NC Nursecast *BRIEF*

Overview: Supply & Demand Model and Graduate Diffusion Tool

What is NC Nursecast? NC Nursecast is a web-based, interactive workforce model that forecasts the future supply and demand for Registered Nurses (RNs) and Licensed Practical Nurses (LPNs) in North Carolina. NC Nursecast gives policy makers, legislators, educators, professional organizations, employers, and other nursing stakeholders the data they need to understand and plan for the future. It is built on data derived from 2015-2018 NC Board of Nursing licensure files; this rich source of state-specific information about nurse demographics, educational institutions, practice locations, and employment settings provides a more accurate basis for a North Carolina model than any other available data source.

The NC Nursecast website enables users to customize forecasts by nurse type (RN or LPN) and geography (state-wide, Medicaid regions, AHEC regions, metro/nonmetro) for various practice settings. The model also allows users to explore different "what if" scenarios that may alter the forecast. For example, what if nurses experience increased burnout and exit the workforce two or five years earlier than they have historically? Conversely, what if more students enter nurse training programs?

NC Nursecast was developed by the Cecil G. Sheps Center for Health Services Research with funding from the NC Board of Nursing and expertise from SMAP, Ltd.

What does NC Nursecast say about NC's future nursing workforce? By 2033, North Carolina is expected to face an estimated shortage of nearly 12,500 registered nurses and slightly more than 5,000 LPNs. After factoring in the size of the projected workforce in 2033, RNs will face an 11% shortfall and LPN demand will outstrip supply by 27%. Not surprisingly, since the majority of RNs work in hospitals, the largest numeric shortfalls for RNs occur in hospitals where demand will exceed supply by nearly 10,000 positions. North Carolina's rapidly expanding and aging population also fuels demand for RNs in nursing home, extended care, and assisted living facilities where demand for RNs will exceed supply by nearly 31% in 2033.

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Unlike RNs, who are more likely to be employed in hospitals, the greatest number of LPNs are employed by nursing home, extended care, and assisted living facilities, and these settings face a forecasted LPN shortage of nearly 50% by 2033. As LPNs leave hospital employment, hospitals will also face a large percentage shortfall (31.7%) of LPNs by 2033. More detailed information about how the future supply and demand of LPNs and RNs could vary by setting is available in our brief: [Nurse Workforce Projections by Setting](#).

Which areas of NC will face the greatest shortages? A powerful feature of NC Nursecast is the ability to examine workforce forecasts at the sub-state level including Medicaid, AHEC, and metropolitan and non-metropolitan regions of the state:

- Most regions of the state are projected to face RN shortages except for the Southeast region; all regions will face LPN shortages.
- Something unique is happening in Southeast NC – The small projected RN surplus in the area is likely due to high retention of nursing graduates from local training programs.
- Large metropolitan areas face significantly higher RN shortages than non-metro areas; both metro and non-metro areas face similar levels of LPN shortages.
- Wake AHEC (including Raleigh-Durham) and Northwest AHEC (including Winston-Salem) face the largest RN shortages.
- The Mountain AHEC (western NC) and Wake AHEC face the largest LPN shortages

What about the pandemic? How will that affect the nursing workforce? Workforce models are often assumed to produce one "answer" about how well RN and LPN supply will meet demand in the future for a given employment setting or geographic area.[1] However, nursing workforce participation patterns, models of care, and other factors are likely to change in the future. For this reason, NC Nursecast includes "what if" scenarios that allow users to explore what will happen if nurses exit the workforce earlier than expected or the number of new nurse graduates increases or the supply of nurses entering NC to practice from out-of-state nurses decreases. These scenarios can be compared to the "baseline model" that uses historical data on nurse practice patterns and assumes trends in the supply and demand for nurses will remain the same in the future.
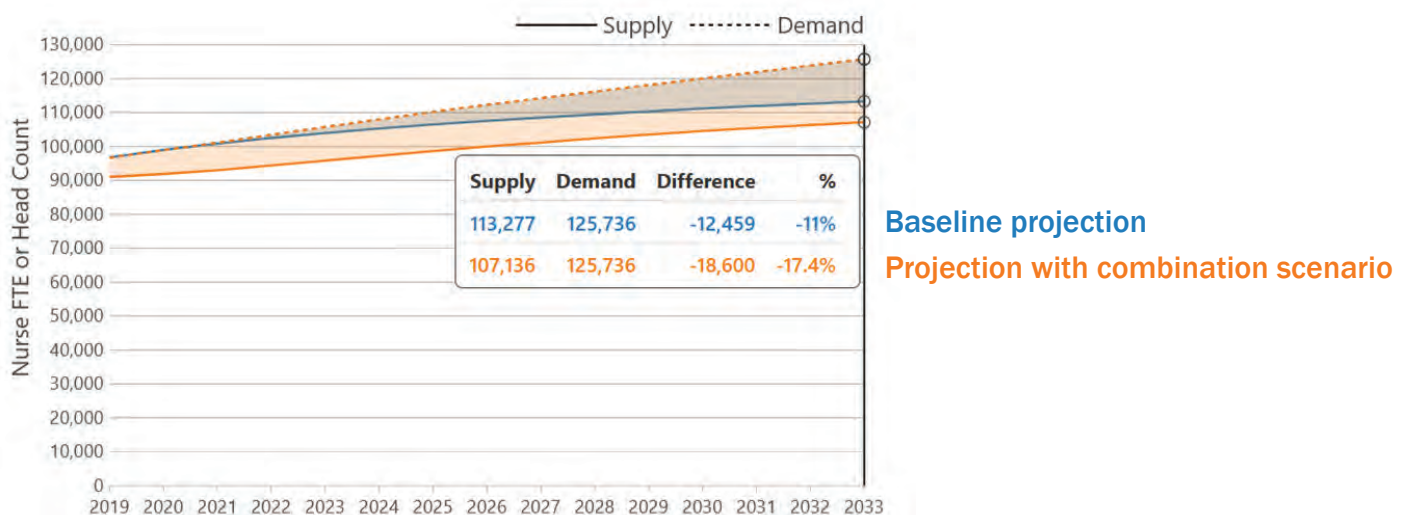
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[1]Fraher, E., Knapton, A. (2021). Workforce Planning in a Rapidly Changing Healthcare System. In C.J. Sampson, B.J Fried (Ed.). Human Resources in Healthcare (pp. 429-456). Health Administration Press.

