



New Jersey. Collaborating Center for Nursing

Workforce Development * Health Policy * Quality Care

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Issue Brief: Projections of the Supply and Demand of Registered Nurses in New Jersey
Review of "What is Behind HRSA's Projected Supply, Demand and Shortage of Registered Nurses?"

Background

The adequacy of nurse supply varies throughout the United States, with a general consensus that at the national level there is currently a moderate shortage of registered nurses (RNs). In 2004, the National Center for Health Workforce Analysis in the Bureau of Health Professions, Health Resources and Services Administration (HRSA) reported that their analysis suggests that the current shortage of RNs would continue to grow in severity during the next 20 years, if current trends prevail.

The HRSA report based the projections on two forecasting models: (a) The Nursing Supply Model (NSM) and the (b) Nursing Demand Model (NDM). Both of these models are built on national existing databases for supply and for demand. State forecasts are then calculated for individual states. An overview follows of the HRSA supply and demand models, as well as their forecasts for New Jersey in 2005, 2010, 2015, and 2020.

Nursing Supply Model (NSM)

The NSM creates annual, state-level projections of the RN supply, i.e., those nurses working in nursing or residing in that state and eligible to work as an RN. The model uses the data from the 2000 National Sample Survey of RN's estimates of the current number of nurses working or eligible to work in a state, adds the estimated number of newly licensed RNs, subtracts the estimated number of RNs leaving employment in that state, and tracks cross-state migration patterns. The model projects the number of licensed RNs and applies labor force participation rates from the U.S. Census middle series population projects to estimate the number of RNs active in the health workforce. Nurses who report working full-time are counted as 1 FTE, while nurses who report working part-time or for only part of the year are counted as 0.5 FTEs. The end of each year's projections becomes the starting value for the next year's projections.

The NSM contains three major components, each based on existing databases:

- **New Graduates:** The National Council of State Boards of Nursing reported that approximately 71,100 RNs graduated from nursing programs in 2000. Comparing state-level data from the National Council Licensure Examination for Registered Nurses (NCLEX-RN) with state-level estimates of the number of women age 20 to 44 creates the applicant pool for each state. The NSM applies algorithms to model the impact on the number of nursing graduates resulting from changes in RN compensation, working conditions, teaching capacity and tuition. Under the baseline scenario, the number of new nurse graduates is relatively constant through 2020 at the national level. In addition, the NSM assumes net immigration of 3,500 RNs graduated per year from foreign schools.
- **The RN Population:** The model starts with number of licensed RNs in each state, tracked by age and education level, as estimated using the 2000 National Sample Survey of RNs (NSSRN). The NSM addresses cross-state migration patterns by estimating the probability of leaving or entering the state as a function of RN age, education level and state of residence. The education level and age composition of the RN population has important implications for the current and future supply of RNs because labor force participation, cross-state migration and retirement patterns vary systematically by age and education level. For example, RNs prepared at the master's level or higher are more likely to migrate than are RNs prepared at the baccalaureate level, who in turn are more likely to migrate than are RNs with a diploma or associate degree. Younger RNs are more likely to migrate across states than are older RNs, reflecting factors such as greater transience among professionals early in their career as they seek employment after graduation.

- **Permanent Separation from the Nurse Workforce:** The NSM constructs separation rates by combining mortality rates for women and estimated rates of attrition for reasons of disability and retirement using data from the 1998, 1999, 2000 and 2001 Current Population Surveys (CPS). Anecdotal evidence suggests that many RNs who leave nursing retain their license even when they have no intent of returning to nursing. Nurses who change careers but continue to renew their license are accounted for in the NSM labor force participation and FTE rates.

Results: Nursing Supply Projections: NSM baseline projections reflect the level of RN supply that is most likely to occur if current trends continue. At the national level, the supply of licensed RNs is projected to remain relatively constant at about 2.7 million RNs between 2000 and 2020. The number of licensed RNs is projected to increase slightly through 2012, but then start declining as the number of retiring RNs exceeds the number of new graduates. On the national level, the number of RNs who are active in nursing is projected to remain between 2.1 million and 2.3 million during this period, while the FTE supply of RNs is projected to decrease slightly from 1.89 million in 2000 to 1.81 million in 2020.

