. During this time, the number of public programs fell from 105 to 102 programs. Private program enrollments increased by 64.4% during this time, while public program enrollments decreased by 22.2%.¹⁴

The majority of California pre-licensure nursing program graduates work in nursing in California after graduation. In 2017-18, nursing program directors estimated that an average of 83.2% of their graduates were employed in California.¹⁵

Post-licensure Education

In 2016, 42% of active RNs in California reported that they had received some additional post-licensure education through degree or certificate programs. While some nurses pursued additional education in non-nursing fields such as public health or healthcare management, most RNs pursued additional nursing education. The most common post-licensure nursing degrees were bachelor of science in nursing (RN-to-bachelor's) (8.9%) and master of science in nursing (MSN) (5.7%). In 2016, 56.6% of California RNs had a bachelor's degree or a higher level of nursing education. In 2016, 10% of all active RNs in California were enrolled in a nursing degree or specialty certification program.¹⁶

In California, 46 nursing schools offer both pre-licensure education and a total of 92 degree-granting post-licensure nursing education programs (Some schools offer more than one program.). There are 38 RN-to-bachelor's programs, 38 master's degree programs and 16 doctoral programs (Doctor of Nursing Practice or PhD). **Table 1** presents a breakdown of program

types and the number of schools offering such programs.¹⁷ (Note that although graduate nursing education is also offered to California nurses by schools that do not offer pre-licensure education, and by online programs based outside California, the California Board of Registered Nursing (BRN) does not collect data about these programs).

Table 1. Number of Post-licensure Programs by Program Type, 2016-2017

Program	Private programs	Public programs	Total
RN-to-bachelor's	20	18	38
Master's	18	20	38
Doctoral	9	7	16

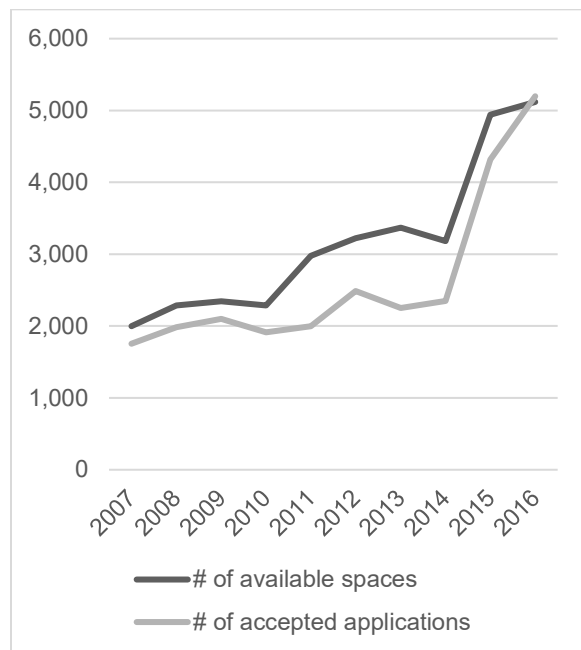
Source: California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California

RN-to-Bachelor's Programs

Between 2007-2008 and 2016-2017, the number of RN-to-bachelor's programs in California increased by 19%, from 32 to 38 programs. The number of available spaces in these programs more than doubled during this time, from 1,998 to 5,119. The number of RN-to-bachelor's graduates in California more than tripled between 2007-2008 and 2016-2017, peaking in 2015-2016 with 3,134 graduates.

