UCSF
University of California
San Francisco

Forecasts of the Registered Nurse Workforce in California

by Joanne Spetz, Lela Chu, and Lisel Blash

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Overview

This study used data from two surveys conducted in California and other data sources to assess the current and future supply and demand of RNs. We find that RN employment rates have remained steady over the past four years, but many older RNs have left nursing. In addition, a large proportion of older RNs intends to retire or quit within the next two years. Many RNs report that childcare and school closures have made it difficult to work during the pandemic and also report that they feel unsupported by their employers. The supply and demand projections estimate that a shortage of RNs now exists but will diminish as RN education enrollments return to and surpass pre-pandemic levels.

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Background

This study used data from two surveys conducted in California and other data sources to assess the current and future supply and demand of RNs and to learn how the coronavirus pandemic is affecting this essential workforce.

Methods

Preliminary data from the 2022 Survey of California Registered Nurses and final data from the 2020-2021 Annual Schools Survey were analyzed. These surveys provided data that were used to produce a preliminary update to the forecasts of RN supply and demand in California. Other data from California Board of Registered Nursing licensing records, California Department of Finance, and California Department of Healthcare Access and Information, were used in the projection models. The supply projections are based on a stock-and-flow model and the demand projections are based on historic RN employment and rates of healthcare utilization by population age group.

Results

The preliminary data from the 2022 Survey of Registered Nurses indicate that RN employment has remained stable over the past four years but that many older RNs have left nursing. In addition, a large proportion of older RNs intends to retire or quit within the next two years. Many RNs reported that childcare and school closures have made it difficult to work, and that the feel that their employers do not care about their well-being or recognize their contributions. There have been decreases in new enrollments and graduations from RN education programs over the past two years, although numbers of applications continue to rise. Together, these changes have led to a reduction in the supply of RNs compared with previous projections. A shortage of RNs is estimated to exist in 2022. RN education enrollments are projected to surpass pre-pandemic levels within the next two years, which will lead to a closing of the shortage by 2029.

Discussion

With a shortage of RNs underway now, employers need to redouble their efforts to retain RNs and develop career paths for newly-graduated RNs. They also need to rapidly develop and implement strategies to mitigate the potential harm of shortages.

Background

For nearly a decade there have been reports of nursing shortages in California, particularly in rural communities and for registered nurses (RNs) with experience in specialized clinical fields such as perioperative care, labor and delivery, intensive care, and emergency care. Concerns about shortages worsened during the COVID-19 pandemic. Anecdotal reports and survey research indicates that some RNs decided to quit working to recover emotionally from the high stress of working during the pandemic. In addition, in spring 2020 nursing education programs reported that their students were not able to continue their clinical education due to worries about infection risks within hospitals. Education programs adopted clinical simulation training and shifted didactic courses to online platforms but ultimately struggled to modify their programs amidst the limitations caused by the pandemic. Some programs deferred starting a new cohort of nursing students in the 2020-2021 academic year, while others reduced new fall enrollments to ensure classrooms had adequate physical distance between students and faculty. In addition, some accepted students deferred their admission because they did not want to engage in remote education. Together these changes could undermine the progress made over the past 20 years toward higher nurse-to-population ratios and a balanced nursing labor market. Nationwide, hospitals and other healthcare settings are reporting lower staffing ratios, more overtime, and greater use of travel nurses to fill staffing gaps.

This study used data from two surveys conducted in California, as well as other data sources, to assess the current and future supply and demand of RNs and to learn how the coronavirus pandemic is affecting this essential workforce. Two sources of data were analyzed to provide a rapid assessment of the workforce: (1) preliminary data from the 2022 Survey of California Registered Nurses and (2) the 2020-2021 Board of Registered Nursing Annual Schools Survey. This analysis provides important information about the pandemic's impact on the nursing workforce in the nation's most populous state.

Methods

Data from two statewide surveys and administrative records were analyzed and used to generate updated projections of future supply and demand for RNs in California.

The biennial Survey of California Registered Nurses has been conducted every two years since 2014. The survey is sent to a sample of 8,000 RNs who have active California licenses. The survey questionnaire includes items about employment, education, intention to retire or quit, and demographics. The survey is first sent via email and then sent to non-respondents by postal mail six weeks after the email. The 2022 survey added several questions to learn how the COVID-19 pandemic has affected RNs in California. The analysis presented in this report is based on 875 survey respondents who responded to an email invitation to the survey by June 21, 2022. Of these respondents, 798 had California addresses and 77 lived outside the state. All analyses presented in this report are weighted to represent the total population of RNs licensed by California.

The California Annual Schools Survey is a comprehensive survey of all RN education programs in California and was revised to include questions about how schools have adjusted in response to the coronavirus pandemic. We used data from the 2020-2021 survey in this analysis. All nursing education programs responded to the survey, although one program did not report its new or projected enrollments. For this school, we estimated enrollments based on its historic data.

These two surveys were combined with administrative data provided by the Board of Registered Nursing in March 2022. Administrative data included numbers of RNs changing their license status between active, inactive, and delinquent, numbers having licenses endorsed from other states, and numbers educated outside California receiving their first licenses from California.

The supply projections are based on a stock-and-flow model and the demand projections are based on historic RN employment and rates of health care utilization by population age group. More information about the model is provided in the technical appendix.

Results

Registered Nurse Employment

Based on preliminary survey data, we estimate that 81.6% of California-resident RNs were employed in nursing in spring 2022 (Figure 1). There was essentially no change in the overall employment rate between 2018 and 2022. In 2022, 13.6% of working RNs reported that they held more than one job, which is higher than in 2020 (11.9%) and 2018 (10.8%).

Figure 1. Percentage of California-resident RNs employed in nursing, 2006-2022
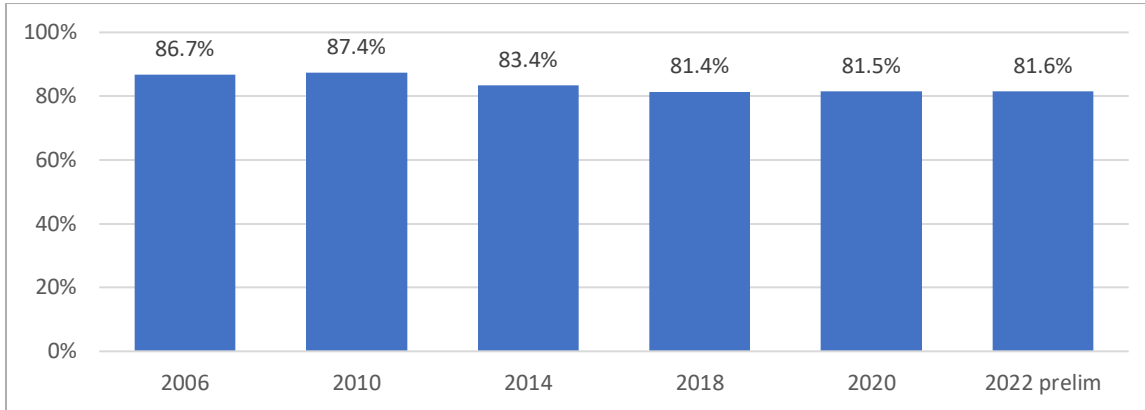
Although there has not been an overall change in the RN employment rate, there have been notable changes for some age groups (Figure 2). The employment rate for nurses between the ages of 30-34 years, 45-49 years, and 60-64 years were higher in 2022 compared with 2018. Employment rates were similar in 2022 as 2018 for RNs aged 35-44 and 50-54 years. However, the employment rates of nurses were lower in 2022 than in 2018 for nurses aged 55-59 years (79.3% vs. 86.5%) and aged 65 years and older (35.2% vs. 42.6%).