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Although the effects of COVID on the NC nurse workforce remain unknown at this point, we can simulate how multiple scenarios might combine to affect the workforce. Nurses may exit the workforce five years earlier than expected due to various reasons including burnout, vaccine mandates, or the rising demand for traveling nurses. NC may face increased competition from other states, reducing our ability to import nurses from outside NC. The state may follow national trends with increased enrollments in pre-licensure nursing programs. If we combine all these effects—nurses exiting the workforce five years earlier + a 10% increase in nurse graduate supply + a 2.5% reduction in out-of-state supply—the net effect is a shortage of over 18,000 Registered Nurses (Figure 1).

Figure 1. 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 Nurse Graduate Supply

Supply	Demand	Difference	%
113,277	125,736	-12,459	-11%
107,136	125,736	-18,600	-17.4%

Baseline projection
Projection with combination scenario

How can we address future workforce shortages? The power of NC Nursecast is that it gives policy makers, educators, employers, and other nursing stakeholders easily accessible, usable to understand which employment settings and geographies may struggle to meet patient care demands in the future.

One common reaction to workforce shortages is to invest in expanding training program enrollments. However, 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, NC will not likely be able to dramatically increase nursing program enrollments. However, even if the state could achieve a 10% increase in new graduate nurse supply, we will still face 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 nurse graduates will address emerging workforce shortfalls.**

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Although increasing nursing program enrollment alone will not solve workforce shortages, increasing funding of nursing programs, raising faculty wages so they can better compete with clinical salaries, and addressing the shortage of preceptors in the state can help increase supply. The good news is that investments in nursing programs yield a high return on investment. Table 1 shows that LPN and ADN programs retain 92% of their graduates and BSN programs retain 86% of graduates in North Carolina. By comparison, medical schools in North Carolina retain 38% of their graduates in the state.[2]

Table 1. Nursing Program Retention Rates in North Carolina

Nurse Education Programs in North Carolina	Retention Rate in NC	Retention in NC Non-metropolitan counties*
Licensed Practical Nurse (LPN) Programs	92%	33%
Associate Degree Nurse (ADN) Programs	92%	29%
Bachelor of Science in Nursing (BSN) Programs	86%	10%

Source: NC Tower data.

*Non-metropolitan counties are defined using the 2017 Office of Management and Budget Core Based Statistical Areas (CBSAs). Rural/non-metropolitan counties include micropolitan counties and counties without CBSAs. Using this definition, NC has 54 non-metropolitan counties.

The Graduate Diffusion Tool enables users to view the "footprint" of ADN, BSN, and LPN programs in the state. It can be used to see the percent of a nursing program's graduates that are retained in North Carolina, practicing in hospitals, and in non-metropolitan areas. Table 2 shows, for example, that there is significant variation between BSN programs within the University of North Carolina System in the percent of new grads entering rural practice, ranging from about 1.8% of UNC-CH's graduates to 49% of UNC-Pembroke's grads. The tool can also be used to see which programs are producing graduates for a more local versus more regional market. Both UNC-CH and Fayetteville State graduates travel an average 20 miles from their program to their first practice location, while graduates from Appalachian State University, East Carolina, UNC-Wilmington, and Western Carolina University diffuse their graduates more broadly across the state.

[2]Association of American Medical Colleges. North Carolina Physician Workforce Profile (2018). https://www.aamc.org/media/38001/download, accessed October 26, 2021.

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Table 2. Percent of BSN Graduates Retained in NC and In Rural Areas, Two Years after Graduation

Institution	# of Grads	% Working in NC	% Non-Metro (i.e. Rural)	Mean distance in miles
Appalachian State University	127	88.5%	15%	90
East Carolina University	848	87.7%	9.3%	71
Fayetteville State University	50	73.6%	26%	20
North Carolina A & T State University	118	88.4%	4.2%	35
North Carolina Central University	190	89.2%	7.4%	15
University of North Carolina Wilmington	314	84.5%	2.5%	76
University of North Carolina at Chapel Hill	497	79.8%	1.8%	20
University of North Carolina at Charlotte	333	88.0%	3.0%	35
University of North Carolina at Greensboro	321	92.9%	3.4%	31
University of North Carolina at Pembroke	104	77.2%	49%	32
Western Carolina University	250	83.6%	12%	68

Unless otherwise noted, source for all tables and figures in this document is the NC Nursecast: **https://ncnursecast.unc.edu**

Questions?
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