

# **Regional Forecasts of the Registered Nurse Workforce in California**

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## Executive Summary

A model of the supply of registered nurses (RNs) in California was developed and used to forecast the supply of full-time equivalent (FTE) RNs in eight California regions through 2030. The model takes into account the age distribution of the RN workforce, movements of RNs into and out of California, nursing program graduations, inter-regional migration, the variation in hours worked by RNs, and the fact that some RNs with active licenses do not work in nursing. The main sources of data were data obtained from BRN licensure records, the California Board of Registered Nursing (BRN) 2004 Survey of RNs, the National Sample Survey of Registered Nurses, and the Internal Revenue Services.

New forecasts of the demand for RNs were developed for this analysis. All the demand forecasts were based on population growth forecasts obtained from the California Department of Finance, combined with data from the California Office of Statewide Health Planning and Development (OSHPD), and a survey of Chief Nursing Officers (CNO survey) co-sponsored by California's Nurse Workforce Initiative, the Hospital Association of Southern California, and the California Institute for Nursing and Health Care. Future hospital patient days were forecasted based on current hospital utilization by population age groups and forecasted population growth. The CNO survey was used to calculate the average number of budgeted RN positions per patient day, and this ratio was used to forecast the number of future RN positions based on forecasted patient days.

The forecasts demonstrate that:

- Most regions of California face a shortage of RNs now.
- All California regions will have a shortage of RNs by 2012.

- The shortage will worsen in all regions between 2012 and 2030, unless policies are enacted to address the problem.
- The greatest number of nurses is needed in the Los Angeles region, which is estimated to have a shortage of 10,000 full-time equivalent RNs. However, the greatest rate of growth in RN supply is needed in the Central Coast region. This region would need at least 25% more full-time equivalent RNs to meet estimated demand.
- By 2030, the Northern Counties region is forecasted to have the greatest share of unfilled RN positions, with nearly 40% of jobs vacant. The Sacramento, Bay Area, Central Valley, and Central Coast regions are forecasted to have over 30% of RN full-time equivalent jobs vacant.
- The largest number of vacant full-time equivalent positions in 2030 is expected to be in Los Angeles, which is forecasted to need over 20,000 additional RNs.

## Introduction

This report presents forecasts of supply and demand for RNs in regions of California. A previous report estimated future supply and demand for RNs statewide, finding a current and widening gap between the supply of and demand for RNs through at least 2030, with demand outstripping supply by between 99,945 and 122,223 full-time equivalent (FTE) RNs by 2030 (Spetz and Dyer, 2005).

In forecasting regional RN supply, this analysis takes into account the aging of the RN workforce, new graduates (including those from international nursing programs), intra-state movements of RNs, interstate flows of RNs, and changes in license status. Estimates of the future demand for RNs were developed using data from the California Office of Statewide Health Planning and Development (OSHPD), California Department of Finance (DOF), and a survey of Chief Nursing Officers (CNO survey) co-sponsored by California's Nurse Workforce Initiative, the Hospital Association of Southern California, and the California Institute for Nursing and Health Care.

Most data sources used for this analysis do not have adequate information to estimate county-level RN supply and demand. Moreover, RN labor markets are not likely to be specific to individual counties; many RNs commute across county lines within regions of the state. Thus, this analysis adapts the California Economic Strategy Panel regions, which are contiguous multi-county regions (see Table 1). The California Economic Strategy Panel, which was established by statute in 1993 and placed under the responsibility of the California Labor & Workforce Development Agency in 2003, engages in an objective and collaborative biennial planning process that examines economic regions, industry clusters, and cross-regional economic issues. Our Region 1 is comprised of the northern Sacramento Valley and other northern counties; The

California Economic Strategy panel divides the northern Sacramento Valley and northern counties into two regions, but we do not have enough data to create separate forecasts for each region. Our Region 2 is the metropolitan Sacramento area, including the foothill counties of Placer and El Dorado. Region 3 is the ten-county San Francisco Bay Area. Region 4 is the central San Joaquin Valley and central Sierra counties, which the California Economic Strategy Panel considers separate regions, but data limitations require us to combine them. Region 5 consists of central coast counties. Region 6 includes Los Angeles, Ventura, and Orange counties, and Region 7 is the Inland Empire of Riverside and San Bernardino counties. The California Economic Strategy Panel combines the Los Angeles and Inland Empire regions; however, because there are differences in demographic trends between these areas, and there is sufficient data, we decided to examine them separately. Region 8 is comprised of San Diego and Imperial counties, which border Mexico.

What follows is a description of the basic structure of the forecasting model, how individual components of the model were estimated, and findings concerning the future supply of California’s RN workforce relative to future demand.

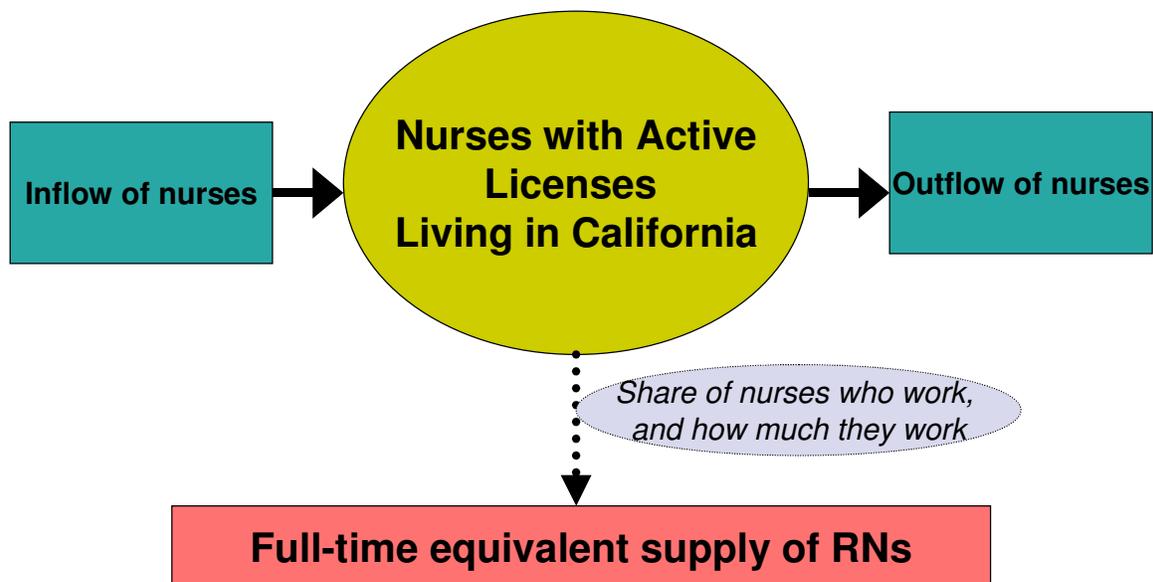
**Table 1: California Regions**

Reg. #	Region Name	Counties in region
1	Northern California	Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Siskiyou, Sierra, Tehama, Trinity
2	Sacramento Area	El Dorado, Placer, Sacramento, Sutter, Yolo, Yuba
3	Bay Area	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma
4	Central Sierra and San Joaquin Valley	Alpine, Amador, Calaveras, Fresno, Inyo, Kern, Kings, Madera, Mariposa, Merced, Mono, San Joaquin, Stanislaus, Tulare, Tuolumne
5	Central Coast	Monterey, San Benito, San Luis Obispo, Santa Barbara
6	Los Angeles Area	Los Angeles, Orange, Ventura
7	Inland Empire	Riverside, San Bernadino
8	Southern Border Region	Imperial, San Diego

## Basic Structure of the Supply Forecast Model

California's RN workforce is in constant flux due to a variety of factors characterized as inflows and outflows of RNs. In the forecasting model, the parameters driving the inflow and outflow of RNs in California are estimated, and these estimates are applied to the number of RNs with active licenses who were California residents as of April 2005 (254,945). Furthermore, this model explicitly takes into account the age distribution of RNs with active California licenses, and estimates inflow and outflow parameters for each age category. Data on the current number and age distribution of California's active RN workforce was obtained directly from the BRN. Figure 1 illustrates the stock-and-flow model of the supply of RNs in California. In this model, there is a pool of RNs (the "stock") that comprise the potential supply of labor. Nurses move into and out of this stock ("flows"), changing the available stock. Working RNs are drawn from the stock available in each year. More details about the model are provided below.