Since the 2007-2008 academic year, the number of qualified applications to California RN-to-bachelor's programs has more than doubled. However, the total number of new student enrollments has consistently been below the number of spaces available. Between 2007-2008 and 2016-2017, the percentage of available spaces that are unfilled has ranged from 10.4% to 33.1%. The most common reason for unfilled spaces is that accepted students choose not to enroll. In some cases, an applicant may be accepted to multiple programs. However, this trend is also explained by a lack of applications relative to the number of spaces available. As shown in **Figure 4**, the total number of accepted applications has typically been less than the number of spots available during this time.¹⁸

Figure 4. Number of Applications and Accepted Applications to California RN-to-Bachelor's Programs, 2007 to 2016



Source: California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California

The percentage of RN-to-bachelor's programs that are private increased from 40.6% of all programs (13 private) to 52.6% (20 private). By the 2016-2017 academic year, 57.9% of all California RN-to-bachelor's students were enrolled in private programs.¹⁹

Master's Degree Programs

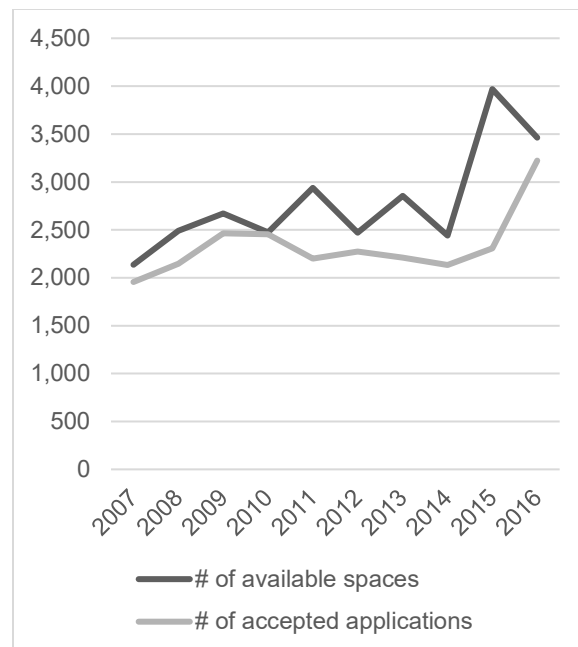
(See Chapter 2 for more information on Advanced Practice Registered Nurse education.)

Since 2007-2008, California has added 10 new post-licensure Master of Science in Nursing programs (from here on referred to as "MSN programs") and the total number of spaces available for students has increased by 62%. Over the last 10 years for which data are reported, the number of students enrolled in California MSN programs grew 64%, peaking in 2016-2017 with 6,267 students. The number of

graduates increased by 61% during this time, from 1,296 graduates in 2007-2008 to 2,086 in 2016-2017.

Although the number of qualified applicants to MSN programs nearly doubled from 2007-2008 to 2016-2017, the total number of new student enrollments has consistently been below the number of spaces available. During this time period, the percentage of available spaces across all MSN programs that were unfilled ranged between 0.8% and 41.9%. Similar to RN-to-bachelor's programs, the most common reasons for unfilled spaces are that accepted students choose not to enroll and the lack of qualified applicants (Figure 5).²⁰

Figure 5. Number of Applications and Accepted Applications to California Post-Licensure Master's Programs, 2007 to 2016



Source: California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California

Although over half (52.6%) of the 38 MSN programs in California are public programs, the majority (61%) of MSN students were enrolled in private programs. Private MSN programs saw 226% growth in student enrollment from 2008 to 2017, while public programs experienced an 8%

decrease in enrollment. The annual number of students completing private programs grew by 141% (639 additional graduates) over the same period. Among public program, the annual number of completions grew only 18% (151 additional graduates).²¹

APRNs make up the majority of MSN graduates; nurse practitioners (NPs) alone made up over half (51.33%) of MSN graduates in 2016-2017, growing from a 40.4% share in 2008-2009. Apart from APRN specialty tracks, the most common MSN program tracks in the 2016-2017 school year were nursing education (11.2%), clinical nurse leadership (6%), nursing administration (5.3%) and school nursing (1.8%).²²

Doctoral Programs

The number of doctoral nursing programs in California more than doubled between 2007-2008 and 2016-2017, increasing from 7 to 16 programs. Enrollment grew 258%, peaking in 2013 with 827 doctoral students. During this time, the number of graduates increased 438%, from 39 (2007-2008) to 171 (2016-2017), peaking in 2014-2015 with 242 graduates. Since 2009, the majority of California doctoral nursing students have been enrolled in private programs.²³

There are two types of doctoral programs in nursing. Doctor of Philosophy (PhD) programs prepare RNs to serve as faculty members at nursing schools. Doctorate of Nursing Practice (DNP) programs are a relatively new type of program that prepares RNs for advanced clinical practice, most often as NPs or NAs.

