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Washington State Registered Nurse Supply and Demand Projections: 2006-2025

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by

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Washington State Registered Nurse Supply and Demand Projections: 2006-2025

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ABSTRACT

This report describes trends in registered nurse (RN) supply and demand for Washington State from 2006 through 2025. Factors affecting supply included graduates from Washington nursing schools, NCLEX exam pass rates, foreign-educated RNs entering the U.S., in-migration from other states, re-activation of licensure after license expiration, deaths, license expirations due to individuals leaving nursing careers and age-related retirements, out-migration to other states, and RNs not employed in nursing. RN demand factors included numbers of employed RNs and vacant RN positions. We estimated baseline (2006) supply and demand as well as rates of change over time. We found that the average age of Washington's RNs is 48 years, and more than a third are 55 years or older. The high rate of RNs retiring from nursing practice over the next two decades will significantly reduce RN supply. RN education capacity is the factor under policy control that appears to have the largest impact on state RN supply. If the rate of graduation from nursing schools in Washington does not increase above that of 2006, RN supply will decline beginning in approximately 2015. If graduation rates increase by 400 RNs per year beginning in 2010, supply will increase over the next two decades and may reach the range of estimated RN demand by approximately 2021. In sub-state areas, the age of RNs may be the best predictor of future RN shortages.

INTRODUCTION AND OVERVIEW OF THE PROJECTIONS MODEL

This report describes analyses by the University of Washington Center for Health Workforce studies to project trends in the supply and demand of registered nurses (RNs) in Washington State from 2006 through 2025. This project was funded by the Washington Center for Nursing, through funding from the state Department of Health. The goals of this effort were:

- To provide an estimate of the extent to which RN supply meets the demand for RNs in the state over time,
- To identify the available data for Washington state that can be used for RN supply and demand estimates at the time the report was prepared,
- To draw attention to the types of data that, if they become available, could be used to improve the accuracy of future projections, and
- To describe, and include in the projections, the policy and environmental factors that influence the rates of change of RN supply and demand across the 20 years of projections.

RN supply and demand projections at the state level have been produced by the Health Resources and Services Administration (HRSA) (Biviano et al., 2004; Dall, 2004a; Dall, 2004b). The HRSA projections, largely based on RN supply data from the 2000 National Sample Survey of Registered Nurses (NSSRN), use national averages for many of the inputs and may be less accurate at the state level than they are at the national level. As a result of the nursing shortages reported around 2000, and because of even larger shortages predicted by the HRSA model, nursing education capacity was increased across the United States and a large number of RN graduates have been added to the supply since 2000. As of the time of this writing, HRSA had not yet released an updated model using the 2004 NSSRN results. The HRSA RN supply-demand projection model was

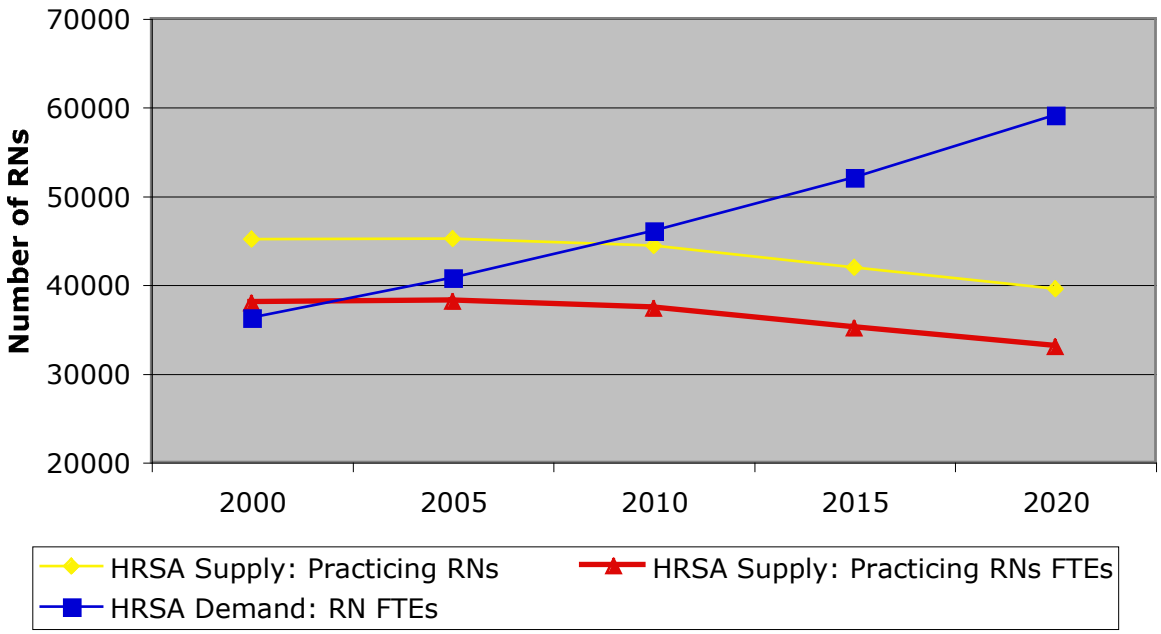
developed using different methodology than was used for the analyses reflected in this report: our model is an additive mathematical model of projected supply of, and demand for, practicing RNs, while the HRSA model uses regression techniques, based on historical data, to estimate future supply of, and demand for, practicing RN FTEs. The results of the HRSA model for Washington State are shown in Figure 1. According to HRSA's projection, while practicing RN FTE supply met (and exceeded) RN FTE demand in 2000, by 2020 supply had declined by several thousand RN FTEs and demand grew by approximately 24,000 RN FTEs.

In recent years there have been several other state-level projections of RN supply and demand. For example, the California model used state RN survey data as a starting point to estimate supply and develop projections (Spetz & Dyer, 2005). Nebraska used HRSA's model as a basis for state-level projections, updating the supply and demand inputs with available local data (Rosenbaum, 2006).

The findings described in this report should be used as planning tools. Readers should place less emphasis on specific projected numbers of RN supply and demand (especially those projected farther into the future) than on the direction of trends and the factors that have been identified as influencing growth or reduction in supply and demand. These projections are built with specific assumptions about "policy levers" (factors affecting RN supply and demand that can be influenced through changes in policy or practice). We include alternative scenarios using different policy levers that demonstrate the flexibility of our projection model for further exploration of "what if...?" scenarios.

Much of the data that we used to establish the baseline estimates of supply and demand (such as numbers of licensed RNs and staff nurse vacancy rates in hospitals) is highly accurate. Other baseline data (such as number of foreign-trained nurses entering the workforce in 2006) are based on databases with small sample sizes, are incomplete, and/or are not sufficiently specific to be able to clearly separate variables of interest. The accuracy of workforce projections is dependent on the accuracy of the input data, and therefore a large amount of the time we spent in developing these projections was devoted to evaluating the quality of data available for baseline supply estimates. To project supply and demand over time, the models require estimates of the rates of change in each of the factors included in the model. Frequently, these rates are based on historical trend data, which may or may not represent future trends. But the power of a workforce projection model, such as we have attempted to create, is to clearly identify the factors that affect change in the workforce over time and to describe how they relate to each other. By displaying the components of RN supply and demand, health planners and policy makers are better able to understand what factors have greatest future impact on the nursing workforce, and can test the impact that different decisions or environmental conditions will have on that workforce.

Figure 1: HRSA Projections of RN Supply and Demand for Washington State, 2000-2020



THE SUPPLY OF RNS IN WASHINGTON

We identified nine major factors that increase or decrease each year's supply of RNs in Washington:

Entrants to the state RN supply:
- Graduates from Washington nursing schools.
- NCLEX exam pass rates.
- Foreign-educated RNs entering the United States.
- In-migration from other states (including new graduates).
- Re-activation of licensure after license expiration.