**Figure 1. A Model of the Supply of RNs**



Factors that comprise the inflow and outflow of active RNs for each California region are as follows:

### **Inflows**

- New graduates from U.S. nursing programs who obtain first RN license in the region
- Graduates of international nursing programs who immigrate to the region
- Interstate migration of RNs to the region
- Intra-state migration of RNs to the region
- RN movement from inactive to active license status

### **Outflows**

- RN movement from active to inactive license status
- Migration out of California (to another state or country)
- Inter-regional migration (to another region within California)

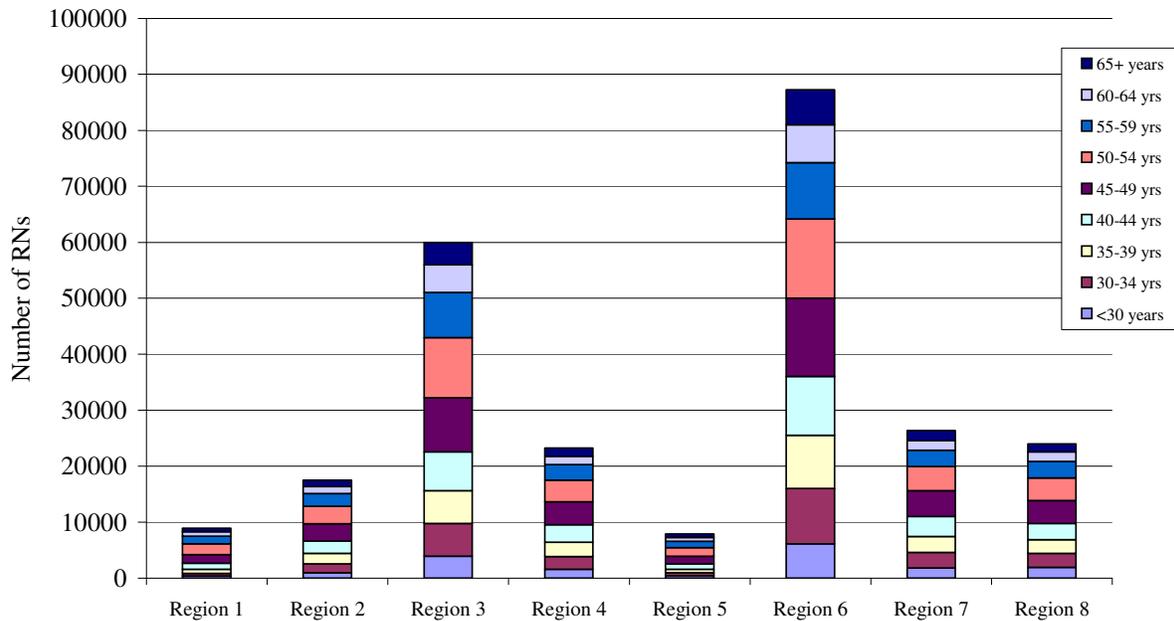
As these components change over time, so does the RN workforce. At first glance, it seems clear that as long as the inflow of RNs is greater than the outflow, the RN workforce is increasing over time. However, such an obvious comparison between total inflow and outflow does not take into account the aging of the RN workforce. Simply put, the age distribution of RNs as well as the age distribution of each inflow and outflow component matters. Thus, the model “ages” each age cohort to address this point.

The total number of RN licenses in California was 298,513 in April 2005. However, some of these license holders do not live in California. Since the focus of this report is on the long-term supply of RNs in California, nurses living outside California are not included in the forecast model. Instead, the starting point for the model is the total number of RNs with active

licenses who have a California address according to BRN records – 254,945 as of April 2005.

Figure 2 describes the population of RNs in each region of California.

**Figure 2: Number and Age Distribution of RNs in California Regions**



Source: California Board of Registered Nursing, 2005

The forecast equation can be summed up in the following manner. First, RNs with active licenses who reside in each region are divided into nine age categories: under 30, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, and 65 and older. Second, one-fifth of RNs in each age category are assumed to move into the next (older) age category each year after 2005. Third, the inflow estimates are added to the workforce, the outflow estimates are subtracted from the current supply of RNs. This process is done for each year through 2030 to obtain forecasts of each region’s RN workforce.

## Estimates of RN Inflows and Outflows

This section describes how the inflow and outflow rates and figures were estimated.

Each inflow and outflow component is addressed separately.

### **Inflows**

#### *New graduates from nursing programs*

Data on new graduates from California nursing programs were obtained from the BRN Annual Schools Report for the 2004-2005 academic year. According to the report, there were 6,598 new graduates from California nursing programs in the 2004-2005 school year<sup>1</sup>.

Graduations from California nursing programs in future academic years could be higher, due to recent grants that have allowed some nursing programs to enroll more students. At this time, however, it is not known whether the grants supporting expansion of nursing programs will last more than a few years. Since the model requires a constant number of graduates per year, the 2004-2005 data are used. Table 2 presents the numbers of graduates in each region of California. The BRN Annual Schools Report provides the age distribution of new graduates of California nursing programs in ten-year age categories, which were allocated to the five-year categories used in the forecasting model.

**Table 2: Graduations from California RN Programs, 2004-2005**

Region	Graduates
1 – Northern Counties	247
2 – Sacramento	403
3 – Bay Area	1,516
4 – Central Valley & Sierra	765
5 – Central Coast	149
6 – Los Angeles	2,239
7 – Inland Empire	586
8 – Southern Border	693

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<sup>1</sup> The 2004-2005 school year corresponds to August 1, 2004 through July 31, 2005.

### *Graduates of international nursing programs who immigrate to California*

According to the BRN, 3,684 non-U.S.-educated candidates passed the NCLEX-RN exam in California and received a California nursing license during the 2003-2004 fiscal year. However, California is a gateway state for non-U.S.-educated nurses seeking to practice in the U.S. This means that some of these nurses apply for endorsement to another state soon after obtaining their California license. These nurses are captured in the estimates of migration out of California, and thus it is not necessary to account for them at this point in the model.

Immigration rules for internationally-educated RNs have been changing in recent years, so it is difficult to estimate how many foreign RNs will contribute to the California workforce in the future. In this model, it is expected that there will be moderate growth in RN immigration, and thus the number of foreign-educated RNs moving to California each year is estimated to be 4,000. To allocate these RNs to regions, the BRN 2004 Survey of RNs was used to calculate the regions of residence of California RNs who graduated from foreign nursing programs between 2001 and 2003. The distribution of foreign-educated RNs to regions is assumed to remain constant in the future. These data are summarized in Table 3.

