Forecasts of the Registered Nurse Workforce in the San Francisco Bay Area of California

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Abstract

The San Francisco Bay region of California, which consists of ten counties, is projected to have growth in the supply of registered nurses (RNs) but supply will not keep up with growth in demand. Projections of supply and demand through 2035 indicate that an RN shortage may exist now and will worsen due to population growth, aging of the population, and rising shares of RNs who enter advanced practice.

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Background

Recent data suggest that a shortage of registered nurses (RNs) may be emerging in California. The Fall 2017 Survey of Nurse Employers found that many Chief Nursing Officers are experiencing difficulty recruiting RNs for specialized positions and that more than 85% of hospitals reported demand for RNs being greater than the available supply (Chu, Bates, & Spetz 2018). Hospital vacancy rates have been rising since 2013, reaching 6.3% in 2017. There also has been growth in the share of newly-graduated RNs reporting they are employed within 12 months of licensure, increasing from 59% in 2013 to 81% in 2017 (HealthImpact 2018). There is variation across regions in the reported difficulty of finding qualified staff, with some employers suggesting there is a surplus of recently-graduated nurses and others indicating severe shortfalls of nurses at all levels of experience.

Rising retirement rates contribute to the challenge of recruiting nurses, particularly those with specialized skills and experience (Buerhaus & Auerbach 2011). In addition, the implementation of the most significant components of the Affordable Care Act (ACA) – an expansion of Medi-Cal and the implementation of the Covered California health insurance exchange to facilitate insurance enrollment – reduced the share of nonelderly Californians without health insurance from 16.2% in 2011 (Charles 2015) to 8.1% in 2015 (Cohen et al. 2016). Growing numbers of insured people will demand more health care services, which in turn drives demand for health professionals, including RNs. Moreover, the ACA established programs to encourage improved care management in order to deliver health care more efficiently and effectively; this type of care provides incentives for health care systems to increase their utilization of RNs (Spetz 2014).

This report provides forecasts of regional RN supply and demand in the San Francisco Bay Area of California, based on a statewide projection model developed for the California Board of Registered

Nursing (BRN). The data used to construct the model were derived from the 2016 BRN Survey of Registered Nurses (Spetz, Chu, & Jura 2017), the 2015-2016 BRN Annual Schools Report (Blash & Spetz 2018), and BRN license records. The supply forecast is compared with several benchmarks of demand, including national ratios of RNs per capita, estimates of future hospital utilization, and projections published by the California Employment Development Department (EDD 2017).

Definition and Description of the San Francisco Bay Area

The San Francisco Bay Area region is defined as a 10-county area that includes counties in the U.S. Census Bureau core-based statistical areas of San Francisco-Oakland-Berkeley, San Jose-Sunnyvale-Santa Clara, Santa Cruz-Watsonville, Santa Rosa-Petaluma, and Napa: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma. This region corresponds to the combined Employment Development Department regions of Oakland, San Rafael, and San Francisco metropolitan divisions (MDs), and Napa, San Jose, Santa Cruz, Vallejo, and Santa Rosa metropolitan statistical areas (MSAs). There are 79 short-term general, children's, and specialty hospitals in the region, as well as 18 associate degree (AD), eight bachelor's degree (BSN), and four entry-level master's (ELM) RN education programs.

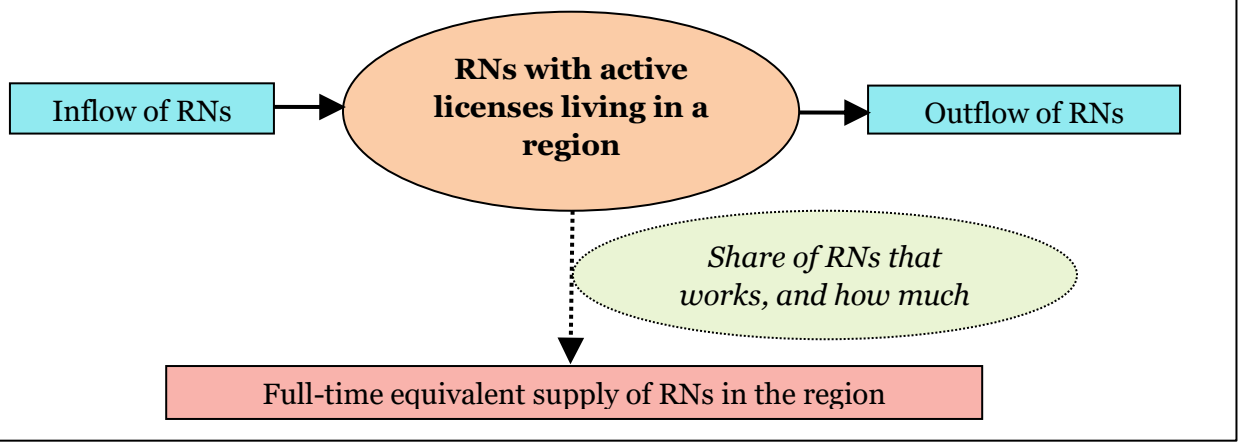
The Supply of RNs

In February 2018, there were 81,595 RNs with current, active licenses living in the San Francisco Bay Area region. The RN workforce constantly changes with the entrance of newly graduated nurses; migration of nurses from other regions, 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:

