WISCONSIN REGISTERED NURSE SUPPLY AND DEMAND FORECAST RESULTS

2022-2040 Long-Term Occupational Projections Report

July 2024

Abstract

A close examination of the Wisconsin registered nurse (RN) workforce provides a good barometer for the challenges facing the healthcare workforce as a whole. The size of the profession also means that maintaining a strong nursing workforce is essential for providing quality health care. The first comprehensive survey in Wisconsin was administered to all RNs in 2010, and this data was used in the first Supply and Demand report. The model has been updated numerous times using the consecutive RN surveys. The 2022-2040 report provides the original demographically driven model and two alternative projections models for supply that were first developed in the 2020-2040 forecast report.

The model starts with the assumption that, for the first time, there is a shortage of nurses. Previous reports highlighted the accomplishment of keeping supply and demand in balance but warned of mounting demographic challenges. These demographic challenges are not unique to nursing; workforce quantity is the main challenge facing Wisconsin's economic future. These demographic constraints make it highly unlikely for the RN workforce to maintain a linear growth rate. The demographic and logarithmic regression models both show flattening supply as demand steadily rises. The demographically driven base model provides a good status quo scenario if nothing changes going forward. The logarithmic model, which considers past trends, is the most realistic outlook because difficulty filling open job positions is not unique to nursing.

There will not be a single solution to alleviating current and future challenges. Therefore, it is imperative that there are steps taken to address the challenges and ensure a quality healthcare system, one that provides good patient care and safeguards public health. The supply side of the equation is constrained by demographics, but it is a key part of addressing shortages. It is important to fill existing nursing programs and continue to expand educational capacity, while also placing extra emphasis on workforce retention. The impact of interventions on the demand side are harder to quantify but could have a larger effect on closing expected shortages. Impacting demand can be done in two ways. The first potential path forward involves making it possible for each nurse to care for more patients. This can include leveraging technology to free up more time for caregiving or finding innovative ways to reduce the amount of time patients are under direct care. The second way of impacting demand is to reduce the number of patients. This can be done by improving the overall health of the population.

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1. INTRODUCTION

The Health Resources and Services Administration (HRSA) released a study in 2004 that projected RN supply and demand for the nation and all 50 states and signaled the challenges facing by the RN workforce. The HRSA projections provided a basic summary of the Wisconsin's future nursing shortage. However, the state-specific projections relied on a small sample size of nurses and used national healthcare usage rates to forecast demand. The initial report served as a catalyst for improving data collection and forecasting efforts in Wisconsin. In 2009, the Wisconsin legislature mandated a survey of RNs each even numbered year to determine the characteristics of the nurses licensed in the state as part of their renewal license process.

The first comprehensive survey was administered to all RNs in 2010. Data from the survey was used by the Office of Economic Advisors, a group of labor market economists in the Department of Workforce Development's Division of Employment and Training, to help projected supply and demand for RNs from 2010-2035. The model has been updated numerous times using the consecutive RN surveys. All updates have highlighted the pressures of the state's aging population on the RN workforce. The 2022-2040 report provides the original demographically driven model and two alternative supply projections models that were first developed in the 2020-2040 forecast report.

The model starts with the assumption that there is currently a shortage of nurses. Previous reports highlighted the accomplishment of keeping supply and demand in balance but warned of mounting demographic challenges. The 2022 National Nursing Workforce Survey(1) highlights that the nursing workforce has become more diverse with an increase in Latino nurses. There are also more male nurses, and a larger proportion of RNs holds bachelor's degree or higher. In addition, salaries have increased, possibly due to inflation and increased demand for nursing services. These achievements shouldn't be dismissed. However, previous reports warned of mounting demographic pressures. The COVID-19 pandemic put additional strains on the nursing workforce when hundreds of thousands of experienced nurses left their positions. With a quarter of the national nursing population considering leaving the profession, the pandemic continues to impact the industry. It will be increasingly difficult to meet healthcare requirements as baby boomers continue to age and the need for healthcare increases. Parallel to the silver tsunami, also known as demographic shift caused by the increasing population of older adults, nursing schools across the country face challenges as they work to expand capacity to meet the rising demand for healthcare.

The average age of nurses continues to increase and more nurses reach retirement age each year.(2) The aging population will constrain the number of RNs in the workforce. This is not unique to nursing; the entire workforce faces a quantity shortage. Based on the Office of Economic Advisors estimations at the Department of Workforce Development, the population in Wisconsin is projected to grow by 4.7% between 2022 and 2040, while the labor force is expected to increase by only 0.5%. The number of residents over the age of 65 will increase by 22.1% over the same time frame. The aging population creates a unique challenge for the nursing and healthcare workforce, since the older population will demand more healthcare services.

