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# The Economic Impact of Hospitals and Health Systems in North Carolina

Report

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# 1. INTRODUCTION

The North Carolina Hospital Association (NCHA) contracted with RTI International to gain an understanding of the economic impact of hospitals and health systems in the North Carolina economy. RTI conducted this analysis using a multimethod approach that involved traditional input-output (I-O) analysis using IMPLAN software and a summary of community impacts that include unreimbursed costs of medical care and a variety of community initiatives in which NCHA member hospitals have played an active role.

## 1.1 The Role of Hospitals in North Carolina

North Carolina has many hospitals located across the state working to improve the health and well-being of the patients they serve. These hospitals range from large university hospital systems to smaller hospitals that primarily serve their local communities. Most hospitals and health systems in North Carolina are members of NCHA. NCHA provides its members with leadership, advocacy, information, and education services with the goal of improving the "delivery of quality and affordable health care in North Carolina" (NCHA, 2017b).

Although the role of hospitals in public health is well known, the economic impacts of hospitals are sometimes overlooked. Hospitals are a massive industry; in 2015, NCHA members directly employed over 162,000 people in North Carolina and spent approximately $24.8 billion on goods, services, and capital investment, which ripples through the state economy creating economic opportunities in other sectors (see Section 4). As of the third quarter of 2016, hospitals and health systems are one of the top 10 employers in 72 North Carolina counties, 48 of them rural (North Carolina Department of Commerce, 2016). Furthermore, two of the state's top 10 largest employers were hospital systems, namely, Carolinas HealthCare System and UNC Health Care System (Tippett, 2015). Hospitals also drive economic activity in other industries through their spending. Hospital revenue spent on medical equipment, payments to management services, and construction of new healthcare facilities ripples through the economy and has substantial economic impacts beyond the healthcare sector. In this study, RTI summarizes the economic impacts and estimates the broader economic impacts of hospitals in North Carolina using an I-O analysis based on IMPLAN data and software[1] and data collected by NCHA's Advocacy Needs Data Initiative.

Our analysis shows that North Carolina hospitals have substantial economic impacts throughout the North Carolina economy. Accounting for interindustry transactions magnifies the immediate impacts of hospital expenditures. NCHA member hospitals and health systems generate $37.8 billion in state gross domestic product (GDP) and distribute $22.4

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[1] (IMPLAN Group LLC, 2015a).

billion in labor income across North Carolina, which supports nearly 395,000 jobs across both the hospitals themselves and the various industries with which they interact. Although the absolute economic impacts of hospitals are largest in the population centers, the per capita economic impacts of hospitals tend to be relatively larger in the more rural parts of the state.

Although these economic impacts are substantial, they do not fully encompass the economic and societal impacts hospitals have on their communities. The majority of hospitals are nonprofit and therefore not taxed, but they contribute public benefits through both unreimbursed medical care and community engagement. The four major categories of unreimbursed costs are bad debt,[2] charity care, Medicaid losses, and Medicare losses. Bad debt is debt owed to the hospital by patients who cannot afford to or will not repay. Charity care costs are costs the hospital willingly takes on to provide free or heavily discounted care to patients. Medicaid and Medicare losses are unreimbursed costs of providing treatment to Medicaid and Medicare patients. In 2015, these four unreimbursed costs totaled $3.6 billion across all member hospitals. Hospitals receive no reimbursement for these costs but continue to provide essential services to patients as a part of their mission to serve patients and promote public health. Many of the patients covered by these unreimbursed costs come from the most vulnerable populations in North Carolina (NCHA, 2017c).

Additionally, hospitals around the state participate in a variety of initiatives to advance public well-being and to support local communities. In some cases, these initiatives are led and funded by the hospitals. In others, the hospital is one partner in a larger organization that spans across many communities. The individual focus of each initiative is different, ranging from food pantries to youth development programs, but all the initiatives work to promote public health broadly by addressing various socioeconomic determinants of health and workforce issues. North Carolina hospitals do not stop serving patients when they walk out the door. Instead, these hospitals aim to improve the underlying conditions that cause poor health, whether that is, for example, ensuring that patients have steady, reliable access to healthy food or providing programs that offer North Carolina youth the tools they need to grow into healthy, productive adults.

First and foremost, hospitals provide care to those who need it. Hospitals also have meaningful impacts on the physical and economic health of North Carolinians through their economic activities and community-focused efforts. This report provides an in-depth look at how these impacts arise in the economy and illustrates the types of public benefits hospitals generate with their community-focused efforts.

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[2] Bad debt represents accounts of patients who are ineligible for financial assistance and are unwilling to pay the balance of their bill for which they are responsible. This general concept applies to a variety of industries. We included this as a community benefit to be consistent with NCHA's reporting to the state of North Carolina.

## 1.2   About the North Carolina Hospital Association

In 1918 in Greensboro, North Carolina, Dr. J.F. Highsmith of Fayetteville proposed that the N.C. Committee on Hospital Standardization, comprising three physicians and three registered nurses, become the North Carolina Hospital Association. A day later, a constitution and bylaws were proposed stating that the objective of the association "shall be the promotion of economy and efficiency in hospital management and the welfare of hospitals and hospital workers in North Carolina" (NCHA, 2017a).

Although the delivery of healthcare has changed extensively over the last century, NCHA still plays a major role in advocating for its member hospitals, promoting quality, and providing education and thought leadership. NCHA represents more than 130 hospitals and health systems providing acute care across the state of North Carolina (NCHA, 2017a).

The NCHA also collects data from member hospitals through the Advocacy Needs Data Initiative (ANDI). ANDI is an online survey that collects financial and workforce advocacy–related data, and it benefits member hospitals directly through a series of financial and workforce-related reporting tools and benchmarks that are provided to members. NCHA provided RTI with data on hospital expenditures from ANDI that allowed RTI to conduct a detailed analysis of the economic impacts of member hospitals.

## 1.3   Report Organization

This report is organized as follows:

- Section 2 provides a brief overview of the state of health and healthcare in North Carolina. This discussion is meant to illustrate the context in which hospitals operate and the health outcomes in which North Carolina excels and struggles compared with its southern neighbors and the United States. This section also looks at the hospital sector related to other major sectors and describes the hospital workforce.

- Section 3 displays economic impact results from the analysis that RTI conducted using NCHA data on members' annual expenditures combined with information from secondary data sources.

- Section 4 provides a brief overview of our research methods. Appendix A provides a detailed companion methodology.

- Section 5 highlights community benefits that hospitals provide to the state of North Carolina in lieu of their tax-exempt status. This section also profiles 10 community initiatives across the state that NCHA member hospitals either led or actively participated in. These profiles complement the economic impact results by showcasing nontraditional impacts that cannot be adequately quantified in the economic impact model.

- Finally, the report concludes with some key takeaways about health systems and the role they play in the North Carolina economy.

# 2. BACKGROUND

The state of health in North Carolina is important because it demonstrates the context in which NCHA member hospitals and healthcare systems operate. Nationally, North Carolina is slightly below the average based on America's Health Rankings (AHR) public health index (see textbox below for additional details on this measure). Compared with other states in the South, however, North Carolina performs much higher than average.

NCHA member hospitals and healthcare systems directly contribute $19.2 billion to state GDP (discussed in Section 3) which is similar in magnitude to the transportation and utilities sector ($19.6 billion), the construction sector ($20.1 billion), and the information sector (17.2 billion). As a point of reference, the manufacturing sector in North Carolina accounts for $99.8 billion of state GDP (U.S. Department of Commerce, 2016). Average wages in the hospital sector are high, although they are somewhat skewed because of high-paying occupations like physicians, surgeons, and other highly skilled occupations. It takes a variety of occupations at various wage levels to keep a hospital operational. For every 1 physician in the hospital sector, there are 11.2 nurses and a variety of other support staff (see Section 2.3) (U.S. Department of Labor, 2016).

Health systems also play a vital role in North Carolina's research economy. North Carolina institutions are leaders in health-related research. Health systems are helping to build the future of healthcare by being testing grounds for innovative new treatments and therapies. University-based hospitals affiliated with NCHA members bring millions of dollars of research funding into the state.

## 2.1 Health Outcomes

AHR (2017) uses a unique methodology to derive national health rankings based on behaviors, community and environmental conditions, policies, and clinical care data. These rankings are a valuable tool for measuring the status of public health in North Carolina relative to other states and the nation as a whole. According to AHR, North Carolina is ranked 32nd in the nation in terms of overall health (see Figure 2-1). North Carolina ranks 25th overall when specifically looking at health behaviors, like drug deaths, excessive drinking, and smoking. Over the past 26 years, North Carolina averaged an overall ranking of 35 with a low of 41 and a high of 31.

> **AHR Rankings**
> AHR conducts the longest-running annual assessment of the nation's health on a state-by-state basis. For nearly three decades, AHR has analyzed a comprehensive set of data to provide a holistic view of the health of United States citizens.