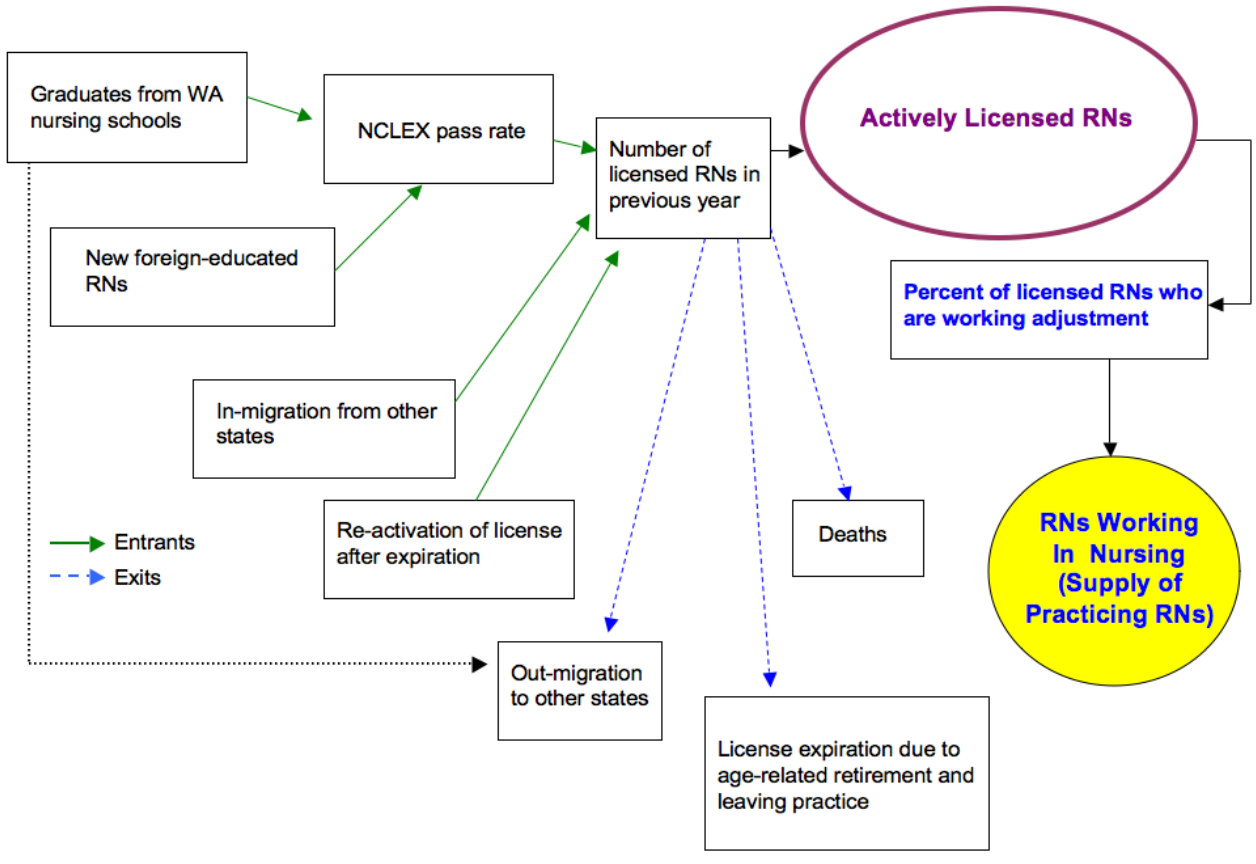
Exits from the state RN supply:
- Deaths.
- License expirations due to individuals leaving nursing careers and age-related retirements.
- Out-migration to other states.
- RNs not employed in nursing.

Figure 2 shows the relationship of these factors to RN supply. We examined each factor at length, and assessed different data sources that potentially could be used for the estimates. Following are descriptions of each component of Washington's RN supply.

BASELINE SUPPLY OF ACTIVELY LICENSED RNS IN WASHINGTON

Our projection of RN supply builds upon the 2006 database of actively licensed RNs from the Washington Department of Health, Health Professions Quality Assurance division. Among the license status categories for Washington RNs, "active" represents an RN whose license is up-to-date and who is available to work in the state. In August, 2006, there were 71,048 actively licensed RNs in Washington. Of these, 58,356 (82.1%) had addresses in Washington State. Because the goal of our projections was to estimate the supply and demand of RNs in Washington State, we excluded all active licensed RNs who had addresses outside of the state, thereby reducing the baseline supply for our model to 58,356 RNs. While this decision likely means we are undercounting RNs who live a short distance across the Washington state border and commute into Washington for work, we are also overcounting the state workforce by including those who live in Washington but work in an adjoining state. This commuting is likely to occur in border urban areas such as the Spokane, Washington/Coeur d'Alene, Idaho corridor, as well as in the Portland, Oregon/Vancouver, Washington corridor. For purposes of these analyses

Figure 2: Conceptual Model of Factors Affecting State RN Supply in One Year



we are presuming the inflow and outflow occur at equal rates.

Another issue for estimating RN supply was whether or not to include advanced registered nurse practitioners (ARNPs) in the RN supply. In Washington, ARNPs are required to hold RN licenses as well as ARNP licenses. Our analyses of the RN and the ARNP licensing files showed that in 2006 there were 3,150 ARNPs among the licensed RNs in Washington (5.4% of the total RNs). Some of the other important data sources we used for the projections do not separate ARNPs from the RN workforce (such as the National Sample Survey of Registered Nurses (NSSRN), conducted every four years by the HRSA). While ARNPs and RNs often fill different roles in the health care workforce, in order for our estimates to be comparable with those from other data sources, we chose to retain the ARNPs within the Washington RN supply.

In addition to the RN's address, Washington's RN licensing data also include the licensee's birthdate and gender. Birthdate, from which age can be calculated, is an important variable for workforce models because most of the entrants and exits to supply are applied by age of the RNs as they progress through subsequent years of the model. The gender variable can be used to track the progress of continuing efforts to bring more men into nursing, which has long been a female-dominated profession.

Using the available data from the RN licensing files, we can describe some basic demographic characteristics of the RN workforce in Washington at the baseline of our projections. We limited the age of nurses in the analysis data set to those whose birthdates indicated they were between the ages of 18 and 75 (inclusive). There were some age outliers in the data that were more likely to represent data entry errors than active RNs. The overall number of RNs in Washington, their average age, percent age 55 or older, and percent male are shown in Table 1. Table 2 shows the distribution of RNs by age group. Information about RN race/ethnicity is not available from RN licensing and renewal records.

Figure 3 shows how RNs are distributed throughout the state in Workforce Development Areas (WDAs). WDAs are groups of counties that plan and carry out workforce development activities for which they receive state and federal funding.

ENTRANTS TO THE STATE RN SUPPLY

Graduates from Washington Nursing Schools: The Washington State Nursing Care Quality Assurance Commission (NCQAC) maintains annual statistics on graduates from nursing schools in Washington State, and distinguishes those graduating from pre-licensure programs (new RNs) from those graduating from post-licensure programs (RNs who have obtained higher nursing education). For purposes of projecting RN supply, only pre-licensure graduates (the new RNs in the workforce) are included in our calculations. We added the number of RN graduates in 2005-2006 (2,115) to the base year of our RN supply projections.

Rate of Change Over Time: Table 3 shows trends in pre-licensure graduates since the 2001-2002 academic year. The numbers of RN graduates in 2005-2006 are 80% higher than for 2001-2002. This increase in education capacity is due, in part, to focused efforts by stakeholders to respond to nurse shortages. Whether this rate of increase can, or should, be continued remains to be determined. Therefore, our basic RN supply/demand projections add 2,115 new RN graduates in each year of the projection, while in the alternative supply projections we explore the impact of expanding RN education capacity on RN supply over time.

To determine the age distribution of new graduates, we examined the 2004 NSSRN and identified respondents who completed their initial RN degree in May 2003 or later. We then determined the age distributions of the RNs with associate degrees in nursing (ADNs) and those with baccalaureate degrees in nursing

Table 1: RNs with Active Licenses in* Washington State: 2006

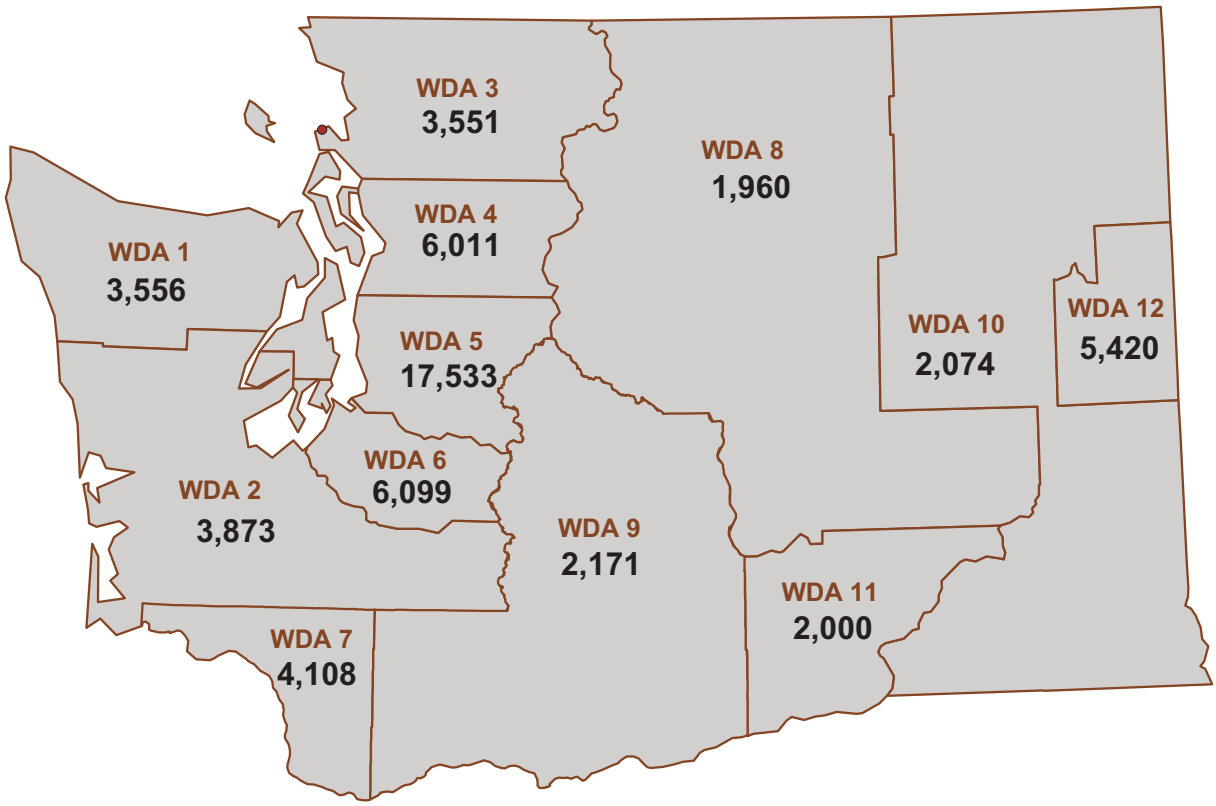
	Number of RNs
Number with active licenses in Washington State	58,356
Mean age	48.4
Percent age 55 years or older	31.6%
Percent male	8.1%

* With addresses in Washington State.

Table 2: Number of RNs in Washington by Age Category

Age Category	Percent of Licensed RNs
< 30	6.9%
30-34	7.4%
35-39	9.1%
40-44	10.9%
45-49	14.6%
50-54	19.6%
55-59	15.5%
60-64	9.2%
65+	6.9%
Total	100.0%

Figure 3: Number of Washington State RNs by Workforce Development Area (WDA)* (2006)



* Counties comprising WDAs: 1 = Clallam, Jefferson, Kitsap; 2 = Grays Harbor, Mason, Thurston, Pacific, Lewis; 3 = Whatcom, Skagit, Island, San Juan; 4 = Snohomish; 5 = King; 6 = Pierce; 7 = Wahkiakum, Cowlitz, Clark; 8 = Okanogan, Chelan, Douglas, Grant, Adams; 9 = Skamania, Klickitat, Yakima, Kittitas; 10 = Ferry, Stevens, Pend Oreille, Lincoln, Whitman, Walla Walla, Columbia, Garfield, Asotin; 11 = Benton, Franklin; 12 = Spokane.

(BSNs), and assigned the same distribution of ages to the new RN graduates data obtained from the Washington State NCQAC.

Out-Migration of New Graduates: Because our data from the NCQAC represent new RN graduates from Washington educational institutions who receive a Washington State license, any graduates who did not receive a Washington State license were not included in our new graduates figure. This model presumes that new graduates RNs who obtain a license in Washington remain in Washington for the coming year.

NCLEX Exam Pass Rates: An RN must pass the National Council of State Boards of Nursing's NCLEX-RN exam (the entry-level nursing board examination) before she or he can become licensed. While available state statistics indicate that approximately 85% of new RNs in Washington pass the NCLEX on their first try, it would be inaccurate to apply this percentage pass rate to the numbers of new graduates

Table 3: Pre-Licensure RN Graduates by Program in Washington State

Academic Year	Associate Degree in Nursing (ADN)	Bachelor of Science in Nursing (BSN) and Masters RN Entry (ME)	Total Pre-Licensure RN Graduates	Increase from Prior Year
2001-2002	799	374	1,173	
2002-2003	853	432	1,285	112
2003-2004	922	453	1,375	90
2004-2005	1,179	605	1,784	409
2005-2006	1,449	666	2,115	331

in the model. Our communication with various nurse leaders in the state indicated that nearly everyone who graduates from a registered nursing school continues to take the NCLEX exam until they pass. Without precise data on the how long it takes members of an education cohort to pass the NCLEX, for purposes of this project we presumed that 100% of each year's graduates pass the NCLEX in that year. This is a reasonable assumption because graduates from previous cohorts are re-testing and passing the exam each year. Therefore we did not adjust for NCLEX exam pass rates in the projections.

Foreign-Educated RNs Entering the United States: We examined the 2004 NSSRN to obtain annual estimates of foreign-educated RNs who enter the United States through Washington State. From the Washington State sample, we identified RNs who resided in the state at the time of the survey but indicated they resided elsewhere one year prior. Among those, we identified the number who obtained their initial RN degree in another country. Through this process we estimated that 35 RNs new foreign-educated entered Washington between 2003 and 2004.

We searched for, but were unable to locate from State sources, annual tallies of the number of foreign-educated RNs who received their first United States RN license in Washington State. We explored several other possible sources of estimates of these numbers, including the American Community Survey being conducted by the U.S. Census. No other data source we explored included variables that would more clearly identify new entrant nurses who had been educated as an RN in another country than the NSSRN. Because of the small sample size and combination of variables required to make the estimate, however, there is likely error in the estimate obtained from the NSSRN.

Rate of Change Over Time: Because employment of foreign-trained nurses generally requires action by employers and is affected by the current political climate for immigration and visa availability, past history may not be a good predictor of future trends for this nurse supply variable. Once we obtained a baseline 2004 estimate of the number of foreign-trained nurses, we added this number to the base supply projection every year from 2006 through 2025—i.e., our projection does not increase the number of foreign educated RNs who in-migrate each year. From communications with stakeholders within the state, we know that hospital recruitment of foreign-educated RNs has declined since a peak in the early part of the decade, and most likely was fewer than 50 RNs per year in 2006. Whether or not that will remain the correct number is difficult to predict, but our projection can be adjusted to explore scenarios where more or fewer foreign-educated RNs are added each year.

In-Migration from Other States: We used the 2004 NSSRN data to estimate the number of licensed RNs who move into Washington from another state each year. The NSSRN asks whether respondents (in this case RNs with Washington licenses) resided in a different state one year prior. This group includes those RNs who graduated from nursing schools in other states but became licensed for the first time in Washington. We excluded those whom we determined to be new foreign-educated RNs (as described above) because we were accounting for them separately in our projection. The numbers, by age group, of the 2,276 in-migrants we estimated from 2003 to 2004, are shown in Table 4.

Rate of Change Over Time: The number of future in-migrants is difficult to estimate. In the future, nursing shortages in other states may drive salaries sufficiently high that an RN may be less tempted to move to Washington. Conversely, if those shortages were to occur in Washington, higher salaries as well as quality of life factors could attract more RNs into the state. Because we could not predict whether in-migrants are likely to increase or decrease in the future, our projections use the same estimated number of in-migrants (2,276) in each year of the projection.

Re-Activation of Licensure after License Expiration: To estimate the proportion of RNs who re-activated their Washington licenses after allowing them to expire, we compared all records with 2004 expiration dates from within a 2004 State RN licensing database with the active licenses in a database from the licensing records approximately two year later. We considered the RNs who appeared in the later database as active, but whose licenses expired in 2004, as reactivated. We

Table 4: Estimates of RNs Migrating into Washington from Other States, by Age Group (2006)

Age Category	Estimated Number of RNs Migrating into State	Estimated Percent of Annual In-Migrants Among Total RNs in Age Group
< 30	479	9.0%
30-34	264	6.0%
35-39	328	6.1%
40-44	316	5.0%
45-49	130	1.5%
50-54	396	3.5%
55-59	329	3.7%
60-64	13	0.3%
65+	0	0.0%
Total	2,256*	3.8%

* Total does not add to 2,276 because age was missing for 20 individuals.

divided the resulting number of re-activated licenses by two to obtain an annual estimate.

Rate of Change Over Time: After identifying the ages of these RNs with re-activated licenses, we added RNs of the same ages to subsequent years of the RN supply projection in numbers proportional to total RN supply for the projected year. This resulted in an increase in the number of estimated re-activations in each year of the projection, ranging from 253 in 2006 to 293 in 2025.

EXITS FROM THE STATE'S RN SUPPLY

Because many RNs retain their licenses long after they leave active nursing, age-related retirement is difficult to estimate using licensing records alone. Our model attempts to estimate the combined number of RNs who "retire" from nursing (i.e., allow their licenses to expire) because they quit working in nursing, and then separately estimate the number of RNs whose licenses expire due to death and due to out-migration. In a separate step we adjusted the licensed RN supply numbers to remove the proportion of RNs with active licenses who are not employed in nursing. The latter adjustment is needed in order to estimate the working RN supply that can be compared with demand estimates each year, and thereby project future RN shortages or surpluses.

Deaths: Because we did not have adequate data to factor gender differences into most of the other variables in the model and because such a large percentage of RNs is female, we used the national female death rates by age from the U.S. Census to estimate deaths in our state RN population over time. For the base year of the projection, we applied these death rates by age group to the overall actively licensed supply of nurses in Washington (Table 5).

Rate of Change Over Time: We applied the same rates of death by age group for each subsequent projection year. Because of the aging of the RN population, the percent of total RN population estimated lost to deaths each year ranges from 0.45%, or 261 RNs, in 2006 to 0.63%, or 379 RNs in 2025.

Out-Migration to Other States: We estimated out-migration by identifying RNs from 2004 NSSRN who reported that they had resided in Washington the year prior to the survey, but who did not live in Washington during the survey year. This estimate of the number and percent of out-migrants, by age group (Table 6), was applied to the base year of the projection.

Rate of Change Over Time: We assigned the same number of out-migrants by age group identified from the 2004 NSSRN to each subsequent year of the projection.

License Expirations Because of Individuals Leaving Nursing Careers and Age-Related Retirement: After identifying all RN licenses that expired in 2004, excluding the estimated deaths by age group and the estimate of those out-migrating to other states by age group (see above), we considered the remaining RNs to be those who allowed their licenses to expire because they decided to leave nursing. As shown in Table 7, our calculations result in the estimate that, on average, 5% of RNs' licenses expire each year because they leave nursing practice, and that rate varies by age group. We do not believe that all of these RNs quit practicing nursing immediately prior to their license expiration. As demonstrated in the section below "RNs employed

Table 5: Estimates of Annual RN Deaths Among Licensed Washington RNs, by Age Group (2006)

Age Category	Estimated Number of Deaths	Estimated Percent Annual Deaths Among Total RNs in Age Group
< 30	2.3	0.04%
30-34	2.7	0.06%
35-39	7.6	0.14%
40-44	9.0	0.14%
45-49	26.5	0.31%
50-54	35.6	0.31%
55-59	63.9	0.72%
60-64	37.7	0.72%
65+	75.1	2.01%
Total	260.5	0.44%

Table 6: Estimates of Licensed RNs Migrating Out of Washington, by Age Group (2006)

Age Category	Estimated Number of RNs Migrating Out of State	Estimated Percent of RNs Migrating Out of State Among Total RNs in Age Group
< 30	287	5.4%
30-34	217	4.9%
35-39	165	3.1%
40-44	145	2.3%
45-49	175	2.1%
50-54	187	1.7%
55-59	138	1.6%
60-64	85	1.6%
65+	48	1.3%
Total	1,447	2.4%

Table 7: Estimated Number of Individuals Leaving Nursing Careers and Age-Related Retirements in Washington, by Age Group (2006)

Age Category	Total Estimated Number	Estimated Percent of Age Group
< 30	134	2.5%
30-34	411	9.3%
35-39	423	7.8%
40-44	348	5.5%
45-49	336	3.9%
50-54	402	3.5%
55-59	354	4.0%
60-64	214	4.1%
65+	363	9.7%
Total	2,985	5.0%

in nursing", many older RNs keep their licenses active even after they quit working in the field.

Rate of Change Over Time: We calculated the proportion of total licensed RNs that these "retired" RNs represented by age. For each subsequent year of the projection we reduced supply by the same age specific proportion (Figure 4).

RNS EMPLOYED IN NURSING

A portion of actively-licensed RNs do not work in a capacity that requires a nursing license. To be able to compare RN supply projections with demand projections, the supply estimates must be adjusted to reflect the percent of actively licensed RNs who are available to fill jobs. Therefore, we reduced the overall supply by the proportion estimated to be employed in nursing in each year of the projections. In 2004, the NSSRN showed that 83.2% of the overall licensed RNs in the United States were employed in a job that required a nursing license (in Washington, an estimated 81.2% of licensed RNs were employed in nursing). This percent varies greatly by age group (see Table 8). Because the Washington State estimates were based on relatively small numbers, the age-specific estimates were less stable than the corresponding national numbers. Thus, we chose to apply the national rates of employment in nursing to our state-level supply projections.

Rate of Change Over Time: We applied the percent of RNs not employed in nursing by 5 year age group to each year of our projections. Because older RNs are more likely to have licenses but not be employed in nursing, as the RN population ages over time, the total percent of RNs who will be employed in nursing drops in later years of our projections (Figure 5).

Figure 4: Estimated Annual Percent of Total RNs' Licenses Expiring Due to Age-Related Retirement and Individuals Leaving Nursing Careers in Washington (2006-2025)

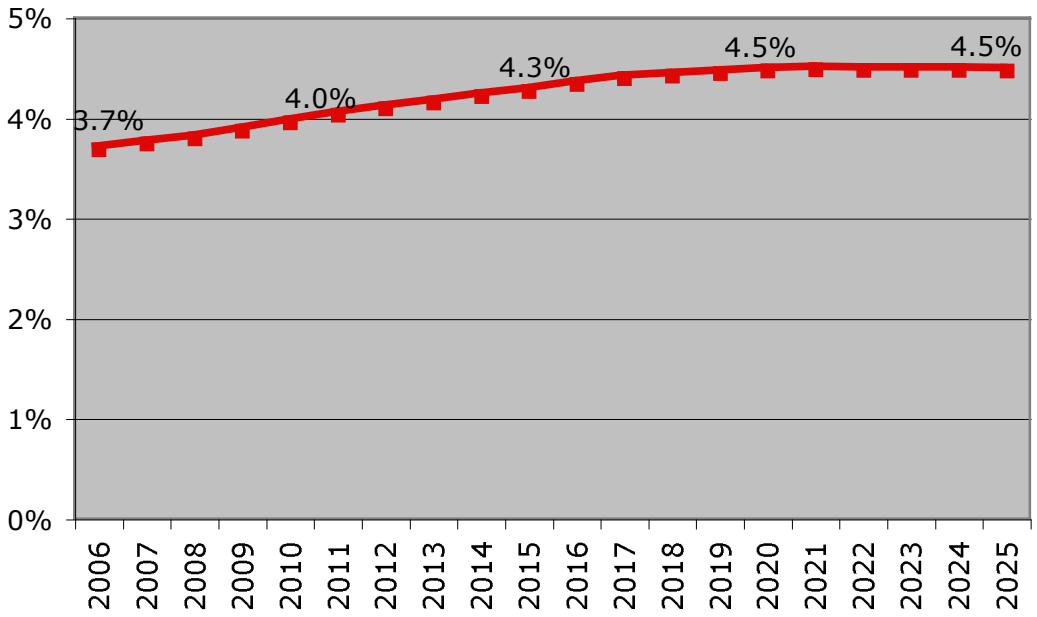


Table 8: Estimated Number and Percent of Licensed RNs Employed in Nursing, by Age Group (2006)

Age Category	Number	Percent of Age Group
< 30	4,982	93.9%
30-34	4,022	90.9%
35-39	4,782	88.8%
40-44	5,614	88.2%
45-49	7,529	88.4%
50-54	9,929	87.7%
55-59	7,124	80.2%
60-64	3,383	64.8%
65+	1,521	40.6%
Total	48,886	82.6%

FULL-TIME AND PART-TIME EMPLOYMENT

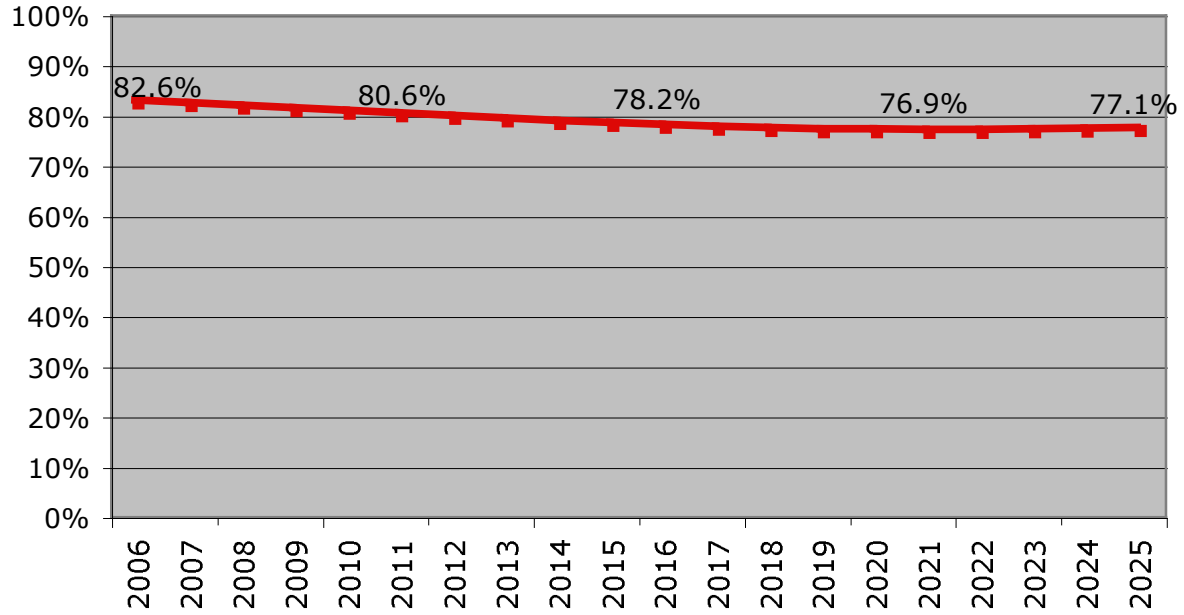
While we recognize that many nurses do not work full time, we have not incorporated a full-time/part-time component in our projections. The demand estimates, described below, are for the number of individual RNs needed in the state across time. The supply estimates for our projections therefore remain at the individual level in order to be comparable to the demand estimates.

THE DEMAND FOR RNS IN WASHINGTON

The demand for RN employment is affected by changes in the general population: population growth and aging will result in increased demand for health care services and, by extension, increased demand for RNs to provide those services. RN demand is also affected by changes in economic factors and social policy. These include changes in how health care is delivered (e.g., shifts in use of inpatient and outpatient services, substitution of practice tasks usually performed by RNs to non-RNs and vice versa), technological development, RN salaries, insurance coverage rates, health care payment policies, and rates of part time employment. If Washington were to follow California's lead and the legislature were to mandate RN:patient ratios in health care facilities, the demand for RNs would rise drastically. On the other hand, if rates of population growth were to be lower than predicted, the demand for RNs would be reduced.