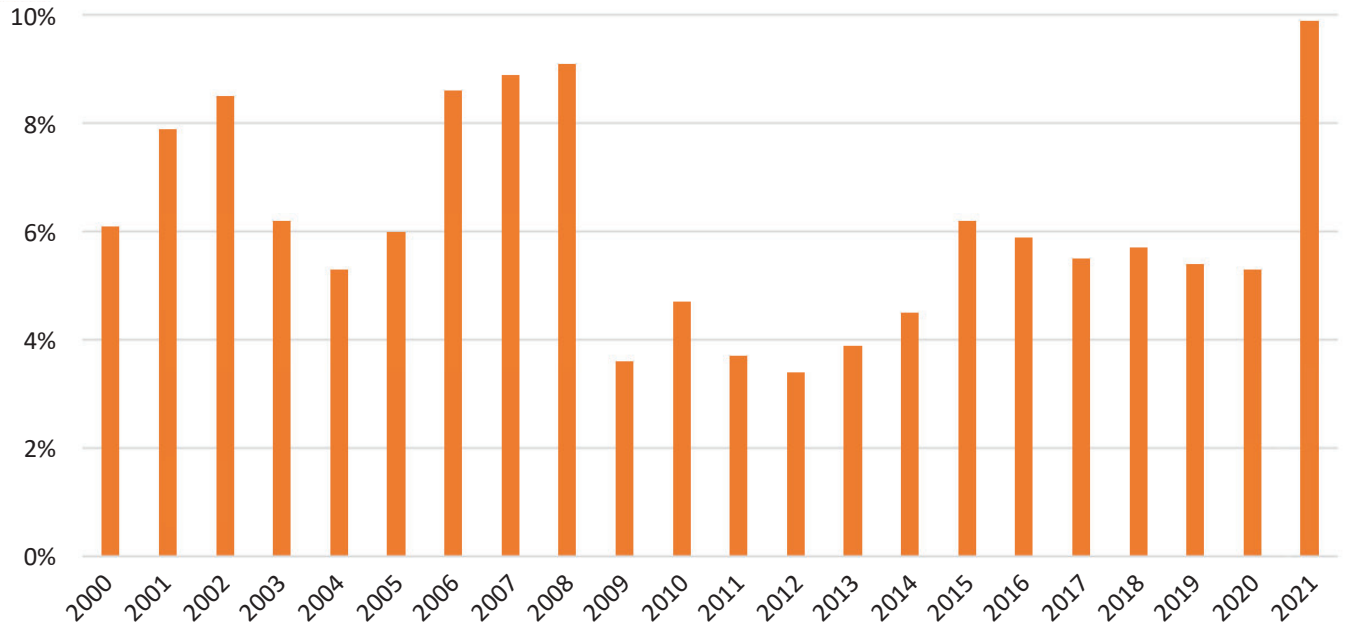
2. CHALLENGING THE EQUILIBRIUM ASSUMPTION

A key step of the forecasting model is determining if there is a balance between the supply of and demand for RNs at the starting point. All previous versions of the model started with the assumption that there were enough nurses to meet demand, which has been a notable accomplishment given demographic challenges. However, recent evidence does not support this assumption. Evidence indicates that there is currently a shortage of RNs. The workforce has faced temporary shortages in the past, but the current shortage is considered different from previous shortages.[3] Trends of an aging nursing population and limited supply to fill vacancies are some of the unique characteristics that bring a new dimension to an old problem (Janiszewski Goodin, 2003). The COVID-19 pandemic is just one of many issues challenging hospitals. Other challenges include surges in seasonal respiratory illnesses, nursing home bed shortages, and the unstable expectations of a multi-generational workforce .

Several factors were examined to determine this key assumption of the current shortage of nurses in Wisconsin. First are the vacancy rates of RNs in Wisconsin hospitals. The Wisconsin Hospital Association (WHA) conducts an annual Wisconsin Hospital personnel survey and reports the vacancy rates for selected healthcare 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 how the difficulty faced when filling positions is changing. The vacancy rate for RNs was 9.9% in 2021, which is a substantial increase from 2020 (5.3%). As a reference, the rate reached a previous high of 9.1% in 2008 when needs for RNs led to increases in educational capacity. WHA's report stated that there was a nursing shortage in 2021 for the first time since the early 2000s.[6] The report also highlighted that prior to 2021, about one in 10 RNs changed jobs annually. In 2021 it was up to nearly one in five.

Figure 1: Vacancy Rates for Registered Nurse Positions in Wisconsin



Source: WHA reports

Second, unemployment rates are observed through the licensure survey. Rates for the nurses are typically much lower than the overall workforce. Unemployment rates among nurses remain within the same range that has been measured over the eight years since the survey began (between 1.1% and 1.2%). Rates dipping lower or higher would provide evidence of a change in the balance. The rate of unemployed nurses seeking work in nursing from the most recent survey was 1.2%.

Last, the Office of Economic Advisors worked with the Wisconsin Health Workforce Data Collaborative to review available evidence to determine whether RN needs are being met overall in the state. The consensus is that the nursing workforce has reached its tipping point,[6] and there are not enough RNs in Wisconsin to meet the current demand.

3. QUANTIFIYING THE SHORTAGE

The current shortage must be quantified for modeling purposes. Using data on existing RN vacancy rates offers the best method for determining the current gap. The five-year average of vacancy rates between 2016 and 2020 was 5.6%. This was assumed to be the baseline for typical vacancy levels when there is a balance between supply and demand. The shortage was quantified as the difference between the 2021 vacancy rate (9.9%) and the base line point (5.6%), which is 4.3%.

The WHA personnel survey only applies to hospitals and the rate that was applied addresses all settings. This does not account for variations that may exist among different work settings. Limited evidence from other settings suggest that a 4.3% shortage is reasonable for modeling purposes. Vacancy rates in long term care facilities have more than doubled since 2016, with 23.8% of caregiver positions being reported as unfilled.[7] This includes a 28.4% vacancy

rate among certified nursing assistants compared to a 24% vacancy rate for the same profession in hospitals. Based on the last RN and LPN Legislative report from the Wisconsin Department of Workforce Development,[8] the hospital setting makes up over half of RN employment, which makes it a good benchmark for the nursing occupation. Additionally, the same initial shortage gap of 4.3% was applied to the whole RN statewide workforce, and regional variations were not examined, which is consistent with previous modeling efforts.

The result of the last 2020-2040 Forecasting Model was used to provide additional justification to the 4.3% gap in the initial year of 2022. The previous report model started at equilibrium but projected a 12% shortage by 2025. A straight-line interpolation of this forecast would project a shortage of 4.8% by 2022 which is not too different than the assumption using the WHA hospital vacancy rate.