**Figure 2-1.  Overall Public Health Scores, 2016**
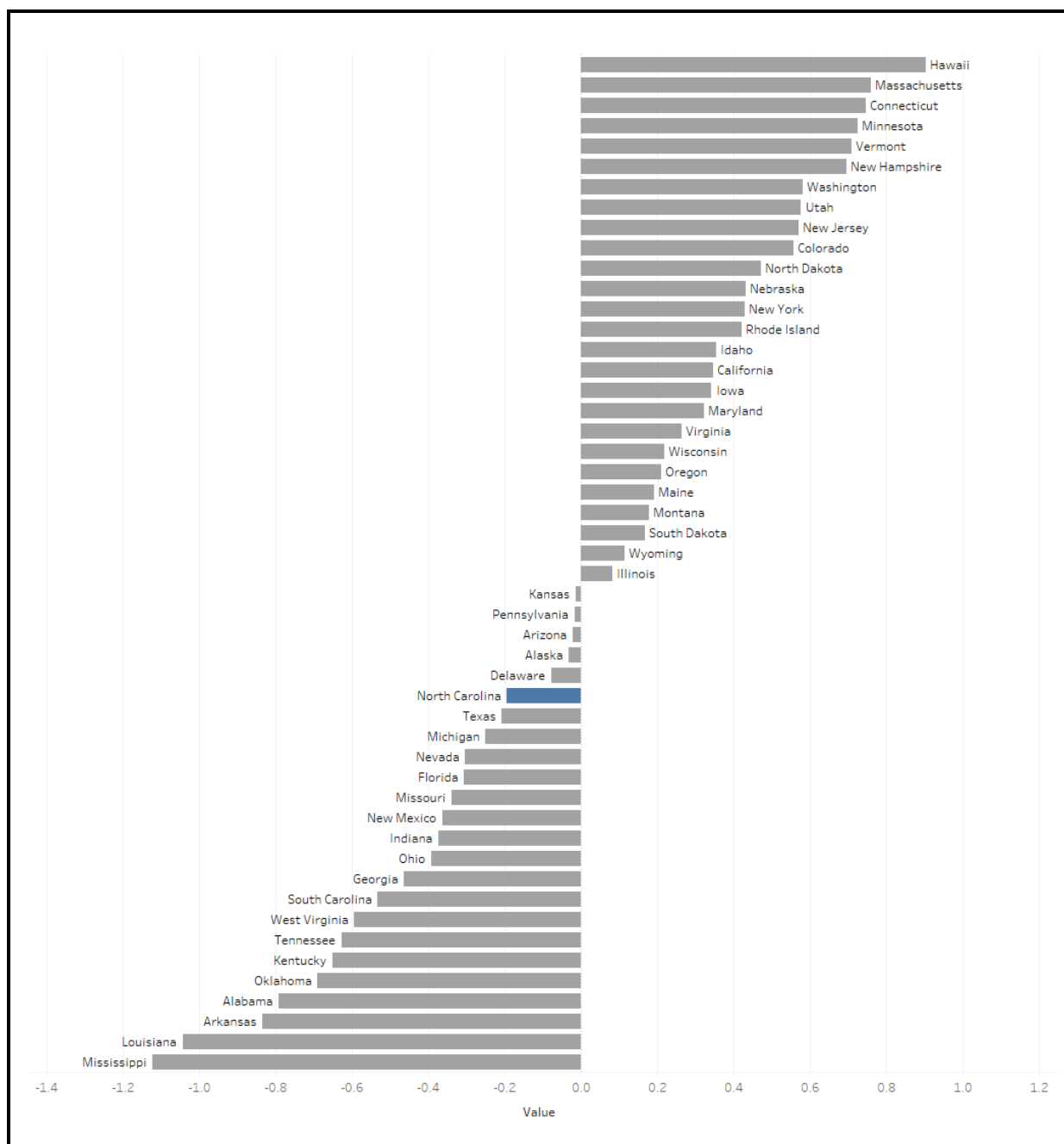


Source: AHR 2017; Note: Score on the horizontal axis is the weighted sum of the number of standard deviations each measure (34 measures included in the AHR Annual Report) is from the national average.

According to AHR, North Carolina's strengths include low prevalence of excessive drinking, high Tdap (diphtheria, pertussis, and tetanus) immunization coverage among adolescents, and high immunization coverage among children. AHR also highlights a 26% decrease in violent crime over the past 7 years, a 23% decrease in preventable hospitalizations among

Medicare enrollees in the past 5 years, and a 21% decrease in disparity of health status by education. However, health challenges in the state include a high percentage of children in poverty (a major socioeconomic determinant of health outcomes), a high prevalence of low birthweight babies, and a high infant mortality rate (AHR, 2017).

North Carolina's position compared with other Southern states is more favorable than national comparisons and perhaps more appropriate given the well-established geographic variation among states across the United States. One can see the geographic differences easily in Figure 2-2, which plots the AHR public health score by state with deviation below the national average in orange and deviation above the national average in blue. We used the Census Bureau's definition for the South as a comparison region for North Carolina. Figure 2-3 displays a map of the health rankings of all Southern states in 2016. Overall, North Carolina ranks 4th among the other states in the region, behind Maryland, Virginia, and Delaware who rank 18th, 19th, and 31st nationally, respectively.

**Figure 2-2.   Map of Public Health Scores for the United States**
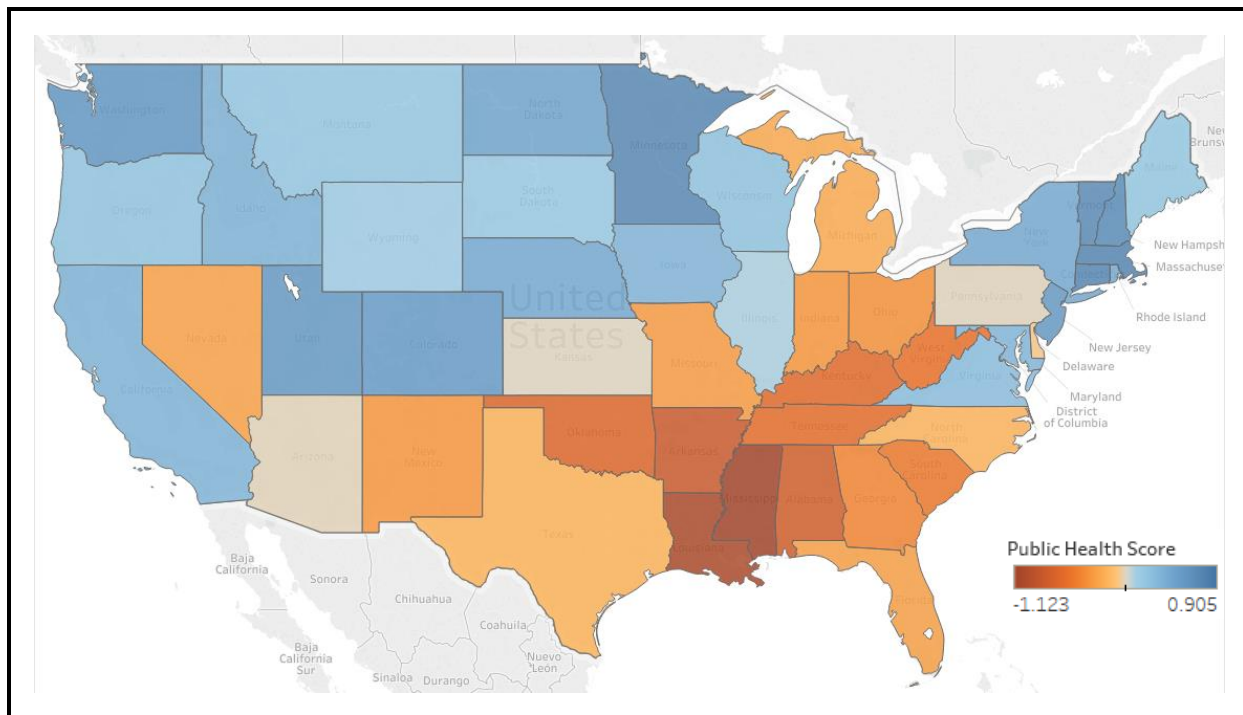


Source: AHR 2017

**Figure 2-3.   Map of Public Health Rankings for the Southern Region**
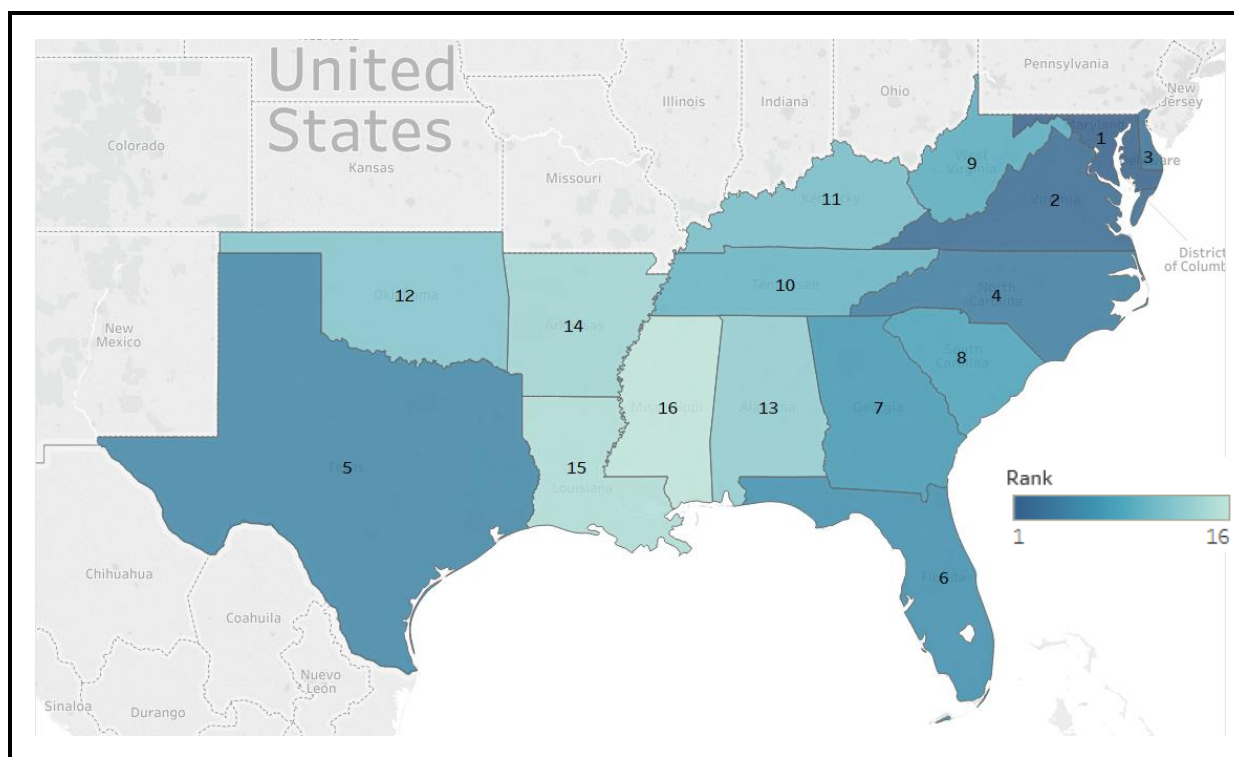


Source: AHR 2017

## 2.2   Hospital Sector in Context

NCHA members directly contributed approximately $19.2 billion in state GDP and directly supported roughly 162,000 jobs[3] across the state. For comparison, the BEA reports that North Carolina's state GDP in 2016 was $517.9 billion (U.S. Department of Commerce, 2017). Using this figure, NCHA member hospitals directly contribute 3.7% of North Carolina's GDP. NCHA members' direct contribution of $19.2 billion to state GDP is similar in magnitude to the transportation and utilities sector ($19.6 billion), the construction sector ($20.1 billion), and the information sector (17.2 billion). As a point of reference, the manufacturing sector in North Carolina accounts for $99.8 billion of state GDP (U.S. Department of Commerce, 2016).

Similarly, jobs directly supported by NCHA hospital members make up a significant portion of total employment in North Carolina. The Bureau of Labor Statistics reports that North Carolina employed an average of 4,341,675 jobs across all months of 2016. Thus, NCHA members directly employed about or 3.7% of total statewide employment in 2016.[4]

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[3] NCHA measures jobs in terms of full-time equivalents.
[4] This percentage is likely a conservative estimate because NCHA measures jobs in terms of FTEs while the BLS measures jobs in terms of head counts.

## 2.3   Hospital Workforce

It takes a variety of skills and occupations to keep a hospital operational. For every 1 physician or surgeon in the hospital sector, there are 11.2 nurses; 5.3 office and administrative staff; 4.3 healthcare aides and assistants; 4.2 technologists, technicians, and EMTs; 1.4 therapists; 1.3 management staff; 1.1 building and grounds staff; 0.6 specialized care staff; and 5.1 staff in various other occupations (U.S. Department of Labor, 2016). These staff have a variety of different qualifications and wage levels.

