

NC Nursecast **BRIEF**

Nurse Workforce Projections under Alternative “What if” Scenarios

NC Nursecast’s Baseline Model. Like most workforce projection models, NC Nursecast uses historical data on the supply and demand of Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) to forecast the future. This approach produces a “baseline model” that assumes trends in the supply and demand for nurses will remain the same in the future. This assumption is easily challenged given the rapid pace of health system change, new payment and care delivery models, and the significant impact that the pandemic and other “shocks” will have on the nursing workforce. However, a solid baseline model, derived from strong data, rigorous methods, and expert nursing input, provides a foundation from which to simulate how future changes such as early (or delayed) exit from the workforce, rising nursing enrollments, and increased competition for out-of-state nurses may affect future nursing supply.

NC Nursecast uses nursing data from 2015 through 2018, derived from North Carolina Board of Nursing (NC BoN) licensure files. This rich source of information about RN and LPN supply, demographics, education, practice location, and employment setting represent a complete census of the workforce. A model built on licensure data, which provide a particularly rich source of information on the supply of nurses in North Carolina and their demographic, educational, and practice characteristics, can provide more accurate projections than models that draw on national data sources such as the Bureau of Labor Statistics and the American Community Survey.¹

The availability of longitudinal data provides information about the number of nurses entering the workforce in each year, whether new graduates are from NC nursing programs or are moving to practice in NC from out-of-state, and the probability, at different ages, that a nurse will exit practice.

¹Bateman, T., Hobaugh, S., Pridgen, E., Reddy, A. (2021). US healthcare labor market. Mercer. Retrieved from: <https://www.mercer.us/content/dam/mercer/assets/content-images/north-america/united-states/us-healthcare-news/us-2021-healthcare-labor-market-whitepaper.pdf>

NC Nursecast is an interactive, web-based tool that forecasts future supply and demand for Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) in North Carolina.

Access it at: <https://ncnursecast.unc.edu>

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Important Factors Influencing the Baseline Model. North Carolina’s nursing workforce depends on importing nurses from outside the state. Table 1 shows that more than one-half (56%) of new RNs and more than one-third (38%) of new LPNs to the NC workforce each year are from out-of-state. This makes the state vulnerable to competition from other states as they also face shortages in the future.

Table 1. New Nurse Entrants to the Workforce, NC Educated vs. Out-of-State, 2008-2018

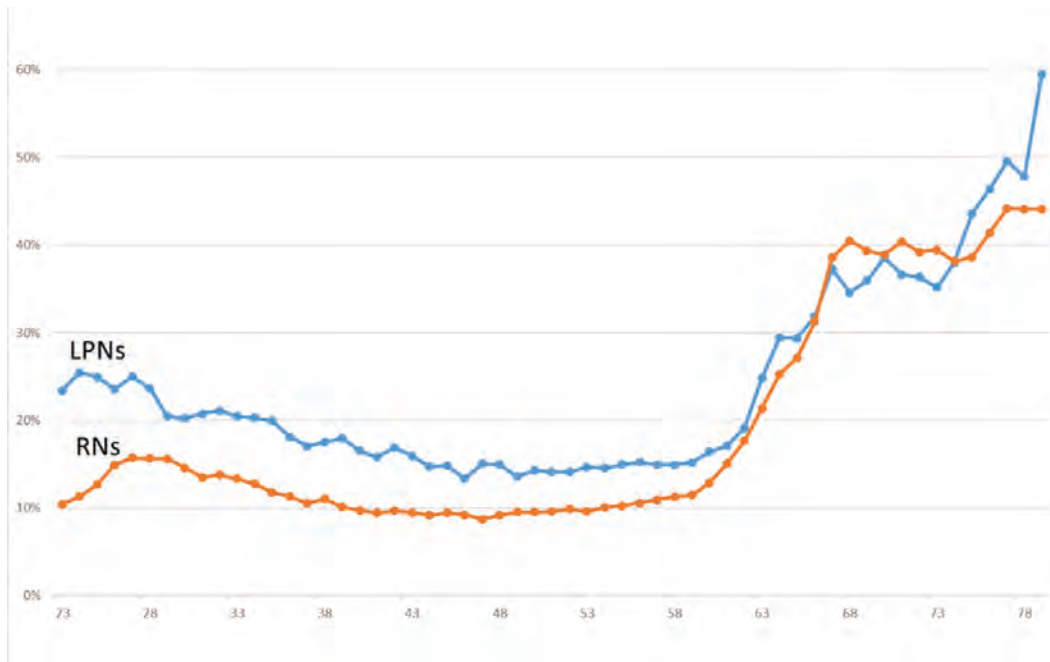
Year	North Carolina Educated		Imported from Out-of-State		% Imported from out-of-state	
	LPN	RN	LPN	RN	LPN	RN
2008	1179	3682	866	4777	42%	56%
2009	1191	3763	745	4371	38%	54%
2010	1166	3726	660	4104	36%	52%
2011	1171	3693	795	4187	40%	53%
2012	1137	3791	829	4481	42%	54%
2013	1114	3605	682	4146	38%	53%
2014	1397	3830	470	3955	25%	51%
2015	1224	3930	618	4275	34%	52%
2016	1032	3736	610	4240	37%	53%
2017	1144	3651	704	5434	38%	60%
2018	1219	4011	841	7900	41%	66%
Average	12974	41418	7820	51870	38%	56%

Additionally, nurse forecasts are sensitive to changes in the number of nurses exiting the workforce in each year. Even small changes in the rate at which nurses exit the workforce can have a significant effect on future supply. Figure 1 shows that the probability that an LPN or RN will exit active practice is fairly steady from about the mid-30s to 60 years of age. After that, the probability of exiting increases significantly in each year.

²Auerbach DI, Buerhaus PI, Staiger DO. Registered nurses are delaying retirement, a shift that has contributed to recent growth in the nurse workforce. Health Aff (Millwood). 2014 Aug;33(8):1474-80. doi: [10.1377/hlthaff.2014.0128](https://doi.org/10.1377/hlthaff.2014.0128). Epub 2014 Jul 16. PMID: 25031246.

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Figure 1. Probability of Leaving the Workforce within Two Years, RNs and LPNs, North Carolina, 2011-2015



Creating ‘what if’ scenarios allows users to examine potential, different, futures. Workforce models are often assumed to produce one “answer” to the question: will RN and LPN supply meet demand in the future for a given employment setting or geographic area?³ However, nursing workforce participation patterns, models of care, and other factors are likely to change in the future. NC Nursecast was developed using data captured before COVID-19 emerged and while we know the pandemic will affect nursing supply and demand in the future, these effects are not yet well understood.

To account for potential changes that cannot be known at the time forecasts are developed, workforce modelers often create “what if” scenarios that allow users to explore what may happen if previous trends change. These shifts could occur for a variety of reasons, including the COVID-19 pandemic. For example, increased burnout, vaccine mandates and the growing demand for travel nurses could increase attrition from the workforce. An alternative scenario is that the pandemic triggers a “nurse hero” effect which increases the number of students applying to nursing school.⁴ Scenarios simulate possible futures even though there is no actual way to know what the “true” future may be.

³Fraher, E., Knapton, A. (2021). Workforce Planning in a Rapidly Changing Healthcare System. In C.J. Sampson, B.J. Fried (Ed.). Human Resources in Healthcare (pp. 429-456). Health Administration Press.

⁴<https://www.nytimes.com/live/2021/02/18/world/covid-19-coronavirus#it-was-like-a-war-call-applications-to-nursing-schools-rose-during-the-pandemic>

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NC Nursecast models five alternative scenarios to demonstrate the effects that changes in workforce exit, out-of-state-supply, and numbers of new graduates could have on the nurse workforce in the future. These five alternatives include:

1. Early exit from the workforce by 2 years: nurses leave the workforce two years earlier than they would have based on historical data, with all nurses retiring by age 68
2. Early exit from the workforce by 5 years: nurses leave the workforce five years earlier than they would have based on historical data, with all nurses retiring by age 65
3. Delayed exit from the workforce by 2 years: nurses delay leaving the workforce by two years beyond historical data, although all nurses still retire by age 70
4. Reduction in out-of-state nurse supply by 2.5%
5. Increase in NC new graduate nurse supply by 10%

We also modeled a sixth scenario that combines three of the five scenarios above and reflects a combination of effects that could occur together, given some early indicators of the current NC nursing environment and the COVID-19 pandemic:

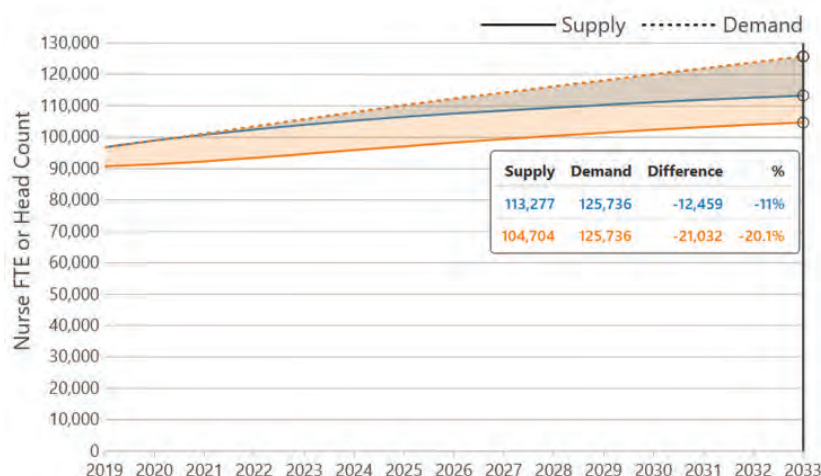
6. Combined scenario: nurses exit the workforce five years earlier than they would have, based on historical data, with all nurses retiring by age 65 + a reduction in out-of-state supply by 2.5% + an increase in NC new graduate supply by 10%

What the scenarios help illuminate about NC’s future nursing forecast: The baseline model shows that even before the effects of the pandemic or other possible scenarios are considered, North Carolina faced a shortage of nearly 12,500 RNs. Below, we explore how each of the “what if” scenarios changes the baseline model forecast for Registered Nurses. Important note: NC Nursecast can be used to generate all the same “what if” forecasts for Licensed Practical Nurses, but for illustrative purposes we have focused on RNs in this brief.

If nurses exit 5 years early: The baseline shortage is significantly worsened—to exceed 21,000 RNs—if nurses leave the workforce five years earlier (Figure 2, next page).

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Figure 2. RN Supply and Demand under Baseline Model vs. RNs Exiting Workforce Five Years Earlier

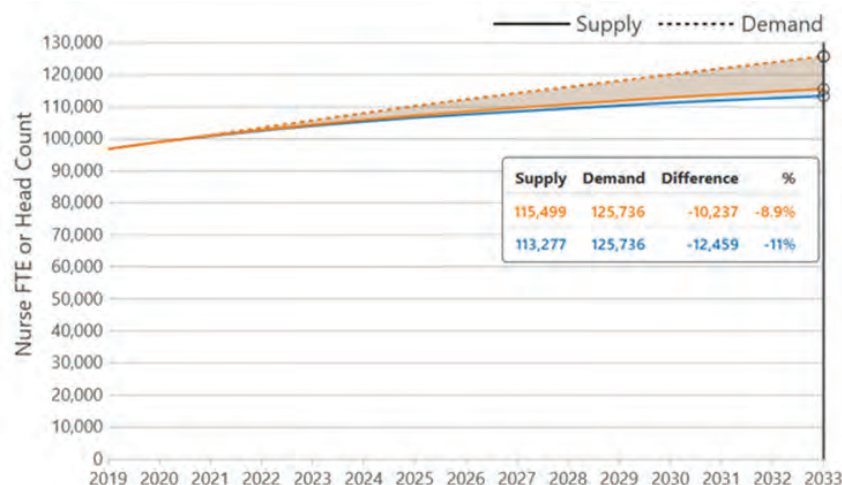


Baseline projection

Projection with nurses exiting workforce 5 years earlier

If the number of nurse graduates increases by 10%. Faculty and preceptor shortages in North Carolina, along with limited clinical site availability and physical space capacity, constrain the number of students that can be admitted to nursing programs. Given these challenges, it is not likely that NC will be able to dramatically increase nursing program enrollments. However, even if the state could achieve a 10% increase in new graduate nurse supply, it will do very little to offset the projected shortage. Figure 3 shows that with a 10% increase in nursing program graduates, NC still faces a shortage of over 10,000 nurses in 2033. These findings highlight the importance of investing in efforts to retain the current NC nurse workforce rather than assuming that growth in the number of nursing program graduates will address emerging workforce shortfalls.

