

WISCONSIN REGISTERED NURSE SUPPLY AND DEMAND FORECAST RESULTS

2020-2040 Long-Term Occupational Projections Report

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STATE OF WISCONSIN
 **DWD**
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Abstract

Maintaining a sufficiently large and qualified Registered Nurse (RN) workforce is more pressing than ever. The aging baby boomer population along with the COVID-19 pandemic provide the context for one of the major challenges facing the RN workforce: projected nursing shortages. In addition to retiring from the workforce, the aging population will require more health care services. While the structural impacts of the pandemic on health care are still uncertain, the outlook using pre-pandemic data highlights the challenges that the RN workforces have been facing for over a decade.

The first comprehensive survey in Wisconsin was administered to all RNs in 2010, and these data were used in the first RN Supply and Demand forecast report. The model has been updated numerous times using the subsequent RN surveys. This 2020-2040 Long-Term Occupational Projections report provides the base model, and two alternative projection models for supply: linear regression and logarithmic regression. The results of the three supply models paint different pictures. The logarithmic regression is likely the most realistic. It projects a substantial but less drastic shortage than the original demographically driven model. Its estimated gap would be 27% by 2040.

One positive observation over the last decade is that the number of nurses has largely kept up with needs prior to the additional demands brought on during the COVID-19 pandemic. However, current events have illuminated what a future would look like if health care staffing needs are not met. While a nursing shortage is uncertain, many nurses are leaving the profession due to rising stress, overwork, and physical and verbal abuse in the workplace. This report recognizes the essential role nurses play in the health care system while providing information to assist leaders in making decisions about the health care workforce.

1. INTRODUCTION

A close examination of the RN workforce is essential for two reasons. First, it provides a good barometer for the challenges facing the health care workforce as a whole. Second, the size of the profession means that maintaining a strong nursing workforce is essential for providing quality health care.

The first comprehensive survey was administered to all RNs in 2010, and the results were used in the first Supply and Demand report. The model has been updated numerous times using the consecutive RN surveys. This 2020-2040 Long-Term Occupational Projections report provides the original demographically driven model, and, additionally, two alternative projection models for supply that were first developed in the previous 2020-2040 forecast report.

This report comes at a time when the need for a strong health workforce is more important than ever. Health Care is still the largest United States employer and RNs are a major segment of the essential workers in this system.¹ The latest RN survey data used to populate workforce supply and demand models for Wisconsin were collected prior to the onset of the COVID-19 pandemic. While the structural impacts of the pandemic on health care are still uncertain, the outlook using pre-pandemic data highlights the challenges that the RN workforce has faced for over a decade. Health care worker shortages have been a problem even before COVID-19, and the nursing sector is particularly difficult as only 1% of the nation's nursing homes and assisted living facilities have a full staff.²

The aging baby boomer population provides the context for one of the major challenges facing the RN workforce: projected nursing shortages (Buerhaus et al, 2009; Juraschek et al, 2012; Auerbach et al 2014; Johnson et al 2016; Buerhaus et al, 2017; Spetz, 2018; Condlife et al 2019). The baby boomer population is characterized as those born between 1946 and 1964. The oldest baby boomer reached the traditional retirement age of 65 in 2011. The youngest boomer will turn 65 in 2029, which means the labor force now stands at roughly the halfway point of this large demographic group's workforce exodus. The Wisconsin Department of Administration³ projects that the population between 20 and 64 years old, or the working age population, will decline by about 1% over the next two decades. The population aged 65 and over is expected to grow by over 44% during the same timeframe.