Post-baccalaureate and certificate programs

While some RNs who return to school enroll in degree programs to receive training in a specialty, many enroll instead in post-baccalaureate certificate programs. These programs allow RNs to expand their skill sets and provide more specialized care.²⁴ In 2016, 6.1% of all RNs were enrolled in non-degree specialty certification programs.²⁵

On average, students complete over half of the coursework for these specialty certification

programs through distance learning modalities such as online classes.²⁶ The BRN officially recognizes and grants two types of specialty certifications – Public Health Nurse (PHN) and Psychiatric/Mental Health Nurse (PMH). In 2016, 17.5% of working California RNs reported having the PHN certification, and 0.5% reported having the PMH certification.²⁷ Other certification tracks include wound care, school nursing and telemetry/health informatics.

FUTURE SUPPLY AND DEMAND FOR RNs

According to the BRN's most recently published forecast, based on forecasted hospital utilization, current trends suggest that statewide supply and demand for full-time equivalent RNs are likely to be nearly perfectly aligned through 2035. The BRN's best supply forecast predicts that in the long term, RN supply will rise more quickly than the state's population.²⁸

There are several uncertainties that could affect the accuracy of this forecast. There is uncertainty about the number of RNs who will migrate to California from other states. RN education programs may not maintain their enrollment numbers at current levels. Furthermore, as the U.S. health care system moves toward value-based care, demand for RNs may increase as RNs play more prominent roles in coordinating care.

Current data suggest that the two primary challenges in the labor market for RNs are regional labor market variations and skill mismatches. While surpluses through 2035 are projected for the Sacramento and Los Angeles regions, shortages are projected for the San Francisco, Central Valley, and Central Coast regions.²⁹

Although 87.6% of California hospitals report that demand for RNs is greater than supply, most hospitals also report a surplus of new RN graduates. This is because the perceived shortage of RNs is concentrated in demand for experienced nurses (especially in labor and delivery, perioperative care, intensive care and emergency care) and for nurses to fill administrative or managerial roles.³⁰ The

unequal demand for experienced versus newly graduated RNs is further highlighted by labor market variations across different regions of the state. Although the majority of hospitals in all regions report a perceived shortage of experienced RNs, over two-thirds of hospitals in the Southern Border and Central California regions report high demand for experienced nurses, compared to less than half of hospitals in other regions. While the majority of hospitals in all regions report a perceived surplus of new RN graduates, there are exceptions. Only one region had zero hospitals reporting shortages of new RNs (the Southern Border). Moreover, forecasts predict future surpluses of experienced RNs in some regions but shortages in other regions.³¹

There is some evidence to suggest that hospital employers are mitigating skill gaps by hiring RNs from other states and countries. While the overall share of RNs educated outside of California has decreased with each decade of nursing graduates since 1950, the percentage of hospitals engaged in international recruitment increased from 1.9% in 2012 to 9.7% in 2018.^{32,33}

Ultimately, meeting the future demand for RNs in California will depend on having the right balance of newly graduated RNs and RNs with more experience or specialty training to meet the unique health care labor market needs of each of the state's regions.

Chapter 2. Advanced Practice Registered Nurses (APRNs)

An APRN is an RN who has completed post-licensure education in advanced clinical skills through a master’s or doctorate program and is certified to practice in one of the following areas of specialization: clinical nurse specialist (CNS), nurse anesthetist (NA), nurse-midwife (NM), or nurse practitioner (NP). **Table 2** describes the care provided by the different types of APRNs. Due to the relative lack of data collected by the BRN on CNSs and NAs, this report contains less information about those professions than about NMs and NPs (The last BRN survey of CNSs was conducted in 2010. At the time of this writing, the authors are not aware of any BRN surveys of NAs.).