Data from the BRN 2004 Survey of RNs were used to assess the age distribution of immigrant RNs. The sample was restricted to respondents who were active RNs, who reported that their home zip code was in California (question 65), who graduated from a nursing program outside of the U.S. (question 50), and who were first licensed as an RN in California between the years 2001 and 2003 (question 57). From this sample of 115 international graduates, the percent that fell into each of the nine age categories was calculated. This model assumes that the age distribution of foreign-educated RNs will be constant across California.

**Table 3: Estimates of Foreign-Educated RN Immigration to California Regions**

Region	% of foreign-educated 2001-03 graduates in region*	Estimated immigration, based on statewide total of 4000
1 – Northern Counties	1.0%	40
2 – Sacramento	6.7%	267
3 – Bay Area	25.7%	1,027
4 – Central Valley & Sierra	1.0%	40
5 – Central Coast	6.7%	267
6 – Los Angeles	42.3%	1693
7 – Inland Empire	13.3%	533
8 – Southern Border	3.3%	133

\* Region 1 and Region 4 had no recent foreign-educated graduates in the 2004 BRN Survey. Because the total sample size was small, it was assumed that the rate will be 1% to each region, and reduce the percent share of the Regions 3 and 6 by one percentage point each to compensate.

#### *Interstate migration of RNs to California*

Estimates of interstate migration of RNs to California were created using data from the Internal Revenue Service (IRS), the National Sample Survey of RNs, and data provided by the Board of Registered Nursing.

The IRS reports county-to-county migration based on tax returns. For each California county, the IRS reports the number of tax returns (and exemptions) filed in a year, and then the counties from which those returns were filed the next year. These data are primarily used to predict how many RNs will move to a region from other California regions. Three years of migration data were used for this analysis – movements from 2001 to 2002, from 2002 to 2003, and from 2003 to 2004 – to calculate three-year average migration rates from the number of returns and from the number of exemptions filed. These two rates were averaged to obtain an overall migration rate. We assumed that RNs migrate at the same rate as the overall population.

The Board of Registered Nursing provided data on the number of RNs from other states who requested endorsement of their license to California.<sup>2</sup> BRN provided fiscal year 2003-2004 data on all active RN licenses obtained by endorsement and the age distribution of these RNs. Only those who had a California address in 2003-2004 were counted towards this estimate. These data provide an estimate of migration to California that is probably lower than the true number, because some RNs are likely to apply for endorsement before moving to California.

The 2000 National Sample Survey of Registered Nurses also was used to examine interstate migration. The National Sample Survey asked respondents about their current and former state of residence. Specifically, it asked the following three questions: (1) where were you living on March 22, 2000 (question 30); (2) did you reside in the same city on March 22, 2000, and on March 22, 1999 (question 31a); and (3) if the answer to 31a is “no,” where were you living on March 22, 1999 (question 31b). The number and age distribution of RNs who did not reside in California in 1999, but did in 2000, were estimated using the variables corresponding to these questions in the 2000 National Sample Survey of RNs. This number is likely larger than the true number that will migrate in the future, because 1999-2000 was the peak of the last economic cycle, during which many people moved to California.

To forecast the number of RNs who will move from other states to each region of California, it was assumed that the total number of RNs that will move to California is the midpoint of the estimates calculated from the BRN endorsement data and the National Sample Survey of RNs. The age distribution of these RNs was assumed to be the average of the age distributions calculated from these two data sources. The shares of RNs who moved to each

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<sup>2</sup> A person who holds a current and active RN license in another state, has completed an educational program meeting all California requirements, and has passed the National Council Licensure Examination (NCLEX-RN) or the State Board Test Pool Examination (SBTPE) may apply for a California RN license. This is referred to as licensure by endorsement.

region from out of state were then calculated using the IRS tax return data, assuming that each region's age distribution would be the same as the statewide distribution. These shares were applied to the total estimate of migration into California to get regional estimates. These are presented in Table 4.

**Table 4: Estimates of Migration of Out-of-State RNs to California Regions**

Region	% of out-of-state RNs who move to this region	Estimated in-migration, based on statewide total of 5225
1 – Northern Counties	3.0%	156
2 – Sacramento	5.9%	308
3 – Bay Area	23.9%	1249
4 – Central Valley & Sierra	7.0%	365
5 – Central Coast	3.8%	197
6 – Los Angeles	30.4%	1588
7 – Inland Empire	9.2%	481
8 – Southern Border	16.8%	879

*Movements from region to region within California*

The IRS tax return reports were also used to estimate the movements of RNs from region to region within California. From these reports, the share of RNs in each region that are expected to stay in the region was calculated, as was the share that will move to each of the other regions. Three-year average migration rates were calculated from the number of returns and from the number of exemptions filed. These two rates were averaged to obtain an overall migration rate. These movements are used dynamically in the forecasting model, so that the number of RNs forecasted for each year is allocated across regions in the next year. Table 5 presents the region-to-region movement rates calculated from the IRS data.

The inter-region estimates assume that RNs move across regions at the same rate as other taxpayers. The rate of regional movement also is assumed to be the same for all age groups,

which is unlikely. However, since there were no good data with which to estimate migration by age group, these estimates are the best available. The regional migration data reveal that people in the central coast region are more likely to move to a new region than people in other regions; people in the Los Angeles region are least likely to move.

**Table 5: Estimates of Inter-Regional Migration of RNs in California**

From Region...	To Region...							
	1	2	3	4	5	6	7	8
1 – Northern Counties	97.72%	0.86%	0.74%	0.15%	0.09%	0.20%	0.11%	0.13%
2 – Sacramento	0.38%	97.88%	0.79%	0.38%	0.08%	0.26%	0.09%	0.14%
3 – Bay Area	0.20%	0.60%	97.63%	0.71%	0.17%	0.42%	0.09%	0.18%
4 – Central Valley/Sierra	0.06%	0.32%	0.57%	98.22%	0.16%	0.39%	0.14%	0.15%
5 – Central Coast	0.13%	0.26%	0.95%	0.70%	96.50%	0.97%	0.21%	0.28%
6 – Los Angeles	0.03%	0.06%	0.22%	0.15%	0.07%	98.35%	0.91%	0.21%
7 – Inland Empire	0.04%	0.07%	0.14%	0.16%	0.06%	1.83%	97.27%	0.42%
8 – Southern Border	0.05%	0.09%	0.29%	0.16%	0.08%	0.76%	0.87%	97.69%

*Movements from inactive to active status*

Data were obtained from the BRN on the number of RNs with California addresses changing from inactive to active license status in the 2003-2004 fiscal year, by age category. Only 303 RNs made this transition. To allocate these transitions to regions, the statewide number was divided among the regions according to the number of licensed nurses per region.

*Total Estimated Inflow*

The total number of RN inflows to each region by age category is the sum of the estimated numbers of new graduates from the region’s nursing programs, international graduates who locate in the region, RNs who migrate to the region from other states, RNs who migrate from other regions within California, and inactive RNs who change to active license status.

## **Outflows**

### *Movements from active to inactive status*

Several data sources were used to estimate the share of California RNs who transition from active to inactive license status each year. First, data were used from the BRN on the number of RNs with California addresses changing status in fiscal year 2003-2004, by age category. These figures were divided by the number of current active RNs to obtain a transition rate.