RNs are employed in many sectors including hospitals, nursing homes, ambulatory clinics, public health, community health, administration, insurance companies, community colleges and universities, schools, and more. Social and policy factors can influence each sector independently. As a result, projecting the demand for RNs is a daunting challenge,

Figure 5: Estimated Percent of Licensed RNs Employed in Nursing in Washington (2006-2025)



and given the paucity of data from which to develop these projections, we determined that the State's economic forecasts were reasonable estimates from which to base most of our demand projections.

DEMAND ESTIMATES

We defined RN demand as the sum of employed RNs plus RN vacancies. The Washington State Employment Security Department (ESD) provides data on the number of employed RNs and RN vacancies. The ESD data, however, probably undercount RN employment and vacancies because an employer may code RNs employed in management, education and other roles using an occupational code other than "registered nurse". We supplemented the estimates of RN demand obtained from ESD using estimates from 2004 NSSRN data of the proportion of RNs employed outside of patient care (e.g., management, administration, education, insurance claims).

Projected RN Employment: For the basis of our RN demand projections, we used the ESD's Labor Market and Economic Analysis Branch's employment projections of RN employment in 2004 of 48,077 (Washington Employment Security Department, 2007). Using ESD's estimated employment growth rate of 1.9%, by 2006 (the base year of our projections) the estimated employed RNs in Washington would be 49,921. From analysis of the 2004 NSSRN data, we found that 11.7% of employed RNs were in job categories that may not be classified by their employers as "registered nurses", such as administration, instruction, surveyor/auditor/regulator, and "other". This results in an estimated additional 6,615 employed RNs, or a total of 56,536 in 2006.

Projected RN Vacancies: ESD's Job Vacancy Survey (Washington Employment Security Department, 2006) estimated 2,125 RN vacancies in 2006. Applying the same rate of undercounting with vacancies as we estimated for RN employment, we calculated an additional 284 RN vacancies for jobs that employers may not classify as "registered nurse" jobs. The total estimate of RN vacancies in 2006 was 2,409.

Adding 2,409 estimated RN vacancies to our estimated RN employment of 56,536, our total estimated RN demand in 2006 was 58,945.

Changes in Demand Over Time: To estimate changes in demand over time, we used the rates of projected RN employment growth from the ESD's Labor Market and Economic Analysis Branch's employment projections (Washington Employment Security Department, 2007). ESD estimated 1.9% growth in RN employment from 2004 to 2009, and 1.5% growth from 2009 to 2014. We used the 1.5% employment growth rate estimate in our projections from 2014 to 2025.

PROJECTIONS OF RN SUPPLY AND DEMAND: 2006 TO 2025

Following is a base model of RN supply and demand for Washington from 2006 to 2025 and several alternative scenarios that explore how changes in policy and RN characteristics might alter the projections. The supply and demand projections include projections of both licensed and practicing RN supply. Readers should note that "practicing RNs" is generally the most relevant comparison to the demand estimates on each graph.

ALTERNATIVE DEMAND SCENARIOS

Predicting demand for health care services, and therefore demand for RNs, is a complex task. Many factors influence demand, as described above. We have based our demand projections on data from the State's Employment Security Department, but the individual components of those projections are less transparent and therefore cannot be as easily manipulated in our model. We note that there is a 17% difference between our 2006 estimated practicing RN supply and our RN demand estimates. This measure of RN shortages is not directly comparable to a facility vacancy rate, but it is useful to compare the shortage estimate with available information on RN vacancies in the state. Staff RN vacancy rates in hospitals across the state averaged 6.5% in 2006 (Hutson et al., 2006). The ESD RN vacancy estimates are approximately 4% of the employed plus vacant RN positions. To reflect the variability and imprecision in demand estimates between 2006 and 2025, in the following projections we show a "high" and a "low" estimate for demand that is $\pm$ 10% of the base demand projection.

BASE SUPPLY/DEMAND PROJECTION

Figure 6 shows the base projection of supply of and demand for RNs from 2006 to 2025. This projection holds the number of RN graduates constant across the time period, and incorporates the rates of change in supply as described above.

ALTERNATIVE SUPPLY SCENARIOS

Delayed Retirement: Because the aging of the RN population is one of the largest factors affecting future RN supply in the state, we produced a version of the model that shows how RN supply (both estimated number of licensed RNs and the number working in nursing) would increase over time if RNs delayed their retirement by 5 years (Figure 7). For this estimate we increased the percentage of practicing RNs beginning at age 60 to the rate of RNs 5 years younger. For example, instead of using 64.8% as an estimate of the percentage of working RNs 60 years of age, we used 80.2% (2004 NSSRN estimate for RNs age 55). We adjusted this rate for all RNs age 60 and older.

Figure 6: Base RN Supply-Demand Projections for Washington State, 2006-2025, with No Increase in the Number of RN Graduates per Year

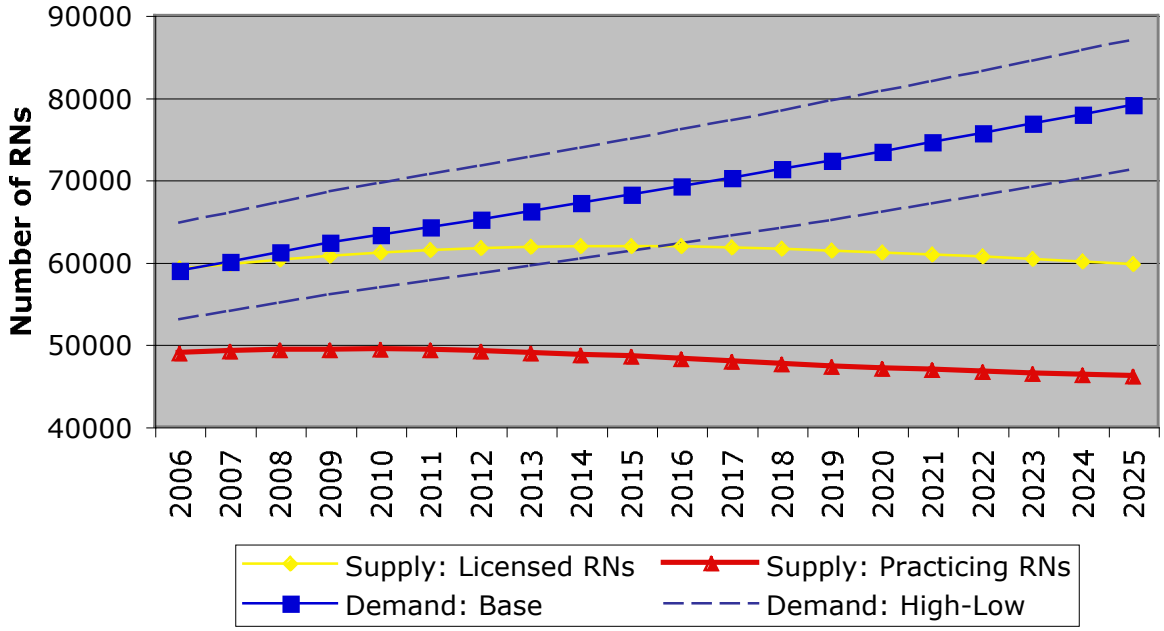
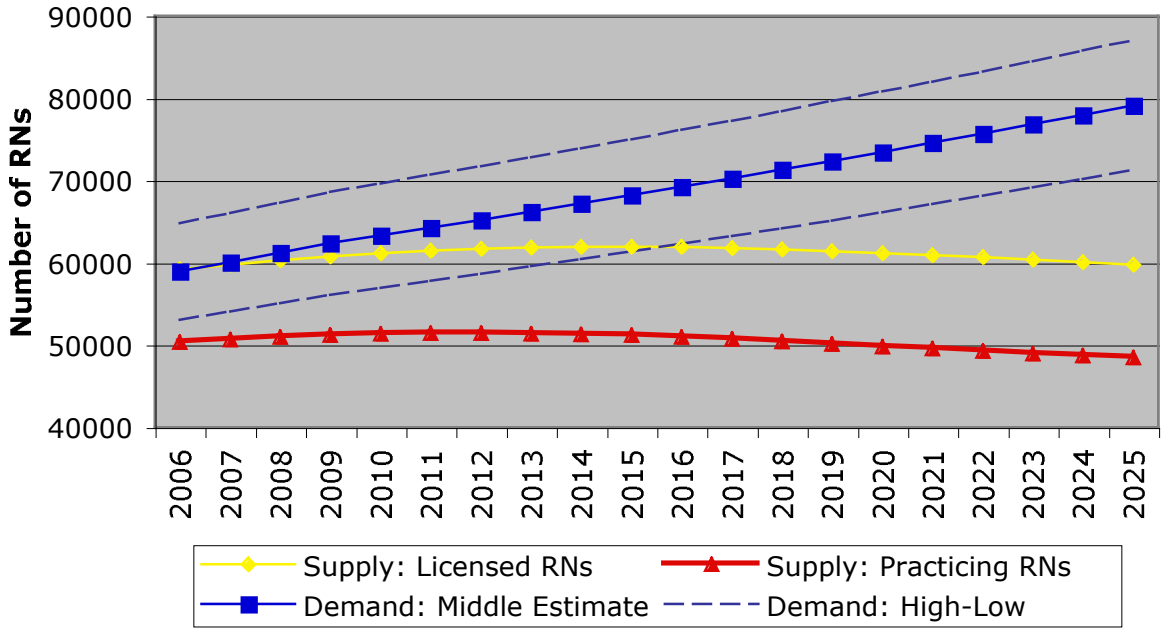


Figure 7: RN Supply-Demand Projections for Washington State, 2006-2025, with Retirement Delayed for Five Years



Increased Graduation Rates—100 per Year: Figure 8 shows how RN supply (both estimated number of licensed RNs and the number working in nursing) would increase over time if the number of RN graduates in the state increased (beyond the 2006 level) by 100 per year (60 ADN graduates, 30 BSN graduates, and 10 Master's Entry graduates) beginning in 2010. In this scenario, the supply of licensed RNs begins at 59,169 in 2006 and reaches 68,805 in 2025. Our estimate of the number of practicing RNs begins at 48,898 in 2006 and reaches 54,240 in 2025. In this scenario, the estimated supply of practicing RNs does not reach the range of estimated demand in the time frame shown.