Physicians and surgeons are the most highly paid employees on average; they make approximately $180,000 a year. The second highest paid group is management occupations, making approximately $120,000 a year. Healthcare practitioners come in third, at $80,000 a year. This group makes up more than half of all jobs directly supported by the hospital sector. Computer, math, business and financial occupations make over $60,000 a year. Hospitals also employ occupations that pay below the national average, including social service, food service, healthcare support, office and administration, and grounds care.

## 2.4   Research Funding

North Carolina is also a leader in health-related research at universities. According to data on total National Institutes of Health (NIH) awards to medical schools in 2016 from the Blue Ridge Institute for Medical Research (2016), several North Carolina schools rank highly. Duke University ranked 8th in the nation, with the school of medicine receiving nearly $338 million in 2016. The University of North Carolina at Chapel Hill ranked 15th in the nation, with the medical school receiving roughly $268 million in 2016. Other North Carolina schools, including Wake Forest University (Wake Forest Baptists Medical Center) and East Carolina University (Vidant Medical Center), received NIH awards of $83 million and $6 million respectively. Overall, these four schools received a total of approximately $695 million in NIH awards (Blue Ridge Institute for Medical Research, 2016). Each of these schools is associated with an NCHA member hospital or health system. These research dollars were awarded to these hospitals, in part because of their reputation for excellence. To continue securing this research funding, these hospitals must continue to excel and produce valuable research. Research is another mechanism by which hospitals can have a long-term impact on future public health (in addition to providing healthcare today).

# 3. RESEARCH METHODS

RTI used multiple research methods to determine the economic impact of hospitals in North Carolina. This section focuses on the methods we used for the economic impact analysis and the community initiative profiles. We also describe other data sources used for descriptive parts of the analysis. Appendix B provides a detailed listing of all data sources with descriptions, uses, and URLs for publicly available data.

## 3.1 Economic Impact Analysis

The economic impact analysis integrates multiple data sources to inform key assumptions in our I-O model of economic impacts and create a complete economic profile of North Carolina hospitals. When we had more detailed information on North Carolina's economy, we augmented IMPLAN's assumptions using more precise information. In the absence of more detailed information, we relied on the default assumptions built into IMPLAN. For example, we used the IMPLAN local purchases that describe the percentage of all goods and services that each sector purchases from North Carolina companies. The steps in our analysis included preparing the input data sources for the economic model, running the economic model using IMPLAN software, and processing the results into summary tables. Each of these steps is described in the subsections below.

### 3.1.1 Preparing Input Data

We retrieved data on NCHA member hospitals from surveys conducted by the NCHA through ANDI. ANDI collects a wide variety of hospital-specific data points, including data on employment and payroll, operating expenditures, and capital expenditures. The three primary input variables for the model were

- operating expenditures,
- capital expenditures, and
- payroll.

Operating expenditures are regularly incurred expenses necessary for day-to-day operations. These expenditures could include expenses such as payments to insurance companies, utilities, management services, and legal services. Capital expenditures are purchases of or investments in long-term goods. These expenditures could include expenditures on surgical equipment or construction of new buildings. We used 2015 payroll and operating expenditures data to create the impacts used in the model. For capital expenditures, we created a 3-year average of capital expenditures from 2013 to 2015 to represent a "typical" year's capital expenditure by hospitals. We also retrieved additional contextual data on community benefits, hospital location, hospital size, employment, and revenue.

The three primary input variables from the ANDI data had variable response rates, summarized in Table 3-1.

**Table 3-1.    Response Rates**

| Data Source | Records with Missing Data | Records with Missing Data as Percentage of All Records | Total Imputed Value | Imputed Value as Percentage of Total Value |
|---|---|---|---|---|
| Operating expenditures, 2015 | 19 | 15.4% | $792M | 6.3% |
| Payroll, 2015 | 19 | 15.4% | $672M | 6.0% |
| Capital expenditures, 2013–2015 | 15 | 12.2% | $71M | 4.1% |
| Employment, 2015 | 33 | 26.8% | 35,250 employees | 21.8% |
| Revenue, 2015 | 25 | 20.3% | $2.8Bn | 8.8% |

We took several steps to fill in missing data. First, we attempted to retrieve quarterly data for hospitals with missing data. We were only able to retrieve quarterly data on operating expenditures and capital expenditures for some hospitals, and the quarterly data were rarely available for all quarters in each year. As a conservative approach, we summed available quarterly data for each year available and considered that sum to be the yearly total. This approach avoids making uninformed assumptions about quarterly expenditures for specific hospitals that, based on our inspection of the data, showed no predictable seasonal pattern. These assumptions would be difficult to make and would likely vary in accuracy. At this point, the 3-year average for each hospital's capital expenditures was calculated and years with missing data were ignored. Thus, if a hospital had only capital expenditure data for 2015, the 3-year average of capital expenditures for that hospital is the capital expenditures in 2015. This method was used instead of considering missing values to be zero. NCHA indicated that missing values are not necessarily or even likely to be zero. Therefore, considering them to be zero would significantly underestimate hospital capital expenditures. After retrieving quarterly data and calculating the 3-year average for capital expenditures, we found that 15 hospitals still had missing data. The same was true for payroll and operating expenditures.

We considered a survey approach to fill in missing data, but we ultimately opted for an imputation approach to estimate the missing data fields. Given that the small hospitals were more likely to not report in ANDI, we only imputed a small share of total expenditures. The imputation method relied on median expenditures from comparable hospitals. Appendix A contains additional details about our imputation methods.

Once we prepared the data and accounted for missing data, we created a custom IMPLAN sector to better align the model with the economic sectors encompassed by NCHA members. After reviewing the breakdown of sectors in IMPLAN and discussing the economic activities of member hospitals with NCHA, we aggregated the sectors listed in Table 3-2 into a single sector intended to capture the economic activities of NCHA members.

**Table 3-2.    NCHA Member Sector Components**

| IMPLAN Sector | IMPLAN Description |
|---|---|
| 475 | Offices of physicians |
| 477 | Offices of other health practitioners |
| 478 | Outpatient care centers |
| 479 | Medical and diagnostic laboratories |
| 480 | Home healthcare services |
| 481 | Other ambulatory healthcare services |
| 482 | Hospitals |
| 483 | Nursing and community care facilities |

Finally, all dollar value inputs, and as a consequence all outputs, were inflation adjusted to 2016 dollars using the consumer price index (U.S. Department of Labor, 2017). We then estimated impacts on the entire state of North Carolina using a 2013 IMPLAN model.

### 3.1.2   IMPLAN Model Runs

I-O analysis is designed to assess the broader economic consequences of economic "shocks." Economic shocks are not necessarily a change in economic activity. They can also be economic activities that are currently occurring. In this case, an I-O analysis helps describe how current activity is filtered through the various linkages of the economy generating economic impacts. The I-O model reports the total impact the economic activity has on the economy as a whole. This total impact can be separated into the direct, indirect, and induced economic effects (see Section 4.3.1). IMPLAN provides underlying data on the structure of the economy along with software to conduct I-O analyses. We relied on the ANDI data to provide the IMPLAN software with an estimate of the economic activity associated with North Carolina hospitals. The IMPLAN software then provided I-O model results on the total economic impact of NCHA hospitals.

We calculated the economic impacts of NCHA members using a "bill-of-goods" approach. This approach entailed allocating NCHA members' expenditures across the various goods- and service-providing sectors that supply the hospital (and health system) sector. We then determined the economic impact of hospital-sector payments to these industries. The bill-

of-goods approach is a best practice when detailed information about spending is available. Given our access to disaggregated data on expenditures from ANDI and others sources, we determined that a bill-of-goods approach would be optimal.

We separated expenditures into three categories: operating expenditures (OPEX), capital expenditures (CAPEX), and payroll and benefits (payroll). We relied on a report from the Healthcare Financial Management Association (HFMA) (Schuhmann, 2009) to adjust the allocation of expenditures across categories and to different sectors for CAPEX.

We allocated all payroll expenses to the "labor income" sector in IMPLAN. We based our distribution of operating expenditures and capital expenditures on IMPLAN's calculated spending pattern for the aggregated NCHA members sector, altered based on our conversations with NCHA and to distinguish between capital and operating expenditures. Capital expenditures were also altered based on 2007 Healthcare Financial Management Association data on capital spending.

### 3.1.3  Postprocessing of Results

The IMPLAN software generates total effects (as well as direct, indirect, and induced effects), which we estimated separately for operating expenditures, capital expenditures, and payroll. Because we used a bill-of-goods approach for our analysis, additional care had to be applied when working with the model results. Model runs had to be adjusted to improve interpretability. Appendix A includes more detailed information on these adjustments.

## 3.2  Community Benefits

### 3.2.1  Community Initiative Summary and Selection

Using community benefits reports from ANDI that several hospitals submitted and data from the Healthier Tomorrow NC website (n.d.) that NCHA curates, RTI compiled a list of initiatives carried out by NCHA's members. Our final list contained 49 initiatives. Section 5.2 profiles the initiatives.

In close consultation with NCHA, we selected 11 community initiatives to profile in the report. The selection process was driven by the need to obtain good geographic coverage and variation in the types of initiatives hospitals are involved in. RTI researched each of the 11 initiatives and interviewed hospital staff to gather more in-depth information.

# 4. ECONOMIC IMPACT ANALYSIS

The economic impact analysis in this report is structured as a benefits assessment of how the total annual expenditures of NCHA member hospitals ripple through the North Carolina economy. This activity generates wages for hospital employees, revenues, profits, and wages to sectors that supply goods and services to hospitals and health systems. The analysis also captures the associated employment impacts and increased household spending that result from the activity in the hospital supply chain. This well-established approach (discussed briefly in Section 3 and in more detail in Appendix A) used to estimate ripple effects in certain geographic areas is called I-O analysis. I-O modeling tools, such as IMPLAN, produce results that rely on a certain set of economic assumptions and the input data a modeler provides. I-O models are tabular representations of how industries transact with each other within a regional economy based on a "snapshot" of economic activity, typically within a given year. To produce the best analytic results, RTI carefully characterized I-O model inputs based on ANDI and other data sources in close collaboration with NCHA staff.

RTI used IMPLAN model data (2013); ANDI data on operating expenditures, payroll, revenues, and employment (2015); and ANDI data on capital expenditures (2013–2015) to conduct the analysis. The structure of the economy stems from the IMPLAN data, but the levels of activity are based on ANDI data.

RTI also leveraged detailed data, when available, to customize industry sectors, spending patterns, and other key assumptions. For example, RTI adjusted spending patterns according to ANDI data and hospital capital investment data at the industry level. However, in the absence of readily available information, RTI relied on default model assumptions. For example, NCHA did not have readily available information on the share of local in-state purchases by hospitals, so in this case RTI relied on default IMPLAN assumptions about local purchases.

