Forecasts of the Registered Nurse Workforce in California

Prepared for the California Board of Registered Nursing

by

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May 2020

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Executive Summary

This report presents supply and demand forecasts for the Registered Nurse (RN) workforce in California from 2019 through 2035. These new forecasts are based on data from the 2018 California Board of Registered Nursing (BRN) Survey of Registered Nurses, the 2017-2018 BRN Annual Schools Report, data extracted from the BRN license records, and other state and national data sources. In addition, comparisons are made to other published projections. The 2019 forecasts indicate that supply of RNs will likely be slightly higher than projected demand (see Executive Summary Exhibit); however, a surplus or shortage could emerge in the future depending on a number of factors, as described in this report.

The forecasts of RN supply take into account the aging of the RN workforce, new graduates (including those from out-of-state and international nursing programs), interstate flows of RNs, and changes in license status. These new forecasts of supply incorporate new data for these factors.

The demand forecasts are based on national numbers of RNs per 100,000 population. An alternate forecast of demand estimates future hospital utilization in California based on projected increases in the need for hospital services due to population aging. The forecasts are compared with other published forecasts including those from the U.S. Bureau of Health Workforce and California Employment Development Department. Together, the demand estimates provide a range of possible scenarios for the future.

The Executive Summary Exhibit indicates that whether California experiences a shortage of RNs in the future depends on the measure of demand selected for comparison with supply as well as whether supply variables change. The forecasting model produces a range of supply forecasts; the "Best Supply Forecast" is based on the midpoint of most of the parameters in the model; the Exhibit presents both the "Best" and "Low" forecasts. In the figure, the supply forecasts are compared with two different estimates of demand: (1) maintaining the 2018 ratio of full-time equivalent employment (FTE) of RNs per capita, and (2) maintaining the 2018 ratio of full-time equivalent employment adjusted for increasing health care utilization among older age groups. California's RN supply is projected to exceed both of these demand forecasts. However, if supply variables shift so that the low supply forecast prevails, California could face a severe shortage of RNs in the future. There also are scenarios in which California could experience a large surplus of RNs.

The projection of a small surplus is based on the premise that current statewide supply and demand are relatively well-balanced. While some concerns about emerging shortages have been reported, data suggest that any shortages (if they exist) are limited to experienced nurses in specific clinical specialties and specific regions of California. Data on RN vacancies, use of traveling nurses, and hiring of newly-graduated nurses do not support claims of statewide shortages of RNs.

Policymakers should be cautioned that the 2019 BRN forecasts cover a 16-year period and are not intended to reflect rapidly changing economic and labor market conditions. The forecasts also do not measure variation across regions of California; prior research has reported large differences in projected supply and demand across regions, with some areas facing significant shortages and others likely to have surpluses. Finally, the factors that affect RN supply and demand are unlikely to remain static. The most important possible changes include the number of graduates from RN education programs, interstate migration, and employment rates of older RNs. California leaders should closely watch retirement patterns that are opening positions for which clinical experience is desired. It will be important for employers to invest in training newly-graduated RNs to fill these positions. Finally, the availability of faculty should be monitored to ensure that there are sufficient numbers of qualified faculty to educate the number of RNs needed in the future.

Executive Summary Exhibit: Projected full-time equivalent supply of and demand for RNs, 2019-2035
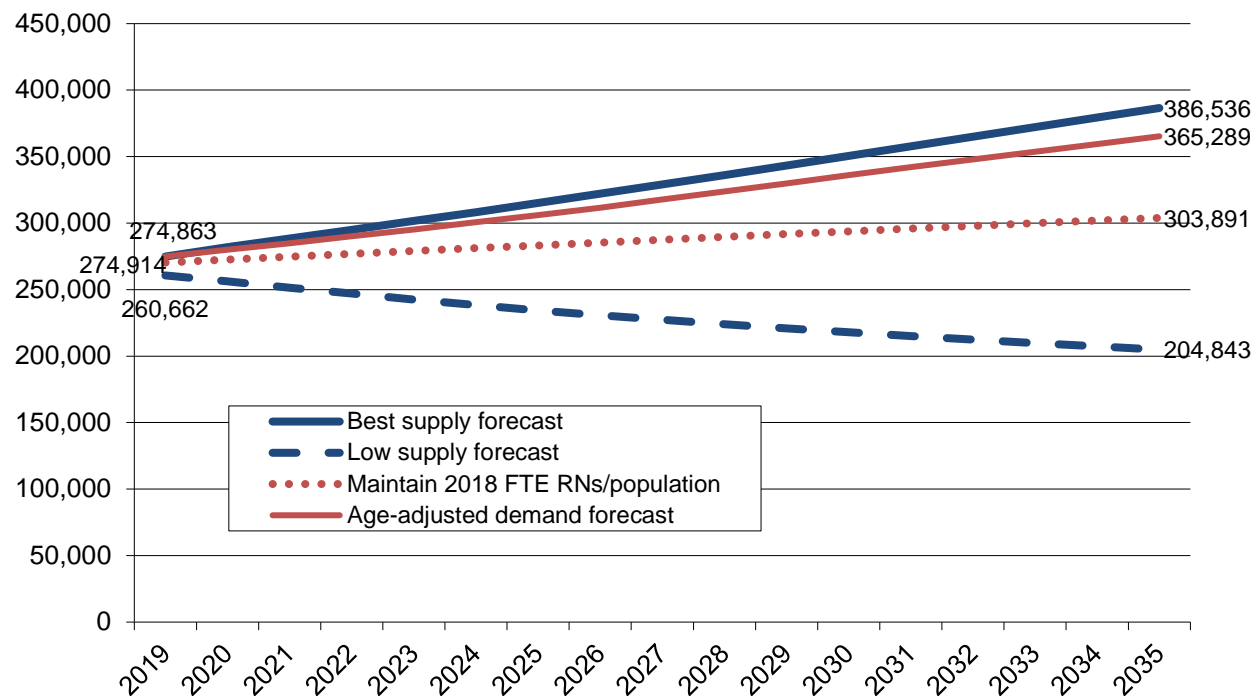
Forecasts of the Registered Nurse Workforce in California

The labor market for RNs has been characterized by cycles of shortage and surplus since World War II. The most recent period of shortage began in the late 1990s (Buerhaus 1998) and persisted through 2007. After 2008, survey data indicated that California's long-standing RN shortage ended (Bates, Keane, & Spetz 2011). In 2010, a survey of chief nursing officers (CNOs) found that there were fewer than 6,500 full-time equivalent vacant positions for RNs statewide (Bates, Keane, & Spetz 2011) while the 2010 BRN Survey of Registered Nurses indicated that nearly 7,700 RNs were seeking employment (Spetz, Keane, & Herrera 2011).

Recent data suggest the labor market may be shifting again. A survey of nurse employers conducted in late 2018 and early 2019 found that many CNOs are experiencing difficulty recruiting experienced RNs for specialized positions. Moreover, 85% of hospital CNOs reported demand for RNs being greater than the available supply (Chu & Spetz, 2020). Hospital vacancy rates averaged 4.2% in fall 2018, which was higher than in the early 2010s but lower than the 5.9% rate in fall 2016. There also have been changes in the proportion of newly-graduated RNs reporting they are employed within 12 months of licensure, rising from 59% in 2013 to 84% in 2016 and stabilizing at 80% in 2018 (HealthImpact 2019). Together, these data suggest a high level of demand for RNs, particularly experienced RNs, but do not clearly indicate a statewide shortage. Nonetheless, concern about a future shortage of RNs is rising due to anticipated retirements of Baby Boomer RNs.

This report updates forecasts of RN supply and demand in California, which were first developed for the California Board of Registered Nursing (BRN) in 2005 and subsequently updated every two years (Spetz & Dyer 2005; Spetz 2007; Spetz 2009; Spetz 2011; Spetz 2013; Spetz 2015; Spetz 2017). New data from the 2018 BRN Survey of Registered Nurses (Chu & Spetz, in press), the 2017-2018 BRN Annual Schools Report (Blash & Spetz 2019), and BRN license records were used to update the model of RN supply. The supply forecast is compared with several benchmarks of demand, including national numbers of RNs per 100,000 population, estimates of future hospital utilization in California, and forecasts published by the U.S. Bureau of Health Workforce and California Employment Development Department (U.S. BHW 2017; California EDD 2018).