4. MODELING RESULTS

The method used for projecting demand remained the same as the original model from 2011.[9] The base demand model relies on two assumptions: nurse staffing intensity and healthcare usage by employment setting 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 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 Health Resources and Services Administration (HRSA) forecasting results of 2017.[10] This report will also 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.
- Other nurses.

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. Supply projections using the original model from 2011 and two basic regression models using the historical RN survey data collected since 2010 were added to the original demographically driven supply model.

The three different models are:

- Demographically driven model (update of the previous versions of 2010, 2012, 2014, 2018, 2020, and 2022).
- Linear regression of RN workforce on year.
- Linear regression of RN workforce on natural log of year (logarithmic model).

4.1 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 2022 survey, and the most recent population projections produced by the Wisconsin Department of Administration.[11] This model implicitly assumes that educational capacity for new RNs can remain at the current level.

Figure 2 and **Table 1** show the forecasted supply and demand for RNs every five years, starting at 2025. The initial point in time is the year 2022 assuming a nurse shortage of 4.3%. The base model projects flat supply and rapidly increasing demand. The estimated gap would be 25.8% by 2040, more than 19,000 nurses.

Figure 2: RN Supply and Demand Projections: Base Model

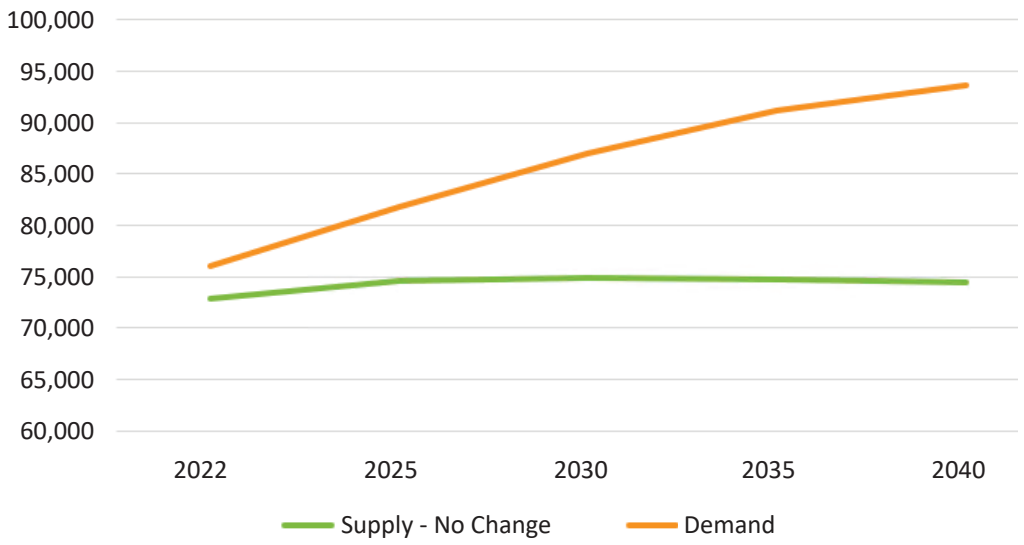


Table 1: RN Supply and Demand Projections: Base Model

	2022	2025	2030	2035	2040
Supply - No Change	72,882	74,559	74,804	74,795	74,387
Demand	76,016	81,862	86,989	91,126	93,578
Gap	-3,134	-7,303	-12,185	-16,331	-19,192
% Gap	-4.3%	-9.8%	-16.3%	-21.8%	-25.8%

4.2 Linear Regression

Ordinary least squares regression is more commonly called linear regression. The RN supply is estimated using the given linear regression formula.

$Yt = \alpha+\beta t +\varepsilon t$

Where:

Yt: 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...2020

The supply linear regression model assumes the growth of RNs will follow the same trend that has been observed since 2022 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 3 and **Table 2** show the supply forecast using linear regression and the base model demand for RNs every five years, starting at 2022. 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, it will come close to keeping up with demand. Past trends show that this model is statistically a strong fit. Using the linear supply, the state will face a surplus of RNs of 7% by 2040. However, this model is likely optimistic given the demographic pressures constraining supply growth.

Figure 3: RN Supply and Demand Projections: Linear Regression

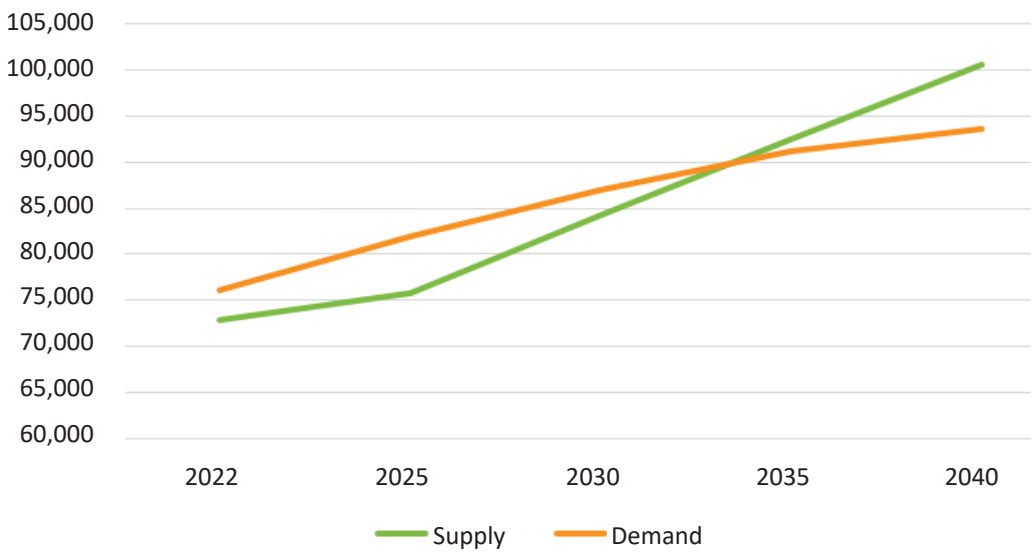


Table 2: RN Supply and Demand Projections: Linear Regression

	2022	2025	2030	2035	2040
Supply	72,882	75,816	84,265	92,484	100,512
Demand	76,016	81,862	86,989	91,126	93,578
Gap	-3,134	-6,046	-2,724	1,358	6,934
% Gap	-4.3%	-8.0%	-3.2%	1.5%	6.9%