## 4.1 Descriptive Statistics

The ANDI database includes data for 123 members at the licensed hospital level. These members collectively generated a total of approximately $19.2 billion in state GDP in fiscal year (FY) 2015, providing 162,000 jobs. Hospitals also indirectly support affiliated physicians in the clinically integrated network, but reliable data on affiliated physicians for NCHA members were not available at the time of this writing.

Overall, total expenditures for NCHA's members in FY 2015 were $24.8 billion. Because some data were missing data (see Table 3-1), we estimated missing expenditures using comparable hospitals. Hospitals' total operating expenditures in FY 2015 (excluding payroll, benefits, bad debt, and depreciation) totaled $11.9 billion. Payroll and benefits alone totaled

$11.2 billion. A 3-year annual average for capital expenditures for FY 2013 to FY 2015 was $1.7 billion.

Of all NCHA member hospitals, 65, or approximately 53%, are located in rural counties, and approximately 50% of hospitals have between 50 and 199 beds (see Table 4-1). The average number of beds per hospital is 217. Hospitals in urban counties tend to be much larger, having an average of 336 beds compared with an average of 142 beds for hospitals in rural counties and 286 beds for hospitals in suburban counties.

**Table 4-1.    Number of Hospitals by County Designation and Number of Beds**

| Number of Beds | Rural | Suburban | Urban | Total |
|---|---|---|---|---|
| 0–49 | 17 | 5 | 0 | **22** |
| 50–199 | 36 | 16 | 10 | **62** |
| 200+ | 12 | 20 | 7 | **39** |
| **Total** | **65** | **41** | **17** | **123** |

Source: ANDI 2015.

## 4.2    Geographic Characterization of the Hospital Expenditures

To describe the data and the geographic "sources" of impact without singling out any specific hospital, we aggregated the expenditures by two geographic characteristics of hospitals and health systems:

- county designation as urban, suburban, or rural
- NCHA district in which a hospital is located

Figure 4-1 displays an overlay of the NCHA districts on top of the county designations.

We categorized the *direct effect* of expenditures by these two geographic characteristics or sources rather than the *estimated total economic effect* of expenditures because the total economic impacts were estimated at the statewide level, not the county level. Put differently, we have greater confidence in the geospatial analysis of direct effects rather than geospatial analysis of total effects.

**Figure 4-1.  Geographic Sources of Impact**
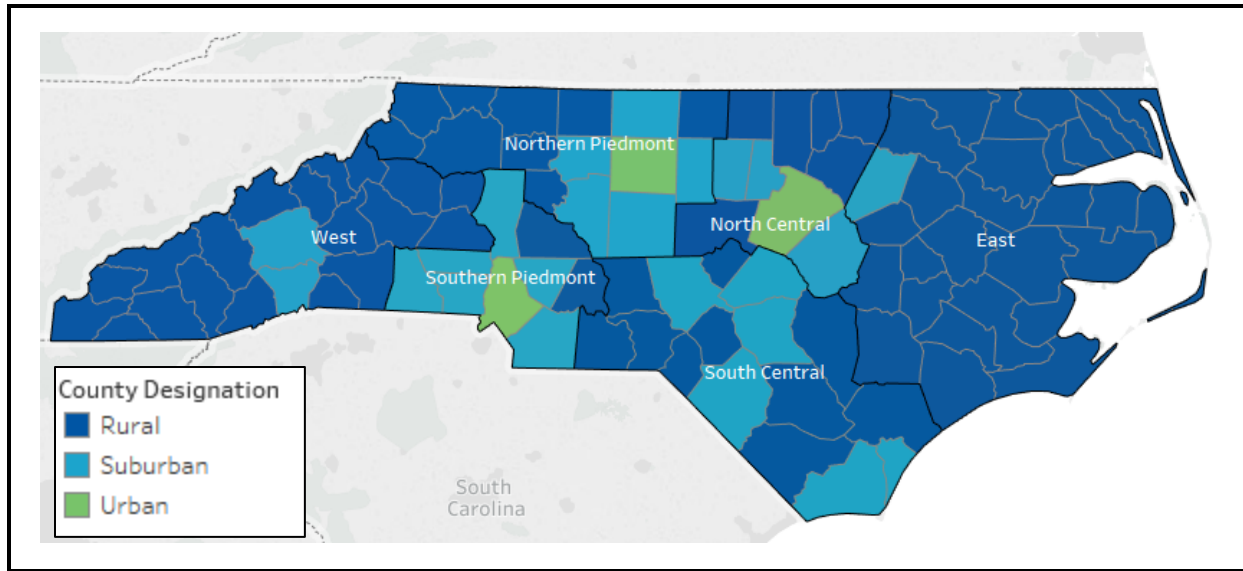


Source: RTI analysis of NCHA information.

## 4.2.1  County Designation

Figure 4-2 displays hospital expenditures by county designation. Suburban hospitals have the largest amount of total expenditures in the aggregate, followed by urban and then rural hospitals. Capital expenditures make up the smallest portion of annual expenditures for all hospitals regardless of geography. Operating expenditures tend to be slightly larger than but on par with payroll expenditures.

**Figure 4-2. Hospital Expenditures Summarized by County Designation**
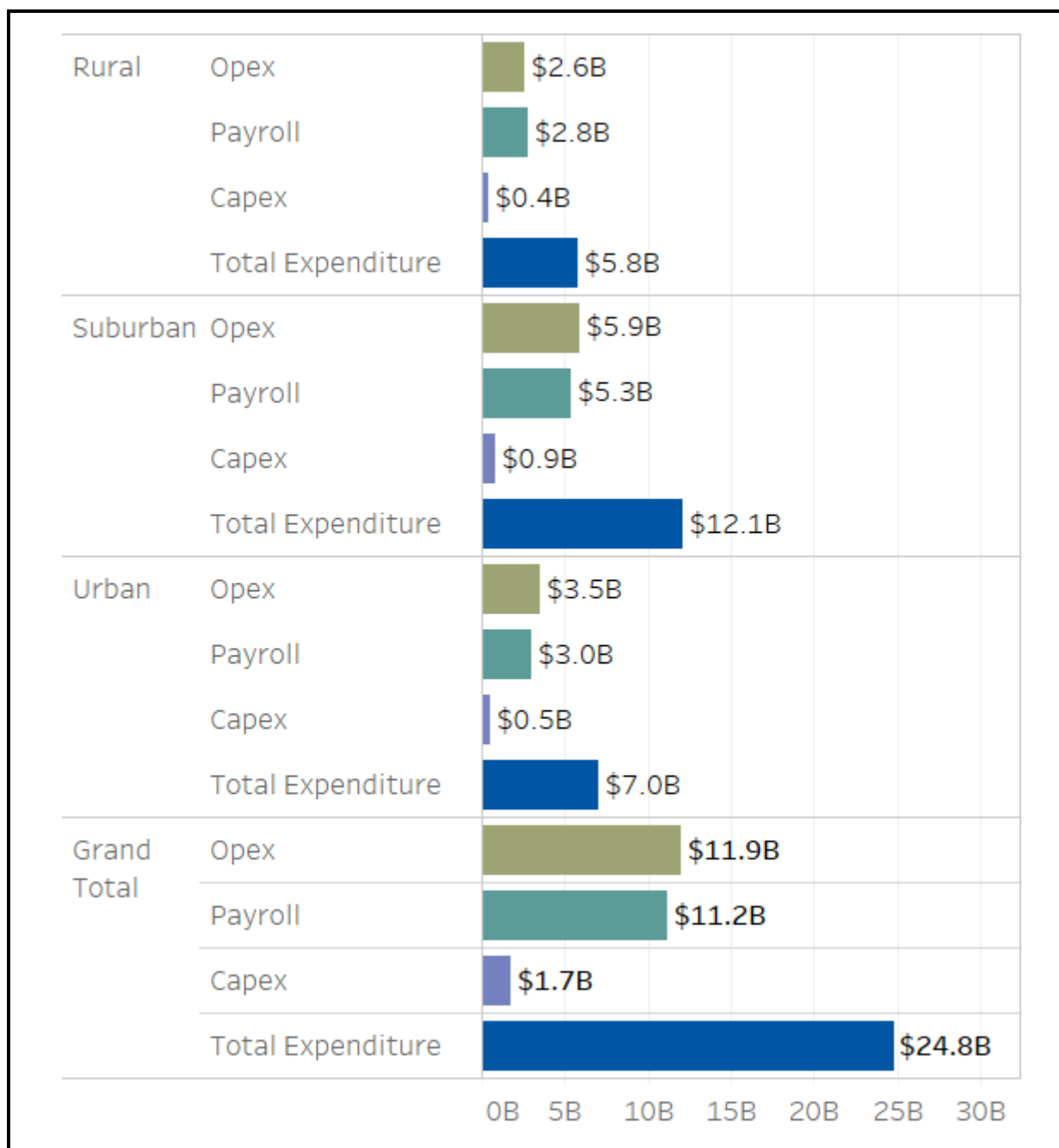


Source: RTI analysis of ANDI data.
Note: Differences from total are due to rounding.

### 4.2.2 Maps of Expenditures by NCHA District

The maps in Figures 4-3 through 4-10 break down the four spending categories—total expenditures, OPEX, payroll, and CAPEX—into regions and counties. Capital investment figures are less sensitive given that many hospitals publicly announce capital investment

figures, so we were able to summarize that information at the county level without concerns about revealing sensitive information for any particular hospital system.

A map for each indicator is presented in absolute terms and then in per capita terms to account for the fact that some regions are much more populated. The per capita maps normalize absolute expenditures by dividing by population. Taken together, the maps demonstrate that although absolute levels of annual expenditures tend to be higher in the more urbanized districts, hospitals appear to play a greater economic role per capita in the more rural districts.

**Figure 4-3.  Operating Expenditures by District**
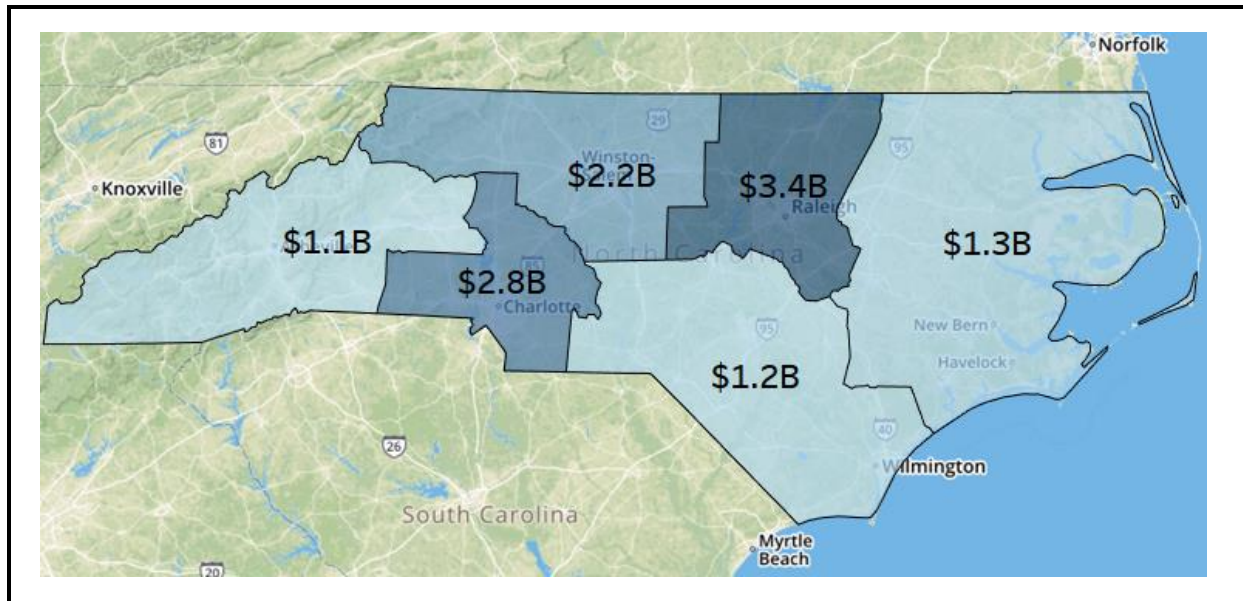


Source: RTI analysis of ANDI data.