The Supply of RNs

The RN workforce constantly changes with the entrance of newly graduated nurses, migration of nurses from other states and countries, retirements, temporary

departures from nursing work, and fluctuations in the number of hours that nurses choose to work. These factors can be grouped into three categories:

- Inflows of nurses: Additions to the number of RNs in California
  - Graduates from California nursing programs
  - Graduates of nursing programs in other states who obtain their first RN license in California
  - Internationally-educated nurses who immigrate to California and obtain their RN license
  - Interstate migration of RNs to California
  - Changes from inactive to active license status
  - Changes from delinquent to active license status
- Outflows of nurses: The departure of RNs from the California population
  - Migration out of California (to another state or country)
  - Movements from active to inactive or lapsed license status
- Labor force participation factors: Decisions to work, and how much to work
  - Proportion of RNs that works in nursing
  - Average number of hours worked per week by RNs working in nursing

The inflows are added to the number of RNs living in California with active licenses, which is called the "stock" of nurses available to work, and the outflows are subtracted from the stock. Estimates of the labor supply of RNs are derived from the stock of RNs potentially available to work and how much they choose to work in nursing. This number is expressed as full-time equivalent (FTE) employment in order to account for differences in the work commitments of those employed full-time and part-time. Exhibit 1 illustrates this model of the supply of RNs in California, commonly called a "stock-and-flow model."

Figure 1. A model of the supply of RNs
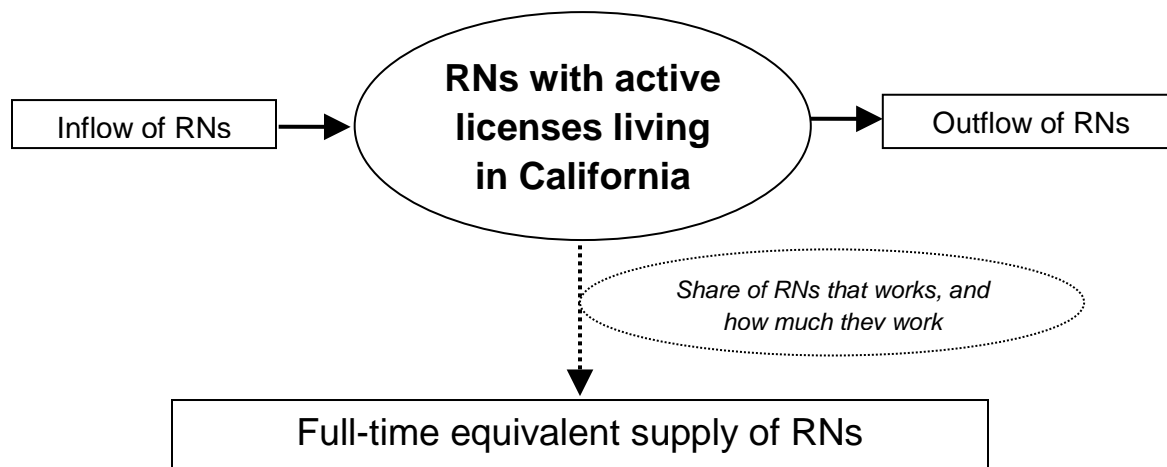
Method of Calculating RN Supply

Changes in the inflows, outflows, and employment decisions of nurses will lead to changes in the overall supply of RNs. The age distribution of the workforce also affects supply; younger RNs are more likely to be employed in nursing, and older RNs are more likely to work part-time or not at all. Thus, the model examines the employment patterns of 13 distinct age groups: under 25, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, and 80 and older. Each year, one-fifth of RNs in each age category moves into the next (older) age category in the subsequent year, until they reach the oldest age category.[1] In each year, the estimated numbers of RNs flowing into the workforce are added to each age group and the estimated outflows are subtracted. The result is a forecast of the new stock of RNs for each age group the next year. Finally, employment rates and average hours worked per week in nursing are applied to the estimated stock of RNs in each age group to obtain estimated FTE supply. This calculation is iterated through 2035 to obtain yearly forecasts of California's RN supply.

For some factors in the supply model, differing estimates are available, with no indication of which estimate is most reliable. For other factors, there is uncertainty as to whether current data are applicable to what might happen in the future. For example, in 2010 and 2012, a greater share of nurses over age 60 was employed as compared with prior years. This increase was likely the result of older nurses delaying retirement due to declines in the value of their retirement savings (Buerhaus & Auerbach 2011). More recent data indicate that employment of nurses in this age group has returned to lower pre-recession levels (Chu & Spetz, in press). However, it also is possible that Baby Boomer nurses have different intentions regarding retirement than did previous generations, and higher rates of employment in older age groups will re-emerge. For variables with such uncertainty, a range of estimates is offered representing the highest and lowest values. In the final models, the "best estimate" for each parameter is the average of the low and high estimates, unless otherwise noted.

Estimates of Supply Model Factors

Stock of RNs in 2019

Data on the stock of RNs was obtained from the BRN. As of June 19, 2019, there were 439,670 RNs with active California licenses, of whom 358,865 had California addresses. In April 2017, there were 415,798 active California licenses, of whom 353,051 had California addresses. For the purposes of these forecasts, the

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[1] All but one age group spans 5 years, so if nurses are evenly distributed across those five years, 20% - or 1 in 5 – would move to the next age group each year. The youngest age group spans 7 years, but there were few RNs under 20 years old in 2017; thus, the 20% assumption seems reasonable for this group as well.

California-resident population is defined as the supply of nurses; the role of nurses who travel to work in California from other states is discussed later in the report.

The number of RNs with active licenses and California addresses was divided into 13 age groups. Table 1 compares the 2019 and 2017 data. The total number of licensed nurses grew 5.7% between 2017 and 2019, from 415,798 to 439,670. However, the number with California addresses grew only 1.6% between 2017 and 2019, which was slower than the rates of growth between 2015 and 2017 (3.6%) and between 2013 and 2015 (3.8%). The number of RNs with California addresses increased for some age groups and decreased for others. The largest rates of increase were for ages 35-39 years (12.3%, from 40,382 to 44,800) and 65-69 years (10.7%, from 23,582 to 26,103). The largest rates of decrease were for ages under 25 years (-19.7%, from 4,424 to 3,554) and 55-59 years (-8.5%, from 39,496 to 36,150).

Table 1. Counts of actively-licensed RNs living in California, by age group, July 19, 2019, and April 6, 2017

Age Group	June 19, 2019		April 6, 2017		Change 2017-2019
	Count	% of Total	Count	% of Total	
Under 25	3,554	0.99%	4,424	1.25%	-19.7%
25-29	25,834	7.20%	28,319	8.02%	-8.8%
30-34	44,800	12.48%	42,917	12.16%	4.4%
35-39	45,341	12.63%	40,382	11.44%	12.3%
40-44	41,313	11.51%	42,122	11.93%	-1.9%
45-49	45,330	12.63%	41,270	11.69%	9.8%
50-54	35,392	9.86%	34,918	9.89%	1.4%
55-59	36,150	10.07%	39,496	11.19%	-8.5%
60-64	39,718	11.07%	41,187	11.67%	-3.6%
65-69	26,103	7.27%	23,582	6.68%	10.7%
70-74	10,316	2.87%	9,605	2.72%	7.4%
75-79	3,729	1.04%	3,495	0.99%	6.7%
80+	1,285	0.36%	1,331	0.38%	-3.5%
Total	358,865	100.00%	353,048	100.00%	1.6%

Source: California Board of Registered Nursing license records, June 2019 & April 2017.

Graduates from California pre-licensure nursing programs

According to the BRN Annual Schools Report, there were 11,890 new graduates from California nursing programs in the 2017-2018 academic year (Blash & Spetz 2019). Table 2 presents the numbers of enrollments and graduates from the past 10 Annual Schools Reports. Growth in new student enrollments leads to growth in graduates in future years. Associate Degree (AD) programs are designed so that students can complete the nursing component of the degree in two years. In most Baccalaureate of Science Nursing Degree (BSN) programs, students are formally enrolled in nursing major courses during the last 2.5 to 3 years of the pre-licensure BSN degree program, unless the program is an accelerated BSN program. Thus, student enrollment changes translate to changes in the number of graduates two to three years in the future.