Figure 3. RN Supply and Demand under Baseline Model vs. 10% Increase in New Nurse Graduate Supply



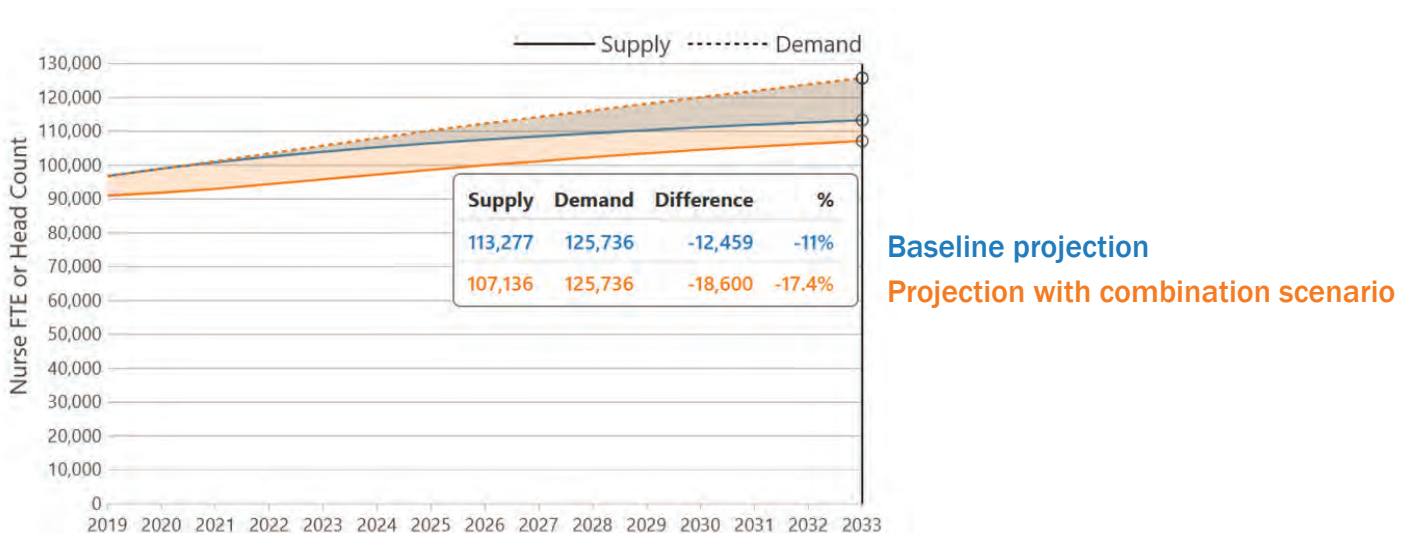
Projection with 10% Increase in RN Graduate Supply

Baseline projection

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While we won't know the outcome of COVID on the NC nurse workforce for a long time, we can simulate how multiple scenarios might combine to affect the workforce. If we balance early exits from the nurse workforce and increased competition from other states (reducing our ability to import nurses from outside NC) with increased enrollment in nursing programs, the net effect is a shortage of over 18,000 RNs.

Figure 4. RN Supply and Demand under Baseline Model vs. RNs Exiting Workforce 5 Years Earlier + Out-of-State Supply Reduced by 2.5% + 10% Increase in New Nurse Graduate Supply



Customizing Scenarios to Different Settings and Regions. This brief has highlighted how the supply and demand of RNs might change under different scenarios at the state level. The model could be used to make these same projections for LPNs. NC Nursecast allows users to see how these different scenarios would affect different regions and employment settings. This is an important feature of NC Nursecast because, for example, the workforce in one region of the state or in one employment setting may have an older workforce that would be more significantly impacted by early workforce exit than state averages would reveal. Some employment settings also may rely more on out-of-state nurses, and some geographic areas may be more or less likely to retain their nursing program graduates. The power of NC Nursecast is the ability to see how these regional and employment setting differences play out under different possible “futures.”

Source for all tables and figures in this document is the NC Nursecast:

<https://ncnursecast.unc.edu>

Questions?

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