**Figure 4-4.  Operating Expenditures per Capita by District**
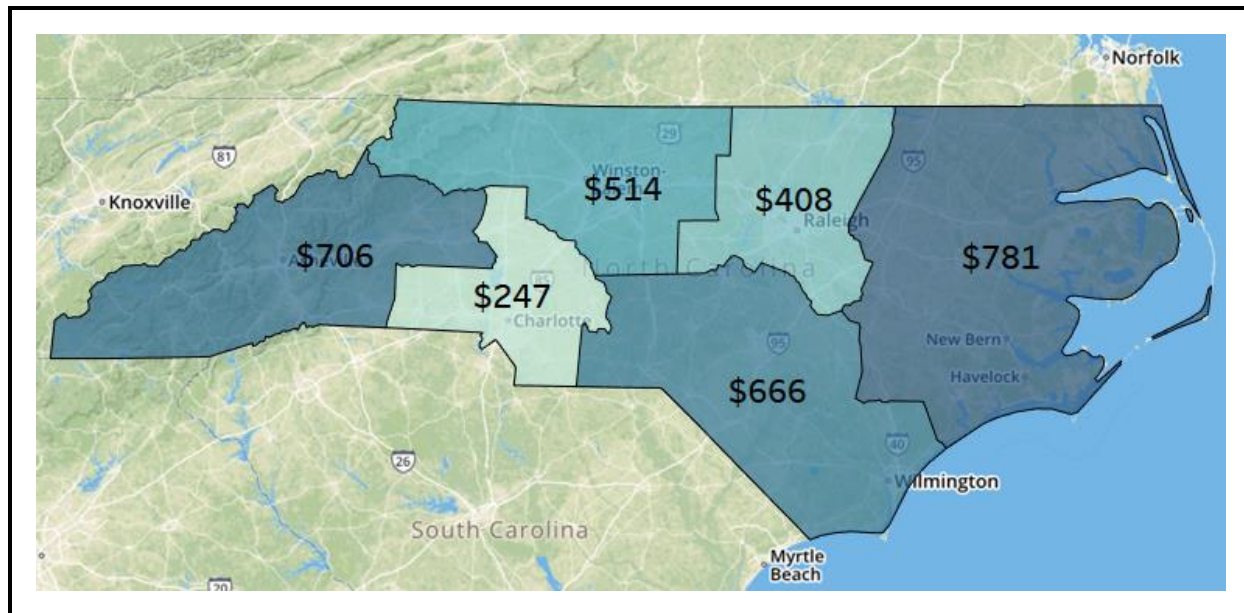


Source: RTI analysis of ANDI data and American Community Survey data.

**Figure 4-5.  Payroll Expenditures by District**
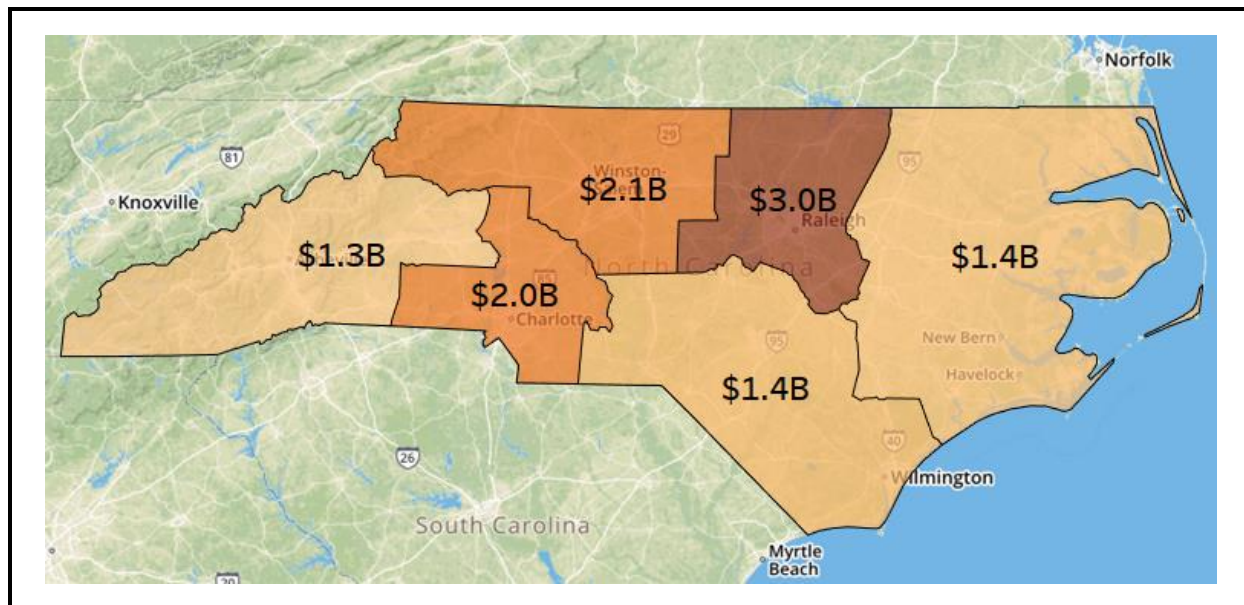


Source: RTI analysis of ANDI data.

**Figure 4-6. Payroll Expenditures per Capita by District**
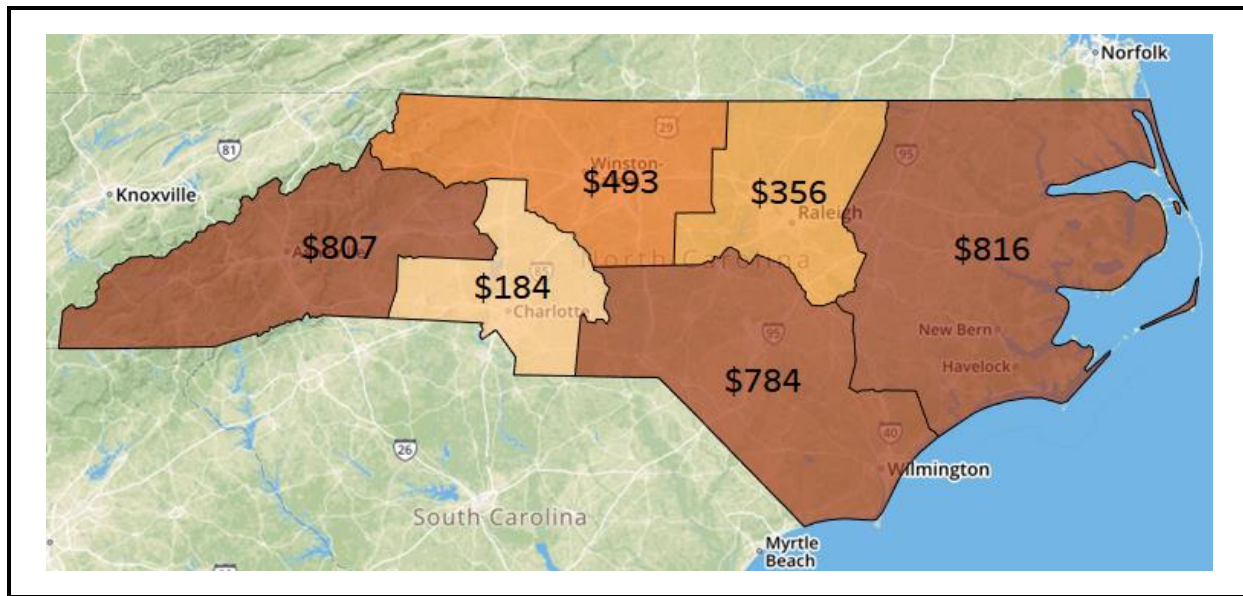


Source: RTI analysis of ANDI data and American Community Survey data.

**Figure 4-7. Capital Investment by County**
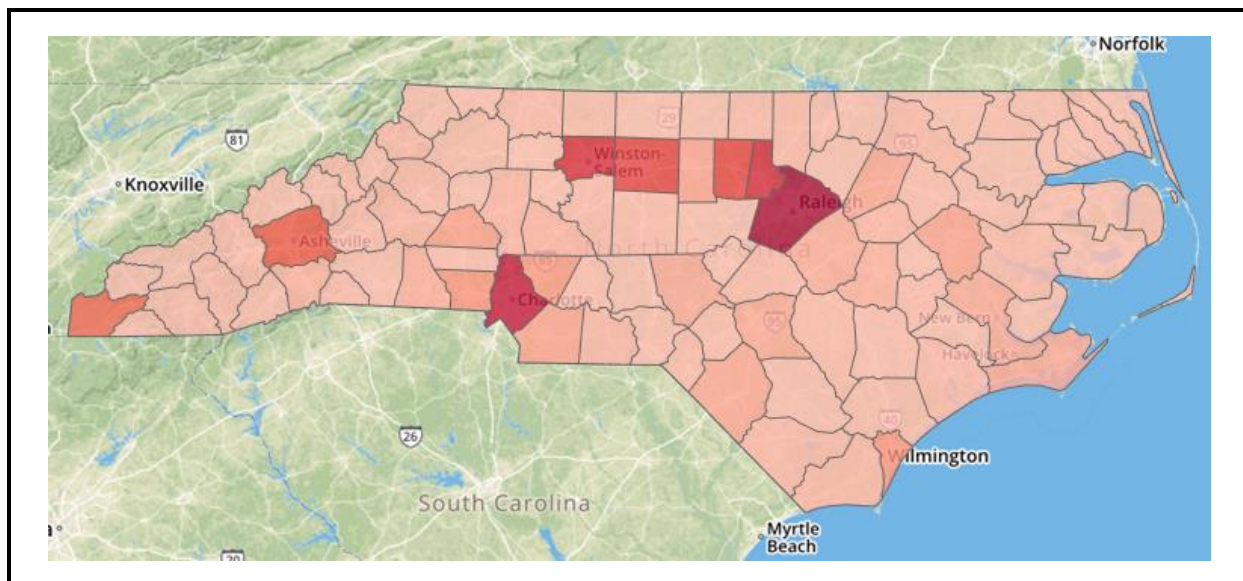


Source: RTI analysis of ANDI data. Note: Map created by using county-level information.