To predict the number of future graduates, actual new student enrollments for each year of the Annual Schools Report were compared with the number of graduates two years later. From 2012-2013 through 2017-2018, graduates averaged 84.6% of the number of student enrollments two years prior (an increase from the 80.8% "productivity rate" used in the 2017 forecasts). This is the rate used to estimate the number of future graduates; thus, the forecasted number of graduates in 2019-2020 is 84.6% of the known student enrollments (14,154) from 2017-2018.

Table 2. Numbers of new pre-licensure RN student enrollments and graduates from California nursing programs, 2008-2009 through 2017-2018

Survey year	Number of new student enrollments	Growth in new student enrollments	Number of graduates	Growth in graduates
2008-2009	13,988	7.9%	10,526	10.5%
2009-2010	14,228	1.7%	11,512	9.4%
2010-2011	13,939	-2.0%	10,653	-7.4%
2011-2012	13,677	-1.9%	10,814	1.4%
2012-2013	13,181	-3.6%	11,292	4.4%
2013-2014	13,226	0.3%	11,291	-0.01%
2014-2015	13,318	0.7%	11,119	-1.5%
2015-2016	13,152	-1.2%	11,191	0.7%
2016-2017	13,597	3.4%	11,302	1.0%
2017-2018	14,154	4.1%	11,890	5.2%

Source: Blash, L, Spetz, J. 2019. 2017-2018 Annual School Report: Data Summary and Historical Trend Analysis. Sacramento, CA: California Board of Registered Nursing.

Forecasting the number of graduates beyond the 2018-2019 academic year is difficult because total new student enrollments after 2017-2018 are not yet known. As part of the BRN Annual School Survey, schools are asked to estimate future new student enrollment. For example, in the 2017-2018 survey, schools were asked to report expected student enrollment totals for the 2018-2019 and 2019-2020 academic years. Schools estimated that 2018-2019 new student enrollments would be 13,005 (8.1% lower than the previous year), and that 2019-2020 new student enrollments would be 13,283. These estimates were multiplied by 84.6% to obtain the forecasted number of graduates for 2018-2019 and 2019-2020, because this 84.6% was the average of the number of graduates over the past six years (2012-2013 through 2017-2018) divided by the number of enrollment from two years prior. The forecasts assume that nursing student enrollments will be stable after the 2019-2020 academic year. In the forecasting model, the low estimate of growth in RN education after 2019-2020 is -1%, the high estimate is 1%, and the best estimate is 0%. Actual and predicted number of graduates from 2014-2015 through 2021-2022 are presented in Table 3.

Table 3. Numbers and predicted numbers of pre-licensure RN enrollments and graduates from California nursing programs

Academic year	Actual/forecasted new student enrollments	Actual/forecasted number of graduates
2014-2015	13,318*	11,119*
2015-2016	13,152*	11,191*
2016-2017	13,597*	11,302*
2017-2018	14,154*	11,890*
2018-2019	13,005	11,506
2019-2020	13,283	11,979
2020-2021		11,007
2021-2022		11,242

* Actual number of student enrollments and graduates based on Annual Schools Report.
Note: Forecasts of student enrollments are provided by RN programs in the Annual Schools Survey. The forecasted number of graduates is 84.6% of enrollments two years prior. Source: Blash, L, Spetz, J. 2019. 2017-2018 Annual School Report: Data Summary and Historical Trend Analysis. Sacramento, CA: California Board of Registered Nursing.

Graduates from other states who obtain their first license in California

Each year, some graduates of nursing programs in other states obtain their first RN license in California. According to the BRN, in 2018, 701 out-of-state graduates obtained their first license from California; this is the high estimate of out-of-state graduates who move to California. BRN records indicate that 387 of these nurses

are living in California; this is the low estimate. The best estimate for the inflow of new graduates from other states is the average of the high and low estimates: 544 nurses. This estimate is higher than that from the 2017 forecasts, which was 461.

Immigration of internationally-educated nurses

In 2018, the BRN reported that 951 internationally-educated nurses passed the National Council Licensure Examination for RNs (NCLEX-RN) and received initial licensure as an RN in California, 750 of whom also had a California residence; the remainder lived in other states or countries. In the supply model, the total number of 2018 international graduates that received initial licensure in California was used as the high estimate of the number of immigrants; the number that lived in California was used as the low estimate. The best estimate is the average of the high and low estimates: 851 internationally-educated RNs immigrate to California each year. This number is higher than the 2017 estimate of 603. However, these figures are much lower than the prior decade when the number of first licenses issued to internationally-educated nurses ranged between 1,145 and 4,107 annually. The lower numbers in recent years are consistent with other reports that international recruitment of nurses slowed significantly after 2008 (Chu & Spetz, 2020).

Age distributions of new graduates

Inflows of new graduates are added to the stock of RNs by age group. The BRN Annual Schools Report uses an uneven set of age groups for new California graduates: 18-25, 26-30, and then 10-year age groups for graduates over age 30. To create consistent groups of graduates in the forecasting model, graduates were allocated into five-year groups. Table 4 shows how new graduates from California nursing programs were distributed by age group. RN graduates from nursing programs in other states seeking initial licensure as an RN in California were assumed to have the same age distribution as California graduates.

BRN records of internationally-educated nurses who receive initial U.S. licensure in California include the birth years of these nurses. The age distribution of internationally-educated RNs who lived in California and obtained licenses in 2018 is presented in the last column of Table 4; these data are used to forecast the age distribution for all internationally-educated RNs receiving first licenses in California.

Table 4. Age distributions of new graduates from California and international RN programs

Age group	Graduates of US RN programs	Internationally-educated graduates
18-25*	29.8%	7.7%
26-29*	31.1%	27.9%
30-34	15.9%	32.4%
35-39	12.3%	15.3%
40-44	5.3%	7.6%
45-49	3.6%	4.5%
50-54	1.3%	2.7%
55-59	0.7%	1.3%
60-64	0.1%	0.5%
65+	0.0%	0.0%

* The age groups for internationally-educated RNs are "Under 25" and 25-29. The Annual Schools Survey reports graduates aged 61 and older; the projection model assumes these graduates are all 60-64 years old and no graduates are 65 years or older.
Sources: Blash, L, Spetz, J. 2019. 2017-2018 Annual School Report: Data Summary and Historical Trend Analysis. Sacramento, CA: California Board of Registered Nursing; California BRN licensing records, 2018.

Interstate migration of RNs to California

Estimates of interstate migration to California were developed in two ways. First, BRN license records from 2016 were compared with those of 2018. There are two components of interstate migration to California: (1) RNs who already have a California license and move to the state, and (2) RNs who obtain a new California license and move to the state. To measure this first component, the 2016 and 2018 license files were compared to identify nurses who had California licenses in both years, but who lived outside California in 2016 and resided in California in 2018. Over the two-year period, the difference was 5,604. This figure was divided by two to get an estimate of one-year change (2,802 RNs). The second component was determined by counting the number of RNs who were newly licensed and had California addresses between 2016 and 2018 (37,727 RNs) and divided by two to get the one-year average number (18,863 RNs). The number of new graduates in the 2017-2018 academic year (11,890) was then subtracted from this number to estimate the number of experienced RNs moving to California from other states in 2018.

All data were reported by age group, so the RNs identified for both components were divided across age groups. To obtain an estimate of in-migration as a percentage of the current workforce, the number of RNs migrating from other states was divided by the total number of RNs in each age group. In the model,

multiplying this percentage by the total projected number of RNs allows the estimates of in-migration to increase as the workforce of California (and, presumably, the United States) grows. Table 5 provides the estimates for each age group. Note that the estimated number and rate of in-migration is negative for the youngest age group; this is likely because some newly-graduated nurses have not yet completed the licensing process. This negative value is not used in the model, as explained below.