1) Inflows of nurses: Additions to the number of RNs in the region
    a) Graduates from regional nursing programs
    b) Graduates of nursing programs in other states and regions who obtain their first RN license in California and move to the region
    c) Internationally-educated nurses who immigrate to the region and obtain their RN license
    d) Inter-regional and interstate migration of RNs
    e) Changes from inactive to active license status
    f) Changes from lapsed to active license status
2) Outflows of nurses: The departure of RNs from the region
    a) Migration out of region (to another region, state or country)
    b) Movements from active to inactive or lapsed license status
3) Labor force participation factors: Decisions to work, and how much to work
    a) Share of RNs with active licenses that work in nursing
    b) Average number of hours worked per week by RNs working in nursing

The inflows are added to the number of RNs living in the region 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. Figure 1 illustrates this model of the supply of RNs, commonly called a "stock-and-flow model."

Figure 1. A model of the supply of RNs



Method of calculating RN supply

As inflows, outflows, and employment decisions change over time, so does the RN workforce. The total supply of employed RNs is determined by the age distribution of the stock of RNs, as well as of each inflow and outflow component. In the supply model, the number of RNs with active licenses who reside in the region is divided into 13 age categories: 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. The model assumes that nurses are evenly distributed within each 5-year age group. Therefore, in each year, 20% of the RNs in each age group – or 1 in 5 RNs – moves into the next (older) age group, until they reach the oldest age group. The youngest age group (under 25) spans 7 years, but because there were so few RNs under 20 years old in 2018, the 20% assumption is used for this group as well.

For each year of the model, the inflow estimates are added to each age group and the outflow estimates are subtracted from each age group, resulting in a forecast of the new stock of RNs for the subsequent year. For each age category, the basic formula is:

Forecasted Supply of RNs next year
= Current supply of RNs in current year
+ Estimated total inflows
– Estimated total outflows.

Employment rates and hours worked per week in nursing are then applied to the estimated stock of RNs in each age group, resulting in an estimated FTE supply. This calculation is iterated through 2035 to obtain yearly forecasts of the region's RN supply.

It is important to acknowledge sources of variability and uncertainty in the supply model. 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 (Spetz, Chu, & Jura 2017). However, it also is possible that "baby boomer" nurses have different intentions regarding retirement than did previous generations, and that higher rates of employment in older age groups will reemerge as a result. This variability in estimated employment participation rates contributes to uncertainty in the supply model. Thus, a range of estimates representing the highest and lowest plausible values is used. In the final models, the "baseline estimate" for each parameter is the average of the low and high estimates, unless otherwise noted.

Stock of RNs in 2018

Data describing the number of RNs with active licenses in February, 2018, were obtained from the BRN. At that time, 81,595 RNs had active licenses and an address in the San Francisco Bay Area region. Table 1 presents the number of actively licensed RNs living in the region for each age group.

Table 1. Counts of actively-licensed RNs living in the San Francisco Bay Area region, by age group, February, 2018

Source: California BRN licensing records.

Age group	Count	% of total
Under 25	933	1.1%
25-29	5,757	7.1%
30-34	9,900	12.1%
35-39	9,815	12.0%
40-44	9,716	11.9%
45-49	9,837	12.1%
50-54	7,848	9.6%
55-59	8,605	10.5%
60-64	9,499	11.6%
65-69	6,089	7.5%
70-74	2,477	3.0%
75-79	847	1.0%
80+	272	0.3%
Total	**81,595**	**100.0%**

Graduates from RN education programs

RN education programs in the San Francisco Bay Area region produced 2,213 new graduates during the 2016-2017 academic year, according to the BRN Annual School Report (Blash & Spetz 2018). Growth in new student enrollments leads to growth in graduates in future years. AD programs are designed so that students can complete the nursing component of the degree in two years, and in most BSN programs, students are formally enrolled in nursing major courses during the last two to three years of the program; the duration is shorter for accelerated BSN programs. In general, student enrollment changes translate to changes in the number of RN graduates two to three years in the future.

To predict the number of future graduates, actual new student enrollments in a given year were compared with the number of graduates two years later. In the San Francisco Bay Area region over the period 2012-2013 through 2016-2017, on average, the number of graduates totaled 88.8% of the number of new student enrollments two years prior. This average rate was used to estimate the number of future graduates as a function of new enrollments.