**Figure 4-8.   Capital Investment per Capita by County**
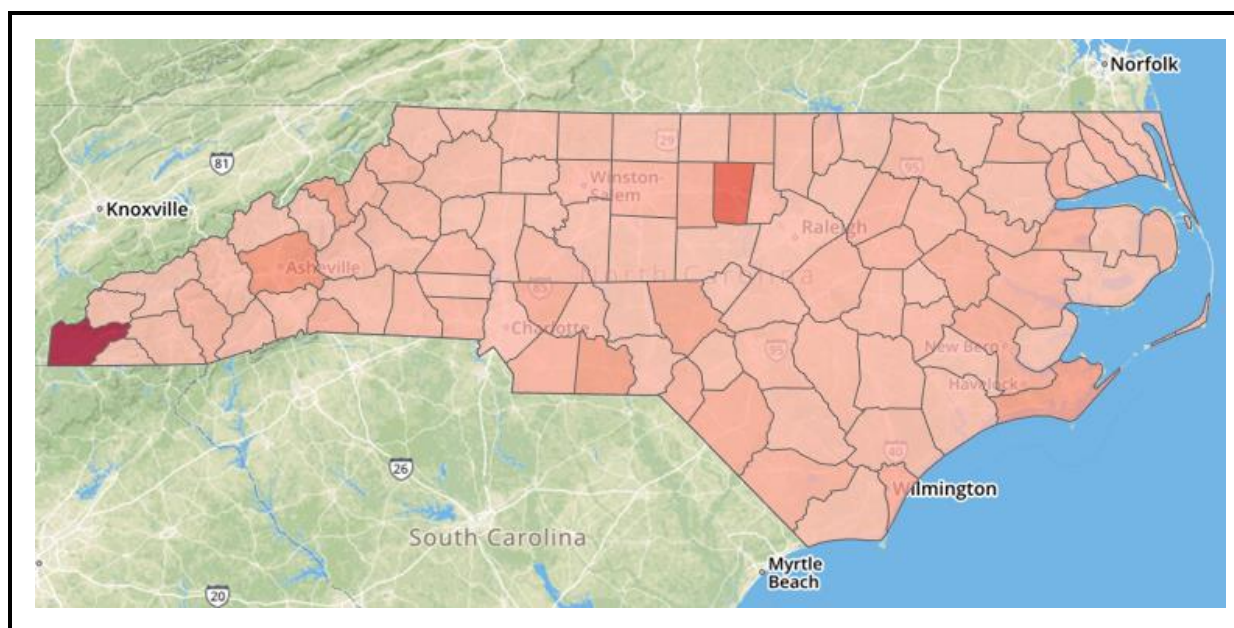


Source: RTI analysis of ANDI data and American Community Survey data. Note: Map created by using county-level information.

**Figure 4-9.   Total Expenditure by District**
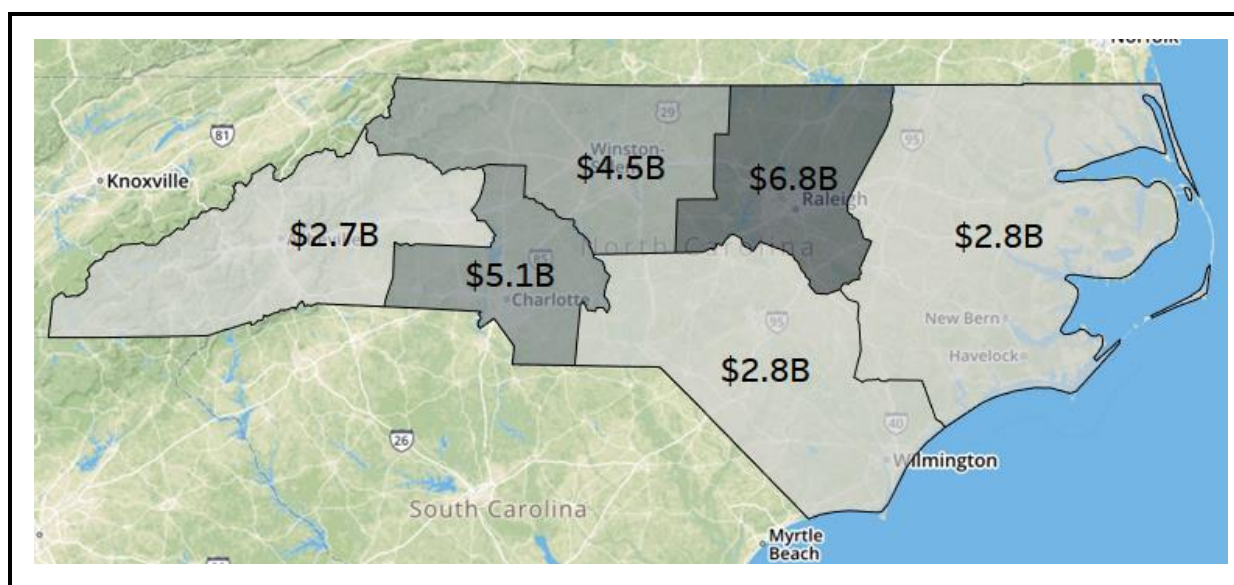


Source: RTI analysis of ANDI data.

**Figure 4-10. Total Expenditure per Capita by District**
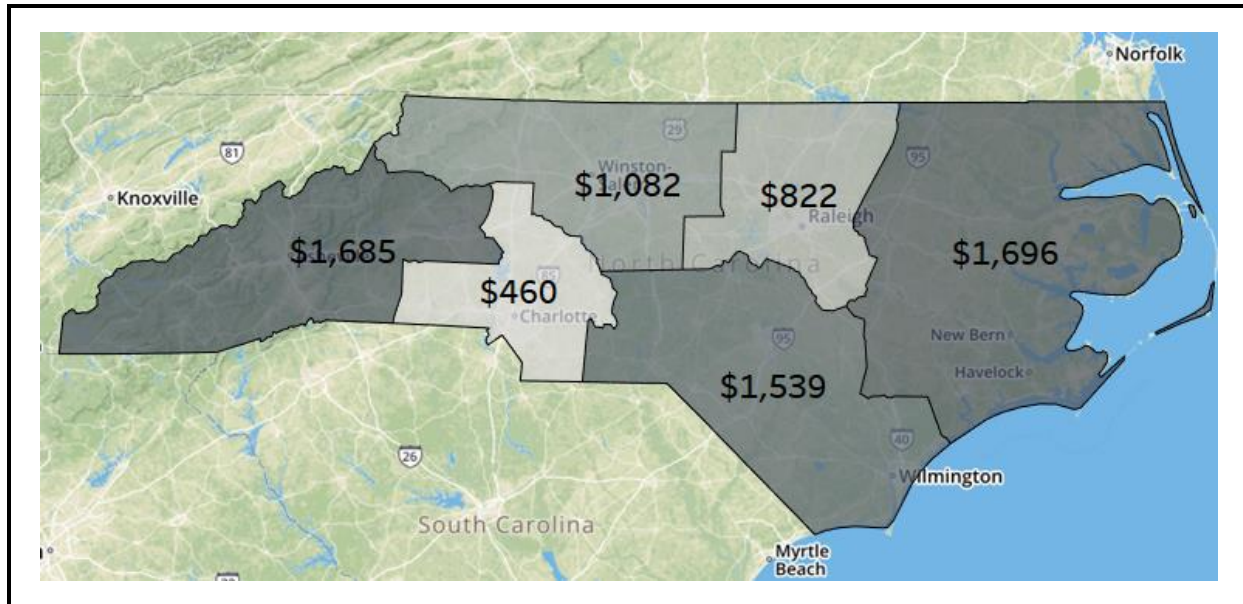


Source: RTI analysis of ANDI data and American Community Survey data.

## 4.3    Economic Impact Analysis Results

This subsection summarizes the results from the economic impact analysis. The figures are estimates of the total impact, including direct, indirect, and induced effects, and are meant to provide a reasonable approximation of the contribution of NCHA member hospitals and health systems to the North Carolina economy.

### 4.3.1   Types of Effects

In general, we report three kinds of economic effects in the results:

- Direct effects: Also referred to as the "shock" to the model, direct effects indicate the economic activity occurring within hospitals and health systems in North Carolina. Examples include operating expenditures; payroll and benefits; and capital expenditures on property, plant, and equipment.

- Indirect effects: Also referred to as supply chain effects, indirect effects encapsulate the economic activity among businesses that supply goods and services to hospitals, businesses that supply those suppliers, and so on.

- Induced effects: Also referred to as household spending effects, induced effects result from economic activity among businesses where hospital-sector employees spend their wages, business that supply goods, and so on.

NCHA members' annual operating expenditures, payroll, and capital investments drive these effects. We separate our results into these three streams of expenditures in certain cases but aggregate them to look at the total economic effect for simplified analysis and presentation elsewhere.

### 4.3.2   Economic Indicators

We used several interrelated economic indicators to measure the statewide economic effects:

- Gross revenues (output): Provide an indicator of gross revenue from production activities (final and intermediate goods and services).

- State gross domestic product (GDP): Provides an indicator of the labor, capital, and tax income generated from production activities. Also referred to as "value-added." States use the indicator to describe the overall size of the economy.

- Labor income: Represents all forms of employee compensation, including wages and benefits.

- Employment: Consists of all full-time, part-time, and temporary positions. Jobs are typically reported as an annual average.

### 4.3.3   Total Economic Impact

Overall, NCHA members have an estimated $31.1 billion in direct revenues per year. These revenues directly support $19.2 billion in state GDP. Roughly 162,000[5] jobs are directly supported by NCHA members with labor income of $11.2 billion. Table 4-2 summarizes the aggregate results across all categories of hospital expenditures.

**Table 4-2.    Total Economic Impacts**

| Type of Impact | Employment Number of jobs | Labor Income ($million) The value of wages, salaries, and benefits earned | State GDP (Value Added) ($million) A measure of the overall size of the economy | Revenues (Output) ($million) Revenues based on hospital services that are reimbursed |
|---|---|---|---|---|
| Direct effect | 162,025[a] | $11,154 | $19,194 | $31,133 |
| Indirect effect | 121,834 | $6,485 | $9,940 | $19,241 |
| Induced effect | 110,855 | $4,802 | $8,657 | $14,906 |
| **Total effect** | **394,714** | **$22,440** | **$37,792** | **$65,280** |

[a] Full-time equivalents reported in ANDI.

Source: RTI analysis of ANDI data; IMPLAN, 2013.

