

*The State of*  
SMALL & RURAL HOSPITALS  
IN THE CAROLINAS – UPDATE

APRIL 2010



*James B. Duke*

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THE DUKE ENDOWMENT

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SPIRIT OF GENIUS. LEGACY OF HOPE.

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## **INTRODUCTION AND PURPOSE**

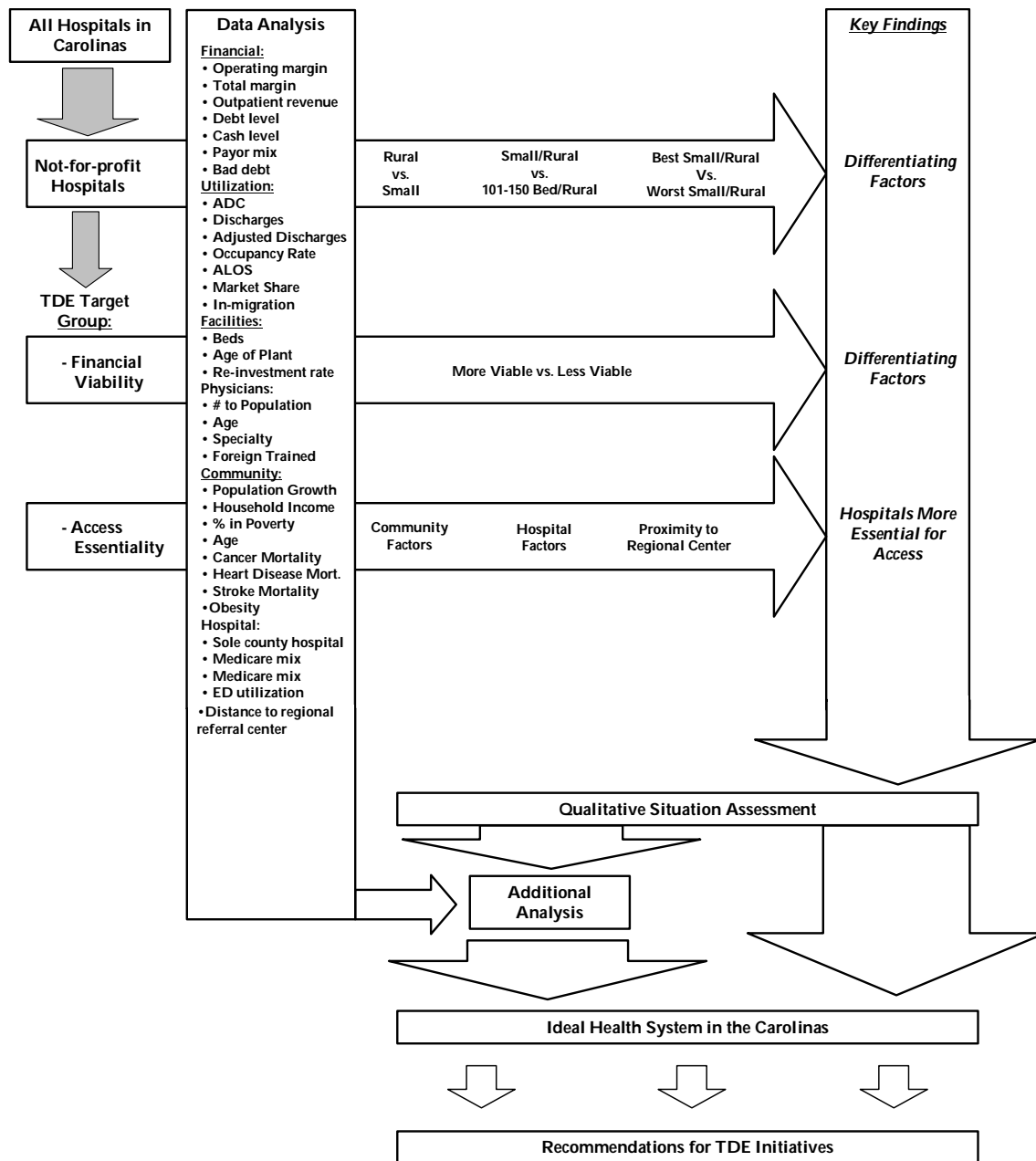
The “State of Small and Rural Hospitals in the Carolinas – Update” is the culmination of a study funded by The Duke Endowment to evaluate the health care delivery system across North and South Carolina. This study affirms and updates the findings of the original study, completed in 2008. The primary purpose of both studies has been to understand the roles of small and rural hospital providers within the health care delivery system and identify the needs of these providers and the communities they serve. From this evaluation, The Duke Endowment expects to develop targeted initiatives that will serve to strengthen the health care delivery system and ensure the long-term viability of critical health care services in rural communities across the Carolinas.

The Duke Endowment’s interest in this research area stems from its continued support of beneficiary hospitals in the Carolinas, over half of which are rural providers. The Endowment’s ongoing review of Carolinas hospitals continues to highlight the growing chasm between urban and rural hospitals. The original study found that patient volume and physician characteristics were the key drivers of this disparity. Similarly, solutions were recommended to address these issues: system affiliation, physician recruitment, targeted service development, and capital programs, for example.

This report serves to provide an updated understanding of the issues that drive the disparities between the successful and unsuccessful hospitals in the Carolinas. It includes a summary of key findings and conclusions, comparing performance and position of small and/or rural hospitals with their larger, more urban peers. This report also includes a comparative analysis among small and rural hospitals in order to better understand what factors allow some providers to succeed while many others in similar situations struggle financially. The report identifies those communities where the presence of a health care facility is essential for maintaining adequate community access to care, while conversely seeking to understand which facilities are less essential for maintaining access. Facilities designated as less essential are, nonetheless, valuable providers in their communities. However, an analysis of community and hospital factors indicates that these facilities are relatively less essential for ensuring access by their communities. The report’s conclusions provide guidance for the development of specific initiatives to support or incentivize positive change in those more essential hospitals.

## **PROCESS OVERVIEW**

The chart below illustrates the approach and process used in both the original study and this update to develop the analyses, findings and conclusions and, ultimately, the recommendations. The goal of the approach was to balance the use of actual, quantitative data with qualitative knowledge of the situations faced by each small and rural provider.



## PROFILES OF HOSPITALS IN THE CAROLINAS

Currently, a total of 172 acute care hospitals operate in the Carolinas<sup>1</sup>. (Given the purpose of the study, for-profit and dedicated specialty hospitals were excluded.) Data were analyzed for all of the 147 not-for-profit acute care hospitals in the Carolinas.

<sup>1</sup> The number of hospitals as defined by NCHA and SCHA. For example, Moses Cone's three Greensboro entities (Moses Cone, Wesley Long, and Women's Hospital) are reported as one hospital while Carolinas Hospital System and Women's Center of Carolinas Hospital System in South Carolina are reported as two hospitals.

To better understand the drivers of disparities in hospital financial performance, 25 performance indicators were examined for each of the 147 hospitals and their communities for four years, 2005 through 2008. Historical facility-based performance indicators included financial, utilization, facility, and payor statistics. Community-based indicators included physician age, education, and mix. Appendix A lists, defines, and indicates the source for each of the 25 indicators.

The process began with an analysis of the performance indicators by geographic status (rural/urban) and hospital bed size (small/large). The definitions used for these designations match those in the original study:

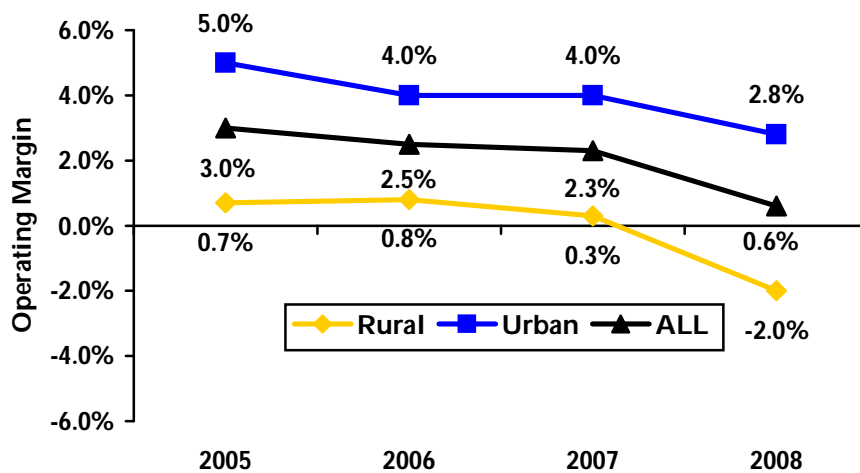
- Rural: A facility located in an area outside of a Metropolitan Statistical Area (MSA)<sup>2</sup>, or located inside a Micropolitan Statistical Area<sup>3</sup>. This definition is also currently used by the American Hospital Association to define rural hospitals.
- Small: A facility with 100 or fewer acute care beds.

The average overall performance was examined for each group during the four year period in which data were provided (see Appendix B for a list of hospitals in each group).

URBAN VS. RURAL

Using operating margin as a proxy for performance, urban facilities performed better overall than their rural counterparts.