Forecasting the number of graduates beyond the 2018-2019 academic year is difficult because total new student enrollments after 2016-2017 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 2016-2017 survey, schools were asked to report expected student enrollment totals for the 2017-2018 and 2018-2019 academic years. Schools in the region estimated that 2017-2018 new student enrollments would be 2,562 and that 2018-2019 new student enrollments would be 2,618. These estimates were multiplied by 88.8% to obtain the forecasted number of graduates for 2019-2020 and 2020-2021. From these totals, 205 projected graduates who attended satellite campuses in other regions were subtracted. The forecast model assumes that new student enrollments will be stable after the 2018-2019 academic year. Actual numbers of graduates from 2012-2013 through 2016-2017 and predicted numbers of graduated from 2017-2018 through 2020-2021 are presented in Table 2.

Table 2. Actual and forecasted numbers of new RN enrollments and graduations

Source: 2016-2017 BRN Annual Schools Report: Data Summary and Historical Trend Analysis, 2018.

Academic year	Actual/forecasted new student enrollments	Actual/forecasted number of graduates
2012-2013	2,411*	2,257*
2013-2014	2,361*	2,193*
2014-2015	2,525*	2,472*
2015-2016	2,349*	2,054*
2016-2017	2,581*	2,213*
2017-2018	2,325	1,880
2018-2019	2,382	2,086
2019-2020		2,069
2020-2021		2,119

* Actual enrollments/graduates, which include satellite campuses located in other regions.

Graduates from nursing programs in other states and countries

Each year, some graduates of nursing programs in other states obtain their first RN license in California. According to the BRN, in 2016, 76 such out-of-state graduates had an address in the San Francisco Bay Area region. Additionally, in 2016, the BRN reported that 703 internationally-educated nurses passed the National Council Licensure Examination for RNs (NCLEX-RN) and received initial licensure as an RN in California, 160 of whom had an address in the San Francisco Bay Area region.

Age distributions of new graduates and licensees

Inflows of new graduates are added to the stock of RNs by age group. The BRN Annual School Report uses an uneven set of age groups for new graduates: 18-25, 26-30, and then ten-year age groups for graduates over age 30. To be consistent with the forecasting model, the region's new graduates were allocated into five-year age groups and assumed that graduates of nursing programs in other states who obtain initial RN licensure in California have the same age distribution as the region's graduates.

BRN records of internationally-educated nurses who received initial U.S. licensure in California include the birth year, so these nurses were added to the model by age group. Table 3 presents the age distribution of new RN graduates used in the model.

Inter-region and interstate migration of RNs

Estimates of migration to the San Francisco Bay Area region were calculated from BRN licensing files for 2016 and 2018, as well as from BRN records of nurses requesting endorsement of their out-of-state license to California in 2016. Inter-region migration was calculated by counting the total number of RNs who lived outside the San Francisco Bay Area region in 2016 (including those with out-of-state addresses), who then reported a mailing address within the San Francisco Bay Area region in 2018, and dividing this number by two to obtain an annual average for each age group. This was added to the number of RNs who requested endorsement of their license from another state in 2016 and reported a San Francisco region address. The region's in-migration rate was as the sum of RNs who migrated to the San Francisco Bay Area region divided by the total number of actively licensed RNs residing in the region in 2018 (per BRN licensing records). These data are presented in Table 4.

Table 3. Estimated age distributions of new graduates

Sources: 2016-2017 BRN Annual Schools Report: Data Summary and Historical Trend Analysis, 2018, & California BRN licensing files.

Age group	Graduates of US RN programs	Internationally-educated graduates
18-25	37.5%	9.4%
26-29	27.9%	33.8%
30-34	12.9%	30.0%
35-39	12.9%	15.0%
40-44	3.6%	4.4%
45-49	3.6%	4.4%
50-54	0.8%	1.9%
55-59	0.8%	0.6%
60-64	0.0%	0.6%
65+	0.0%	0.0%

Table 4. Movement of RNs into San Francisco Bay Area region

Source: California BRN licensing records.

Age group	Average annual number moving to region 2016-18	Number requesting endorsement	Total as a share of RNs living in region
Under 25	47	35	8.7%
25-29	338	204	9.4%
30-34	365	162	5.3%
35-39	214	97	3.2%
40-44	155	43	2.0%
45-49	143	38	1.8%
50-54	105	27	1.7%
55-59	105	27	1.5%
60-64	73	26	1.0%
Over 64	31	4	0.4%
Total	**1,576**	**663**	

Movements from inactive and delinquent to active license status

BRN data were obtained describing the number of RNs changing from inactive to active license status and from delinquent to active status in 2016, by age group. These data are presented in Table 5.

Table 5. Number and age distribution of RNs changing status from inactive or delinquent to active license status, San Francisco Bay Area region, 2016

Source: California BRN licensing records.

Age group	Count	% of total
Under 30	28	2.0%
30-34	88	6.4%
35-39	102	7.4%
40-44	95	6.9%
45-49	125	9.1%
50-54	136	9.9%
55-59	159	11.5%
60-64	208	15.1%
65-69	199	14.4%
70-74	134	9.7%
75+	104	7.5%
Total	**1,378**	**100.0%**

Migration out of the region

Estimates of migration out of the San Francisco Bay Area region to other regions or states were derived from 2016 and 2018 BRN licensing files. Out-migration was calculated by taking the total number of RNs in each group who lived in the San Francisco Bay Area region in 2016, but then reported a mailing address outside of the region in 2018, and dividing it by two to obtain an annual average. The region's out-migration rate was computed as the sum of RNs who left the San Francisco Bay Area region divided by the total number of actively licensed RNs residing in the region in 2018, by age group (per BRN licensing records). Table 6 presents the rates used in the model.