Table 2. Types of APRNs

Certification	Types of care provided
Clinical nurse specialist (CNS)	Conducts research about and provides education, consultation, and clinical leadership to an identified patient population through direct and indirect patient care activities and expert clinical practice.
Nurse anesthetist (NA)	Provides anesthesia services ordered by a physician, dentist or podiatrist.
Nurse-midwife (NM)	Attends cases of normal childbirth, provides perinatal care, family planning, reproductive health and primary care (under the supervision of a licensed physician or surgeon).
Nurse practitioner (NP)	Assesses patient needs, orders and interprets diagnostic and laboratory tests, diagnoses illness, prescribes medication and formulates treatment plans (under a collaborative agreement with physician)

CURRENT SUPPLY OF APRNs

In 2016, there were 24,528 APRNs working in California, holding 26,759 APRN certifications. (The number of certifications exceeded the number of APRNs because some APRNs were certified in more than one area of specialization. For example, in 2016, there were 569 RNs in California who were dually-certified as NPs and NMs).³⁴ As shown in **Table 5**, NPs made up the largest share of APRN certifications.³⁵

Table 3. APRN Certifications of Currently Working Registered Nurses Residing in California in 2016

Certification	Percentage of APRN Certifications	Number of APRN Certifications
Clinical nurse specialist (CNS)	12.24%	3,276
Nurse anesthetist (NA)	6.82%	1,826
Nurse-midwife (NM)	4.29%	1,148
Nurse practitioner (NP)	76.64%	20,509
Total		26,759

Source: California Board of Registered Nursing, data request.

In 2017, the majority of NPs (77.2%) and NMs (70%) worked in APRN positions. Approximately 11% of both NPs and NMs were not employed as APRNs, and worked only in RN-level positions. Approximately 12% of NPs and 19% of NMs were not employed in nursing. The most common reasons NPs and NMs did not work in nursing were retirement, family or childcare responsibilities, and temporary or permanent exits from the profession.³⁶

APRN Practice Settings

APRNs worked in a variety of settings. CNSs worked primarily in hospitals (65.4%), followed by home health agencies (6.3%) and university or college academic departments (6.1%). NPs most commonly worked in hospitals (40.1%), private medical offices (29%) and public clinics (11.4%).³⁷ NMs most commonly practiced in non-hospital ambulatory settings (48.9%), hospitals (40.2%) and alternative birth sites (i.e., freestanding birth center or home birth) (3%).³⁸

Geographic Distribution of APRNs

In 2017, most (97.7%) working NPs practiced in large urban areas. The remaining 2.3% worked in rural areas. On average, NPs working in urban areas were younger. Only 36% of the urban NP workforce in 2017 was age 55 or older, while over 60% of rural NPs were 55 or older. Male NPs were more likely to work in urban areas, making up 12.6% of the urban NP workforce, compared to only 5.4% of rural NPs. While NP rates of employment in APRN positions were similar between urban and rural areas, NMs had a higher rate of employment in NM positions in rural areas (78.7%) than urban areas (69.6%).³⁹

Demographic Characteristics of APRNs

Similar to the broader RN population, APRNs are predominantly female, but the male share of the workforce is slowly increasing. Between 2010 and 2017, the percentage of male NPs increased from 9.4% to 10.1%. While the share of male NMs was mostly consistent during this time, the share of dual-certified NP-NMs who are male increased from 0.8% to 1.5%.⁴⁰

On average, APRNs are older than RNs. In 2016, the average age for RNs was 45. In 2017, the average age for NPs was 49.8 and was 52.7 for NMs. Over half of NPs (53.4%) and NMs (59.3%) are age 45 or older.⁴¹

Compared to the broader population of RNs, APRNs are less racially diverse. While less than half (49%) of RNs in 2016 were white, the majority of APRNs were white. In 2017, NPs were 61.6% white, 4.5% Black, 8.4% Hispanic,