**Operating Margin, 2005-2008: Rural vs. Urban**



Source: NCHA, SCHA

<sup>2</sup> Large population center consisting of a large metropolis and its adjacent zone of influence. Generally includes a population greater than 50,000.

<sup>3</sup> Includes at least one urban cluster of at least 10,000 persons, but less than 50,000.

Financial performance for all groups declined from 2005 to 2008 even though volumes steadily increased. Despite a relatively stable payor mix overall, bad debt and charity care increased among all groups. As expected with declining margins, all groups experienced a decline in days cash on hand.

The disparity between urban and rural as well as the extent to which a hospital's geographic status affected both small and large hospitals are consistent with the findings in the original study. Significantly, the average small and rural hospital experiences a net loss from operations while the average hospital of similar size in an urban location has a positive operating margin.

#### **Average Operating Margin Performance**

Figures are four-year averages	Rural	Urban	<b>Difference</b>
Small Hospitals	-1.4%	1.4%	<b>2.8%</b>
Larger Hospitals	2.4%	5.6%	<b>3.2%</b>

Source: NCHA, SCHA

Excludes hospitals with operating margins more than four standard deviations from the mean

The key factors that appear to have the greatest impact on the 2.8 point difference between small rural and urban hospitals include:

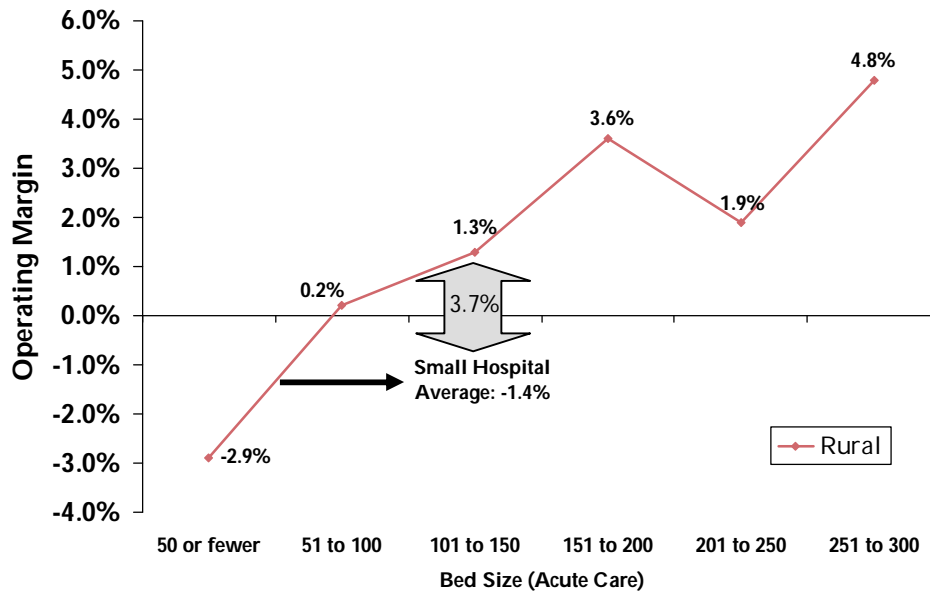
- On average, small/rural facilities are more reliant on government payors, Medicare and Medicaid (63 percent versus 51 percent), which typically offer lower reimbursement;
- There are fewer physicians within small/rural communities; those present are older, less specialized and more likely to have been trained internationally; and,
- Small/rural facilities had lower average adjusted discharge growth, and were less likely to be affiliated with systems.

These key factors were all affirmed from the original study. In the study update, small/rural facilities were found to have lower occupancy, but slightly higher days cash on hand.

#### SMALL RURAL VS. 101-150 BED RURAL

Understanding that facility size plays a significant role in operating performance regardless of geographic location, all rural hospitals were segregated by bed size using 50 bed increments to determine if operating performance has a direct correlation to a facility's bed size. While the graphic below illustrates that a linear relationship does not exist beyond 150 beds, it is quite apparent that a significant gap exists between small hospitals (less than 100 beds) and those that are only slightly larger.

### Operating Margin as Major Disparity: Small Rural vs. 101-150 Bed Rural



Source: NCHA, SCHA

This gap appears to be driven by utilization, financial structure, and physician characteristics:

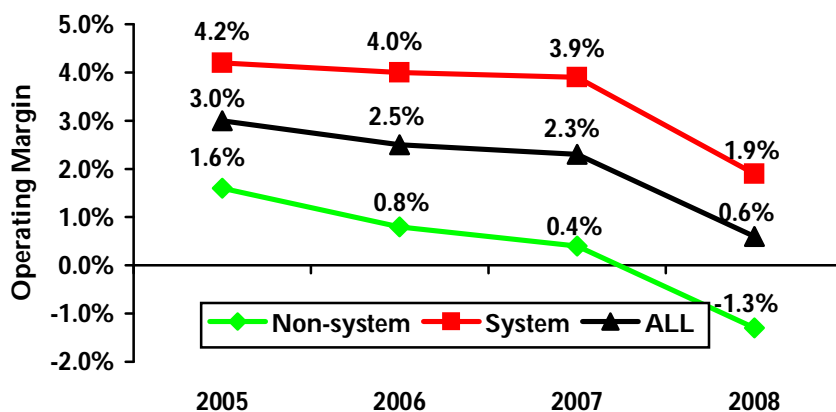
- Small rurals have an average daily census less than half that of larger rurals (23.6 versus 56.6).
- The disparity in volumes appears to be driven by a significantly greater home county market share (52 percent versus 35 percent).
- Relative to their size, small rural facilities have more debt and half the cash of the larger rurals.
- Although total physician supply is similar, small rural communities' are older and less specialized.

These key factors were all affirmed from the original study. In the study update, small rurals were found to have slightly lower lengths of stay (3.7 versus 4.0) and to rely more heavily on government payors.

#### IMPACT OF AFFILIATION

When evaluating at the impact of affiliation, it is clear that, on average, system-affiliated hospitals have outperformed non-system hospitals every year since 2005. While the original study considered affiliation status, this study update sought to understand how the financial performance of recently affiliated hospitals was affected by affiliation.

### Operating Margin, 2005-2008: System vs. Non-system



Source: NCHA, SCHA

Pre- and post-affiliation financials were available for seven previously independent hospitals that joined systems between 2005 and 2008<sup>4</sup>. Preliminary operating margins indicate positive, although somewhat mixed, results:

- Four hospitals, all with long-term management contracts, appear to have experienced a positive impact in connection with affiliation.
- Two hospitals experienced neither a positive nor negative impact.
- One hospital's relative financial performance was negative.

#### DEFINITION OF TARGET GROUP

The Target Group was identified in order to isolate the small and rural hospitals that are the focus of this study. The study update affirmed the previous definition of the Target Group which is comprised of all rural hospitals regardless of size<sup>5</sup> and all 'more rural' hospitals with an acute average daily census of 85 or less. The expanded rural definition includes a subset of MSA classified geographies that were deemed to be more rural locations. (See Appendix C for a list of designations for the hospitals in the Target Group).

The Assistance Matrix, shown below, provides a framework for the research and analysis that was completed for the Target Group. This tool was adapted from other entities seeking to best understand regional health care systems and allocate scarce resources<sup>6</sup>. By drawing distinctions between more and less financially viable providers and more and less "access essential" providers, this Assistance Matrix offers guidance

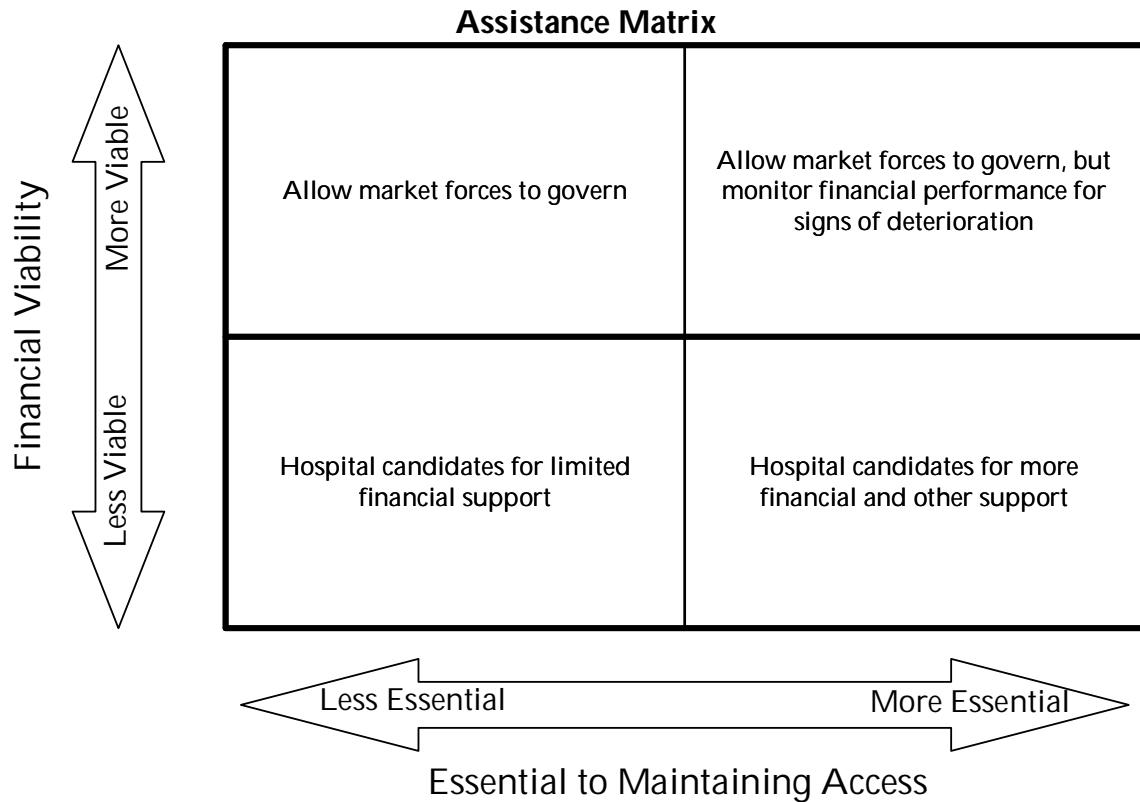
<sup>4</sup> Chatham and Columbus Regional ended affiliations with Quorum and joined new systems.

<sup>5</sup> As with the original study, FirstHealth Moore was excluded.

<sup>6</sup> The Assistance Matrix was used by the New Jersey Commission on Rationalizing Health Resources, Interim Report, June 29, 2007.



regarding the degree to which financial and other support is needed by the local community.



**TARGET GROUP: FINANCIAL VIABILITY**

Operating margin was chosen as the best measure of overall profitability, as it excludes non-operating revenue (often less controllable and not tied to hospital performance). In addition, it was necessary to use a metric that is universally calculated and available within the two state databases. An analysis of total margin reflects similar trends to operating margin.

The Target Group was separated into four categories by average operating margin over the four year period:

- More Financially Viable:
  1. Best Hospitals: Achieved average operating margins greater than or equal to one standard deviation above the mean, a range of 8.1 percent to 16.3 percent.
  2. Above Average: Achieved operating margins greater than the mean, but less than one standard deviation above the mean, a range of 0.0 percent to 7.3 percent.

- Less Financially Viable:
  3. Below Average: Achieved average operating margins less than the mean, but within one standard deviation below the mean, a range of -0.7 percent to -8.1 percent.
  4. Worst Hospitals: Achieved average operating margins one standard deviation or more below the mean, a range of -8.6 percent to -53.2 percent.

The following table shows the number of hospitals assigned to each group and the four-year average operating margin for each group:

<b>Four Year Average Operating Margin Performance</b>					
	Worst	Below Avg.	Above Avg.	Best	All
Number of Facilities	9	27	52	4	92
Operating Margin	-17.9%	-3.6%	2.9%	10.3%	-0.6%

See Appendix D for a list of hospitals by group  
Source: NCHA, SCHA

An analysis of the historical performance indicators defined in Appendix A identifies those factors that are instrumental to financial viability, as well as factors of less importance. Indicators were assessed for their contribution to financial performance using regression analysis and are ranked according to the strength of their contribution in the table below:

<b>Indicators Ranked by Contribution to Financial Performance</b>	
<b>Rank</b>	<b>Indicator</b>
1	Primary Specialty Physician Mix (Lower % of primary care physicians led to higher performance)
2	Overall Occupancy Rate (using Licensed Beds)
3	Average Length of Stay (General Acute Care Only)
4	Overall Occupancy Rate (using Staffed Beds)
5	Physician to Population
6	Bad Debt as a % of Gross Revenue (Charges)
7	Long Term Debt to Net Assets
8	Market Share of Home County
9	Adjusted Discharges
10	Days Cash on Hand
11	Physician over 65 years of age
12	Medicaid as a % of Gross Revenue (Charges)
13	Medicare as a % of Gross Revenue (Charges)
14	Commercial Payors as a % of Gross Revenue (Charges)
15	Acute Discharges
16	Charity Care as a % of Gross Revenue (Charges)
17	Acute Average Daily Census
18	Number of Acute Care Beds
19	% in System
20	Spread between Adjusted Discharge Growth and Population Growth
21	% In-migration to Hospital
22	Outpatient Revenue (Lower % of outpatient revenue led to higher performance)
23	Physician % foreign trained
24	New Property Plant & Equipment to Depreciation Ratio
25	Average Age of Plant

Based on the results of the regression analysis, the top five performance indicators were determined to have strong to moderate relationships to financial performance. Indicators ranked six and below were determined to have limited or no relationship with financial performance. Please see Appendix D for charts which demonstrate that relationship.

Large disparities exist between the Best and Worst performing hospitals, particularly with respect to inpatient volume. On average, Best performing hospitals have:

- Acute discharges nearly two times more than the Worst hospitals.
- Nearly equal numbers of primary and specialty care physicians whereas Worst hospitals have two-thirds of physicians practicing primary care.
- Higher amounts of commercial pay than Worst hospitals, but similar amounts of Medicaid and charity care.

#### Performance Indicators by Financial Viability Category

Figures are four-year averages	<b>Operating Margin Performance</b>				
	Worst	Below Avg.	Above Avg.	Best	All
Occupancy Rate (Using Licensed Beds)	33%	44%	48%	56%	46%
Acute ADC	18.2	28.9	56.3	32.3	43.7
Acute Discharges	1,619	2,610	5,004	3,111	3,908
Primary Specialty Physician Mix	66%	60%	57%	55%	59%
Commercial Payors as a % of Gross Revenue	25%	25%	26%	35%	26%
Medicaid as a % of Gross Revenue	16%	16%	15%	15%	15%
Bad Debt as a % of Gross Revenue	8%	8%	7%	6%	7%
Charity Care as a % of Gross Revenue	4%	2%	3%	3%	3%

Source: NCHA, SCHA

#### **TARGET GROUP: ESSENTIALITY**

Hospitals in the Carolinas are essential resources in maintaining the health of their communities. At the same time, not all hospitals are equally essential to maintaining access for their communities. For example, in communities with access to two or more hospitals within thirty minutes, each individual hospital is less essential to maintaining the community's access to hospital care. In contrast, for communities whose access is limited to only one hospital within an hour's drive time, that single hospital is more essential for maintaining access.

Without these more essential facilities communities that are more geographically isolated, have higher than average poverty, and higher than average disease rates would experience considerable difficulty in accessing needed health care services. To best quantify the degree of essentiality across communities within the Carolinas, both the original study and the study update examined a range of community indicators. Age, income, and population growth for each hospital's home county were weighed alongside disease burden and geographic access to specialty services.

### Community Indicators

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- Population growth
- Household income
- Population in poverty
- Population 65 +
- Obesity Rate
- Cancer mortality
- Heart disease mortality
- Stroke mortality
- Time to referral center \*

\*Referral centers were defined as hospitals offering open heart surgery and/or with an ADC greater than 190.

In addition, facility-specific metrics were examined to determine the degree to which a hospital served as a safety-net provider. This analysis evaluated the proportion of government payors, emergency department utilization, and whether a hospital was the only acute care provider in its county.

### Hospital Indicators

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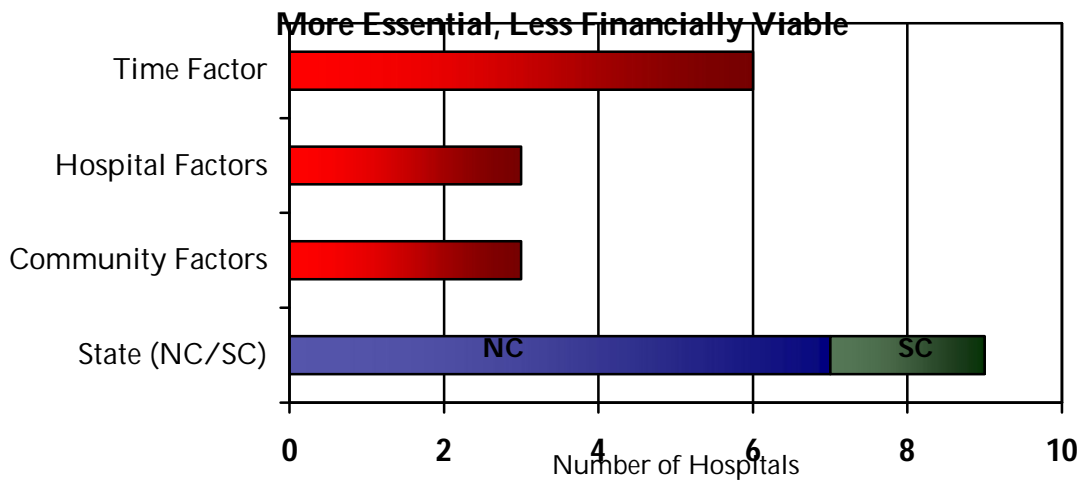
- Sole county provider
- Medicare mix
- Medicaid mix
- Emergency department visits to population ratio

This updated study used current data for the same community and hospital indicators as the original study with one addition, obesity rates<sup>7</sup>. Hospitals were assigned a score for each indicator based on that indicator's measurement relative to other hospitals. Each hospital's total score was the result of the sum of the indicator scores. The hospitals with the highest total scores were deemed "More Essential" providers for maintaining access. Moreover, any sole county provider located more than one hour from a regional referral center was automatically designated "More Essential," without regard for its community and hospital indicator scores. Appendix E defines and indicates the source for each of the Community and Hospital indicators.

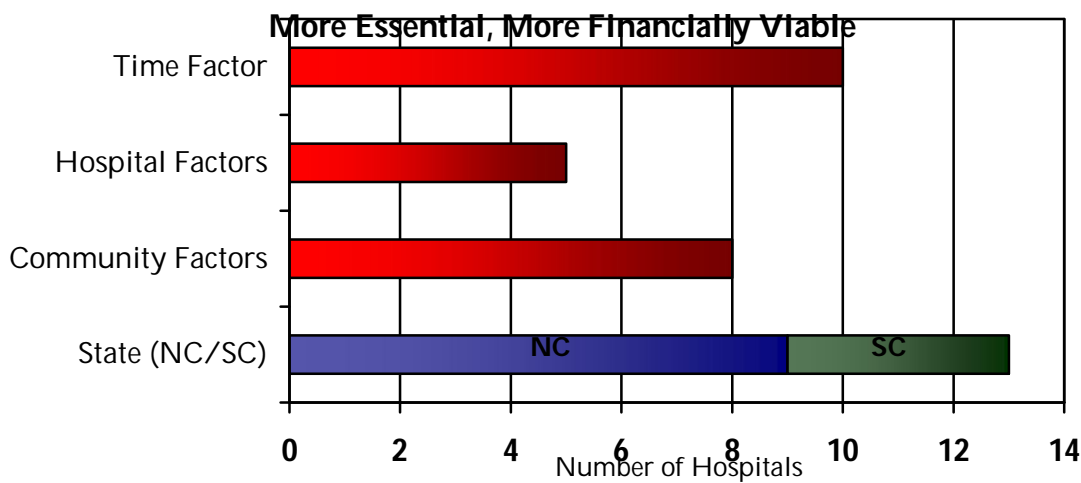
The following chart shows the number of "More Essential" providers for maintaining access that were also determined to be "Less Financially Viable" based on the preceding financial analysis. In addition, the chart shows to what degree community, hospital, and/or time (i.e., a sole county provider located more than one hour from a regional referral center) contributed to the essential status designation.

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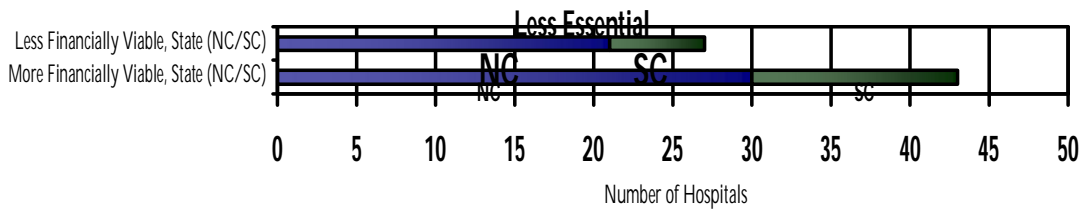
<sup>7</sup> In cases where obesity rates were not available for an individual county, regional obesity rates were used.



The table below presents the “More Essential” providers that were determined to be “More Financially Viable” based on the preceding financial analysis.



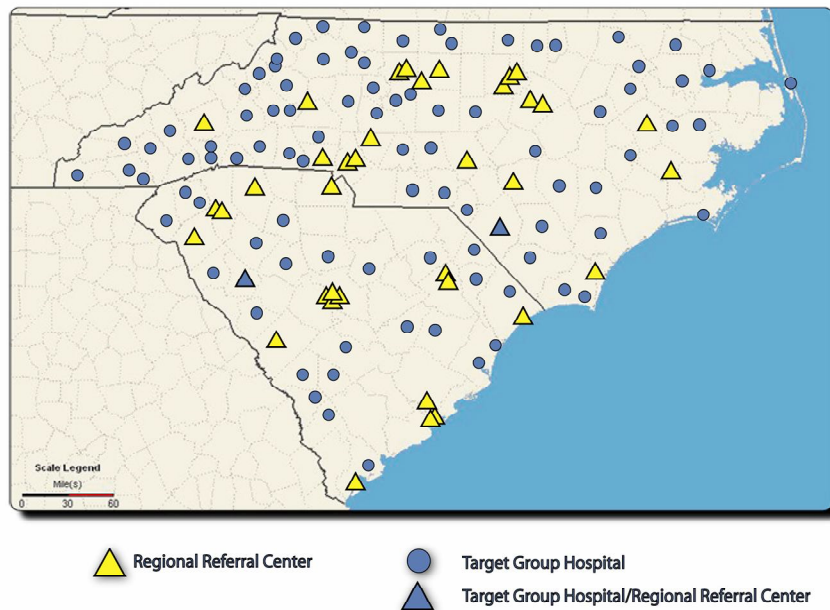
The following chart presents the two remaining categories of hospitals which complete the Assistance Matrix. As defined above, these hospitals are deemed to be “Less Essential” for maintaining access and are divided into “More Financially Viable” and “Less Financially Viable” categories based on the preceding financial analysis.



As shown on the map below, regional referral centers- defined as hospitals with an average daily census greater than 190 and/or offering open heart surgery services—are fairly well distributed throughout the Carolinas. Only 26 hospitals are located more than one hour drive time from a regional referral center located in the Carolinas. (Of these 26, some are located within an hour drive time of regional referral centers in bordering states.)

Those areas with limited access to regional referral centers are largely rural, sparsely populated, and geographically isolated (e.g., northeast North Carolina, High Country North Carolina, western North Carolina, between the Midlands and Lowcountry South Carolina). Smaller, less viable hospitals are somewhat concentrated in more rural, geographically isolated areas.

Target Group Hospitals and Regional Referral Centers

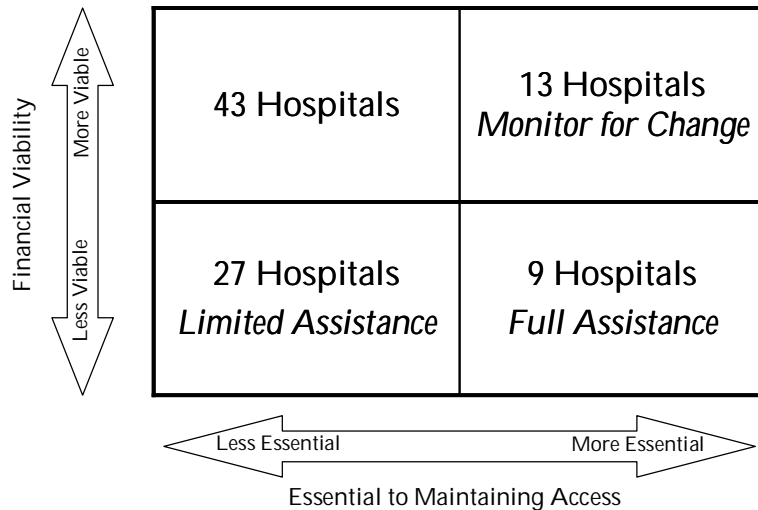


**SUMMARY OF ASSISTANCE MATRIX**

As stated above, financial success, as measured by operating margin, is driven by higher inpatient utilization and volume. Hospitals with a greater mix of specialty physicians are more likely to achieve above average financial performance. A higher mix of commercial patients is associated with operating margins that are higher overall, but Medicaid and charity mix do not appear to correlate strongly. However, increases in charity care over time correspond to declining financial performance. On average, hospitals with dissimilar financial performance showed little difference in age of plant, the number of acute care beds, and the percentage of physicians that are foreign trained. These findings suggest that hospitals, small and rural, should focus on building volume and recruiting/retaining physicians, particularly specialists, to achieve long-term financial viability.

The intersection of the financial and essentiality analyses completes the Assistance Matrix, which serves not only as a tool for future funding initiatives, but also in envisioning how hospital-based care should be organized across the Carolinas.

Assistance Matrix



MORE ESSENTIAL HOSPITALS – DISPARITIES IN FINANCIAL PERFORMANCE

Of the 22 hospitals that were determined to be more essential via the assistance matrix, 13 were considered more financially viable, with the remaining nine being classified as less financially viable. An analysis was completed to understand factors driving this disparity for two primary reasons:

1. To determine if drivers of variation were similar for this group compared to the broader target group of 92 hospitals; and,
2. To assist The Endowment with the development of hospital-specific funding initiatives that will incentivize the improvement of those key factors within less viable hospitals.

Based on the analysis, the primary differentiating factors between these groups appears to be volume, with more viable facilities having two times the acute average daily census as less viable facilities, driven by greater local market share and higher rates of in-migration. Although variation in physician characteristics persists, it does not appear to be as significant a driver as volume. Less viable hospitals are unable to re-invest enough in facilities to offset depreciation, perhaps a result of lower volumes and physician characteristics.

#### More Essential Hospitals: Differentiating Factors

Figures are four-year averages	More Essential Hospitals	
	Less Viable	More Viable
Acute ADC	15.0	33.3
Overall Occupancy Rate (using Licensed Beds)	36.4%	46.4%
Market Share of Home County	29.6%	49.1%
Percent In-migration to Hospital	14.5%	27.1%
Physician over 65 years of age	21.6%	16.7%
Physician to Population (per 100,000)	110.8	119.7
Primary Specialty Physician Mix	69.2%	64.1%
Average Age of Plant	14.3	9.6
New Property Plant & Equipment to Depreciation Ratio	0.9	2.5

#### THE IDEAL HEALTH SYSTEM IN THE CAROLINAS

The development of specific initiatives to support or incentivize positive change in essential hospitals should be guided by an understanding of where each hospital is located relative to the ideal health system in the Carolinas.

The goal of defining the ideal health system in the Carolinas is to understand how health resources would “ideally” be distributed throughout the two states if starting from scratch and developing a care delivery model that most closely matches population demand with health care facilities/services. The ideal health care system in the Carolinas—as measured by sufficient volume demand by the population to support effective levels of utilization and quality delivery, as well as sustainable financial performance—would be based on the following segmentation by county population.<sup>8</sup>

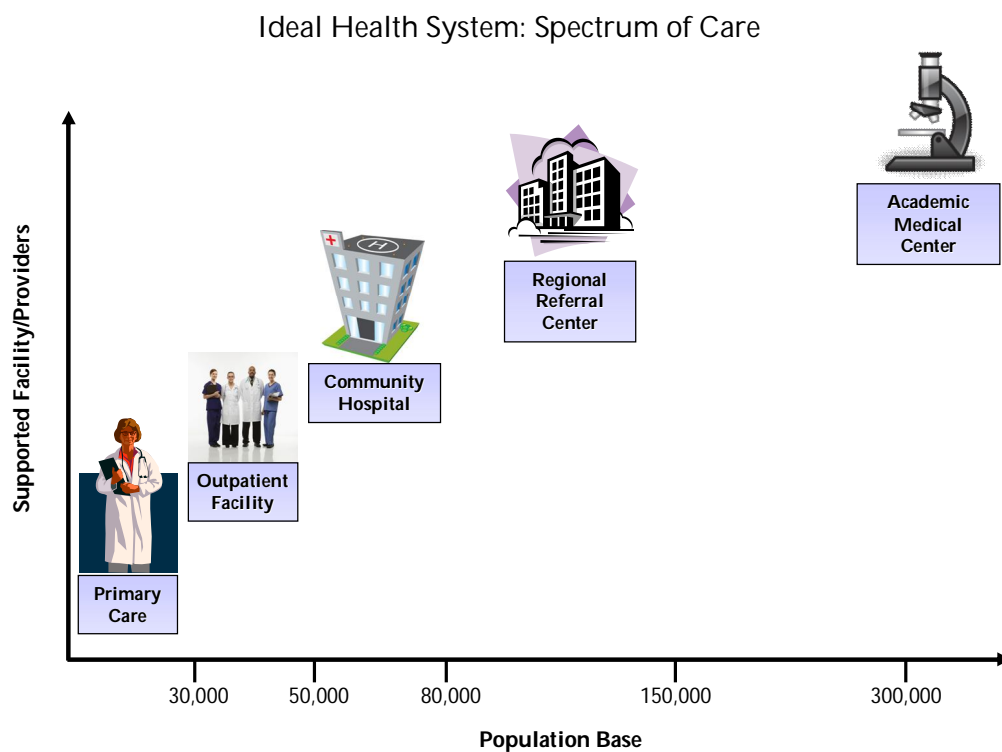
- Adjacent counties with population totaling at least 300,000 or more would support development of a larger **academic medical center**.
- Counties with populations of 80,000 to 150,000 would support development of **regional referral centers**.

<sup>8</sup> Please note that any attempt to design an ideal system founded on population-based utilization represents a reasonable, overall approach for both states. However, such analysis may require adjustments in particular markets given that county boundaries, on which this analysis is based, do not always represent trade/service/traffic patterns. In addition, this analysis does not consider the availability of health services in neighboring states, which in some cases represents the closest regional or tertiary facility.



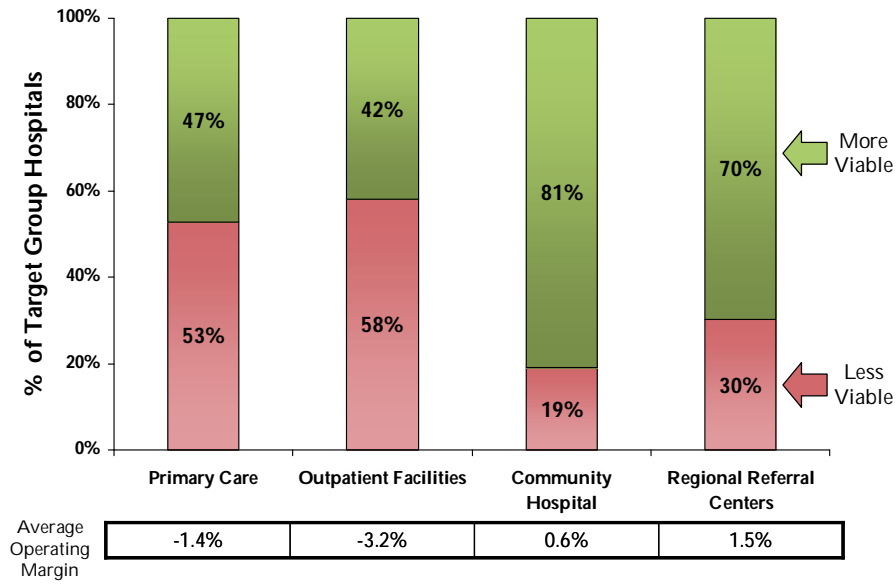
- Counties with populations of 50,000 to 80,000 would support development of **community hospitals**.
- Counties with populations of 30,000 to 50,000 would support development of large **outpatient facilities**, including freestanding emergency departments, outpatient surgery, full-scale imaging, primary and specialty physician practices.
- Counties with populations of less than 30,000 would support development of **primary care**, rotating specialists, urgent care, and basic imaging.

Please see Appendix F for a matrix presenting the ideal health system service offerings by level of care; an illustration of the ideal health system is presented below.



The Target Group hospitals were separated into the ideal health system categories based on their home county population; none fell into the Academic Medical Center category. As shown below, hospitals in the Community Hospital and Regional Referral Center categories were far more likely to demonstrate above average financial performance than hospitals in markets with lower populations.

## Ideal Health System: Financial Viability of Target Group Hospitals



Source: NCHA, SCHA

Although change cannot be forced on to the existing health care system in the Carolinas, incentives via The Endowment's funding process can encourage the development of a more ideal system that provides reasonable access to the most appropriate level of services, while ensuring well-utilized, high quality, financially sustainable program and service delivery.

### CONCLUSION

Any hospital-specific recommendations developed by The Endowment should be designed to assist hospitals with improvement in those areas that were determined to be key drivers of financial performance. In addition, The Endowment should also consider the extent to which funding initiatives promote or improve the "appropriate" level of services supported by the population according to the hospital's position within the ideal health system. As The Endowment funds these initiatives, it should also prepare to monitor the results to ensure that they are having the desired impact and to assist with determining how long funding for those initiatives should be continued. The Target Group should be re-evaluated over time to determine any changes in essentiality or financial viability that would realign the priority hospitals. Recent developments in health care reform are also expected to have a significant impact on the health care system in the Carolinas, especially in the latter half of this decade. Although the specific impact of reform is yet to be determined, it is fairly certain that any efforts by The Endowment to assist hospitals with physician recruitment/infrastructure or system affiliation can only help to better position Carolina hospitals for the future.

## APPENDIX A

Indicator	Source	Additional Clarification
Acute Average Daily Census	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Acute Discharges	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Adjusted Discharges	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Average Age of Plant	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Average Length of Stay (General Acute Care Only)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Bad Debt as a % of Gross Revenue (Charges)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Charity Care as a % of Gross Revenue (Charges)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Commercial Payors as a % of Gross Revenue (Charges)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Days Cash on Hand	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Long Term Debt to Net Assets	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Market Share of Home County	Solucient NC 2005-2006; NC Hospital License Renewal Applications 2007-2008; SC Office of Research and Statistics 2005-2008	
Medicaid as a % of Gross Revenue (Charges)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Medicare as a % of Gross Revenue (Charges)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
New PP&E to Depreciation Ratio	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Number of Acute Care Beds	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Outpatient Revenue	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Overall Occupancy Rate (using Licensed Beds)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Overall Occupancy Rate (using Staffed Beds)	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database	
Percent in System	2005-2008 NCHA ANDI database; 2005-2008 SCHA JARS database; HPS Research	Percent of the hospitals in the designated performance category or group that belong to a hospital system
Percent In-migration in County	Solucient NC 2005-2006; NC Hospital License Renewal Applications 2007-2008; SC Office of Research and Statistics 2005-2008	Percent of the home county inpatient discharges from patients originating outside the county.
Physician % foreign trained	NC Medical Board; SC Office of Research and Statistics	Percent of the home county physicians that received their medical training outside of the U.S.
Physician over 65 years of age	NC Medical Board; SC Office of Research and Statistics	Percent of home county physicians older than 65 years of age
Physician to Population	NC Medical Board; SC Office of Research and Statistics; 2005-2008 NC Office of State Budget and Management; 2005-2009 U.S. Census Bureau for SC	Number of physicians divided by the population for home county
Primary Specialty Physician Mix	NC Medical Board; SC Office of Research and Statistics	Percentage of home county physicians practicing primary care
Spread between Adjusted Discharge Growth and Population Growth	2005-2008 NCHA ANDI database; 2005-2008 NC Office of State Budget and Management; 2005-2008 SCHA JARS database; 2005-2008 U.S. Census Bureau for SC	Difference in hospital's adjusted discharges four year compound annual growth rate and home county population's four year compound annual growth rate

## APPENDIX B

Hospital	Small/Large	Urban/Rural	Target Group
Abbeville Area Medical Center	Small	Rural	Yes
Alamance Regional Medical Center	Large	Urban	No
Albemarle Hospital	Large	Urban	No
Alleghany Memorial Hospital	Small	Rural	Yes
Allen Bennett Memorial Hospital	Small	Urban	No
Allendale County Hospital	Small	Rural	Yes
Angel Medical Center	Small	Rural	Yes
AnMed Health Medical Center	Large	Urban	No
AnMed Health Womens & Childrens	Large	Urban	No
Annie Penn Hospital	Large	Rural	Yes
Anson Community Hospital	Small	Rural	Yes
Ashe Memorial Hospital	Small	Rural	Yes
Bamberg County Memorial Hospital	Small	Rural	Yes
Barnwell County Hospital	Small	Rural	Yes
Beaufort County Hospital (NC)	Large	Rural	Yes
Beaufort Memorial Hospital (SC)	Large	Rural	Yes
Bertie Memorial Hospital	Small	Rural	Yes
Betsy Johnson Regional Hospital	Large	Urban	Yes
Bladen Healthcare, LLC	Small	Rural	Yes
Blowing Rock Hospital	Small	Rural	Yes
Blue Ridge Regional Hospital	Small	Rural	Yes
Bon Secours St Francis Xavier	Large	Urban	No
Brunswick Community Hospital	Small	Urban	Yes
Caldwell Memorial Hospital	Large	Urban	Yes
Cannon Memorial Hospital (NC)	Small	Rural	Yes
Cannon Memorial Hospital (SC)	Small	Urban	Yes
Cape Fear Valley	Large	Urban	No
CarolinaEast Medical Center	Large	Urban	No
Carolinas Medical Center	Large	Urban	No
Carolinas Medical Center-Lincoln	Large	Urban	Yes
Carolinas Medical Center-Mercy	Large	Urban	No
Carolinas Medical Center-NorthEast	Large	Urban	No
Carolinas Medical Center-Pineville	Large	Urban	No
Carolinas Medical Center-Union	Large	Urban	No
Carolinas Medical Center-University	Large	Urban	No
Carteret County General Hospital	Large	Rural	Yes
Catawba Valley Medical Center	Large	Urban	No
Charleston Memorial Hospital	Small	Urban	No
Chatham Hospital	Small	Urban	Yes
Chowan Hospital	Small	Rural	Yes
Clarendon Memorial Hospital	Small	Rural	Yes
Cleveland Regional Medical Center	Large	Rural	Yes
Columbus Regional Healthcare System	Large	Rural	Yes
Conway Hospital Inc	Large	Urban	No
Davie County Hospital	Small	Urban	Yes
Duke Raleigh Hospital	Large	Urban	No
Duke University Hospital	Large	Urban	No
Duplin General Hospital	Small	Rural	Yes
Durham Regional Hospital	Large	Urban	No
Edgefield County Hospital	Small	Urban	Yes
Fairfield Memorial Hospital	Small	Urban	Yes
FirstHealth Montgomery Memorial Hospital	Small	Rural	Yes
FirstHealth Moore Regional Hospital	Large	Rural	No
FirstHealth Richmond Memorial Hospital	Small	Rural	Yes
Forsyth Medical Center	Large	Urban	No

Hospital	Small/Large	Urban/Rural	Target Group
Gaston Memorial Hospital	Large	Urban	No
Georgetown Memorial Hospital	Large	Rural	Yes
Grace Hospital	Large	Urban	Yes
Granville Health System	Small	Urban	Yes
Greenville Memorial Med Ctr	Large	Urban	No
Halifax Regional Medical Center	Large	Rural	Yes
Hampton Regional Medical Center	Small	Rural	Yes
Harris Regional Hospital	Small	Rural	Yes
Haywood Regional Medical Center	Large	Urban	Yes
Heritage Hospital	Large	Urban	Yes
High Point Regional Health System	Large	Urban	No
Highlands-Cashiers Hospital	Small	Rural	Yes
Hillcrest Memorial Hospital	Small	Urban	No
Hoots Memorial Hospital	Small	Rural	Yes
Hugh Chatham Memorial Hospital	Small	Rural	Yes
Iredell Memorial Hospital	Large	Rural	Yes
J. Arthur Doshier Memorial Hospital	Small	Urban	Yes
Johnston Memorial Hospital	Large	Urban	No
Kershaw County Medical Center	Large	Urban	Yes
Kings Mountain Hospital	Small	Rural	Yes
Laurens County Hospital	Small	Urban	Yes
Lenoir Memorial Hospital	Large	Rural	Yes
Lexington Medical Center	Large	Urban	No
Lexington Memorial Hospital	Small	Rural	Yes
Loris Community Hospital	Large	Urban	Yes
Margaret R. Pardee Memorial Hospital	Large	Urban	Yes
Maria Parham Hospital	Small	Rural	Yes
Marion County Medical Center	Large	Rural	Yes
McLeod Medical Center - Dillon	Small	Rural	Yes
McLeod Medical Center-Darlington	Small	Urban	Yes
McLeod Regional Med Ctr - Pee Dee	Large	Urban	No
Medical Park Hospital	Large	Urban	No
Mission Hospital	Large	Urban	No
Morehead Memorial Hospital	Large	Urban	Yes
Moses Cone HS - Greensboro Operations	Large	Urban	No
Murphy Medical Center	Small	Rural	Yes
Musc Medical Center	Large	Urban	No
Nash Health Care System	Large	Urban	No
New Hanover Regional Medical Center	Large	Urban	No
Newberry County Memorial Hospital	Small	Rural	Yes
North Carolina Baptist Hospital	Large	Urban	No
Northern Hospital of Surry County	Small	Rural	Yes
Oconee Memorial Hospital	Large	Rural	Yes
Onslow Memorial Hospital	Large	Urban	No
Our Community Hospital	Small	Rural	Yes
Palmetto Baptist Med Ctr Easley	Small	Urban	Yes
Palmetto Health Baptist	Large	Urban	No
Palmetto Health Richland	Large	Urban	No
Park Ridge Hospital	Small	Urban	Yes
Pender Memorial Hospital	Small	Rural	Yes
Person Memorial Hospital	Small	Urban	Yes
Pitt County Memorial Hospital	Large	Urban	No
Presbyterian Healthcare	Large	Urban	No
Presbyterian Hospital Huntersville	Small	Urban	No
Presbyterian Hospital Matthews	Large	Urban	No

<b>Hospital</b>	<b>Small/Large</b>	<b>Urban/Rural</b>	<b>Target Group</b>
Providence Hospital	Large	Urban	No
Providence Hospital Northeast	Small	Urban	No
Pungo District Hospital Corporation	Small	Rural	Yes
Randolph Hospital	Large	Urban	Yes
Regional Medical Center of Orangeburg and Calhoun Counties	Large	Rural	Yes
Rex Healthcare	Large	Urban	No
Roanoke-Chowan Hospital	Small	Rural	Yes
Roper Hospital, Inc.	Large	Urban	No
Rowan Regional Medical Center	Large	Rural	Yes
Rutherford Hospital	Large	Rural	Yes
Sampson Regional Medical Center	Large	Rural	Yes
Scotland Memorial Hospital	Small	Rural	Yes
Self Regional Healthcare	Large	Rural	Yes
Southeastern Regional Medical Center	Large	Rural	Yes
Spartanburg Regional Medical Ctr	Large	Urban	No
St. Francis - Downtown	Large	Urban	No
St. Francis - Eastside	Large	Urban	No
St. Luke's Hospital	Small	Rural	Yes
Stanly Regional Medical Center	Small	Rural	Yes
Stokes-Reynolds Memorial Hospital	Small	Rural	Yes
Swain County Hospital	Small	Rural	Yes
The McDowell Hospital	Small	Rural	Yes
The Outer Banks Hospital	Small	Rural	Yes
Thomasville Medical Center	Large	Rural	Yes
Transylvania Community Hospital	Small	Rural	Yes
Tuomey	Large	Urban	No
UNC Hospitals	Large	Urban	No
Valdese General Hospital	Large	Urban	Yes
Waccamaw Community Hospital	Small/Large	Rural	Yes
WakeMed	Large	Urban	No
WakeMed Cary Hospital	Large	Urban	No
Wallace Thomson Hospital	Large	Rural	Yes
Watauga Medical Center	Large	Rural	Yes
Wayne Memorial Hospital	Large	Urban	No
Wilkes Regional Medical Center	Large	Rural	Yes
Williamsburg Regional Hospital	Small	Rural	Yes
Wilson Medical Center	Large	Rural	Yes

## APPENDIX C

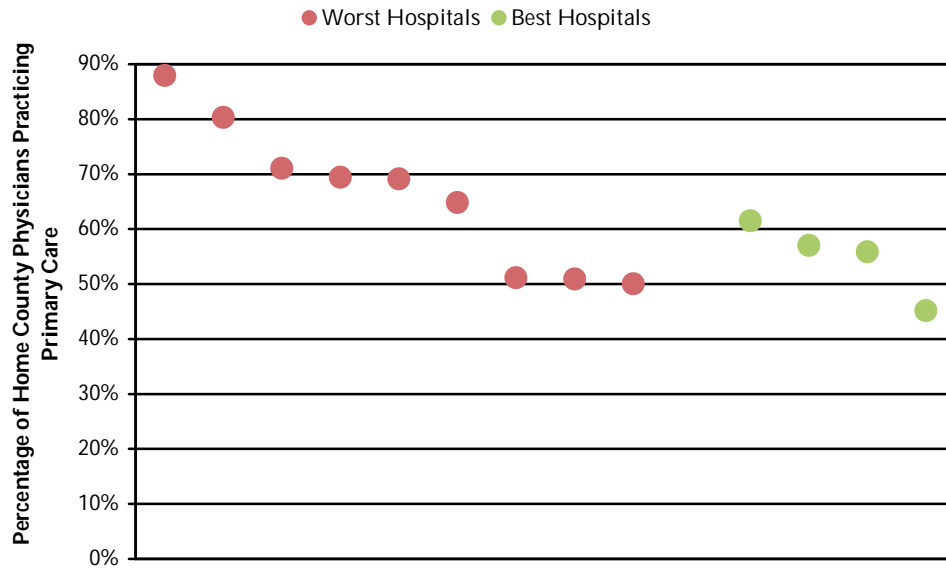
Hospital	More Rural	Rural (not in MSA)	Small (ADC under 85)
Abbeville Area Medical Center		Yes	Yes
Alleghany Memorial Hospital		Yes	Yes
Allendale County Hospital		Yes	Yes
Angel Medical Center		Yes	Yes
Annie Penn Hospital		Yes	Yes
Anson Community Hospital		Yes	Yes
Ashe Memorial Hospital		Yes	Yes
Bamberg County Memorial Hospital		Yes	Yes
Barnwell County Hospital		Yes	Yes
Beaufort County Hospital (NC)		Yes	Yes
Beaufort Memorial Hospital (SC)		Yes	
Bertie Memorial Hospital		Yes	Yes
Betsy Johnson Regional Hospital	Yes		Yes
Bladen Healthcare, LLC		Yes	Yes
Blowing Rock Hospital		Yes	Yes
Blue Ridge Regional Hospital		Yes	Yes
Brunswick Community Hospital	Yes		Yes
Caldwell Memorial Hospital	Yes		Yes
Cannon Memorial Hospital (NC)		Yes	Yes
Cannon Memorial Hospital (SC)	Yes		Yes
Carolinas Medical Center-Lincoln	Yes		Yes
Carteret County General Hospital		Yes	Yes
Chatham Hospital	Yes		Yes
Chowan Hospital		Yes	Yes
Clarendon Memorial Hospital		Yes	Yes
Cleveland Regional Medical Center		Yes	
Columbus Regional Healthcare System		Yes	Yes
Davie County Hospital	Yes		Yes
Duplin General Hospital		Yes	Yes
Edgefield County Hospital	Yes		Yes
Fairfield Memorial Hospital	Yes		Yes
FirstHealth Montgomery Memorial Hospital		Yes	Yes
FirstHealth Richmond Memorial Hospital		Yes	Yes
Georgetown Memorial Hospital		Yes	
Grace Hospital	Yes		Yes
Granville Health System	Yes		Yes
Halifax Regional Medical Center		Yes	
Hampton Regional Medical Center		Yes	Yes
Harris Regional Hospital		Yes	Yes
Haywood Regional Medical Center	Yes		Yes
Heritage Hospital	Yes		Yes
Highlands-Cashiers Hospital		Yes	Yes
Hoots Memorial Hospital		Yes	Yes
Hugh Chatham Memorial Hospital		Yes	Yes
Iredell Memorial Hospital		Yes	
J. Arthur Doshier Memorial Hospital	Yes		Yes
Kershaw County Medical Center	Yes		Yes
Kings Mountain Hospital		Yes	Yes
Laurens County Hospital	Yes		Yes
Lenoir Memorial Hospital		Yes	

<b>Hospital</b>	<b>More Rural</b>	<b>Rural (not in MSA)</b>	<b>Small (ADC under 85)</b>
Lexington Memorial Hospital		Yes	Yes
Loris Community Hospital	Yes		Yes
Margaret R. Pardee Memorial Hospital	Yes		Yes
Maria Parham Hospital		Yes	Yes
Marion County Medical Center		Yes	Yes
McLeod Medical Center - Dillon		Yes	Yes
McLeod Medical Center-Darlington	Yes		Yes
Morehead Memorial Hospital	Yes		Yes
Murphy Medical Center		Yes	Yes
Newberry County Memorial Hospital		Yes	Yes
Northern Hospital of Surry County		Yes	Yes
Oconee Memorial Hospital		Yes	Yes
Our Community Hospital		Yes	Yes
Palmetto Baptist Med Ctr Easley	Yes		Yes
Park Ridge Hospital	Yes		Yes
Pender Memorial Hospital		Yes	Yes
Person Memorial Hospital	Yes		Yes
Pungo District Hospital Corporation		Yes	Yes
Randolph Hospital	Yes		Yes
Regional Medical Center of Orangeburg and Calhoun Counties		Yes	
Roanoke-Chowan Hospital		Yes	Yes
Rowan Regional Medical Center		Yes	
Rutherford Hospital		Yes	Yes
Sampson Regional Medical Center		Yes	Yes
Scotland Memorial Hospital		Yes	Yes
Self Regional Healthcare		Yes	
Southeastern Regional Medical Center		Yes	
St. Luke's Hospital		Yes	Yes
Stanly Regional Medical Center		Yes	Yes
Stokes-Reynolds Memorial Hospital		Yes	Yes
Swain County Hospital		Yes	Yes
The McDowell Hospital		Yes	Yes
The Outer Banks Hospital		Yes	Yes
Thomasville Medical Center		Yes	Yes
Transylvania Community Hospital		Yes	Yes
Valdese General Hospital	Yes		Yes
Waccamaw Community Hospital		Yes	Yes
Wallace Thomson Hospital		Yes	Yes
Watauga Medical Center		Yes	Yes
Wilkes Regional Medical Center		Yes	Yes
Williamsburg Regional Hospital		Yes	Yes
Wilson Medical Center		Yes	