Table 6. Estimated annual rates of RNs migrating out of the San Francisco Bay Area region

Source: California BRN licensing records.

Age group	Average annual number moving to region 2016-18	Total as a share of RNs living in region
Under 25	39	4.2%
25-29	218	3.8%
30-34	285	2.9%
35-39	219.5	2.2%
40-44	182	1.9%
45-49	130.5	1.3%
50-54	132.5	1.7%
55-59	164.5	1.9%
60-64	144	1.5%
65-69	84	1.4%
70-74	23	0.9%
75+	0	0.0%
Total	**1,622**	

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 BRN licensing files for 2016 and 2018. The number of RNs who lived in the San Francisco Bay Area region in 2016 but who were no longer actively licensed in 2018 was calculated and divided by two to obtain an annual average for each age group. This was divided by the number of RNs in each age group in 2018 to obtain the rates at which RNs allow their licenses to lapse or become inactive. The data are presented in Table 7.

Table 7. Estimated annual rates of RNs allowing licenses to lapse or become inactive

Source: California BRN licensing records.

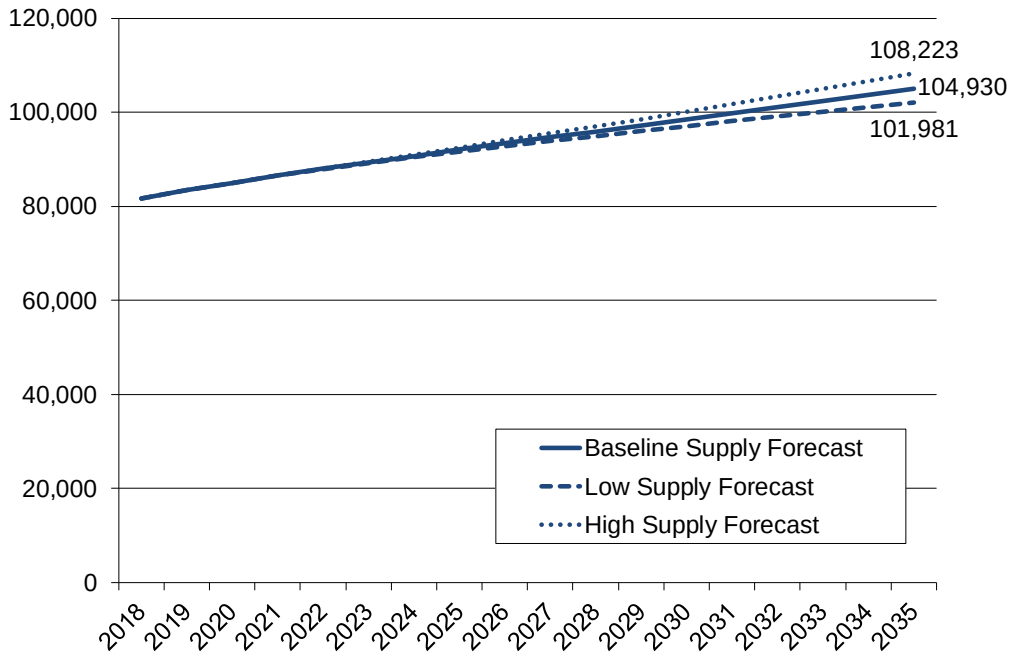
Age group	Average annual number changing to lapsed/inactive status 2016-18	Total as a share of RNs living in region
Under 25	16	1.7%
25-29	87	1.5%
30-34	146.5	1.5%
35-39	127	1.3%
40-44	99	1.0%
45-49	98.5	1.0%
50-54	124.5	1.6%
55-59	207	2.4%
60-64	509.5	5.4%
65-69	595.5	9.8%
70-74	486.5	13.5%
Total	**2,497**	

Supply forecasts of the region's RN workforce

Figure 2 presents the supply forecasts based on the projection model described above. A range of supply estimates were calculated; the baseline forecast assumes that RN education programs maintain the number of graduates, after 2022, the low forecast assumes that RN graduations shrink by 1% per year, and the high model assumes that graduations increase by 1% per year after 2022.