4.3 Logarithmic Regression

The RN supply using the logarithmic regression is estimated using the following equation:

$Yt = \alpha+\beta\ln(t)+\varepsilon t$

Where:

Yt: 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;

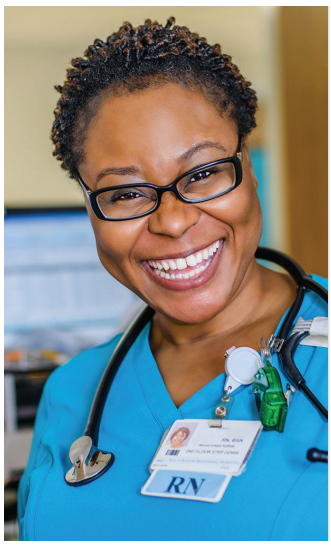
Ln(t): Natural log of time (the independent variable):

t = 2010...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 4 and **Table 3** show the supply forecast using logarithmic regression and the base model demand for RNs every five years, starting at 2022. 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 of 11,800 nurses (14.5%) by 2040.

Figure 4: RN Supply and Demand Projections: Logarithmic Regression



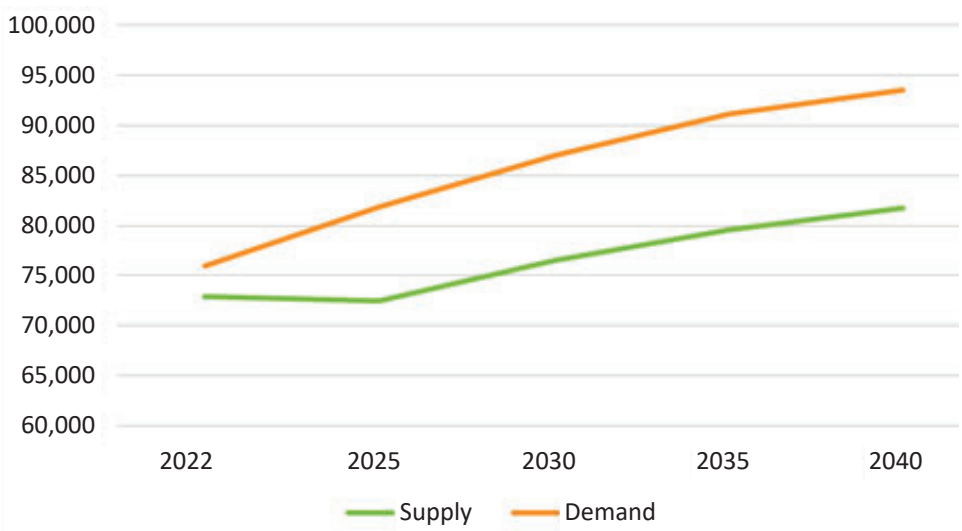


Table 3: RN Supply and Demand Projections: Logarithmic

	2022	2025	2030	2035	2040
Supply	72,882	72,499	76,568	79,554	81,732
Demand	76,016	81,862	86,989	91,126	93,578
Gap	-3,134	-9,364	-10,421	-11,572	-11,846
% Gap	-4.3%	-12.9%	-13.6%	-14.5%	-14.5%

4.4 Demand Growth by Setting

The base demand model relies on two data elements: nurse staffing intensity, and healthcare 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 count of nurses by setting. The remaining sources used to populate this model include:

- Census of Wisconsin Nursing Home Residents by Age, Wisconsin Department of Health Services (DHS) on Dec. 31, 2022 (special request).
- Wisconsin Home Health Agency Patients from Jan. 1, 2020, to Dec. 31, 2022, Wisconsin Department of Health Services (special request).
- Wisconsin Hospital Association, Hospital Utilization Report 2022.
- Wisconsin Hospital Association, Health Care Data Report: 20 Most Common Surgeries 2022.
- National Center for Health Statistics, National Medical Care Survey 2018.
- Wisconsin Department of Administration, County Age-Sex Population Projections, 2010 - 2040, Final Release.

Table 4 and **Figure 5** display the projected percent growth with respect to the base year 2022. 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 23% in 2040. Demand for nurses in extended care and home healthcare are expected to more than double by 2040 (85% and 67%, respectively). These projections could be impacted by yet to be seen consequences of the COVID-19 pandemic. For example, the immediate public health response led to delayed preventative treatment and elective procedures. This has the potential to place upward pressure on future demand. It is also important to remember that the 2022 demand numbers start with an assumed 4.3% shortage in each setting.