The aging population will make it difficult for employers across all industries to find and retain skilled workers. Employers will need to meet increasing demands of a growing population without growth in the workforce. It will be even more difficult for the health care industry to balance worker supply and service demand. Along with retiring from the workforce, the aging population will require more health care services. To aggravate this situation, a faculty shortage exists at nursing schools across the entire country, which is limiting the enrollment and number of graduates the schools can provide.⁴

2. THE EQUILIBRIUM ASSUMPTION

A key assumption of this forecasting model is an initial balance between the supply of and demand for RNs. Maintaining this balance has been a notable accomplishment given demographic challenges. Determining if this "equilibrium assumption" can be used for modeling relies on three key points. First, unemployment rates are observed through a licensure survey. Rates for the nurses are typically much lower than the overall workforce. Unemployment rates among nurses maintaining an active license remain within the same range that has been measured over the last decade (between 0.30% and 0.60%). Rates dipping lower or higher would provide evidence of a change in the balance.

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All model updates have started with a balance between supply and demand.

The second point is vacancy rates of RNs in Wisconsin hospitals. The Wisconsin Hospital Association conducts an annual personnel survey and reports the vacancy rates for selected health care professions. There will always be some level of vacancy since it takes time to find a nurse to fill an open position. Comparing the rate over time provides insight into the availability of RNs. The vacancy rate for RNs was 5.4% in 2019,⁵ which was down slightly from 5.5% in 2018. As a reference, the rate reached a high of 9.1% in 2008 when needs for RNs were considered more pressing.

Third, the Office of Economic Advisors works with the Wisconsin Health Workforce Data Collaborative and reviews anecdotal evidence to ascertain whether RN staffing needs are being met statewide. The starting point for this model will remain in balance. The Future of Wisconsin's Healthcare Workforce report published by the Wisconsin Council on Medical Education and Workforce also used this assumption while examining roughly the same time frame. However, it comes at a time when the state is facing unmet needs. Roughly 95% of the ICU beds were occupied in January of 2022. Governor Evers requested Federal Emergency Management Agency workers and deployed National Guard nurses to address hospital staffing shortages.⁶ Health care providers are resorting to strategies that are indicative of potential employee shortages. These include sign-on bonuses and hiring traveling nurses as temp workers. Hospitals are seeking alternatives to fill vacancies, such as recruiting foreign nurses and clerical staff.⁷ While the COVID-19 pandemic brought the staffing challenge to the forefront, the situation has been building for years. It will take continued examination to determine how much of the current staffing challenges are based on the situation and how much is being driven by long-standing demographic pressures.

3. MODELING RESULTS

The method used for projecting demand remained the same as the original model from 2011.⁸ The Base Demand Model relies on two assumptions: 1) nurse staffing intensity (nurse to patient ratio) and 2) health care usage by employment setting and by age (the number of patients in various settings broken down by patient age group). Both elements are held constant, which means aging population and overall population growth are the only driving forces for the Base Demand Model. The demand projections incorporate patient demographic data and staffing patterns by care setting. The projections show growing demand, which is consistent with previous versions of the model and HRSA forecasting results of 2017.⁹ For the first time, this report will provide a breakdown of changing demand by setting. The employment settings are the following:

- Extended Care: Nursing Home, Hospice, Assisted Living, and Community-Based Residential Facilities;
- Home Health Care;
- Emergency;
- Inpatient;
- Ambulatory Surgeries in Hospitals;
- Ambulatory Surgeries Free Standing;
- Public Health;
- Educators; and
- Other Nurses.

The method used for projecting demand remained the same as the original model from 2011. Given the faster than anticipated growth of the RN workforce, the supply model was reviewed.

A more detailed description of the base model method and assumptions is provided in “Wisconsin Registered Nurse Supply and Demand Forecasting Model: Technical Report” (Walsh et al., 2011).

Given the faster than anticipated growth of the RN workforce, the supply model was reviewed in the previous 2020-2040 forecast report. Now we provide supply projections using the original model from 2011 and two basic regression models using the historical RN survey data collected since 2010.

Specifically, the three different models are:

- Demographically driven model (update of the previous versions of 2010, 2012, 2014, 2018, and 2020);
- Linear regression of RN workforce on year; and
- Linear regression of RN workforce on natural log of year (logarithmic model).

3.1 Base Model: Demographically Driven

The demographically driven model works under the assumption that the nursing workforce will follow the age demographics of the entire population. This is essentially the "status quo" scenario and provides an outlook if population demographics were the only thing that changed going forward. The data sources for the base model are the most current survey, specifically the 2020 survey, and the most recent population projections produced by the Wisconsin Department of Administration.¹⁰ This model implicitly assumes that educational capacity for new RNs can remain at the current level.

Figure 1 and Table 1 show the forecasted supply and demand for RNs every 5 years, starting at 2025. The base model projects flat supply and rapidly increasing demand. The estimated gap would be 33% by 2040, almost 23,000 nurses.

Figure 1: RN Supply and Demand Projections: Base Model

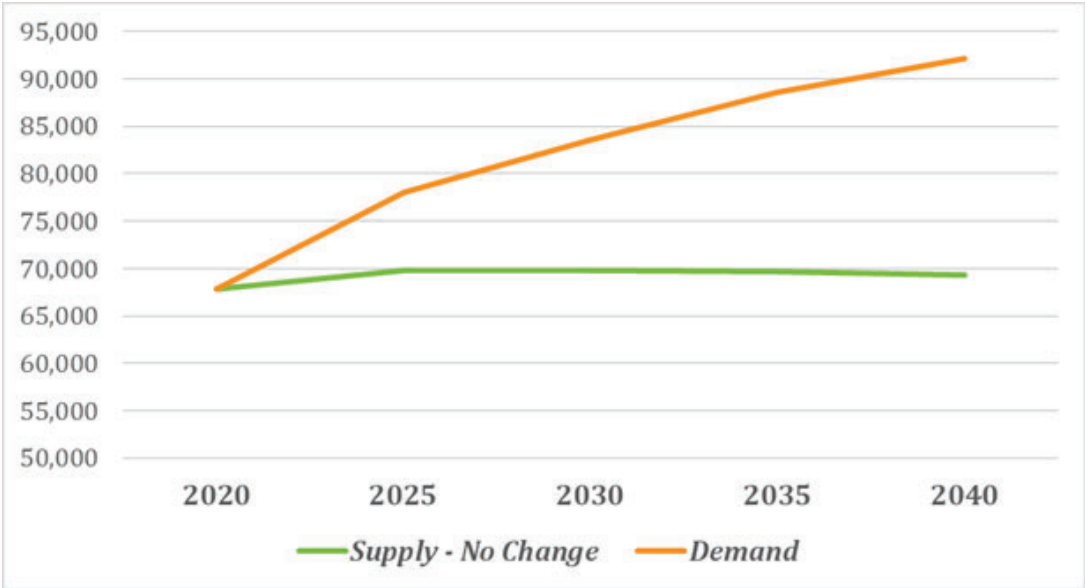


Table 1: RN Supply and Demand Projections: Wisconsin: Base Model

	2020	2025	2030	2035	2040
Supply	67,900	67,900	69,800	67,900	69,300
Demand	67,900	78,000	83,600	88,600	92,200
Gap	0	-8,300	-13,900	-19,000	-22,900
% Gap	0%	-12%	-20%	-27%	-33%



3.2 Linear Regression

Ordinary Least Squares regression (OLS) is more commonly called linear regression. The supply for RN is estimated using the given linear regression formula.

$$Y_t = \alpha + \beta t + \epsilon_t$$

Where:

Y_t : is the value of RN Workforce (the dependent variable) at time t ;

α : is the intercept at the vertical axis;

β : the trend coefficient;

ϵ : error term;

t : time (the independent variable): $t = 2010 \dots 2020$

The supply linear regression model assumes growth of RNs will follow the same trend that has been observed since 2020 and continue to grow at the same rate. The difference between the base model and the regression models is the use of historical data from all the previous licensure surveys since 2010.

Figure 2 and Table 2 show the supply forecast using linear regression and the base model demand for RNs every five years, starting at 2021. The results of this model largely match the supply and demand modeling provided by HRSA (2017). If it continues to grow at a linear rate, supply will come close to keeping up with demand. Past trends show that this model is statistically a strong fit. However, this model is likely optimistic given the demographic pressures constraining supply growth. The estimated gap would be 3% by 2040.

Figure 2: RN Supply and Demand Projections: Linear Regression

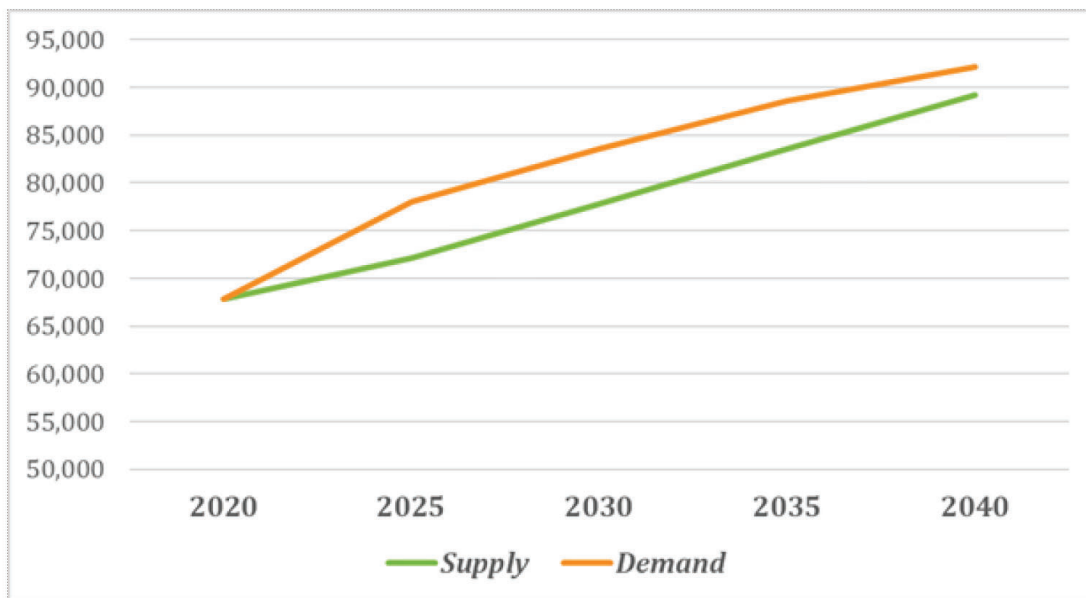


Table 2: RN Supply and Demand Projections: Wisconsin: Linear

	2020	2025	2030	2035	2040
Supply	67,900	72,200	77,800	83,500	89,200
Demand	67,900	78,000	83,600	88,600	92,200
Gap	0	-5,800	-5,900	-5,100	-3,000
% Gap	0%	-8%	-8%	-6%	-3%

3.3 Logarithmic Regression

The supply for RNs using the logarithmic regression is estimated using the following equation:

$$Y_t = \alpha + \beta \ln(t) + \epsilon_t$$

Where:

Y_t : is the value of RN Workforce (the dependent variable) at time t ;

α : is the intercept at the vertical axis;

β : the trend coefficient;

ϵ : error term;

$\ln(t)$: Natural log of time (the independent variable):

$t = 2010 \dots 2020$

The logarithmic regression uses historical data from the RN survey to project supply going forward. It assumes continued growth but at a decreasing rate.

Figure 3 and Table 3 show the supply forecast using logarithmic regression and the base model demand for RNs every five years, starting at 2021. This model is both a statistically strong fit and intuitively fits with demographic pressures facing the workforce. This model projects a substantial but less drastic shortage than the original demographically driven model. The estimated gap would be 27% by 2040, 19,800 nurses.

Figure 3: RN Supply and Demand Projections: Logarithmic Regression

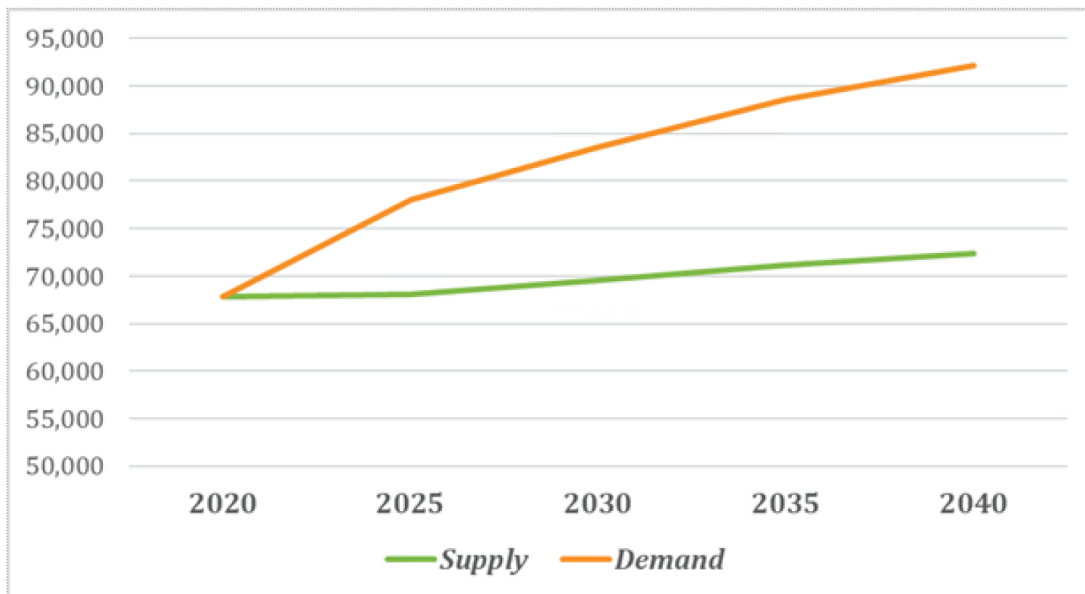


Table 3: RN Supply and Demand Projections: Wisconsin: Logarithmic

	2020	2025	2030	2035	2040
Supply	67,900	68,100	69,600	71,200	72,300
Demand	67,900	78,000	83,600	88,600	92,200
Gap	0	-9,900	-14,000	-17,500	-19,800
% Gap	0%	-15%	-20%	-25%	-27%

3.4 Demand Growth by Setting

The Base Demand Model relies on two data elements: 1. nurse staffing intensity and 2. health care usage by employment setting and by age. Both elements are held constant, which means aging population and overall population growth are the only driving forces for the Base Demand Model. The Nurse Licensing Survey was used to establish a headcount of nurses by setting. The remaining sources used to populate this model include:

- Census of Wisconsin Nursing Home Residents by Age, WI DHS on December 31, 2020 (special request);
- Wisconsin Home Health Agency Patients from January 1, 2020, to December 31, 2020, WI DHS (special request);
- Wisconsin Hospital Association (WHA), Hospital Utilization Report 2020;
- Wisconsin Hospital Association, Hospital Utilization Report 2020;
- Wisconsin Hospital Association, Health Care Data Report: 20 Most Common Surgeries 2020;
- National Center for Health Statistics, National Medical Care Survey (NAMCS) 2018; and
- Wisconsin Department of Administration, County Age-Sex Population Projections, 2010 - 2040, Final Release.

Figure 4 and Table 4 display the projected percent growth with respect to the base year 2020. This makes it possible to make a comparison of relative growth. The results are consistent with an aging population. Overall demand for nurses is projected to grow by 35.8% in 2040. Demand for nurses in extended care and home health care are expected to more than double by 2040 (110%, and 105%, respectively). These projections could be impacted by unknown consequences of the COVID-19 pandemic. For example, preventive treatment and elective procedures were postponed indefinitely in the initial public health response to the pandemic. That alone is likely to have widespread impact, and not just on the health of individuals whose care was put on hold. As such treatments and procedures resume and the consequences of delayed care are revealed, pressure will build on a health care system already strained to the limit during the pandemic, exacerbating the nursing shortage.

Figure 4: RN Demand Projections by Setting

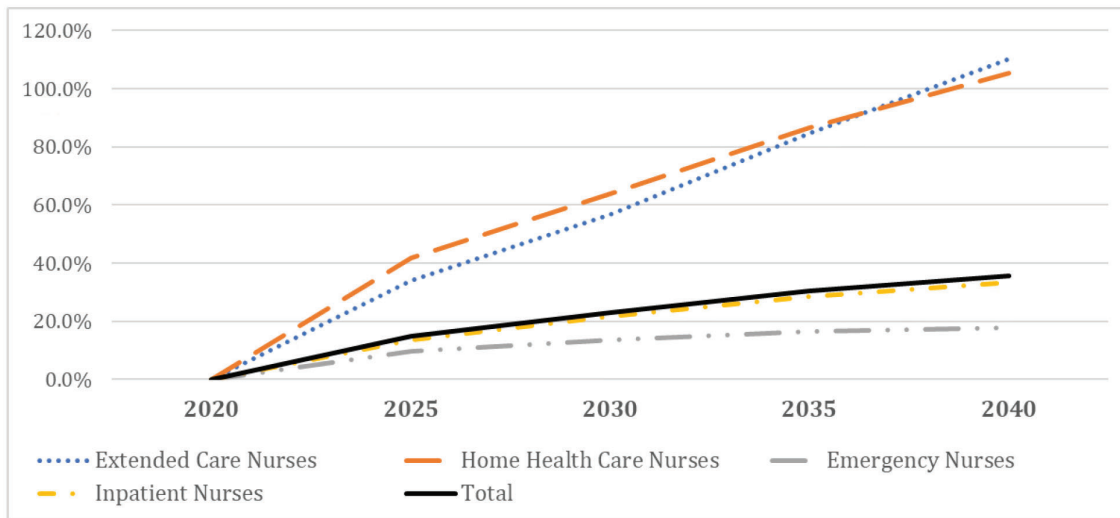


Table 4: RN % Growth from 2020 in Demand by Setting

	2020	2025	2030	2035	2040
Extended Care Nurses	4,956	34%	57%	84%	110%
Home Health Care Nurses	3,738	42%	64%	87%	105%
Emergency Nurses	8,426	10%	14%	17%	18%
Inpatient Nurses	24,665	13%	22%	29%	33%
Ambulatory Nurses in Hospitals	1,814	12%	19%	23%	25%
Ambulatory Nurses (Free Standing)	15,911	11%	17%	21%	23%
Public Health Nurses	2,138	10%	13%	15%	15%
Other Nurses	4,167	9%	12%	14%	14%
Educators	2,091	7%	10%	11%	11%
Total	67,906	15%	23%	31%	36%

* Year 2025 to 2040 are percent change with respect to base year 2020

4. Interpretation and Final Discussion

One positive observation that can be made over the last decade is that the number of nurses has largely kept up with needs prior to the COVID-19 pandemic.¹¹

The linear regression model shows that supply will roughly keep up with demand if supply continues to grow at the historical pace.

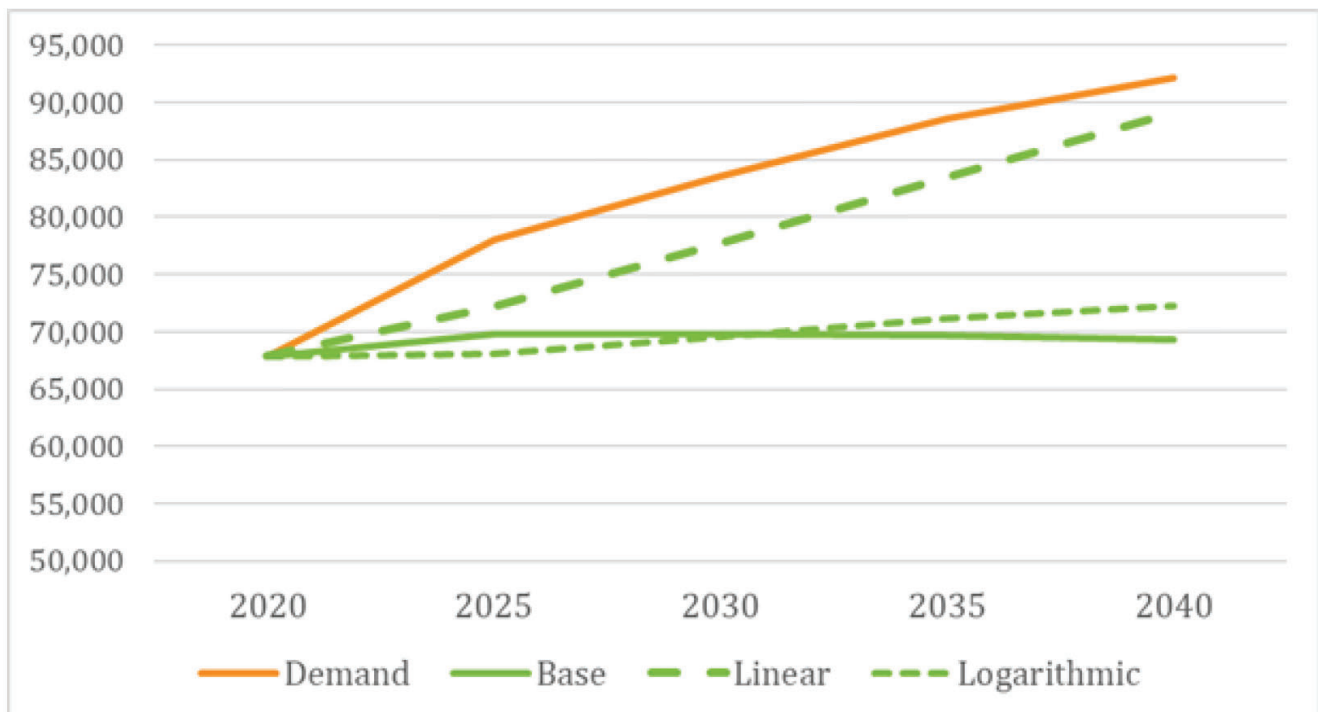
Increasing the number of graduates from nursing schools is consistently recommended as one method for improving nursing shortages (Buerhaus et al, 2009; Johnson et al, 2016). Annual growth in graduates has been a bright spot. Efforts to increase capacity and fill nursing programs around the state have been underway since the early 2000's. The number of graduates taking the National Council Licensure Examination (NCLEX) for the first time rose from 1,795 in 2003 to 4,106 in 2020 in Wisconsin.¹² Wisconsin's RN workforce grew by 17% between 2010 and 2020 according to the license renewals surveys. While Wisconsin's population overall is trending older, nurses overall are becoming a younger group. Survey results shows that the share of nurses under 40 increased from 35.7% in 2010 to 38.9% in 2020.

In addition, more Wisconsin nurses are earning advanced degrees. The first RN survey of 2010 showed that 56.3% of nurses held a bachelor's degree or higher compared to 72.9% in 2020. The percentage of nurses receiving master's or doctorate degrees has also increased from 10.5% in 2010 to 15.4% in 2020. Advanced nursing degree awards have shifted younger since 2010 as well.

However, current events shed light on what a future would look like if health care staffing needs are not met. The results of the forecasting models indicate this is a very real threat. The three supply models paint different pictures (See Figure 5).

The demographically driven base model provides a good "status quo" scenario if nothing changes going forward. However, actual growth has exceeded demographic growth over the decade, and it is reasonable to think that will continue. The linear growth model shows that supply would roughly keep up with demand if the current growth rate continued. The logarithmic regression model is likely the most realistic. It shows a scenario in which the number of RNs continue to grow but at a slower rate than we've seen over the last decade.

