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Louisiana's Multi-Regional Statewide Nursing Workforce Forecasting Model



Summary Report 2013



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The Louisiana Multi-Regional Statewide Nursing Workforce Forecasting Model

Introduction

A health care system that functions appropriately has a workforce that directly impacts quality, cost, and access to health care. Redesigning the health care delivery system to make more effective use of the health care workforce is critical. The health of the country's population depends on a well-trained health care workforce that is adequate in number. Therefore, identification of workforce priorities and policies that ensure a properly trained and effective workforce that incorporates technological advances and efficient operating models into its practice is needed (Keckley, Coughlin, Gupta, Korenda, & Stanley, 2011).

One of the eight recommendations from The Institute of Medicine Report on the Future of Nursing; *Leading Change, Advancing Health* (2011) addresses the need for better data collection and an improved information system if we are to be effective in workforce planning and policy making. The Patient Protection and Affordable Care Act (hereafter referred to as ACA) addresses the need to develop strategies that will increase workforce supply and capabilities, develop workforce diversity, and strengthen professional areas where supply is weak (Keckley et al., 2011). Priorities identified within ACA include "systematic monitoring of health care workforce shortages and surpluses, review of the data methods needed to predict future workforce needs, and coordination of the collection of data relating to the health care workforce in federal surveys and in the private sector" (IOM Report on the Future of Nursing, 2011, p. 262).

Nurses, which represent the largest segment of the health care workforce, will be at the center of the health care delivery system over the next two decades. Therefore, collecting and analyzing high quality and timely data will be needed to assess how the nursing workforce is adjusting to the many transitions and changes that are expected to occur (Buerhaus, 2012). Nurses are vital to creating and maintaining a health care system that provides high quality, patient-centered, cost-effective care to the citizens of the U.S. (Budden, Zhong, Moulton, & Cimiotti, 2013).

Tracking the Nursing Workforce

Knowledge of the supply and demand for Registered Nurses (RNs), Advanced Practice Registered Nurses (APRNs), and Licensed Practical Nurses (LPNs) is the first step in determining the nursing workforce that will be needed to provide care across the spectrum to the over three hundred million American citizens (U.S. Census, 2012). But, we cannot stop there. What about the nursing workforce that will be needed in five, ten, and fifteen years? It currently takes approximately 3 to 5 years to produce an RN, yet the baby boomers are getting older each day. Having the ability to predict future nursing supply and demand using forecasting models that incorporate state and regional level data will assist in the allocation of resources, program development, and recruitment efforts in both the health care system and education sectors.

Appropriate tracking of the size and characteristics of the RN, APRN, and LPN workforce is critical to determine nursing education capacity, supply, demand, and the distribution of the nursing workforce (Martiniano, McGinnis & Moore, 2011). The lack of relevant and timely data about the nursing workforce is a significant barrier to identifying where nursing shortages and/or surpluses exist. Without this information, policy makers will be making

decisions in the dark which may lead to the development of health care workforce programs and policies that do not address the needs of the populations living within the state and/or region (Martiniano et al., 2011).

Statewide and Regional Analysis of the Nursing Workforce

The health care needs of each state, as well as the regions within those states (i.e., urban vs rural) are unique, it is almost impossible to determine the size and composition of the health care workforce needed using national data and trends. Health policies designed to expand access, improve quality, and control costs must take into account the supply, distribution, education, and utilization of the health care workforce at the state and regional levels in order for these policies to succeed (Martiniano et al., 2011; McEllistrem-Evenson, 2009). A thorough analysis of the nursing workforce at the state and regional level is essential for effective workforce planning and data driven decision making.

It is imperative that the health care workforce is examined not only at the national level, but at the state, regional, or county level as we move forward with plans to improve the quality, efficiency, and effectiveness of the health care system (Keckley et al., 2011). Generalized statewide analysis of the nursing workforce does not capture nursing workforce needs at the regional level, and in turn, does not allow policy makers to implement the reforms necessary to address local workforce issues (Lin, Juraschek, Xu, Jones, and Turek, 2008). Nursing workforce shortages and surpluses tend to be specific to particular localities, and national data, even when used at the state level, may not be adequate to document the supply and demand for nurses at the regional or county level. Even in the face of the most severe national nursing shortages, some communities will have enough of certain types of nurses to meet patient care needs, and even when the supply is adequate, there could be communities that will have difficulty meeting their need for nurses. While national data are a useful barometer for tracking trends over time, the presence and severity of nursing shortages are best determined at the regional or county level. The data required are often found in state-level datasets such as state licensure data, workforce data collected by workforce centers or by state workforce commissions, or other state-level data sources (Martiniano et al., 2011). Studying the nursing workforce at the regional or county level provides the level of specificity required for policy makers and stakeholders to make incremental progress in addressing current nursing supply and demand imbalances as well as strategically planning for the future nursing workforce with limited fiscal resources.