At the state level there is substantial variation in the growth or decline of the RN population between 2000 and 2020, based on the projected number of new graduates, net cross-state immigration and attrition from the RN population. For example, the total decrease in the supply of New Jersey RNs from 2000 to 2020 is -26%, compared to -4% of decline on a national level.

Table 1. Baseline FTE RN Supply for New Jersey and the U.S. by Year: 2000 to 2020

	2000	2005	2010	2015	2020	% Change 2000 to 2020
New Jersey	60,400	58,200	55,000	50,500	44,900	-26%
U.S.	1,890,700	1,942,500	1,941,200	1,886,100	1,808,000	-4%

Nursing Demand Model (NDM)

The NDM projects state-level demand for FTE RNs through 2020. Nursing demand is defined as the number of FTE nurses that employers are willing to hire given population needs, economic considerations, the healthcare operating environment, availability, and other factors. Changing demographics are a key determinant of projected need for FTE RNs. The U.S. Census Bureau projects a rapid increase in the elderly population starting around 2010. Because the elderly have much greater per capita healthcare needs compared to the non-elderly, the rapid growth in demand for nursing services is especially pronounced for long-term care settings that predominantly provide care to the elderly. In addition to state-level U.S. Census Bureau projections of changing demographics, the NDM projects nurse demand as a function of changing patient acuity, economic factors, and various characteristics of the healthcare environment, such as managed care enrollment rates.

The NDM uses the two following components to input data and projection equations to project demand: Healthcare Services and Nurse Staffing Intensity.

- **Healthcare Services:** The demand for RNs is derived from the demand for healthcare services. Estimates of Healthcare Services come from multiple sources including the American Hospital Association (AHA), the American Health Care Association (AHCA), and the Centers for Medicare and Medicaid Services (CMS).

Analyses of the use of healthcare services suggest several scenarios that impact nursing demand. As Health Maintenance Organization (HMO) enrollment rates rise, the number of inpatient days at short-term hospitals, emergency room visits, and nursing facility residents decline. As surgeries shift from inpatient to outpatient settings, the number of inpatient days in short-term hospitals fall and the number of outpatient visits and home health visits rise. The percentage of the population enrolled in Medicaid is positively correlated with higher utilization of healthcare services, including inpatient

days, outpatient visits, emergency room visits and home health services. An increase in the proportion of the population that is non-white is associated with a slight increase in the use of outpatient services and long-term hospital inpatient days. An increase in the proportion of the Hispanic population is associated with a slight decrease in emergency department visits.

- **Nurse Staffing Intensity:** The overall impact of staffing intensity must be considered in conjunction with healthcare services projections to comprehend fully the magnitude of additional RN FTE's required. Nurse staffing intensity is defined as the number of FTE nurses divided by some measure of workload specific to the setting. The NDM calculates base year values of nursing staffing intensity for each state and setting by dividing estimates of RN employment by estimates of healthcare utilization. Staffing intensity is projected considering nurse wages, HMO enrollment rates, hospital inpatient and outpatient surgeries, healthcare reimbursement rates, percent of population uninsured, percent of population Medicaid-eligible, per capita personal income, patient acuity levels, and geographic location. In many instances, the impact of change may have a mixed effect on nurse staffing intensity. In percentage terms, the NDM projects the fastest growth will occur in settings that predominantly serve the elderly (e.g., home health and nursing facilities) and in hospitals outpatient settings. FTE RN demand data projections for New Jersey and the U.S. follow.