Figure 2. Percentage of California-resident RNs employed in nursing, by age group, 2006-2022
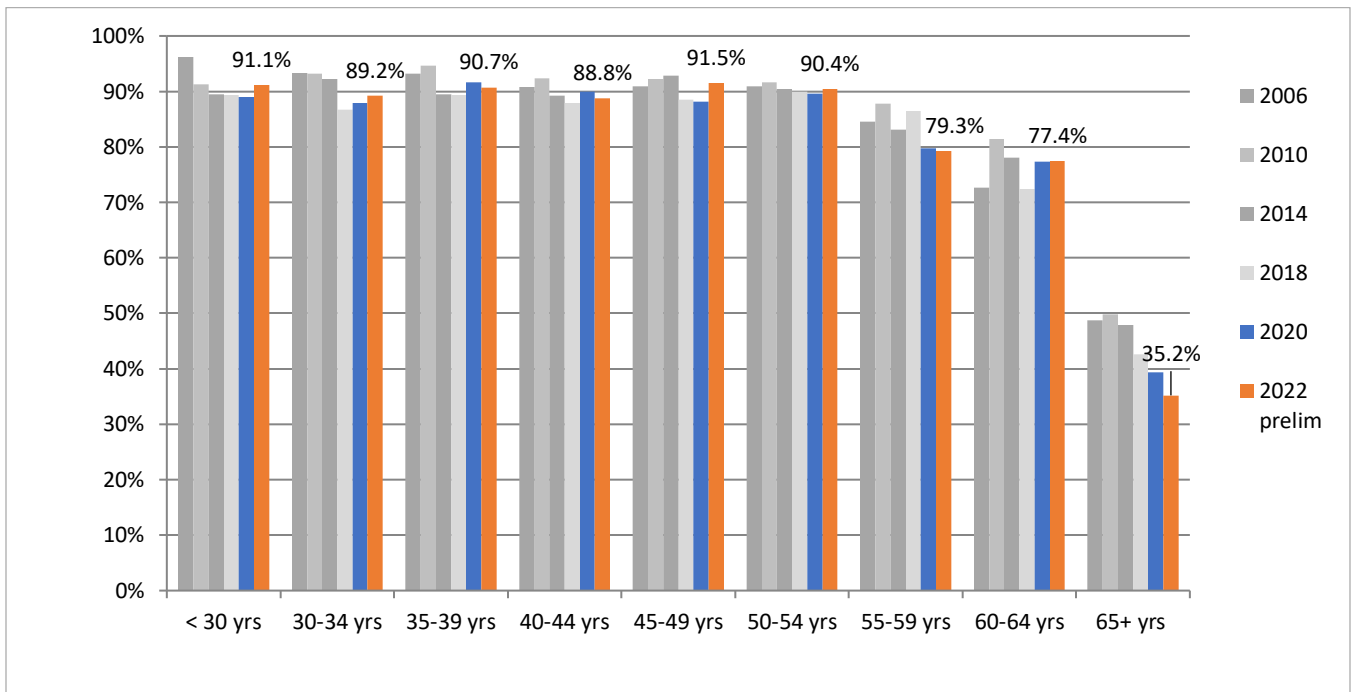
There have been some changes in the employment status of RNs in their principal nursing position, as shown in Figure 3. In 2020 and 2022, there were greater percentages of RNs working for temporary agencies in their principal position (2.0% and 2.2%) compared with 2018 (0.8%), although these differences are not statistically significant. The percentages of RNs working as travel nurses was fairly stable over these years.

Figure 3. Employment status of California-resident RNs in principal nursing position, 2018-2022
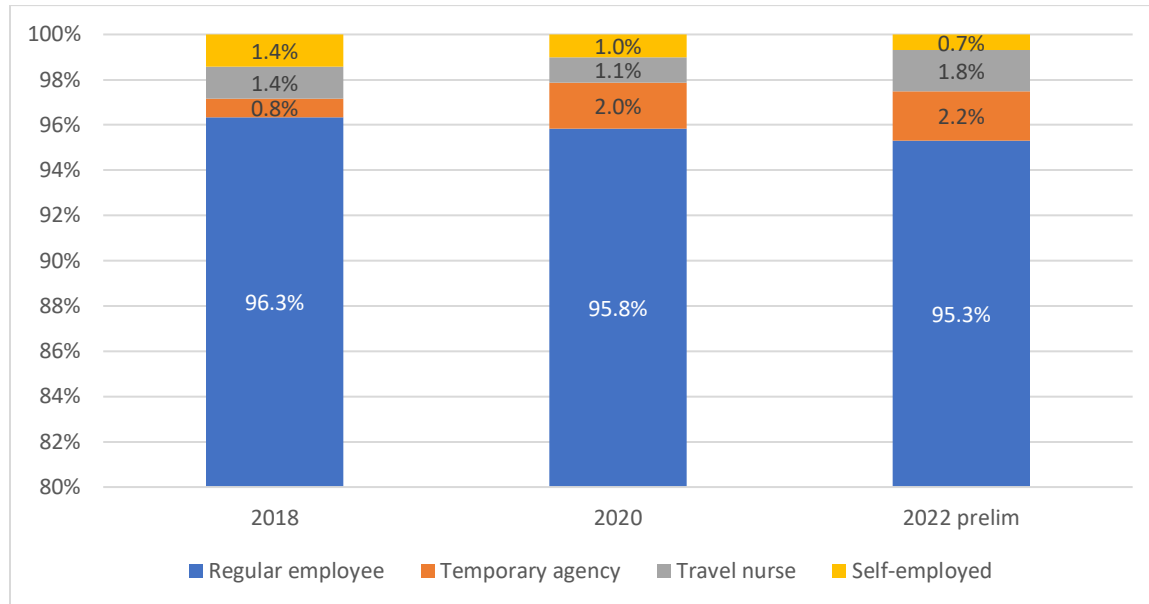
There were changes in the average number of hours worked per week by RNs between 2018 and 2022, as seen in Figure 4. The average number of hours worked per week by all employed RNs was 36.8 hours in 2018, which was similar to prior year, but only 33.7 hours in 2020 and 34.9 hours in 2022.

Figure 4. Average hours worked per week for California-resident RNs, 2012-2022
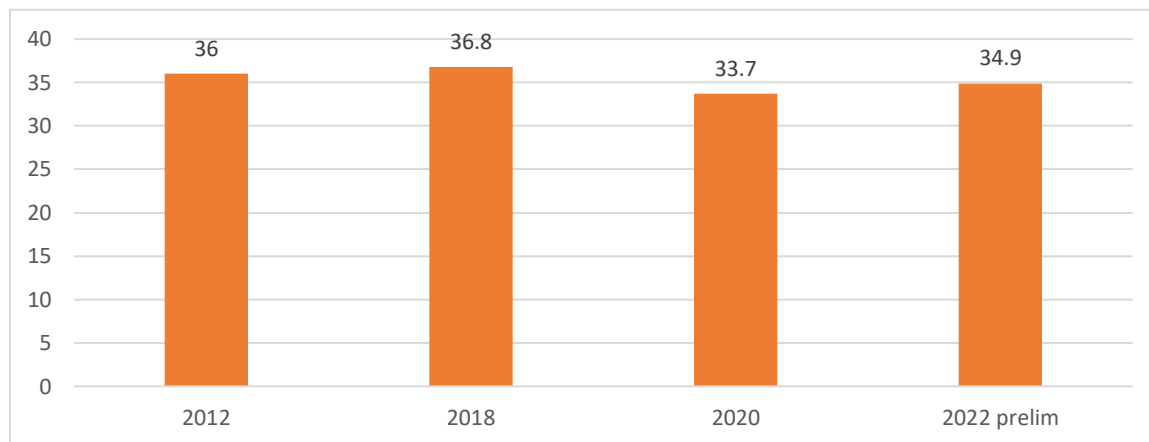
Figure 5 reports the percentage of employed RNs who plan to retire or leave nursing in the next two years, by age group. As seen in this figure, there was a large increase in the percentage of RNs aged 55 to 64 years who plan to retire or quit in the next two years, from 11.4% in 2018 to 22.5% in 2022. The percentage of RNs 65 years and older who plan to quit or retire in the next two years also increased, from 37.2% in 2018 to 47.3% in 2022. There also were increase in the percentages of younger RNs reporting plans to leave nursing between 2018 and 2022, but the numbers of respondents in the preliminary 2022 data are small and thus these differences are not

statistically significant. The final 2022 survey data will illuminate whether there are indeed significant increases in the percentages of younger nurses planning to leave the profession.

Figure 5. Percentage of employed California-resident RNs who plan to retire or leave nursing in the next 2 years, 2018-2022
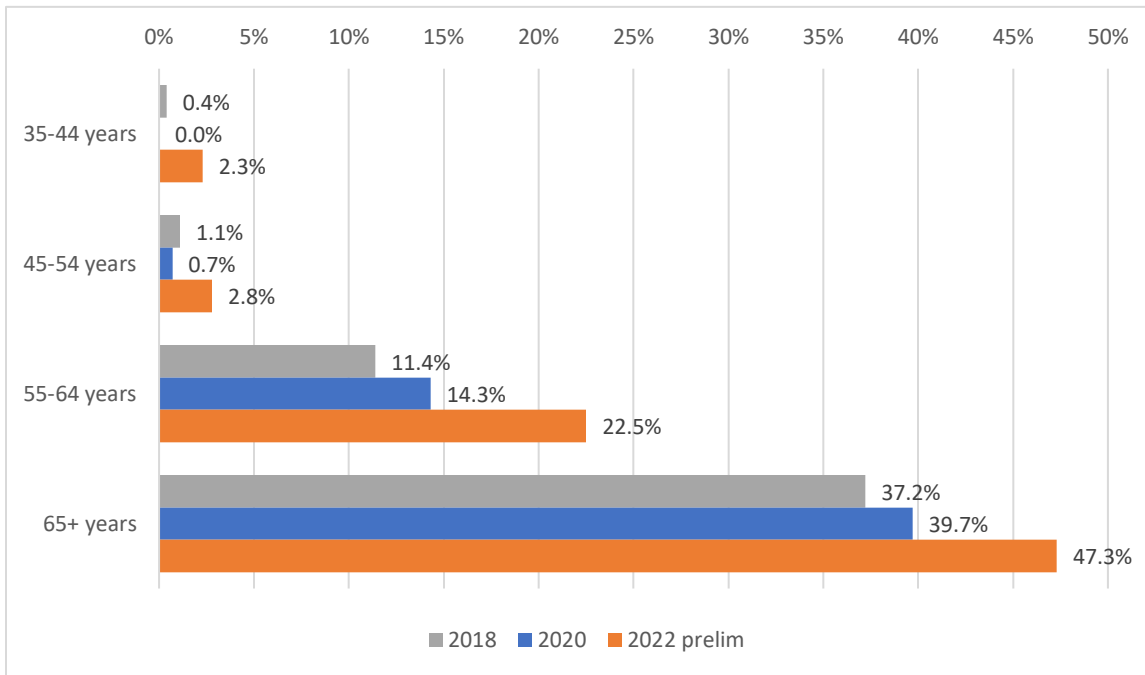
Although most RNs plan to remain in the nursing profession for at least the next two years, many intend to change jobs. As seen in Figure 6, in 2022 24% of RNs said it was "reasonably likely" they will leave their principal nursing position in the next two years, and 14.8% said they are "definitely leaving." This was a new question in the 2022 survey.