Nursing Workforce Projections

Health care workforce models provide a mechanism for making future projections and testing possible solutions. These models range from simple to complex and can produce highly varied results. They tend to use population-based forecasting methods, in particular, the “stock and flow” approach used in the HRSA Nursing Supply and Demand Forecasting Model, which captures estimates of existing workforce numbers and utilization data and then translates those numbers into estimates of required FTE workers (Keckley et al., 2011; Biviano, Tise, Fritz, & Spencer, 2004; HRSA, 2004). The last projections based on the HRSA Nursing Supply and Demand Forecasts were released in 2004 and although the HRSA model was seen as the best available source for state level workforce projections, there were limitations related to the model.

Many at the state level did not find the HRSA model to be user friendly and some of the state level projections were found to be inaccurate (Health Policy Institute of Ohio, 2009).

Forecast studies for RNs which include APRNs, and LPNs can be valuable in quantifying supply and demand, as well as gaps in supply and demand, and identifying the most appropriate strategies to prevent future shortages. In order to quantify RN, APRN, and LPN supply/demand gaps, now and in the future, it will be important to have accurate data including the number of active RNs, APRNs, and LPNs, as well as their demographic, education, and practice characteristics, and work location(s). A lack of relevant and timely data on the nursing workforce is a significant barrier to identifying where nursing shortages currently exist, where they may exist in the future, and where they will be most severe. The absence of this information impedes the development of effective health workforce programs and policies to alleviate shortages and the ability to evaluate these programs and policies for effectiveness (Martiniano et al., 2011).

Simulation Models

Modeling using computer simulation is now recognized as a third way of doing science because of its ability to allow theorists to make realistic assumptions rather than compromise with analytically convenient assumptions. Simulations are based on formal models which are precise formulations of relationships between variables, including the formulation of the processes through which the values of variables change over time, based on theoretical reasoning (Harrison, Lin, Carroll, and Carley, 2007). The strength of simulation is the theoretical rigor introduced by formal modeling. Simulation is seen as a powerful technique which allows planners to explore consequences of alternative policies, facilitate input and output sensitivity analysis, and makes it easier to involve stakeholders throughout the process. Simulations are a means to assist planners to make decisions, they are not an end to themselves. The extent to which simulation provides useful scenarios for consideration depends on the quality of the data used in the model and on the extent to which the variables modeled reflect the system as a whole (O'Brien-Pallas, Birch, Baumann & Murphy, 2000).

The accuracy of any model's simulations depends on the quality of the data used to run it. Timely access to reliable data is a challenge for researchers. The model has to be designed so that users can easily update it as newer and/or better data become available (Barjis, 2011). Studies on the use of simulation in medical and nursing education are prevalent yet there are limited studies which have addressed the use of computer simulation for workforce policy development and strategic planning. In a study conducted by Tomblin-Murphy et al. (2012), a simulation model was developed to estimate the supply of and requirements for RNs based on data on the health needs of Canadians with current service delivery patterns and levels of productivity as a baseline scenario. The potential individual and cumulative effects of various policy scenarios on the 'gap' between service delivery patterns and levels of productivity were simulated. The model was not necessarily designed to predict the future, but rather to integrate knowledge of different components of the health-care system to better understand how various factors affect the supply of and/or requirements for health-care providers. The model enabled policy-makers to "rehearse" potential policy changes by altering variables in the model. Users of the simulation model were able to see the effects of each change on the supply of and requirements for a given type of health-care provider. In this way, it gave policy-makers a means of testing and evaluating policy options to determine the most efficient and effective ways to manage the workforce under different future scenarios. Often, a central concern for policy-

makers is the gap, or difference, between the number of providers available and the number required – hence the model was designed to calculate the gap automatically (Tomblin-Murphy et al., 2012).

Purpose of the Study

The aim of the current study was to develop a forecasting model that can be used to predict future nursing workforce needs (RNs, APRNs, and LPNs) at the regional and statewide level through 2020. The Louisiana State Board of Nursing (LSBN) and the Louisiana State Board of Practical Nurse Examiners (LSBPNE) have been collecting data about Louisiana’s nursing workforce for over twenty years through the annual licensure renewal process and annual reports submitted by schools of nursing. The Louisiana Center for Nursing (Louisiana’s Nursing Workforce Center) was established through a Senate Resolution in 2008 as a division of LSBN. The work that has come out of the Center for Nursing (e. g., Annual Nursing Supply and Education Capacity Reports; Nursing Workforce Demand Study; and the New Graduate Survey) have provided stakeholders with valuable information needed for strategic planning and workforce policy development. Collaborative efforts between LSBN, LSBPNE, the Nursing Supply and Demand Council, the Health Works Commission, and other stakeholder groups, has resulted in a tremendous growth in the collection, analysis, and reporting on the nursing workforce in Louisiana at the statewide level. The next step for nursing workforce analysis in Louisiana is the development of a nursing workforce forecasting model that can be used to not only predict nursing supply and demand through 2020, but also address ‘what if’ scenarios using computer simulation for the purposes of strategic planning and policy development.

The Louisiana Multi-Regional Statewide Forecasting Model

The Louisiana Center for Nursing (LCN) received funding from the Louisiana Health Works Commission (LHWC) and LSBN in 2012 to develop a nursing workforce forecasting model. The Forecasting Model will be used to predict nursing workforce supply and demand for Registered Nurses (RNs), Advanced Practice Registered Nurses (APRNs), and Licensed Practical Nurses (LPNs). This Forecasting Model provides a more precise way of assisting policymakers, nurse leaders, and nurse educators in their efforts to plan and prepare a future nursing workforce for decades to come. The model incorporates a number of data sets including population demographics, economic conditions, level of patient care mix (acute and long-term care), as well as the current nursing workforce supply and demand.

The Northeast Ohio Nursing Initiative (NEONI) Forecasting Model was used as a template for Louisiana’s Multi-Regional Statewide Nursing Workforce Forecasting Model. The NEONI Group, composed of Dr. Craig Moore, economist, and private consultant, Dr. Patricia Cirillo, statistician and President of Cypress Research Group in Northeast Ohio, and Lisa Anderson, MSN, RN, Vice President with the Center for Health Affairs in Cleveland, OH, in collaboration with Dr. Cynthia Bienemy, Director for the Louisiana Center for Nursing, developed Louisiana’s Multi-Regional Statewide Nursing Workforce Forecasting Model.

The Louisiana Multi-Regional Statewide Nursing Workforce Forecasting Model offers a unique and powerful tool to both monitor and forecast changes in the supply of and demand for nursing region by region and healthcare setting by setting across the state. It provides a mechanism for employing the annual nurse registration data in the state and, over time, will

establish trends in nurse utilization, career development, and nurse education. The HRSA supply and demand structure that it uses is well established and applied in many states. But, unlike HRSA that projects national figures and then allocates a share to each state, the Louisiana model begins with eight regional models for each type of nurse and aggregates them to a statewide model. This bottom up approach is both more accurate and allows each region to have an independent model for its nurse workforce analysis. Louisiana's Multi-Regional Statewide Nursing Workforce Forecasting Model may be the only nursing workforce forecasting model that has the ability to predict the supply and demand for RNs, APRNs, and LPNs at both the **regional** and **statewide** level, and **identify gaps (shortages or surpluses)**. Because of the flexibility in the design, the model can be updated with new data at any time. Assumptions in the model can also be adjusted based on additional data that becomes available such as an increase or decrease in nurse patient ratios, staffing patterns, changes in the regional or statewide health care delivery systems, advances in medical technology, and importation or exportation of health care in and out of the region or state.

Unlike many workforce models that are actually just forecasts of the demand and supply of nursing, the Louisiana model allows the user to manipulate the basic assumptions in each regional model with regard to utilization of nurses in each healthcare setting and the expected change in that utilization going forward. It allows for 'what if' analysis that can be a powerful policy tool when discussing different approaches to meeting the nursing needs of each region and for the state as a whole. It has the capacity to include export sales of healthcare resulting from serving out of state patients. And, it allows the user to look at various changes in demand due to migration of the population.

The Model

Although referred to as a 'Model,' the Louisiana Multi-Regional Statewide Nursing Workforce Forecasting Model is actually a tool, not a forecast, which is designed to allow for adjustments of the assumptions within the model which reflect nursing supply and demand.

The Demand Model (Appendix A and B)

The demand side of the model marries three general pieces of information:

- Population demographics, in particular the size, age, gender, and degree of urbanization of the population;
- The amount of healthcare (by setting) required by the population; and,
- The number of nurses required to provide each 'unit' of healthcare.

The Supply Model (Appendix C)

The supply side of the model is based on the number of nurses working in each region by their age. It marries three pieces of information in each region:

- The number of newly licensed nurses (RNs, APRNs, and LPNs);
- The demographics of the nurse workforce (in particular, age); and
- The work patterns of the nurse workforce (in particular, the number of hours worked).

Healthcare Settings

A core piece of the model relies on the number of nurses required to care for patients within various settings also known as the 'intensity factor'. Because the "intensity factor" varies

tremendously by healthcare setting, the model separates the demand for nurses by setting. The various settings delineated in the model are:

- Hospital Inpatient Care
- Emergency Department
- Ambulatory Care
- Nursing Facilities/Nursing Homes
- Home Health
- Community Health
- Public Health
- Nursing Education
- Other – Health care related settings other than the eight listed above

Sensitivity Analysis

One interesting feature the models allow users to test is called sensitivity analysis. The user can see how sensitive the change in the supply or demand for FTE nurses is to one particular factor. For example, to determine how sensitive a predicted shortage of nurses will be to a change in the number of newly licensed nurses each year, the user can vary the number of newly licensed nurses in increments of 100 (or any desired number) to see how that affects the supply and demand of nurses through 2020. By running the model with different numbers of newly licensed nurses while keeping everything else unchanged, the user can see the number of FTE newly licensed nurses that will need to be employed to positively affect a change in the supply of FTE nurses on an annual basis. This information could be useful in looking at overall nursing graduation rates and retaining those nurse graduates as newly licensed nurses within the state of Louisiana as a strategy to increase the overall supply of FTE nurses.

Other variables that can be changed include: increasing the intensity factors in one of the five health care setting; increasing the growth rate in intensity factors: changing the number of nurses recruited to a region or region(s); changing the export rate setting (hospital inpatient, ambulatory visits or nursing facilities); and changing the migration factor (patients seeking care in a region other than the region where they reside).

Policy Implications for the Forecasting Models

A number of key assumptions regarding the future of healthcare and changes in the nursing workforce can be easily changed in each model to provide a range of future forecasts. Used in this way, the models become policy tools that can help identify the most effective way to manage any anticipated shortages in the availability of nurses.

Validation of the Louisiana Multi-Regional Statewide Nursing Supply and Demand Forecasting Simulation Model

An initial forecasting model design meeting was held with stakeholder groups which included, but was not limited to, members of LSBN, LSBPNE, the Nursing Supply and Demand Council, the Louisiana Health Works Commission, the Louisiana State Nurses Association, and the Louisiana Hospital Association. The purpose of the design meeting was to inform the team of experts (statistician and econometrician) responsible for developing Louisiana's forecasting model about the uniqueness of Louisiana's health care system, economy, regional demarcations,

workforce, and politics. The stakeholder groups were instrumental in providing Louisiana specific data related to the nursing workforce, patient utilization, and nurse staff ratios in various health care settings. It was important to understand the landscape of Louisiana, as well as engage stakeholders in the process from the beginning to ensure that the forecasting model was geared toward meeting the needs of the stakeholders.

The Louisiana Multi-Regional Statewide Forecasting Simulation Model was thoroughly commented, documented, debugged, tested, and verified, throughout the development process and a thorough quality control check was performed by a team of researchers post-development. Throughout the development phase, model performance was continually compared to the time study data and was reviewed with the quality control team who gave feedback on the accuracy of the results. This iterative development process, although time-consuming, helped establish credibility with the stakeholders and trust in computer-generated analyses.

Major Findings

Registered Nurses (RNs)

- Nearly 60 percent of RNs are employed in Louisiana hospitals.
- Almost 10 percent of RNs in Louisiana are unemployed or choose not to work.
- A **statewide shortage** for RNs is expected to continue through 2016. In 2017, the supply of RNs will just meet the demand until 2020 based on current conditions.*
- 2013 shows a shortage of full-time equivalent (FTE) RNs (41,397 supply) compared to demand (44,472) which varies significantly by region.
- Shortages will exist through 2020 for RNs in the following regions: Baton Rouge, Lafayette, and New Orleans.
- There will be a surplus of RNs in Alexandria, Houma, and Lake Charles through 2020.

**Changes in health care policy/health care reform, patient care delivery, nurse intensity, or population shift will affect demand for RNs, APRNs, and LPNs*

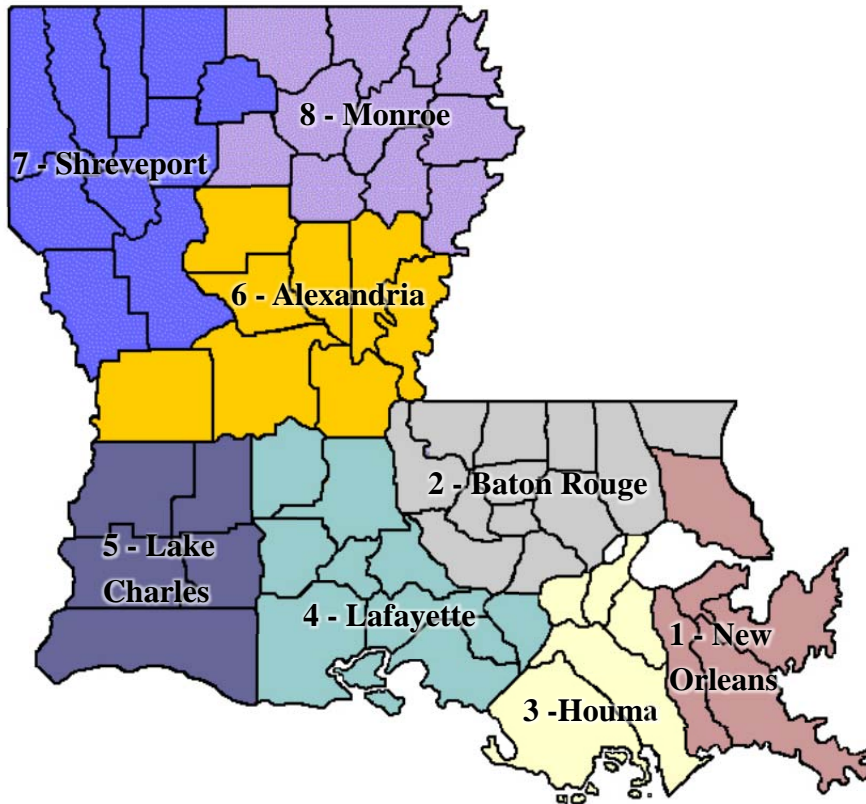
Advanced Practice Registered Nurses (APRNs)

- The demand for APRNs (FTEs) in 2013 was estimated at 5,282, with a supply of 3,959, leaving a gap of 1,323 FTEs. The ultimate size of this gap over the next decade will depend on the changing patterns of APRN utilization and healthcare policy as we go forward.
- Based on the current intensity (nurse-to-healthcare-unit ratio) for APRNs in Louisiana and a growth rate of 4% annually for APRNs in both the inpatient and ambulatory care settings, the demand for APRNs will be almost 7,000 FTEs by 2020. If, state-wide, the number of new APRNs entering the workforce remains at about 10% (the recent rate in Louisiana), the state-wide shortage of APRNs will continue at its current level until 2020.
- There will be a demand for APRNs through 2020 in the following regions: Baton Rouge, Lafayette, New Orleans, and Shreveport.

Licensed Practical Nurses (LPNs)

- The majority of LPNs are employed in long-term care facilities (5,411) and hospitals (4,569).
- About 10 percent of LPNs are unemployed.
- The LPN ratio of nurses to patients is much higher in Louisiana hospitals, especially rural facilities, than other states in the country.
- There will be a shortage of LPNs through 2020 in the following regions: Baton Rouge, New Orleans, and Houma.
- A surplus in the number of FTE LPNs will extend through 2020 in Alexandria, Lafayette, and Monroe.
- Statewide, the demand for LPNs will extend through 2013. Beginning in 2014 and extending through 2020, the supply of LPNs will just meet the demand.

Regional and Statewide Nursing Workforce Forecasts for Louisiana



Forecasts represent predictions based on the current conditions. Changes in health policy, patient care delivery, nurse intensity, or population shift, and implementation of all, or components of the Affordable Care Act, will affect demand for RNs, APRNs, and LPNs in Louisiana.

Forecasts by Regional Labor Market Area (RLMA)

Region 1 (New Orleans RLMA): Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany Parishes

Forecast

RNs – There will be a demand for RNs through 2020

APRNs – There will be a demand for APRNs through 2020

LPNs – There will be a demand for LPNs through 2020

Region 2 (Baton Rouge RLMA): Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, Tangipahoa, Washington, West Baton Rouge, West Feliciana Parishes

Forecast

RNs – There will be a demand for RNs through 2020

APRNs – There will be a demand for APRNs through 2020

LPNs – There will be a demand for LPNs through 2020

Region 3 (Houma RLMA): Assumption, Lafourche, Terrebonne Parishes

Forecast

RNs – There will be a surplus of RNs through 2020

APRNs – There will be a demand for APRNs through 2016. Beginning in 2017 and extending through 2020, supply will just meet the demand for APRNs.

LPNs – There will be a demand for LPNs through 2020

Region 4 (Lafayette RLMA): Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, Vermilion Parishes

Forecast

RNs – There will be a demand for RNs through 2020

APRNs – There will be a demand for APRNs through 2020

LPNs – The supply of LPNs will exceed the demand through 2020

Region 5 (Lake Charles RLMA): Allen, Beauregard, Calcasieu, Cameron, Jefferson Davis Parishes

Forecast

RNs – A surplus for RNs will begin in 2013 and extend through 2020.

APRNs – There will be a demand for APRNs through 2017. Beginning in 2018, the supply of APRNs will just meet the demand through 2020.

LPNs – There will be a surplus of LPNs through 2016, followed by a closing of the gap between supply and demand beginning in 2017, subsequently leading to a demand for LPNs in 2018 which will extend through 2020.

Region 6 (Alexandria RLMA): Avoyelles, Catahoula, Concordia, Grant, LaSalle, Rapides, Vernon, Winn Parishes

Forecast

RNs – There will be a surplus of RNs through 2020.

APRNs – The supply of APRNs just meets demand through 2013. Beginning in 2014 the supply of APRNs will exceed demand through 2016. In 2017 the gap between supply and demand will begin to close leading to a demand for APRNs in 2018 extending through 2020.

LPNs – There will be a surplus of LPNs through 2020.

Region 7 (Shreveport RLMA): Bienville, Bossier, Caddo, Claiborne, DeSoto, Lincoln, Natchitoches, Red River, Sabine, Webster Parishes

Forecast

RNs – Beginning in 2013, the supply of RNs will just meet demand through 2014. There will be a surplus of RNs in 2015 which will extend through 2020.

APRNs – The demand for APRNs will exceed supply through 2020.

LPNs – Supply will just about meet the demand for LPNs through 2014, but beginning in 2015 the demand for LPNs will exceed the supply through 2020

Region 8 (Monroe RLMA): Caldwell, East Carroll, Franklin, Jackson, Madison, Morehouse, Ouachita, Richland, Tensas, Union, West Carroll Parishes

Forecast

RNs – In 2013, the supply of RNs will just meet demand. There will be a surplus of RNs beginning in 2014 extending through 2020.

APRNs – For APRNs, supply will exceed demand beginning in 2013 continuing through 2020.

LPNs – A surplus of LPNs is predicted to extend through 2020.

Statewide:

Forecast

RNs – There will be a demand for RNs through 2016. The gap between supply and demand will begin to close in 2017, at which time the supply will just meet the demand for RNs through 2020 based on current conditions.

APRNs – There will be a statewide demand for APRNs through 2020.

LPNs – The demand for LPNs will extend through 2013. Beginning in 2014 and extending through 2020, the supply of LPNs will just meet the demand.

Recommendations:

- Present the forecasting model to stakeholders across the state to share how the model can be used by educators, nursing administrators, healthcare facilities, and legislators for strategic planning, workforce planning, and policy development.
- Update the Multi-Regional Statewide Nursing Workforce Forecasting Model each year using the most current licensure renewal data (nursing supply) and education capacity data.
- Seek funding to:
 - Develop comprehensive regional profiles of the current supply, demand, and education capacity for RNs, APRNs, and LPNs for the eight regional labor market areas in Louisiana
 - Validate and modify the assumptions in the Forecasting Model based on the findings obtained from the regional analysis of the 2013-2014 nursing supply, education capacity, demand, and new graduate data
 - Predict nursing supply and demand through 2020 at the regional and statewide level using the updated Louisiana Multi-Regional Statewide Nursing Workforce Forecasting Model
 - Use Geographic Information System (GIS) Mapping to visually illustrate regional and state-wide nursing workforce profiles
 - Develop recommendations for workforce development and strategic planning for each region and the state as a whole based on ‘what if’ scenarios generated by the Louisiana Multi-Regional Statewide Nursing Workforce Forecasting Model.

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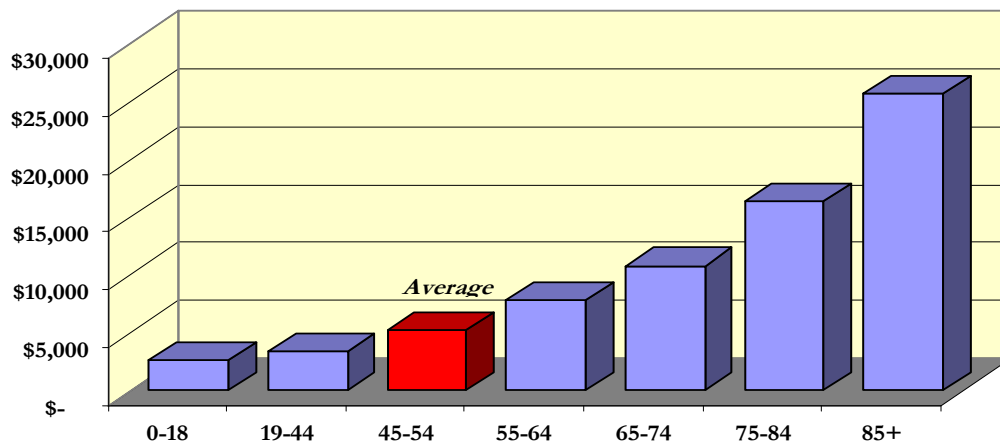
APPENDIX A

Demand for Health Care

The demand for health care increases geometrically with age. This can be easily illustrated by looking at the relative expenditures on healthcare by age group for the U.S. below:

Figure A1.

U.S. Per Capita Healthcare Expenditures



- People between 45 and 54 spend 2 times as much as someone under 19
- People between 55 and 64 spend 3 times as much as someone under 19
- People between 65 and 74 spend 4 times as much as someone under 19 or 2 times as much as someone between 45 and 54
- People between 75 and 84 spend 6 times as much as someone under 19 or 3 times as much as someone between 45 and 54
- People 85 and older spend almost 10 times as much as someone under 19 or 5 times as much as someone between 45 and 54

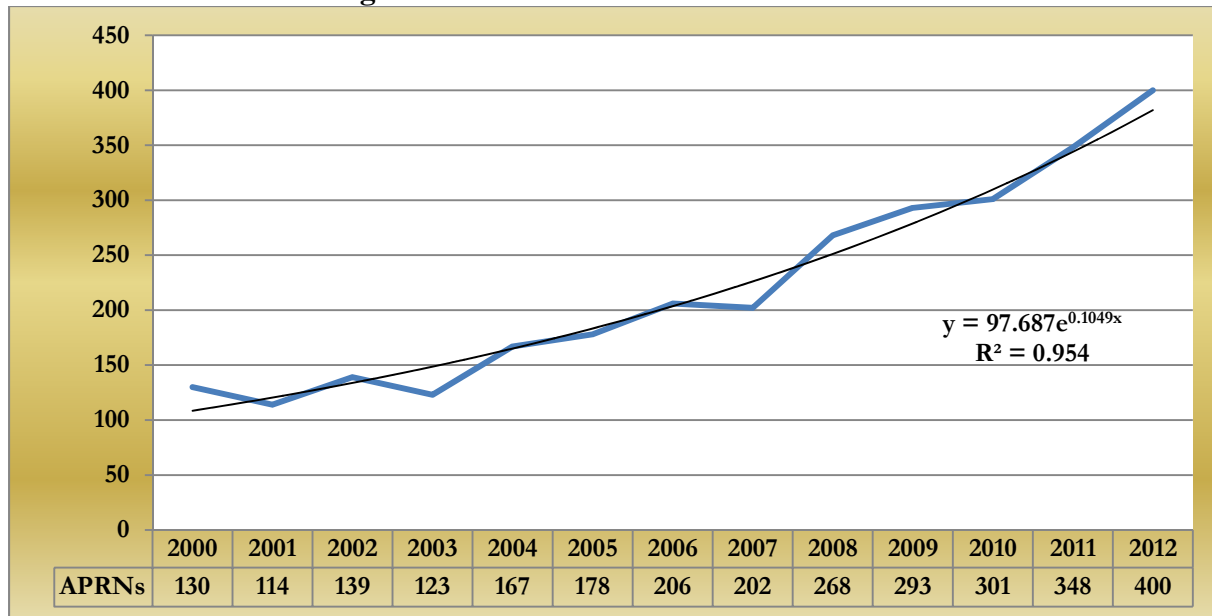
APPENDIX B

Explosive Growth in the Demand for APRNs

The role of nurses today is ever widening and the greatest change involves the use of Nurse Practitioners and Physician Assistants. In rural areas and core urban areas where health care is least affordable, APRNs are used to supplement the care given by primary care physicians.¹

The growth in the demand for APRNs can be seen in the following chart that shows the exponential growth of newly licensed APRNs in Louisiana in the past 12 years⁵. The current annual number of newly licensed APRNs is about 350, but, this number has been growing at 10.8% a year. The unemployment rate for APRNs, based on 2012 licensure data, is only 1.5%. It is easy to see that as fast as these new nurses have entered the labor market they have found work. Based on this, an initial growth rate in the intensity factor was used for APRNs of 4% a year for inpatient care and 4% for outpatient care. These are the two health care settings where the vast majority of APRNs currently work according to the current registration data. This may be a very conservative figure given the obvious growth in demand in the recent past in the state. However, in the model itself the user can modify the growth rate assumption.

Figure B1. New APRNs Licensed Each Year



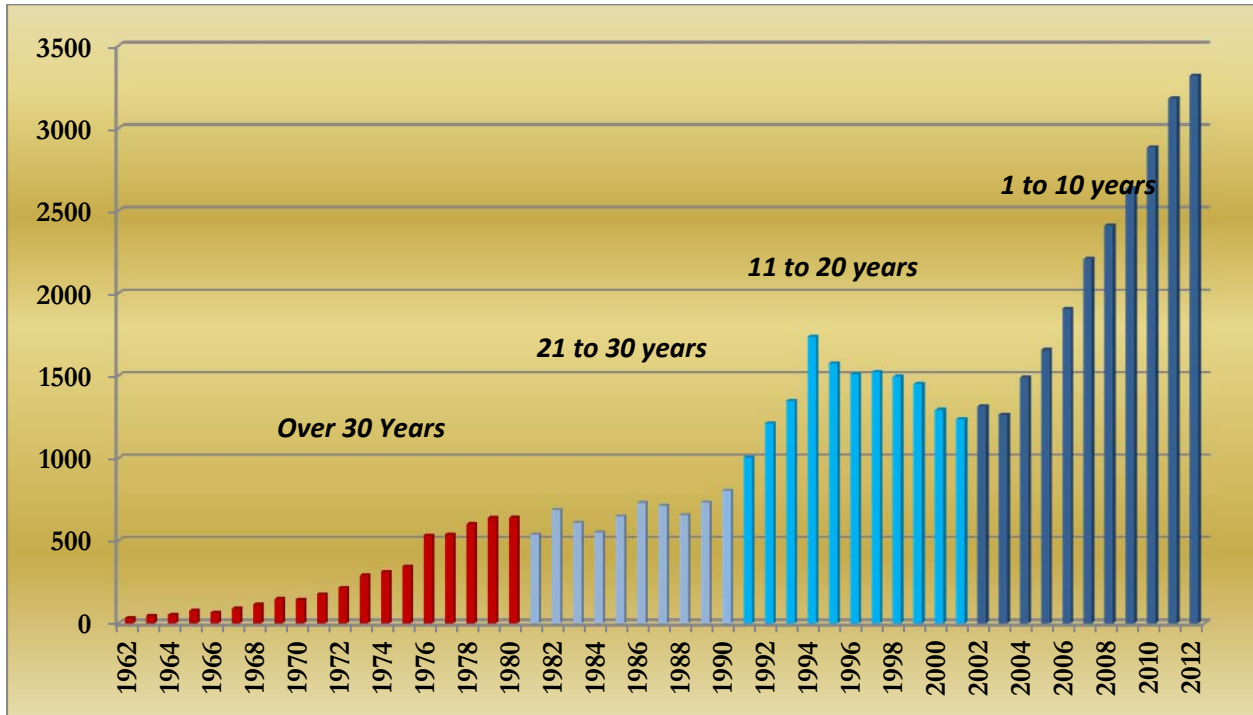
Note: Growth of newly licensed APRNs in Louisiana in the past 12 years.

¹O’Grady, E. R., Hanson, C., Lugo, N. R., & Hodnicki, D. (2010). Unleashing the nation’s nurse practitioners. *The Journal of Rural Health*. Retrieved on March 3, 2012 from <http://m.eileenogrady.net/upload/Unleashing%20the%20Nation's%20Nurse%20Practitioner%20s.pdf>.

APPENDIX C

The following bar chart shows the breakdown of RNs by the year they were first licensed⁵. Most of the RNs in red and light blue will be retiring from the workforce by 2020 as they surpass 30 years of service. Replacing them in the face of increasing demand for health care as the population gets older will certainly be a challenge.

Figure C1. RN Workforce by Year of Initial License



Note: Breakdown of RNs by the year they were first licensed.