Table 5. Estimates of the number of nurses moving to California based on comparison of 2016 and 2018 licensing records

Age Category	A. Number licensed both years who moved to California (2016-2018)	B. Number licensed in 2018 but not 2016	C. Total of RNs moving to California 2016-2018 (A+B) divided by 2	D. Number of RN graduates 2018	Estimated annual in-migration (C-D)	In-migration rate
Under 25	174	4,119	2,146.5	3,538	-1,392	-39.2%
25-29	1,152	10,815	5,983.5	3,693	2,290	8.9%
30-34	1,175	7,666	4,420.5	1,888	2,532	5.7%
35-39	794	4,615	2,704.5	1,457	1,248	2.8%
40-44	660	2,885	1,772.5	634	1,139	2.8%
45-49	475	2,279	1,377	428	949	2.1%
50-54	399	1,510	954.5	152	802	2.3%
55-59	382	1,239	810.5	83	727	2.0%
60-64	269	1,119	694	17	677	1.7%
Over 64	124	1,480	802	0	802	3.1%

Sources: California Board of Registered Nursing license records, 2016 & 2018

Alternate estimates of interstate migration were computed from BRN records of nurses requesting license endorsement from another state into California. Table 6 presents the number of RNs requesting endorsement to California in 2018 who had permanent addresses in California, and the number requesting endorsement with permanent addresses anywhere.

Table 6. Requests for license endorsement into California, 2018

Age Category	Residing in California		Residing anywhere	
	# requesting endorsement	Endorsements as % of total RNs	# requesting endorsement	Endorsements as % of total RNs
Under 25	182	5.1%	1,374	38.7%
25-29	677	2.6%	8,905	34.5%
30-34	573	1.3%	6,474	14.5%
35-39	353	0.8%	4,023	8.9%
40-44	214	0.5%	2,975	7.2%
45-49	191	0.4%	2,651	5.8%
50-54	120	0.3%	2,105	6.0%
55-59	81	0.2%	1,710	4.7%
60-64	62	0.2%	1,053	2.7%
Over 64	26	0.1%	390	1.5%

Sources: California Board of Registered Nursing license records, 2018

Table 7 summarizes the three different estimated rates of in-migration. The low estimate was the rate of endorsement requests only for those with California addresses. The high estimate was half of the rate of all endorsement requests because prior research found that 49% of RNs requesting endorsement to California intended to live and work in the state (Waneka, Spetz, & Chan 2008); the remaining RNs either never worked in California or worked only temporarily in California (as traveling nurses). The best estimate was the rate calculated from licensing records, except the endorsement rate for RNs with California addresses was used for the youngest age group due to the negative estimate from the license file calculation.

Movements from inactive and lapsed to active license status

Data were obtained from the BRN on the number of RNs, by age category, with California addresses changing from inactive to active license status in 2018. The total has ranged from a low of 189 nurses in 2002-2003 to a high of 971 nurses in 2018. The 2018 data were used to estimate the number and age distribution of RNs changing from inactive to active license status (Table 8).

The BRN provided data on the number and age distribution of RNs whose licenses were lapsed and later were reactivated. In 2018, 5,829 RNs living in California reactivated their licenses. The rate of reactivation was computed by dividing the number of RNs reactivating their licenses in each age group by the total number of actively licensed RNs in the age group (Table 9). The average rate of license reactivation was 1.6% of the total number of licensed RNs living in California.

Table 7. Projected rates of in-migration to California

Age Category	California address endorsement rate (Table 6)	Overall endorsement rate (Table 6)	In-migration (Table 5)	Low estimate	High estimate	Best estimate
Under 25	5.1%	38.7%	-39.2%	5.1%	19.3%	5.1%
25-29	2.6%	34.5%	8.9%	2.6%	17.2%	8.9%
30-34	1.3%	14.5%	5.7%	1.3%	7.2%	5.7%
35-39	0.8%	8.9%	2.8%	0.8%	4.4%	2.8%
40-44	0.5%	7.2%	2.8%	0.5%	3.6%	2.8%
45-49	0.4%	5.8%	2.1%	0.4%	2.9%	2.1%
50-54	0.3%	6.0%	2.3%	0.3%	3.0%	2.3%
55-59	0.2%	4.7%	2.0%	0.2%	2.4%	2.0%
60-64	0.2%	2.7%	1.7%	0.2%	1.3%	1.7%
Over 64	0.1%	1.5%	3.1%	0.1%	0.7%	3.1%

Sources: California Board of Registered Nursing license records, 2016 & 2018

Table 8. Number and age distribution of RNs changing status from inactive to active license status, 2018

Age Category	Number	Percent	Age Category	Number	Percent
<30	47	4.8%	55-59	88	9.1%
30-34	84	8.7%	60-64	124	12.8%
35-39	77	7.9%	65-69	118	12.2%
40-44	105	10.8%	70-74	67	6.9%
45-49	98	10.1%	75+	53	5.4%
50-54	110	11.3%	Total	971	100.0%

Source: California Board of Registered Nursing license records, 2018.

Table 9. Number and rate of RNs reactivating lapsed licenses, 2018

Age Category	Number	Rate	Age Category	Number	Rate
<30	146	0.5%	55-59	614	1.7%
30-34	420	0.9%	60-64	784	2.0%
35-39	543	1.2%	65-69	709	2.7%
40-44	576	1.4%	70-74	420	4.1%
45-49	670	1.5%	75+	332	6.6%
50-54	615	1.7%	Total	5,829	1.6%

Source: California Board of Registered Nursing license records, 2018.

Migration out of California (to another state or country)

Estimates of migration out of California were developed in two ways. First, BRN license records from 2016 were compared with those of 2018. Nurses who had California licenses in both years but who lived in California in 2016 and resided outside California in 2018 were counted by age group and divided by two to get an estimate of one-year out-migration (2,445 RNs). The number of RNs moving to other states was divided by the total number of RNs in each age group to obtain estimates of out-migration as a percentage of the current workforce. In the model, multiplying this percentage by projected numbers of RNs allows the estimated numbers of nurses moving out of California to grow with the size of the workforce.

Alternative estimates of migration out of California were developed from BRN records of nurses requesting license endorsement to another state. Some people who requested outgoing endorsement had in-state addresses at the time of the request and others had out-of-state addresses. Both of these numbers were divided by the numbers of RNs in each age group in 2019 to obtain estimates of the rates of out-migration. The best estimate is the average of the three estimated out-migration rates (Table 10). The low estimate is the out-migration rate based on endorsement requests for all addresses, which estimates the highest numbers moving out of California and thus leads to smaller projected numbers of RNs. The high estimate is the one based on comparing 2016 and 2018 licensing files, which produces the lowest estimate of out-migration and thus higher future projections.

Table 10. Estimates of the number of nurses moving out of California

Age Category	Licensed both years, had California address in 2016 but not 2018		Endorsement requests with California address		Endorsement requests for all addresses		Best estimate (average of all rates)
	Number	Rate	Number	Rate	Number	Rate	
Under 25	46	1.3%	63	1.8%	94	2.6%	1.9%
25-29	293	1.1%	518	2.0%	1,231	4.8%	2.6%
30-34	418	0.9%	834	1.9%	2,276	5.1%	2.6%
35-39	332	0.7%	729	1.6%	1,775	3.9%	2.1%
40-44	231	0.6%	461	1.1%	1,377	3.3%	1.7%
45-49	210	0.5%	396	0.9%	1,185	2.6%	1.3%
50-54	227	0.6%	356	1.0%	1,087	3.1%	1.6%
55-59	269	0.7%	373	1.0%	1,054	2.9%	1.6%
60-64	255	0.6%	288	0.7%	925	2.3%	1.2%
65-69	127	0.5%	159	0.6%	543	2.1%	1.1%
70-74	31	0.3%	50	0.5%	140	1.4%	0.7%
75 & older	10	0.2%	16	0.3%	35	0.7%	0.4%
TOTAL	2,445		4,243		11,722		

Sources: California Board of Registered Nursing license records, 2016 & 2018

Movements from active to inactive or lapsed license status

Estimates of the rate at which actively-licensed RNs allow their licenses to lapse were computed from California BRN license records. These estimates are very important to the model because they measure the loss of nurses due to relocation, change in employment plans, retirement, and death. The model does not distinguish among these reasons for allowing a license to lapse.

Two approaches were used to estimate the rates at which RNs allow their licenses to lapse. First, the BRN provided data on the number of RNs with California addresses who changed their license status to inactive or allowed their license to lapse in 2018. Second, the BRN license records from 2016 were compared with those of 2018. Nurses who had California licenses and residences in 2016 but were not in the license file in 2018 were counted as an estimate of the number of lapsed licenses over a two-year period for each age group. These data were divided by 2 to estimate annual rates. As seen in Table 11, these rates were notably lower than the rates calculated from the records provided by the BRN. In the model, the higher rate is used because it was based on more recent data (full year 2018) and produces a more conservative estimate of future supply.