8.3% Filipino, 10.9% other Asian/Pacific Islander, and 6.3% mixed race/other. NMs were 84.2% White, 7.1% Black, 3.7% Hispanic, 9.2% Filipino, 1.5% Other Asian/Pacific Islander, and 3.3% mixed/other.^{42,43}

Slightly less than half (42.6%) of NPs were multilingual, while 54.6% of NMs were multilingual. The most common non-English languages spoken by multilingual APRNs were Spanish (64%) and Tagalog or other Filipino languages (11.8%).⁴⁴

APRN EDUCATION

RNs may become APRNs by completing a master's or doctoral program in their intended practice specialty. In California, there are 46 APRN education programs offered across 31 schools. **Table 6** summarizes the number of programs per certification.

Table 6. Number of APRN programs by specialty and private/public status

Certification	# of schools	# private	# public
Clinical nurse specialist (CNS)	12	5	7
Nurse anesthetist (NA)	5	5*	0
Nurse-midwife (NM)	2	0	2
Nurse practitioner (NP)	27	11	16

Source: California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/education/apprograms>

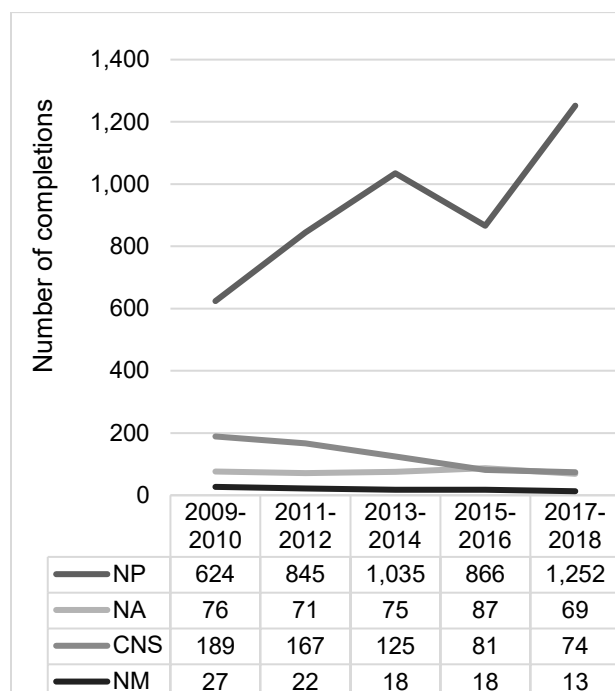
*Note: One program is a private-public partnership between CSU Fullerton and the Kaiser Permanente School of Anesthesia

Master's Programs

APRNs make up the majority of MSN graduates. NPs alone made up over half (51.33%) of California MSN graduates in 2016-2017, growing from 40.4% in 2008-2009. Over the

same period, the share of MSN graduates completing NA programs remained largely stable at 4% to 5%, and the NM share ranged between 0.5% to just under 2%. The CNS share fell by over 75%, from 13.8% in 2008-2009 to 3.4% in 2016-2017 (Figure 6).⁴⁵

Figure 6. Student Completions by APRN Master's Programs in California, by Academic Year*



Source: 2016-2017 Board of Registered Nursing School Survey, California Board of Registered Nursing

*Note: The nursing education surveys conducted by the California Board of Registered Nursing only collect data on master's degree programs affiliated with BRN-approved pre-licensure programs. Therefore, data is not collected on all approved master's degree APRN education programs in California.

The vast majority (94.6%) of California's NP graduates in 2016-2017 graduated from MSN programs. The most common specialty tracks for these graduates were individual/family care (64%), adult/gerontology acute care (9.3%) and adult/gerontology primary care (8.8%).