Figure 5: RN % Growth from 2022 in Demand by Selected Work Setting

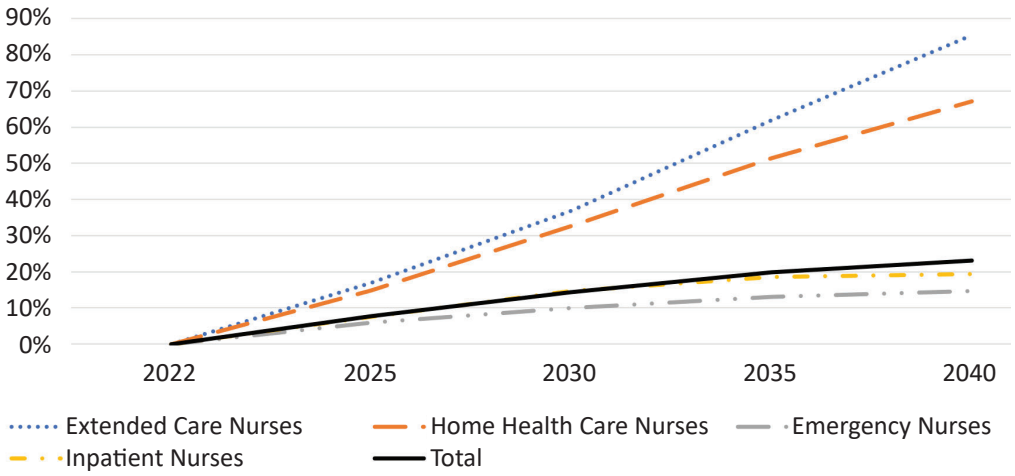


Table 4: RN % Growth from 2022 in Demand by Setting*

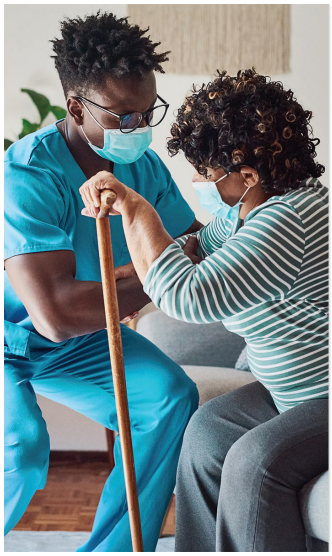
	2022	2025	2030	2035	2040
Extended Care Nurses	5,471	16.9%	36.9%	61.9%	85.5%
Home Health Care Nurses	3,477	14.9%	32.6%	51.4%	67.1%
Emergency Nurses	9,717	5.9%	10.0%	13.1%	14.6%
Inpatient Nurses	26,803	7.6%	14.6%	18.6%	19.4%
Ambulatory Nurses in Hospitals	1,918	6.4%	12.2%	16.1%	18.0%
Ambulatory Nurses (Free Standing)	19,062	6.1%	10.0%	12.8%	13.8%
Public Health Nurses	2,778	5.3%	8.2%	9.9%	10.2%
Other Nurses	4,746	5.3%	8.2%	9.9%	10.2%
Educators	2,045	5.3%	8.2%	9.9%	10.2%
Total	**76,016**	**7.7%**	**14.4%**	**19.9%**	**23.1%**

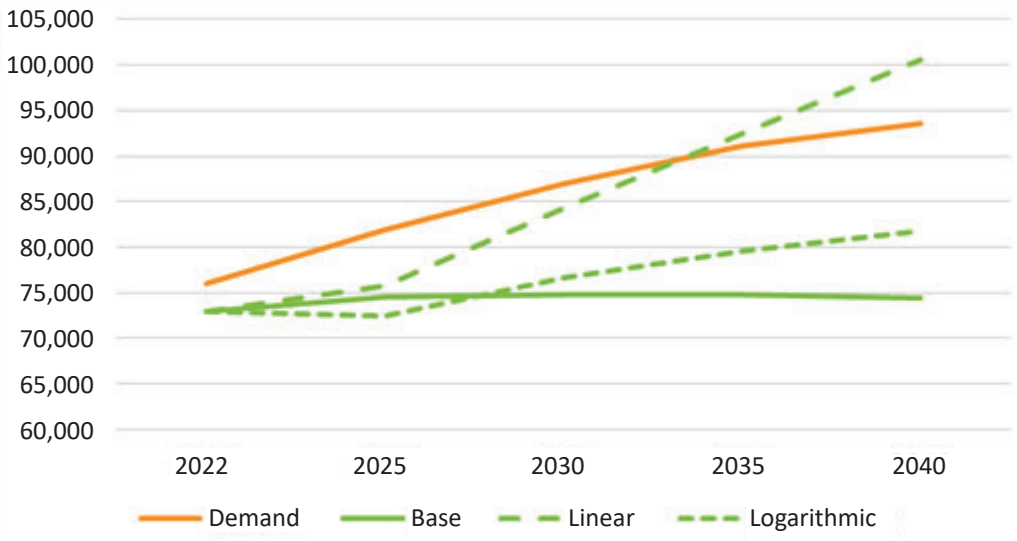
* Year 2025 to 2040 are percent change with respect to base year 2022

5. MODELS INTERPRETATION

The three alternative supply models show a wide range of outcomes (See **Figure 6**). The linear regression supply outcome of a surplus of RNs is highly unlikely due to demographic constraints. This model reflects past performance and captures efforts to increase capacity and fill nursing programs around the state that have been underway since the early 2000s. The demographic and logarithmic regression models both show flattening supply as demand steadily rises. The demographically driven base model provides a good status quo scenario if nothing changes going forward. The logarithmic model is likely the most realistic outlook because difficulty filling open job positions is not unique to nursing. It also shows a scenario in which the number of RNs continue to grow but at a slower rate than the state has seen over the last decade.

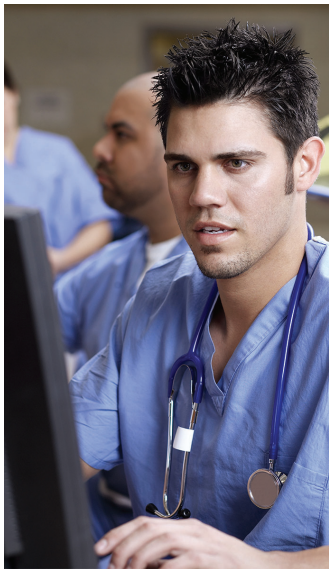
Figure 6: RN Supply and Demand Projections: All Models

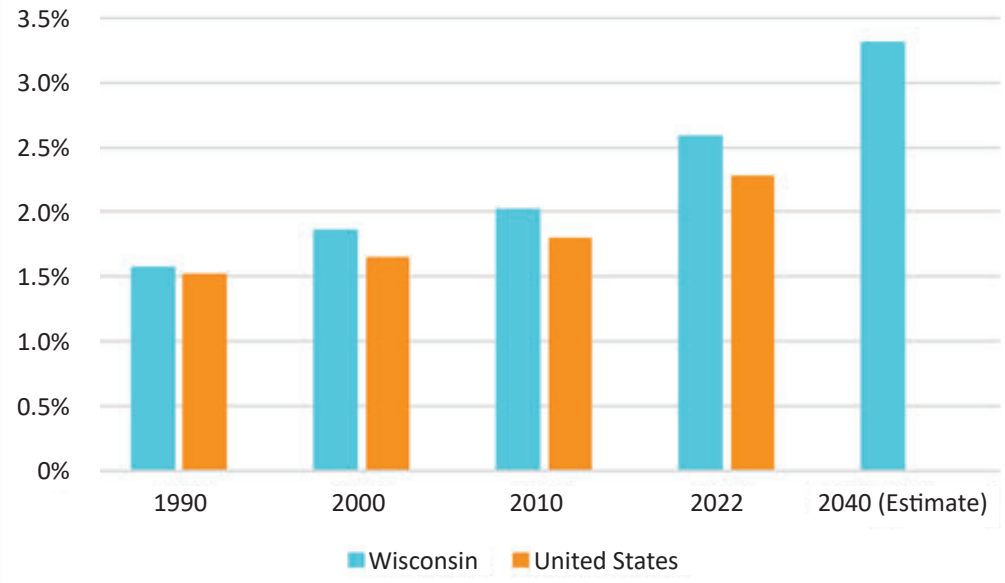




It is important to highlight that RNs have progressively made up a larger share of the total labor force. RNs made up 2.0% of the workforce in 2010 according to the American Community Survey (ACS) (See **Figure 7**). The share of RNs rose to 2.6% by 2022, a rate that exceeds the nationwide ratio of 2.3%. The ratio would need to rise to 3.3% by 2040 to meet projected demand based on labor force projections from the Office of Economic Advisors and the demand growth from the model.

Figure 7: Share of RNs in the Total workforce





Source: Own calculations based on American Community Survey (ACS)

Demographic challenges are not unique to nursing. Workforce quantity is the main challenge facing Wisconsin's economic future. The demographic dynamics facing the state, other upper-Midwest states, the U.S., and most of the developed economies will advance in the coming years. While Wisconsin's population will continue to grow over the next 20 years, the workforce faces serious constraints. People over the age of 65 made up 13.7% of the total population in 2010. Around 20% of residents are currently in this age cohort, and it is projected to rise to nearly one in four by 2040. The labor force trend began to seriously flatten in 2008 as the first baby boomers (those born in 1946) reached age 62 and began to leave the labor force. Baby boomers continue to exit the workforce in great numbers and will continue to do so over the next 10 years. This lifecycle event will continue to complicate employers' ability to find workers and talent leading to a workforce shortage.[12] If trends continue, that shortage could reach 120,000 jobs across the state in 2031 based on projections by the Office of Economic Advisors.

6. FINAL DISCUSSION

The initial iteration of the RN Forecasting Model projected supply and demand from 2010 to 2035. The 2010 model started with a balance between supply and demand and projected a gap of 8.3% by 2020. Maintaining a balance while demographic challenges were brewing was a major accomplishment of the past decade. Efforts to increase capacity and fill nursing programs around the state have been underway since the early 2000s. The number of graduates sitting for the National Council Licensure Examination (NCLEX) for the first time rose from 1,795 in 2003 to 4,279 in 2022 in Wisconsin.[13] Wisconsin's RN workforce grew by 23% between 2010 and 2022 according to the license renewals surveys. Nurses have also been increasing the level of education. The first RN survey of 2010 showed that 56.3% of nurses held a bachelor's degree or higher compared to 82.6% in 2020. The percentage of nurses receiving master's or doctorate degrees has increased from 10.5% in 2010 to 17.4% in 2022.

This 2022-2040 report marks the first year in which the model starts with a shortage of RNs. It should be noted that the estimated 4.3% gap is an improvement from the initial outlook. However, the existence of a shortage is a clear sign that demographic challenges are intensifying. The challenges associated with the aging baby boomer generation remain, and the waves of retirements will continue for another decade. Healthcare must also face the challenge of fast-increasing healthcare demand. These challenges need to be addressed urgently in a way that maintains or improves public health and patient care.

Today's nursing shortage will not be fixed by just returning to the solutions of the past, and strategies to reduce its impact will have to be more creative and focus on the long-term. There will not be a single solution that alleviates the current and future challenges. The supply side of the equation is constrained by demographics, but it is a key part of addressing shortages. It is important to fill existing nursing programs and continue to expand educational capacity. This includes both attracting students and having enough qualified instructors.

Additionally, there needs to be extra emphasis on retaining existing nurses. Many nurses are leaving the profession due to increased stress, overwork, and physical and verbal abuse in the workplace.[14] Workforce shortages could exacerbate this problem as they place additional burdens on the staff. Responses to the 2022 RN survey provide some troubling signals of nurse dissatisfaction. The last Registered Nurse & Licensed Practical Nurse (LPN) Legislative Report[15] shows that 48% of RNs in Wisconsin report their personal health (mental or physical) to be worse or much worse compared to before the COVID-19 pandemic. This response is more prevalent among younger nurses with 50% of nurses under 50 reporting feeling worse or much worse (see **Figure 8**). Only 8% of RNs report their overall personal health to be better than before the COVID-19 pandemic. Second, dissatisfaction was reported as the top reason for changing employment positions in the previous year (see **Table 5**). Almost 18% of nurses in the 2022 RN survey that changed positions said that "dissatisfaction with previous positions" was the most important factor for the switch. Only 13.7% made a change due to a promotion or career advancement compared to 22.8% in 2020.