Figure 5: RN Supply and Demand Projections: All Models



The previous report mentioned the following key points for maintaining a strong RN workforce:

- Avoiding complacency.
- Maintaining a strong educational structure.
- Taking a holistic view.
- Addressing varying needs within the state.
- Focusing on demand as well as supply.

These key points remain relevant. The previous report mentioned leveraging technology to help the health care workforce expand its reach. The increased use of technology is being seen throughout the workforce. A common misconception is that technology replaces workers. A better explanation is that technology replaces tasks that are routine and repetitive. The workers are needed to perform tasks that cannot be automated, which includes the interpersonal elements. Technology leveraged in the right way has the potential to free more time for caregiving. For instance, telehealth has the potential to greatly expand access and quality of care, and it is one means nurses can use to address critical unmet health needs post COVID-19. With the nursing shortage intersecting with this pandemic, a more extensive commitment to the nursing workforce, education, and training on virtual monitoring and treatment will be required to address the demands and innovations.¹³

Additionally, the need to avoid nurse burnout is more pressing than ever before. The future of nursing supply is uncertain. This mental health burden is deepening health care labor shortages and threatening quality of care.¹⁴ Many nurses are leaving the profession due to increased stress, overwork, and physical and verbal abuse in the workplace.¹⁵ During the COVID-19 pandemic, nurses have demonstrated how essential they are to the Health Care system.

A larger theme of the last few years is what has been done to address and avert crises. Temporary changes have been made to get students into the workforce faster and to change the ways that care is provided such as including telehealth in insurance coverage. A harsh reality has been the need to delay procedures and implement triage protocols. Steps were taken to address a surge in demand and staffing shortages due to illnesses. Consider this a preview of greater challenges and serious consequences, stressing the system and affecting care, if shortages occur as forecast. Looking to the future, the hard truth is this: The nursing shortage is a crisis in the making, and to avert it, we must see it and treat it as such. The demographic challenges will continue to strain the system. Proactive steps should be taken to address these challenges in a way that maintains or improves public health and patient care. While no one can predict with certainty the severity of the persistent nursing shortage, it is imperative that we take steps to address the challenges and ensure a quality health care system, one that provides good patient care and safeguards public health.



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NOTES

- ¹ <https://www.census.gov/library/stories/2020/10/health-care-still-largest-united-states-employer.html>
- ² <https://www.healthcarefinancenews.com/news/healthcare-lost-17500-jobs-september-amid-ongoing-labor-shortage>
- ³ https://doa.wi.gov/Pages/LocalGovtsGrants/Population_Projections.aspx
- ⁴ <https://nightingale.edu/blog/nursing-shortage-by-state/>
- ⁵ https://www.wha.org/MediaRoom/DataandPublications/WHARports/Workforce/2020/Report/WHA-Workforce-Report-2020_web
- ⁶ <https://www.jsonline.com/story/news/politics/2021/12/08/tony-evers-seeks-100-fema-workers-national-guard-covid-surges/6436598001/>
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- ⁸ <https://jobcenterofwisconsin.com/wisconomy/pub/nursetabv21>
- ⁹ https://bhwa.hrsa.gov/sites/default/files/bhw/nchwa/projections/NCHWA_HRSA_Nursing_Report.pdf
- ¹⁰ https://doa.wi.gov/Pages/LocalGovtsGrants/Population_Projections.aspx
- ¹¹ https://www.jobcenterofwisconsin.com/wisconomy/wits_info/downloads/nurse-survey-reports/supply-nurse-reports/2018_WI%20RN%20Nurse%20Supply%20Demand%20Forecast%202018-2040.pdf
- ¹² <https://www.ncsbn.org/1236.htm>
- ¹³ <https://healthpolicy.duke.edu/covid-19-and-nursing-profession-where-must-we-go-here>
- ¹⁴ <https://www.statnews.com/2021/12/16/health-care-workers-suffering-goes-far-beyond-burnout-self-care-isnt-the-cure/>
- ¹⁵ <https://nursejournal.org/articles/post-pandemic-nursing-shortage/>

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