Second, the 1996 and 2000 National Sample Surveys of RNs was used to obtain an alternative estimate of RN transitions from active to inactive status. The number of RNs who were U.S. residents in 1996 was calculated, by age category. This was added to the number of RNs (U.S. residents only), by age category, who responded in the 2000 survey that they received their first U.S. license between 1996 and 2000. Then the number of RNs who were U.S. residents in 2000 was calculated, by age category.<sup>3</sup> The formula for estimating the number going “inactive” is: Number of RNs in 2000 – Number of RNs in 1996 – Number newly licensed between 1996 and 2000. (Note: only U.S. residents are included in these calculations.)

To translate these estimates into rates of going inactive by age category, it was assumed that the same number of RNs went inactive in each age category between 1996 and 2000. Thus, there are four rates (one for each of 1996-97, 1997-98, 1998-99, and 1999-2000), for each age category. These were averaged and the resulting percentages are estimated annual rates of going inactive for each age category. Rates that were negative or less than one percent are considered to be effectively zero.

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<sup>3</sup> The survey item used was q32\_yr, and the analysis focused on cases where q32\_yr = 1996-2000. The RNs were “aged” from the 1996 National Sample Survey of RNs by 4 years, so the age categories for which estimates were obtained using the 2000 National Sample Survey are 4 years older.

The inactive transition rates calculated from these two data sources are different from each other, with the BRN estimates being lower than the National Sample Survey estimates. Table 6 presents these estimated rates of movement from active to inactive status, by age category. These two rates are averaged for the forecasts, except when the high rate was equal to 0%, in which case the low rate is used. The rate of movement to inactive license status is assumed to be the same for each region of California.

**Table 6: Estimated Annual Rate of RNs Moving from Active to Inactive Status, by Age Category**

Age Category	Estimate used in forecasts	Low Rate Estimate (Source: BRN)	High Rate Estimate (Source: National Sample Survey)
<30	0.1%	0.1%	0%
30-34	0.4%	0.4%	0%
35-39	0.5%	0.5%	0%
40-44	0.6%	0.6%	0%
45-49	0.5%	0.5%	0%
50-54	1.0%	0.7%	1.4%
55-59	1.7%	0.9%	2.5%
60-64	3.5%	1.8%	5.1%
65+	9.0%	4.8%	13.2%

*Migration out of California (to another state or country)*

The IRS county-to-county migration data were used to estimate movement out of California to other states or nations. The rate of movement to a non-California address was computed for each California county, for 2001-02, 2002-03, and 2003-04. Three-year average migration rates were calculated from the number of returns, and then three-year average migration rates were calculated from the number of exemptions filed. These two rates were averaged to obtain an overall out-of-state migration rate for each region.

The 2000 National Sample Survey data were used to estimate the age distribution of nurses moving out of California. The same variables were used to calculate migration of RNs out of California as were used to calculate migration into California. All estimates from the 2000 National Sample Survey of RNs were weighted using sample weights provided in the National Sample Survey. Thus, estimates were obtained of the number and age distribution of RNs who moved out of California between March 22, 1999 and March 22, 2000.

#### *Movements from region to region within California*

Movements out of each region to other California regions were estimated as the adjunct of the estimates of movements into regions from other California regions. In other words, one region's loss is another region's gain. These estimates were calculated using the IRS tax return reports. Table 5 presents the region-to-region movement rates calculated from the IRS data.

#### *Total Estimated Outflow*

The estimated rates of movements to inactive status, migration out of California, and migration out of each region are combined to obtain a total rate of outflow for each age category and region. Multiplying this by the current active RN population in California results in estimated RN outflow figures for each age category and region.

## Supply Forecasts of California's RN workforce

To create a forecast of the total number of RNs with active licenses in each region of California, one-fifth of RNs in each age category is assumed to move into the next age category every year after 2005. In this manner, the workforce is “aged”. For each age category, the basic formula is: Current supply of RNs as of April 2005 + Estimated total inflows – Estimated total outflows. For the population under 30, 80% are assumed to remain in this age category in the following year. For subsequent age categories except those over 64, 80% of the previous year remains in the category, and 20% of the younger cohort from the previous year enters the next age category. For the over-64 cohort, 100% of the previous year remains and 20% of those 60-64 in the previous year enter the category.

A forecast of the total active RN population residing in each region of California through 2030 is produced using this formula. These forecast figures, however, do not account for the variation in hours worked by RNs and the fact that some RNs with active licenses do not work in nursing, and, hence, overestimate the supply of working RNs. Therefore, for each age category and each region, the proportion of RNs living in California with active licenses that are employed in nursing was estimated with data from the 2004 BRN Survey of RNs (question 3). There were not enough survey respondents for some region-age categories to explicitly calculate age- and region-specific employment rates. Thus, statewide age-specific employment rates were computed. Then, region-specific employment rates were calculated, and the age-specific employment rates were adjusted for regional differences in overall RN employment. For example, the statewide employment rate of nurses aged 30 to 34 is 94.96%. The average employment rate in the San Francisco Bay Area is 81.7%, which is somewhat lower than the statewide average – specifically, the ratio of the Bay Area rate to the statewide rate is 0.965. To

estimate the employment rate for Bay Area RNs aged 30 to 34, one multiplies 94.96% by 0.965, obtaining an estimate of 91.66%. This is the estimate used in the forecasts. The sample process was used to estimate age-specific employment rates for each region. Table 7 presents these estimates.

To account for variation in hours worked by RNs, data from the 2004 BRN Survey of RNs were used to estimate, for each age category and region, the average usual hours worked per week (question 5) by active RNs who reside in California and are employed in nursing. The same method was used to estimate regional age-specific hours per week as for employment rates. Estimated hours per week were divided by 40 to obtain the average full-time equivalent (FTE) for each age category. These estimates are presented in Table 8.

**Table 7: Estimates of Age-Specific Employment Rates for California Regions**

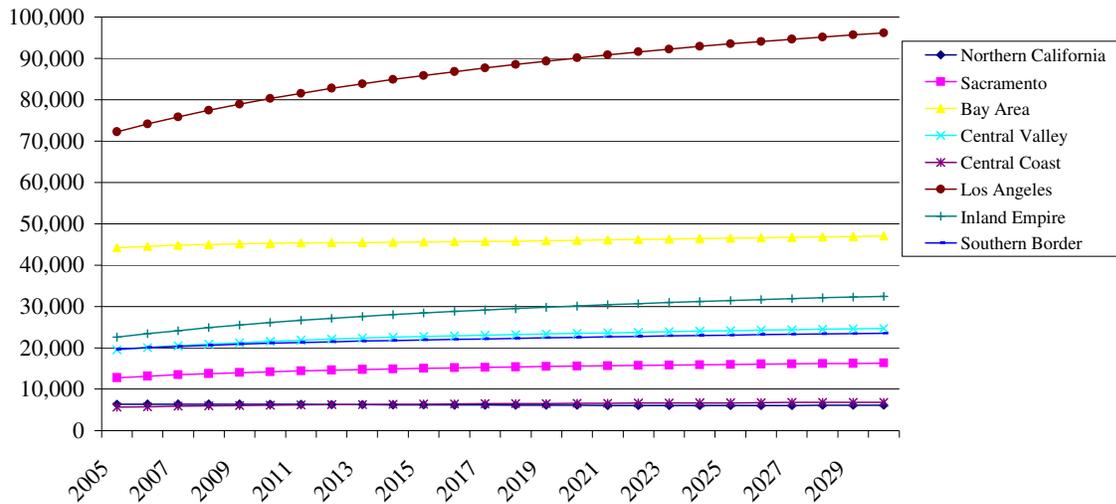
Region	< 30 years	30-34 years	35-39 years	40-44 years	45-49 years	50-54 years	55-59 years	60-64 years	65+ years
1 – Northern Counties	89.4%	88.3%	85.3%	82.2%	84.2%	85.4%	84.0%	73.2%	51.5%
2 – Sacramento	92.8%	91.7%	88.6%	85.3%	87.5%	88.6%	87.2%	76.0%	53.5%
3 – Bay Area	94.8%	93.7%	90.5%	87.2%	89.4%	90.6%	89.1%	77.6%	54.7%
4 – Central Vall./Sierra	100.0%	100.0%	97.7%	94.1%	96.4%	97.7%	96.2%	83.8%	59.0%
5 – Central Coast	97.2%	96.0%	92.8%	89.4%	91.6%	92.9%	91.4%	79.6%	56.0%
6 – Los Angeles	95.5%	94.4%	91.2%	87.8%	90.0%	91.2%	89.8%	78.2%	55.1%
7 – Inland Empire	99.4%	98.2%	94.9%	91.4%	93.7%	94.9%	93.4%	81.4%	57.3%
8 – Southern Border	97.5%	96.4%	93.1%	89.7%	92.0%	93.2%	91.7%	79.9%	56.2%