Figure 6. Intentions of RNs to remain in or leave their principal nursing position within two years, 2022

Figure 7 presents the employment intentions of RNs who were not working in nursing. Between 2018 and 2020, there was a notable increase in the percentage of non-working RNs who reported that they were retired, accompanied by a decrease in the percentage who reported they were looking for work or intending to re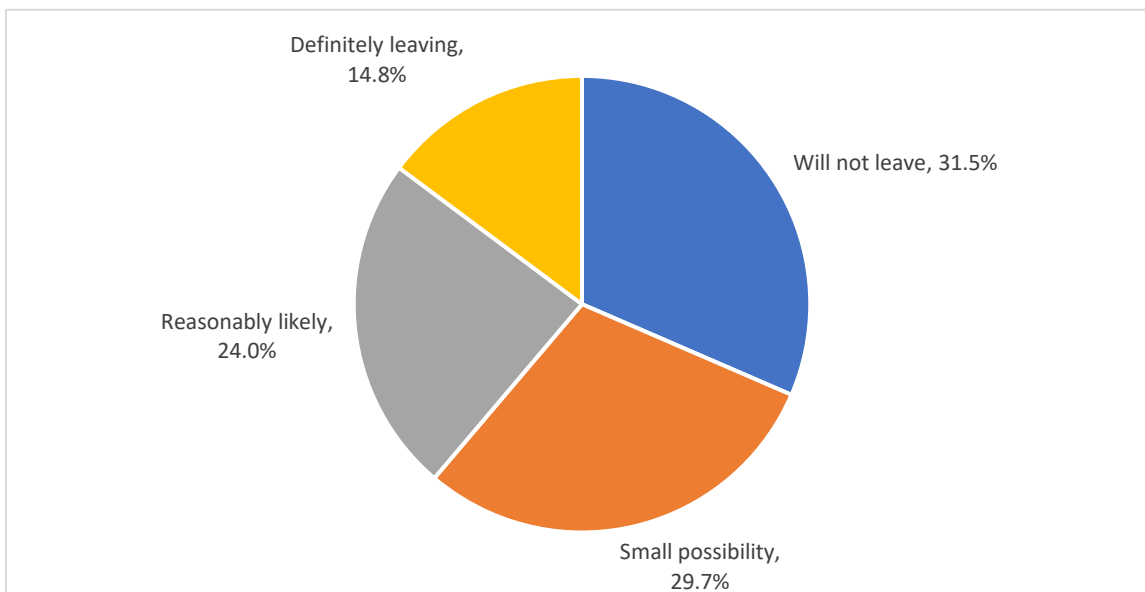turn to nursing work. The percentage that indicated they were currently looking for work declined further between 2020 and 2022, but the percentage who planned to return to nursing in the future was larger in 2022 (19.2%) than in 2012, 2018, or 2020.

Figure 7. Employment intentions of California-resident RNs who were not working in nursing, 2016-2020
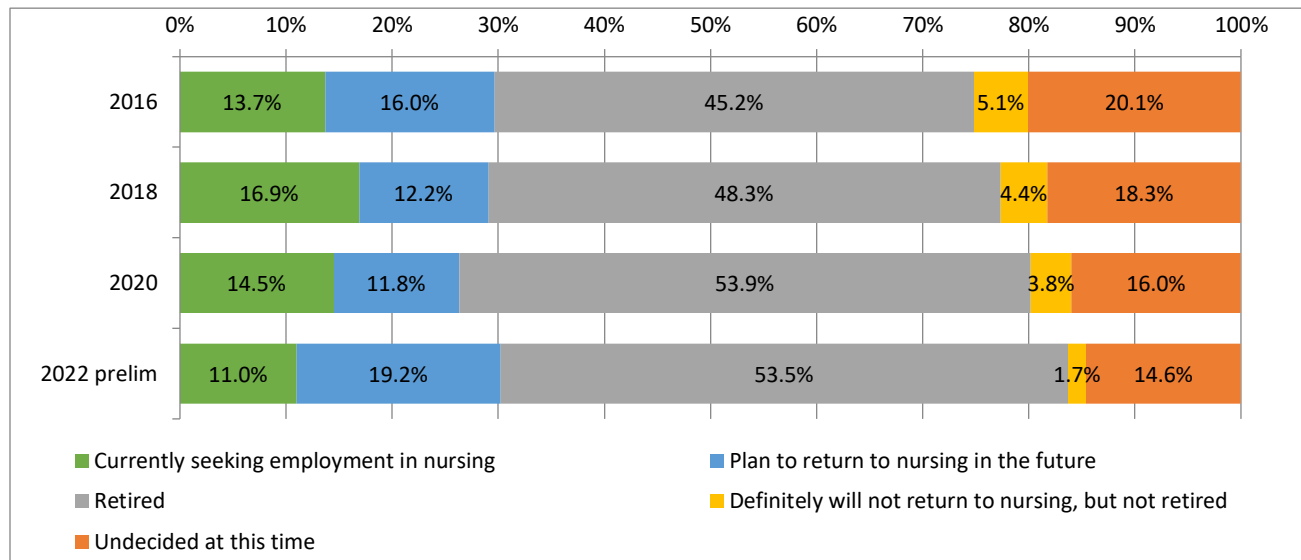
RN experiences and issues with their employment during the pandemic

The 2022 survey included new questions about RNs' experiences during the pandemic and their views of the support they have received in their workplace. Note that the 2022 data are preliminary and final data may reflect different responses than those reported here.

The first bar in Figure 8 indicates that 37.9% of respondents agreed that childcare and school closures made it difficult to work, while 18.4% did not agree or strongly agree with this. Eldercare needs made it difficult to work for 21.8% of respondents.

More than one-third (34.6%) of respondents agreed or strongly agreed that they are considering, planning, or have changed their nursing job due to pandemic-related burnout. Only 28% disagreed or strongly disagreed with this statement, 19.3% were neutral, and 18.1% said the statement didn't apply to them. Leaving a nursing job to become a travel nurse was being considered, planned, or had been done by 19.4% of respondents. Burnout had led 20.9% of respondents to agree or strongly agree that they were considering, planning, or had left nursing entirely due to burnout. And, 15.4% were considering, planning, or had left their job due to vaccination mandates. These data suggest that many respondents face challenges to maintaining their nursing work and are seriously considering changing jobs or leaving nursing.

Figure 8. Challenges and responses to the COVID-19 pandemic among California-resident RNs who were employed at any time from 2020 through 2022

Figure 8 is a horizontal stacked bar chart with categories: Strongly agree, Agree, Neutral, Disagree, Strongly disagree, Does not apply.

- Childcare/school closures have made it difficult to work: 17.0%, 20.9%, 14.0%, 2.5%, 1.9%, 43.8%
- Eldercare needs have made it difficult to work: 7.5%, 14.3%, 16.8%, 4.6%, 2.0%, 54.9%
- I am considering or planning or have changed by nursing job due to pandemic burnout: 16.9%, 17.7%, 19.3%, 17.0%, 11.0%, 18.1%
- I am considering or planning or have left my nursing job to be a traveling nurse: 8.5%, 10.9%, 11.8%, 14.9%, 21.6%, 32.3%
- I am considering, planning, or have left nursing entirely due to burnout: 9.6%, 11.3%, 16.5%, 19.7%, 19.4%, 23.4%
- I am considering, planning, or have left my job due to vaccine mandates: 9.2%, 5.9%, 6.9%, 12.6%, 45.8%, 19.7%

Figure 9 presents the degree to which RNs agreed or disagreed with a series of statements about the support and respect they receive in their workplaces. The majority of RNs agreed with all of the statements, with the greatest percentages agreeing that "my organization values my contribution to its well-being," "if I did the best job possible, my organization would notice," and "my organization takes pride in my accomplishments." However, more than 40% of RNs disagreed that "my organization responds to my complaints," and nearly 40% disagreed that "my organization really cares about my well-being."