Increased Graduation Rates—400 per Year: Figure 9 shows how RN supply (both estimated number of licensed RNs and the number working in nursing) would increase over time if the number of RN graduates in the state increased (beyond the 2006 level) by 400 per year (240 ADN graduates, 120 BSN graduates, and 40 Master's Entry graduates) beginning in 2010. In this scenario, the supply of licensed RNs begins at 59,169 in 2006 and reaches 96,045 in 2025. Our estimate of the number of practicing RNs begins at 48,898 in 2006 and reaches 78,732 in 2025. In this scenario, the estimated practicing supply meets the estimated demand by 2025, and is within the -10% range of estimated demand by 2021.

BENCHMARKS: RN SUPPLY COMPARISONS TO POPULATION 2005 TO 2025

An alternative way to explore potential RN shortages or oversupply is to use a benchmarks. The distribution of the health care workforce across geographic regions is often described using the benchmark of numbers of providers per 100,000 general population. Such benchmarks are problematic because high rates do not necessarily reflect adequacy (and conversely, low rates do not necessarily reflect shortage) but instead provide a measure of the current environment. Nonetheless, an examination of how one region's rates of RNs per 100,000 population compares to other regions is a reasonable starting place for discussing why the rates vary and whether major differences indicate problems. In the 2004 NSSRN we found that the national average number of licensed RNs employed in nursing per 100,000 population was 825 (an increase from 752 in 2000). Because the national nursing shortage situation was perceived to be worse in 2000 than in 2004, we assumed that 825 working RNs per 100,000 population reflected a more adequate overall supply than was the case four years prior. For this analysis we used our supply projections and U.S. Census projections of changes in the general population in Washington through 2025.

Figure 10 shows how our scenarios of the supply of licensed RNs per 100,000 Washington residents change

Figure 8: RN Supply-Demand Projections for Washington State, 2006-2025, with Number of RN Graduates Increased by 100 per Year

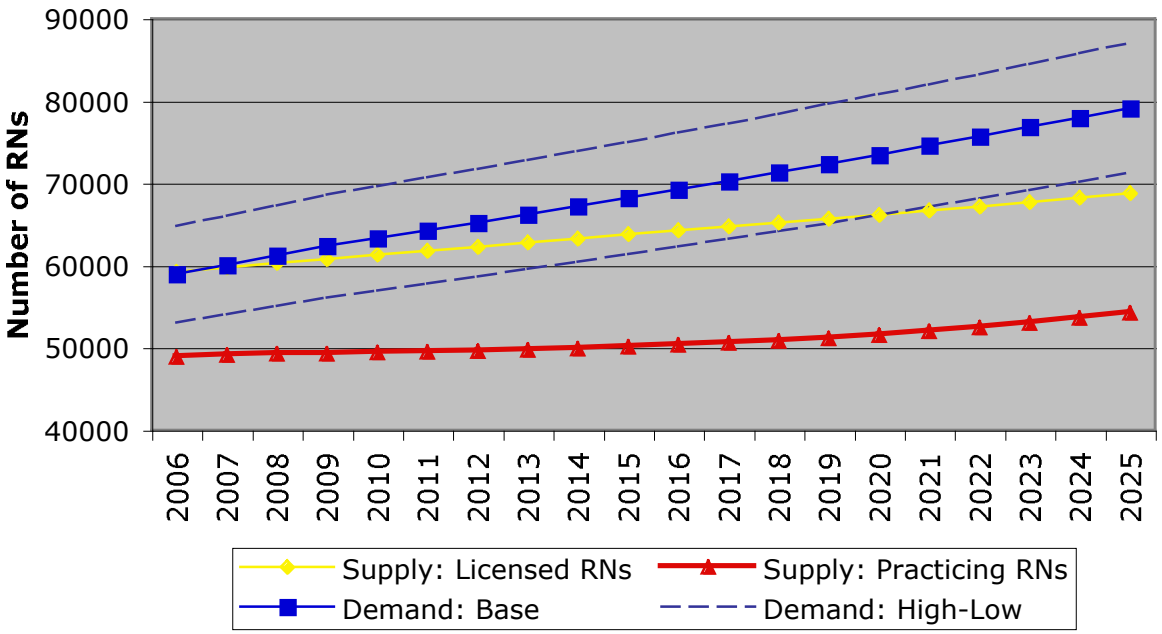
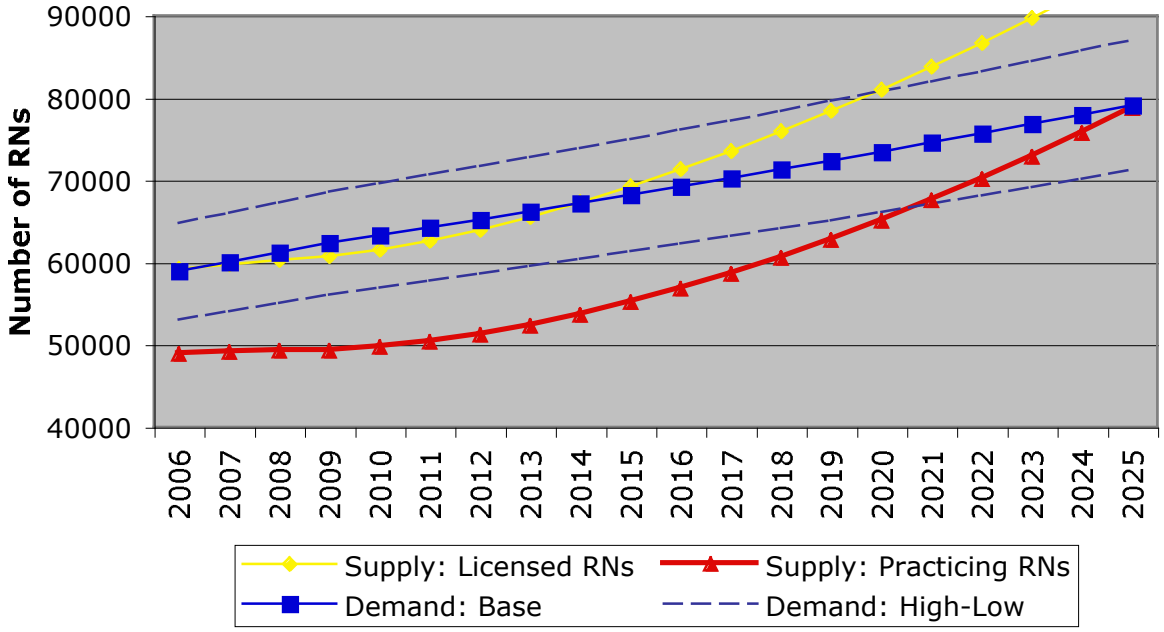
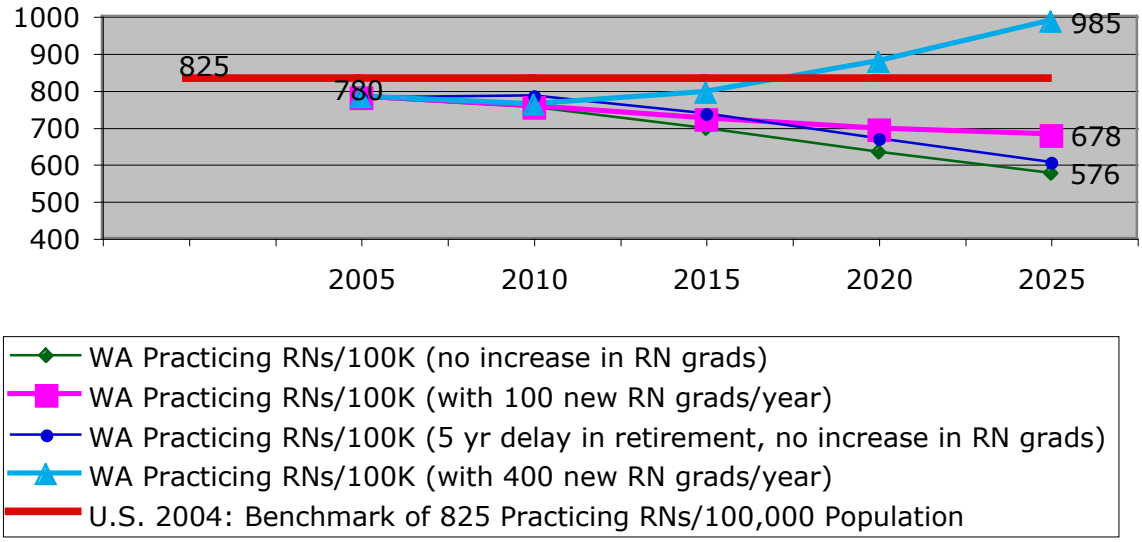