**Table 8: Estimates of Age-Specific Hours Worked per Week for California Regions**

Region	< 30 years	30-34 years	35-39 years	40-44 years	45-49 years	50-54 years	55-59 years	60-64 years	65+ years
1 – Northern Counties	35.7	35.7	34.0	34.1	36.0	35.7	36.3	35.2	26.8
2 – Sacramento	35.0	35.0	33.4	33.4	35.3	35.0	35.6	34.5	26.3
3 – Bay Area	34.6	34.6	33.0	33.0	34.8	34.6	35.1	34.1	26.0
4 – Central Vall./Sierra	36.5	36.5	34.8	34.8	36.8	36.5	37.1	36.0	27.4
5 – Central Coast	33.1	33.1	31.6	31.6	33.4	33.1	33.7	32.7	24.9
6 – Los Angeles	38.6	38.6	36.8	36.9	38.9	38.6	39.3	38.1	29.0
7 – Inland Empire	38.3	38.2	36.5	36.5	38.6	38.3	38.9	37.7	28.7
8 – Southern Border	37.1	37.1	35.4	35.4	37.4	37.1	37.7	36.6	27.9

Combining rates of employment and average FTE for each age category and applying these to the active population forecasts, forecasts of full-time equivalent RNs for each region of California were produced. These are presented in Figure 2. Anticipated growth in the RN workforce varies greatly across regions. The Inland Empire is forecasted to have 44% growth in the RN workforce between 2005 and 2030, while the Northern Counties are expected to see a decline of 4%.

**Figure 2: Forecasts of the Supply of Full-Time Equivalent RNs for California Regions, 2005-2030**



## Forecasts of the Demand for RNs

The regional forecasts of the demand for RNs are based on population growth forecasts obtained from the California Department of Finance (DOF), as well as data from the California Office of Statewide Health Planning and Development (OSHPD), and a survey of Chief Nursing Officers (CNO survey) co-sponsored by California's Nurse Workforce Initiative, the Hospital Association of Southern California, and the California Institute for Nursing and Health Care.

First, the number of hospital patient days that will be demanded in the future was estimated for each region, based on current regional hospital utilization by population age groups. Length of stay information for acute care hospitals was extracted from OSHPD's 2004 Inpatient Hospital Discharge Data, and regional patient days were calculated for each of the five age categories in the OSHPD data (i.e., under 1 year, 1-17 years, 18-34 years, 35-64 years, and 65 years and over). Then, California age-specific and region-specific population forecasts were obtained from the DOF and organized the numbers to match OSHPD's age categories. Dividing 2004 patient days by 2004 population forecasts provides the number of patient days per population for each age category and region. These ratios were applied to the DOF population projections to get patient day forecasts by age category and region.

Then, the average number of budgeted RN positions per patient day were calculated from the CNO survey. The CNO survey data indicated that statewide average per hospital budgeted RN FTEs were 332.90 in 2004. In 2004, there were 390 acute care hospitals in California, and these two figures were multiplied to get an estimate of the total number of RN FTEs budgeted by acute care hospitals in California in 2004. This figure was then divided by the statewide 2004 patient day forecast to get an estimate of the number of RN FTEs budgeted per patient day, on average, in California. Each regional forecast of future patient days was multiplied by the

statewide average budgeted FTEs per patient day to obtain demand projections of RN FTEs in acute care hospitals through 2030.

The calculations described above result in demand forecasts for only one type of employer. Demand forecasts for all employers of RNs were developed using information from the 2004 BRN Survey of RNs and the BHPPr's National Center for Health Workforce Analysis (July 2002). These sources estimate that approximately 60% of RNs work in acute care hospitals, and that this share will be constant through 2020. By assuming this percent will remain constant throughout the forecast period, the forecasts were augmented<sup>4</sup> to get total FTE RN demand projections for California regions.

Alternate demand forecasts based on the ratio of RNs per 100,000 population in each region were considered. Table 9 presents RN full-time equivalent employment per 100,000 population in each region in 2004. California's RN per 100,000 population ratio is the lowest in the United States (California Institute on Nursing and Health Care, 2006). Although it might seem a reasonable goal to maintain a stable RN-to-population ratio over time, this ratio does not measure the actual demand for RNs. A low RN-to-population ratio might reflect the existence of a shortage of RNs available to work, but it also might represent a small number of jobs available for RNs. The current RN-to-population ratio might not be adequate to meet patient care needs at the present time, nor might it be adequate to meet minimum nurse-to-patient staffing requirements in California hospitals. The forecasts based on budgeted positions are more likely to reflect the true need for RNs, and thus are used in this report.

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<sup>4</sup> Specifically, the demand forecasts for acute care hospitals were divided by 0.60 to obtain total RN demand across all employers.

**Table 9: RN FTE Employment per 100,000 in California Regions, 2004**

Region	RN FTE employment per 100,000
1 – Northern Counties	604
2 – Sacramento	575
3 – Bay Area	597
4 – Central Valley & Sierra	497
5 – Central Coast	481
6 – Los Angeles	515
7 – Inland Empire	592
8 – Southern Border	610