Figure 9. Perceptions about support and respect from the organizations in which RNs work, 2022

Figure 9 is a horizontal stacked bar chart with categories: Strongly agree, Agree, Somewhat agree, Somewhat disagree, Disagree, Strongly disagree.

- My organization values my contribution to its well-being: 10.2%, 26.3%, 31.7%, 14.5%, 11.9%, 5.5%
- My organization takes pride in my accomplishments: 10.3%, 25.7%, 30.9%, 14.5%, 14.8%, 3.9%
- My organization responds to my complaints: 8.1%, 20.1%, 30.0%, 19.2%, 16.3%, 6.4%
- My organization really cares about my well-being: 9.1%, 23.4%, 29.4%, 15.2%, 15.6%, 7.3%
- If I did the best job possible, my organization would notice: 12.8%, 22.5%, 30.9%, 11.3%, 15.5%, 7.0%

Registered Nurse Education

California's nursing schools provided information about their enrollments and graduations for the 2020-21 academic year in a survey that was fielded in fall 2021. (Note that one private bachelor's degree program did not report data; the prior year's enrollments were used as an estimate for the 2020-21 year.) During the pandemic, many schools have been impacted by the loss of access to clinical sites and shifted instruction to online modalities to reduce virus transmission. Six education programs indicated that they skipped an admissions cohort in the 2019-20 academic year due to the pandemic. As seen in Table 1, there was a decrease in enrollment spaces available between 2018-19 and 2020-21, with a loss of 529 spaces (-3.6%). There was an even larger decrease in total new enrollments, with a decline of 1,146 students (-7.6%). The 2019-20 and 2020-21 academic years were the first in more than a decade in which there were fewer new enrollments than spaces available. The decreases in enrollments were almost entirely in associate degree programs and public colleges/universities.

Table 1. Change in new enrollments in California RN education programs between 2018-19 and 2019-20 academic years

	2018-19 new enrollment	2019-20 new enrollment	2020-21 new enrollment	Percentage change 2018-19 to 2020-21
Spaces available	**14,897**	**15,204**	**14,368**	**-3.6%**
Total enrollments	**15,150**	**15,007**	**14,004**	**-7.6%**
Associate degree enrollments	7,014	6,852	5,941	-15.3%
Bachelor's degree enrollments	7,266	7,242	7,133	-1.8%
Master's degree enrollments	870	913	930	6.9%
Public college/university enrollments	8,103	7,944	6,866	-15.3%
Private college/university enrollments	7,047	7,063	7,138	1.3%

Figure 10 presents new enrollments in RN education programs in the 2020-21 academic year and schools' projections of their enrollments for the 2021-22 and 2022-23 academic years. AD program directors estimated that their new enrollments would increase in each of the next two years, surpassing their 2018-2019 enrollment. BSN and entry-level master's program directors also anticipated growth. Thus, statewide new enrollments are projected to return to (and surpass) 2018-19 levels next year.

Figure 10. New and projected enrollments in RN education programs, 2020-21 through 2022-23
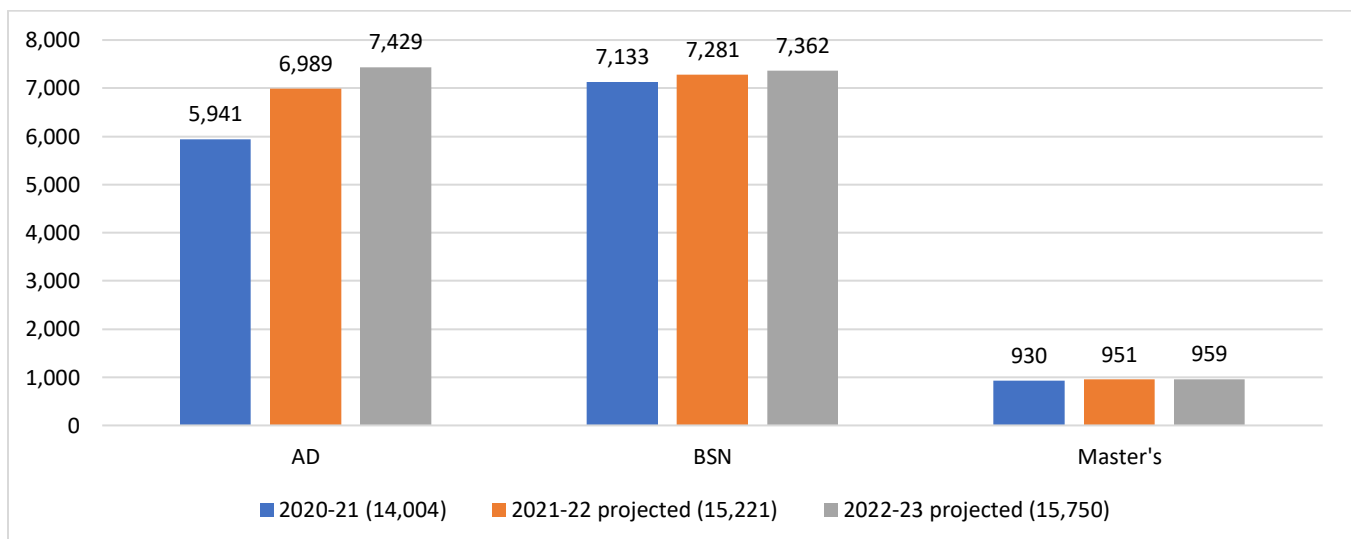
Projections of Future Supply and Demand for RNs

The future supply and demand for RNs were projected using the RN Survey and Schools Survey data described above, as well as other data sources detailed in Appendix A. As presented in Figure A3, the best projection of future RN supply is slightly lower than was projected in 2019, with 391,067 projected FTE RN supply in 2037. The age- and vacancy-adjusted demand projections estimate that there will be a need for 361,727 FTE RNs in that year.

As seen in Figure 11, the supply of RNs by the end of 2022 is estimated to be below demand by 18,952 full-time equivalent employment, which is a 6.2% gap. A shortage of RNs is projected to persist until 2029, when supply and demand become balanced. The projected supply also exceeds the 2030 demand projection from the Employment Development Department. By 2037, there is projected to be greater supply of RNs than demand, with an 8.1% surplus (29,330 RNs).

Note that some RNs were not working in nursing but seeking employment in 2022, as reported above. We estimate that approximately 7,862 RNs were seeking employment, which would fill about 41% of the current shortfall.

Figure 11. Projected supply and demand of RN full-time equivalent employment, 2022-2037
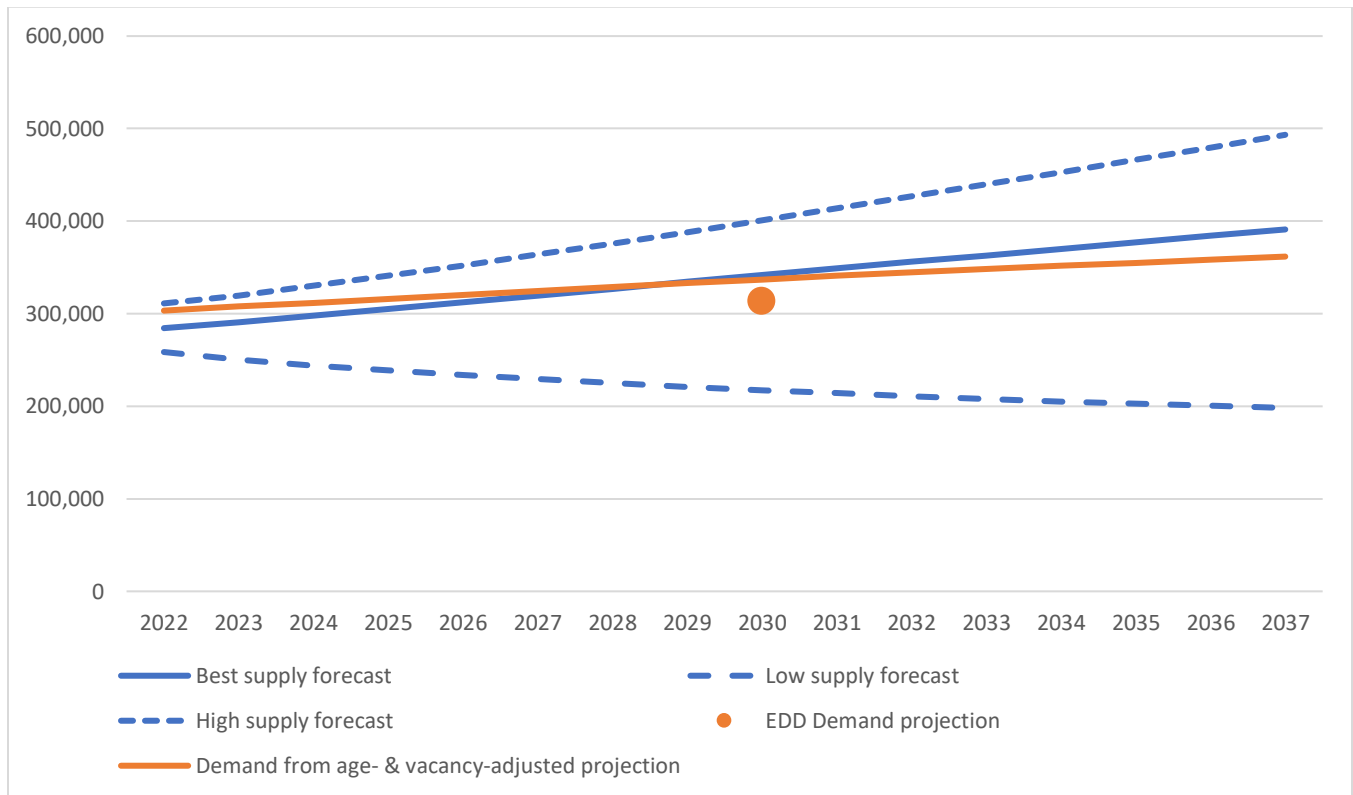
Discussion

The preliminary data from the 2022 Survey of Registered Nurses indicate that RN employment rates have been stable since 2018 but are lower among older RNs. In addition, a larger proportion of RNs intend to retire or quit within the next two years compared with 2018. There also have been decreases in new enrollments and graduations from RN education programs since the 2018-2019 academic years. Together, these changes have led to a reduction in the supply of RNs compared with previous projections. However, RN education enrollments are projected to surpass pre-pandemic levels within the next two years. These new RNs are anticipated to be sufficient in numbers to fill open jobs, with supply matching demand in approximately seven years.

RNs have experienced substantial stress during the COVID-19 pandemic. Many reported that childcare and school closures have made it difficult to work. Many also feel that the organizations for which they work do not care about their well-being and do not value their contributions and accomplishments. These issues likely contribute to the plans of more than one-third of RNs to change nursing jobs and the departure of some to traveling nurse positions that can be financially lucrative.

Several limitations need to be considered. First these are statewide analyses and projections, which do not reveal important regional differences that have been previously reported. Second, the projections include assumptions about retirement patterns and other departures from RN work that may not hold true in the long-term. Third, the projections assume that most newly-graduated RNs obtain licenses and become available to work in California. However, if newly-graduated RNs have difficulty passing the national licensing examination, supply will be attenuated; national data indicate that exam pass rates have declined during the pandemic. In addition, if newly-graduated RNs are not hired by California's health care organizations, they may move to other states and thus not become part of California's RN supply.

National data indicate growing interest in the RN profession. The American Association of Colleges of Nursing, which is an association for nursing programs that offer baccalaureate and graduates degrees, reported that their survey of 956 baccalaureate-granting RN education programs found an increase of 1.5% in applications to entry-level programs and an increase of 5.6% in total enrollments. The 2021-22 Annual Schools Survey also reports that there was an increase in the number of applications to RN education programs over the past year, continuing a trend since the 2014-2015 academic year.

National research has reported that RN employment held steady through the pandemic, although this was a notable change after nearly a decade of continuous growth in employment. At the same time, average hourly RN earnings increased and unemployment rates stayed low overall. But, unemployment among non-White RNs was higher in the first two quarters of 2021 than prior to the pandemic. There also were differences between nurses who worked in hospitals and those who worked in other settings. RN employment in nursing homes has dropped more than 13% since the start of the pandemic and employment in home health care dropped about 4%. It is thus not surprising that unemployment rates for RNs who had been working in non-hospital settings were notably higher in early 2021 than prior to the pandemic. Another national study noted that although turnover rates have largely returned to pre-pandemic levels after peaking in late 2020 turnover rates remain particularly high among women with young children.

Shortages of RNs – even if short-lived – have significant consequences for patients and for our healthcare system. Low RN staffing levels are associated with greater risk of hospital-acquired infections, readmissions, and death. Shortages of RNs also have financial repercussions as employers have to pay more for traveling nurses to fill staffing gaps and increase wages to attract permanent employees. A number of policy strategies have been recommended to alleviate the challenges faced by the RN workforce, which include policies and programs to increase the numbers of nurses entering the workforce and to ensure high-quality, safe, and supportive work environments to increase RN retention. In addition, healthcare organizations can implement a variety of evidence-based approaches to mitigate burnout among their workforce, including improving communication, establishing wellness initiatives, offering individual counseling and group counseling, providing services such as childcare and transportation assistance, offering flexibility in the workplace, ensuring adequate protective equipment and supplies, and developing peer support programs.

Policy Implications

Our results are consistent with other studies that have reported concerns about nurses' stress during the pandemic and the potential for greater numbers to leave their jobs or to leave nursing entirely. Healthcare workers have reported increases in the prevalence of depression, anxiety, and insomnia, which will require sustained interventions to ensure nurses' health and long-term productivity. With a shortage of RNs likely underway now, employers need to redouble their efforts to retain RNs and develop career paths for newly-graduated RNs. They

also need to rapidly develop and implement strategies to mitigate the potential harm of shortages over the next five years.

A. Technical Appendix

The forecasts of RN supply and demand are based on models that were initially developed in 2005 and have been refined as new data and methods have become available.
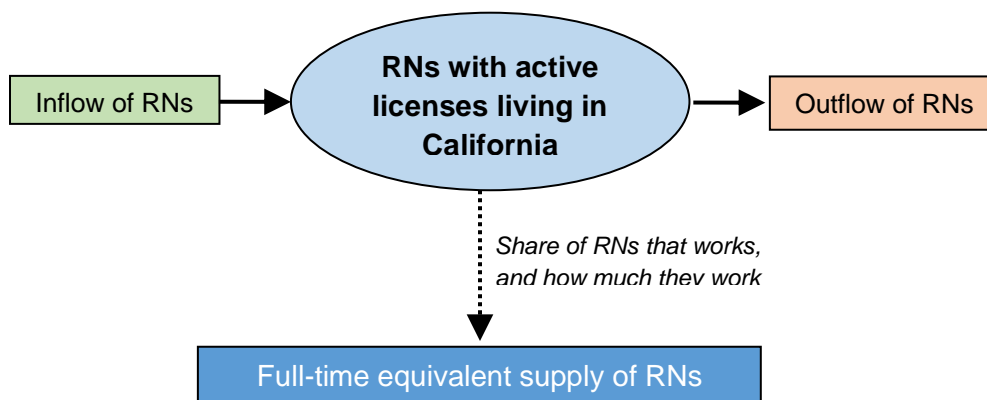
The Supply of RNs

The RN workforce constantly changes with the entrance of newly graduated nurses, migration of nurses to and 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

Exhibit 1 illustrates the supply model, commonly called a "stock-and-flow model." The number of RNs with active licenses (light blue oval) is the "stock" of nurses available to work. It grows with inflows (green rectangle) and decreases with outflows (orange rectangle). Estimates of the labor supply of RNs (dark blue rectangle) are derived from the stock of RNs potentially available to work and how much they choose to work in nursing. This final supply 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.

Figure A1. 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 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 variables with such uncertainty, a range of estimates is offered representing the highest and lowest plausible values. In the final models, a "best estimate" for each parameter is used, usually the average of the low and high estimates.

Estimates of Supply Model Factors

Stock of RNs in 2019

Data on the stock of RNs was obtained from the BRN. As of March 21, 2022, there were 466,874 RNs with active California licenses, of whom 388,463 had California addresses. On June 19, 2019, there were 439,670 RNs with active California licenses, of whom 358,865 had California addresses. For the purposes of these forecasts, the 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 in the report narrative.

The number of RNs with active licenses and California addresses was divided into 13 age groups. Table A1 compares 2022 and 2019 data. The total number of licensed nurses grew 8.3% between 2019 and 2022, which was a notably higher rate of growth than observed in past reports. Growth of RNs with California addresses was only 1.6% between 2017 and 2019, 3.6% between 2015 and 2017, and 3.8% between 2013 and 2015. The number of RNs with California addresses increased for some age groups and decreased for others. The largest rates of increase were for ages under 25 years (72.7%, from 3,554 to 6,136), 25-29 years (21.3%, from 25,834 to 31,333), and 35-39 years (20.5%, from 45,341 to 54,633). The largest decreases were for ages 60-64 (-13.2%, from 39,718 to 34,475) and 55-59 (-7.0%, from 36,150 to 33,613).

Table A1. Counts of actively-licensed RNs living in California, by age group, June 2019 and March 2022

Age Group	June 19, 2019		March 21, 2022		Change 2019-2022
	Count	% of Total	Count	% of Total	
Under 25	3,554	0.99%	6,136	1.58%	72.7%
25-29	25,834	7.20%	31,333	8.07%	21.3%
30-34	44,800	12.48%	50,161	12.91%	12.0%
35-39	45,341	12.63%	54,633	14.06%	20.5%
40-44	41,313	11.51%	45,538	11.72%	10.2%
45-49	45,330	12.63%	44,862	11.55%	-1.0%
50-54	35,392	9.86%	41,999	10.81%	18.7%
55-59	36,150	10.07%	33,613	8.65%	-7.0%
60-64	39,718	11.07%	34,475	8.87%	-13.2%
65-69	26,103	7.27%	28,225	7.27%	8.1%
70-74	10,316	2.87%	12,101	3.12%	17.3%
75-79	3,729	1.04%	4,046	1.04%	8.5%
80+	1,285	0.36%	1,341	0.35%	4.4%
Total	**358,865**	**100.00%**	**388,463**	**100.00%**	**8.3%**

Source: California Board of Registered Nursing license records.

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[1] All but the youngest and oldest age groups span 5 years, and 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 are few RNs under 20 years old; thus, the 20% assumption seems reasonable for this group as well.

Graduates from California pre-licensure nursing programs

According to the BRN Annual Schools Report, there were 12,304 new graduates from California RN programs in the 2020-2021 academic year. Table A2 presents the numbers of new enrollments and graduates from the past 10 Annual Schools Reports.

Table A2. Numbers of new pre-licensure RN student enrollments and graduates from California nursing programs, 2011-2012 through 2020-2021

Survey year	Number of new student enrollments	Growth in new student enrollments	Number of graduates	Growth in graduates
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%
2018-2019	15,150	7.0%	11,857	-0.3%
2019-2020	15,002	-1.0%	12,714	7.2%
2020-2021	14,004	-6.7%	12,304	-3.2%

Source: Blash, L., Spetz, J. 2020-2021 Annual School Report: Data Summary and Historical Trend Analysis, A Presentation for Pre-Licensure Nursing Programs in California. Sacramento, CA: California Board of Registered Nursing, February 25, 2022.

We used these data to project future numbers of RN graduates. We assumed that new student enrollments in each year are associated with graduations two years later. 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.

From 2015-2016 through 2020-2021, graduates averaged 86.4% of the number of student enrollments two years prior. This is the rate used to estimate the number of future graduates. We use actual enrollments through 2020-2021, but student enrollments after that year are not yet known. In the BRN Annual School Survey, schools are asked to estimate future enrollment for the next two academic years (through 2022-2023). These estimates were multiplied by 86.4% to obtain the forecasted number of graduates for 2023-2024 and 2024-2025. Our low estimate of growth in RN education after 2024-2025 is 0%, the high estimate is 1%, and the best estimate is 0.5%. Actual and projected numbers of graduates from 2014-2015 through 2021-2022 are presented in Table A3.

Table A3. 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
2017-2018	14,154*	11,890*
2018-2019	15,150*	11,857*
2019-2020	15,002*	12,714*
2020-2021	14,004*	12,304*
2021-2022	15,221	11,471
2022-2023	15,750	13,238
2023-2024		13,493
2024-2025		13,601

* Actual number of student enrollments and graduates based on Annual Schools Report.

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 2021, 580 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 473 of these nurses had California addresses in 2022; 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: 527 nurses. This estimate is similar to that from the 2019 forecasts, which was 544.

Immigration of internationally-educated nurses

BRN records report that 1,329 internationally-educated nurses passed the National Council Licensure Examination for RNs (NCLEX-RN) and received initial licensure as an RN in California in 2021, 1,028 of whom had a California residence in 2022; the remainder lived in other states or countries. In the supply model, the total number of 2021 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: 1,179 internationally-educated RNs immigrate to California each year. This number is higher than the 2017 and 2019 estimates of 603 and 851. However, these figures are much lower than a peak of 4,107 during the first decade of the 2000s.

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 for the forecasting model, graduates were allocated into five-year groups. Table A4 presents estimates of the age distribution of new graduates from California RN education programs. 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 2021 is presented in the last column of Table A4; these data are used to forecast the age distribution for all internationally-educated RNs receiving first licenses in California.

Table A4. Age distributions of new graduates from California and international RN programs

Age group	Graduates of US RN programs	Internationally-educated graduates
18-25*	28.9%	3.8%
26-29*	28.8%	17.3%
30-34	16.4%	38.0%
35-39	13.6%	22.0%
40-44	6.0%	8.3%
45-49	4.1%	5.5%
50-54	1.4%	3.7%
55-59	0.8%	0.8%
60-64	0.3%	0.6%
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.

Interstate migration of RNs to California

Estimates of interstate migration to California were developed in two ways. First, BRN license records from 2020 were compared with those of 2022. 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 2020 and 2022 license files were compared to identify nurses who had California licenses in both years, but who lived outside California in 2020 and resided in California in 2022. Over the two-year period, the difference was 7,980, which is higher than the change between 2018 and 2020 (5,604). This figure was divided by two to get an estimate of one-year change (3,990 RNs). The second component was determined by counting the number of RNs who were newly licensed and had California addresses between 2020 and 2022 (43,992 RNs) and divided by two to get the one-year average number (21,996 RNs). The number of new graduates in the 2020-2021 academic year (12,304) was then subtracted from this number to estimate the number of experienced RNs moving to California from other states in 2022.

All data were reported by age group, and the RNs identified for both components were allocated 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 A5 provides the estimates for each age group. Note that the estimated number and rate of in-migration is negative for the youngest age group (-14.9%; 913 RNs); this is likely because some newly-graduated nurses have not yet completed the licensing process and some may have moved to another state to obtain their first license. This negative value is used in the model, as explained below.

Table A5. Estimates of the number of nurses moving to California based on comparison of 2020 and 2022 licensing records

Age Category	A. Number licensed both years who moved to California (2020-2022)	B. Number licensed in 2022 but not 2020	C. Total of RNs moving to California 2020-2022 (A+B) divided by 2	D. Number of RN graduates 2020-2021	Estimated annual in-migration (C-D)	In-migration rate
Under 25	20	5,261	2,640.5	3,553	-913	-14.9%
25-29	953	11,434	6,193.5	3,541	2,652	8.5%
30-34	1,587	8,632	5,109.5	2,015	3,094	6.2%
35-39	1,275	5,142	3,208.5	1,667	1,541	2.8%
40-44	845	2,973	1,909	732	1,177	2.6%
45-49	621	2,135	1,378	498	880	2.0%
50-54	618	1,769	1,193.5	173	1,020	2.4%
55-59	593	1,548	1,070.5	92	978	2.9%
60-64	618	1,748	1,183	31	1,152	3.3%
Over 64	850	3,350	2,100	0	2,100	7.4%

Sources: California Board of Registered Nursing license records, 2020 & 2022

Alternate estimates of interstate migration were computed from BRN records of nurses requesting license endorsement from another state into California. Table A6 presents the number of RNs requesting endorsement to California in 2021 who had permanent addresses in California and the number requesting endorsement with permanent addresses anywhere.

Table A6. Requests for license endorsement into California, 2021

Age Category	Residing in California		Residing anywhere	
	# requesting endorsement	Endorsements as % of total RNs	# requesting endorsement	Endorsements as % of total RNs
Under 25	151	2.5%	733	12.0%
25-29	416	1.3%	4,034	12.9%
30-34	367	0.7%	2,789	5.6%
35-39	219	0.4%	1,765	3.2%
40-44	128	0.3%	1,218	2.7%
45-49	88	0.2%	976	2.2%
50-54	60	0.1%	784	1.9%
55-59	46	0.1%	533	1.6%
60-64	25	0.1%	270	0.8%
Over 64	23	0.1%	116	0.4%

Sources: California Board of Registered Nursing license records, 2021

Table A7 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; 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.

Table A7. Projected rates of in-migration to California

Age Category	California address endorsement rate (Table A6)	Overall endorsement rate (Table A6)	In-migration (Table A5)	Low estimate	High estimate	Best estimate
Under 25	2.5%	12.0%	-14.9%	2.5%	6.0%	2.5%
25-29	1.3%	12.9%	8.5%	1.3%	6.4%	8.5%
30-34	0.7%	5.6%	6.2%	0.7%	2.8%	6.2%
35-39	0.4%	3.2%	2.8%	0.4%	1.6%	2.8%
40-44	0.3%	2.7%	2.6%	0.3%	1.3%	2.6%
45-49	0.2%	2.2%	2.0%	0.2%	1.1%	2.0%
50-54	0.1%	1.9%	2.4%	0.1%	0.9%	2.4%
55-59	0.1%	1.6%	2.9%	0.1%	0.8%	2.9%
60-64	0.1%	0.8%	3.3%	0.1%	0.4%	3.3%
Over 64	0.1%	0.4%	7.4%	0.1%	0.2%	7.4%

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 2021. The total has ranged from a low of 189 nurses in 2002-2003 to a high of 971 nurses in 2018. The 2021 data were used to estimate the number and age distribution of RNs changing from inactive to active license status (Table A8).

The BRN provided data on the number and age distribution of RNs whose licenses were lapsed and later were reactivated. In 2021, 6,407 RNs living in California reactivated their licenses, which is slightly higher than in 2016 and 2018 (5,489 and 5,829). 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 A9). The average rate of license reactivation was 1.7% of the total number of licensed RNs living in California.

Table A8. Number and age distribution of RNs changing status from inactive to active license status, 2021

Age Category	Number	Percent	Age Category	Number	Percent
<30	18	2.1%	55-59	75	8.8%
30-34	40	4.7%	60-64	110	13.0%
35-39	62	7.3%	65-69	182	21.5%
40-44	60	7.1%	70-74	122	14.4%
45-49	62	7.3%	75+	46	5.4%
50-54	71	8.4%	**Total**	**848**	**100.0%**

Source: California Board of Registered Nursing license records, 2021.

Table A9. Number and rate of RNs reactivating lapsed licenses, 2021

Age Category	Number	Rate	Age Category	Number	Rate
<30	274	0.7%	55-59	527	1.6%
30-34	597	1.2%	60-64	675	2.0%
35-39	840	1.5%	65-69	878	3.1%
40-44	668	1.5%	70-74	542	4.5%
45-49	554	1.2%	75+	299	5.6%
50-54	553	1.3%	**Total**	**6,407**	**1.7%**

Source: California Board of Registered Nursing license records, 2021.

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 2020 were compared with those of 2022. Nurses who had California licenses in both years but who lived in California in 2020 and resided outside California in 2022 were counted by age group and divided by two to get an estimate of one-year out-migration (4,277 RNs). The number of RNs moving to other states was higher in 2021 than in 2018 (2,445 RNs). The number of RNs moving to other states in 2021 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 in 2021. 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 2022 to obtain estimates of the rates of out-migration. The best estimate is the average of the three estimated out-migration rates (Table A10). The estimate used in the "low" projection 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 estimate used in the "high" projection is the one based on comparing 2020 and 2022 licensing files, which produces the lowest estimate of out-migration and thus higher future projections.

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.

Table A10. Estimates of the number of nurses moving out of California

Age Category	Licensed both years, had California address in 2020 but not 2022		Endorsement requests with California address		Endorsement requests for all addresses		Best estimate (average of all rates)
	Number	**Rate**	**Number**	**Rate**	**Number**	**Rate**	
Under 25	9	0.1%	219	3.6%	293	4.8%	1.9%
25-29	215	0.7%	914	2.9%	1,877	6.0%	2.6%
30-34	554	1.1%	1,321	2.6%	2,745	5.5%	2.6%
35-39	558	1.0%	1,180	2.2%	2,521	4.6%	2.1%
40-44	456	1.0%	838	1.8%	1,863	4.1%	1.7%
45-49	386	0.9%	633	1.4%	1,518	3.4%	1.3%
50-54	394	0.9%	611	1.5%	1,437	3.4%	1.6%
55-59	486	1.4%	468	1.4%	1,166	3.5%	1.6%
60-64	562	1.6%	379	1.1%	965	2.8%	1.2%
65-69	439	1.6%	164	0.6%	465	1.6%	1.1%
70-74	172	1.4%	42	0.3%	116	1.0%	0.7%
75 & older	50	0.9%	13	0.2%	28	0.5%	0.4%
TOTAL	**4,277**	**1.1%**	**6782**	**2.2%**	**14994**	**3.9%**	**2.4%**

Sources: California Board of Registered Nursing license records, 2020 & 2022.

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 2021; the number was slightly lower in 2021 than in 2018 (15,868 vs. 16,317). Second, the BRN license records from 2020 were compared with those of 2022. Nurses who had California licenses and residences in 2020 but were not in the license file in 2022 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 counts and rates. As seen in Table A11, these rates were notably lower than the rates calculated from the records provided by the BRN. In the model, the higher rate is used as the best estimate because it produces a more conservative estimate of future supply.

Table A11. Estimated annual rates of RNs allowing licenses to lapse or become inactive

Age Category	Changes to inactive or delinquent status, 2021		RNs active in 2020 but not in license file in 2022, divided by 2	
	Number	**Rate**	**Number**	**Rate**
Under 25	45	0.7%	76	1.2%
25-29	481	1.5%	424	1.4%
30-34	1,042	2.1%	690	1.4%
35-39	1,305	2.4%	688	1.3%
40-44	1,001	2.2%	494	1.1%
45-49	809	1.8%	516	1.2%
50-54	879	2.1%	552	1.3%
55-59	968	2.9%	946	2.8%
60-64	1,916	5.6%	2,438	7.1%
65-69	3,669	13.0%	3,589	12.7%
70-74	2,258	18.7%	2,028	16.8%
75-79	1,021	25.2%	865	21.4%
80+	474	35.3%	354	26.4%
TOTAL	**15,868**		**13,302**	

Source: California Board of Registered Nursing license records, 2020, 2021, and 2022.

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 2022. 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 none exit to an older age group. Numbers of new graduates and RN migration from other states and countries are added to each age group. Projected future graduations are based on RN education program projections, as described above. However, for the low forecast and best forecast, we subtracted from this 913 graduates, based on the observation that there was a gap of 913 RNs between the number that graduated and growth in the group of RNs under 25 years old between 2020 and 2022. For all age groups, people also leave based on the estimated outflows described above. The basic formula is:

Forecasted Supply of CA RNs next year =

Current supply of RNs in current year + Estimated inflows – Estimated outflows

This calculation 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 2037, as shown in Figure A2. 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 A2 presents the range of supply estimates that result when the highest and lowest plausible supply forecasts are calculated. The rapid growth of the RN workforce in the high forecast is largely driven by higher rates of graduation growth and migration from other states coupled with lower rates of lapsed licenses. The declining supply in the low forecast results from stalled growth in program enrollments, low rates of migration to California from other states, and high migration of nurses out of California. 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 A2. Forecasted number of RNs with active licenses residing in California, 2022-2037
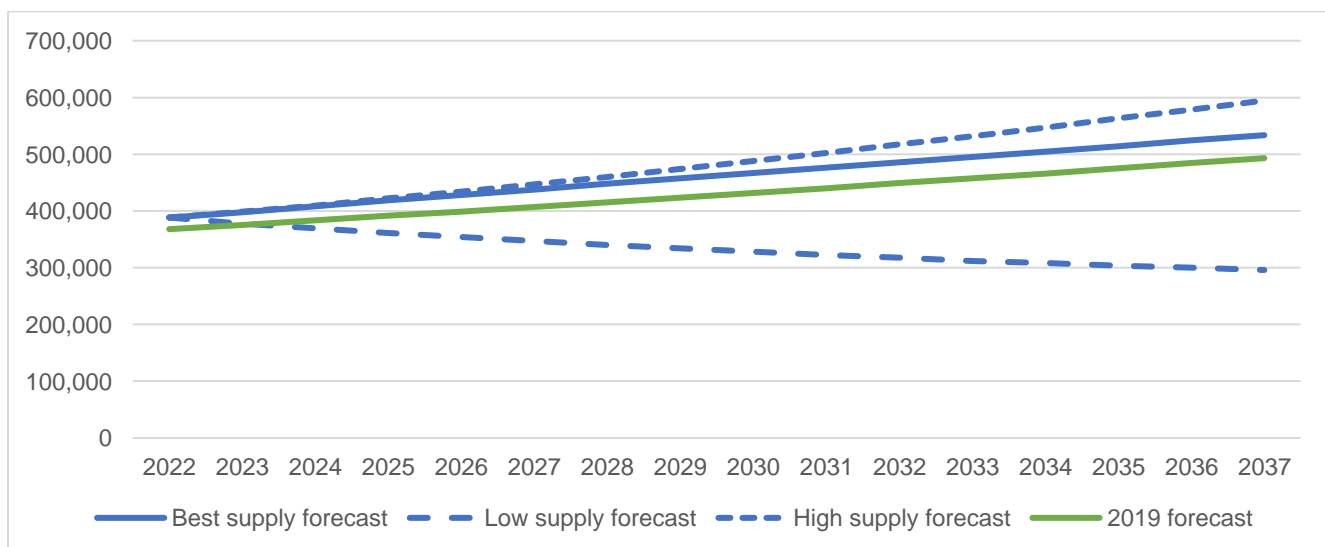
The forecasted number of RNs with active licenses does not account for the variation in hours worked by RNs and the fact that some RNs with active licenses do not work in nursing. Data from the BRN Surveys of RNs were used to estimate the proportion of RNs living in California with active licenses that are employed in nursing, by age category. In the preliminary 2022 data, the estimated employment rates range from a high of 92% for RNs 25 years and younger to a low of 29.6% for RNs 70-74 years old. Employment rates by age groups have varied over

time, and thus we consider a range of potential employment rates in the projections. The low estimate of the employment rate for each age group is the lowest employment rates measured in biennial BRN Surveys between 2016 and 2022. The high estimate is the highest of these six rates. The best estimate is the average of employment rates between 2016 and 2022 (see Table A12).