Figure 8: RN 2022 Personal Health compared to before the Pandemic and Age Distribution

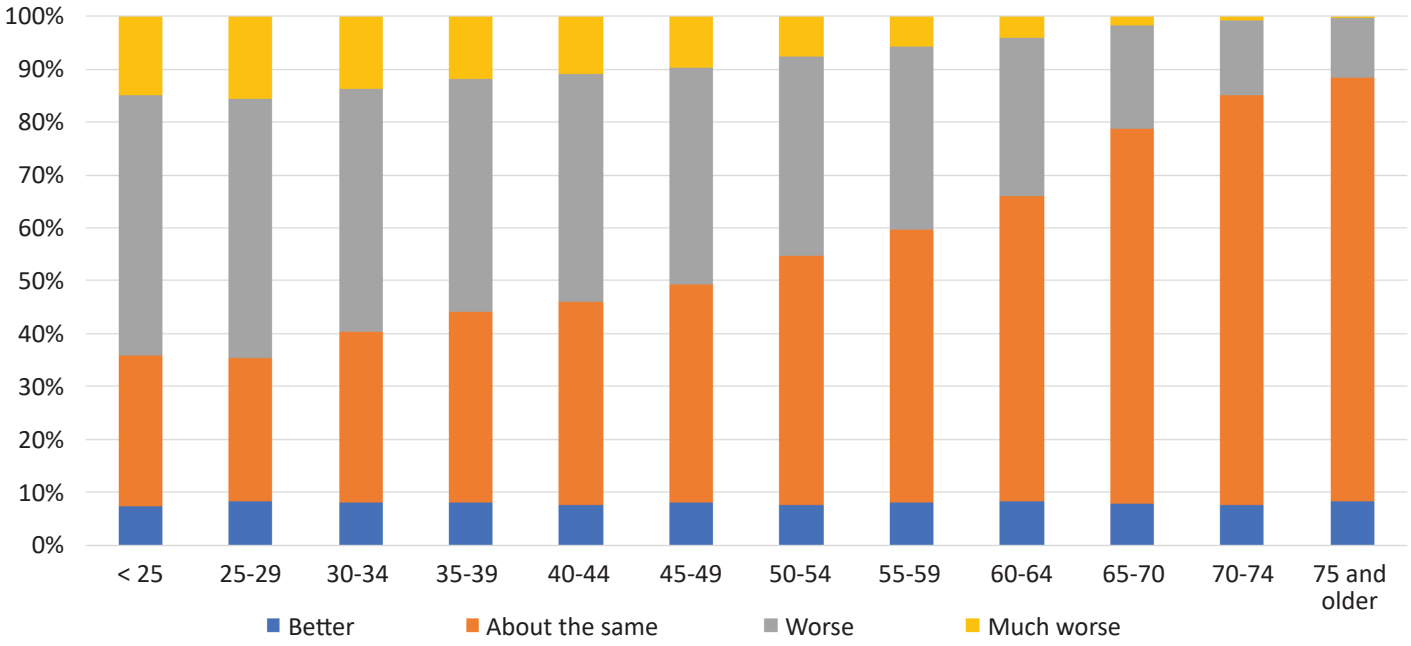


Table 5: Most Important Factor in Change in Employment for RNs in the previous year

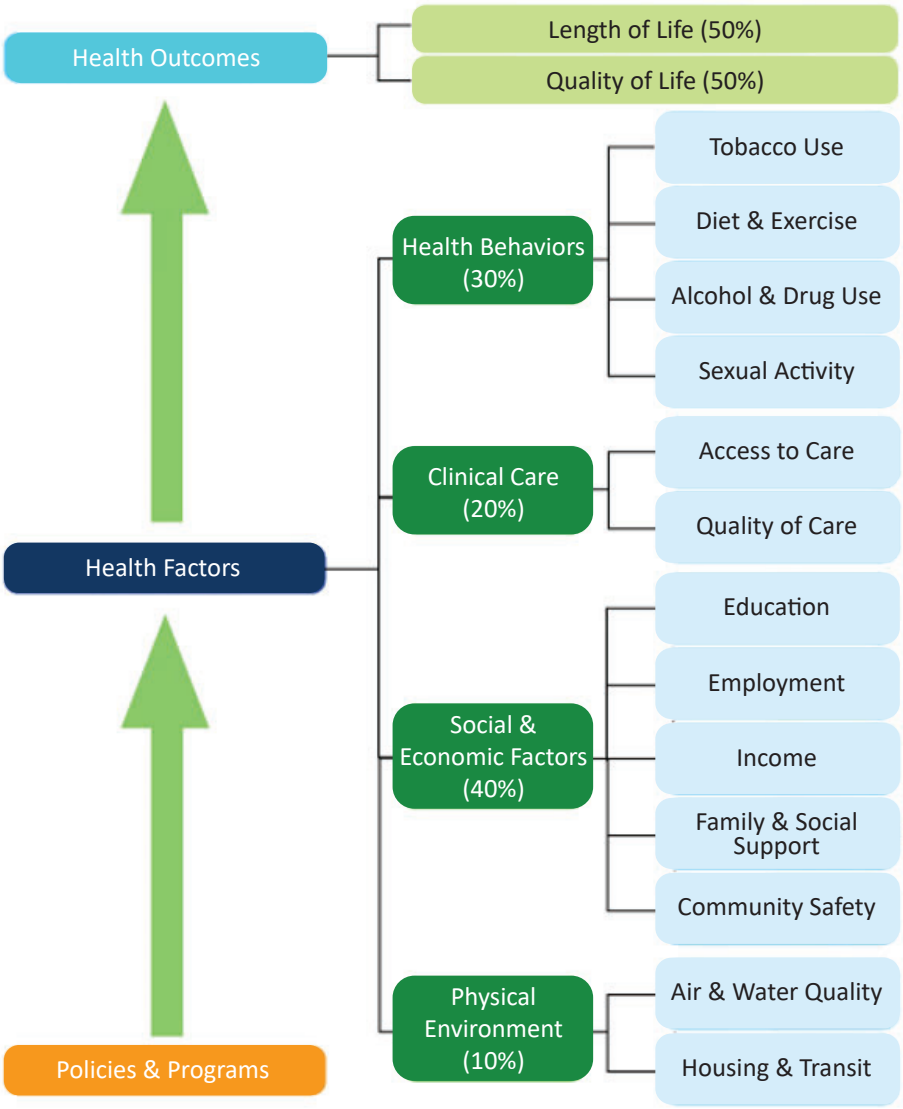
Most Important Factor in Change in Employment	n	%
Dissatisfaction with previous position	6,135	17.86
Promotion/career advancement	4,525	13.17
Salary/medical or retirement benefits	3,167	9.22
Retired	3,116	9.07
Seeking more convenient hours	3,102	9.03
Childcare responsibilites	2,389	6.96
Relocation/moved to a different area	1,548	4.51
Other family responsibilites	1,529	4.45
Change in my health status	1,369	3.99
Returned to school	1,076	3.13
Change in financial status	689	2.01
Change in spouse/partner work situation	609	1.77
Laid off	408	1.19
Other	4,687	13.65
Total	**34349**	**100**