The forecasted number of RNs with active licenses does not account for variation in hours worked, or the fact that some RNs with active licenses do not work in nursing. Employment rates by age groups have varied since 2008, likely due to the economic recession that began in late 2007. During the recession, younger nurses were employed at lower rates and older nurses were employed at higher rates than in other years. To account for variation in employment rates over time, multiple years of data were examined. The proportion of RNs in the San Francisco Bay Area region employed in nursing in 2016, by age group, was calculated from the 2016 BRN Survey of RNs. Statewide employment rates by age group were obtained from BRN Surveys of RNs from 2008 through 2016 (Spetz, Chu, & Jura 2017). The employment rate used for the "low" forecast was the lowest of these employment rates, and the

Figure 2. Forecasted number of RNs with active licenses residing in the San Francisco Bay Area region



employment rate used for the "high" forecast was the highest of these rates. The baseline estimate is the average of the low and high rates and is presented in Table 8.

Table 8. Employment rates of RNs in the San Francisco Bay Area region

Source: Spetz, J, Chu, L, Jura, M. 2017. 2016 Survey of Registered Nurses. Sacramento, CA: California Board of Registered Nursing.

Age group	Actual region 2016	Low estimate	High estimate	Baseline estimate
Under 25	100.0%	89.6%	100.0%	94.8%
25-29	92.0%	92.0%	97.4%	94.7%
30-34	92.4%	92.1%	95.5%	93.8%
35-39	94.8%	92.3%	95.2%	93.8%
40-44	97.7%	89.7%	97.7%	93.7%
45-49	89.7%	89.7%	93.4%	91.6%
50-54	90.1%	89.8%	90.8%	90.3%
55-59	89.2%	85.3%	89.2%	87.3%
60-64	74.4%	74.4%	78.5%	76.4%
65-69	47.3%	47.3%	65.2%	56.2%
70-74	46.2%	40.5%	46.2%	43.3%
75-79	58.4%	32.0%	58.4%	45.2%
80+	0.0%	0.0%	24.2%	12.1%

The supply model also utilized data from the 2016 BRN Survey of RNs to calculate average usual hours worked per week in all nursing jobs in the San Francisco Bay Area region, by age group, as well as statewide average hours per week from 2008 through 2016 (Spetz, Chu, & Jura 2017). Estimated hours per week were divided by 40 to obtain the average full-time equivalent employment (FTE) for each age group. In the forecasts, the high for each age group is the highest of these FTE rates and the low estimate is the lowest of the FTE rates. The baseline estimate is the average of the high and low estimates and are presented in Table 9.

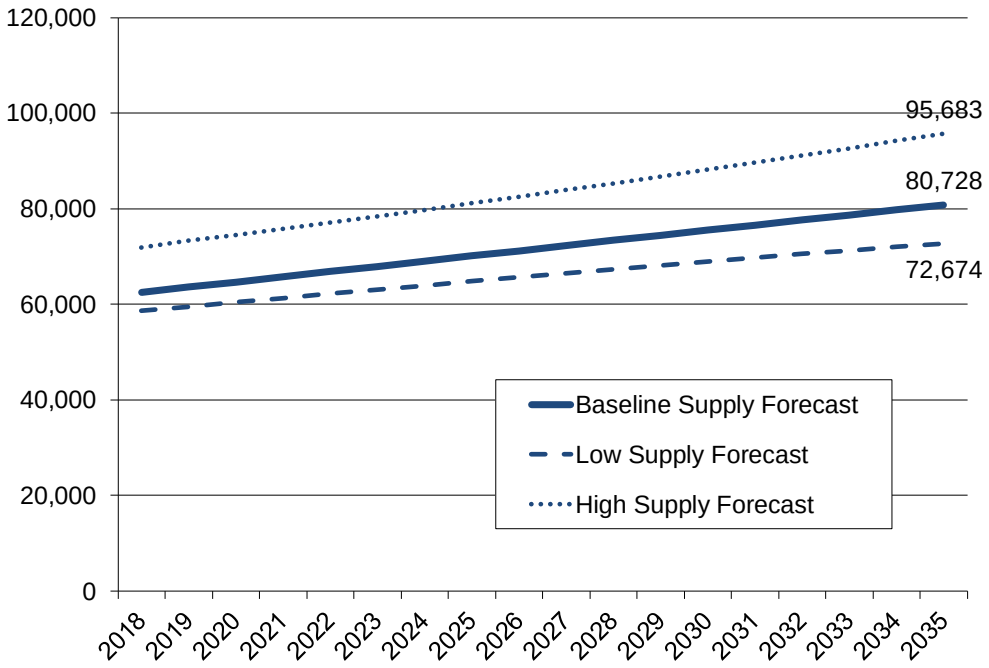
Table 9. Hours worked per week by employed RNs in the San Francisco Bay Area region

Source: Spetz, J, Chu, L, Jura, M. 2017. 2016 Survey of Registered Nurses. Sacramento, CA: California Board of Registered Nursing.

Age group	Actual region 2016	Low estimate	High estimate	Baseline estimate
Under 25	34.9	34.9	47.1	41.0
25-29	41.4	35.8	41.4	38.6
30-34	34.6	34.6	36.6	35.6
35-39	34.1	34.1	36.2	35.2
40-44	34.6	34.6	37.0	35.8
45-49	34.4	34.4	37.4	35.9
50-54	36.1	36.1	37.6	36.9
55-59	36.6	36.6	37.4	37.0
60-64	35.6	35.3	35.6	35.4
65-69	34.5	32.0	34.5	33.3
70-74	31.5	24.0	31.5	27.7
75-79	29.2	18.8	29.2	24.0
80+	7.0	7.0	31.1	19.1

Figure 3 presents projected high, low, and baseline estimates of FTE supply of actively licensed RNs for the San Francisco Bay Area region. These estimates in 2035 range from 72,674 to 95,683 in 2035, demonstrating the importance of assumptions about education program growth and labor force participation of RNs.

Figure 3. Forecasted full-time equivalent supply of RNs, 2018-2035



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 in determining demand 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 newborn deliveries being attended by a skilled birth attendant (WHO 2006). Similarly, demand for RNs could be defined as a specific number of nurses per capita. It is important to recognize, however, that demand based on population needs is not the same thing as demand based on economic factors. 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 decide that investment in a new electronic health record will produce more value to patients. In this context, demand for nurses is derived from economic forces, which may not be aligned with population needs.

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

- Fixed benchmarks based on current RN-to-population ratios in the region
- Fixed benchmarks based on U.S. RN-to-population ratios
- Demand forecasts based on 2015 hospital patient days, employment in hospitals, and future population growth and aging
- Regional employment forecasts for 2024 published by the California Employment Development Department (EDD 2017)

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. For decades, California has had one of the lowest ratios of employed RNs per capita in the U.S., usually ranking in the bottom 5 nationwide. Many policy advocates have supported efforts to increase California's FTE employment of RNs per capita to be on par with that of other states, targeting either the current 25th percentile ratio (916 RNs per 100,000) or the national average ratio (1,038 RNs per 100,000). Data on the current and forecasted population of the San Francisco Bay Area region (California Department of Finance 2018) were used to calculate the number of RNs that would be needed to maintain the current RN-to-population ratios, reach the 25th percentile ratio, and reach the national average ratio.

The main shortcoming of targeting a fixed number of RNs per population, such as a national average, is that the target may not reflect the unique population and health care system of the state or region. An additional shortcoming is that fixed nurse-to-population ratios do not account for increased demand for health care services resulting from an increase in the number of persons with insurance coverage or an aging population.

Forecasts based on hospital staffing of RNs per patient day

A second approach to forecasting demand for RNs is to use current hospital utilization and staffing patterns to estimate growth in future demand for RNs. The first step in this process was to obtain the total number of hospital patient discharges in 2015 (the most recent data available) from short-term, acute-care hospitals in the San Francisco Bay Area region (Office of Statewide Health Planning and Development 2016). In order to estimate the total number of patient days per age group (10-year ranges), these data were multiplied by the average length of stay per age group, as reported by Hospital National Inpatient Statistics (AHRQ 2014).

To calculate the rate of hospital utilization per age group, the total number of patient days per age group was divided by the estimated population of each age group in the region. Age-specific population estimates and forecasts were sourced from the California Department of Finance (2018). These rates of patient days per age group were then applied to the population projections to forecast total patient days by age group.

To produce forecasts of hospital demand for RNs, RN hours per patient day were calculated using OSHPD's Hospital Annual Financial Data (Office of Statewide Health Planning and Development 2017). In 2016, a total of 43,855,081 productive RN hours were reported by hospitals in the San Francisco Bay Area region. The number of RN hours per discharge was calculated by dividing total productive RN hours by the number of patient days in 2017, resulting in an estimated 13.03 productive RN hours per patient day. Multiplying the number of productive RN hours per patient day by the forecasted total number of patient days produces an estimate of hospital-based RN hours needed in the future. To equate these estimates to FTE jobs, RN hours were divided by 1,768 (average annual productive hours per FTE), resulting in 24,805 FTE RN employment in 2017.

The calculations described above provide demand forecasts for only one type of care setting (hospitals), and only for a subset of hospitals (long-term hospitals and federal hospitals are not included in the calculations). The 2016 BRN Survey of Registered Nurses indicates that total FTE employment in the San Francisco Bay Area region was 61,107 (Spetz et al. 2017); thus, total RN employment was 2.46 times greater than hospital RN employment. To forecast total demand for RNs, it was assumed that total RN demand would continue to be 2.46 times greater than hospital RN demand in future years. The projections indicate there will be a need for 34,807 FTE RNs in hospitals and 85,747 FTE RNs throughout the region in 2035.

Employment Development Department forecasts

The most recent projection by the California Employment Development Department (EDD) indicates that there will be 67,610 RN jobs in the San Francisco Bay Area region in 2024 (California Employment Development Department 2018). The

EDD projection does not distinguish between full-time and part-time jobs. To estimate the FTE employment implied by the EDD projection, an adjustment factor of 0.872 was used, which is the average number of hours worked per week by RNs in the region in 2016 (34.87), divided by 40 (Spetz, Chu, and Jura 2017). This results in a projected 58,945 FTE jobs across the region in 2024.

Comparing the demand forecasts

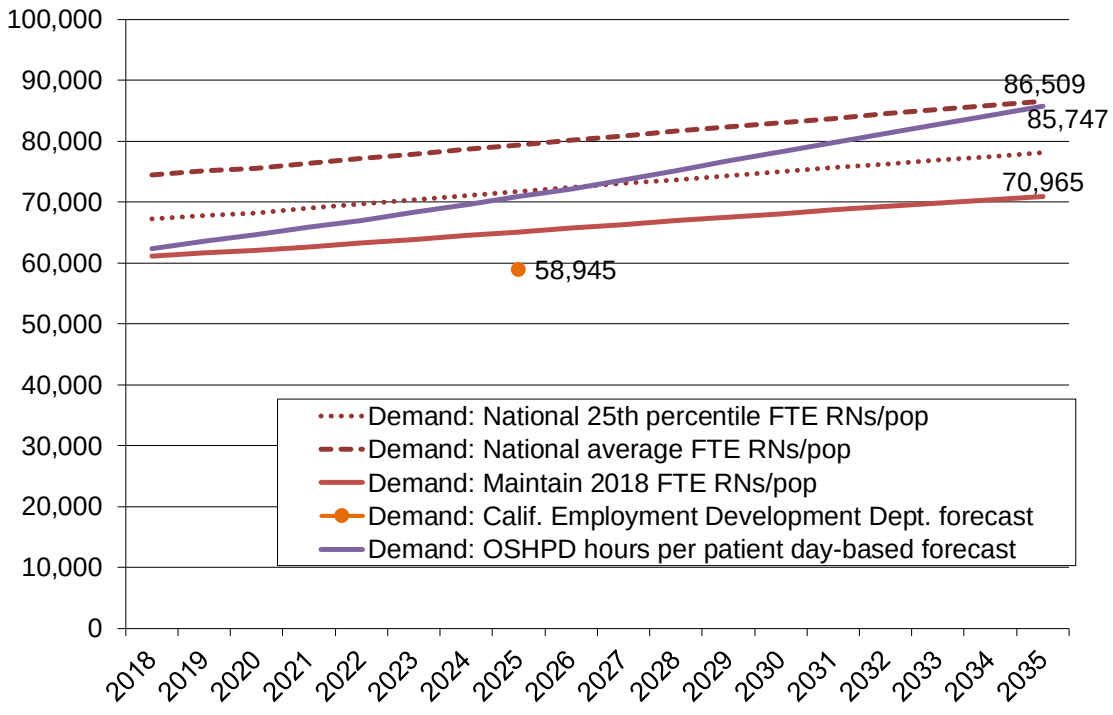
Figure 4 compares alternative forecasts of demand for full-time equivalent RNs. In order to maintain the current RN-to-population ratio in the San Francisco Bay Area region, 8,050 FTE RNs will be needed in 2035. The forecast based on projected growth in hospital utilization results in 70,965 FTE RNs needed in 2035. To reach the national average ratio of RNs per population, 86,509 FTE RNs will be needed in 2035. Figure 4 also shows that the projected number of FTE RN jobs in 2024 derived from EDD is notably lower than any of the other demand projections.

Comparing Supply and Demand for RNs

Figure 5 compares the baseline supply forecast and the low supply forecast with three alternate demand forecasts: (1) demand based on attaining the national per capita ratio at the 25th percentile; (2) demand based on attaining the national average per capita ratio; and (3) demand based on forecasted growth in hospital patient days. All forecasts are for FTE employment.

The baseline supply forecast estimates that in 2018 there were 62,507 FTE RNs available to work; the low supply forecast estimates there were 58,586 FTEs. The projections of RN demand based on hours per patient day (OSHPD data) indicate there was demand for 62,325 RNs that year, suggesting the market was fairly well-balanced. It is worth noting that RN supply in 2018 was 7.1% lower than demand based on the national per capita ratio at the 25th percentile. In the long term, the baseline supply forecast predicts that nurse supply will increase more slowly than projected demand based on OSHPD

Figure 4. Forecasted full-time equivalent demand for RNs, 2018-2035



data. Thus, the labor market is projected to have a 5.8% shortage of RNs compared with the demand forecast based on hours per patient day by 2035.

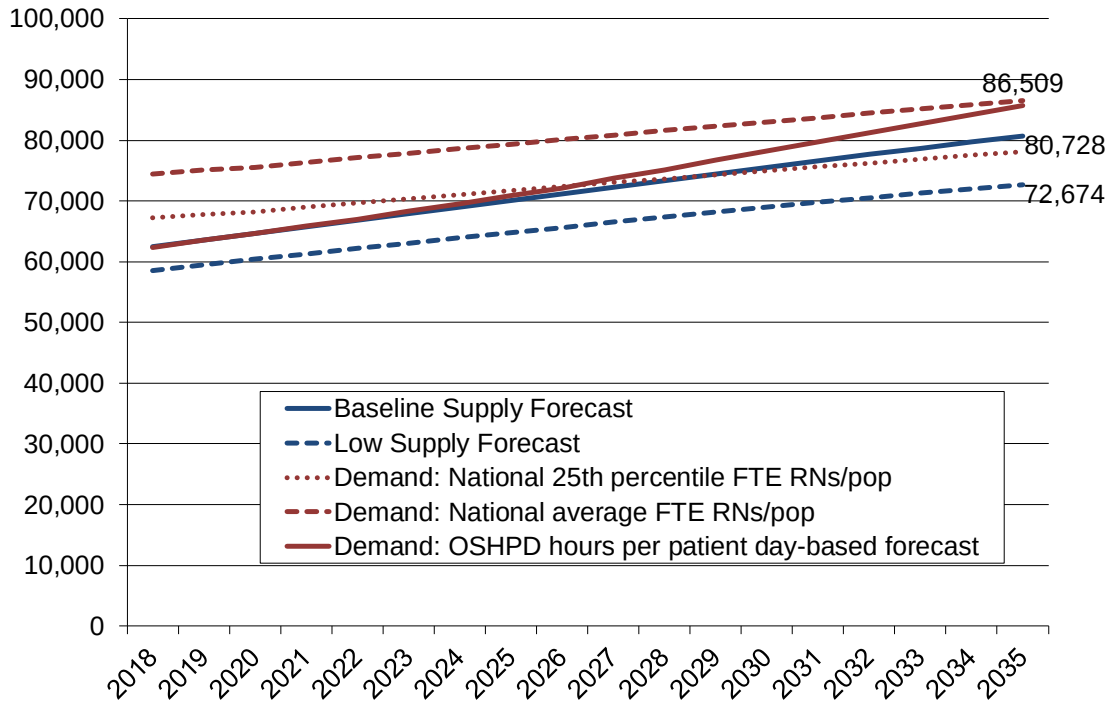
Additional factors that affect regional RN shortages

Some RNs travel across regions for work, which could result in fewer or more nurses working in the San Francisco Bay Area region. Data from the 2016 BRN Survey of RNs indicate that 98.5% of employed RNs who lived in the San Francisco Bay Area region also worked in the region. Approximately 1000 RNs with San Francisco Bay Area addresses worked in other regions, with most of those working in the Central Coast or Sacramento areas. Conversely, some nurses living in other regions worked in the Northern region: approximately 907 from Sacramento, 1,064 from the Central Valley, and 328 from Northern counties. In sum, in 2016 the San Francisco Bay Area region had an estimated 1,500 more RNs crossing regional boundaries to work in the area versus to work outside the area.

A second factor that may affect the supply of RNs is that some are also advanced practice RNs (APRNs) – nurse practitioners (NPs), certified nurse-midwives (CNMs), clinical nurse specialists (CNSs), and nurse anesthetists (CRNAs). Both the supply projections and the projections of demand for RNs based on RN-to-population ratios and hospital patient utilization treat all these APRNs as RNs. The EDD projection does not include APRNs. In the San Francisco Bay Area region, 4.9% of RNs are NPs, 0.5% are CNMs, and 0.6% are CRNAs. If these APRNs are not considered part of the RN supply, together they reduce the region's baseline supply by approximately 6% (4,050 RNs).

Hospital employment data sourced from OSHPD were examined to identify the number of RN hours worked by contract personnel in 2016. 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 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. The OSHPD data indicated that the average share of hospital RN hours provided by contract staff

Figure 5. Forecasted full-time equivalent supply and demand for RNs, 2018-2035



in the San Francisco Bay Area region was 6.2%, equivalent to a total of 1,953 FTE RNs.

Overall assessment of RN labor market in the region

Together, data on inter-regional commuting, the size of the advanced practice workforce, and the employment of agency personnel suggest that RN supply in the San Francisco Bay Area region might be 2,500 fewer than the model calculation, and demand might be approximately 2,000 greater in 2018. The baseline supply and demand forecasts estimate that the region has balanced RN supply and demand, but the addition of inter-region commuting and use of contract RNs suggests that the San Francisco Bay Area region may have a shortage of more than 4,000 FTE RNs (6.4%) in 2018. In the long-term, the demand for RNs will grow more rapidly than supply in the San Francisco Bay Area, leading to a shortage of 10% or more.

Policy Implications

The San Francisco Bay Area region of California may have a small shortage of RNs in 2018, and projected growth in supply will not keep pace with projected growth in demand for RNs. If the number of RN graduations declines in this region – even a small amount – a shortage is likely.

These projections could change if any of the variables in the model change. The most important changes that could change the projections are increases or decreases in: (1) the number of graduates from RN education programs; (2) inter-regional migration; and/or (3) employment rates of RNs. These factors and any other potential influences on the San Francisco Bay Area region's nursing supply, 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.

Regional health care and education 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 monitor new student enrollments in nursing programs, as well as the degree to which employers are reliant on contract personnel and commuters, to determine the extent to which local RN education programs should expand.

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