Figure 9: RN Supply-Demand Projections for Washington State, 2006-2025, with Number of RN Graduates Increased by 400 per Year



over time, and how those compare with the 2004 national RNs to 100,000 population benchmark from the 2004 NSSRN. The supply of RNs per population drops over time for each of the first three scenarios (no changes in graduation rates, 100 new graduates per year, and delayed retirement). The scenario that

Figure 10: Estimated Number of RNs per 100,000 Population Under Different Supply Projection Scenarios, 2005-2025, Compared with 2004 U.S. Benchmark



adds 400 new RN graduates each year meets the 2004 U.S. benchmark by approximately 2017, and by 2025 exceeds the benchmark by 160 RNs per 100,000 population.

SUB-STATE ESTIMATES OF SUPPLY AND DEMAND

For a variety of reasons, making projections of RN supply and demand for small geographic areas can be very difficult. For instance, RNs often commute considerable distances to work, and new graduates from nursing education programs do not necessarily stay in the area where the institution is located. Knowing an RN's residence and counting graduates from local nursing schools may not be related to actual working RN supply for that area. We can examine, however, some characteristics of the RN population in sub-state areas (such as WDAs) that are likely to be related to future RN supply.

Because of the large impact of RN age on projections of future RN supply, one of the best indicators of likely future RN shortage is average age of RNs in a region, and percent of RNs older than 55 years. Figures 11 and 12 show that the areas with the oldest average populations of RNs are WDAs 1, 2 and 3, which also have the highest proportions of RNs age 55 and older.

Figure 13 shows the estimated number of practicing RNs per 100,000 population in the 12 WDAs in Washington State. We calculated these ratios by applying the estimates of the percent of RNs working in nursing by age group (Table 8) to the number of RNs with license mailing addresses in each WDA. We obtained Washington population data from CLARITAS, a proprietary database of demographic estimates derived from Census and supplemental data sources. Three WDAs (1, 10 and 12) have ratios higher than the 2004 national benchmark of 825 RNs:100,000 population. Because a high proportion of RNs, especially rural RNs, commute to work in areas other than those in which they live (Skillman et al., 2006), the apparent larger supply in some regions of the state may simply reflect RNs' choice of residence and not employment. For example, RNs residing in the largely rural WDA 1 may be commuting to work in three of the state's largest metropolitan areas, WDAs 4, 5 and 6, where the cities of Everett, Seattle, and Tacoma are located.

Figure 11: Average Age of Washington State RNs by Workforce Development Area (WDA) (2006)

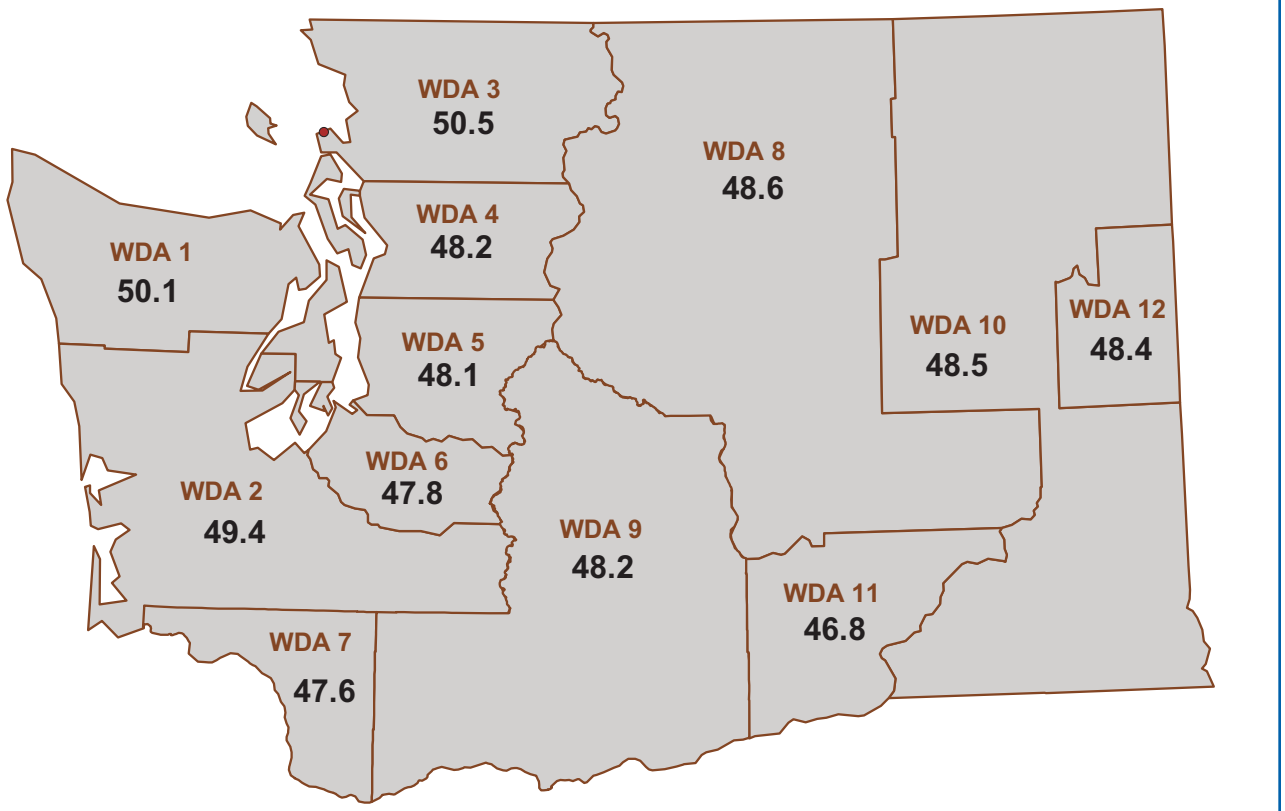


Figure 12: Percent of RNs Age 55 and Older in Washington by Workforce Development Area (2006)

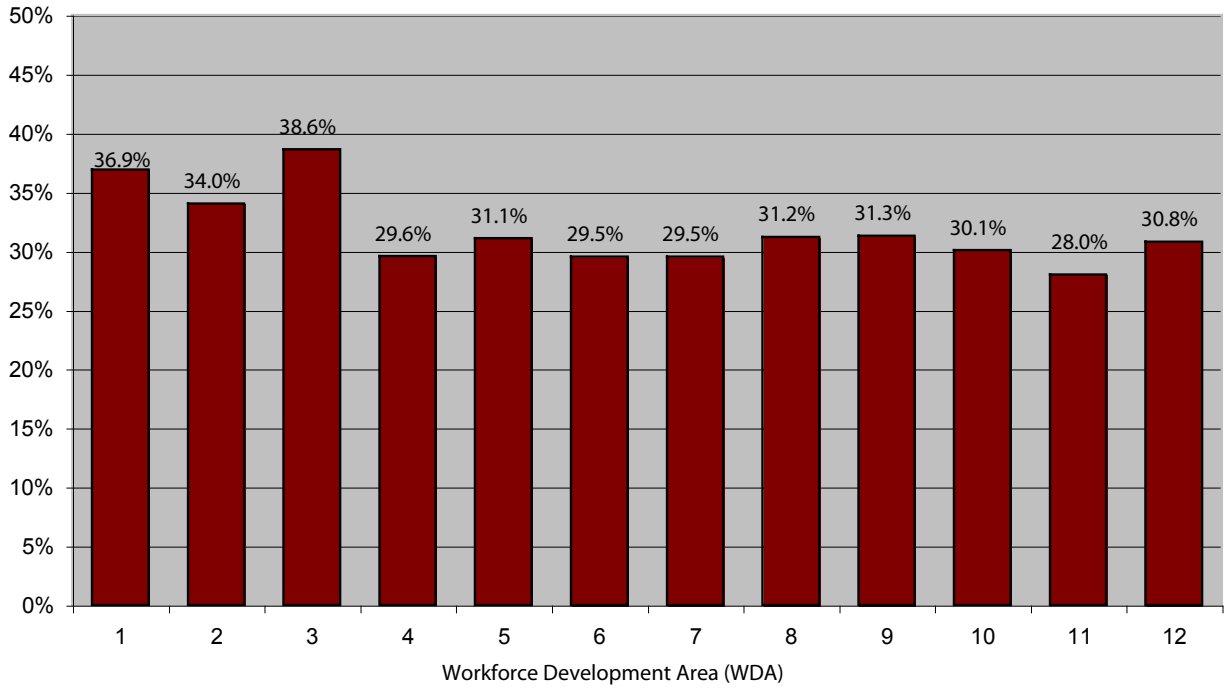


Figure 13: Estimated Number of Practicing RNs per 100,000 Population in Washington by Workforce Development Area (WDA) (2006)