Table 11. Estimated annual rates of RNs allowing licenses to lapse or become inactive

Age Category	Changes to inactive or delinquent status, 2018		RNs active in 2016 but not in license file in 2018, divided by 2	
	Number	Rate	Number	Rate
Under 25	16	0.5%	66	1.9%
25-29	389	1.5%	430	1.7%
30-34	904	2.0%	614	1.4%
35-39	993	2.2%	494	1.1%
40-44	917	2.2%	472	1.1%
45-49	1,030	2.3%	464	1.0%
50-54	924	2.6%	565	1.6%
55-59	1,144	3.2%	952	2.6%
60-64	2,239	5.6%	2,045	5.1%
65-69	3,512	13.5%	2,334	8.9%
70-74	2,487	24.1%	1,182	11.5%
75-79	1,108	29.7%	847	22.7%
80+	654	50.9%		
TOTAL	16,317		10,463	

Source: California Board of Registered Nursing license records, 2016 and 2018.

Supply Forecasts of California's RN workforce

To create a forecast of the total number of RNs with active licenses in California, the model assumes that one-fifth of RNs in each age category moves into the next age category every year after 2017. In this manner, the workforce is "aged." For the age group 80 years and older, 20% of those 75 to 79 years old in the previous year enter, and people leave this age group (and other) based on the estimated outflows described above. For each age category, the basic formula is:

Forecasted Supply of CA RNs next year =
Current supply of RNs in current year + Estimated inflows − Estimated outflows

This formula is used to produce a forecast of the total active RN population residing in California through 2035. The model projects that California will have 493,038 active resident RNs by 2035, as shown in Figure 2. This is 1.5% smaller compared with the 2017 forecast of 500,434 RNs by 2035. This difference is largely due to higher projected rates of licenses lapsing, which offsets increases in the numbers of new graduate RNs, decreases in the rate of migration out of California, and increases in the rate of migration to California.

As noted above, there was a range of plausible estimates for several of the inflow and outflow parameters in the model. Figure 2 presents the range of supply estimates that result when the highest and lowest possible supply forecasts are calculated. The rapid growth of the RN workforce in the high forecast is largely driven by a high rate of migration to California from other states, and the slow growth in the low forecast results from a low rate of migration to California from other states. These alternate forecasts provide a sense of the range of possible supply outcomes that could occur as a result of changes in any of the variables.

Figure 2. Forecasted number of RNs with active licenses residing in California, 2019-2035
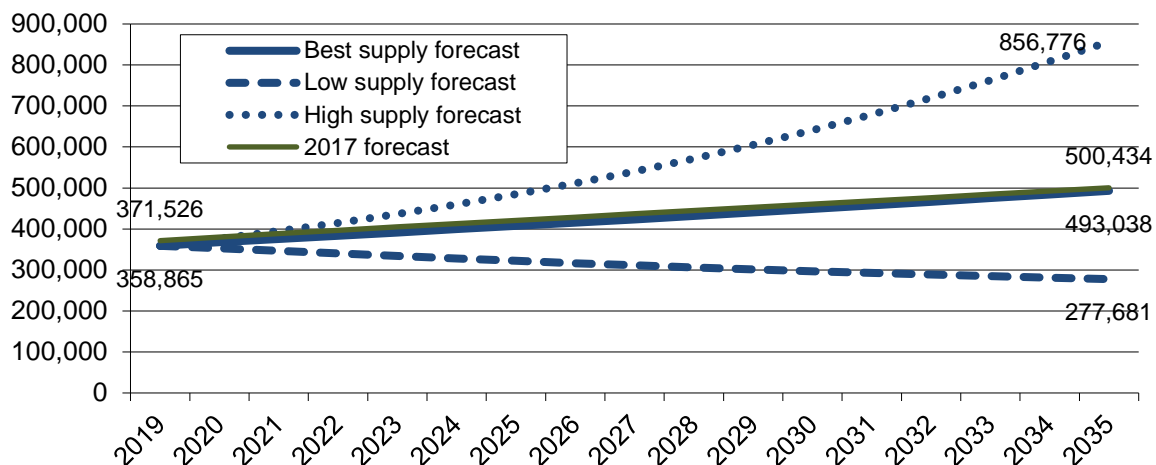
The forecasted number of RNs with active licenses does not account for the variation in hours worked by RNs and the fact that some RNs with active licenses do not work in nursing. Data from the 2018 BRN Survey of RNs were used to estimate the proportion of RNs living in California with active licenses that are employed in nursing, by age category (Chu & Spetz, in press). The estimated employment rates range from a high of 94.8% for RNs 25 years and younger to a low of 22.8% for RNs 80 years and older. Employment rates by age groups have varied over time, and the 2018 survey produced estimates of employment rates that were notably lower than in previous years. The low estimate of the employment rate for each age group is the lowest of six most recent employment rates measured in biennial BRN Surveys. The high estimate is the highest of these six rates. The best estimate is the average of the low and high rates and is presented in Table 12.

Table 12. Employment rates for RNs residing in California, 2018, and average rates used in forecasts

Age Category	Share Employed, 2018	Low Estimate	High Estimate	Best Estimate
Under 25	92.6%	89.6%	100.0%	94.8%
25-29	88.7%	88.7%	97.4%	93.1%
30-34	86.7%	86.7%	95.5%	91.1%
35-39	89.4%	89.4%	95.2%	92.3%
40-44	87.9%	87.9%	92.6%	90.3%
45-49	88.5%	88.5%	93.4%	91.0%
50-54	90.0%	89.8%	90.8%	90.3%
55-59	86.5%	85.3%	87.5%	86.4%
60-64	72.4%	72.4%	78.5%	75.4%
65-69	49.9%	49.9%	65.2%	57.5%
70-74	36.2%	36.2%	43.3%	39.8%
75-79	28.4%	28.4%	36.0%	32.2%
80+	28.5%	17.1%	28.5%	22.8%

Source: Chu, L, Spetz, J. In press. 2018 Survey of Registered Nurses. Sacramento, CA: California Board of Registered Nursing.

In the supply model, the 2018 BRN Survey of RNs was used to estimate the average usual hours worked per week in all nursing jobs for each age category by active RNs who resided in California and were employed in nursing (Chu & Spetz, in press). This is to account for variation in hours worked by RNs. These estimated hours per week are divided by 40 to obtain the average FTE for each age category. The data used for this calculation are presented in Table 13. As with the estimates of the employment rate, the high estimate is the highest of the number of hours

worked in the past six surveys and the low estimate is the lowest of these six. The best estimate is the average of the high and low estimates.

Table 13. Average hours worked per week by RNs residing in California, 2018, and average hours used in forecasts

Age Category	Hours Worked per Week, 2018	Low Estimate	High Estimate	Best Estimate
Under 25	40.1	40.0	47.1	43.5
25-29	36.9	35.8	36.9	36.3
30-34	37.0	35.8	37.0	36.4
35-39	35.8	35.8	36.2	36.0
40-44	37.0	36.4	37.0	36.7
45-49	38.0	36.7	38.0	37.4
50-54	36.9	36.9	37.6	37.2
55-59	37.5	36.6	37.5	37.0
60-64	37.5	35.3	37.5	36.4
65-69	34.4	32.0	34.4	33.2
70-74	28.3	24.0	28.3	26.2
75-79	22.8	18.8	24.5	21.6
80+	7.5	7.5	31.1	19.3

Source: Chu, L, Spetz, J. In press. 2018 Survey of Registered Nurses. Sacramento, CA: California Board of Registered Nursing.

Figure 3 presents projected high, low, and best estimates of FTE supply based on the best estimates of the future count of RNs. The 2019 forecast projects there will be 386,536 FTE RNs in 2035, which is slightly lower than the 390,487 projected in 2017, reflecting the lower forecasted total number of RNs discussed above. In the chart, these forecasts are compared with the FTE supply forecast for 2025 published by the U.S. Bureau of Health Workforce (BHW), which was 343,400 FTE RNs (BHW 2017). The BHW forecast is 9% higher than the forecast from the California model (315,115 FTE RNs in 2025).

Figure 3. Forecasted full-time equivalent supply of RNs, 2019-2035
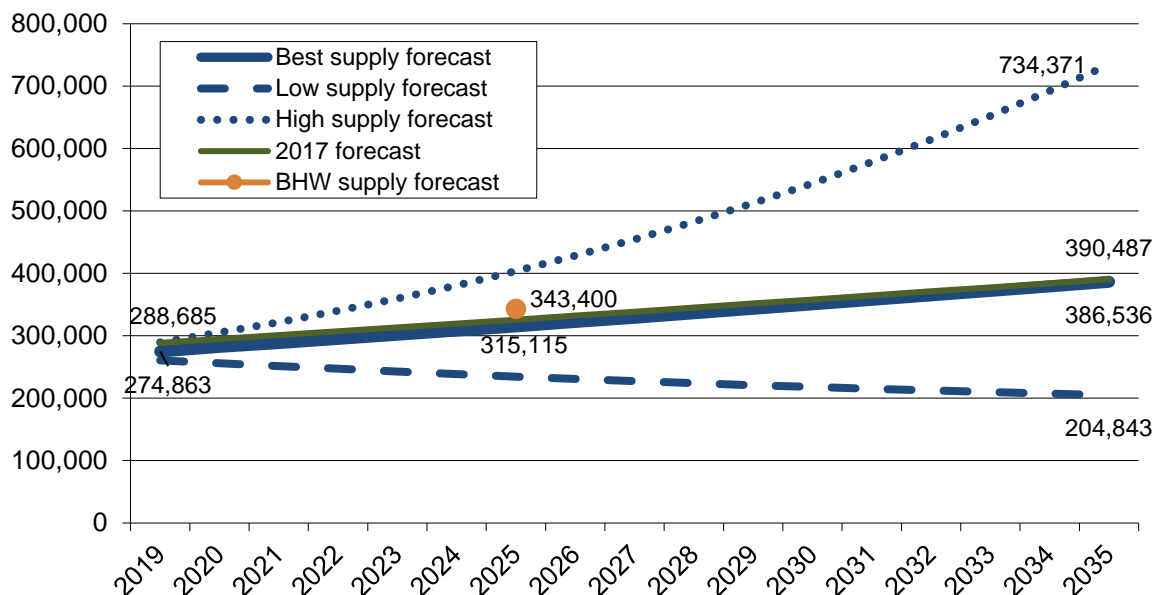
The Demand for RNs

The demand for RNs can be measured and forecasted in many ways, reflecting disparate notions of what demand is or should be. Many policymakers and health planners consider population needs as the primary factor that should dictate the need for health care workers. For example, the World Health Organization has established a goal of countries needing a minimum of 2.28 health care professionals per 1,000 population in order to achieve the goal of 80% of deliveries being attended by a skilled birth attendant (WHO 2006). Similarly, policymakers could target a stable number of nurses per capita, a level developed by an expert panel, or a goal based on comparisons with other U.S. states.

It is important to recognize, however, that population need is not the same thing as economic demand. Nurses and other health professionals are not free, and the cost of employing them must be weighed against other uses of resources. A nurse employer might want to hire more nurses but may not have sufficient income from its patient care services to afford more nurses. An employer might have resources that could be used to hire more nurses, but might think that investment in an electronic medical record or patient navigators will produce more value to patients. The demand for nurses is essentially derived from economic forces, which may not be aligned with population needs.

For this report, several different measures of demand (or need) are considered in order to develop a range of plausible estimates of future demand for RNs. The approaches used are:

- Fixed benchmarks based on current RN-to-population ratios in California
- Fixed benchmarks based on U.S. RN-to-population ratios
- Demand forecasts based on 2017 hospital patient days, employment in hospitals, and future population growth and aging
- An employment forecast for 2026 published by the California Employment Development Department (EDD 2018)
- A demand forecast for 2025 published by the U.S. Bureau of Health Workforce (BHW 2017)

These approaches are informed by surveys of RN employers conducted from fall 2010 through 2018.

Forecasts based on RNs per capita

One frequently used benchmark of the need for RNs is the number of employed RNs per 100,000 population (California Institute for Nursing and Health Care 2006). For decades, California has had one of the lowest ratios of employed RNs per 100,000 population in the United States. Table 14 presents 2017 ratios of working RNs per 100,000 population for the states with the 10 lowest and 10 highest ratios, based on data from the American Community Survey (U.S. Bureau of the Census 2018). California had the 4th lowest ratio (826 RNs per 100,000). Some policy advocates have supported efforts to move California's full-time equivalent employment of RNs toward the 25th percentile nationwide (957 RNs per 100,000) or even the national average (1,053 RNs per 100,000). These population-based benchmarks were compared with the current and forecasted population of California (California Department of Finance 2019) to project the numbers of RNs required to remain at the current RN-to-population ratio, reach the 25th percentile ratio, and attain the national average ratio.

Note that California has always had an RN-per-population ratio in the lowest 5 in the U.S., even though California is the only state with minimum nurse staffing ratios in acute care hospitals (since 2004) and has better health outcomes for most indicators than national averages. Thus, there is no empirical reason to think that California's nursing workforce should be at a higher RN-to-population ratio than it is today.

The main shortcoming of targeting a fixed number of RNs per population is that the target is arbitrarily defined. The current number of nurses per capita may be too

high or too low, and a target number based on a national average or other source might not reflect the unique population and health care system of California. In addition, fixed nurse-to-population ratios do not account for increases in the demand for health care services associated with population aging.

Table 14. Working RNs per 100,000, 2017

State with the lowest ratios	RNs per 100,000	States with the highest ratios	RNs per 100,000
Utah	741	South Dakota	1,509
Nevada	752	Massachusetts	1,375
Idaho	797	Kansas	1,349
California	826	Ohio	1,346
Oklahoma	832	Minnesota	1,338
Arizona	866	Iowa	1,312
Georgia	903	Alaska	1,304
Colorado	918	North Dakota	1,289
Wyoming	924	Wisconsin	1,284
South Carolina	938	Rhode Island	1,280

Source: U.S. Bureau of the Census. 2018. American Community Survey, Summary File, 2017. Washington DC: U.S. Bureau of the Census. Note: States with small sample sizes have greater margin of error in the estimated RN-to-population ratio.

Forecasts based on hospital staffing of RNs per patient day

A second approach to forecasting demand for RNs used hospital utilization and staffing patterns to estimate future demand. First, the 2017 total number of hospital patient discharges per 10-year age group at short-term acute-care hospitals was obtained (California OSHPD 2019).[2] To estimate the total number of patient days per age group, these data were multiplied by the average length of stay per age group, as reported from the 2015 Hospital National Inpatient Statistics (AHRQ 2015).

To calculate the rate of hospital utilization per age group, the estimated total number of patient days per age group was divided by the estimated population of each age group. Age-specific population estimates and forecasts were gathered from the California Department of Finance (2019). Dividing patient days by population provided the number of patient days per population for each age group.

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[2] The age groups are under 1, 1-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80 and older.

These rates of patient days were then applied to the population projections to get projections of total patient days by age category.

To produce forecasts of hospital demand for RNs, RN hours per patient day were calculated using OSHPD's Hospital Annual Financial Data (OSHPD 2019). In 2017, a total of 233,706,564 productive RN hours were reported. The number of RN hours per discharge was calculated by dividing these hours by the number of patient days in 2017, resulting in 12.76 productive RN hours per patient day (in 2015, there were 12.51 hours per patient day). Multiplying the number of productive RN hours per patient day by the forecasted total number of patient days produces a forecast of hospital-based RN hours needed in the future. To equate these estimates to FTE jobs, RN hours are divided by 1,768 (average annual productive hours per FTE).

The calculations described above provide demand forecasts for only hospitals, and only for a subset of hospitals (long-term hospitals and federal hospitals are not included in these calculations). The OSHPD data indicate that there were 132,187 FTE hospital positions in 2017. Calculations based on the 2018 BRN Survey of Registered Nurses indicate that total FTE employment was 268,179 in 2018 (Chu & Spetz, in press). Together, these figures indicate that 49.3% of jobs were in the types of hospitals included in the OSHPD data. The hospital-based projections of future RN demand were thus augmented to maintain this 49.3% ratio in future years. The projections indicate there will be a need for 180,053 FTE RNs in hospitals and 365,289 FTE RNs statewide in 2035.

Employment Development Department (EDD) forecasts

The most recent projection by the EDD indicates that there will be 327,800 registered nurse jobs in California by 2026 (EDD 2018). The EDD projection does not distinguish between full-time and part-time jobs. To estimate FTE employment from the EDD projection, the adjustment of 0.919 is used, which is the average number of hours worked per week by California RNs in 2018 (36.78), divided by 40 (Chu & Spetz, in press). The FTE projection for 2026 is thus 301,388, which is notably higher than the EDD's prior projection of 272,072 jobs in 2024.

Bureau of Health Workforce (BHW) forecasts

The U.S. Bureau of Health Workforce developed forecasts of supply and demand for RNs nationally and for states (BHW 2017). These forecasts are based on a multi-step model that first projects demand for different types of health services and then projects demand for health care workers based on estimated service demand. The BHW projects that demand in California in 2025 will be 387,900 FTE RNs.

Comparing the demand forecasts

Figure 4 compares alternative demand forecasts of full-time equivalent RNs. The forecasts estimate that the FTE demand for RNs in 2017 ranged from 270,331 to 386,764. Demand in 2035 is forecasted to be between 303,891 (to maintain the current FTE RN-to-population ratio) and 435,440 (to attain the national average FTE RN-to-population ratio). The lower figures are not likely to accurately represent total future demand because they do not account for additional demand caused by the aging of the population. The EDD forecast for 2026 is higher than that produced by maintaining the current RN-to-population ratio. The BHW forecast for 2025 is between the 25th percentile and national average FTE RN-to-population ratios. Note that the BHW forecast is based on national patterns of RN demand, which will naturally lead to projections of demand that are closer to national averages than the California-specific projections presented in this report.

Figure 4. Forecasted full-time equivalent demand for RNs, 2019-2035
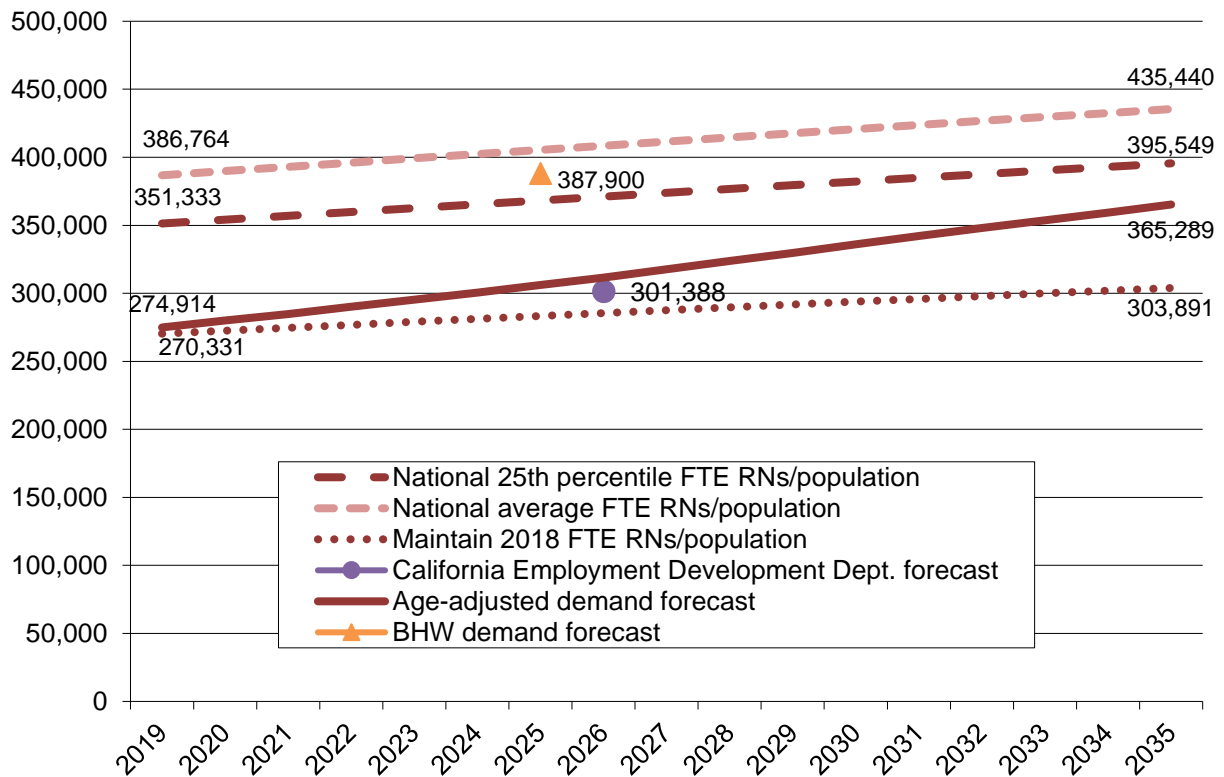
Comparing Supply and Demand for RNs

Through most of the 2000s, there was a widespread perception that California faced a significant shortage of RNs and forecasts published by the BRN in 2005 and 2007 were consistent with this perception. However, after the number of RN graduations more than doubled in California by the late 2000s, the forecasts published in 2011 indicated that California had closed the gap between RN supply and demand. Forecasts since then have generally indicated that California's supply and demand would be well-balanced through 2035.

Figure 5 presents the 2019 best supply forecast and low supply forecast (blue lines), along with three alternate demand forecasts (red lines) based on maintaining the current FTE RN-to-population ratio, striving to reach the national 25th percentile, and forecasted growth in hospital patient days. The best supply forecast indicates that in 2035, supply will be 386,536 FTE RNs, which is 5.8% higher than the age-adjusted demand forecast of 365,289 FTE RNs. The projections estimate that in 2019, demand and supply were nearly equal (274,863 FTE RN supply vs. 274,914 FTE RN demand).

Figure 5. Forecasted full-time equivalent supply and demand for RNs, 2019-2035
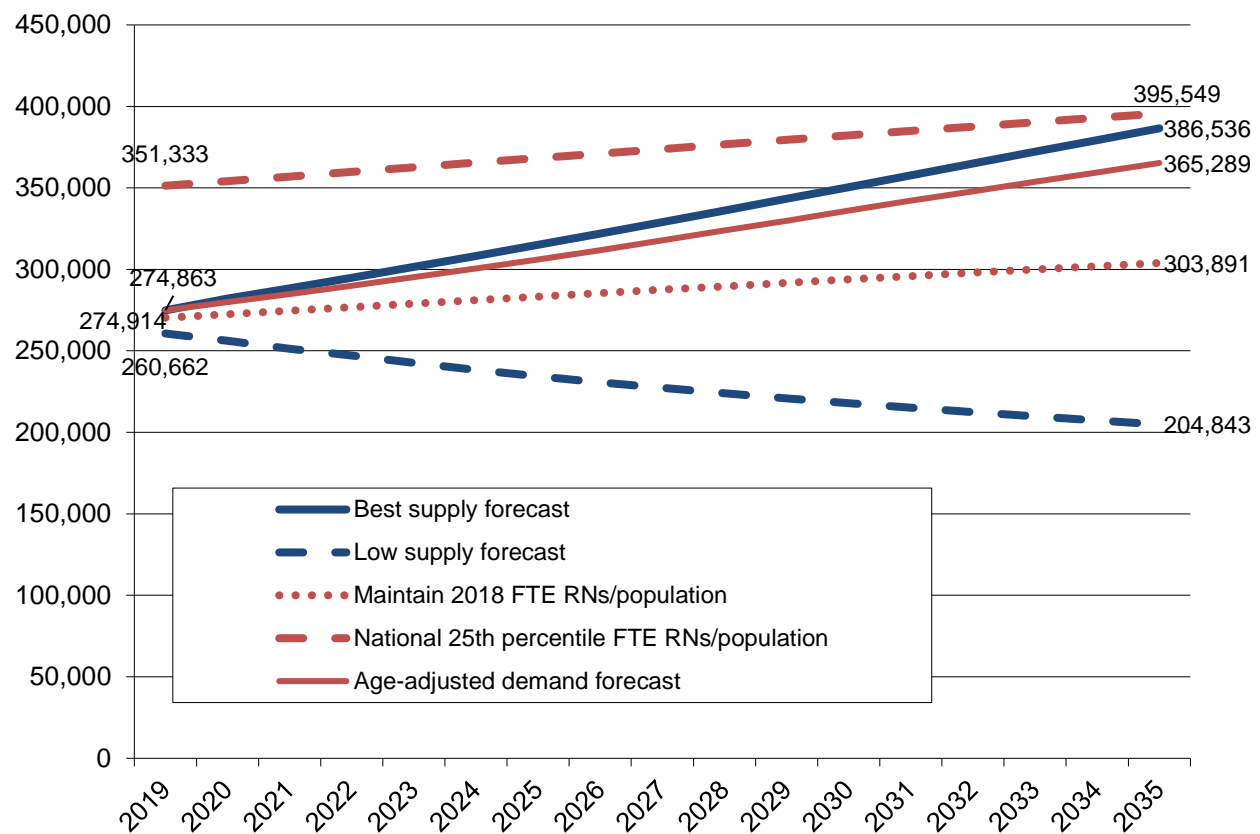
The projection of a surplus in the future is in part dependent on the assumption that today's labor market is balanced. However, it is possible that employment of RNs today is lower than it should be because there is now a shortage. There is no objective measurement of shortages, but several data sources provide insight regarding this possibility.

First, data on vacancy rates collected by the Hospital Association of Southern California indicate that the statewide average vacancy rate for RNs was 4.3% in the 3rd quarter of 2019. This vacancy rate was lower than in 2015, 2016, and 2017, when the average vacancy rate was more than 6% in most quarters. There is no widely-accepted threshold for when a vacancy rates indicates that a shortage exists, but the lower vacancy rate in 2019 relative to previous years does not support the idea that there is an emerging shortage.

Second, surveys of California's hospital CNOs indicate that many of them perceive a shortage of RNs. A survey conducted in late 2018 and early 2019 found that 85% of responding CNOs believed there was a shortage of RNs in their region (Chu & Spetz, 2020). However, when asked to report perceptions of the labor market for newly-graduated nurses as compared with experienced nurses, CNOs indicated deep shortages of experienced nurses but surpluses of new graduates. It seems that employers are not anticipating nurse retirements by hiring and developing new graduates, but instead are seeking to hire experienced nurses to fill positions opened due to retirements. Data from the 2018 Survey of Registered Nurses indicate that approximately 11,725 employed RNs planned to retire within the next two years. With more than 11,000 students graduating from California RN education programs per year, there are plenty of new graduates available to fill positions vacated by retiring nurses. Graduating more RNs will not address the problem of gaps in availability of experienced nurses, as employers are already demonstrating reluctance to hire new graduates.

Third, use of contract staff by hospitals may indicate the degree to which hospitals are experiencing a shortage of RNs with the skills required for open positions. However, since contract personnel are also used to fill gaps during staff vacations and leaves of absence, as well as normal seasonal fluctuations in hospital utilization, this is not a perfect measure of the magnitude of RN shortage. OSHPD data indicate that the average share of hospital RN hours provided by contract staff was 6.3% in 2016, which was equivalent to a total of 8,010 FTE RNs. This is only 2.9% of the total estimated number of FTE RNs and does not suggest a substantial statewide shortage of RNs.

Finally, employment of traveling RNs who live in other states and work in California for some part of the year can indicate that there is unmet demand among

employers. The 2018 Survey of RNs indicates that 18.6% of California-licensed RNs residing outside California worked in the state at some point over the prior year, which is an estimated 11,852 RNs. These nurses worked an average of 6.2 months and 37.6 hours per week, equating to 5,756 FTE RNs. This is a small portion of overall employment in California and also does not indicate widespread shortages.

It is important to note that there are many local labor markets within California, and these projections of statewide supply and demand do not reveal whether some regions of California have a shortage of RNs while other regions have a surplus. Recent regional forecasts indicate that there is substantial variation across regions, with projected shortages in the Central Valley, Central Coast, and San Francisco Bay Areas, and projected surpluses in other regions (although the labor markets in the Inland Empire and Southern Border regions are comparatively well-balanced) (Spetz 2018).

It also is essential to recognize that it is possible California will enter another period of RN shortage if the "low" parameters in the forecasts are realized. Which scenario prevails will depend on a number of factors:

- Whether the number of RN graduates is sustained at the current level
- Whether interstate migration leads to more or fewer nurses entering California than leaving
- Whether RNs work at higher or lower rates than in the past
- Whether there is greater expansion of health insurance coverage, which may lead to higher demand for health care services
- How organizations utilize RNs to meet population health goals and leverage value-based health insurance payment

Educational and public policies at the state and federal level will play roles in determining whether California's RN workforce stays in balance or tips toward shortage.

Policy Implications

Periods of nursing shortage generate significant challenges because patient outcomes are impacted by the level of nurse staffing in hospitals and other care facilities (Kane & Shamliyan 2007; Institute of Medicine 2011; Penoyer 2010). In addition, shortages drive up the cost of health care as wages rise (Spetz and Given 2003). Thus, it is essential that these forecasts of RN supply and demand guide policies to prevent RN shortages.

In late 2018 and early 2019, CNOs reported concern about shortages of nurses with experience in emergency departments, labor and delivery, perioperative care, and critical care (Chu & Spetz, 2020). Although data suggest that the number of new RN graduates entering the profession is larger than the number retiring, employers indicate reluctance to hire new graduates to fill newly-vacant positions. In 2018, more than 25% of California's RNs had less than 5 years of experience in nursing (Chu & Spetz, in press), and employers may be facing difficulty supporting these nurses as they transition from novice nurses to expert nurses. In addition, more than 70% of CNOs report that they require or prefer that the RNs they hire have a bachelor's degree in nursing or higher degree and nearly half require a minimum level of experience before hiring (Chu & Spetz, in press).

The 2005 forecast report advised that "The only plausible solution to the RN shortage, based on our preliminary analyses, appears to be continued efforts to increase the numbers of graduates from California nursing programs." This recommendation was acted upon by state leaders. Significant increases in state funding for nursing programs, increased funding for equipment, use of updated instructional technologies, and other educational investments had a favorable impact on addressing the RN shortage in California. Between the academic years 2004-2005 and 2009-2010, the number of nursing graduates increased 72%, exceeding 11,500 new RN graduates in 2009-2010 (Waneka, Keane, & Spetz 2012). The number of graduates is projected to remain above 11,000 per year for the foreseeable future, maintaining a stable workforce. If future numbers of RN graduates decline to below about 10,000 RNs, a shortage could re-emerge.

Changes in the demand for RNs also could lead to a future shortage or surplus. If emerging care delivery models, such as accountable care organizations and patient-centered medical homes, lead to greater use of RNs in care management roles, demand for RNs – particularly those with bachelor's and graduate degree – could rise above the projections presented in this report. A report on the potential impact of the Affordable Care Act found that if health care organizations increase employment of RNs by 10% to serve in care management roles, overall demand would increase by about 22,000 jobs in California (which may include some part-time jobs) (Oberlin et al. 2015). This would be a relatively small change in demand that would likely emerge slowly enough over time that nursing education programs could respond by increasing student enrollment.

Policymakers should be cautioned that the 2019 BRN forecasts do not reflect the fact that one region of California may experience a shortage while another may face a surplus of RNs. Both statewide and regionally, the most important changes that could lead to shortages include: (1) the number of graduates from RN education programs; (2) interstate migration; and (3) employment rates of older RNs. These

factors and any other potential influences on California's nursing shortage, such as the limited pool of faculty, limited availability of clinical education placements, and faculty salaries that are not competitive with clinical practice positions, should be monitored continuously.

California leaders should track the employment paths of recent nursing graduates as they develop specialized skills to fill the roles of experienced nurses who will retire in the near future. Moreover, they should watch new student enrollments in nursing programs, as well as monitor local labor market conditions, which could warrant local action. California will need to maintain the present number of nursing graduates in order to meet long-term health care needs.

Acronyms

AD – Associate Degree

AHRQ – Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services

BHW – Bureau of Health Workforce, Health Resources and Services Administration, U.S. Department of Health and Human Services

BRN – California Board of Registered Nursing

BSN – Bachelors (or Baccalaureate) of Science in Nursing

CNO – Chief nursing officer

EDD – California Employment Development Department

FTE – Full-time Equivalent

NCLEX-RN – National Council Licensure Examination – Registered Nurses (NCLEX is a registered trademark and/or servicemark of the National Council of State Boards of Nursing, Inc.)

OSHPD –Office of Statewide Health Planning and Development

RN – Registered Nurse

UCSF – University of California San Francisco

WHO – World Health Organization

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