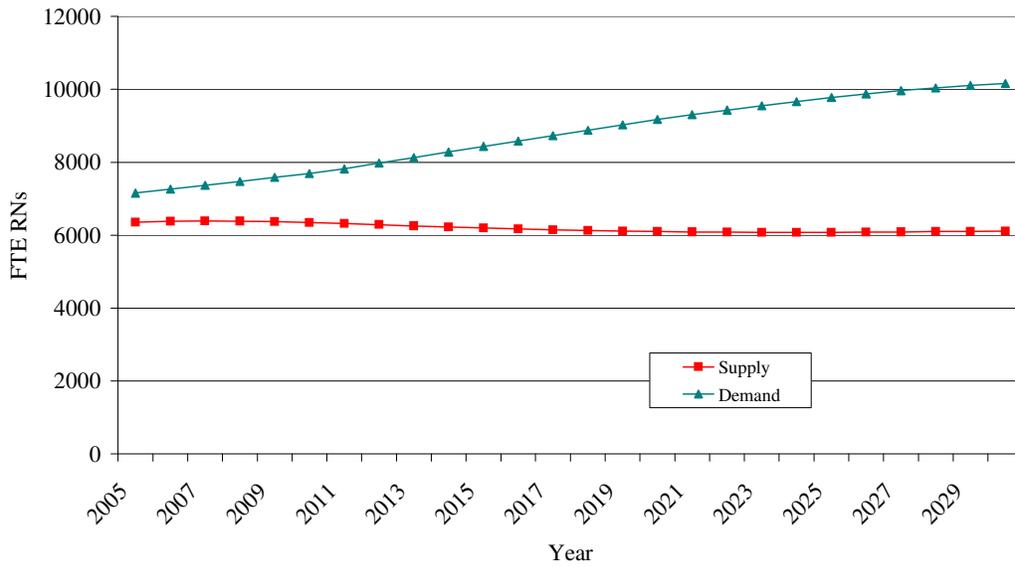
## Forecasted Shortage

Here, the forecasts of the regional supply of RNs in California are compared to forecasts of the regional demand for RNs. Figures 3 through 10 present the supply and demand forecasts for each region of California. In most regions of California, there is now a shortage of registered nurses, and shortages will grow over the next 25 years. Each region is discussed below.

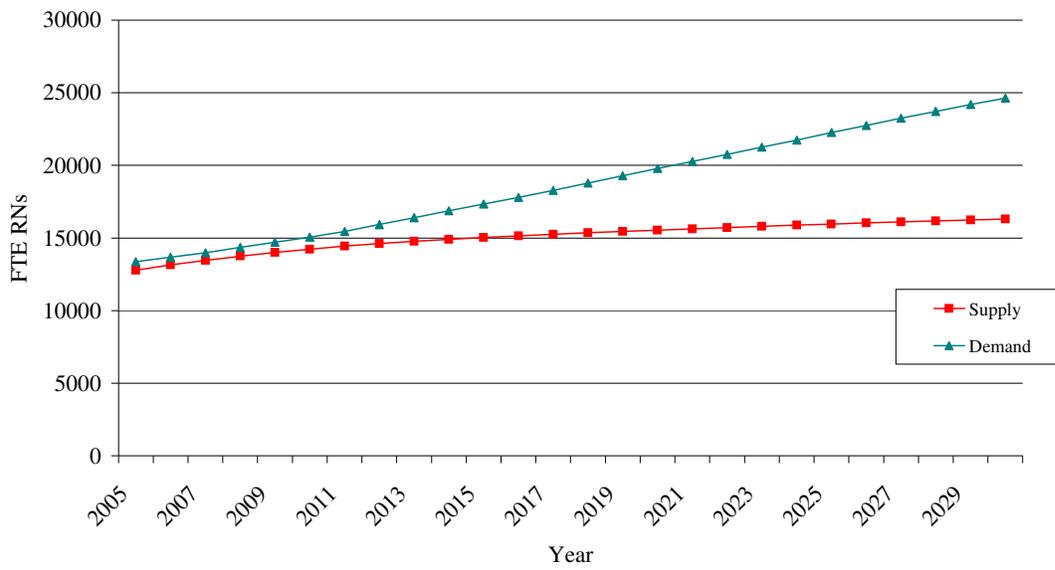
Figure 3 presents forecasts of the supply and demand for RNs for the Northern California region, which consists of all counties north of Sacramento and San Francisco. This region is mostly rural, with a few small cities such as Redding, Chico, and Eureka. There is a gap between supply and demand in this region, with a shortage of about 800 RNs. This gap represents a need for 12% more FTE RNs. The gap between demand and supply is expected to grow consistently over time to over 4000 RN FTEs, because the supply of RNs will fall unless current trends in the number of new RN graduates and migration to the region change.

Figure 4 presents the forecasts for the Sacramento region. At present, the RN shortage is about 585 RNs, which is a gap of 5%. Although the supply of RNs in this region is expected to grow in the future, the gap between supply and demand will grow. Rapid population growth and the aging of the population in this region will drive rapid growth in the demand for health services, and thus RNs. By 2020 the gap rises to more than 4,200 RNs, and the shortage is more than 8,300 RNs by 2030.

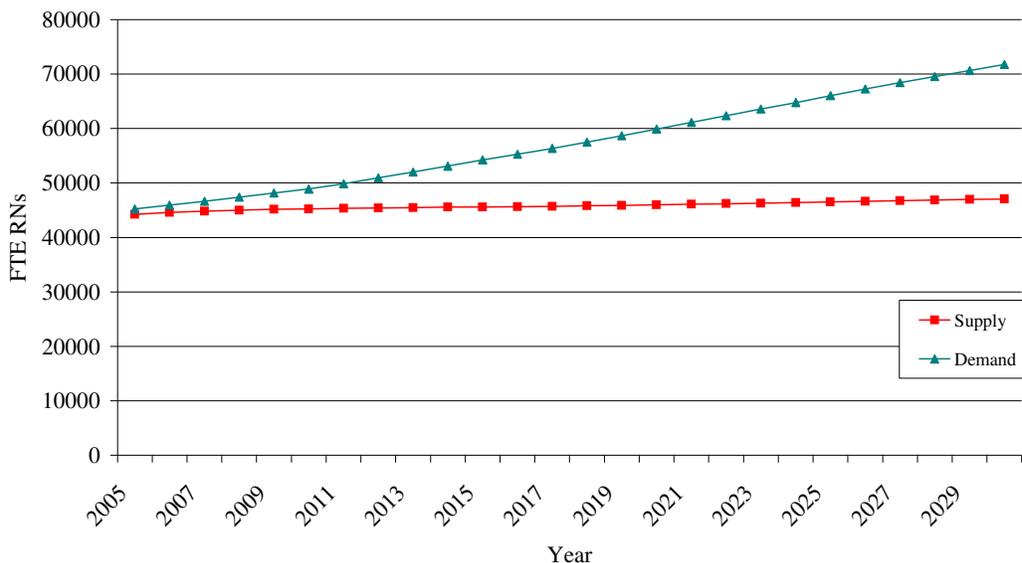
**Figure 3: RN Supply & Demand Forecasts for Northern California Region**



**Figure 4: RN Supply & Demand Forecasts for Sacramento Region**



**Figure 5: RN Supply & Demand Forecasts for San Francisco Bay Region**



Supply and demand forecasts for the San Francisco Bay Area are presented in Figure 5. At present, the RN labor market in this region appears to be fairly balanced, but there is a shortage of about 1,000 RNs, which is small as a percentage of total FTE RNs in the region (2%) but nonetheless important. The supply of RNs in this region is expected to grow only a small amount, while the demand for RNs will rise. By 2020, a shortage of up to 13,887 RNs is projected, and this shortage will widen to up to 24,686 RNs by 2030. Although there does not appear to be a significant shortage in the Bay Area region at this time, a shortage is imminent.

The Central Valley and Central Sierra regions of California face a substantial shortage of over 3,200 RNs, as seen in Figure 6. Resolution of this shortage would require an increase of 16% FTE RNs. Even though the supply of RNs in this region is anticipated to grow by about 5,000 FTE RNs by 2030, growth in the demand for nurses will be even more rapid. The RN shortage is anticipated to be over 15,000 FTE RNs by 2030.