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[5] This figure is somewhat smaller than the 205,000 Bureau of Labor Statistics (BLS) QCEW figure commonly cited for hospitals in North Carolina for a variety of reasons including hospital nonresponse in the ANDI data that required imputation methods and the fact that BLS QCEW data capture information for non-NCHA hospitals and health systems such as some of the Veterans Administration hospitals. Our analysis is strictly limited to NCHA members reporting in ANDI.

### *4.3.4   Multipliers*

I-O analyses typically rely on economic "multipliers" to relate indirect and induced effects to direct effects. The multipliers reported in this report are "Type II" multipliers, which are simply a ratio of the total economic effect divided by the direct effect (Eq. 4.1).

Type II multiplier = (Direct Effect + Indirect Effect + Induced Effect) / Direct Effect        (4.1)

The Type II employment multiplier of 2.45 means that for every 1 hospital job, there are 2.45 total jobs in the economy. Put differently, there are 1.45 additional jobs elsewhere in the economy for every single hospital job. One can also relate direct effects of one indicator to the effects of other indicators. For example, each $1 million in hospital revenue is associated with 4.5 hospital jobs and 12.9 other jobs in the North Carolina economy. The multipliers for Employment, Labor Income, and State GDP are shown in Table 4-3.

**Table 4-3.   Multipliers**

|  | Employment | Labor Income | State GDP (Value Added) | Gross Revenues (Output) |
|---|---|---|---|---|
| Multipliers (Type II) | 2.44 | 2.01 | 1.97 | 2.10 |

Note: Multipliers represent the total effects from Table 4-2 divided by the direct effects from Table 4-2.

Source: RTI analysis of ANDI data; IMPLAN, 2013.

### *4.3.5   Industry Sector Impacts*

Hospital expenditures have varying impacts on all of the industry sectors in the economy based on key parameters such as their production functions ("spending pattern") and the propensity to purchase in the state. Table 4-4 shows the top 10 industries where hospital sector spending has the largest impacts, in descending order based on total effects on employment and State GDP. Average annual wages are also shown, with above average wages marked. The average wage in North Carolina in the IMPLAN model is $45,382 per person per year.

The largest total effect on employment is for employment services, and the custom industry sector that we created to represent NCHA members experiences the second highest employment effect. Unsurprisingly, the highest total effect on State GDP is for the custom industry sector. Full-service restaurants, insurance carriers, management consulting services, and real estate all had substantial direct employment effects of more than 6,000 jobs. Industries with relatively large indirect supply chain effects and induced household spending effects (compared with the direct effect) include full-service restaurants; real estate; limited-service restaurants; wholesale trade; and insurance agencies, brokerages, and related activities.

**Table 4-4.    Top 10 Industry Sector Impacts**

| Sector | Description | Direct | Indirect | Induced | Total | Wages ($2016) |
|---|---|---|---|---|---|---|
| **Top Employment Impacts** | | | | | | |
| 464 | Employment services | 14,437 | 3,529 | 2,570 | 20,536 | $27,575 |
| 475 | NCHA members and other health system industries | 3,985 | 33 | 16,197 | 20,215 | $54,326* |
| 501 | Full-service restaurants | 4,308 | 1,029 | 6,096 | 11,433 | $20,124 |
| 440 | Real estate | 396 | 2,308 | 5,835 | 8,539 | $9,400 |
| 502 | Limited-service restaurants | 1,534 | 524 | 6,213 | 8,271 | $17,118 |
| 437 | Insurance carriers | 4,857 | 801 | 1,540 | 7,197 | $65,964* |
| 395 | Wholesale trade | 1,776 | 1,503 | 3,246 | 6,525 | $71,327* |
| 454 | Management consulting services | 4,627 | 1,069 | 602 | 6,298 | $58,296* |
| 438 | Insurance agencies, brokerages, and related activities | 141 | 3,717 | 1,125 | 4,983 | $51,913* |
| 511 | Dry-cleaning and laundry services | 3,271 | 311 | 860 | 4,442 | $10,585 |
| **Top State GDP Impacts** | | | | | | |
| 475 | NCHA members | $268,819,881 | $2,248,270 | $1,092,714,706 | $1,363,782,857 | $54,326* |
| 440 | Real estate | $51,749,930 | $301,898,753 | $763,118,294 | $1,116,766,977 | $9,400 |
| 395 | Wholesale trade | $253,903,527 | $214,846,521 | $464,015,334 | $932,765,383 | $71,327* |
| 464 | Employment services | $580,553,827 | $141,897,605 | $103,356,002 | $825,807,435 | $27,575 |
| 437 | Insurance carriers | $550,012,782 | $90,660,144 | $174,426,212 | $815,099,139 | $65,964* |
| 433 | Monetary authorities and depository credit intermediation | $175,941,070 | $197,498,280 | $405,677,144 | $779,116,494 | $92,159* |
| 461 | Management of companies and enterprises | $357,382,129 | $188,069,146 | $111,095,929 | $656,547,204 | $116,257* |
| 174 | Pharmaceutical preparation manufacturing | $488,308,008 | $12,967,099 | $134,469,215 | $635,744,322 | $127,828* |
| 454 | Management consulting services | $347,453,867 | $80,297,937 | $45,197,213 | $472,949,018 | $58,296* |
| 447 | Legal services | $205,142,886 | $54,128,118 | $90,986,357 | $350,257,360 | $51,789* |

Source: RTI analysis of ANDI data; IMPLAN 2013. Note: Wages marked with an * are above the statewide average of $45,382.

Average wages of the top industries show substantial variation, which is common. Industries in the top 10 with above-average wages included insurance carriers; wholesale trade; management consulting services; and insurance agencies, brokerages, and related activities. Industries with below-average wages include employment services, full-service restaurants, real estate, and limited-service restaurants.

The top industries in terms of State GDP are similar, albeit with a different rank order. Three new industries made the list—monetary authorities and depository credit intermediation, management of companies and enterprises, and pharmaceutical preparation manufacturing. The higher value-add for these industries is partially a result of their much higher average wages.

# 5. COMMUNITY BENEFITS

This section highlights the "Big Four" categories of community benefits that NCHA hospitals provide as unreimbursed costs (see Figure 5-1). Community benefits are already accounted for in the economic impact analysis above; however, we highlight them here because they deserve additional attention. We also highlight specific grant-making efforts and other initiatives that NCHA hospitals are responsible for in their local communities.

**Figure 5-1.   The "Big Four" Unreimbursed Costs, 2015**
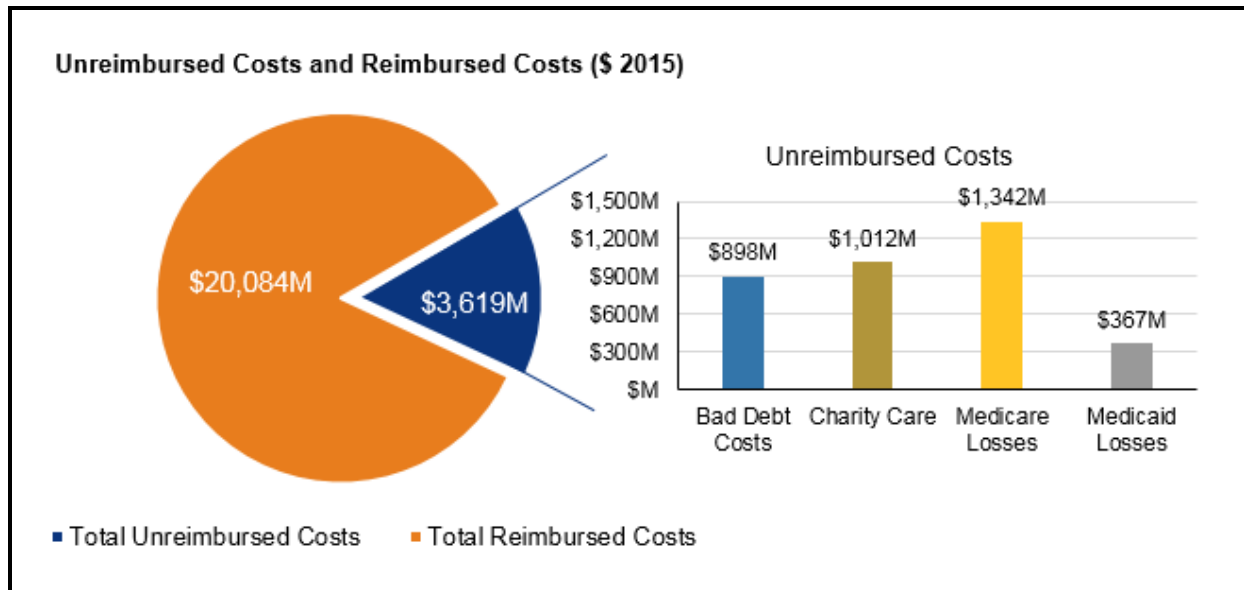


## 5.1   Unreimbursed Costs

NCHA hospitals provide four mutually exclusive categories of community benefits (NCHA, 2014):

- Charity care: Either free or discounted care directed toward the community's poor who cannot pay for hospital services. Patients are eligible if they qualify under the hospital's financial assistance policy.

- Medicare losses: Every hospital treats Medicare patients; most people aged 65 or older are covered by federal health insurance. Medicare losses reflect hospitals providing services to the Medicare population without getting reimbursed fully.

- Medicaid losses: Every hospital treats Medicaid patients. Medicaid is a joint federal-state program that provides health coverage to certain categories of needy individuals including people with disabilities and low incomes. Medicaid losses reflect hospitals providing services to the Medicaid population without getting reimbursed fully.

- Bad debt costs: These are accounts where patients are ineligible for financial assistance and they are unwilling to pay the balance of their bill for which they are responsible.

In FY 2015, these four categories totaled $3.6 billion of unreimbursed costs for NCHA hospitals—equivalent to 15% of total expenditures (NCHA, 2017c). The bill-of-goods approach used in the economic impact analysis (discussed in Section 4) estimates the impact of total expenditures, which includes unreimbursed costs other than bad debt.

## 5.2    Member Impact Profiles

The following profiles or "stories" complement the economic impact analysis by demonstrating community impacts that are not captured in I-O models. NCHA hospitals engage in local grantmaking, lead and partner in community initiatives, train workers, and create innovative new ways to deliver essential healthcare services. To generate ideas for specific stories to profile in this report, RTI reviewed information collected in ANDI and at https://www.healthiertomorrownc.com/community-benefits on specific community stories. NCHA staff also provided additional ideas for impactful stories. We first categorized these stories to provide a starting point for down-selecting for additional research and inclusion in the report.

Then, in collaboration with NHCA staff we chose about 10 stories to include in this report and used secondary research (news articles, hospital websites) and interviews with hospital staff and other key stakeholders to develop these member impact profiles. The list of interviewee's, their associated organizations, and the profiles they helped develop can be found in Appendix C. Our criteria in selecting specific stories to profile in this report were twofold: (1) we aimed to cover various parts of the state and (2) we aimed to capture a good cross section of the kinds of activities that hospitals engage in.