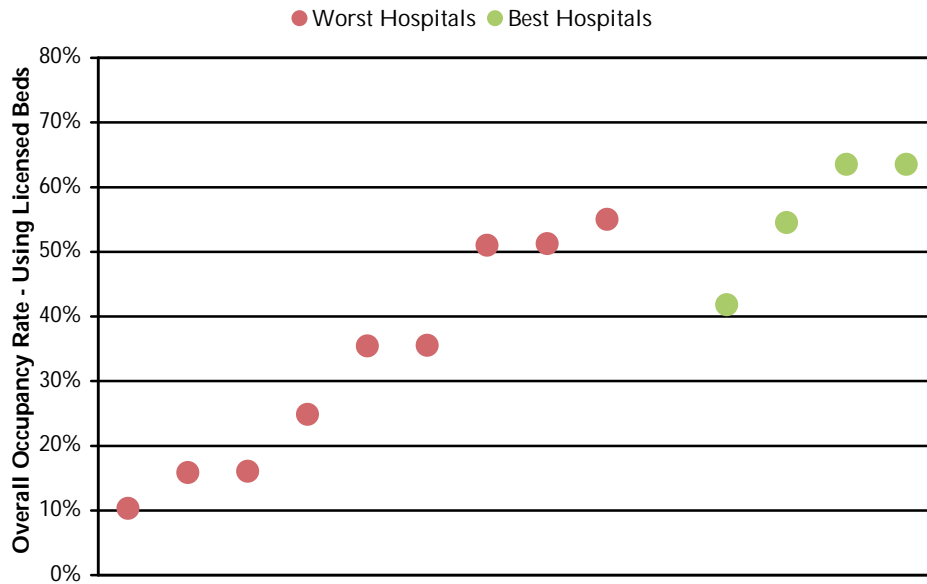
## APPENDIX D

### Primary Specialty Physician Mix



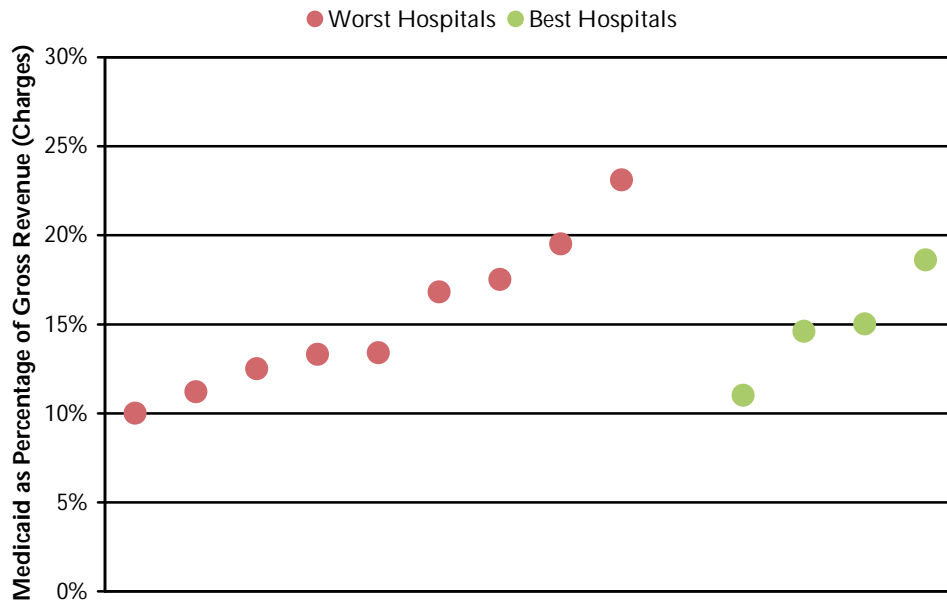
Source: NCHA, SCHA

### Overall Occupancy Rate - Using Licensed Beds



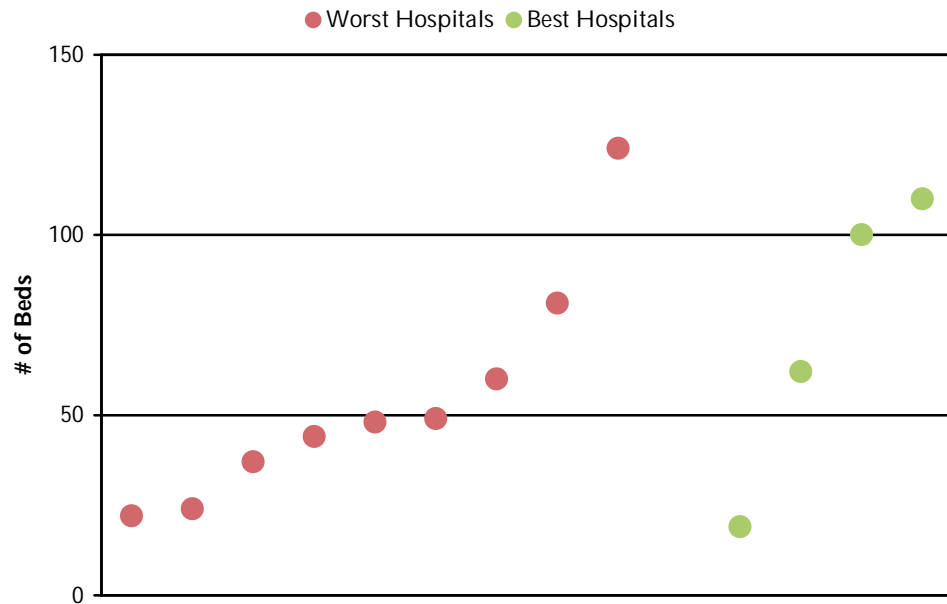
Source: NCHA, SCHA

### Medicaid as % of Gross Revenue



Source: NCHA, SCHA

### Number of Acute Care Beds



Source: NCHA, SCHA

## APPENDIX E

	Definition	Source	Target Group Mean	Target Group Standard Deviation
COMMUNITY INDICATORS				
Population growth	Home county population four year compound annual growth rate	2005-2008 NC Office of State Budget and Management; 2005-2008 U.S. Census Bureau for SC	0.9%	1.2%
Household income	Median household income for home county population	U.S. Census Bureau 2008	\$39,389	\$6,341
Population in poverty	Percent of home county population in poverty	U.S. Census Bureau 2008	18%	5%
Population 65 +	Percent of home county population older than 65 years of age	U.S. Census Bureau 2008	9%	2%
Cancer mortality	Annual deaths per 100,00 people from cancer in the home county population	Mortality Statistics Summary for 2007, NC Residents, NC State Center for Health Statistics; 2007 SC Community Assessment Network, Death Certificate Data	238.0	42.4
Heart disease mortality	Annual deaths per 100,00 people from heart disease in the home county population	Mortality Statistics Summary for 2007, NC Residents, NC State Center for Health Statistics; 2007 SC Community Assessment Network, Death Certificate Data	253.3	54.9
Stroke mortality	Annual deaths per 100,00 people from stroke in the home county population	Mortality Statistics Summary for 2007, NC Residents, NC State Center for Health Statistics; 2007 SC Community Assessment Network, Death Certificate Data	66.2	22.1
Obesity	Percent of population overweight or obese	2008 BRFSS Survey Results for certain NC Counties and NC Regions, NC State Center for Health Statistics; 2008 BRFSS Survey Results for SC Regions, SC Department of Health and Environmental Control	66.2	2.8
Time to referral center	Time in minutes in order to drive to nearest regional referral center using street addresses	Driving times and routes determined by Google Maps	57	32
HOSPITAL INDICATORS				
Sole county provider	Hospital is only acute care provider in its home county	2005-2008 NCHA ANDI Database; 2005-2008 SCHA JARS database	N/A	N/A
Medicare mix	Two year average of Medicare as a percent of Gross Revenue (Charges)	2005-2008 NCHA ANDI Database; 2005-2008 SCHA JARS database	46%	6%
Medicaid mix	Two year average of Medicaid as a percent of Gross Revenue (Charges)	2005-2008 NCHA ANDI Database; 2005-2008 SCHA JARS database	16%	6%
Emergency department visits to population ratio	Hospital ED visits divided by home county population	2005-2008 NCHA ANDI Data and 2005-2008 NC Office of State Budget and Management; 2005-2008 SCHA JARS Database and 2005-2008 U.S. Census Bureau for SC	42%	19%

**APPENDIX F**  
**Ideal Health System Services Matrix**

<b>Primary Care</b>	<b>Outpatient Services</b>	<b>Community Hospital</b>	<b>Regional Referral Center</b>	<b>Academic Medical Center</b>
<ul style="list-style-type: none"> <li>▪ Family practitioners</li> <li>▪ Internists</li> <li>▪ Pediatricians</li> <li>▪ Ob/gynecologists</li> <li>▪ Urgent care</li> <li>▪ X-ray/Basic lab</li> <li>▪ Rural health clinics</li> <li>▪ Federally qualified health centers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Primary care, <i>plus</i></li> <li>▪ Medical specialists (high volume services)</li> <li>▪ Surgical specialists (high volume services)</li> <li>▪ Freestanding emergency department</li> <li>▪ Imaging: X-ray, mammography, CT, ultrasound, MRI, bone density</li> <li>▪ Outpatient surgery</li> <li>▪ Endoscopy</li> <li>▪ Cardiac rehab</li> <li>▪ Rehab (PT, OT, ST)</li> <li>▪ Lab services</li> </ul>	<ul style="list-style-type: none"> <li>▪ Outpatient services, <i>plus</i></li> <li>▪ Broader medical/surgical specialties</li> <li>▪ Primary/Secondary inpatient services:               <ul style="list-style-type: none"> <li>_ Obstetrics</li> <li>_ Orthopedics</li> <li>_ General surgery</li> <li>_ Cardiology</li> <li>_ Gastroenterology</li> <li>_ Oncology</li> <li>_ General ICU</li> </ul> </li> <li>▪ Diagnostic cath</li> </ul>	<ul style="list-style-type: none"> <li>▪ Community hospital, <i>plus</i></li> <li>▪ Comprehensive oncology (e.g., PET, stereotatic radiosurgery)</li> <li>▪ Neurology/Neurosurgery</li> <li>▪ Neonatal intermediate care</li> <li>▪ Interventional cath</li> <li>▪ Specialty medical-surgical intensive care</li> <li>▪ Pediatric specialties</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regional referral center, <i>plus</i></li> <li>▪ Neonatal intensive care unit</li> <li>▪ Pediatric intensive care unit</li> <li>▪ Pediatric subspecialties</li> <li>▪ Trauma center</li> <li>▪ Transplants</li> <li>▪ Burn</li> <li>▪ Research/Teaching</li> </ul>