Table 3. Baseline FTE RN Demand New Jersey and the U.S. by Year: 2000 to 2020

	2000	2005	2010	2015	2020	% Change 2000 to 2020
New Jersey	65,600	65,600	74,600	80,400	87,300	33%
U.S.	2,001,500	2,161,300	2,347,000	2,569,800	2,824,900	41%

Future nurse demand will be determined, in part, by political decisions, changes in technology, changes in healthcare operating environment, and changes in other factors that are hard to predict. Projection models such as the NDM are relatively simplistic simulations of a complex healthcare system that try to capture the major trends, so the RN demand projections are made with some level of imprecision. For example, managed care growth shifts may shift care to outpatient settings and increase inpatient staff intensity to reflect increasing levels of patient acuity. Raising RN wages 1% annually may decrease demand for FTE RNs by 10% in 2020 but provide employers greater financial incentives to substitute LPNs where possible. If the U.S. population grows 20% faster than projected by the Census Bureau, by 2020 the demand for FTE RNs would increase by 3%. Conversely, if the U.S. population grows 20% slower than projected by the U.S. Census Bureau, by 2020 the demand would decrease by 3%.

Assessing the Adequacy of Future Supply

- Comparing the baseline supply and demand projections suggests that if current trends continue, 64% of projected demand for FTE RNs in the U.S. will be met by 2020, as compared to 2005 when 90% of demand will be met. By 2015, every state is projected to experience some level of shortfall. State-level shortages are projected to vary substantially and market forces will create financial incentives for nurses to migrate to states with more severe shortages. FTE RN demand shortfall projections for New Jersey and the U.S. follow.

Table 4. Baseline FTE RN Demand Shortfall for New Jersey and the U.S. by Year: 2000 to 2020

	2000	2005	2010	2015	2020
New Jersey	8% (-5,200)	16% (-11,500)	26% (-19,600)	37% (-29,900)	49% (-42,400)
U.S.	6% (-110,800)	10% (-218,800)	17% (-405,800)	27% (-683,700)	36% (-1,016,900)

Limitations of the Models

The NSM and NDM are independent models. The demand model makes projections without considering the potential supply of nurses, and vice versa. The future nurse workforce, in reality, will be influenced by the combination of supply and demand. Both models use HRSA's National Sample Survey of RNs (NSSRN) to create estimates. Because the precision of estimates is proportional to sample size, estimates of demand for RNs in a particular setting within a state are less precise than state-level estimates, which in turn are less precise than national-level estimates. Because the NSM and NDM are scaled-down versions of complex systems, there are many determinants that are not included in the models that impact trends at the state level. The NSM models only the supply of RNs and does not consider LPNs and nurse aides, both categories of health workers that impact nursing demand and the applicant pool. Parts of both models are static. In the NSM, for example, the probability of cross-state migration is based on historical patterns that do not consider current state shortages. The NDM has limited ability to model substitution between types of nurses and between nurses and other healthcare workers. Similarly, it has limited ability to capture interaction of healthcare settings when some settings might be viable substitutes (e.g., home health and nursing facilities) and others might be complimentary (e.g., increased use of outpatient services leading to the increased use of home health services).

Conclusion

Although the NSM/NDM are valuable in providing one scenario of what the future might hold, analyses of New Jersey data in a State constructed model also are useful in planning strategically for the future. The NJCCN's forecasts of the demand for RNs and LPNs for 2006, based on a New Jersey data constructed model, can be found on our website at www.njccn.org. Using the actual 2000 data compared to the model's 2000 forecasts has tested these forecasts, based on the NJ Demand Model. The model was found to have underestimated the RN projections by 3-5% and overestimated the LPN projections by 4%. The LPN demand-forecasting model was somewhat less reliable because it contained one year less of data than the RN forecasts. However, it must be noted that the NJ Nurse Demand Forecasting Model is based on the number of RNs or LPNs needed, rather than on FTE positions as does the HRSA models. Our forecasts for 2010 are forthcoming; watch for the reports on our website.

Reference

Biviano, M., Dall, T.M., Fritz, M.S., and Spencer, W. (September 2004). *What is behind HRS's projected supply, demand, and shortage of Registered Nurses*. Rockville, MD: National Center for Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration.