A Study of Associate Degree Nursing Program Success

Evidence from the 2002 Cohort

A Final Report Compiled by:

The Cecil G. Sheps Center for Health Services Research
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A report prepared for the
North Carolina Community College System by:

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NORTH CAROLINA
COMMUNITY COLLEGE SYSTEM

UNC
THE CECIL G. SHEPS CENTER
FOR HEALTH SERVICES RESEARCH

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List of Acronyms and Abbreviations

NCCCS ..... North Carolina Community College System
BoN ..... North Carolina Board of Nursing
Sheps Center ..... Cecil G. Sheps Center for Health Services Research
HPDS ..... North Carolina Health Professions Data System
UNC GA ..... University of North Carolina General Administration
ADN ..... Associate Degree Nursing
RN ..... Registered Nurse
NCLEX ..... National Council Licensure Examination-Registered Nurse
RAGR ..... Risk Adjusted Graduation Rate
NC ..... North Carolina
CC ..... community college
TCC ..... technical community college
NEWH ..... Nash-Edgecombe-Wilson-Halifax Consortium
NCCN ..... North Carolina Center for Nursing
NLN ..... National League for Nursing Accreditation Commission
NC IOM ..... North Carolina Institute of Medicine
FTE ..... full-time equivalent
GPA ..... grade point average
HOBET ..... Health Occupations Basic Entrance Test
TEAS ..... Test of Essential Academic Skills
PSBH ..... Problem Solving for Better Health
MSN ..... Master's of Science in Nursing
BSN ..... Bachelor's of Science in Nursing
HPSA ..... Health Professional Shortage Area
S.E. ..... standard error

Acknowledgements

One of the most exciting and unique aspects of this study was that it combined several data sources that have not been analyzed together in the past, bringing together information from the North Carolina Community College System (NCCCS) data warehouse, the North Carolina Board of Nursing, and the North Carolina Health Professions Data System. This enabled us to track students from when they enrolled in an ADN program to the time they sat for their NCLEX exam through to when they began nursing practice in North Carolina. We are indebted to Keith Brown, Associate Vice President for Research and Performance Management at the North Carolina Community College System for the student- and faculty-level data used in this analysis. The study would not have been possible without the generous contribution of data and expertise from the NC Board of Nursing's former and current Executive Directors, Polly Johnson and Julie George, as well as from Barbara Knopp, Manager of Education. We are grateful to Linda Lacey who provided data even as the North Carolina Center for Nursing's doors were closing. We also thank Diana Haywood and Scott Jenkins from the University of North Carolina for sharing data on ADN students who went on to pursue BSN education.

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Executive Summary

Summary of Findings

North Carolina faces a slowing per capita supply of registered nurses at a time of increased demand for health care services. Despite a 28.6% increase in RN graduates in the State, attrition remains high from North Carolina Community College System Associate Degree Nursing programs. This study identifies the factors influencing attrition and expands the current evidence base that can be used to inform efforts to reduce student attrition.

- Student demographic and socioeconomic characteristics are the most powerful predictors of on-time graduation.
- To fairly judge program performance, graduation rates must be considered in comparison to what should be expected given the student body's demographic and socioeconomic profile.
- Programs with higher than expected graduation rates
  - Used standardized tests in their admissions processes
  - Employed slightly more educated faculty
  - Tended not to use the same faculty in clinic and lecture settings
  - More frequently required orientation for clinic instructors
- Students were more likely to pass the National Council Licensure Examination (NCLEX) if they enrolled in a program
  - Where more of the faculty had a master's degree
  - That used standardized tests in the admissions process
  - That had a higher science competency standard than the standard for the community college
- On-time graduates from NCCCS ADN programs have a high retention rate (90%) in the North Carolina RN workforce.
- On-time graduates from NCCCS ADN programs enter practice close to the communities where they are educated.
- NCCCS ADN graduates are more likely to practice in long-term care, home care/hospice, and mental health settings, and in rural counties.

High workforce retention rates for NCCCS ADN on-time graduates (90%) combined with the tendency of these graduates to practice in 1) clinical settings with high vacancy rates such as long-term care and 2) counties experiencing shortages of health professionals make a compelling case for policy makers to invest resources in understanding and addressing attrition from ADN programs.

North Carolina faces a slowing per capita supply of RNs at a time of increased demand for health care services. Ensuring an adequate supply of nurses to meet the growing demand for health care services is a key issue facing state policy makers. In 2004, a task force of the North Carolina Institute of Medicine (NC IOM) reported an emerging perfect storm of factors that could lead to a nursing shortage: population growth, particularly among persons aged 65 years and older, is converging with the rapid aging of the state's nursing workforce. Consistent with this forecast, the North Carolina Center for Nursing (NCCN) has projected that by 2020 the State's supply of full-time RNs will meet only 70% of demand.

Despite growth in output of RNs, attrition remains high in NCCCS ADN programs. In response to recommendations made by the NC IOM's taskforce, the State has initiated a series of strategies to increase the number of nurses graduating from pre-licensure RN programs. These efforts have been largely successful, resulting in a 28.6% increase in RN graduates in North Carolina between 2003 and 2006. However, rates of attrition from Associate Degree Nursing (ADN) programs remain high. According to internal estimates, only 58% of students entering North Carolina Community College System (NCCCS) ADN programs complete the degree. While policy makers are keenly aware that attrition from ADN programs is problematic, there is a lack of empirical evidence identifying specific factors contributing to student attrition.

This study helps develop an evidence base to inform efforts to address student attrition in NCCCS ADN programs. In late 2007, the North Carolina Community College System (NCCCS) asked the Cecil G. Sheps Center for Health Services Research (Sheps Center) to conduct a study of Associate Degree Nursing (ADN) program attrition and its causes. This report summarizes the findings from the study and identifies the student- and program-level characteristics associated with more and less successful associate degree nursing (ADN) programs. Program success is measured by three outcomes; 1) graduation within three years of enrollment, 2) passing the NCLEX-RN on the first attempt, and 3) practicing as an RN in North Carolina within five years after enrolling in an ADN program. These criteria were chosen because they are consistent with The National League for Nursing Accreditation Commission (NLN) criteria for accrediting nursing education programs but also because they explicitly recognize that the State's investment in nursing education cannot be evaluated by simply examining program completion rates—the ultimate return on investment in these programs is having graduates practice nursing in North Carolina.

The study tracked the outcomes of 2,237 students in a cohort that enrolled in the gateway Nursing 110 or Nursing 115 class in the North Carolina Community College System (NCCCS) in the Fall of 2002. Student-level data were combined with information about the 842 faculty who taught in ADN programs during the period and with data on the institutional characteristics of the 42 community colleges and consortia that enrolled nursing students in the Fall of 2002.

Student demographic and socioeconomic characteristics are the most powerful predictors of on-time graduation. Results indicate that student demographic and socioeconomic characteristics play an important role in determining graduation outcomes. Young age (18-23 years), non-white race/ethnicity (excluding American Indian ancestry), having a GED rather than a high school diploma, and being a Pell Grant recipient were all associated with lower probabilities of graduating on-time.

To fairly judge program performance, graduation rates must be considered in comparison to what would be expected based on the student body's demographic and socioeconomic profile. Because these risk characteristics are not evenly distributed across NCCCS programs, statistical techniques were used to construct a "risk adjusted graduation rate" (RAGR) that identified programs whose graduation rates were higher or lower than would be expected given their student populations.

Programs with higher than expected graduation rates

- Used standardized tests in their admissions process
- Employed slightly more educated faculty
- Tended not to use the same faculty in clinic and lecture settings
- More frequently required orientation for clinic instructors

Student characteristics played less of a role in determining whether program graduates passed the National Council Licensure EXamination-Registered Nurse (NCLEX-RN) licensure exam. Only young age was associated with a lower probability of passing the test on the first attempt. However, several characteristics of the programs in which students enrolled were associated with their likelihood of success.

Students were more likely to pass NCLEX if they enrolled in a program

- Where more of the faculty had a master's degree
- That used standardized tests in the admissions process
- That had a higher science competency standard than the standard for the community college

On-time graduates from NCCCS ADN programs have a high retention rate (90%) in the North Carolina RN workforce. This high retention rate means the returns to increasing graduation rates are nearly twice those of increasing program size. Based on a system-wide graduation rate of approximately 60% and a workforce retention rate of around 90%, 100 new ADN program slots will yield only 54 new RNs to the North Carolina workforce. By contrast, 100 additional graduates will yield 90 RNs.

On-time graduates from NCCCS ADN programs enter practice near to where they earn their degree. Half of all on-time graduates practiced within 13 miles of their program of enrollment in 2002.

NCCCS ADN program graduates are more likely to practice in long-term care, home care/hospice, and mental health settings, and in rural counties. Compared to RNs educated in other educational programs, NCCCS graduates were more likely to practice in nursing homes, home care or hospice settings, and mental health facilities. NCCCS graduates were also more likely to practice in rural counties, and in counties designated Health Professional Shortage Areas.

Conclusions

High workforce retention rates for NCCCS ADN on-time graduates (90%) combined with the tendency of these graduates to practice in 1) clinical settings with high vacancy rates such as long-term care and 2) counties experiencing shortages of health professionals make a compelling case for policy makers to invest resources in understanding and addressing attrition from ADN programs. While the existing policy debate about an emerging nursing shortage has focused on mechanisms to increase the overall supply of nurses, the findings from this report emphasize the critical importance of ADN nursing graduates to the distribution of nurses in the state both geographically and by practice setting. The fact that ADN graduates distribute to rural and underserved parts of the state and tend to work in clinical settings facing high vacancy rates makes a compelling case for policy makers to invest resources in understanding and addressing attrition from ADN programs.

Recommendations

1. Standardizing Performance Measures

- A uniform method should be used by the North Carolina Board of Nursing and the NCCCS to calculate retention rates.
- On-time graduation rates should be calculated for all students within a curriculum (full- and part- time) using the NLN standard of 150% of program length to define "on-time." In this study, part-time and full-time students were equally likely to graduate on-time according the 150% definition.
- The Board of Nursing and the Community College System should explore whether a first-time pass rate is the best measure of performance. In this study, approximately three-quarters of all on-time graduates failing NCLEX on their first attempt later passed and entered the NC workforce.

2. Adjusting Performance Evaluations to Reflect Differences in Service Populations

- Performance measures that evaluate graduation rates should be adjusted to reflect student body characteristics. This adjustment should include the following student characteristics:
  - Age, gender, race/ethnicity
  - Education
  - Pell grant status
  - Part-time/full-time enrollment status
  - Socioeconomic characteristics of ZIP code of residence, including rurality, poverty level, educational attainment, and proportion of active duty military in the student's home community.

3. Best Practices in Associate Degree Nursing Education

Although findings from this study are not conclusive, several practices of high performing programs have emerged and should be considered by programs seeking to improve graduation rates. These include:

- increasing graduate education among faculty through continuing education or recruitment;
- requiring orientation for clinic instructors;
- using standardized tests to rank applicants for admission; and
- requiring science competency above the general community college standard.

4. Registered Nurse Workforce Policy

Higher rates of practice in rural areas and in long-term care, home care/hospice, and mental health settings among BSNs who first earned an ADN highlight the importance of improving articulation between ADN and BSN programs as the state moves toward the NC Institute of Medicine's recommended goal of a 60% BSN workforce. An important first step in this process would be for the NC State Board of Community Colleges to request that the NC General Assembly direct that a Nursing Articulation Legislative Study be conducted by the Joint Legislative Education Oversight Committee. The purpose of the study would be to identify, and to make recommendations about, barriers and opportunities that exist for increasing the number of ADN nurses who pursue additional education.

Decisions about whether to open new nursing programs or expand existing ones, to enact or change policies regarding the regulation of educational programs, and other policy decisions concerning the nursing workforce affect a wide range of stakeholders and can be the source of

contentious debate. The ability of educators, legislators, legislative staff, and policymakers to understand, consider, and debate pressing issues and identify potential policy solutions exists only if decision makers have access to both a ready source of rich data and researchers who can work with that data to objectively present the analyses "as they lay." The NCCCS should pursue $150,000 from the legislature in the 2009 session to undertake workforce analyses that will provide policy makers the evidence base needed to make informed decisions about how to best invest in preparing the nursing workforce to meet the demands of North Carolina's rapidly growing and aging population.

Part I. Introduction

Overview

Ensuring an adequate supply of nurses to meet the growing demand for health care services is a key issue facing state policy makers. In 2004, a task force of the North Carolina Institute of Medicine (NC IOM) reported an emerging perfect storm of factors that could lead to a nursing shortage: population growth, particularly among persons aged 65 years and older, is converging with the rapid aging of the state's nursing workforce.[1] Consistent with this forecast, the North Carolina Center for Nursing (NCCN) has projected that by 2020 the State's supply of full-time RNs will meet only 70% of demand.[2]

In response to recommendations made by the NC IOM's taskforce, the State has initiated a series of strategies to increase the number of nurses graduating from pre-licensure RN programs. These efforts have been largely successful, resulting in a 28.6% increase in RN graduates in North Carolina between 2003 and 2006.[3] However, attrition from Associate Degree (ADN) programs has continued at high levels. Data from the North Carolina Community College System (NCCCS) reveal that, on average, only 58% of students entering ADN nursing programs complete the program.[i] While policy makers are keenly aware that attrition from ADN programs is problematic, there is a lack of empirical evidence to identify the specific factors that contribute to student attrition.

In late 2007, the North Carolina Community College System (NCCCS) asked the Cecil G. Sheps Center for Health Services Research (Sheps Center) to conduct a study of Associate Degree Nursing (ADN) program attrition and its causes. This report summarizes the findings from the study and identifies the student- and program-level characteristics associated with more and less successful associate degree nursing (ADN) programs. Program success is measured by three outcomes; 1) graduation within three years of enrollment, 2) passing the NCLEX-RN on the first attempt, and 3) practicing as an RN in North Carolina within five years after enrolling in an ADN program. These outcomes are examined for a cohort of students who enrolled in the gateway nursing course (NUR110 or NUR115) in the Fall of 2002.

The first part of this report presents a rationale for the study. Part II reviews the literature and briefly discusses efforts to boost RN supply in other states. Part III details the study design and methods, including the conceptual model guiding the study, identification of the sample cohort, data, and analytic approach. Part IV describes the sample students and programs. Part V presents results for the first outcome, on-time graduation. Parts VI and VII cover NCLEX and workforce retention outcomes, respectively. Conclusions are reported in Part VIII, and recommendations in Part IX.

Why Study Nursing Education Programs?

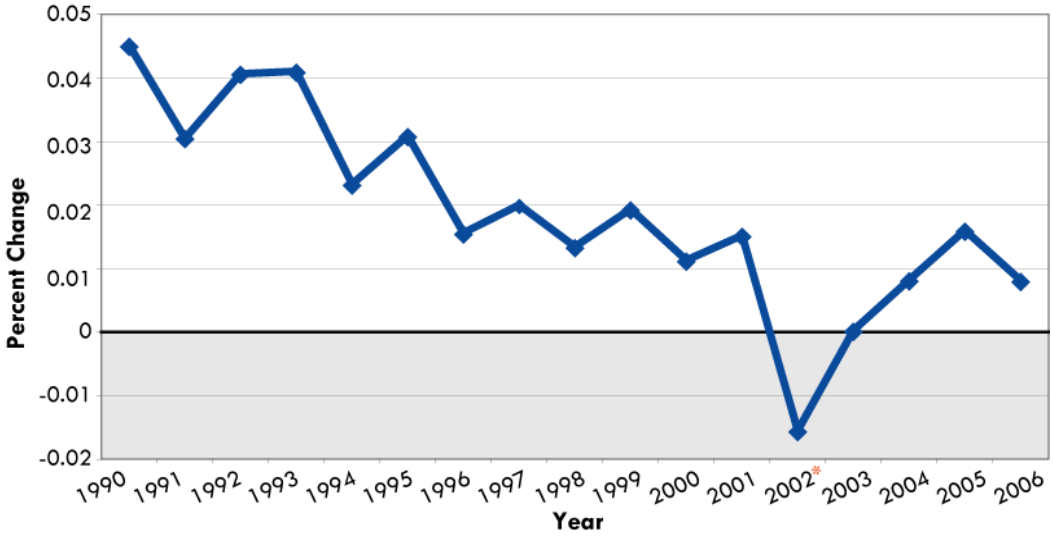
Growth in North Carolina's per capita supply of registered nurses has slowed in recent years (**Figure 1**). Overall, the annual percent increase in the ratio of RNs per 10,000 population declined from 1990 to 2006, with some variation year to year.

Every year the North Carolina Health Professions Data System (HPDS) receives a file from the North Carolina Board of Nursing (BoN) containing practice information on registered nurses licensed to practice in the state in that year. Of the 8,129 nurses gained in active, in-state practice in North Carolina between 2005 and 2006, 4,189 (51.5%) were educated in North Carolina. Two-thirds

[i] NCCCS analyses

(64.6%) of these NC educated nurses (2,706) had an Associate Degree in Nursing (ADN).[4] These data reveal several important facets of North Carolina's supply of RNs. We are a state that relies heavily on nurses educated outside of North Carolina and our supply of nurses gained to practice each year draws significantly on graduates from ADN programs. Continuing reliance on a steady inflow of RNs from other states to meet NC's growing demand for health care services is risky in light of the well-documented national RN shortage. For this reason, both the NC IOM[1] and the NCCN[5] have recommended increasing output from the state's educational programs.

Figure 1. Growth in Registered Nurses per Population
North Carolina, 1990-2006



Data include active, in-state RNs licensed in North Carolina as of October 31 each year.
*Prior to 2000, RN licensure renewals occurred in December of each year. Data in 2002 were the first year that reflected the shift to licensure renewal by birth month. Numbers for 2002 were lower than usual because they reflected RNs who left the file in the 22 months between January 2001 and October 2002.
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Nursing, 1990-2006.

An Alternative to Program Expansion: Improving Graduation Rates in NCCCS ADN Programs

While increasing the number of new nursing programs and adding additional slots to existing programs is one way to increase output, such growth is limited by some important constraints. First, program expansion is hampered by the short supply of nursing faculty. The State has enacted various measures to increase the supply of faculty, including offsetting the cost of graduate education for prospective nursing faculty, expanding financial aid for nursing students in both public and private institutions at both the bachelor's and associate's degree levels, and offering scholarships for bachelor's level education to RNs with associate's level education.[6-8] As well, in its 2007 and 2008 budgets, the NC Legislature included monies to provide scholarships in the amount of $15,000 per year to RNs seeking graduate degrees with the intention of teaching in NC RN education programs. Such efforts focused on educating future nursing faculty, while essential to ensuring the security of the state's future RN supply, will not have an immediate effect on increasing the number of nursing program graduates available to provide clinical care.

A second barrier to expanding existing programs and opening new ones is the high cost of nursing education. Already, North Carolina's community colleges struggle to meet the financial burdens of operating health sciences programs, whose costs outstrip state support by $1,520 per-

student per year.[9] Although the NC IOM's 2004 report included a recommendation that the legislature reclassify community college nursing programs as "high-cost," affording them a higher rate of reimbursement per full-time equivalent (FTE) student,[1] this has not yet occurred. $5.6 million in recurring funds for allied health programs was allocated in the 2007 legislative budget;[6] however this falls far short of the overall gap between cost of health science education programs and state funding.[3]

Because faculty shortages and resource constraints limit the degree to which the State can increase output from educational institutions in the short-term, there is a pressing need to address attrition from existing programs. Reducing attrition rates from Associate Degree Nursing Programs has the potential to significantly expand RN production in the short-term without significant demands for new resources or faculty. The North Carolina Center for Nursing reports 1,811 students graduated from NCCCS ADN programs in 2006-2007.[10] Raising the NCCCS system-wide graduation rate from 58% to 75% would result in the addition of 531 RNs to the workforce, increasing the total contribution from the cohort to 2,342. Thus, real and substantial gains in RN production can be realized with moderate improvements in NCCCS ADN program graduation rates.

Part II. Literature Review and Lessons Learned from Other States

The California Attrition Studies

For the past decade, California has been a national leader in focusing on reducing attrition rates from ADN programs as a means of addressing the nursing shortage. Based on studies conducted since the late 1990s, the California Legislative Analyst's Office in 2007 went so far as to argue that, with respect to the state's nursing shortage, reductions in community college ADN program attrition rates could render further program expansions unnecessary.[11]

California has a long-standing commitment to boosting RN production through reducing attrition rates in its community college nursing programs. Facing what the U.S. Bureau of Health Professions classified as the most severe nursing shortage in the country,[12] California undertook two important studies of the factors related to attrition rates in nursing programs in the community college system. The resulting reports, issued in 2002[13] and 2003[14] provide a framework for the current study.

In the 2002 report, researchers adapted a model from education theory to conceptualize attrition/on-time graduation as a function of three categories of factors: institutional, dispositional and situational factors.[15] Institutional factors included admissions policies and program requirements. Dispositional factors comprised student academic performance both prior to, and within, the ADN program. Situational factors included life events and economic and social resources and pressures. Only institutional and dispositional factors were measured.

The 2002 study found that a student's probability of graduating on-time was higher if she or he was enrolled in a program with admissions policies that had minimum standards than those that used lottery or first-come-first-serve methods to allocate limited slots. Differences grew smaller over time, however, and for the 1998 cohort, probability of on-time graduation was unrelated to admissions policies at the program of enrollment. Students enrolled in programs with prerequisites in the core areas of English and chemistry were more likely to graduate on-time, while those enrolled in programs requiring electives such as psychology, child development, and speech were less likely to graduate. Higher academic performance in English and biology courses prior to enrollment predicted on-time graduation, whereas the more semesters a student was enrolled in college prior to enrollment in an ADN program, the less likely she or he was to graduate on-time.

In the 2003 report, researchers measured program success not only by examining college graduation rates, but also by examining NCLEX pass rates. Although the 2002 report had identified English and science prerequisites and prior academic performance as predictors of on-time graduation at the student-level, the 2003 report found these factors had no relationship with graduation rates at the program-level. Having a larger applicant pool relative to available slots (conceivably allowing for more selective admissions) was similarly unrelated to graduation rates. Having more support services, such as English as a Foreign Language support, tutoring resources, or mentoring programs was associated with slightly higher graduation rates. Academic support services such as tutoring, having a learning resource center, and remediation were associated with higher on-time graduation rates, although the effects were small. None of these student support services were related to first-time NCLEX pass rates.

Including first-time NCLEX pass rates as an outcome measure provided California researchers with a common metric to evaluate program performance. While individual programs

may vary in the rigor of their curriculum or the willingness of counselors, administrators, and faculty to pass poorly performing students, the licensure exam provides an objective assessment of performance. In some cases, program characteristics had opposite effects on graduation and NCLEX pass rates. For example, smaller schools posted higher graduation rates than their larger counterpart but graduates from these programs were less likely to pass the NCLEX.

At the program level, the demographic makeup of the student body proved the only factor to powerfully influence both graduation and NCLEX pass rates. Programs with higher proportions of white and Asian students, and lower proportions of African American, Latino, and American Indian students had higher graduation rates and higher NCLEX pass rates. When interpreting these findings, the study authors suggest racial/ethnic characteristics act as proxies for the quality of secondary education students received prior to program enrollment.

Reports from Other States

The California studies drew on earlier community college system evaluations, including one conducted of NCCCS Health Sciences programs in the 1980s.[16] This study found admissions test performance in math, English, and science predicted higher GPAs in the nursing program, as did older age. However, student-level data was reported by administrators based on personal recollections and thus the findings are subject to bias. Another study of community college ADN programs in several states[17] using academic records to measure student performance found no relationship between admissions criteria and either GPA or graduation rates.

The Academic Literature

Academic literature on the determinants of attrition in ADN programs is limited. Student relationships with faculty,[18] social integration into a nursing program,[19, 20] and the availability of academic and social support services[20, 21] have shown positive relationships with program completion. Student academic performance prior to enrollment[22] and student demographic characteristics[20, 23] have also been associated with likelihood of program completion. Academic[24, 25] and standardized test performance[26-28] have also been linked to NCLEX outcomes. Socioeconomic status is another predictor frequently associated with higher education outcomes,[29] but not measured in any of the research on ADN programs identified in the literature review.

Efficiency and Access as Competing Goals in Community Colleges

In the two California studies and in the academic literature, minority race/ethnicity, poor prior academic performance and poor academic preparation most consistently predict negative outcomes. These risk factors highlight the competing objectives of efficiency and access that community college-based ADN programs face. According to its mission statement,[30] NCCCS programs must 1) train the workforce, 2) support economic development, and 3) improve quality of life in the community. In a recent article in *North Carolina Insight*,[31] NCCCS President Scott Ralls notes that those North Carolinians with little education and limited economic resources, the most vulnerable to the current economic downturn, are both the most challenging population to educate, and the community college system's most important clients. Community college ADN programs serve not only to supply nurses to a growing health care industry, but also to afford access to quality education and employment to citizens at the lower end of the socioeconomic scale.[32] ADN programs are part of what President Ralls, borrowing a phrase from former Board of

Education chairman Dallas Herring, described as the NCCCS's mission to "...take the people where they are and carry them as far as they can go."

Recent research increasingly acknowledges the importance of a diverse health care workforce in providing high quality care to communities with high proportions of minorities. Consensus is developing among both academic researchers and health care leaders that increasing the diversity of the health care workforce can improve provider competency, patient comfort, and through these, quality of care.[33] Combined with the high demand and strong wages in nursing, training at risk populations to become RNs stands to improve both quality of health care and economic well-being of communities. However, such prospective RNs are at the highest risk for attrition due to lower quality academic preparation and greater financial and family care burdens.[34-36]

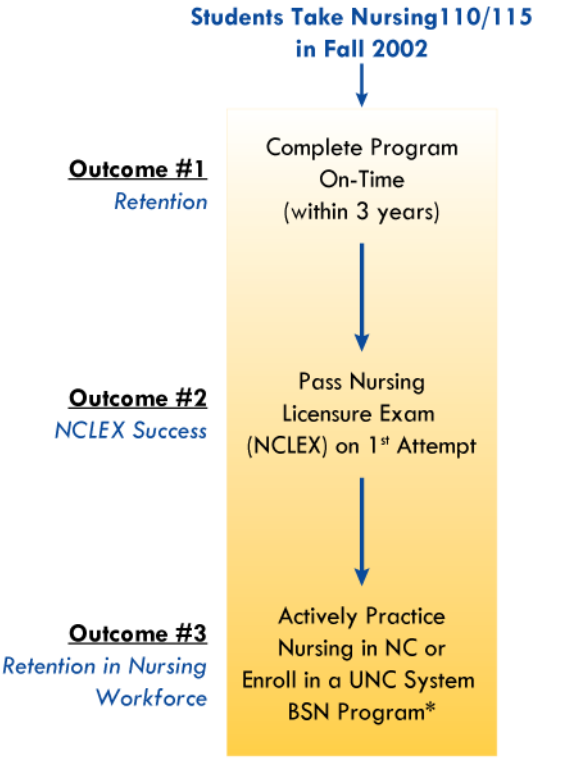
Part III. Study Design, Data and Methods

Study Design

The current study investigates factors associated with "successful" ADN programs in the NCCCS (**Figure 2**). To define success, we rely on criteria outlined in the 2005 NLNAC's *Accreditation Manual with Interpretive Guidelines by Program Type,*[37] from which we draw three measures evaluating student academic achievement:

1. Measurement of graduation rates of students who complete the program within *a defined period of time*;
2. Measurement of performance on licensure examinations of program graduates;
3. Measurement of job placement rates within one year of graduation.

Figure 2. Analysis of Outcomes to Determine "Successful" Nursing Program



*Note: Data were only available for UNC System programs; private programs are not included.

These criteria were chosen because they recognize that the State's investment in nursing education cannot be evaluated by simply examining program completion rates—the ultimate return on investment in these programs is having graduates practice nursing in North Carolina. First, programs must deliver quality education to students and graduate them in a timely fashion. This outcome is assessed in "on-time" graduation. After graduating, nursing students must pass an exam for licensure, the NCLEX-RN. Third, graduates of ADN programs who pass the NCLEX-RN must be retained in the state's nursing workforce, preferably in areas experiencing shortages.

To accommodate program completion by part-time students, and in keeping with NLN guidelines, we define "on-time" graduation as within three years (nine semesters) of enrollment, or roughly 150% of the typical course of study. Students who dropped out, graduated with another degree, or were still enrolled in the nursing program more than three years following enrollment are considered non-completers. NCLEX and workforce participation outcomes are assessed through four years following enrollment, the maximum possible in the most current data available.

Identification of Cohort Tracked in Study

The nontraditional educational path followed by many community college students presents a challenge to studying ADN program performance. Students often take several years to complete prerequisites for associate degree nursing programs. As a result, initial enrollment in the community college with the stated objective of completing an ADN may precede the student's

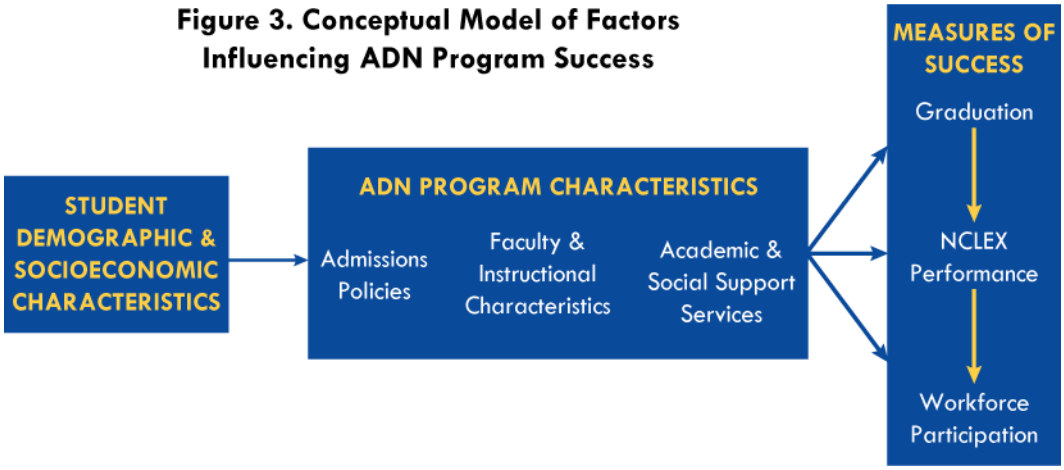
actual start in ADN coursework. This makes cohort identification challenging. To address this challenge, the North Carolina Center for Nursing, together with the NCCCS and a group of diverse stakeholders from the nursing community, developed a strategy that identifies cohorts of students by when they enroll in a gateway associate degree nursing course (NUR 110/115).[38] Using this approach, on-time graduation is measured in a defined, three-year period from when a student enrolls in that gateway course.

This study focuses on a single cohort of 2,237 ADN students who enrolled in the gateway ADN course in the Fall of 2002.[ii, iii] and examines the probability of a student in this cohort completing the ADN program by Summer 2005, and passing the NCLEX and practicing as an RN in North Carolina by December 2006.

Conceptual Model

The conceptual model (**Figure 3)** underlying the study divides the factors contributing to student outcomes into student-level demographic and socioeconomic characteristics and program-level characteristics. Program-level characteristics are further subdivided into three groups, admissions policies, faculty and instructional characteristics, and support services and resources. Student characteristics are measured in Fall 2002, at the time of the students' enrollment. Program characteristics are measured over the period 2002-2005.

Figure 3. Conceptual Model of Factors Influencing ADN Program Success



Data

While the conceptual model incorporates measures suggested by past research to be associated with attrition, it is constrained by the data that were available to undertake the study. A host of student-level factors related to life events, innate ability, past academic preparation and other areas undoubtedly contribute to student success, but could not be measured in this study. As well, there are many program-level factors related to resources, organizational culture, leadership

[ii] Workforce data are available through 2006. Choosing a cohort entering in 2002 allows sufficient time for both full-time and part-time students to complete a program of study, pass NCLEX, and enter the workforce.

[iii] Notably, this method does not exclude students who may have failed the gateway nursing course in 2001 or any previous year and are re-taking the course in Fall 2002. Students enrolling in LPN-RN programs who do not take Nursing 110 or 115 are not included in this study.

and other variables that affect graduation rates and for which data were not available. However, even acknowledging these limitations, this study combined several data sources that have not been analyzed together in the past, bringing together information from the NCCCS data system, NC Board of Nursing (BoN) licensure exam records, and North Carolina Health Professions Data System (HPDS).

In addition, to obtain program-level information on the policies, support services/ resources, and instructional approaches at NCCCS ADN programs, a survey was administered to the 42 program directors in March of 2008. All 42 directors completed the survey. Directors were asked to report on their programs' admissions policies in 2002, and their support services, resources, and instructional approach during 2002-2005. Directors faced significant challenges in obtaining precise information for the survey. Many program directors were new to their positions in the Spring of 2008 and over half the directors who responded to the survey were not in their current position in 2002. Despite these limitations, program directors made use of administrative records and other resources to respond to survey questions. The complete survey is included in **Appendix III**.

Using these quantitative and qualitative data sources, the current study combines 1) measures of student demographic and socioeconomic characteristics with 2) measures of program policies and resources, including faculty and instructional characteristics during 2002-2005 to develop a model of individual student probabilities of graduation, NCLEX success, and participation in the North Carolina RN workforce. Outcomes and data sources are listed in **Table 1**. A complete list of measures and data sources used in the analysis is provided in **Appendix I**.

Table 1. Data Used to Model Outcome Measures

Outcome	Definition	Sample	Data Source*
1. On-Time Graduation	Successful program completion within 3 years of enrollment	2002 NCCCS ADN cohort	NCCCS Data System; Survey Data
2. First Time NCLEX Performance	Passing NCLEX on the first attempt within 4 years of enrollment	On-time graduates	BoN NCLEX Data; Survey Data
3. Retention in North Carolina RN Workforce	In active nursing practice or enrolled in UNC BSN program four years following enrollment	On-time graduates passing NCLEX by December, 2006	North Carolina Health Professions Data System; UNC General Administration

*A full description of data sources is provided in Appendix I

Methods

With the exception of the California studies, past research on the factors associated with student success in ADN programs has used small, limited samples. In addition, much of the existing research relies heavily on simple descriptive and correlational analyses. Because such techniques fail to control for factors other than the two examined, they cannot identify the unique contribution of each factor to on-time graduation *holding all other factors equal*. For example, simple correlational analyses may identify that education, income, race, and student-teacher ratio are each associated with graduation outcomes. However, such results provide little information to policy

makers in cases where white, educated students with higher incomes tend to enroll in programs with lower student-teacher ratios and higher graduation rates.

The current study improves on the designs of the California studies in two important ways. First, because graduating more ADN nurses will contribute to NC's RN supply only if graduates choose to practice in NC, we extend our outcome measures one step beyond previous studies to assess whether, where, and how NCCCS ADN graduates participate in the NC RN workforce. In this way, our analysis of retention of ADN graduates in the North Carolina RN workforce, their geographic location, and their setting of practice, provides the most comprehensive assessment to date of a community college system's contribution to the State's RN workforce.

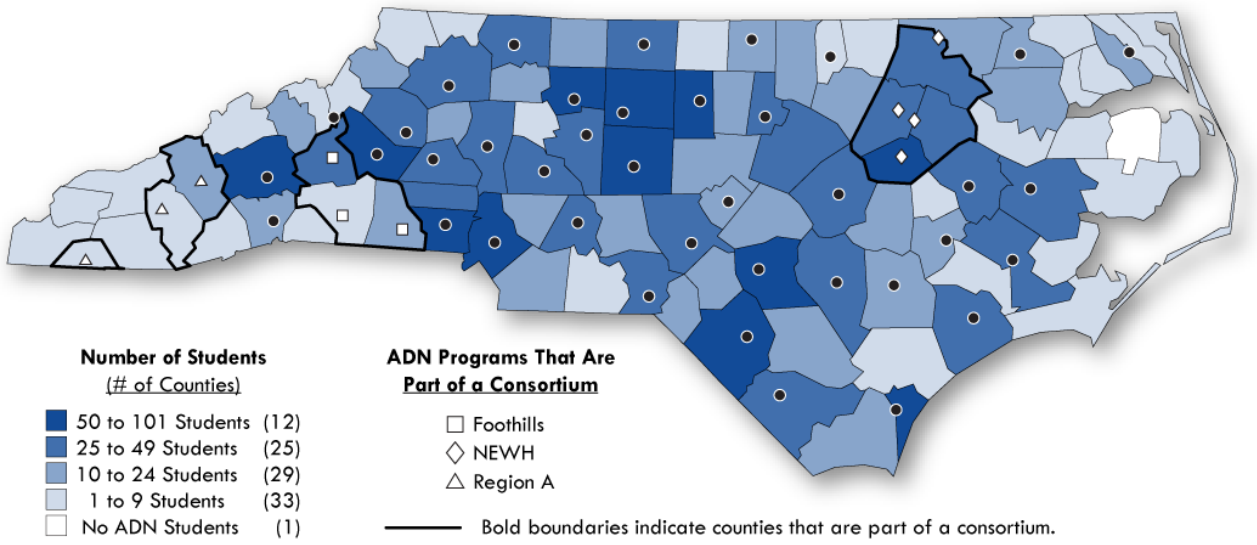
Second, we employ more sophisticated statistical techniques such as fixed and random effects regression analyses to investigate the factors influencing student attrition. This approach allows us to draw conclusions about the importance of student characteristics independent of program characteristics, and vice versa.

Part IV: Characteristics of Students and ADN Programs in Sample

Sample

The following section describes characteristics of the 2002 NCCCS ADN cohort and the programs in which they enrolled. This description helps frame the analyses later in the report that examine how student and program characteristics relate to the study outcomes. The cohort analyzed in this study consisted of 2,237 students enrolled in the gateway nursing course in one of 42 NCCCS programs in Fall of 2002. Data were not available for Wayne Community College, and these ADN students are not included in the sample. Wake Technical Community College did not have any students enrolled in the gateway course in the Fall of 2002 and therefore data from Wake Tech are also excluded from this study. An analysis of the students enrolled in the Wayne Community College and Wake Technical Community College ADN programs revealed that they were not statistically significantly different in age, race, education, socioeconomic background or part-time enrollment status than the sample included in the study. **In simple terms, this means that, while ideally the Wayne and Wake Tech students would have been included in the study, their exclusion does not compromise the validity of the study findings. In addition, the conclusions and recommendations made in this report are as relevant to these two omitted programs as they are to the programs that were included in the analysis.**

Map 1.
County of Residence in 2002 for Students in 2002 NCCCS ADN Cohort
North Carolina

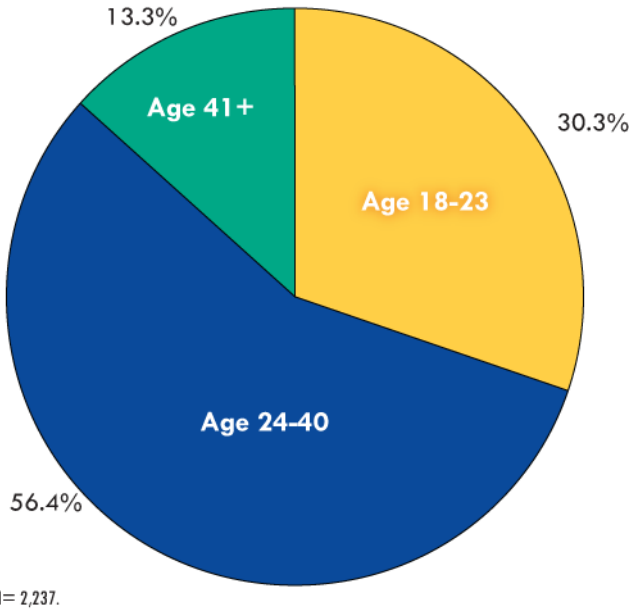


Note: There were 17 out-of-state students enrolled in the 2002 cohort.
"Newly enrolled"" indicates the number of students enrolled in a gateway nursing class (NUR 110/115) in Fall 2002.
Source: North Carolina Health Professions Data System, with data derived from the North Carolina Community College System, 2008.
Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 1 shows the distribution of the 2002 cohort by county of residence when they enrolled in the program. The map shows that students in the 2002 cohort came from nearly every NC county (except Tyrrell) and that the greatest concentrations of students came from the state's most populous counties.

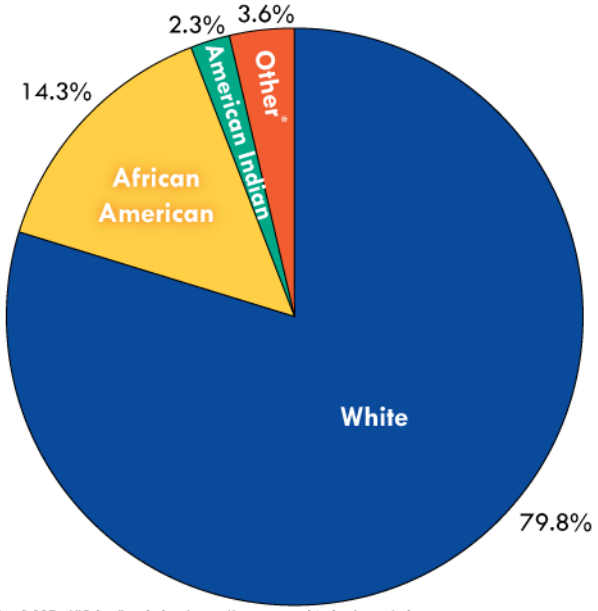
Around one-third of the 2002 cohort was aged 18-23 in 2002, slightly over half was between age 24 and age 40, and the remainder aged 41 and over (**Figure 4**). Nearly 80% of the cohort was white (**Figure 5**). Over 90% of the cohort was female. While most students held a high school diploma at program entry, nearly one in ten had a GED, and slightly less than one in six had more than a high school education (**Figure 6**). Consistent with NCCCS's mission to serve less advantaged North Carolinians, over 40% of the cohort received a Pell Grant in 2002 (**Figure 7**), a federal benefit dependent on demonstration of financial need. Similarly, in 2002, nearly 50% of the cohort lived in a ZIP code in which 10% or more of families had incomes below the Federal Poverty Level, while one in six of the cohort lived in a ZIP code in which one-third or more of the population aged 25 and older had less than a high school education. Most students worked, with slightly over one- quarter reporting full-time employment in 2002, and over 40% part-time employment (**Figure 8**). Students

Figure 4. Age Distribution of Students in the 2002 NCCCS ADN Cohort



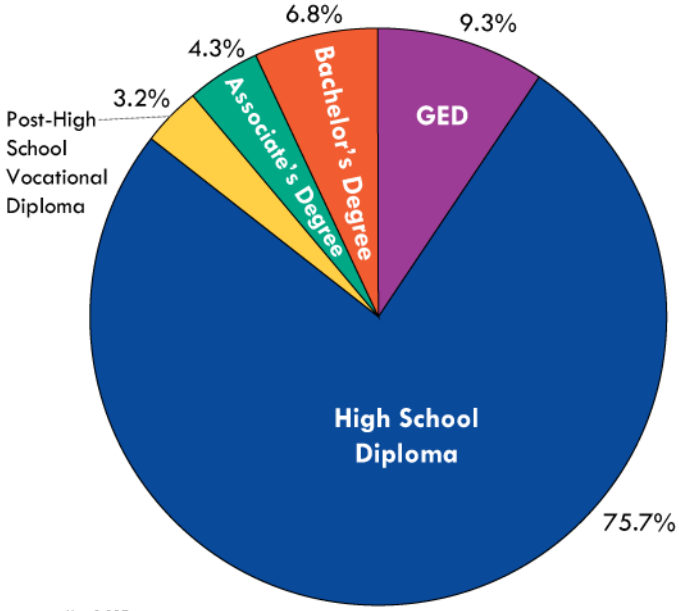
N= 2,237.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Figure 5. Racial/Ethnic Background of Students in the 2002 NCCCS ADN Cohort



N= 2,237. *"Other" includes Asian, Hispanic, and 'other' race/ethnicity.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

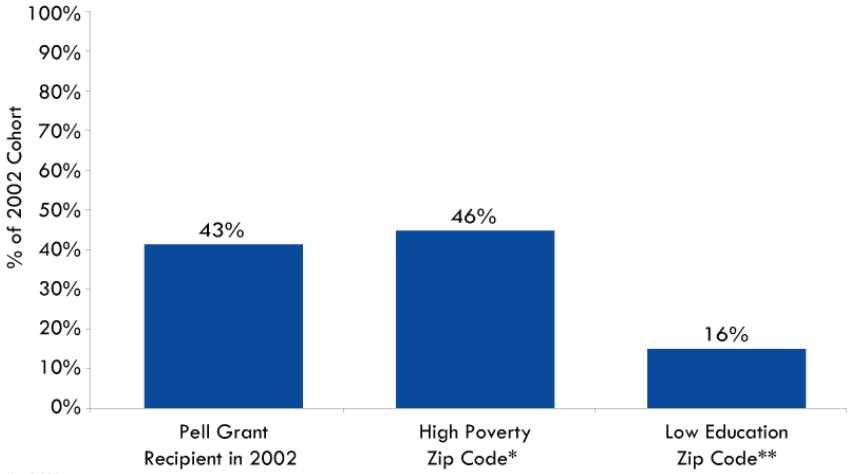
Figure 6. Education Background of Students in the 2002 NCCCS ADN Cohort



N= 2,237.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

enrolling in NCCCS ADN programs in Fall of 2007 were very similar to those in the 2002 cohort except that they were slightly better educated. This similarity is important because it means that the findings from this study are likely representative of more recent cohorts of students entering NCCCS ADN programs.

Figure 7. Percent of Students from Disadvantaged Backgrounds in the 2002 NCCCS ADN Cohort



N= 2,237
*High poverty ZIP codes are those which in 2003 included 10% or more of all families were living below 100% Federal Poverty Level in 2003.
**Low education ZIP codes are those in which one third or more of population aged 25 and older had less than a high school education in 2003.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

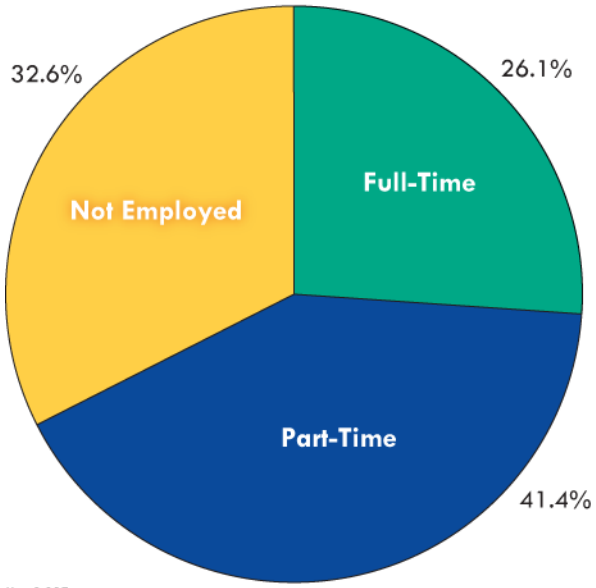
Description of ADN Programs During 2002-2005

Size and Location

The 2,237 students in the 2002 cohort enrolled in 39 individual community college programs and three consortia.[iv] **Map 2** shows the size of the 2002 cohort enrolled in each of the counties that had programs in 2002. Consortia are indicated with dark borders and matching symbols.

Map 2 excludes two programs—Wake Tech Community College and Wayne Community College—that had ADN programs in the Fall 2002. Fifty-four students enrolled in Wake Tech's ADN program in the Summer of 2002 and thus were not captured in the sample which was defined as all students who took Nursing 110 or 115 in Fall 2002. Also excluded are 40 students who enrolled in Wayne CC's ADN program in the Fall of 2002. Data were not available for these students at the time the study was completed.

Figure 8. Employment Status of Students in the 2002 NCCCS ADN Cohort



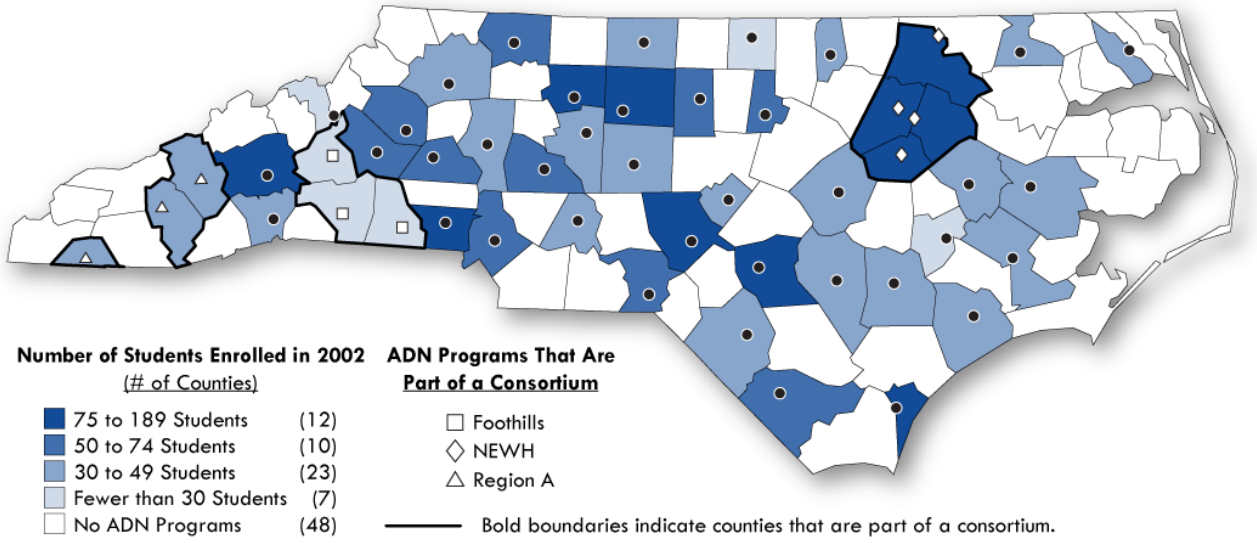
N= 2,237.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

[iv] To extend as many educational opportunities as possible to their student bodies, some NCCCS colleges lacking sufficient resources to offer an associate's degree in nursing on their own arrange to offer the ADN curriculum jointly with other community colleges as 'consortium' programs. The Fall 2002 sample used in this report includes three consortia. These consortia are the Nash-Edgecombe-Wilson-Halifax (NEWH) Nursing Consortium, comprising Nash, Edgecombe, Wilson, and Halifax Community Colleges, the Region A Nursing Consortium, comprising Haywood, Southwestern, and Tri-County Community Colleges, and the Foothills Nursing Consortium, comprising Cleveland and Isothermal Community Colleges, and McDowell Technical Community College.

An analysis of the students enrolled in the Wayne Community College and Wake Technical Community College ADN programs revealed that they were not statistically significantly different in age, race, education, socioeconomic background or part-time enrollment status than the sample included in the study. Furthermore, these two programs did not differ significantly from the 42 included in the analysis in terms of the admission policies, support services/resources, instructional methods or faculty that were in place in 2002-2005. Therefore, omission of these programs does not affect the validity of the study findings.

The size of the 2002 cohort ranged from 19 at Piedmont Community College to 195 at NEWH Nursing Consortium. The average cohort size was 69 students.

Map 2.
Number of Students in Fall 2002 Cohort by County of Enrollment*
North Carolina, 2002



*Note: Counties with consortia programs are shaded based on data for the whole consortium. Data include students enrolled in NUR 110/115 in Fall 2002. Data on students enrolled at Wayne Community College and Wake Technical Community College in 2002 are not included.
Source: North Carolina Health Professions Data System, with data derived from the North Carolina Board of Nursing and the North Carolina Center for Nursing.
Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Admissions Policies

Data on admissions policies, support services and instructional characteristics were obtained through a survey (**Appendix III**). All 42 programs reported using a competitive admissions process in 2002.[v] However, admission policies varied widely across ADN programs in that year. Of the 42 programs, 39 reported at least one admissions requirement in addition to the general college admissions requirements,[vi] and 34 reported ranking applicants on at least one criterion.[vii] Some colleges used ranking criteria to prioritize students for admission where more

[v] Survey item 6 "In Fall 2002, how were applicants selected for admission to the ADN program? (check only one)" Response: " Competitive admission (*students are admitted in order of performance on selected criteria*)"
[vi] Survey item 5 "Many ADN programs require prospective students to meet more stringent admissions requirements compared to the community college's general admissions policy. Please indicate whether your program required a higher standard of performance than the general community college admissions criteria in each of the following areas in the Fall of 2002. (check all that apply)"
[vii] Survey item 7 "Below is a list of criteria that could be used to rank students in a competitive admissions process. Please rate these criteria by their importance to admissions decisions in Fall 2002, with 1 being minimally important, 2 being moderately important, 3 being very important, and 0 being not considered. If your program did not use a competitive process, please enter 0 for all categories."

applicants met general requirements than the program had open slots. Twenty-nine colleges employed an admission counselor specifically for health sciences programs.[viii]

Directors rated ranking criteria as ranging from minimally to very important in making admissions decisions.[ix] Admissions policy information is summarized in **Table 2**. English and math competency were the most common requirements for admission, present in 34 and 36 programs, respectively. Only one program reported imposing no additional requirements. The most common criterion used to rank applicants meeting minimum requirements was performance on one of several standardized tests. Twenty-five programs rated test scores as a "very important" ranking criterion, while 11 did not use test scores to rank qualified applicants. Past college course work, college GPA, and high school course work were also common ranking criteria.

Table 2. Admissions Policies of NCCCS ADN Programs in 2002

Panel A.
Programs Reporting Requirement Above General College Admission Requirements

Requirement	Number of Programs
No requirements	1
English Competency	34
Math Competency	36
Science Competency	27
High School GPA	15
High School Course work	26
Health Professions Work Experience	14
Other Requirement	13

Panel B.
Programs Rating Ranking Criteria as "Very Important"

Criterion		Number of Programs
High School	GPA	11
	Courses Taken	18
College	GPA	18
	Courses Taken	23
Standardized Test Performance		25
Tests used:*	NET/HOBET	9
	TEAS	5
	PSBH	6
	ACT	8
	Other standardized test	2
Residence in college service area		4
Health professions work experience		5

*Some programs reported using more than one test to rank applicants for admission. North Carolina Health Professions Data System with data from survey of NCCCS ADN program directors, March and April 2008.

Support Services and Resources

Academic support services were common in NCCCS ADN programs in 2002. Only one program did not provide any form of tutoring or faculty support. Faculty lead study groups (not including those for NCLEX review) were offered in 19 programs, and faculty or staff tutoring for nursing courses were available in 28 programs (**Table 3**). Tutoring was less commonly offered for non-nursing courses and was available in 16 programs. While nearly all programs offered a dedicated skills lab, only about half were able to staff that lab during 2002-2005.

Counseling, as well as subsidies or other support for childcare and for transportation to and from campuses were also common, but not universal to NCCCS ADN programs during 2002-2005. Only six programs employed retention specialists during 2002-2005, and only two did so specifically for their ADN programs.

Instructional Characteristics

Instruction occurs in three settings in NCCCS ADN programs. Students receive traditional classroom instruction in a lecture setting. Hands on instruction in the clinical techniques of nursing

[viii] Survey item 22 "Was there a dedicated Admissions Counselor for Nursing and/or Health Sciences Programs?"
[ix] In subsequent analyses reported in this report, only those ranking criteria rated as "very important" were considered. Non-responses and all other ratings of ranking criteria were treated as "not used."

as well as in critical thinking and problem solving occur in the "lab" setting. Finally, ADN students provide clinical care in real-life practice settings in the "clinic" component of ADN programs.

Table 3. Support Services and Resources Offered in NCCCS ADN Programs in 2002

Services/ Resources	Number of Programs
Academic Support	
Faculty Lead Study Group	19
Faculty or Staff Tutoring for Nursing Courses	28
Faculty or Staff Tutoring for Other Courses	16
Learning Resources	
Dedicated Skills Lab	39
With Staffing	20
Computer Lab w/ Nursing Software	38
Social/ Financial Support	
Counseling	38
Peer Mentoring	18
Childcare Services, Subsidies, or Cash Assistance	26
Transportation Services, Subsidies, or Cash Assistance	9
Emergency Fund	31
Retention Specialist	6

North Carolina Health Professions Data System with data from survey of NCCCS ADN program directors, March and April 2008.

The size of average class sections varied substantially across NCCCS ADN programs.[x] Directors were asked to estimate the average size of class sections in each of the three instructional settings during the 2002-2005 period. Average sizes for lecture, lab, and clinic were 40, 19, and 8 respectively (**Table 4**). Clinic class size reflects the average number of students per instructor. The NC BoN requires a minimum of one instructor per ten students.

The average 8:1 ratio reported in the survey for 2002-2005 shows NCCCS ADN programs have a lower (i.e. better) ratio than the BoN requirements in this area.

Team teaching occurred in all three instructional setting in NCCCS ADN programs, and was most common in the lab and least common in the clinic.[xi] On the survey completed by program administrators, team teaching was defined as "two or more instructors in the same physical location with students at the same time for entire course." The team approach reduces faculty to student ratios while economizing on classroom resources and potentially providing a more dynamic classroom environment. According to director's responses, during 2002-2005 most or all lectures were team taught in 18 programs. This was true of labs in 26 programs, and clinic in 3 programs.

All programs employed some master's degree faculty in all three educational settings.[xii] Fourteen programs used exclusively master's degree faculty to teach lectures and another six programs used exclusively master's degree faculty in lab settings.

Table 4. Instructional Characteristics of NCCCS ADN Programs, 2002-2005

Setting	Average Number of ***Students*** in a Section, 2002-2005 (n=41)*	Number of ***Programs*** in which Most of All Sections are Team Taught (n=42)	Number of ***Programs*** in which All Sections Taught by Faculty with Master's Degree (n=39-40)**
Lecture	40	18	14
Lab	19	26	6
Clinical	8	3	0

*Average lecture size excludes one program that reported a lecture size of one; **Data provided by 39 programs for lecture and 40 programs for lab and clinic settings; North Carolina Health Professions Data System with data from survey of NCCCS ADN program directors, March and April 2008.

[x] Class sections were defined in the survey as a group of students receiving instruction in the same place at the same time.
[xi] Survey item 31 "Please indicate whether none, some, most, or all of the following were team taught (*two or more instructors in same physical location with students at same time for entire course*)."
[xii] Survey item 32 "Please indicate whether none, some, most, or all of the following were taught by faculty with a master's degree or beyond."

On average, NCCCS ADN programs offered clinic instruction in nine sites during 2002-2005, with about a quarter providing instruction in fewer than five sites, and another quarter doing so in more than ten.[xiii] In most cases, ADN programs provided their own clinic instructors, meaning students shadowed nurses employed by the community college rather than by the clinic site.[xiv]

During 2002-2005, most programs relied on a mix of college employees and outside personnel to provide clinic instruction.[xv] Five programs reported using only college employees as clinic instructors. Five others did not use any college employees. One program did not report data on the employment status of clinic instructors. System-wide, 21 programs required clinic instructors to complete an orientation before taking on students.[xvi]

Faculty

Data on faculty were obtained from the NCCCS data system. The goal of describing faculty characteristics in this study was to establish a picture of the faculty that the 2002 ADN cohort encountered as they moved through their programs.[xvii]

The average age of faculty teaching in NCCCS ADN programs during 2002-2005 ranged from 41 at Coastal Carolina CC to 52 at Durham TCC, and averaged 47 years across programs (**Table 5**). Faculty longevity at their current program averaged 10 years across programs and ranged from four years at Foothills Nursing Consortium to 18 years at Sandhills CC. On average, over 2002-2005, 67% of full-time faculty teaching in NCCCS ADN programs had master's degrees but the proportion of teaching faculty who were master's prepared varied considerably between programs. A number of programs reported that 100% of their teaching faculty had master's degrees while one program reported that just 12% did.

Table 5. Characteristics of Faculty* in NCCCS ADN Programs, 2002-2005

	System Average	Minimum Program Average	Maximum Program Average
All ADN Teaching Faculty			
Years of Age	47	41	52
Years of Experience at Current Program	10	4	18
Full-Time ADN Teaching Faculty			
Master's Degree Educated (%)	67%	12%	100%
Monthly Salary ($)	$4,526	$3,837	$5,351

*ADN faculty defined as employees whose Area of Instruction is Associate Degree Nursing and whose Area of Responsibility is Teaching. See footnote xvii for construction of average values.
North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

[xiii] Survey item 35 "Through how many clinical education sites did your college offer clinical instruction?"
[xiv] Survey item 40 "Please indicate whether none, some, most, or all of the clinical instructors working with your program over the 2002-2005 period"
[xv] Survey item 40 "Please indicate whether none, some, most, or all of the clinical instructors working with your program over the 2002-2005 period: Were full-time faculty at your institution; Were part-time faculty at your institution"
[xvi] Survey item 42 "Were clinical instructors required to attend a college-sponsored orientation to clinical instruction before accepting rotations?"
[xvii] Faculty data are reported by each college at the beginning of each academic year. Faculty data were obtained for the Fall of 2002, 2003, and 2004. To summarize faculty characteristics for the 2002-2005 period, we first constructed averages within individual years, and then averaged these across the three study years, weighting each year equally.

Faculty turnover during Fall 2002- Fall 2004 averaged 52% (**Table 6**), ranging from zero at Wilkes CC to 156% at Cape Fear CC. Turnover was defined as follows:

$$\frac{\textit{Faculty Departing } 2002-2004}{(\textit{Faculty in } 2004 + \textit{Faculty Departing } 2002-2004 - \textit{Faculty Hired } 2002-2004)}$$

In ADN program faculties system-wide, there were 291 departures between 2002 and 2004, and 350 entries. Around 35% of both departing and incoming faculty had master's degrees.

Additional data on faculty were obtained from the survey of ADN program directors in 2008. Directors were asked to provide information on faculty characteristics during 2002-2005. In all but one program at least some faculty taught in both clinic and lecture settings.[xviii] This was true of most or all faculty in 28 programs, and of all faculty in 13. Faculty involvement in both clinic and lecture settings was unrelated to either program or class section sizes. At least some faculty were in active nursing practice in 36 programs.[xix]

Table 6. Faculty Turnover in NCCCS ADN Programs, 2002-2005

	Average Turnover in a Program	Minimum Turnover in a Program	Maximum Turnover in a Program
Turnover 2002-2005	52%	0%	156%

*ADN faculty defined as employees whose Area of Instruction is Associate Degree Nursing and whose Area of Responsibility is Teaching. See footnote x for construction of average values.
North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

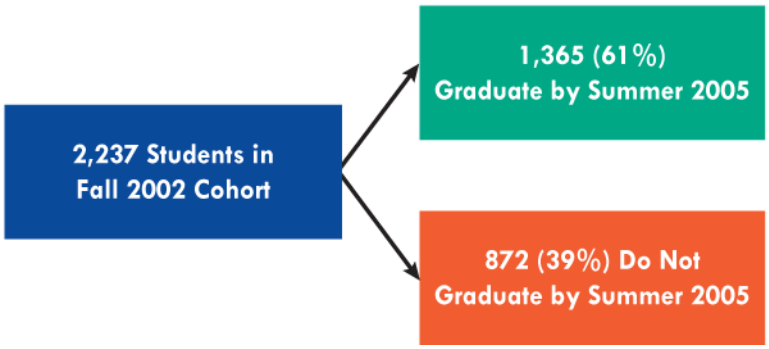
[xviii] Survey item 34 "Please indicate whether none, some, most, or all of your faculty (full-time and part-time) taught in BOTH clinical and lecture settings."
[xix] Survey item 46 "Please indicate whether none, some, most, or all of full-time faculty were employed in a clinical setting outside of the college?"

Part V: Outcome #1: Probability of On-Time Graduation

Student Demographic and Socioeconomic Characteristics

Figure 9 shows 61% of the Fall 2002 cohort graduated within 3 years (i.e. by summer 2005) while 39% did not.

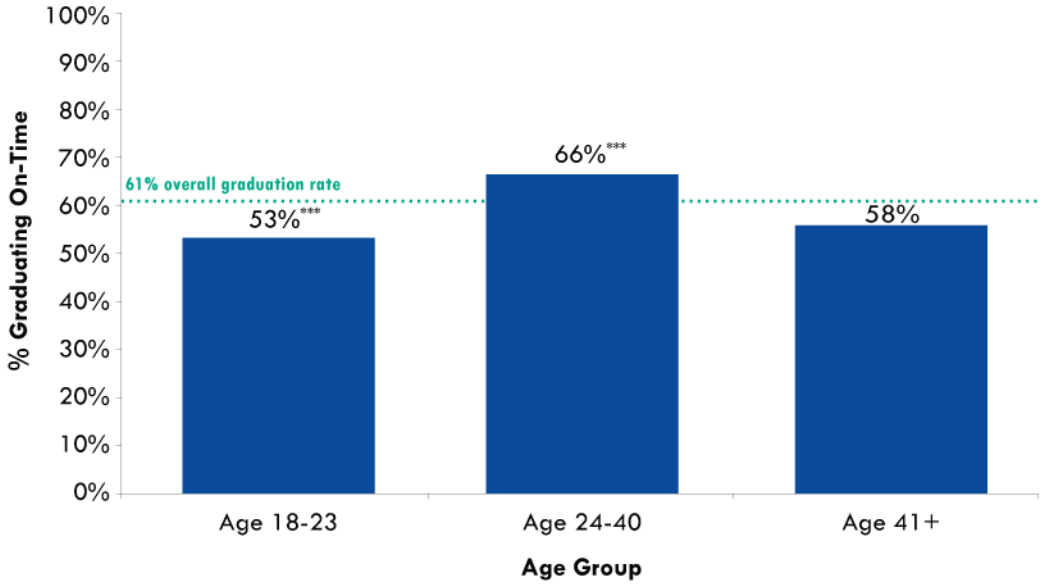
Figure 9.
Outcome 1: Percent of ADN Students Graduating On-Time



Student demographic and socioeconomic characteristics show marked differences among the on-time graduates as compared to those not graduating by Summer, 2005. Students aged 18-23 and those over 41 years of age (**Figure 10**), African-American students and students from other (e.g. Hispanic, Asian and other) racial/ethnic backgrounds (**Figure 11**), as well as students with high school equivalence degrees were less likely to graduate (**Figure 12**). **Figure 13** shows that students from ZIP codes in which 1/3 or more of the population had less than a high school education or in which 10% or more of families lived below the federal poverty level had lower than average graduation rates. Students receiving Pell Grants were also less likely to graduate. Ninety-eight students came from ZIP codes in which more than 10% of the population was in active military duty and while students were slightly less likely to graduate, the difference was not statistically significant.

About one in every four students was employed full-time when s/he enrolled in the ADN program and these students were more likely to graduate than students who were employed part-time or were unemployed (**Figure 14**).

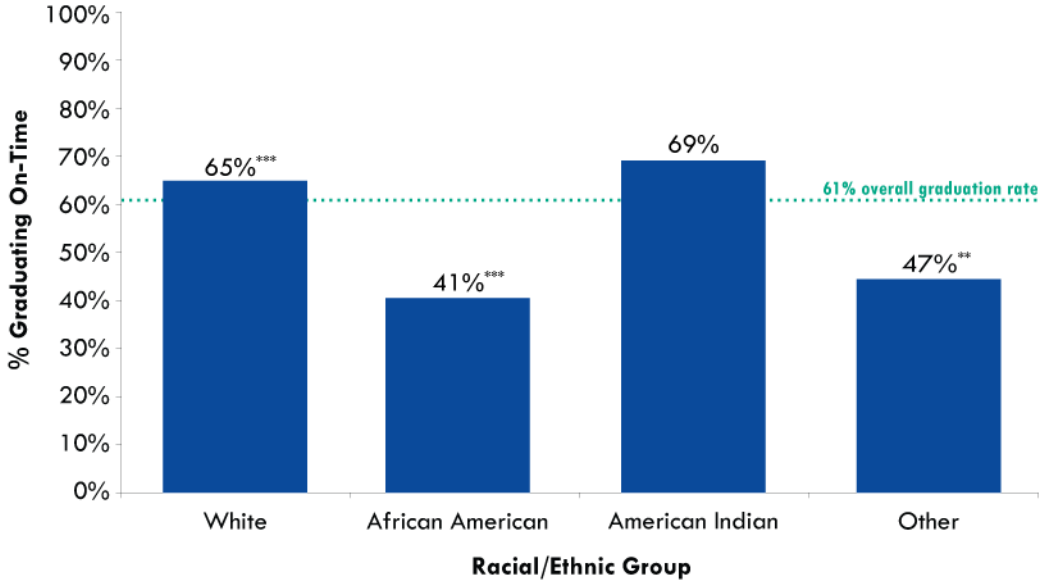
Figure 10. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Age Group



N= 2,237; ***p<0.001
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

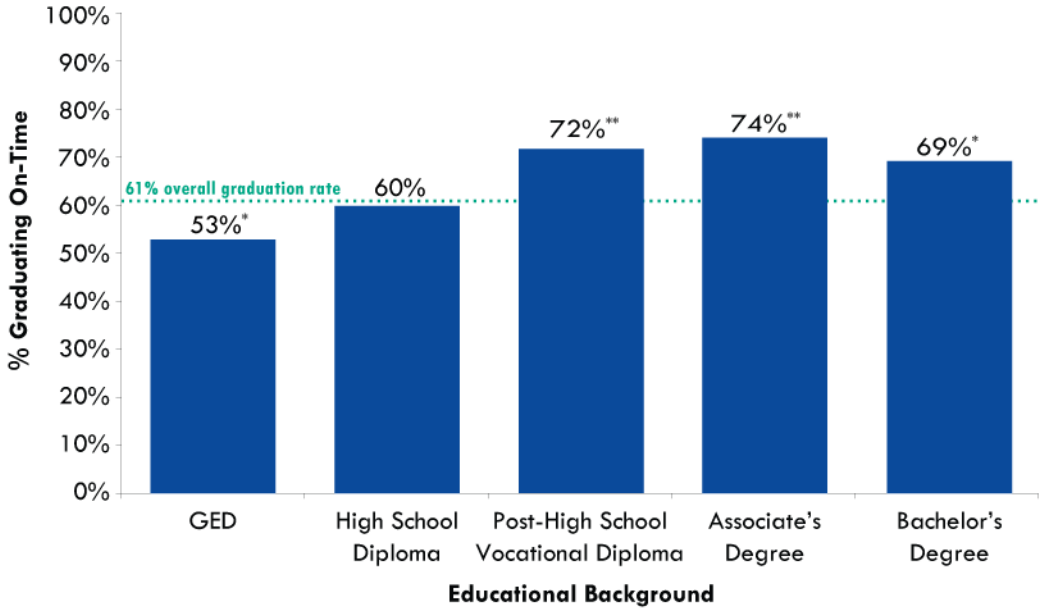
Many of the student and program characteristics examined in this study are correlated with one another. This makes interpreting the results described above difficult. For example, young (aged 18-23) students have sharply different graduation rates from those slightly older (aged 24-40). However, the higher graduation rate observed for the older students may reflect differences in education or wealth, or in the types of programs in which they tend to enroll. Using a statistical technique known as regression,[xx] we are able to account for these other factors and make better assessments of the relationships between student characteristics and graduation outcomes.

Figure 11. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Racial/Ethnic Group



N= 2,237; **p<0.01, ***p<0.001. "Other" includes Asian, Hispanic, and 'other' race/ethnicity.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

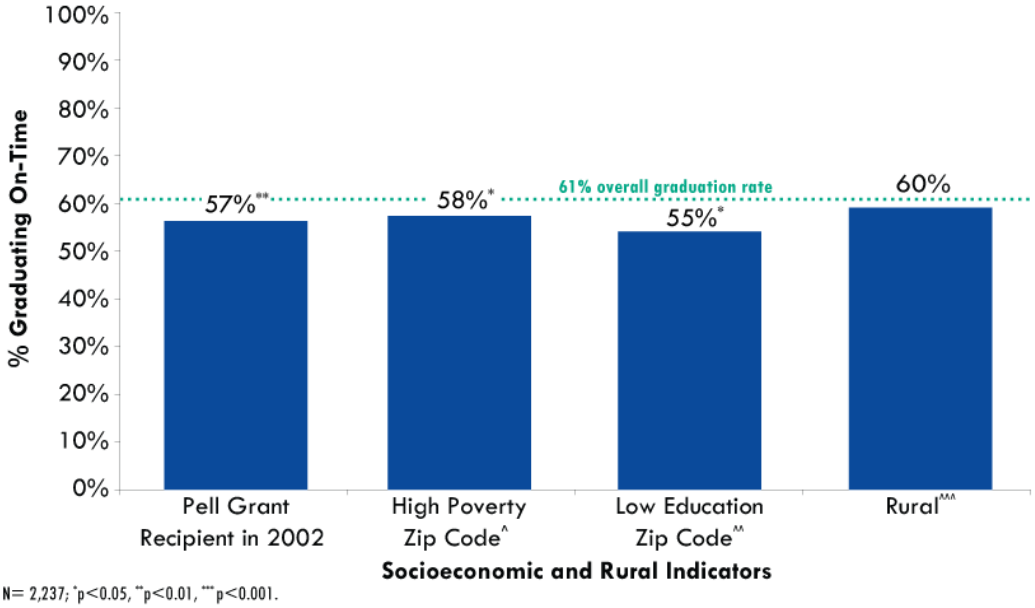
Figure 12. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Educational Background



N= 2,237; *p<0.05, **p<0.01.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

[xx] A fixed effects linear probability model was used in this analysis. The dependent variable =1 if the student graduated.

Figure 13. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Socioeconomic and Rural Indicators

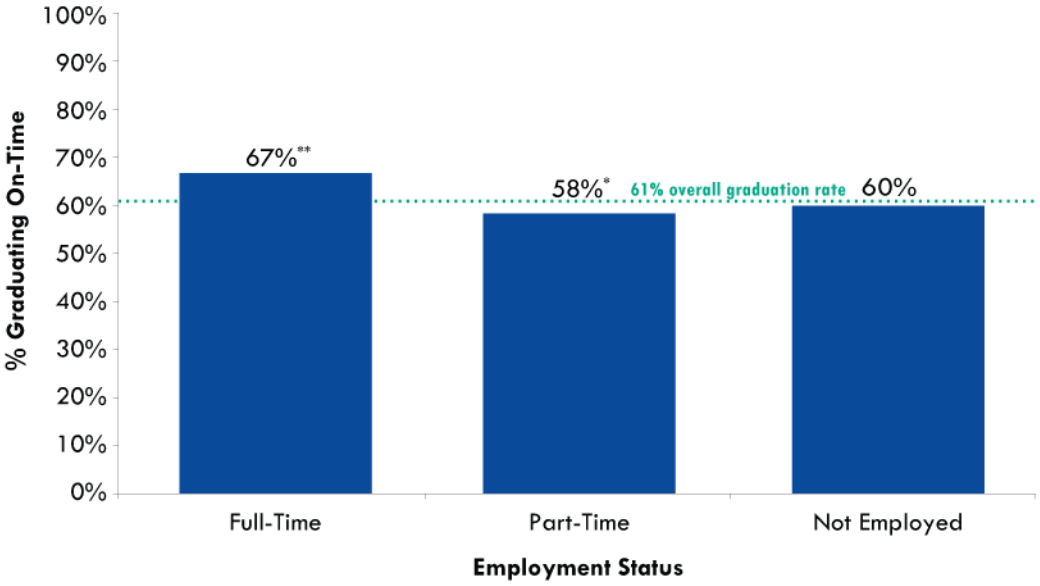


N= 2,237; *p<0.05, **p<0.01, ***p<0.001.

^High poverty ZIP codes are those which included 10% or more of all families living below the Federal Poverty Level in 2003; ^^Low education ZIP codes are those in which one third or more of population aged 25 and older had less than a high school education in 2003; ^^^As defined by the North Carolina Rural Center.

Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Figure 14. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Employment Status in 2002



N= 2,237; *p<0.05 **p<0.01.

Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Table 7 shows that after controlling for differences in program characteristics and all other student-level factors included in the analysis, young age and being from a minority race/ethnicity are the largest risk factors for not completing an ADN program within 3 years. Due to the adjustment process described in the previous paragraph, regression produces slightly different

results than the simple comparisons displayed in Figures 11-15. Students younger than 23 years of age are 14 percentage points less likely to graduate than are students aged 24-40. Minority students are 20 percentage points less likely to graduate than white students. In addition, having a GED as compared to a high school diploma reduces the probability of graduating within three years by more than eight percentage points. Complete regression results are included in **Appendix IV**.

Table 7. Percentage Point Change in Probability of Graduation by Student Characteristics[xxi]

Age 18-23	-14.14	**
Age 41+	-8.86	*
African American	-19.96	**
Other Race/Ethnicity	-18.57	*
GED	-8.84	*
Pell Grant Recipient	-4.14	*
Associate's Degree	8.52	*

*p<0.05, **p<0.001

North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

These results paint a picture of the "at-risk student" in NCCCS ADN programs. The at-risk student is young, non-white, has a GED, and receives a Pell Grant. It is important to note that the percentage point changes in probability of graduation associated with each risk factor are estimated after accounting for all other student risk characteristics and all program characteristics included in the model. In other words, the youngest students in the 2002 ADN cohort are, on average, 14% points less likely to graduate than are students aged 24-40 regardless of the students' other characteristics and regardless of which ADN program they enrolled in.

Academic Performance and Program Transfer

Once in the ADN program, academic performance in the gateway nursing course (Nursing 110 or 115) is a strong predictor of graduation (**Figure 15**). About one-fifth of students in the 2002 cohort earned less than a C in the gateway nursing course, and less than one in six of these graduated.xxii About one-third of the cohort earned a C in the gateway course, and just over half of this group graduated on-time. Students earning Bs or As in the gateway course were much more likely to graduate.

Nearly one out of every 10 students switched from one community college ADN program to another between 2002 and 2005. Switching programs dramatically reduced the probability that a student would graduate—fewer than one in five students (18%) who switched programs graduated (**Figure 16**).

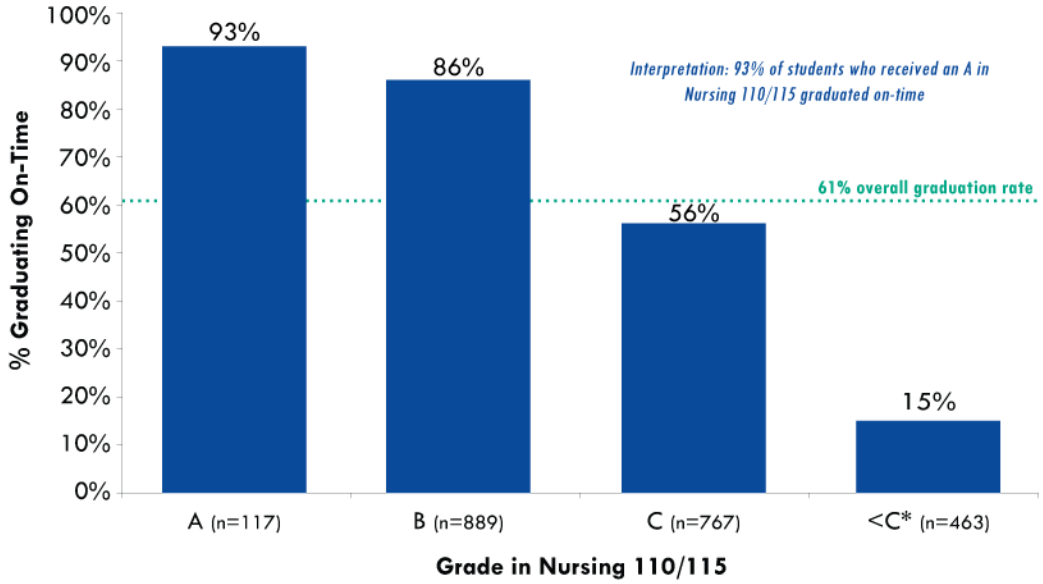
Assessing Relationships Between Program Characteristics and On-Time Graduation: Risk Adjusted Graduation Rates

On-time graduation rates among students in the 2002 NCCCS ADN cohort ranged from 24% at Central Carolina CC to 85% at Asheville-Buncombe TCC. Programs that are successful in graduating students can provide a "best practice" model for programs with lower graduation rates. However, determining which programs should serve as best practice models requires more than a simple examination of graduation rates. The strong relationships between categories of age, race/ethnicity, and prior educational attainment shown above makes it important to identify

[xxi] Linear probability regression of graduation status (graduation=1 for students completing degree by Summer, 2005) on student characteristics with program fixed effects for 2,237 students in 42 colleges. Results are adjusted for gender, employment status, enrollment status, poverty, military presence, and rurality of ZIP code of residence, and all program characteristics. Comparison case is a female student aged 24-40, white, with a high school diploma, not-employed, and enrolled full time.

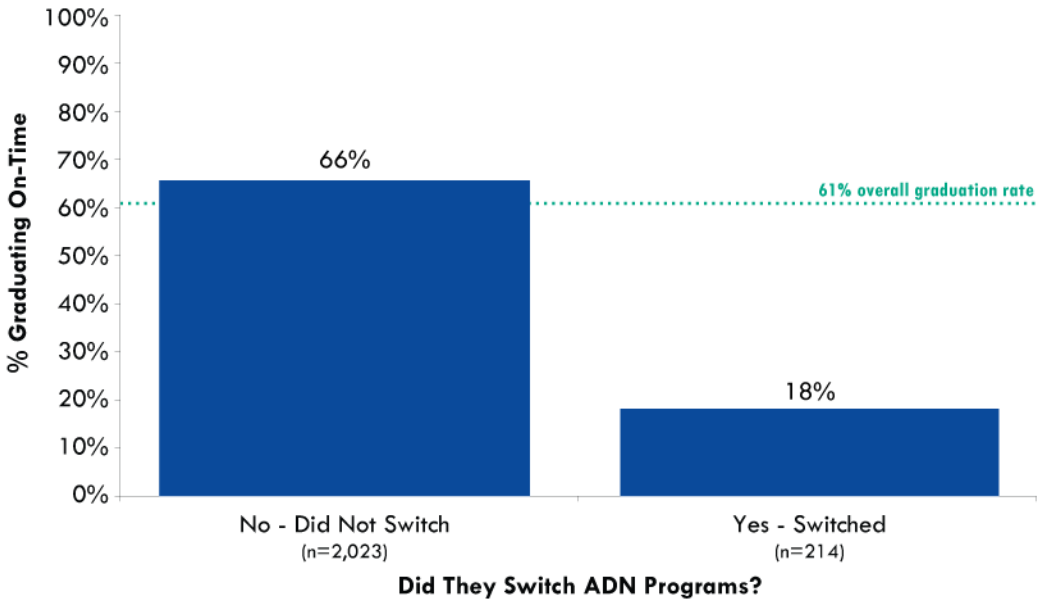
[xxii] Although students in the Fall 2002 cohort were allowed to continue the program even if they obtained lower than a C in Nursing 110 or 115, current students must obtain a C or higher to continue enrollment.

Figure 15. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time by Grade in Nursing 110/115



N= 2,237; all differences are statistically significant at p<0.001. *Includes students who withdrew from the course or earned an incomplete.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Figure 16. Percent of the 2002 NCCCS ADN Cohort Graduating On-Time for Students Who Did and Did Not Switch Programs



N= 2,237; difference is statistically significant at p<0.001.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

highly successful programs. It is important to distinguish programs offering a good chance of on-time graduation to all students from those where graduation rates generally follow expected patterns according to the characteristics of the student population.

In the 2002 cohort, some NCCCS ADN programs had many more students "at risk" than did others. Just under half of the cohort received a Pell Grant in 2002. In some programs this proportion was as high as 76%, while in others fewer than 20% of students received a Pell Grant.

Younger students (age 18-23) accounted for around one-sixth of the cohort in some colleges and up to one-half in others. In three programs, the 2002 cohort included no African American students while in others as much as one-half of students were African American. Student bodies showed similar patterns in their educational backgrounds. Demographic and socioeconomic characteristics of the 2002 cohort for each of the 42 ADN programs are listed in **Appendix IV (A4.2).**

Program-level factors such as faculty education or the availability of resources must be evaluated in a way that takes into account student body characteristics. If one program has a large proportion of high risk students—non-white, young, poor, with a GED, etc., yet posts a graduation rate above the system average, that program should be considered successful. In the same way, a program that has mostly high school educated, white, non-poor students in their 20s and 30s, but still graduates only an average share of its students is performing below expectations.

When health care researchers compare hospital mortality rates, they take into account the patient population. Expectations are different for doctors or hospitals treating young versus old or chronically ill versus generally healthy populations. Researchers evaluate how well providers deliver medical care by making predictions about the mortality rate for a certain type of patient at each provider, and then comparing these predicted rates to the rates they actually observe. In the current study, this comparison takes the form of a ratio: actual graduation rate over predicted graduation rate. Ratios greater than one indicate better than expected performance. Ratios below one indicate the opposite.

Using a statistical technique known as "fixed effects," the regression model above provides the predicted probability of graduation for each student according to their demographic and socioeconomic characteristics, independent of which program she or he attends. The average of these probabilities across students in a program is the predicted graduation rate based only on student characteristics. Dividing the actual graduation rate by the predicted graduation rate to calculate the ratio results in a risk adjusted graduation rate, or "RAGR." Programs with RAGRs greater than one are performing better than expected given their students' demographic and socioeconomic characteristics. The reverse is true for programs with RAGRs below one. **Table 8** shows the RAGRs for the 42 programs in which students were enrolled in the gateway course in the Fall 2002. The best performing ADN program has an RAGR of 1.36 and the worst performing program has an RAGR of 0.4. Programs that are grouped around 1 have a predicted graduation rate that is near the actual rate.

Student Characteristics by Risk Adjusted Graduation Rates

The wide distribution of RAGRs across programs shown in **Table 8** raises the question of whether there are differences in program-level factors that explain why some ADN programs are able, given a higher risk student body, to have a relatively high graduation rate. Table 8 includes each program's predicted graduation rate based only on student body characteristics, their actual graduation rate, and the risk adjusted rate derived from these two measures. In most cases, programs predicted to show low graduation rates did so. However, a few notable exceptions exist. Vance-Granville, Mitchell, Coastal Carolina, and Craven CCs, which all have predicted graduation rates of below 60%, all achieve on-time graduation rates above 70%. Davidson County CC and Asheville-Buncombe TCC had relatively more advantaged students in their 2002 cohorts, but still outperformed expectations. By contrast, Guilford TCC & College of the Albemarle both have predicted graduation rates above the system average—more advantaged students, but actual graduation rates well below that average. Central Carolina, James Sprunt, and Rowan-Cabarrus CCs have average student bodies, but below average on-time graduation rates in the 2002 cohort.

Table 8. Predicted, Actual, and Risk Adjusted (Actual/Predicted) Graduation Rates Based on Students in the 2002 ADN Cohort

College Name	Predicted Graduation Rate	Actual On-Time Graduation Rate	Risk Adjusted Graduation Rate (RAGR)
Alamance CC	59.81	57.81	0.97
Asheville-Buncombe TCC	66.20	85.37	1.29
Beaufort County CC	61.69	75.00	1.22
Blue Ridge CC	61.60	70.00	1.14
Caldwell CC/TI	62.49	72.73	1.16
Cape Fear CC	65.80	77.63	1.18
Catawba Valley CC	63.54	61.90	0.97
Central Carolina CC	60.18	23.91	0.40
Central Piedmont CC	55.53	40.00	0.72
Coastal Carolina CC	58.82	80.00	1.36
College Of The Albemarle	66.66	50.00	0.75
Craven CC	59.88	73.17	1.22
Davidson County	65.23	85.11	1.30
Durham TCC	60.81	62.00	1.02
Fayetteville TCC	59.75	62.92	1.05
Foothills Nursing Consortium	63.33	75.00	1.18
Forsyth TCC	60.64	68.35	1.13
Gaston College	64.39	62.65	0.97
Guilford TCC	63.34	53.01	0.84
James Sprunt CC	59.44	39.02	0.66
Johnston CC	62.37	70.83	1.14
Lenoir CC	58.42	42.86	0.73
Mayland CC	61.65	79.31	1.29
Mitchell CC	58.12	72.73	1.25
NEWH Nursing Consortium	57.85	38.46	0.66
Piedmont CC	64.63	57.89	0.90
Pitt CC	61.78	63.04	1.02
Randolph CC	62.05	62.79	1.01
Region A Nursing Consortium	62.44	69.57	1.11
Richmond CC	62.01	68.52	1.10
Roanoke-Chowan CC	52.78	51.52	0.98
Robeson CC	64.56	76.19	1.18
Rockingham CC	59.05	66.67	1.13
Rowan-Cabarrus CC	60.64	47.54	0.78
Sampson CC	55.93	40.48	0.72
Sandhills CC	59.23	53.25	0.90
Southeastern CC	59.87	58.62	0.98
Stanly CC	59.48	56.52	0.95
Surry CC	63.06	72.97	1.16
Vance-Granville CC	57.78	73.68	1.28
Western Piedmont CC	59.29	59.09	1.00
Wilkes CC	61.92	58.97	0.95

North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007. ADN programs at Wake TCC and Wayne CC were not included in this study. Wake Technical Community College did not have any students enrolled in the gateway course in the Fall of 2002. Data were not available for the Fall 2002 cohort at Wayne CC.

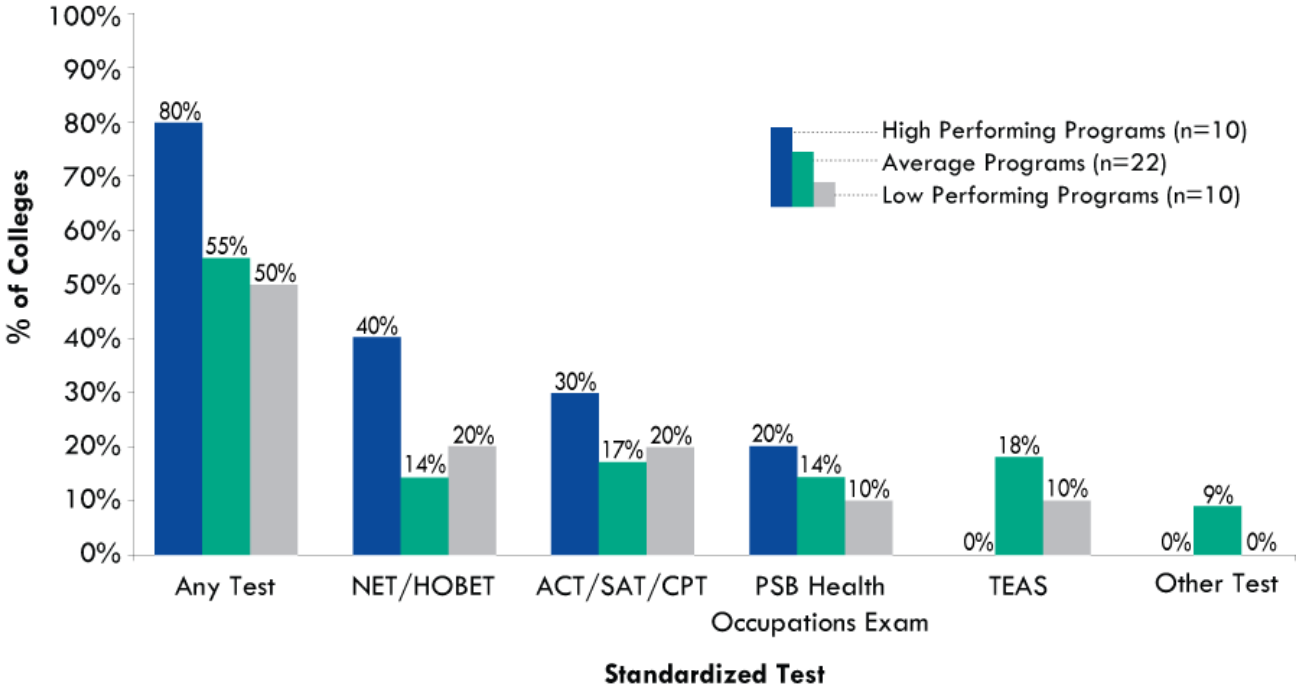
Program Characteristics by Risk Adjusted Graduation Rates

In an attempt to identify which program-level factors might be related to graduation rates, programs were grouped together according to their RAGR. ADN programs with the ten highest RAGRs were grouped together as the high performing group. Those with the ten lowest RAGRs are the low performing group. The 22 programs in the middle provide an "average" comparison.[xxiii] To examine patterns in the characteristics of high versus low performing programs, admissions policies, support services and resources, and instructional and faculty characteristics were compared across categories of risk adjusted performance.

Admissions Policies. High performing programs were twice as likely to rank applicants based on standardized test scores relative to low performing programs (**Figure 17**). The NET/HOBET in particular was more commonly used by high performing programs. Programs in the top and bottom performance categories shared a number of admissions policies, including requirements for English and math competency.

High performing programs were also more likely to rank applicants on their high school course work than were low performing programs (**Figure 18**). Science requirements were slightly more common to high performing programs. High performing programs were somewhat less likely to require health professions work experience and to rank applicants based on college course work, college GPA, or health professions work experience.[xxiv]

Figure 17. Use of Standardized Test Scores to Rank Applicants in 2002 by Risk Adjusted Graduation Rate (RAGR) Category

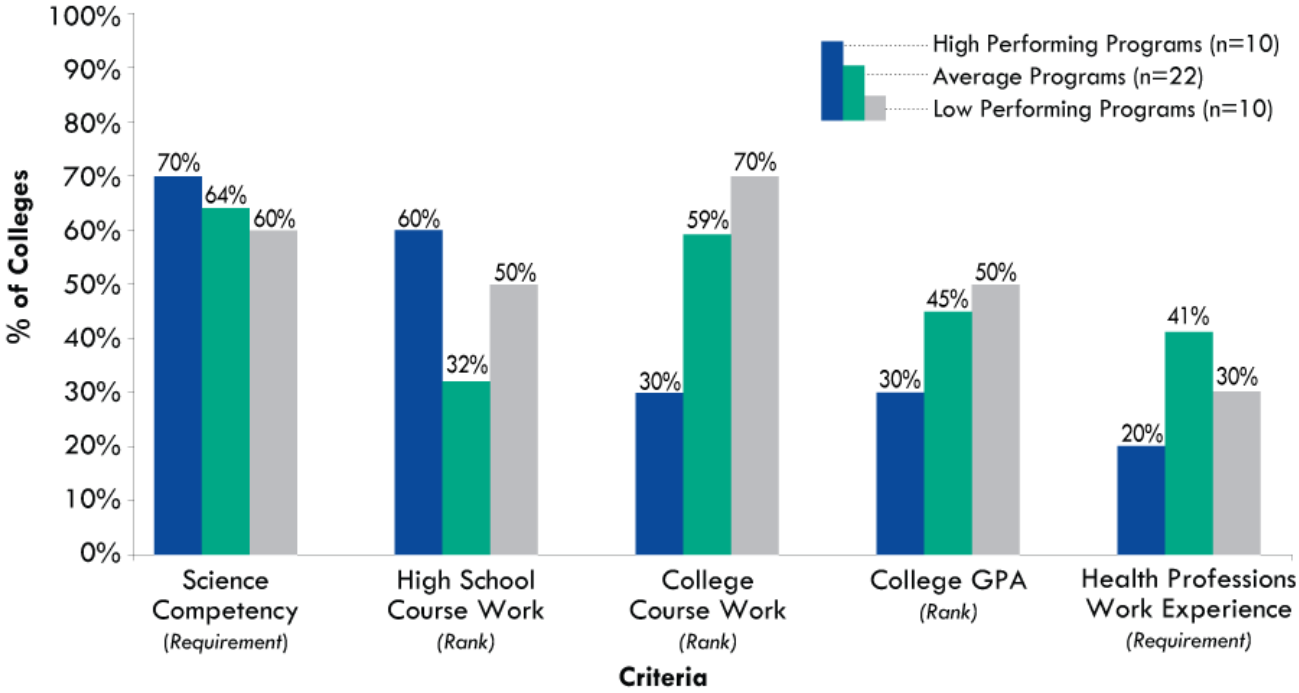


Source: North Carolina Health Professions Data System with data from a survey of 42 NCCCS ADN program directors, March and April 2008 (item #7).

[xxiii] Differences in the distribution of program characteristics across categories should be interpreted with caution. The high and low performance groups comprise only 10 colleges each, and the average performance group 22 colleges.

[xxiv] Data from survey items 5 "Many ADN programs require prospective students to meet more stringent admissions requirements compared to the community college's general admissions policy. Please indicate whether your program required a higher standard of performance than the general community college admissions criteria in each of the following areas in the Fall of 2002. (check all that apply)" and 7 "Below is a list of criteria that could be used to rank students in a competitive admissions process. Please rate these criteria by their importance to admissions decisions in Fall 2002, with 1 being minimally important, 2 being moderately important, 3 being very important, and 0 being not considered. If your program did not use a competitive process, please enter 0 for all categories."

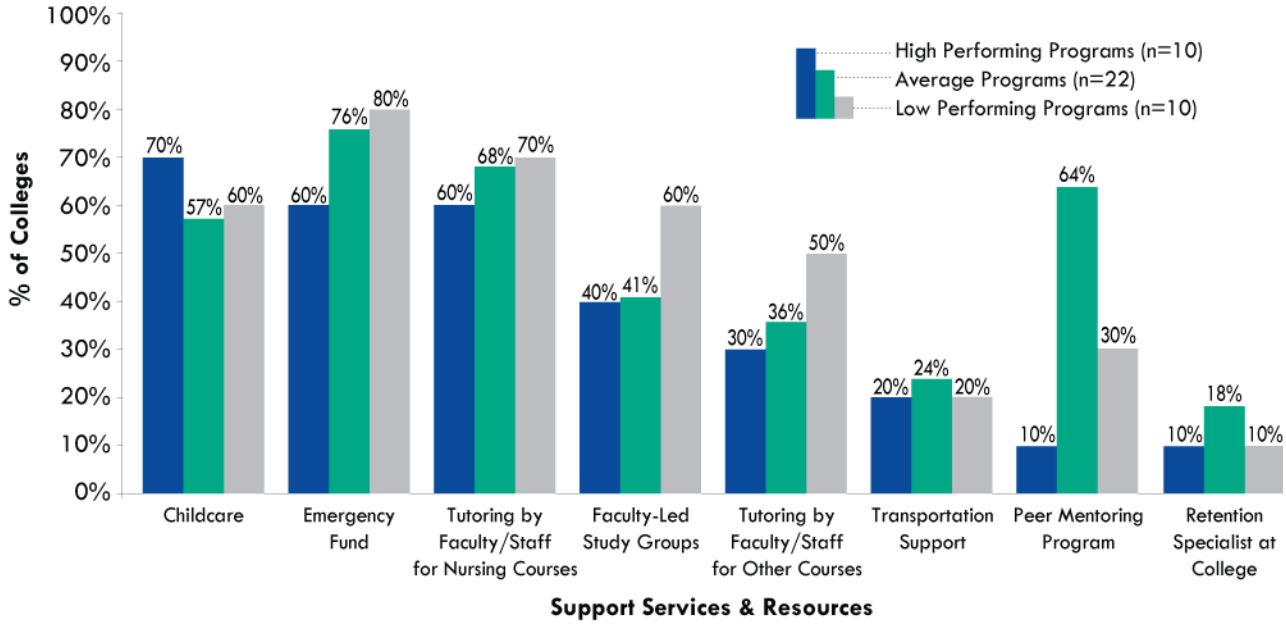
Figure 18. Admissions Requirements and Ranking Criteria* in 2002 by Risk Adjusted Graduation Rate (RAGR) Category



Source: North Carolina Health Professions Data System with data from a survey of 42 NCCCS ADN program directors, March and April 2008 (requirements data: item #5; ranking criteria data: item #7).

*Note: Some colleges used "ranking" criteria to prioritize students for admission where more applicants met general requirements than the program had open slots.

Figure 19. Support Services and Resources in 2002-2005 by Risk Adjusted Graduation Rate (RAGR) Category



Source: North Carolina Health Professions Data System with data from a survey of 42 NCCCS ADN program directors, March and April 2008 (in order of graph from left to right, data from items #19, 21, 11, 13, 12, 20, 26, 28).

Support Services and Resources. Many of the support services and resources assessed were available at nearly all 42 of the NCCCS ADN programs during 2002-2005. Those for which

some variation was observed between programs are summarized in **Figure 19**.[xxv] Childcare funding support was the only support service or resource more commonly available in high performing programs relative to average or low performing programs.

Generally, support services and resources were more frequently offered by low performing programs. The distribution of these services suggests programs with low graduation rates were aware of the challenges they faced and were seeking to address them. A common example from health care research mirroring this pattern is that persons who receive more health care services tend to have worse health outcomes. This does not mean that health care makes people less healthy, rather that those who need services are more likely to use them.

Because this study observes only a single cohort of students, and because it lacks information on the quality or the time since implementation for these services, no determination can be made as to program effectiveness. However, it seems programs that outperform expectations based on student body characteristics achieve their success without certain supports more commonly found in lower performing programs.

Instructional Characteristics. Instructional characteristics were generally comparable across RAGR categories (**Appendix IV A4.6**).[xxvi] However, high performing programs tended to require orientation for clinic instructors,[xxvii] whereas this was less common in other programs (**Table 9**). In addition, high performing programs had relationships with slightly more clinic sites during 2002-2005.[xxviii]

Table 9. Characteristics of Clinic Instruction In NCCCS ADN Programs, 2002-2005 by Risk Adjusted Graduation Rate (RAGR) Category

	High Performing	Average	Low Performing
Average Number of Clinic Sites	10	10	8
Percent of Programs Requiring Orientation for Clinical Instructors	60%	50%	40%
N	*10*	*22*	*10*

North Carolina Health Professions Data System with data from survey of NCCCS ADN program directors, March and April 2008. Questionnaire items 35, 42.

Faculty Characteristics. Faculty characteristics were analyzed by performance category. On average, high performing programs paid their full-time faculty slightly less than did low performing programs ($p<0.05$, **Table 10**). Despite paying slightly lower average salaries, top performing programs had higher proportions of master's degree faculty relative to other programs, although this difference was not statistically significant. Average age of faculty and

[xxv] In order of appearance in the graph, data from items 19 "Was child care funding support available to students?",21 "Were short-term emergency funds available (*e.g. ability to assist student with unexpected expenses*)?",11 "Did you provide tutoring for nursing courses?",13 Were faculty-led study groups offered (not including those for NCLEX preparation)?",12 "Did you provide tutoring for other required courses?",20 "Was transportation support (*financial or otherwise*) available to students?", 26 "Did your department have a peer mentoring program (*e.g. formal relationships between students designed to orient new students in the program and provide ongoing academic and social support*)?", 28 "Did the college employ a general retention specialist who served the ADN program?".

[xxvi] Data from survey items 30 "On average, how large were your: Nursing lecture sections; Lab sections; Clinic sections", 31 "Please indicate whether none, some, most, or all of the following were team taught (*two or more instructors in same physical location with students at same time for entire course*)" for lecture, lab, and clinic sections, 32 "Please indicate whether none, some, most, or all of the following were taught by faculty with a masters degree or beyond" for lecture, lab, and clinic sections.

c. Lab sections?

[xxvii] Survey item 42 "Were clinic instructors required to attend a college-sponsored orientation to clinical instruction before accepting rotations?"

[xxviii] Survey item 35 "Through how many clinical education sites did your college offer clinical instruction?" (in reference to the 2002-2005 period)

average years of longevity at current institution were roughly comparable across RAGR categories, although average faculty age and average years longevity were slightly higher for low as compared to high performing programs. Reflecting patterns in longevity, turnover rates over three years were somewhat higher in programs in the high performance group (50%) relative to those in the low performance group (45%) (**Table 11**).

Table 10. Characteristics of Faculty in NCCCS ADN Programs, 2002-2005 by Risk Adjusted Graduation Rate (RAGR) Category

	High Performing (n=10)	Average (n=22)	Low Performing (n=10)
Master's Degree Educated (%)	54	55	47
Years of Age	46	48	47
Years of Experience at Current Program	9	11	10
Monthly Salary (100$s, full-time employees only)	43*	45	47

*p<0.05 vs. low performing group

North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007

Table 11. Faculty Turnover in NCCCS ADN Programs, 2002-2005 by Risk Adjusted Graduation Rate (RAGR) Category

	High Performing (n=10)	Average (n=22)	Low Performing (n=10)
Average Turnover 2002-2005	50%	56%	45%

North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Summary of Effect of Program Characteristics by Risk Adjusted Performance Category

Overall, programs in the top performance category differed only slightly from other programs in terms of admissions policies, availability of services and resources, and faculty and instructional characteristics. Few of the differences observed were statistically significant. Nevertheless, those differences that were observed merit further exploration. Programs that out-performed expectations had different admissions policies, employed more educated faculty, experience higher faculty turnover, were less likely to have faculty teaching in both clinic and lecture settings, and were more likely to provide orientation to clinic instructors.

Conclusions: On-Time Graduation

The key "take away" point from the analyses of on-time graduation rates is that student-level factors, rather than program-level factors, seem to play a greater role in predicting graduation rates. In order of magnitude, non-white NCCCS students, the youngest and oldest students, those with a GED, and those receiving Pell Grants were less likely to graduate on-time. In additional regression analyses (not shown), the effect of these characteristics on a student's probability of on-time graduation were little changed by the inclusion of more or different program characteristics. Statistical models including admissions policies, instructional characteristics, and faculty education and turnover alongside student demographic and socioeconomic characteristics failed to identify

statistically significant effects for any of the program factors. The estimated effects of the student factors remained virtually unchanged from models including none of the program characteristics.

It may be the case that poor survey design resulted in low quality data on instructional characteristics and admissions policies. However, the survey was developed in concert with ADN program directors and NCCCS administrators, and was vetted and edited by the directors who would be answering the survey. As a result, there is reason for some confidence in the questions used. It is more likely that program directors found it difficult to answer questions about their ADN program in 2002, both because many of the directors were not in place at that time and because few administrative records exist that recorded information needed for some questions asked by the survey. Thus, inconsistent or incorrect responses to the survey could have introduced measurement error into the data and could be why few program characteristics appear statistically significant. The small number of programs analyzed also reduced the amount of inter-program variation necessary to find statistically significant factors related to attrition.

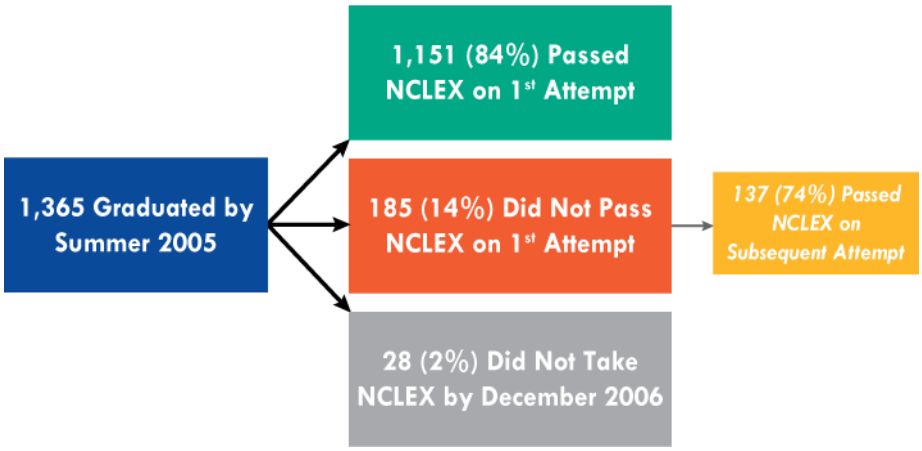
It is also possible that the analyses conducted examined the wrong program attributes. While the survey items and the measures of faculty characteristics drawn from the NCCCS data system were selected in consultation with the NCCCS and following a careful review of existing research, measures were limited by available data. The goals, vision, and leadership of a program director, the motivation and skills of educators on faculty, and the quality of the physical infrastructure such as classrooms and lab facilities were among the many factors not collected by the survey and more amenable to in-depth, qualitative research on individual programs.

Despite the fact that statistical analyses did not identify any important program-level factors associated with attrition, the comparison of program characteristics in high versus low performing programs revealed some findings that merit further investigation. After accounting for differences in student body makeup, programs with higher than expected on-time graduation rates were more likely to rank applicants on standardized test scores and to require applicants meet a basic science competency requirement. Programs with higher than expected graduation rates employed slightly more educated faculty, paid slightly lower salaries to full-time faculty, and experienced a higher rate of turnover in their faculties than did low performing programs. Faculty in high performing programs were less likely to teach in both clinic and lecture settings, and clinic instructors were more likely to receive some orientation prior to taking on a clinic section. High performing programs were somewhat less likely to provide many support services and resources, and reported comparable instructional approaches to other programs.

Part VI: Probability of Passing NCLEX

After a student has graduated from an ADN program, s/he must pass the National Council Licensure Examination in Nursing (NCLEX) to become licensed to practice in North Carolina. Figure 20 shows that of the 1,365 students who graduated from the ADN program by the summer 2005, 1,151 (84%) passed the NCLEX on the first attempt. Another 137 (74%) of the 185 students who did not pass on the first attempt, passed the NCLEX on a subsequent try and became licensed to practice in the state by 2006. NCLEX first-time pass-rates ranged from a low of 59% (Robeson County CC) to a high of 100% (Catawba Valley and Davidson County CCs).

Figure 20. Outcome 2: ADN Graduates' NCLEX Success Rates on First Attempt



Among students graduating on-time, demographic and socioeconomic characteristics showed no statistically significant relationship with passing NCLEX on the first attempt, with one exception: students in the youngest age group were somewhat less likely to pass NCLEX on their first attempt than were students aged 24-40 in 2002 (Table 12). One reason student characteristics are less powerfully related to NCLEX performance than to on-time graduation is that NCLEX success was analyzed only for the sample of students who graduated on-time.

Table 12. Percentage Point change in Probability of Passing NCLEX on First Attempt by Student and Program Characteristics

Age 18-23	-6.20*
Science Competency Requirement	7.17*
Ranking on Standardized Test Performance	5.67*
All Lectures Taught by Faculty with Masters Degree	5.18**
Percentage of Faculty with Masters Degree	0.15*
Most or All Lectures Team Taught	-5.56*

**p<0.1, *p<0.05
North Carolina Health Professions Data System with data from survey of NCCCS ADN Program Directors, March and April 2008.

Program characteristics played a much larger role in determining a student's likelihood of passing NCLEX on the first attempt than they did in predicting on-time graduation. Students enrolling in programs requiring science competency for admission in 2002 were about seven percentage points more likely to pass NCLEX on their first attempt than were those enrolling in other programs. Compared to other students, those enrolling in programs that ranked applicants based on standardized test performance and programs in which all lecture sections were taught by faculty with a master's or higher degree were between five and six percentage points more likely to pass NCLEX on their first attempt. The percentage of a program's faculty who had earned a master's degree was also related to students' probabilities of passing NCLEX on their first attempt. For each 10% increase in the proportion of faculty with a master's degree, students were one and a half percentage points more likely to pass NCLEX on their first attempt. Putting this in terms of program level first-time pass rates, a program at which five of ten faculty were educated at the master's degree level would

have a predicted advantage in first-time NCLEX pass-rate of 4.5 percentage points over a program at which only two of ten faculty held master's degrees.

The only program characteristic negatively related to NCLEX outcomes was team teaching in lecture sections. Students enrolling in programs in 2002 in which most or all lecture sections were taught by a team—in which more than one faculty member taught in the same place at the same time to the same students—were over five percentage points less likely to pass the NCLEX the first time they took it.

While the estimated percentage change in students' (and by extension programs') predicted NCLEX first-time pass rates associated with different program characteristics are small, they are nonetheless important. Currently, the Board of Nursing regulates ADN programs on the basis of their first-time NCLEX pass rates—rates must exceed 95% of the national average over a period of three years to remain on full approval status. Given the relatively tight range of pass rates across programs, characteristics such as educational attainment of faculty may make the difference between programs performing above and below 95% of the national average.

Conclusions: Passing NCLEX

The analysis of factors associated with NCLEX pass rates revealed that master's degree educated faculty are associated with higher first-time NCLEX pass rates. More selective admissions policies, specifically ranking applicants for admission based on standardized test scores and requiring applicants to demonstrate basic science competency, were also associated with higher first time pass rates on the NCLEX.

These findings should be interpreted with some caution. Based only on quantitative analyses, it is impossible to know whether, for example, certain admissions policies in fact screen out students unlikely to pass NCLEX, or whether those policies are simply more common at more academically rigorous programs. Qualitative research is required to further explore differences in the classroom, lab, and clinic that affect NCLEX pass rates and are not included in this analysis.

Part VII: Workforce Retention

Students in the Fall 2002 cohort were matched with licensure files from the North Carolina Board of Nursing and with enrollment data from the University of North Carolina system to determine which students went on to become licensed in the State or to enroll in a Registered Nurse (RN) to Bachelors of Science in Nursing (BSN) program. **Figure 21** shows that slightly more than nine out of ten (90%) of graduates from the 2002 cohort were retained in practice or pursued further nursing education in the State.[xxix]

Figure 21. Retention of Graduates from the 2002 NCCCS ADN Cohort in the North Carolina Workforce

While only 55% of the original cohort ended up in the workforce or pursuing additional education, 90% of the on-time graduates were retained in North Carolina. This high retention rate is a compelling reason to dedicate resources to reducing attrition rates from ADN programs—for every 100 additional students who complete the program, 90 will be added to the nursing workforce in North Carolina.

Not only are NCCCS ADN program graduates retained in high numbers in North Carolina, they tend to practice relatively close to the program where they earned their ADN. **Map 3** illustrates this phenomenon and shows that the contributions of ADN programs to the state nursing workforce are concentrated in the communities where programs are located. The result of this clustering around programs is that many graduates enter practice in their home communities which are rural and underserved areas, and they are employed in practice settings more common in these communities such as home care/hospice and long-term care facilities.

The importance of the NCCCS contribution can be more easily observed through a comparison with BSN nurses who completed their education in North Carolina at the same time as the 2002 ADN cohort.[xxx]Relative to this comparison cohort of BSN graduates, graduates from the 2002 NCCCS ADN cohort were around twice as likely to practice in rural counties and three times more likely to practice in the most underserved counties—those designated as a whole-county health professions shortage area (HPSA), (**Table 13**).

Table 13. Percentage of Graduates from NCCCS ADN Cohort and BSN Comparison Cohort Practicing in Counties Designated Health Professions Shortage Areas (HPSA)* and Non-Metropolitan Areas

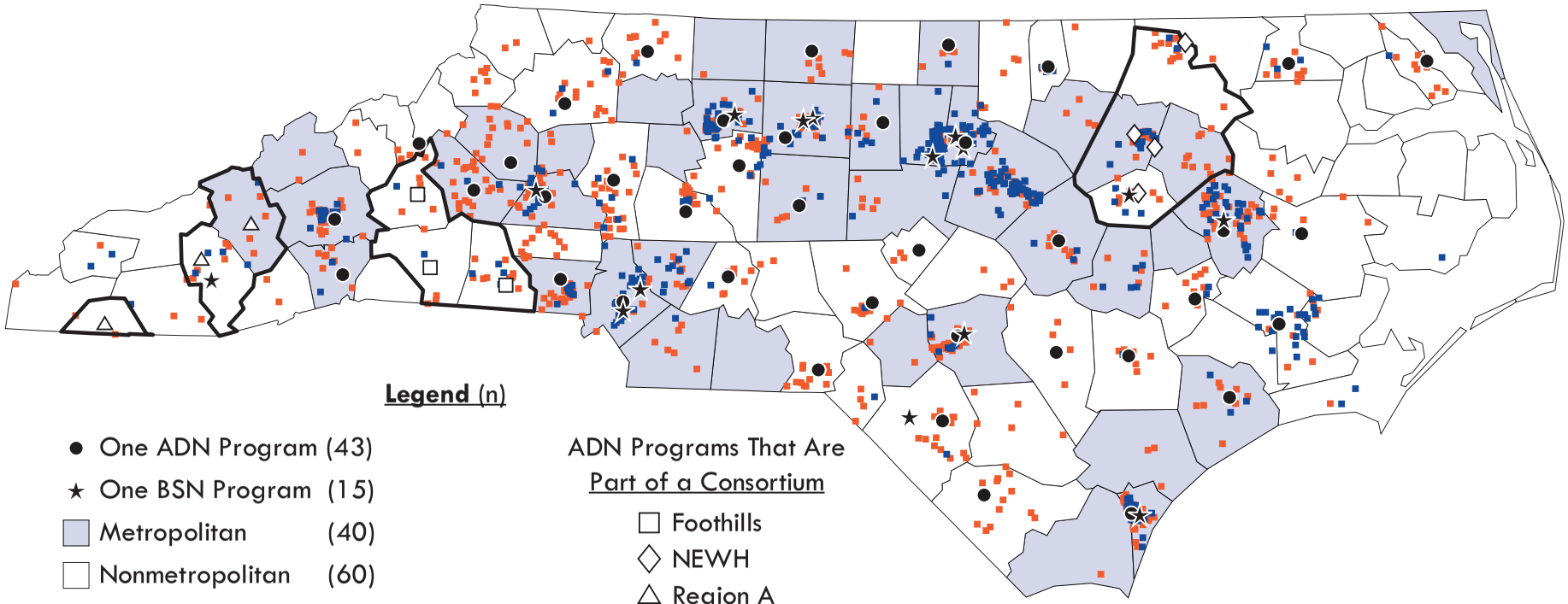
	Graduates from 2002 NCCCS ADN Cohort	2004-2005 NC BSN Graduates
Whole County HPSA	7.89%	2.40%
Part County HPSA	11.21%	21.36%
Non-Metropolitan County	35.22%	12.22%
N	*1,204*	*1,334*

*Counties designated as HPSAs in 2007
North Carolina Health Professions Data System with data from the North Carolina Community College Data Warehouse, accessed December, 2007.

[xxix] Note that these data underestimate the total number of nurses added to the workforce because students who enrolled in an RN to BSN program at Barton College, Cabarrus College of Health Sciences, Gardner-Webb University, Lees' McRae College, Lenoir Rhyne College or Queens University are excluded from the analysis.

[xxx] A comparison cohort was created of 1,363 RNs who graduated from a North Carolina BSN program during 2004 and 2005, the same years that the 2002 NCCCS ADN cohort first entered the workforce. These comparison cohorts were derived from NC licensure files and only include nurses who after graduation became licensed to practice in North Carolina.

Map 3.
Distribution of ADN and BSN Cohorts of Graduates in Active Practice in North Carolina, 2006



*Note: Dots are scattered randomly within ZIP code areas. Data include North Carolina ADN and BSN graduates from the 2002 cohort who were actively practicing in North Carolina as of 2006.

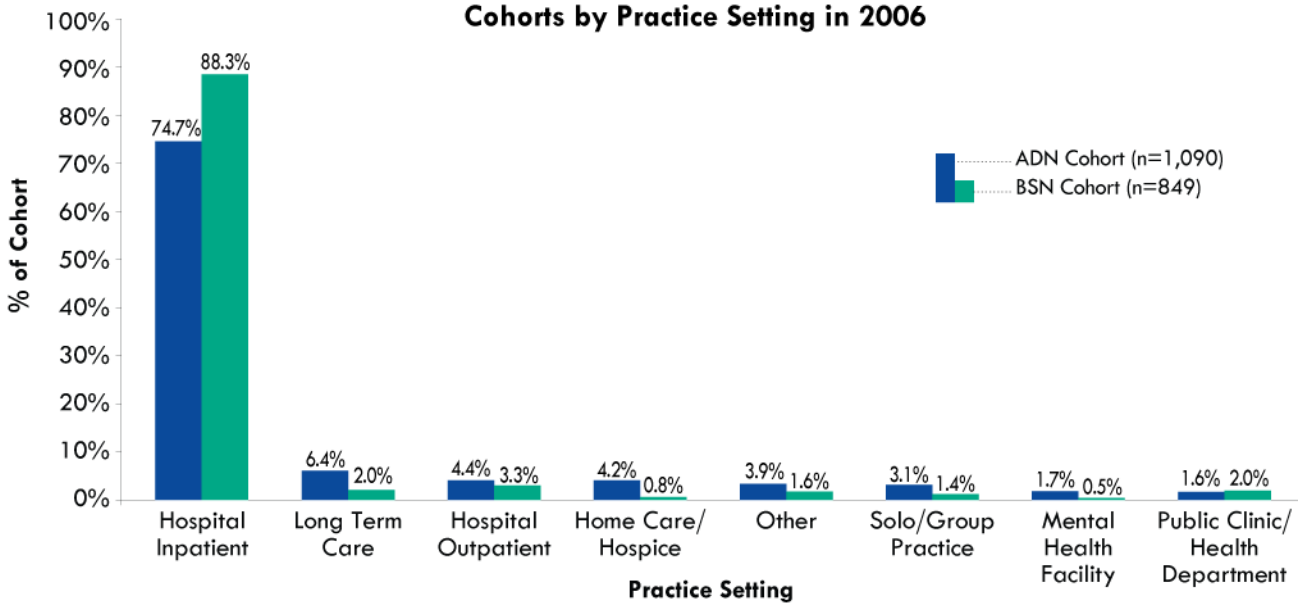
Source: North Carolina Health Professions Data System, with data derived from the North Carolina Board of Nursing, 2006.

Produced by: North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 3 shows the geographic distribution of graduates in the two cohorts. Graduates from the 2002 ADN cohort are more geographically dispersed across the state. Just over one-quarter of the comparison BSN cohort practiced outside one of the state's seven most populous counties in 2005-2006, whereas more than two thirds of the 2002 NCCCS ADN cohort did so. In addition, the ADN graduates are clustered more tightly around the programs where they were educated. On average, these graduates practiced within 29 miles of their programs. Those RNs in the BSN cohort reporting their practice address to the Board of Nursing (n=870) averaged twice this distance.

In addition to wider geographic distribution, graduates of the 2002 ADN cohort were more likely to practice in home care/hospice, long-term care, and mental health, employment settings that were identified by the North Carolina Center for Nursing as having high vacancy rates in 2006.[39] It is important to note that the majority of graduates in both cohorts for whom data on setting of practice were available practiced in inpatient hospital settings (**Figure 22**). Nevertheless, differences shown in other settings represent substantive differences in the distribution of RNs in the two cohorts. For example, if graduates of the 2002 NCCCS ADN cohort had distributed like those in the comparison BSN cohort, long-term care settings would have gained 48 fewer RNs, home care/hospice 37 fewer, and mental health facilities 13 fewer. Among all graduates of RN education programs during 2004-2005 in active practice in North Carolina in 2006, 151 practiced in long-term care, 115 in home care/hospice, and 38 in mental health.[40] Thus, in proportional terms, redistributing RNs from the 2002 NCCCS ADN cohort according to the pattern observed for the comparison BSN cohort would reduce the contribution of recent graduates to each setting by about one-third.

Figure 22. Percentage Distribution of ADN and BSN Cohorts by Practice Setting in 2006



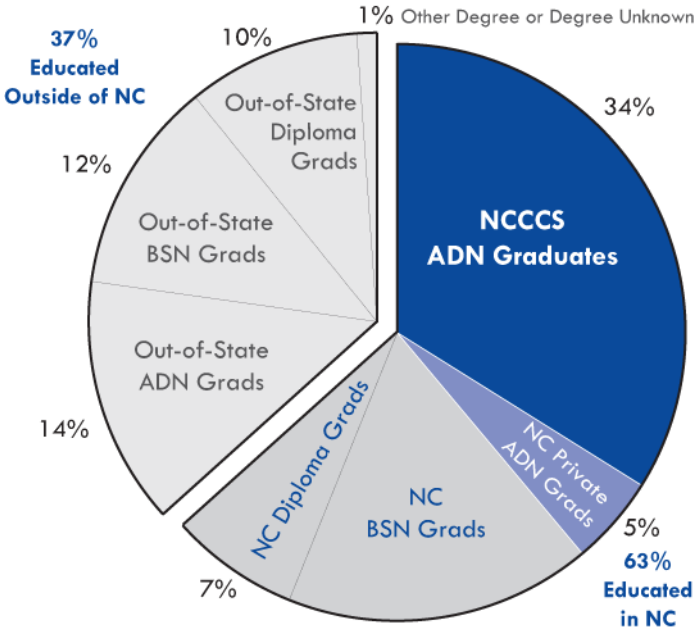
Source: North Carolina Health Professions Data System with data derived from the North Carolina Board of Nursing, 2006 and with data from the North Carolina Community College Data Warehouse, accessed December 2007.
Note: "Other" category includes school of nursing or medicine, student health site, HMO or insurance company, private duty, industry or manufacturing site, and "other" settings. Samples exclude114 in ADN cohort and 485 in BSN cohort who were in active practice in 2006 but who did not report a practice setting.

The distribution of the 2002 cohort is similar to the distribution of the current ADN educated workforce licensed to practice in North Carolina. Analysis of all licensed RNs in active practice in 2006 shows that those who earned their initial nursing degree in NCCCS ADN programs practice disproportionately in rural and underserved areas. In 2006, these NCCCS

graduates accounted for one in every three RNs in active practice (**Figure 23**), but comprised one out of every two nurses practicing in rural counties, and three out of every five nurses practicing in the state's most underserved counties—those designated as whole county HPSAs (data not shown).

RNs who earned their initial nursing degree in NCCCS ADN programs were also more likely to practice in settings with high vacancy rates. They were more likely than other RNs in North Carolina in 2006 to practice in long-term care (7.7% of NCCCS graduates versus 5.5% of other RNs), home care/hospice (8.2% versus 5.8%), and mental health facilities (2.2% versus 1.6%) (**Table 14**). They were also slightly more likely to practice in hospital inpatient settings (52.6% versus 51.6%). NCCCS ADN graduates were less likely to practice in an HMO/insurance company, outpatient hospital, solo/group medical practice, or medical education setting. Practice patterns among NCCCS educated RNs and others were similar for county health departments or public clinics.

Figure 23. RNs in Active Practice by Education North Carolina, 2006
(N=82,303)



Categories are for initial nursing degree. "Out-of-State" categories include RNs not including sate of initial nursing education.
Source: North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Table 14. Setting of Employment for Graduates of NCCCS ADN Programs and Other RNs in Active Practice, 2006

	NCCCS ADN Graduates		All Other RNs		
Employment Setting	***Number***	***Percent***	***Number***	***Percent***	
Home Care/Hospice	2,056	8.20%	2,813	5.82%	***
Long-term Care	1,938	7.73%	2,660	5.50%	***
Hospital Inpatient	13,170	52.55%	24,954	51.63%	***
Mental Health Facility	562	2.24%	776	1.61%	***
Public Clinic/Health Department	859	3.43%	1,669	3.45%	
Solo/Group Medical Practice	1,598	6.38%	3,694	7.64%	***
Hospital Outpatient	2,062	8.23%	4,639	9.60%	***
Other	2,815	11.23%	7,130	14.75%	***
Total	**25,060**		**48,335**		

**p<0.01, ***p<0.001
NCCCS ADN graduates defined as those completing their initial nursing degree in an NCCCS ADN program. Excludes 2,771 NCCCS ADN graduates and 6,137 other RNs in active practice not reporting practice setting in 2006. 'Other' category includes school of nursing or medicine, student health site, HMO or insurance company, private duty, industry or manufacturing site, and "other" settings. North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

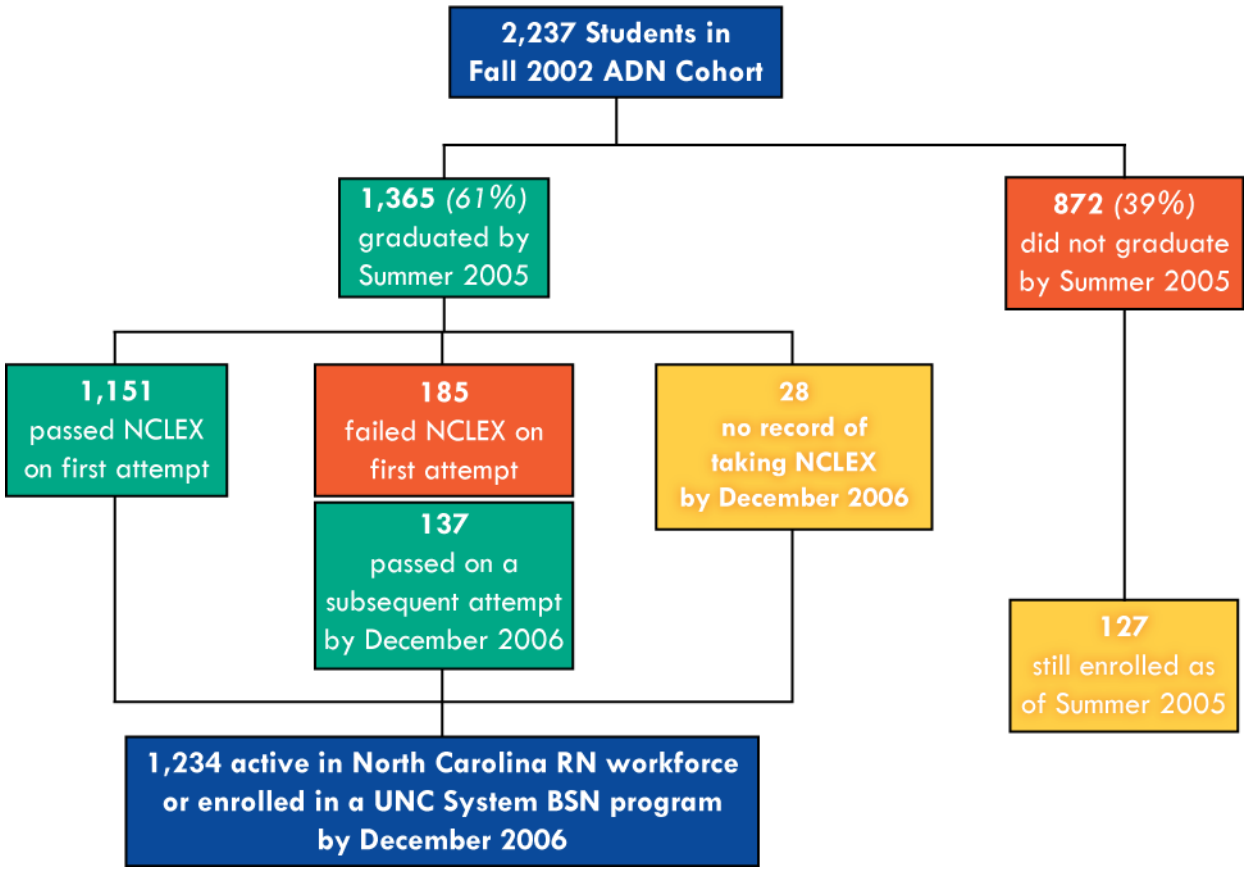
Conclusions: Workforce Retention

Over nine out of ten on-time graduates in the 2002 NCCCS ADN cohort were actively practicing as RNs in North Carolina by 2006. RNs from the 2002 cohort were more likely than a comparable group of BSN graduates to practice in rural and underserved counties, and to practice in settings experiencing high vacancy rates such as long-term care, home care/hospice, or mental health. In the 2006 RN workforce, nurses who completed their initial nursing degree in NCCCS ADN programs were more likely to practice in rural and underserved areas, and in settings currently experiencing high vacancy rates.

Part VIII: Conclusions

Figure 24 contains a summary of the study sample and the outcomes measured. Of the 2,237 students in the cohort, 61% graduated within three years. Of these graduates, 84% passed the NCLEX on the first attempt. Notably, another 137 graduates who failed NCLEX on the first attempt, passed the test on a subsequent attempt. Slightly over 90% of graduates who passed NCLEX ended up in active practice in the North Carolina workforce.[xxxi]

Figure 24. Outcomes in the 2002 NCCCS ADN Cohort



This study has shown that at the *student-level*, demographic and socioeconomic characteristics play an important role in determining graduation outcomes. Young age (18-23 years), non-white race/ethnicity (excluding American Indian ancestry), having a GED rather than a high school diploma, and being a Pell Grant recipient were all associated with lower probabilities of graduating on-time. At the *program-level*, those programs with higher than expected graduation rates employed slightly more educated faculty, paid slightly lower salaries to full-time faculty, and experienced a higher rate of turnover in their faculties. Faculty in these higher performing programs were less likely to teach in both clinical and lecture settings, and clinic instructors were more likely to receive some orientation.

[xxxi] On-time graduation, first-time NCLEX pass, and workforce retention rates of the 2002 cohort for all ADN programs are listed in Appendix II.

Student characteristics played less of a role in determining whether program graduates passed the NCLEX licensure exam. Only young age was associated with a lower probability of passing the test on the first attempt. However, several characteristics of the programs in which students enrolled were associated with their likelihood of success. On-time graduates enrolled in programs employing higher proportions of master's degree educated faculty or in programs in which all lectures were taught by faculty with master's degrees were more likely to pass the NCLEX on their first attempt. In addition, enrolling in a program that required a basic level of science competency or that ranked applicants for admission based on standardized test performance was also associated with higher probability of first-time NCLEX success.

These findings provide important best practice models that ADN programs could pursue to increase program completion rates. However, another key component to improving the output of RNs from NCCCS ADN programs is the alignment of program evaluation measures with program goals. More specifically, policy change within the NCCCS and North Carolina Board of Nursing about how attrition and NCLEX pass rates are used to evaluate program performance may be needed in light of this study's findings.

While the top performing programs in this study had both high graduation rates and high NCLEX pass rates, some programs had very high NCLEX pass rates and very low graduation rates. This finding suggests that programs may be selectively graduating only those students most likely to pass NCLEX on their first try. This practice could be discouraged by using a more comprehensive measure of program performance.

One option would be to combine graduation and NCLEX pass-rates into a composite performance measure. A composite score could be calculated by multiplying a program's NCLEX pass rate by its risk adjusted graduation rate. The resulting score would take into account a program's student body characteristics, its graduation rate, and how well prepared its graduates are to enter nursing practice (as measured by the NCLEX). Doing so would give colleges some room to prioritize one measure over another, while discouraging them from pursuing one measure at the expense of the other. The adjusted graduation rate measure could be incorporated into the Board of Nursing standard for programs in full approval status. Currently, the standard is that a program's first-time NCLEX pass rate meet or exceed 95% of the national 3 year average rate.44 This measure may encourage some programs to trade off graduation rates for NCLEX pass rates, graduating only those students certain to pass NCLEX on their first attempt.

The difference between using the composite score and using the raw NCLEX pass rate to determine whether programs have met the North Carolina Board of Nursing requirement can be seen in Table 15. For the years 2004-2006, (the years during which NCLEX outcomes were assessed for the 2002 cohort in this study), 95% of the national average first-time NCLEX pass rate was 82.66%.45 Table 15 shows that using the composite score instead of the NCLEX pass rate shifts the programs highlighted in black from the "warning" category to the "full approval" category. The adjustment takes into account the fact that these programs graduated a greater proportion of their 2002 cohort than expected based on student characteristics. For those highlighted in orange, the reverse is true.

Importantly, using the composite score does not shift programs with extremely low pass rates into the "full approval category." In addition, almost all of the colleges that are shifted from "full approval" to "warning" status have low risk adjusted graduation rates, meaning that these are programs that graduate fewer students than expected. The effect of the composite score is to balance the goals of graduation and NCLEX success and to remove the incentive to achieve high NCLEX pass rates at the expense of high attrition rates.

Table 15. Program Performance on a Composite Measure of NCLEX Performance and Risk Adjusted Graduation Rate for the 2002 Cohort

	Composite Performance (First-Time NCLEX Pass Rate x RAGR)	First-Time NCLEX Pass	On-Time Graduation	Risk Adjusted Graduation Rate (RAGR)
Coastal Carolina CC	129.83	95.45	80.00	1.36
Davidson County	130.47	100.00	84.78	1.30
Asheville-Buncombe TCC	109.99	85.29	85.19	1.29
Mayland CC	**100.68**	**78.26**	**82.14**	**1.29**
Vance-Granville CC	**91.09**	**71.43**	**73.68**	**1.28**
Mitchell CC	117.31	93.75	72.73	1.25
Craven CC	**96.00**	**78.57**	**72.50**	**1.22**
Beaufort County CC	**99.07**	**81.48**	**75.00**	**1.22**
Foothills Nursing Consortium	**90.23**	**76.19**	**75.00**	**1.18**
Robeson CC	70.08	59.38	75.61	1.18
Cape Fear CC	105.77	89.66	77.03	1.18
Caldwell CC/TI	104.45	89.74	72.73	1.16
Surry CC	**87.34**	**75.47**	**72.97**	**1.16**
Blue Ridge CC	97.40	85.71	75.00	1.14
Johnston CC	110.13	96.97	72.34	1.14
Rockingham CC	108.19	95.83	67.65	1.13
Forsyth TCC	**86.71**	**76.92**	**67.53**	**1.13**
Region A Nursing Consortium	93.44	83.87	68.18	1.11
Richmond CC	95.14	86.11	68.52	1.10
Fayetteville TCC	91.14	86.54	62.92	1.05
Pitt CC	94.48	92.59	63.04	1.02
Durham TCC	95.15	93.33	62.00	1.02
Randolph CC	74.96	74.07	62.79	1.01
Western Piedmont CC	61.33	61.54	59.09	1.00
Southeastern CC	83.52	85.29	58.62	0.98
Roanoke-Chowan CC	86.12	88.24	51.52	0.98
Catawba Valley CC	97.43	100.00	61.90	0.97
Gaston College	87.94	90.38	62.65	0.97
Alamance CC	75.19	77.78	58.06	0.97
Wilkes CC	86.96	91.30	58.97	0.95
Stanly CC	**80.40**	**84.62**	**59.09**	**0.95**
Sandhills CC	80.91	90.00	53.25	0.90
Piedmont CC	71.67	80.00	64.71	0.90
Guilford TCC	**81.74**	**97.67**	**52.50**	**0.84**
Rowan-Cabarrus CC	**75.70**	**96.55**	**47.54**	**0.78**
College of the Albemarle	**69.65**	**92.86**	**50.00**	**0.75**
Lenoir CC	**61.13**	**83.33**	**42.86**	**0.73**
Sampson CC	**68.11**	**94.12**	**40.48**	**0.72**
Central Piedmont CC	**64.83**	**90.00**	**38.78**	**0.72**
NEWH Nursing Consortium	**57.37**	**86.30**	**38.46**	**0.66**
James Sprunt CC	**61.55**	**93.75**	**39.02**	**0.66**
Central Carolina CC	**36.12**	**90.91**	**23.91**	**0.40**

Composite scores are calculated by multiplying a program's Risk Adjusted on-time Graduation Rate (RAGR) by their NCLEX pass rate. Programs highlighted in **black** have NCLEX pass rates below 95% of the national 3-year average for 2004-2006 (82.66%), but have composite scores at or above this threshold. The change reflects that these programs have higher than expected graduation rates. For those highlighted in **orange**, the reverse is true.

Using a composite score to evaluate program performance would shift the emphasis away from test performance as a goal onto itself and instead place the focus on program output into the workforce. Such a shift is important because an analysis of the practice patterns of the 2002 cohort showed high workforce retention rates among graduates. Over 90% of all on-time graduates in the cohort were active in the North Carolina RN workforce in 2006. NCCCS graduates tended to practice in the communities where they were educated. Half of all graduates practiced within just over 12 miles of where the program in which they were enrolled. Relative to RNs graduating from BSN programs in 2004 or 2005, graduates of the 2002 NCCCS ADN cohort were more likely to practice in clinical settings with high vacancy rates such as nursing homes, home care or hospice, and mental health facilities. Graduates from the NCCCS cohort were also more likely to practice in rural counties. While nearly three out of every four BSN graduates in 2004 and 2005 went on to practice in one of the state's seven most populous counties, less than one out of every three of the 2002 NCCCS ADN cohort did so.

While the existing policy debate about an emerging nursing shortage has focused on mechanisms to increase the overall supply of nurses, the findings from this report emphasize the critical importance of ADN nursing graduates to the distribution of nurses in the state both geographically and by practice setting. The fact that ADN graduates distribute to rural and underserved parts of the state and tend to work in clinical settings facing high vacancy rates makes a compelling case for why policy makers need to invest resources in both understanding and reducing attrition from ADN programs. Workforce retention rates observed for the 2002 cohort suggest that the returns to increasing graduation rates are nearly twice those of increasing program size. Based on a system-wide graduation rate of approximately 60% and a workforce retention rate of around 90%, 100 new ADN program slots will yield only 54 new RNs to the NC workforce. By contrast, 100 additional graduates will yield 90 RNs.

This study began with the question of how graduation rates in ADN programs might be improved. Analyses of a wide variety of program resources and support services, instructional and faculty characteristics, and admissions policies revealed few program-level best practices for improving graduation rates. Student-level characteristics proved to be far more powerful determinants of graduation outcomes than program policies or resources. The socioeconomic and demographic profile of a student at risk for attrition developed in this study points to a conclusion that is both obvious and expected: older, more highly educated white students from better economic backgrounds are more likely to succeed. As the California studies concluded, these are precisely the students who are better prepared academically and who have the personal and economic resources necessary to succeed in ADN programs.

The fact that empirical analyses strongly support the profile of an "at risk student" creates a quandary for the community college system and state policy makers. The NCCCS system is founded on an open door policy that arguably makes it inappropriate to discriminate against students based on demographic and socioeconomic characteristics but with limited fiscal resources and an emerging shortage of nurses, one could make an argument for limiting admission to ADN programs to students who are most likely to graduate.

This study's identification of some, though weak, relationships between certain program-level practices and higher graduation rates provides a fruitful ground for future research. This study has made important contributions to identifying the factors that contribute to attrition, but there is much that is still not known. Quantitative data and statistical modeling techniques provide powerful analytic tools to analyze the causes of program attrition, but there are a host of other unmeasured factors that need to be explored. Some ADN programs—Craven CC, Forsyth TCC, Mitchell CC, and Vance-Granville CC—achieved graduation rates substantially higher than would be expected given their student population. Others, such as Guilford Tech & College of the Albemarle, have predicted graduation rates above the system average, but actual graduation rates well below that average. Central Carolina, James Sprunt, and Rowan Cabarrus have predicted rates near the mean, but perform much below the average graduation rate. In-depth qualitative analyses including site visits, focus groups and interviews with students, faculty, and administrators in both sets of programs are needed to better understand the factors allowing some programs to succeed beyond expectations and others to fall short.

Part IX. Recommendations

R1. Standardizing Performance Measures—Recommendations for the NCCCS & NC BoN

- **A uniform method should be used by the North Carolina Board of Nursing and the NCCCS to calculate retention rates.**

The North Carolina Board of Nursing regulates the expansion of NCCCS ADN programs[41] and requires that an ADN program's three year retention rate equal or exceed the three year average for ADN programs statewide. Retention rates also serve as an important benchmark of program performance within the NCCCS. A uniform method should be used by both the Board of Nursing and NCCCS programs to calculate retention rates.

- **On-time graduation rates should be calculated for all students within a curriculum (full- and part- time) using to the NLN standard of 150% of program length to define "on-time." In this study, part-time and full-time students were equally likely to graduate on-time according the 150% definition.**

The North Carolina Center for Nursing, together with the NCCCS and a group of diverse stakeholders from the nursing community, developed the retention measure used in this study that groups students into cohorts according to the semester in which they enroll in a gateway associate degree nursing course (NUR 110/115).[38] Using this approach, on-time graduation is measured in a defined, three-year (9 semester) period from when a student enrolls in that gateway course. This measure of on-time graduation allows for part-time students to complete course requirements and is consistent with the National League of Nursing guideline of on-time graduation as a length of study that is 150% of the standard course length of a program. Currently, the Board of Nursing calculates retention rates based on 100% of standard program length, and adjusts that standard length according to the curriculum of each student (i.e. part- or full-time generic ADN or LPN to ADN).

This recommendation represents a simplification of the current process, and emphasizes program output. Evidence from the current study suggests this measure does not penalize programs with high proportions of part-time students. On-time graduation rates were nearly identical for students who enrolled part- and full-time in 2002.

- **The Board of Nursing and the Community College System should explore whether a first-time pass rate is the best measure of performance. In this study, approximately three quarters of all on-time graduates failing NCLEX on their first attempt later passed and entered the NC workforce.**

Performance on licensure exams is another important benchmark of success for NCCCS programs. Currently, the Board of Nursing and the Community College System assess first-time NCLEX pass rates. Data from this cohort show that that nearly three quarters of students graduating on-time who fail the exam on their first attempt later pass it. The Board of Nursing and the Community College System should explore whether a first-time pass rate is the best measure of performance.

R2. Adjusting Performance Evaluations to Reflect Differences in Service Populations—NCCCS, NC BoN

- **Performance measures that evaluate graduation rates should be adjusted to reflect student body characteristics.**

North Carolina Community College ADN programs vary substantially in the populations they serve. Some programs operate in better educated and wealthier communities, where students are better prepared by schools and families for the academic rigor and better supported socially to meet the emotional and logistical challenges of ADN education. Other programs serve communities experiencing high poverty rates, low quality schools, and other social challenges that leave students less well prepared for the academic requirements of ADN programs and with little social support. Performance measures should account for these service population characteristics so as not to penalize those programs serving populations at the core of the community college system's mission.

The risk adjustment method outlined in this study accounts for the socioeconomic and demographic characteristics of a program's student body. While the risk adjustment procedure requires the application of a more complex statistical method than is currently used, the necessary data are readily available from student records housed at the NCCCS. Risk adjustment is essential for a fair comparison of programs. Without risk adjustment, those ADN programs serving communities with more challenging student populations will be handicapped in their attempts to expand.

Both the Board of Nursing and the Community College System Office should consider risk adjusted graduation rates when evaluating program performance.[xxxii] Risk adjustment should include the following student characteristics:

- Age
- Gender
- Race/ethnicity
- Education
- Pell Grant status
- Part-time/full-time enrollment status
- Socioeconomic characteristics of ZIP code of residence, including rurality, poverty level, educational attainment, and proportion of active duty military

R3. Best Practices in Associate Degree Nursing Education—NCCCS ADN Program Directors

Although findings from this study are not conclusive, several characteristics of high performing programs have emerged. The use of standardized tests, particularly the NET/HOBET to rank applicants for admission, minimum competency requirements in science as well as in English and math, orientation for clinic instructors, and a greater proportion of master's level faculty in lecture settings were all characteristic of high performing programs and were less common in low performing programs. Each of these practices warrants further, qualitative

[xxxii] The risk adjusted rates calculated in this report used on NCCCS data. An ideal risk adjusted rate should be calculated using data from both NCCCS and private ADN programs because the regulations governing expansion of ADN programs include all ADN programs in the calculation of a statewide average retention rate. See the North Carolina Administrative Code, Title 21, Chapter 36, Section .0321(k), p. 41, http://www.ncbon.com,

investigation at the program level. However in the interim, programs seeking to improve graduation and/or NCLEX pass rates may wish to consider these approaches.

Standardized Tests to Rank Applicants and Basic Science Competency Requirement. Best practices in admission policies may be difficult for some programs to implement due to their limited applicant pools. Data reported by ADN programs to the NC Board of Nursing (**Table A4.3**) show that in 2007, eight programs accepted all or nearly all of the students who met minimum criteria for admission. Implementing more stringent admissions criteria may also be challenging because administrators and leaders at individual ADN programs must balance two competing objectives: to supply nurses to a growing health care industry and maintain access to quality education and employment to citizens at the lower end of the socioeconomic scale. Nevertheless, for those programs that feel they can afford to be more selective, standardized tests, particularly the NET/HOBET, appear to provide good guidance in identifying those students most likely to succeed. In addition, requiring students meet a basic science competency requirement before enrolling in the gateway nursing course also seems to reduce attrition rates.

Required Orientation for Clinic Instructors. Another best practice to emerge from these analyses is the formal orientation of clinic instructors. Higher performing colleges in this study tended to require an orientation for clinic instructors, whereas low performing colleges did not. Many colleges rely heavily on clinic instructors who are not full-time college employees. Many of these clinic instructors do not teach in classroom or lab settings and have no formal background in education. Others may have experience as classroom educators and as clinicians, but not in the environment of the clinical practicum. Orienting instructors to the expectations and challenges involved can help smooth the transition for new clinic faculty. Orientation programs at Davidson, Coastal, and Vance-Granville CCs provide examples of clinic instructor orientation in high performing programs.

Graduate Education for Nursing Faculty. Finally, improving the educational level of faculty is important to both graduation and NCLEX outcomes for students. Higher performing programs in this study employed a larger proportion of master's educated faculty and were more likely to use only master's educated faculty to teach lecture sections relative to lower performing programs. In addition, as the share of faculty educated at the master's degree level rose, so did students' chances of passing NCLEX. However, attracting and retaining master's degree educated faculty may be difficult for many NCCCS ADN programs. In 2007, NCCCS ADN program faculty with master's degrees earned, on average, $13,000 (17%) less per year than master's educated faculty working in the UNC system.[42] Findings from this study argue for more resources for ADN programs to hire and retain faculty with graduate degrees. The analyses reported show benefits to both on-time graduation and NCLEX pass rates from better-educated faculty.

R4. Registered Nurse Workforce Policy—NC BoN & the North Carolina State Legislature

Educating North Carolina's nursing workforce to meet the Institute of Medicine's recommendation of a nursing workforce with a ratio of 60% BSN: 40% ADN/hospital diploma graduates[1] requires substantial investment in the state's BSN and RN-BSN education programs. In the context of an emerging nursing shortage, such investment must be carefully planned to preserve and enhance the distribution of nurses into geographic areas and practice settings that chronically experience RN staffing shortfalls. In 2006, RNs who earned their initial degree from North Carolina BSN programs were less likely to practice in underserved geographic areas and clinical settings than were nurses educated in the community college system. Assuming these

practice patterns persist, transitioning to a majority BSN-educated workforce has the potential to exacerbate existing RN shortages in rural and underserved areas, and in long-term care, home care and hospice, and mental health facilities.

Not all BSN-educated RNs are alike, however. As can be seen in **Table R1**, more than one in ten RNs who complete their initial degree in an ADN program go on to earn a BSN. These ADN to BSN RNs account for over one-fifth of all BS-RNs in practice in 2006 (data not shown).

Table R2 shows that BS-RNs who earned an ADN as their initial degree were almost as likely to practice in a non-metropolitan county as ADNs who did not earn a higher degree. By contrast, RNs whose first and only degree is a BSN program are half as likely to practice in a non-metropolitan county.[xxxiii]

Table R1. Educational Mobility of RNs in Active Practice in North Carolina, 2006

	Highest Degree (%)						
Initial Degree	**Diploma**	**ADN**	**BSN**	**MSN**	**PhD in Nursing**	**Degree in Other Field**	**N**
Diploma	68.25%	5.23%	12.05%	4.98%	0.26%	3.11%	13,905
ADN		78.72%	10.48%	2.91%	0.06%	7.61%	43,370
BSN or Higher			80.25%	13.79%	0.47%	8.26%	24,075
Percent of All Active Practice RNs	11.67%	42.86%	31.40%	6.48%	0.22%	7.03%	81,350

*Excludes 811 RNs in active practice in 2006 who did not report initial nursing degree and 142 who reported 'other' as their initial degree. North Carolina Health Professions Data System.

Table R2. Percentage Practicing in Non-Metropolitan North Carolina Counties by Initial and Highest Degree, 2006

Initial Degree / **Highest Degree**	**ADN**	**ADN BSN**	**BSN**	**ADN MSN**	**BSN MSN**
Practicing in Non-Metropolitan County (%)	31.43	27.90	13.73	26.04	15.07
N	*29,004*	*4,527*	*16,264*	*1,256*	*3,305*

*Includes only RNs in active practice in 2006 reporting either an ADN or a BSN as their initial nursing degree. Percentages do not sum to 100 within initial degree categories as some earned non-nursing degrees or PhDs. North Carolina Health Professions Data System.

ADN nurses who go on to earn a BSN are somewhat less likely than those who do not to work in long-term care, home care and hospice, and mental health settings (Table R3). Nevertheless, they remain between 20% and 50% more likely to practice in these settings relative to RNs educated solely in BSN programs.

These data show that BSN nurses who first earned an ADN are more likely to practice in rural and underserved areas as well as high need employment settings. The implication of these findings is that as the state moves toward a 60:40 ratio of BSN to ADN/diploma nurses, there needs to careful planning of pathways for ADN nurses to purse BSN education.

[xxxiii] Using the Bureau of Health Professions HPSA designation as an indicator of under-service, similar patterns emerge; 8% of ADNs who did not earn a higher degree, 6% of those who later earned a BSN, and only 3% who only earned a BSN practiced in a whole county HPSA counties in 2006.

An important first step in this process would be for the NC State Board of Community Colleges to request that the NC General Assembly direct that a Nursing Articulation Legislative Study be conducted by the Joint Legislative Education Oversight Committee. The purpose of the study would be to identify, and to make recommendations about, barriers and opportunities that exist for increasing the number of ADN nurses who pursue additional education.

Table R3. Practice Setting by Basic and Highest Nursing Degree for RNs in Active Practice in NC in 2006

Initial Degree / Highest Degree	ADN	ADN BSN	BSN	ADN MSN	BSN MSN
Hospital Inpatient	52.57%	56.43%	58.48%	36.61%	40.61%
Hospital Outpatient	8.54%	8.85%	9.15%	7.69%	10.76%
Long-term Care	8.48%	5.61%	3.41%	3.96%	2.32%
Solo/ Group Medical Practice	6.29%	3.65%	5.8%	20.68%	17.78%
Home Care/ Hospice	8.53%	6.18%	4.94%	2.69%	2.08%
Mental Health	2.11%	1.87%	1.3%	2.69%	1.24%
School of Nursing/ Medicine	0.38%	1.85%	1.44%	12.44%	11.33%
Other	10.03%	12.14%	11.28%	9.19%	10.12%
N	*29,092*	*4,544*	*16,341*	*1,262*	*3,319*

'Other' category includes school of nursing or medicine, student health site, HMO or insurance company, private duty, industry or manufacturing site, and "other" settings. Includes only RNs in active practice in 2006 reporting either an ADN or a BSN as their initial nursing degree. Percentages do not sum to 100 within initial degree categories as some earned non-nursing degrees or PhDs. North Carolina Health Professions Data System.

Highlights indicate settings with the highest vacancy rates as of 2006 (Lacey & McNoldy 2007)

R5. Investing in Ongoing Workforce Analyses to Inform State Health Workforce Policy

Decisions about whether to open new nursing programs or expand existing ones, to enact or change policies regarding the regulation of educational programs, and other policy decisions concerning the nursing workforce affect a wide range of stakeholders and can be the source of contentious debate. The ability of educators, legislators, legislative staff, and policymakers to understand, consider, and debate pressing issues and identify potential policy solutions exists only if decision makers have access to both a ready source of rich data and researchers who can work with that data to objectively present the analyses "as they lay."

This study was unique because it combined several data sources that have not been analyzed jointly in the past, bringing together information from the NCCCS data system, NC Board of Nursing (BoN) licensure exam records, and North Carolina Health Professions Data System (HPDS). These rich data sources enabled researchers to examine students from the time they enrolled in a North Carolina Community College System ADN program through entry into the nursing workforce. These types of analyses are crucial to shaping health workforce policy and need to be an integral and ongoing effort.

Future workforce studies should aim to replicate the current study with a more recent cohort of ADN students to identify high and low performing programs. Once these programs have been identified, in-depth qualitative analyses including site visits, focus groups and interviews

with students, faculty, and administrators in both sets of programs are needed to identify the factors that contribute to some programs succeeding beyond expectations and others falling short. A host of student-level factors related to life events, innate ability, past academic preparation and other areas undoubtedly contribute to student success, but could not be measured in this study. As well, there are many program-level factors related to resources, organizational culture, leadership and other program-level variables that affect graduation rates and for which quantitative data were not available. While the current study represents an important first step in understanding the factors influencing student attrition, qualitative analyses will enrich our understanding of the issues and provide more information about potential best practices that could improve NCCCS ADN program performance.

Funding workforce analyses will provide policy makers the evidence base needed to make informed decisions about how to best invest in preparing the nursing workforce to meet the demands of North Carolina's rapidly growing and aging population. The NCCCS should pursue $150,000 from the legislature in the 2009 session to undertake workforce analyses and should also investigate the willingness of organizations such as the National Council of State Boards of Nursing to also provide financial support.

Appendix I. Data and Measures

Data

Data for this study were obtained from four sources. First, from the NCCCS data system, we obtained student academic records for 2002-2005, including demographic and socioeconomic information collected at enrollment on the 2,267 students enrolling in a gateway nursing course in NCCCS in 2002. Thirty of these students were excluded from analyses due to missing data on demographic and socioeconomic characteristics. The 30 students excluded due to missing data did not differ systematically from the included students on any of the variables for which data was available. Also excluded from the analyses were 40 students at Wayne Community College and 54 students at Wake Tech Community College. Data on the Wayne CC students were not available at the time the analyses were completed and the Wake Tech students were not enrolled in Nursing 100/115 in the Fall of 2002 and thus were not part of the cohort studied. The age, race, education, socioeconomic and part-time enrollment status of these students were not statistically different than the sample included in the study and thus their omission does not affect the reliability or validity of the study's findings.

Students' ZIP codes were used to link students with data on community socioeconomic characteristics in 2003 obtained from a commercial database of community characteristics.

NCCCS also provided data for 2002, 2003, and 2004 on the 847 unique faculty whose area of instruction was associate degree nursing and whose area of responsibility was teaching. Over the three year period, these 847 unique faculty constituted 1,699 observations, comprising faculty members' age, educational attainment, program of employment, longevity at current institution, employment status, and, for full-time faculty, monthly salary.

NCLEX performance data were provided by the NC BoN, and were linked to NCCCS graduates. Workforce participation data were obtained from NC HPDS, and include licensure status, location and setting of practice, and whether the RN is currently in active practice. Students were also matched to the University of North Carolina System's records to determine which students went on to pursue a BSN.

Data on program characteristics were obtained through a survey of ADN program directors designed by a committee comprising NCCCS administrators, program directors, and faculty, as well as veteran survey researchers from the Cecil G. Sheps Center for Health Services Research, and administered online in Spring, 2008. The survey called for directors to report on the state of their programs during 2002-2005. Directors of all 42 programs operating in NCCCS in 2002 responded to the survey.

Measures

1) Student Characteristics
   a) Demographics as reported to CC in Fall 2002
      i) Age
      ii) Race/ Ethnicity
      iii) Gender
   b) SES
      i) Highest education (self report to college in Fall 2002)
      ii) Employment status in Fall 2002 (self report to college in Fall 2002)
      iii) Community Measures (based on ZIP code of residence in 2002 as reported to CC)
         (1) Rurality of ZIP code of residence in 2002 (NC Rural Center definition for 2002; 85/100 counties defined as rural)
         (2) Socioeconomic Measures, 2003
            (a) % ZIP code population aged 25+ without a high school education
            (b) % ZIP code population aged 16+ active duty military
            (c) % ZIP code families living below 100% FPL
         (3) Pell Grant recipient in 2002 (from college records)
   c) Graduation status
      i) Date of graduation from NCCCS data system; matched with year of graduation from BoN licensure file and workforce data from HPDS. In cases of discrepancies, confirmation with college of graduation.
   d) NCLEX performance (NC BoN)
      i) Workforce participation (NC HPDS)
      ii) Activity status
      iii) Geographic location (ZIP code)
      iv) Setting
      v) Specialty
2) Faculty Characteristics (NCCCS Data System)
   a) Demographics
      i) Age
      ii) Race/ Ethnicity
      iii) Gender
   b) Educational Attainment
   c) Employment Status
   d) Longevity
3) Program Characteristics
   a) See attached copy of survey instrument.

Appendix II

Table A2. College Rates of Three Outcomes For the 2002 NCCCS ADN Cohort

	On-Time Graduation	First-Time NCLEX Pass	Workforce Retention
Alamance CC	58.06	77.78	78.38
Asheville-Buncombe TCC	85.19	85.29	88.57
Beaufort County CC	75.00	81.48	96.30
Blue Ridge CC	75.00	85.71	90.48
Caldwell CC/TI	72.73	89.74	92.50
Cape Fear CC	77.03	89.66	96.61
Catawba Valley CC	61.90	100.00	94.87
Central Carolina CC	23.91	90.91	90.91
Central Piedmont CC	38.78	90.00	90.00
Coastal Carolina CC	80.00	95.45	79.17
College Of The Albemarle	50.00	92.86	86.67
Craven CC	72.50	78.57	80.00
Davidson County	84.78	100.00	95.00
Durham TCC	62.00	93.33	93.55
Fayetteville TCC	62.92	86.54	80.36
Foothills Nursing Consortium	75.00	76.19	90.48
Forsyth TCC	67.53	76.92	85.19
Gaston College	62.65	90.38	98.08
Guilford TCC	52.50	97.67	95.45
James Sprunt CC	39.02	93.75	100.00
Johnston CC	72.34	96.97	97.06
Lenoir CC	42.86	83.33	100.00
Mayland CC	82.14	78.26	91.30
Mitchell CC	72.73	93.75	96.88
NEWH Nursing Consortium	38.46	86.30	93.33
Piedmont CC	64.71	80.00	100.00
Pitt CC	63.04	92.59	89.66
Randolph CC	62.79	74.07	92.59
Region A Nursing Consortium	68.18	83.87	78.13
Richmond CC	68.52	86.11	83.78
Roanoke-Chowan CC	51.52	88.24	100.00
Robeson CC	75.61	59.38	78.13
Rockingham CC	67.65	95.83	91.67
Rowan-Cabarrus CC	47.54	96.55	100.00
Sampson CC	40.48	94.12	100.00
Sandhills CC	53.25	90.00	92.68
Southeastern CC	58.62	85.29	76.47
Stanly CC	59.09	84.62	84.62
Surry CC	72.97	75.47	88.89
Vance-Granville CC	73.68	71.43	92.86
Western Piedmont CC	59.09	61.54	92.31
Wilkes CC	58.97	91.30	95.65

North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007. ADN programs at Wake TCC and Wayne CC were not included in this study. Wake Technical Community College did not have any students enrolled in the gateway course in the Fall of 2002. Data were not available for the Fall 2002 cohort at Wayne CC.

Appendix III. Survey

A STUDY OF ASSOCIATE DEGREE NURSING PROGRAM SUCCESS
A SURVEY OF NCCCS NURSING PROGRAM DIRECTORS

*The following questions are intended to gather information about the ADN program at your community college **during the period 2002-2005**. Please answer questions in reference to this period. If the answer varies over the study period, answer as you feel best describes the experience of a student enrolled during that period.*

Name and Title of Primary Person Completing Survey:

_____

Position:_____

Contact information: *Phone*:_____ *Email*:_____

_____ 1. How many years have you served as director of the ADN program?

_____ 2. How many years did the previous program director serve?

3. Please check all the degrees you have completed
   - ☐ BSN
   - ☐ Other bachelors
   - ☐ Masters in nursing education
   - ☐ MSN
   - ☐ Other masters
   - ☐ Doctorate in nursing
   - ☐ Other doctoral degree

_____ 4. How many years has the ADN program been offered at your community college?

I. Admissions Policies

5. Many ADN programs require prospective students to meet more stringent admissions requirements compared to the community college's general admissions policy. Please indicate whether your program required a higher standard of performance than the general community college admissions criteria in each of the following areas in the Fall of 2002. (check all that apply)

N/A	
☐	Not Applicable—ADN program admission policy was the same as the community college policy (*continue to question 6*)

No	Yes	
☐	☐	High school GPA
☐	☐	High school course work
☐	☐	Demonstrated competency in English (*may be minimum placement test performance, high school grades, or pre-admission community college course work*)
☐	☐	Demonstrated competency in Math (*may be test performance, high school grades, or pre-admission community college course work*)
☐	☐	Demonstrated competency in Science (*may be test performance, high school grades, or pre-admission community college course work*)
☐	☐	CNA or other selected health professions work experience

6. In Fall 2002, how were applicants selected for admission to the ADN program? (check only one)

☐ Open door (*includes first come first serve and lottery*)

☐ Competitive admission (*students are admitted in order of performance on selected criteria*)

7. Below is a list of criteria that could be used to rank students in a competitive admissions process. Please rate these criteria by their importance to admissions decisions in Fall 2002, with 1 being minimally important, 2 being moderately important, 3 being very important, and 0 being not considered. If your program did not use a competitive process, please enter 0 for all categories.

Check one:

1	2	3	0	
☐	☐	☐	☐	High school GPA
☐	☐	☐	☐	High school course work
☐	☐	☐	☐	Pre-admission college GPA
☐	☐	☐	☐	Pre-admission college course work or Advanced Placement coursework
☐	☐	☐	☐	NET/HOBET
☐	☐	☐	☐	Test of Essential Academic Skills
☐	☐	☐	☐	PSB Health Occupations Exam
☐	☐	☐	☐	ACT/SAT/CPT
☐	☐	☐	☐	Other standardized tests
☐	☐	☐	☐	Residence in your college's service area
☐	☐	☐	☐	Work experience in health sector
☐	☐	☐	☐	Other (please list)

_____

_____

8. In the Fall of 2002, did your college maintain a waiting list for admissions which was rolled over from the previous year (*e.g. students did not have to re-apply for admission in Fall 2002*)?

No	Yes
☐	☐

II. Progression Policies

9. During 2002-2005, did your program have an early alert system (*e.g. a formal process for identifying students who perform below minimum standards*) or other progression policy? (please check one)

- ☐ No early alert system
- ☐ Yes, students referred to remediation
- ☐ Yes, students asked to leave program
- ☐ Yes, students referred to remediation and students asked to leave program

10. Please indicate whether your program used the following criteria to enforce minimum performance standards for continued enrollment in the ADN program during 2002-2005 (please check all that apply):

N/A		
☐		Not Applicable—No progression policies enforced (*continue to question 11)*
No	**Yes**	
☐	☐	Performance on tests
☐	☐	Satisfactory clinical evaluation
☐	☐	Minimum attendance
☐	☐	C or better in all nursing courses
☐	☐	C or better in all major courses
☐	☐	Other (please list)

_____

_____

III. Services and Resources

Please answer the following questions with respect to your program during 2002-2005. If certain services or resources were available for some but not all of this period, answer according to whether the services or resources were available for most of the period.

11. Did you provide tutoring for nursing courses? (select one)

- ☐ No
- ☐ Yes, most tutoring provided by faculty
- ☐ Yes, most tutoring provided by staff
- ☐ Yes, most tutoring provided by students

12. Did you provide tutoring for other required courses? (select one)

- ☐ No
- ☐ Yes, most tutoring provided by faculty
- ☐ Yes, most tutoring provided by staff
- ☐ Yes, most tutoring provided by students

N/A	No	Yes	
	☐	☐	13. Were faculty-led study groups offered (not including those for NCLEX preparation)?
	☐	☐	14. Did the nursing program have its own dedicated skills lab?
☐	☐	☐	15. Was the skills lab staffed with a person to assist students and make sure equipment was available and running smoothly?
☐	☐	☐	16. Was the skills lab open and available outside of regularly scheduled class time?
	☐	☐	17. Was there an available computer lab equipped with nursing software?
	☐	☐	18. Was personal counseling available (*e.g. stress management, time management*)?
	☐	☐	19. Was child care funding support available to students?
	☐	☐	20. Was transportation support (*financial or otherwise*) available to students?
	☐	☐	21. Were short-term emergency funds available (*e.g. ability to assist student with unexpected expenses*)?
	☐	☐	22. Was there a dedicated Admissions Counselor for Nursing and/or Health Sciences Programs?
	☐	☐	23. Did your department have a Student Nursing Association or other student organizations?
	☐	☐	24. Did students complete any required orientation about program expectations and academic requirements prior to admission?
	☐	☐	25. Did students complete any required orientation about program expectations and academic requirements prior to matriculation?
	☐	☐	26. Did your department have a peer mentoring program (*e.g. formal relationships between students designed to orient new students in the program and provide ongoing academic and social support*)?
	☐	☐	27. Did the college employ a dedicated retention specialist who worked only with the ADN program?
	☐	☐	28. Did the college employ a general retention specialist who served the ADN program?

IV. Instruction

When answering these questions, please think about your core ADN courses (NUR 110,115, 120, 125, 130, 135, 185, 210, 220, 235) over the period 2002-2005 unless otherwise specified.

29. Not counting core nursing credit hours (NUR 110,115, 120, 125, 130, 135, 185, 210, 220, 235), how many additional credit hours did you require of students in the ADN program? _____

30. On average, how large were your
    a. Nursing lecture sections? _____
    b. Clinical sections? _____
    c. Lab sections? _____

31. Please indicate whether none, some, most, or all of the following were team taught (*two or more instructors in same physical location with students at same time for entire course*).

None	Some	Most	All	
☐	☐	☐	☐	Nursing lecture sections
☐	☐	☐	☐	Clinical sections
☐	☐	☐	☐	Lab sections

32. Please indicate whether none, some, most, or all of the following were taught by faculty with a masters degree or beyond.

None	Some	Most	All	
☐	☐	☐	☐	Nursing lecture sections
☐	☐	☐	☐	Clinical sections
☐	☐	☐	☐	Lab sections

33. Please indicate whether none, some, most, or all of the following were taught by full-time faculty.

None	Some	Most	All	
☐	☐	☐	☐	Nursing lecture sections
☐	☐	☐	☐	Clinical sections
☐	☐	☐	☐	Lab sections

34. Please indicate whether none, some, most, or all of your faculty (full-time and part-time) taught in BOTH clinical and lecture settings.

None	Some	Most	All	
☐	☐	☐	☐	Nursing lecture sections
☐	☐	☐	☐	Clinical sections
☐	☐	☐	☐	Lab sections

35. Through how many clinical education sites did your college offer clinical instruction? *Number of Sites:* _____

36. How many of your clinical sites had their own education coordinator? *Number of Sites:* _____

37. How many of your clinical sites provided preceptors for clinical instruction from their own staff? *Number of Sites:* _____

38. How many of your clinical sites had a formal training relationship with another educational institution? *Number of Sites:* _____

39. Thinking about clinical instructors, please indicate whether none, some, most, or all were in active nursing practice.

None	Some	Most	All
☐	☐	☐	☐

40. Please indicate whether none, some, most, or all of the clinical instructors working with your program over the 2002-2005 period.

None	Some	Most	All	
☐	☐	☐	☐	Were full-time faculty at your institution
☐	☐	☐	☐	Were part-time faculty at your institution?
☐	☐	☐	☐	Were not employees of your institution?

41. On average, how many students were assigned to each clinical instructor during clinical rotations? *Number of Students:* _____

42. Were clinical instructors required to attend a college-sponsored orientation to clinical instruction before accepting rotations?

No	Yes
☐	☐

V. Faculty

For the purposes of this survey, we define full-time ADN faculty as faculty who spend 50% or more time teaching in the ADN program and part-time faculty as those who spend less than 50% (1%-49%) of their time teaching in the ADN program.

Again, please answer questions for the period 2002-2005.

No	Yes	
☐	☐	43. Were part-time faculty required to hold office hours?
☐	☐	44. Were part-time faculty required to attend faculty meetings?
_____		45. On average, how many contact hours of teaching did full-time faculty members perform per semester?

46. Please indicate whether none, some, most, or all of full-time faculty were employed in a clinical setting outside of the college?

None	Some	Most	All
☐	☐	☐	☐

47. In the Fall of 2002, please list the number of faculty (full- and part-time) by their total experience as a nursing educator

a. Number with less than 1 year _____

b. Number with 1-2 years _____

c. Number with 3-4 years _____

d. Number with 5-9 years _____

e. Number with 10-15 years _____

f. Number with more than 15 years _____

g. Don't know _____

Thank you very much for participating in our survey. We welcome any comments, questions or feedback that you may have.

Appendix IV

Table A4.1. Use of Site Provided Clinic Preceptors by NCCCS ADN Programs, 2002-2005

	Did Not Use Site Provided Preceptors	Used Some Site Provided Preceptors
Average % of Sites Providing Preceptors	-	43
Colleges Requiring Orientation For Clinic Instructors	9	21
Colleges	20	22

North Carolina Health Professions Data System with data from survey of NCCCS ADN program directors, March and April 2008

Table A4.2. Demographic and Socioeconomic Characteristics of the 2002 NCCCS ADN Cohort, by Program of Enrollment in 2002

	Sample Characteristics in 2002 (%)									
College	Male	Age 18-23	Age 24-40	Age 41+	White	African American	American Indian	Other	Employed Full-Time	Employed Part-Time
Alamance CC	8	22	63	14	70	25	0	5	34	32
Asheville-Buncombe TCC	26	16	65	20	93	1	1	5	36	46
Beaufort County CC	22	31	56	14	83	17	0	0	28	31
Blue Ridge CC	10	27	60	13	97	0	0	3	23	60
Caldwell CC/TI	7	31	55	15	100	0	0	0	13	58
Cape Fear CC	21	17	70	13	91	4	1	4	39	28
Catawba Valley CC	8	27	63	10	97	2	0	2	17	43
Central Carolina CC	9	26	54	20	78	15	2	4	26	33
Central Piedmont CC	10	26	60	14	42	48	0	10	26	30
Coastal Carolina CC	7	23	63	13	80	7	3	10	20	53
College Of The Albemarle	3	20	63	17	97	3	0	0	33	23
Craven CC	7	34	54	12	80	10	2	7	27	41
Davidson County	6	19	64	17	91	9	0	0	32	43
Durham TCC	18	14	70	16	60	32	0	8	42	26
Fayetteville TCC	8	20	66	13	62	24	3	11	33	18
Foothills Nursing Consortium	25	25	61	14	93	7	0	0	29	54
Forsyth TCC	11	30	51	19	80	18	0	3	27	51
Gaston College	6	29	53	18	90	7	1	1	37	25
Guilford TCC	7	22	64	14	69	27	1	4	42	36
James Sprunt CC	7	20	56	24	76	22	0	2	24	29
Johnston CC	10	25	60	15	94	6	0	0	21	54
Lenoir CC	14	43	39	18	82	18	0	0	25	39
Mayland CC	10	41	48	10	100	0	0	0	14	48
Mitchell CC	16	36	59	5	84	7	2	7	14	70
NEWH Nursing Consortium	9	28	60	12	65	33	1	1	28	38
Piedmont CC	11	28	72	0	89	11	0	0	17	56
Pitt CC	7	46	43	11	83	11	0	7	28	35
Randolph CC	2	33	58	9	93	5	2	0	42	47
Region A Nursing Consortium	9	26	61	13	91	2	4	2	15	48
Richmond CC	9	26	67	7	76	7	9	7	13	56
Roanoke-Chowan CC	3	33	52	15	58	42	0	0	6	64
Robeson CC	19	19	69	12	31	7	57	5	32	22
Rockingham CC	3	46	49	6	80	20	0	0	12	53
Rowan-Cabarrus CC	2	39	46	15	84	16	0	0	23	57
Sampson CC	10	50	48	2	69	24	2	5	7	45
Sandhills CC	3	49	43	8	79	9	4	8	12	43
Southeastern CC	7	47	45	9	88	5	5	2	7	45
Stanly CC	2	50	43	7	80	9	0	11	30	39
Surry CC	7	43	46	11	99	1	0	0	36	41
Vance-Granville CC	5	37	42	21	71	24	0	5	21	45
Western Piedmont CC	18	38	48	14	85	8	2	6	29	47
Wilkes CC	10	38	41	21	95	3	0	3	15	51

Table A4.2 - Continued

College	Sample Characteristics in 2002 (%)				
	Received Pell Grant	High Poverty ZIP Code*	Low Education ZIP Code*	High Military ZIP Code*	N
Alamance CC	42	27	3	0	64
Asheville-Buncombe TCC	18	21	5	0	82
Beaufort County CC	42	75	6	0	36
Blue Ridge CC	43	17	0	0	30
Caldwell CC/TI	38	13	35	0	55
Cape Fear CC	29	33	0	0	76
Catawba Valley CC	44	6	8	0	63
Central Carolina CC	54	61	4	15	46
Central Piedmont CC	34	12	2	0	50
Coastal Carolina CC	40	50	0	80	30
College Of The Albemarle	37	83	7	0	30
Craven CC	46	39	0	34	41
Davidson County	43	6	4	0	47
Durham TCC	30	30	0	0	50
Fayetteville TCC	37	51	0	45	89
Foothills Nursing Consortium	46	39	7	0	28
Forsyth TCC	24	18	3	0	79
Gaston College	48	17	16	0	83
Guilford TCC	39	29	10	0	83
James Sprunt CC	51	85	29	15	41
Johnston CC	31	46	2	0	48
Lenoir CC	36	75	46	11	28
Mayland CC	41	90	7	0	29
Mitchell CC	36	23	0	0	44
NEWH Nursing Consortium	52	76	29	0	195
Piedmont CC	47	72	0	0	19
Pitt CC	20	52	13	0	46
Randolph CC	42	42	49	0	43
Region A Nursing Consortium	76	70	2	0	46
Richmond CC	52	100	19	0	54
Roanoke-Chowan CC	76	100	64	0	33
Robeson CC	62	100	29	0	42
Rockingham CC	50	65	6	0	36
Rowan-Cabarrus CC	31	18	2	0	61
Sampson CC	55	90	29	5	42
Sandhills CC	39	60	13	4	77
Southeastern CC	53	95	21	0	58
Stanly CC	46	11	7	0	46
Surry CC	38	31	58	0	74
Vance-Granville CC	58	68	13	0	38
Western Piedmont CC	56	6	9	0	66
Wilkes CC	46	59	77	0	39

ADN programs at Wake TCC and Wayne CC were not included in this study. Wake TCC did not enroll a cohort in Fall of 2002. Data were not available for students enrolling in the Wayne CC ADN program in Fall 2002. *High Poverty ZIP Code defined as 10% or more of families living below Federal Poverty Level in 2003; Low Education ZIP Code defined as 1/3 or more residents aged 25 and older has less than a high school education in 2003; High Military ZIP Code defined as 10% or more of persons aged 25 and older are active duty military. North Carolina Health Professions Data System with data from The North Carolina Community College System Data Warehouse, accessed December, 2007.

Table A4.3. Applications and Admissions Data for NCCCS ADN Programs from the 2007 North Carolina Board of Nursing Annual Report Survey

College	Total Applications	Total Qualified Applications	Total Admissions	Ratio of Qualified Applications to Admissions*	Total New Enrollees
Alamance CC	824	207	74	2.8	72
Asheville-Buncombe TCC	253	253	96	2.6	67
Beaufort County CC	119	97	44	2.2	40
Bladen CC	111	78	25	3.1	25
Blue Ridge CC	168	69	30	2.3	30
Brunswick CC	98	83	52	1.6	44
Caldwell CC/TI	591	220	83	2.7	55
Cape Fear CC	279	151	104	1.5	90
Carteret CC	146	47	37	1.3	26
Catawba Valley CC	688	279	73	3.8	68
Central Carolina CC	87	72	52	1.4	50
Central Piedmont CC	463	398	143	2.8	120
Coastal Carolina CC	152	109	42	2.6	36
College Of The Albemarle	41	41	41	1.0	31
Craven CC	175	138	96	1.4	74
Davidson County CC	679	209	66	3.2	64
Durham TCC	1,301	587	172	3.4	67
Fayetteville TCC	386	270	184	1.5	149
Foothills Nursing Consortium	154	100	50	2.0	46
Forsyth Tech CC	740	293	210	1.4	187
Gaston College	139	139	100	1.4	100
Guilford Tech CC	1,025	214	93	2.3	93
James Sprunt CC	315	63	62	1.0	49
Johnston CC	340	180	89	2.0	77
Lenoir CC	159	154	65	2.4	47
Mayland CC	72	61	39	1.6	35
Mitchell CC	99	96	66	1.5	58
NEWH Nursing Consortium	1,227	447	238	1.9	189
Piedmont CC	55	41	41	1.0	38
Pitt CC	191	151	94	1.6	80
Randolph CC	85	45	45	1.0	45
Region A Nursing Consortium	561	234	56	4.2	50
Richmond CC	205	121	86	1.4	86
Roanoke-Chowan CC	85	34	34	1.0	33
Robeson CC	495	76	66	1.2	51
Rockingham CC	246	65	46	1.4	41
Rowan-Cabarrus CC	437	112	60	1.9	60
Sampson CC	249	77	50	1.5	47
Sandhills CC	330	86	81	1.1	78
South Piedmont CC	318	55	20	2.8	20
Southeastern CC	79	79	79	1.0	73
Stanly CC	623	141	107	1.3	73
Surry CC	142	120	120	1.0	97
Vance-Granville CC	915	337	57	5.9	57
Wake TCC	377	343	155	2.2	109
Wayne CC	104	104	57	1.8	53
Western Piedmont CC	580	80	67	1.2	67
Wilkes CC	371	40	40	1.0	35
System Total	**17,279**	**7,396**	**3,787**	**2.0**	**3,182**
System Average	**360**	**154**	**79**	**2.0**	**66**

*Calculation based on data reported in North Carolina Board of Nursing Annual Report Survey for 2007, provided courtesy of the North Carolina Center for Nursing.

Table A4.4. Percentage Point Change in Probability of Graduation by Student Characteristics†

	Coefficient	S.E.	
Age 18-23	-14.14	2.86	**
Age 41+	-8.86	3.08	*
African American	-19.96	2.87	**
Other Race/Ethnicity	-18.57	5.24	*
GED	-8.84	3.42	*
Pell Grant Recipient	-4.14	2.05	*
Associate's Degree	8.52	4.12	*
Constant	76.59	3.19	

†Linear probability regression of graduation status (graduation=1 for students completing degree by Summer, 2005) on student characteristics with program fixed effects for 2,237 students in 42 colleges. Results are adjusted for gender, employment status, enrollment status, poverty, military presence, and rurality of ZIP code of residence, and all program characteristics. Comparison case is a female student aged 24-40, white, with a high school diploma, not-employed, and enrolled full time. *p<0.05, **p<0.01, ***p<0.001
North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Table A4.5. Percentage Point Change in Probability of First-Time NCLEX Success by Student Characteristics†

	Coefficient	S.E.	
Age 18-23	-5.80	2.64	*
Age 41+	1.86	2.23	
African American	-2.57	3.17	
Other Race/Ethnicity	-3.08	7.03	
GED	-0.13	2.77	
Pell Grant Recipient	-1.96	2.18	
Associate's Degree	5.43	3.20	
Constant	87.69	3.18	

†Linear probability regression of first time NCLEX success (pass=1 for students passing NCLEX during 2005-2006) on student characteristics with program fixed effects for 1,336 students in 42 colleges. Results are adjusted for gender, employment status, enrollment status, poverty, military presence, and rurality of ZIP code of residence, and all program characteristics. Comparison case is a female student aged 24-40, white, with a high school diploma, not-employed, and enrolled full time. *p<0.05, **p<0.01, ***p<0.001
North Carolina Health Professions Data System with data from the North Carolina Community College System Data Warehouse, accessed December, 2007.

Table A4.6. Percentage Point change in Probability of Passing NCLEX on First Attempt by Student and College Characteristics†

	Coefficient	S.E.	
Age 18-23	-6.20	2.57	*
Science Competency Requirement	7.17	2.90	*
Ranking on Standardized Test Performance	5.67	2.49	*
All Lectures Taught by Faculty with Masters Degree	5.18	2.68	~
Most or All Lectures Team Taught	-5.56	2.41	*
Percentage of Faculty with Masters Degree	0.15	0.06	*

†Linear probability regression of graduation status (graduation=1 for students completing degree by Summer, 2005) on student characteristics with program random effects for 1,336 students in 42 colleges. Results are adjusted for student gender, education, and Pell Grant, employment, and enrollment status; poverty, military presence, and rurality of ZIP code of residence; and the proportion of faculty with masters degrees, faculty turnover during 2002-2005, whether all lecture sections were taught by faculty with masters degrees, and whether most or all lecture sections were team taught in the program of enrollment. Comparison case is a female student aged 24-40, white, with a high school diploma, not-employed, and enrolled full time.~p<0.06, *p<0.05, **p<0.01
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