Source: Table 1- 2022 RN & 2023 LPN Surveys Wisconsin Legislative Report

The impact of interventions on the demand side of the equation are harder to quantify but could have a larger effect on closing expected shortages. Impacting demand can be done in two ways. The first potential path forward involves making it possible for each nurse to care for more patients. This can include leveraging technology to free up more time for caregiving or finding innovative ways to reduce the amount of time patients are under direct care. One tangible example is the use of robotic surgeries. The percentage of laparoscopic surgeries performed robotically in the Thedacare system has grown from 28% to 81% between 2018 and 2022.[16] This modality requires few staff during the surgery and reduces recovery time and length of stay for the patient. Additionally, artificial intelligence technologies are being developed, tested, evaluated, and applied to healthcare.

The second way of impacting demand is to reduce the number of patients. This can be done by improving the overall health of the population. Clinical care makes up only 20% of the factors that create health.[17] The remaining 80% of health is determined by social and economic factors (40%), health behaviors (30%), and the physical environment (10%). Addressing these additional factors needs to be a key part of alleviating projected shortages.

Figure 9: Use County Health Rankings' model of health



Looking to the future, the nursing shortage represents a crisis in the making and averting this crisis will require innovative solutions. The demographic challenges will continue to strain the system. Proactive steps need to 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 healthcare system, one that provides good patient care and safeguards public health.

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NOTES

[1] https://www.journalofnursingregulation.com/issue/S2155-8256(23)X0004-0

[2] https://www.americanprogress.org/article/how-to-ease-the-nursing-shortage-in-america/

[3] https://www.uschamber.com/workforce/understanding-americas-labor-shortage

[4] 4 https://www.wha.org/MediaRoom/DataandPublications/WHAReports/Workforce/2022

[5] https://www.wha.org/MediaRoom/DataandPublications/WHAReports/Workforce/2023/Report/WHA-Workforce-Report-2023-web-(1)

[6] https://wicenterfornursing.org/wisconsin-nursing-shortage-has-reached-its-tipping-point/

[7] https://www.leadingagewi.org/media/113792/2022-workforce-report-7-13a.pdf

[8] https://acc.jobcenterofwisconsin.com/wisconomy/wits_info/downloads/nurse-survey-reports/legislative/2023%20DWD%20Report%20to%20Legislators%20-%20WI%20Nursing%20Surveys.pdf

[9] https://acc.jobcenterofwisconsin.com/wisconomy/pub/nursetabv23.htm

[10] https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/NCHWA_HRSA_Nursing_Report.pdf

[11] https://doa.wi.gov/Pages/LocalGovtsGrants/Population_Projections.aspx

[12] https://jobcenterofwisconsin.com/wisconomy/pub/profiles.htm

[13] https://www.ncsbn.org/exams/exam-statistics-and-publications/nurse-licensure-and-nclex-exam-statistics.page

[14] https://nursejournal.org/articles/post-pandemic-nursing-shortage/

[15] https://jobcenterofwisconsin.com/wisconomy/wits_info/downloads/nurse-survey-reports/legislative/2021%20DWD%20Report%20to%20Legislators%20-%20WI%20Nursing%20Surveys.pdf

[16] https://static1.squarespace.com/static/5a3ac16af14aa15ae-de6d0ed/t/6542ae8146e60c5eec3d6f5f/1698868866933/2C+Tech+Advances.pdf

[17] https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model

REFERENCES

Janiszewski Goodin H. (2003). The nursing shortage in the United States of America: an integrative review of the literature. Journal of advanced nursing, 43(4), 335–343. https://doi.org/10.1046/j.1365-2648.2003.02722_1.x

Walsh, T., Udalova V., and Winters D., (2011). “Wisconsin Registered Nurse Supply and Demand Forecasting Model: Technical Report.” Department of Workforce Development

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