Table A12. Employment rates for RNs residing in California, 2022, and average rates used in forecasts

| Age Category	Share Employed, 2022 preliminary	Low Estimate	High Estimate	Best Estimate
Under 25	92.0%	92.0%	95.5%	93.7%
25-29	90.9%	87.3%	95.4%	90.6%
30-34	89.2%	86.7%	93.8%	89.2%
35-39	90.7%	88.9%	93.8%	90.7%
40-44	88.8%	86.7%	92.6%	89.0%
45-49	91.5%	88.2%	93.4%	90.4%
50-54	90.4%	90.0%	90.4%	90.3%
55-59	79.3%	79.3%	87.3%	83.6%
60-64	77.4%	72.4%	77.4%	75.8%
65-69	39.3%	39.3%	59.2%	49.7%
70-74	29.6%	29.6%	43.3%	35.0%
75-79	30.6%	26.6%	31.0%	29.1%
80+	44.0%	17.1%	44.0%	30.1%

In the supply model, data from BRN Surveys of RNs were used to estimate average usual hours worked per week in all nursing jobs for each age category by RNs who resided in California and were employed in nursing. 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 A13. As with the estimates of the employment rate, the high estimate is the highest of the number of hours worked from 2016 through 2022 and the low estimate is the lowest of these years. The best estimate is the average across these years.

Table A13. Average hours worked per week by RNs residing in California, 2022, and average hours used in forecasts

Age Category	Hours Worked per Week, 2022 preliminary	Low Estimate	High Estimate	Best Estimate
Under 25	54.9	36.6	54.9	43.5
25-29	37.0	35.0	37.0	36.3
30-34	36.2	34.9	37.0	36.2
35-39	35.3	33.4	35.8	35.1
40-44	35.5	34.2	37.0	35.8
45-49	33.9	33.6	38.0	35.7
50-54	35.3	35.3	37.5	36.3
55-59	32.7	32.6	37.5	35.0
60-64	34.6	32.1	37.5	34.9
65-69	23.0	23.0	34.4	30.2
70-74	29.5	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

Figure A3 presents projected high, low, and best estimates of FTE supply based on the best estimates of the future count of RNs. The forecast projects there will be 391,067 FTE RNs in 2037, which is slightly lower than the 400,705 projected in 2019, reflecting the lower forecasted hours worked per week by RNs compared with the 2019 projection.

Figure A3. Forecasted full-time equivalent supply of RNs, 2022-2037
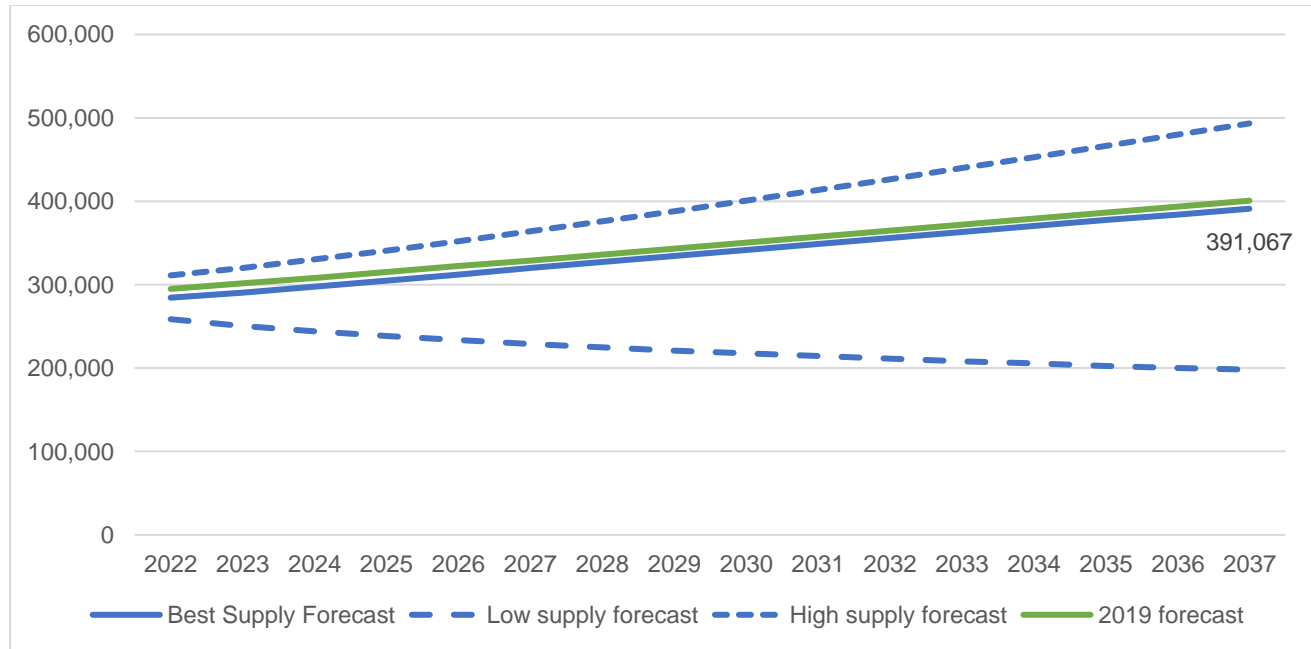
The Demand for RNs

The demand for RNs can be conceptualized and measured 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 having a minimum of 2.28 skilled health care workers per 1,000 population. Similarly, health care leaders can 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 upgrades to the electronic health record or in hiring 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 projected growth hospital patient days, employment in hospitals, and future population growth and aging

- An employment forecast for 2030 published by the California Employment Development Department

Demand projections based on RNs per capita

One frequently used benchmark of the need for RNs is the number of employed RNs per 100,000 population. For decades, California has had one of the lowest ratios of employed RNs per 100,000 population in the United States. Table A14 presents ratios of the number of licensed RNs residing in the state in 2018 divided by the state's population in 2021 for the states with the 10 highest and 10 lowest ratios. California had the 10th lowest ratio (995 RNs per 100,000), which is a notable improvement from its past ranking as 4th lowest. Some nursing advocates have argued that California's ratio should be closer to the 25th percentile (1,030 RNs per 100,000) or even the national average (1,179 RNs per 100,000). Using population projections from the California Department of Finance, we calculated the numbers of RNs that would be required to reach these benchmarks as well as to maintain the current ratio.

Note 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 shortcomings of targeting a fixed number of RNs per population are that (1) the target is arbitrarily defined and (2) the ratio does not account for changes in the demographics and health of the population. 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 A14. Licensed RNs per 100,000

States with the lowest ratios	Licensed RNs per 100,000	States with the highest ratios	Licensed RNs per 100,000
Nevada	686	District of Columbia	1,824
Idaho	771	Missouri	1,636
South Carolina	781	Massachusetts	1,562
Washington	903	Hawaii	1,522
Utah	923	Minnesota	1,480
New Mexico	924	Ohio	1,478
Texas	937	Pennsylvania	1,446
Georgia	940	Iowa	1,418
Oregon	986	Wisconsin	1,402
California	995	Michigan	1,358

Source: National Sample Survey of Registered Nurses, 2018, data on the sample frame used for the survey, divided by state population in 2021.

Demand projections that account for population aging and current vacancy rates

The second approach to forecasting demand for RNs used in this study was designed to account for changes in the demand for health care services associated with the aging of the population. Hospital utilization patterns were used as a proxy of overall health care utilization. First, the 2020 total number of hospital patient discharges per 10-year age group at short-term acute-care hospitals was obtained from the California Department for Healthcare Access and Information.[2] To estimate the total number of patient days per age group in California, these data were multiplied by the average length of stay per age group, as reported in the 2018 Hospital National Inpatient Statistics. We then divided the number of patient days by the age-specific population estimates to obtain

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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.

utilization rates for each age group. These utilization rates were then applied to population projections to forecast future total patient days per age category and rates of projected growth in hospital patient days. We calculated the numbers of RNs that would be required to maintain a stable ratio of RNs-to-patient days in the future.

This estimate of future demand for RNs is based on the premise that current RN employment levels are optimal and that there is not a shortage. However, the Hospital Association of Southern California has reported that the hospital vacancy rate for RNs was 7.2% in the first quarter of 2022. We increased our projected demand for RNs by this percentage to account for what may be a current shortage of RNs.

California Employment Development Department forecasts

The most recent projection by the [California Employment Development Department](#) indicates that there will be 358,900 registered nurse jobs in California by 2030. The EDD projection does not distinguish between full-time and part-time jobs. To estimate FTE employment from the EDD projection, the adjustment of 0.873 is used, which is the average number of hours worked per week by California RNs in 2022 (34.9; preliminary data), divided by 40. The FTE projection for 2030 is thus 313,140.

Comparing the demand forecasts

Figure A4 compares alternative demand forecasts of full-time equivalent RNs. The forecasts estimate that the FTE demand for RNs in 2022 range between 276,570 and 331,263. Demand in 2037 is forecasted to be between 296,222 (to maintain the current FTE RN-to-population ratio) and 361,727 (to attain a stable ratio of RNs-per-patient day and fill current vacancies). 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 2030 is higher than that produced by maintaining the current RN-to-population ratio and slightly above attaining the national 25th percentile.

Figure A4. Forecasted full-time equivalent demand for RNs, 2019-2035