Doctoral Programs

In 2004, the American Association of Colleges of Nursing (AACN) adopted a position statement endorsing the doctorate of nursing practice (DNP) as the most appropriate level of education for APRNs. Since then, many nursing schools have added DNP programs or converted their post-licensure MSN programs into DNP programs, although others continue to offer MSN programs. Current trends suggest that unless schools and state governments allocate more funding to opening or expanding DNP programs, there will continue to be multiple education pathways that satisfy requirements to become an APRN.⁴⁶

Although only a small share of APRNs are trained through doctoral programs, NP-track students made up the greatest share (35.5%) of DNP program graduates in California for 2016-2017. NPs were the only APRN-track students in the DNP graduate population that year. Of these graduates, the most common specialties were individual/family care (68%), adult/gerontology primary care (18%) and pediatrics primary care (8%).⁴⁷

FUTURE SUPPLY AND DEMAND FOR APRNs

Nurse Practitioners

By 2030, California is likely to face a statewide shortage of primary care clinicians, especially in the supply of primary care physicians. The state is projected to have 34,000 to 46,000 full-time equivalent (FTE) primary care clinicians in 2030 but will need 12% to 17% more FTE primary care clinicians to meet projected demand.⁴⁸

NPs and physicians' assistants (PAs) are expected to make up half of primary care clinicians by 2030. Between 12,097 and 17,095 FTE NPs are expected to provide primary care. Current forecasts still predict statewide shortages because the growth in primary care NPs and PAs will be insufficient to fully offset the projected decrease in primary care physicians.

Mid-range forecasts (assuming 3% annual growth in the primary care clinician workforce)

predict that primary care provider shortages will occur in all regions of the state in 2025 and 2030. The Bay Area would experience the smallest shortfalls, while the Central Valley, Central Coast and Southern Border regions would experience the largest shortfalls. Even if high-range forecasts (assuming 7% annual growth in primary care clinician workforce) are accurate, shortages would occur in 2025 in the Central Valley, Central Coast, Los Angeles, Orange County, Inland Empire and Southern Border regions.⁴⁹

Furthermore, California faces a shortage of behavioral and mental health services providers. By 2028, the state will have 50% fewer psychiatrists than are needed to meet both current patterns of demand and provide psychiatric care to people with unmet mental health needs. The state is projected to have 28% fewer psychologists, licensed marriage and family therapists, licensed professional clinical counselors and psychiatric technicians than are needed. Psychiatric mental health nurse practitioners (PMHNPs) can help address this shortage because they are the only providers other than psychiatrists who can prescribe psychiatric medications. Moreover, they may also provide psychotherapy services.⁵⁰ However, there is insufficient data about PMHNPs in California to generate estimates of future supply and demand.

Policies that will eliminate barriers to NP care are necessary to ensure that the future supply of NPs can adequately address these primary care and behavioral health shortages. California is the only western state that requires NPs to work under physician oversight. Physicians currently bill \$5,000 to \$15,000 per year for the time they spend overseeing NPs.⁵¹ Costs associated with physician oversight may limit the supply of NPs if physicians choose not to work with NPs, or they may be passed along to patients in the form of higher healthcare costs, further inhibiting access to care.

Research has shown that in states with full practice authority for NPs, NP supply is larger and grows more rapidly, the numbers of NPs providing care for underserved populations increases, access to primary care services is

greater, and people travel shorter distances to get care.^{52,53,54,55} Full practice authority for NPs has also been linked to greater use of primary care services, fewer avoidable hospitalizations, fewer hospital readmissions, and decreases in emergency department use. Additionally, NPs are more likely to take new Medi-Cal and uninsured patients and work in rural areas or community health centers.⁵⁶

Nurse Anesthetists

The Health Resources & Services Administration (HRSA) predicts that the national supply of NAs will have increased by 38% between 2013 and 2025, but that the demand for NAs will only have only increased by 16%.⁵⁷ Under this scenario, demand for NA services would be met. However, demand for NAs is also linked to demand for surgery. California has a growing senior population, and demand for surgery (and consequently, NAs) may increase over the long term due to increases in the prevalence of chronic diseases (e.g., heart disease, osteoarthritis). Alternatively, demand could be moderated or reduced, as health care systems put greater emphasis on preventive care that would avert conditions requiring surgery.