**Figure 6: RN Supply & Demand Forecasts for Central Valley & Central Sierra Region**

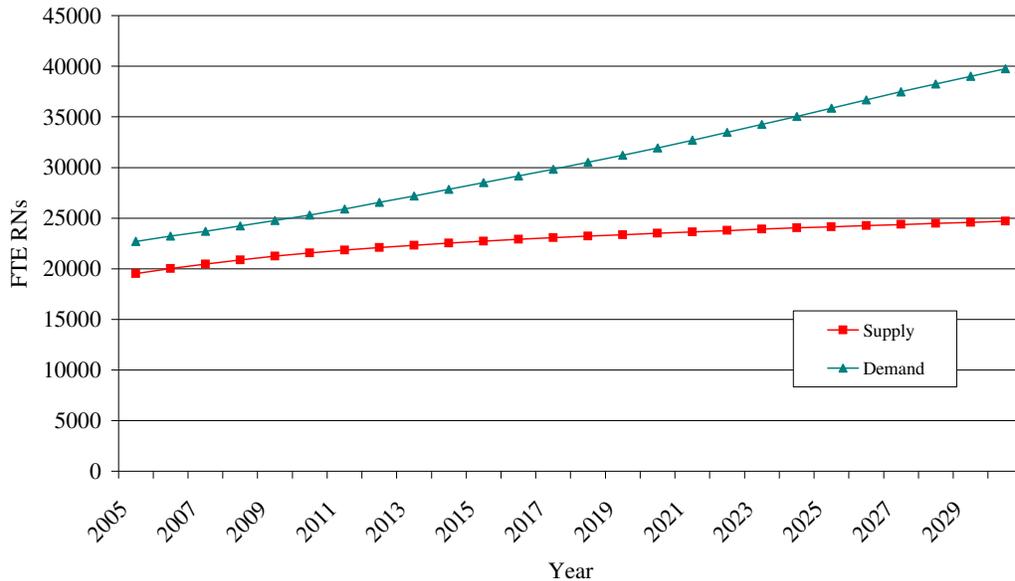
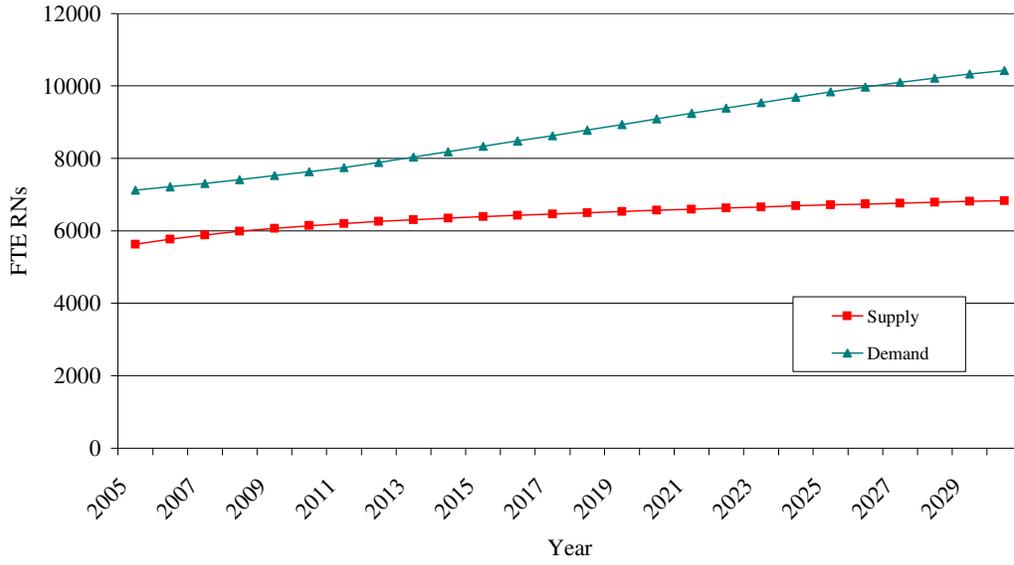


Figure 7 presents the forecasts for the Central Coast region. At present, this region faces a shortage of about 1,500 FTE RNs; to fill this gap the RN workforce would need to grow 26%. As in most other regions, the supply of RNs is expected to grow, but demand for nurses will rise even more rapidly. By 2030, a gap of over 3,500 RNs will emerge, leaving over 34% of FTE positions unfilled in this region.

The Los Angeles region also faces a shortage of RNs now, as seen in Figure 8. The current gap is estimated to be about 10,115 RNs (14%). The shortage is forecasted to improve somewhat for the next seven years, likely due to expanding RN supply as a result of growth in RN education in the region. However, between 2020 and 2025, the gap between supply and demand is expected to expand rapidly, as older RNs retire and demand for health services continues to grow. By 2025, the shortage will be over 15,000 RN FTEs, and by 2030 it is forecasted to be over 20,000 FTEs.

**Figure 7: RN Supply & Demand Forecasts for Central Coast Region**



**Figure 8: RN Supply & Demand Forecasts for Los Angeles Region**

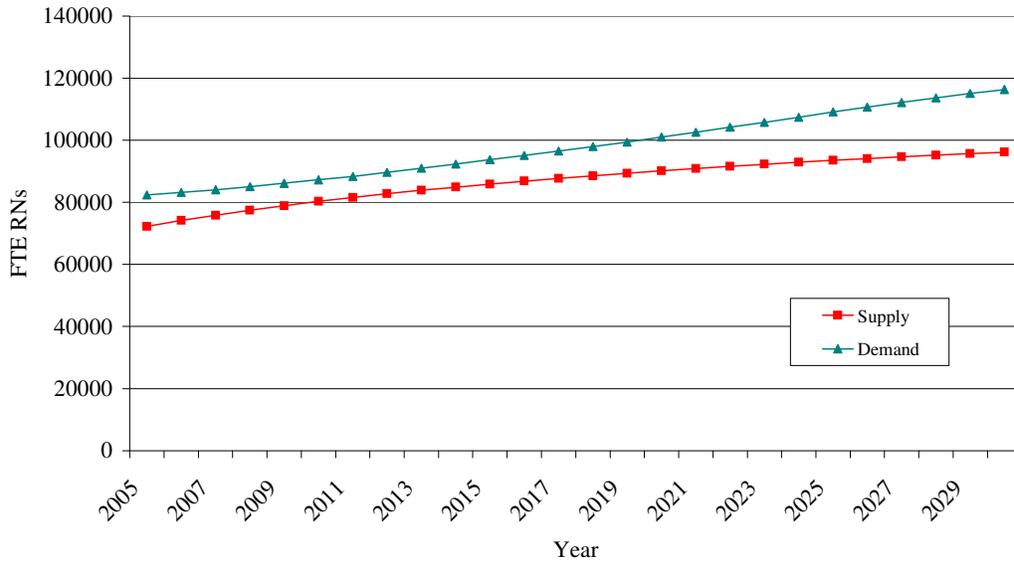
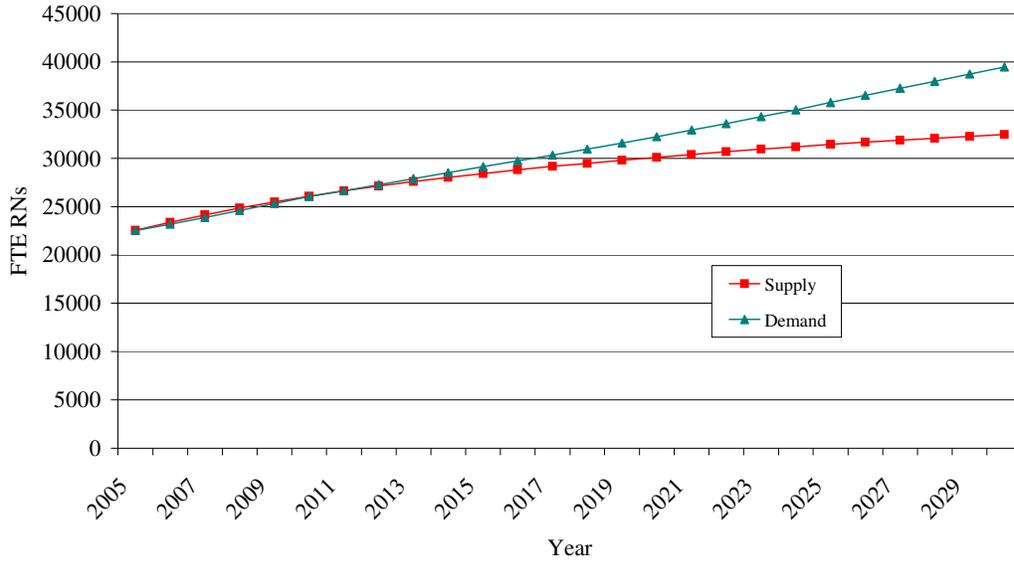