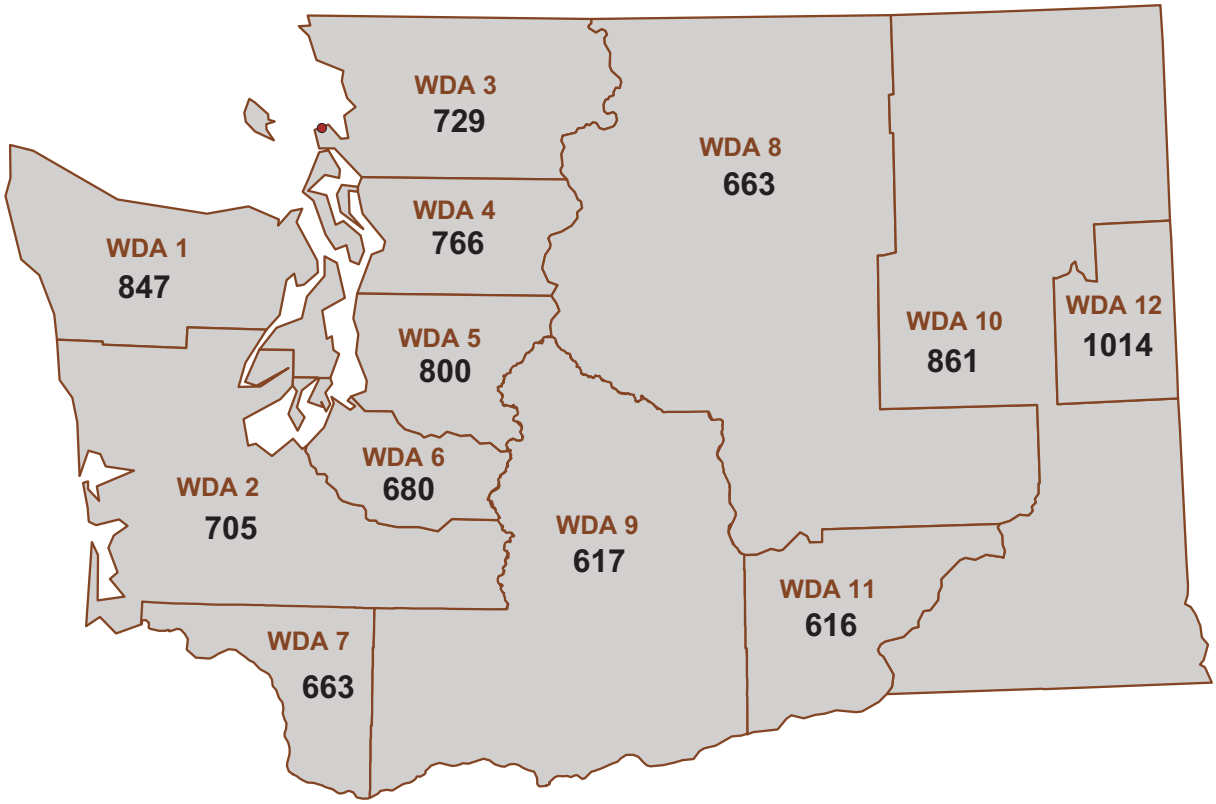
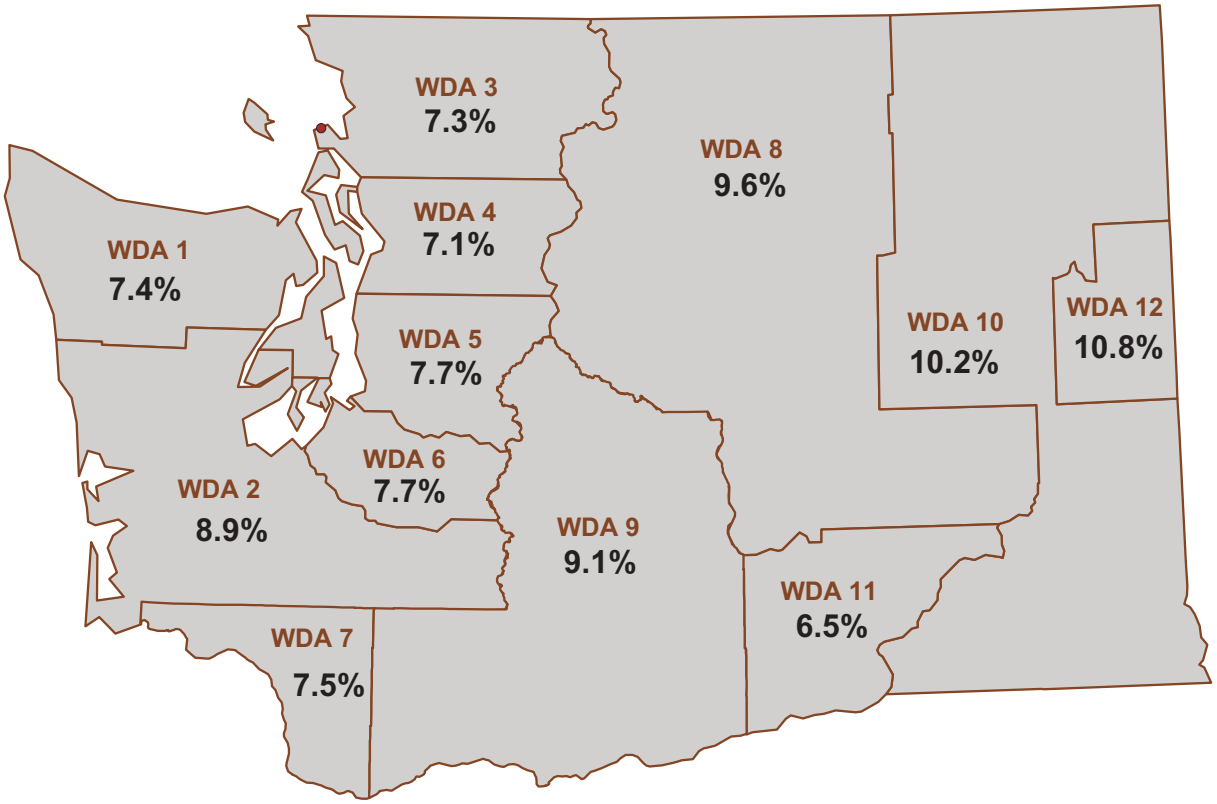


Figure 14: Percentage Male Washington State RNs by Workforce Development Area (WDA) (2006)



Nursing is a predominately female profession. Nationally only 5.8% of RNs are male (Bureau of Health Professions, 2006). Areas that have been able to attract a larger percent of males into the profession may have an advantage in recruiting more of this generally under-represented group into nursing in the future. Figure 14 shows the percent of male RNs in each WDA in Washington in 2006. WDAs 10 and 12 have the largest percentage of male licensed RNs compared to the rest of the areas of the state.

CONCLUSIONS

This report should be used as a planning tool and not as a precise prediction of the future. Most health care planners and policy makers agree that more RNs are needed to meet demand over the next decade, and are working to find ways to accomplish that goal. Better understanding of the factors that affect RN supply and demand and which factors have the greatest impact are critical for making policy decisions to address the problem.

From our analyses of RN supply and demand in Washington State, we found the following:

- The average age of Washington's RNs is 48 years, and more than a third are 55 years of age or older. As a result, the high rate of RNs retiring from nursing practice over the next two decades will significantly reduce RN supply.
- RN education capacity is a factor under policy control that has a large impact on state RN supply.
- If the rate of graduation from nursing schools in Washington does not increase above that of 2006, RN supply in Washington will begin to decline in approximately 2015. If graduation rates increase by 400 RNs per year beginning in 2010, it appears that supply will increase over the next two decades and reach the range of estimated RN demand by approximately 2021.
- The demand for RNs appears likely to increase steadily due to increases in, and aging of, the state's population. Major changes in health care delivery systems or the economic environment, however, could alter the rate of increase in RN demand.
- At the sub-state level it is difficult to project RN supply and demand. The age of RNs in small areas,

however, may be the best predictor of future RN shortage.

The quality of health personnel supply/demand projections reflects the quality of the data available to fuel the projections. Areas where better data would improve projections for Washington State include annual summaries of the number of:

- Foreign educated RNs who first obtain U.S. RN licenses in Washington,
- RNs who obtain licenses in Washington after entering from other states, and
- Licensed RNs in Washington who are not employed in nursing.

In addition, better information on where RNs work compared with where they live would help assess RN supply issues in sub-state regions. Information about RNs' race and ethnicity would also help in assessing the extent to which nursing supply is reflective of the state's population.

Additional data on RNs in Washington will become available in late 2007 when the results of the State Department of Health's survey of licensed RNs are released. Future RN supply/demand projections will benefit from the availability of this additional information, as well as improvements in the accuracy of information about RNs in the state. As more and better data become available, and as policy and population changes occur that alter the data inputs to this projection model, these projections should be revised and updated.

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