Nurse-Midwives and Clinical Nurse Specialists

Insufficient data are available to assess future supply and demand for nurse-midwives and clinical nurse specialists, which limits the ability to estimate future supply and demand for all APRNs.

All APRNs

Given that NPs make up over three-quarters of APRNs in California, trends in future supply and demand for APRNs will likely center around NPs, especially their role in mitigating primary care provider shortages, behavioral and mental health care provider shortages and improving healthcare access in underserved communities. Their ability to make these contributions is ultimately contingent upon whether APRNs can achieve full practice authority in California.

¹ Spetz, J. (2017). *Forecasts of the Registered Nurse Workforce in California*. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/forms/forecast2017.pdf>

² Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

³ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁴ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁵ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁶ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁷ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁸ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁹ <https://www.aacnnursing.org/Nursing-Education-Programs/Baccalaureate-Education>

¹⁰ <https://www.aacnnursing.org/Nursing-Education-Programs/Accelerated-Programs>

¹¹ Blash, L., & Spetz, J. (2019). 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. California Board of Registered Nursing. Retrieved

from <https://www.rn.ca.gov/pdfs/education/schoolrpt17-18.pdf>

¹² Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

¹³ Chu, L., Spetz, J., Bates, T. (2018). Survey of Nurse Employers in California, Fall 2017. University of California, San Francisco. Retrieved from https://rnworkforce.ucsf.edu/sites/rnworkforce.ucsf.edu/files/2017_Moore_Report_Final.pdf

¹⁴ Blash, L., & Spetz, J. (2019). 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/education/schoolrpt17-18.pdf>

¹⁵ Blash, L., & Spetz, J. (2019). 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. 2017-18 Annual School Report: Data Summary and Historical Trend Analysis. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/education/schoolrpt17-18.pdf>

¹⁶ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

¹⁷ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

¹⁸ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California.

California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

¹⁹ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²⁰ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²¹ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²² Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²³ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²⁴ California Board of Registered Nursing. (n.d.). License/Certificate Renewal. Retrieved from

<https://www.rn.ca.gov/licensees/lic-renewal.shtml#certificate>

²⁵ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

²⁶ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from

<https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

²⁷ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

²⁸ Spetz, J. (2017). Forecasts of the Registered Nurse Workforce in California. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/forms/forecast2017.pdf>

²⁹ Spetz, J. (2018). Forecasts of the Registered Nurse Workforce in Regions of California. Healthforce Center at UCSF. Retrieved from https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/RN_Forecast_Report.pdf

³⁰ Chu, L., Spetz, J., Bates, T. (2018). Survey of Nurse Employers in California, Fall 2017. University of California, San Francisco. Retrieved from

https://rnworkforce.ucsf.edu/sites/rnworkforce.ucsf.edu/files/2017_Moore_Report_Final.pdf

³¹ Chu, L., Spetz, J., Bates, T. (2018). Survey of Nurse Employers in California, Fall 2017. University of California, San Francisco. Retrieved from

https://rnworkforce.ucsf.edu/sites/rnworkforce.ucsf.edu/files/2017_Moore_Report_Final.pdf

³² Spetz, J. (2017). Forecasts of the Registered Nurse Workforce in California. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/forms/forecast2017.pdf>

³³ Chu, L., Spetz, J., Bates, T. (2018). Survey of Nurse Employers in California, Fall 2017.

University of California, San Francisco. Retrieved from

https://rnworkforce.ucsf.edu/sites/rnworkforce.ucsf.edu/files/2017_Moore_Report_Final.pdf

³⁴ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

³⁵ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

³⁶ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

³⁷ Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

³⁸ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

³⁹ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

⁴⁰ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

⁴¹ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

⁴² Spetz, J., Chu, L., Jura, M., & Miller, J. (2017). 2016 Survey of Registered Nurses. California Board of Registered Nurses. Retrieved from <https://www.rn.ca.gov/pdfs/forms/survey2016.pdf>