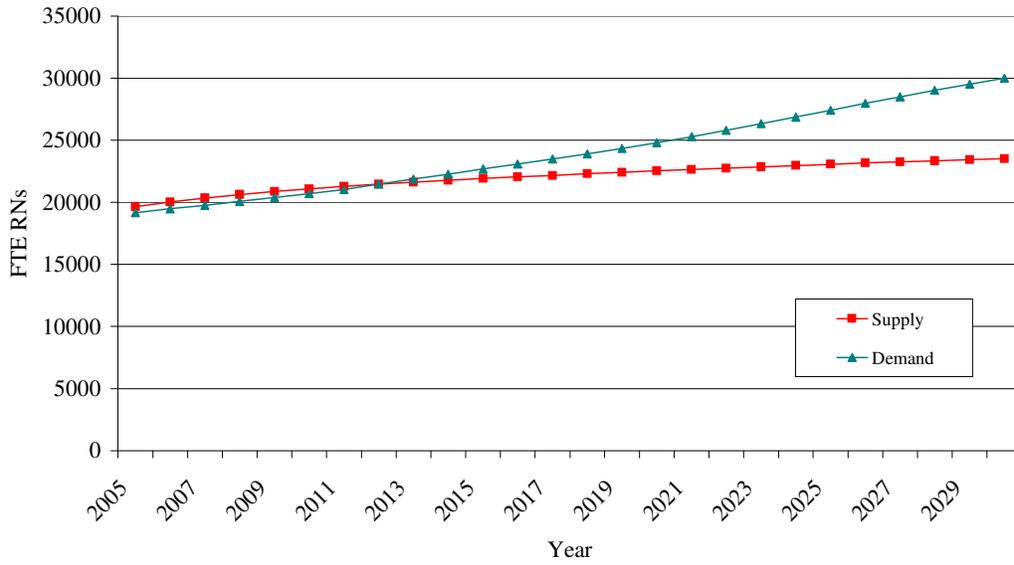
Figure 9 presents forecasts for the Inland Empire region of California. Unlike other regions, it is estimated that there are currently enough RNs in the region to meet demand. However, it is possible that some RNs in this region are working in the Los Angeles region – particularly RNs who live in the western part of the Inland Empire. Thus, these numbers might understate the extent of any shortage in the region. The RN population in this area is expected to grow rapidly for two reasons. First, rapid population growth in this region should include the migration of many RNs educated in other regions of California. Second, local hospitals and the Riverside and San Bernardino County Workforce Investment Boards have invested in expansions of RN education, improving the region’s ability to meet RN needs. Although a shortage is not expected for a decade, by 2030 the region will face a shortage of nearly 7,000 FTE RNs and have over 17% of its positions vacant. Thus, policymakers should not be complacent about the nursing labor market in this region.

Forecasted demand and supply for the San Diego region are presented in Figure 10. At present, this region appears to have a well-balanced RN labor market. This may be the result of a strong local collaborative effort that has supported growth in RN education in the region. The Southern Border counties have the highest RN-per-100,000 population ratio in the state. However, a shortage is expected to emerge in about five years, and the shortage is anticipated to increase to over 6,400 RN FTEs by 2030.

**Figure 9: RN Supply & Demand Forecasts for Inland Empire Region**



**Figure 10: RN Supply & Demand Forecasts for San Diego Region**



## **Comparisons with Other Forecasts and Recommendations for Policymakers**

An analysis of the statewide RN workforce conducted in 2005 estimated that the current shortage of RNs was between 872 and 21,161 FTEs. The regional forecasts presented here produce a statewide shortage estimate of 16,683 FTE RNs. In 2005, it was forecasted that the shortage by 2030 would range between 99,945 and 122,223 FTE RNs. The forecasts presented here are somewhat more optimistic, anticipating a shortage of 89,314 FTE RNs by 2030. Growth in the number of RN graduates between 2004 and 2005 likely explains the improvement in the expected shortage. However, California will have an extremely large shortage of RNs unless policies are enacted to address the problem.

The forecasts presented here demonstrate that the nursing shortage varies greatly across California regions, but that all regions face a growing shortage over the next decades. There are two remedies for nursing shortages. The first is to reduce the demand for nurses – that is, to adapt the health care system to meet patient needs with fewer RNs. However, this does not appear to be a desirable strategy, because numerous studies have demonstrated that nurse staffing levels have a significant impact on patient mortality and other patient outcomes (Needleman et al., 2001; Kovner & Gergen, 1998).<sup>5</sup> In fact, new research indicates that increased RN staffing is a cost-effective approach to improving patient outcomes (Needleman et al., 2006; Rothberg, 2005).

The other way in which a shortage can be remedied is that supply can rise. This can be achieved by increasing the number of RNs who graduate within California, luring more nurses from other states, and encouraging immigration from other nations. The first approach is the one

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<sup>5</sup> Although there is a strong literature linking nurse staffing to better patient outcomes, no research has identified the “best” staffing ratio.

over which policymakers have the greatest influence. At present, thousands of qualified applicants to California RN education programs are not admitted due to lack of space across all regions of the state (California Board of Registered Nursing, 2006). Thus, there is no shortage of people who want to enter the nursing profession – there is insufficient educational capacity to help them in this goal.

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## ACRONYMS

BHPr – Bureau of Health Professions, part of the Health Resources and Services Administration  
in the U.S. Department of Health and Human Services

BRN – California Board of Registered Nursing

CA – California

CNO – Chief Nursing Officers

DOF – California Department of Finance

DOL – U.S. Department of Labor

FTE – Full-time Equivalent

HPPD – Hours Per Patient Day

HRSA – Health Resources and Services Administrations

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

NSSRN – National Sample Survey of Registered Nurses

OSHPD – California Office of Statewide Health Planning and Development

RN – Registered Nurse

RN HPPD – Registered Nurse Hours Per Patient Day

SBTPE – State Board Test Pool Examination

UCSF – University of California San Francisco