⁴³ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

⁴⁴ Spetz, J., Blash, L., Jura, M., & Chu, L. (2018). 2017 Survey of Nurse Practitioners and Certified Nurse Midwives. California Board of Registered Nursing. Retrieved from https://www.rn.ca.gov/pdfs/forms/survey2017n_pcnm-final.pdf

⁴⁵ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

⁴⁶ Martsof, G. R., Auerbach, D. I., Spetz, J., Pearson, M. L., & Muchow, A. N. (2015). Doctor of nursing practice by 2015: An examination of nursing schools decisions to offer a doctor of nursing practice degree. *Nursing Outlook*, 63(2), 219-226. doi: 10.1016/j.outlook.2015.01.002

⁴⁷ Blash, L., & Spetz, J. (2018). California Board of Registered Nursing 2016-2017 Annual School Report: Data Summary and Historical Trend Analysis - A Presentation of Post-Licensure Nursing Education Programs in California. California Board of Registered Nursing. Retrieved from <https://www.rn.ca.gov/pdfs/education/postlicensure1617.pdf>

⁴⁸ Spetz, J., Coffman, J., & Geyn, I. (2017). *California's Primary Care Workforce: Forecasted Supply, Demand, and Pipeline of Trainees, 2016-2030*. Healthforce Center at UCSF. Retrieved from https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/UCSF_PCP_Workforce_Study_Rpt_2_-_Final_081517.pdf

⁴⁹ Spetz, J., Coffman, J., & Geyn, I. (2017). *California's Primary Care Workforce:*

Forecasted Supply, Demand, and Pipeline of Trainees, 2016-2030. Healthforce Center at UCSF. Retrieved from

https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/UCSF_PCP_Workforce_Study_Rpt_2_-_Final_081517.pdf

⁵⁰ Coffman, J., Bates, T., Geyn, I., & Spetz, J. (2018). *California's Current and Future Behavioral Health Workforce.* Healthforce Center at UCSF. Retrieved from

https://healthforce.ucsf.edu/sites/healthforce.ucsf.edu/files/publication-pdf/California's_Current_and_Future_Behavioral_Health_Workforce.pdf

⁵¹ Spetz, J. (2019). *California's Nurse Practitioners: How Scope of Practice Laws Impact Care.* California Health Care Foundation. Retrieved from

<https://www.chcf.org/wp-content/uploads/2018/09/NursePractitionersScopePracticeLaws.pdf>

⁵² P. B. Reagan and P. J. Salsberry, "The Effects of State-Level Scope-of-Practice Regulations on the Number and Growth of Nurse Practitioners," *Nursing Outlook* 6, no. 1 (2013): 392–99.

⁵³ Ying Xue et al., "Full Scope-of-Practice Regulation Is Associated with Higher Supply of

Nurse Practitioners in Rural and Primary Care Health Professional Shortage Counties," *Journal of Nursing Regulation* 8, no. 4 (2018): 5–13.

⁵⁴ K. Stange, "How Does Provider Supply and Regulation Influence Health Care Markets? Evidence from Nurse Practitioners and Physician Assistants," *Journal of Health Economics*, 33 (2014): 1–27.

⁵⁵ Donna F. Neff et al., "The Impact of Nurse Practitioner Regulations on Population Access to Care," *Nursing Outlook*, 66, no. 4 (July–Aug. 2018): 379–85, doi:10.1016/j.outlook.2018.03.001.

⁵⁶ Joanne Spetz et al., *2017 Survey of Nurse Practitioners and Certified Nurse-Midwives; and 2015 physician data reported in California Physicians: Who They Are, How They Practice*, CHCF, 2017. <https://www.chcf.org/wp-content/uploads/2018/08/CAPhysiciansAlmanacWhoTheyAre2017.pdf>

⁵⁷ Health Resources & Services Administration. (2016). *Health Workforce Projections: Certified Nurse Anesthetists.* Retrieved from <https://bhw.hrsa.gov/sites/default/files/bhw/health-workforce-analysis/research/projections/crna-fact-sheet.pdf>