Each member impact profile that follows is unique. The common thread is that they capture ways that members are investing time, money, and energy in improving the lives of North Carolinians.

*Carolinas HealthCare System's Mobile Lung Cancer Screening Unit*
## The Levine Cancer Institute Mobile Lung Unit



According to the Centers for Disease Control and Prevention, more people die from lung cancer than any other type of cancer. And for residents in rural communities, barriers to healthcare may inflate late diagnosis and complications. Less than 10% of physicians practice in rural communities, and the few physicians who do may not provide the full suite of services offered by large, urban facilities. Geographic, climatic, and temporal barriers, like long drive times or poor infrastructure, also make it difficult for people in rural areas to travel to other regions to access healthcare (Stanford University, 2010).

Carolinas HealthCare Systems' Levine Cancer Institute is addressing the need for increased preventive health services in rural communities with a first-of-its-kind mobile lung cancer screening unit. We spoke with Melissa Wheeler of Carolinas HealthCare and Dr. Derek Raghavan, President of the Levine Cancer Institute, about their Mobile Lung Cancer Screening Unit. The unit, funded by a grant from the Bristol-Myers Squibb Foundation, takes a portable computerized tomographic scanner to uninsured vulnerable populations in rural communities near Charlotte that are the least likely to seek preventive care or regular diagnostic testing. When diagnosed at late stages, lung cancer is nearly impossible to treat successfully and the few available treatments for late-stage cancer are expensive.

Through the mobile lung cancer screening unit, the Levine Cancer Institute hopes to improve health outcomes by diagnosing these vulnerable populations at earlier stages,

when lung cancer is more easily and more successfully treated. Diagnosing these patients at earlier stages is also a cost-saving measure. By the Levine Cancer Institute's estimates, treatment of early-stage lung cancer can cost between $100,000 and $150,000 with a success rate between 50% and 70%. In contrast, treating stage 4 metastatic lung cancer can cost between $500,000 and $750,000 with very little chance of successful treatment.

Carolinas HealthCare System, the Levine Cancer Institute, and the mobile lung cancer screening unit offer more than just diagnostic services. They also focus on connecting patients who are diagnosed with lung cancer, with affordable treatment options. In addition, the mobile lung cancer screening unit attempts to educate vulnerable populations about better health practices, and connects them with resources and materials to help them quit smoking and improve other healthy behaviors.

Carolinas HealthCare System's mobile lung cancer screening unit is part of a wider pattern of North Carolina hospital programs focused on the whole health of patients. Hospitals have recognized that by addressing patient behaviors, improving patient trust in healthcare facilities, and taking their services directly into vulnerable communities, hospitals can dramatically improve health outcomes.

### *Ashe Memorial Hospital Pantry*
**Distributing food at Ashe Memorial Food Pantry**

Across the United States, 13% of households face food insecurity, meaning they lack reliable access to affordable, nutritious food (Feeding America, n.d.). According to Feeding America (n.d.), at 15.9%, North Carolina has a statistically higher rate of food insecurity than the national average. Ashe County, located in northern North Carolina, faces extremely high rates of food insecurity compared with both the United States and other North Carolina counties—roughly 17% of adults and 33% of children in Ashe County face food insecurity.

As part of their mission to improve patients' health, Ashe Memorial Hospital partnered with Ashe County Sharing Center in December 2015 to create a pantry that distributes food to patients who face barriers to affordable and nutritious food. Melissa Lewis of Ashe Memorial Hospital gave us more information about the program. When patients enter the hospital, they are asked if they typically run out of food before having money to purchase more and if they are worried about running out of food before having money to purchase more. If a patient answers yes to either question, the Ashe Memorial Hospital Pantry supplies them with a box containing a 6-day supply of food, supplied by Second Harvest Food Bank of Northwest North Carolina. From December 2015 to March 2017, the hospital distributed 496 boxes of food, serving 1,572 family members. Ashe Memorial Hospital also offers these patients additional services based on other needs the hospital identifies. These additional services include connections with dieticians, referrals to primary care physicians, education on healthy behaviors, services to help them afford their medications, flu shots, mammograms, and a host of other services.

There was one particularly impactful story that Ashe Memorial Hospital shared. A patient checked into the hospital after a car accident, and because of the injuries sustained in the accident, he eventually lost his job and was unable to find additional work. The assistance the hospital provided through the food pantry helped him through an extremely difficult time. He was eventually able to find a job, and he now has a good-paying job, and he and his family are doing well. He noted that if not for the food pantry program, he likely would have lost his home.

### *FaithHealthNC*

FaithHealthNC is a partnership of religious groups, healthcare facilities, and other community organizations that "improves health by getting people to the right door at the right time, ready to be treated, not alone" (FaithHealthNC, 2017a). Healthcare industry partners include Carolinas HealthCare Blue Ridge, CaroMont Health, Davie Medical Center, Lexington Medical Center, Randolph Health (formerly Randolph Hospital), Southeastern Health, Wake Forest Baptist Health, and Wilkes Regional Medical Center (FaithHealthNC, 2017b). The hospital partners provide funding, education, and healthcare services as a part of this initiative. By partnering with FaithHealthNC, these healthcare facilities can improve the overall health of their patients and, as an added benefit, reduce costs. We spoke with Jeremy Moseley, Teresa Cutts, and Paula Faria about the program.

FaithHealthNC serves 25 counties in North Carolina. Often, the communities they serve lack trust in or have difficulty accessing healthcare facilities. FaithHealthNC works to identify and address these barriers to care through their Connectors. Connectors are contracted staff, given a small $500 stipend, who support community members' health through their connection to volunteers and faith networks. These volunteers often hold positions of trust within their community and are well positioned to identify the health needs of community members and to renew trust in healthcare institutions. As part of these efforts, Connectors encourage community members to take advantage of preventive care, regularly visit a physician, and practice good self-management, as opposed to waiting until it is necessary to visit the emergency room. These preventive measures improve individual health, save the individual money, and save healthcare facilities money.

Connectors and volunteers also provide other services beyond trust and knowledge building. If a community member cannot find transportation to a healthcare facility for a procedure, a Connector or volunteer will provide transportation both to and from the facility. If a community member requires home visitations, Connectors or volunteers will visit them. If a community member experiences food insecurity, Connectors or volunteers will provide them with food support. These are only some of the many activities undertaken by Connectors and volunteers as part of FaithHealthNC's focus on an individual's "journey of health" (FaithHealthNC, 2017b). This focus emphasizes that a person's health does not begin and end with a hospital visit. Rather, it is an ongoing process that encompasses both building trust in healthcare facilities and ensuring that the person has knowledge of and the ability to meet basic health needs.

**FaithHealthNC Home Visitation**



*Vidant Health and Conetoe Family Life Center Break the Chain of Poverty and Poor Health*

Poverty and health are inextricably linked. Poverty can lead to poor nutrition and make accessing healthcare difficult, which in turn leads to poor health. Poor health may cause financial strain because of piling medical bills and missed work. This cycle of poor health and poverty can be difficult for people to break without assistance (Health Poverty Action, n.d.).

Conetoe Family Life Center seeks to break the chain of poverty and poor health for youth in Edgecombe County by providing access to healthy foods and healthcare. We spoke with Kahla Hall and Michelle Cherry about the program. The Conetoe Family Life Center, led by Reverend Richard Joyner, runs a farm and donates half of its harvest to low-income families. As part of the organization's focus on local youth, students volunteer on the farm, and proceeds from food that is sold are used to purchase school supplies. The Center also hosts free events focused on healthy lifestyle changes for both children and adults, such as cooking, smoking prevention, and increased physical activity. Youth development programs, such as the "Bee Bus," a recycled school bus turned into a honey bee hive, teach children about healthy lifestyles, encourage physical activity, and promote positive self-esteem and entrepreneurship. Through the Bee Bus, children learn about the science of bee hives and

sell the honey to help maintain the Center's activities. Encouraging the adoption of healthy lifestyles and teaching children life skills can help break the cycle of poverty and poor health (Conetoe Family Life Center, n.d.).

Like other North Carolina hospitals, Vidant Health recognized the importance of Conetoe Family Life Center's efforts to improve community health and how improving healthy behaviors in underserved populations can improve health outcomes. To support Conetoe Family Life Center's efforts, Vidant supports the Center with grants. Over the past 11 years, Vidant Health has contributed $170,000 to Conetoe Family Life Center through grants. In recognition for his work with Conetoe, Reverend Joyner was nominated as one of the top 10 CNN Hometown Heroes of 2015, and Conetoe was awarded a $10,000 prize (Gorman, 2015).

### *Southeastern Health Compassion for U Wellness Program*

Like other hospitals, Southeastern Health recognized that patient health could be better improved by directly engaging with patients, as opposed to waiting for patients to come to them. This realization led them to create the Compassion for U Congregational Wellness Network. The Network, a part of FaithHealthNC, provides a variety of services focused on the whole health of a patient, from lifestyle choices and preventative care to end-of-life issues. Health agencies and churches interested in joining the network are asked to sign a covenant. This covenant commits the members to working with other members in improving health at all stages. So far, nine area health agencies and 17 churches have signed covenants. We spoke with Reverend Dean Carter to learn more about the program.

These covenant members offer a wide variety of services spanning the entirety of health issues. Some covenant members offer transportation services that assist people with difficulty accessing healthcare by offering rides to and from healthcare facilities. In some cases, patients are forced to choose between purchasing food and purchasing gas so they can drive to medical appointments. The transportation services offered by Compassion for U Congregational Wellness Network volunteers eliminates this concern for these vulnerable patients. The covenant hospitals and churches also partner to offer education to community members on healthy behaviors and lifestyle choices. Educating people about how to live healthier lives improves their overall health and can save them money by avoiding possible future health problems.

Compassion for U Congregational Wellness Network also assists patients with palliative care decisions. These decisions are often extremely difficult for patients and their families to make. Compassion for U Congregational Wellness Network helps patients and their families navigate the various healthcare options they have and choose the most appropriate option. The Network's assistance in these issues helps ease the burden on patients and helps them decide whether they want to pursue expensive treatments that are unlikely to succeed and could significantly lower their quality of life. Although these decisions are difficult and often

uncomfortable, they help improve patient well-being and avoid unnecessary or inappropriate medical treatments. These palliative care choices also save patients money. Compassion for U Congregational Wellness Network estimates that they have saved patients over $7 million from avoiding costly treatments that would be ineffective for their condition. They also stress that this cost figure does not fully represent the impact of their palliative care services. They focus on helping patients make the most appropriate choices for their condition. Cost savings are a benefit but do not factor into their advice, and often the choices they advise patients to make do not save money, but they are still the right choices for those patients.

**Camp Care Bereavement Experience for Children**

Another program Compassion for U Congregational Wellness Network is particularly proud of is the Camp Care Bereavement Experience for Children. This program was started as part of the Network's focus on spiritual as well as physical health. It allows children who have experienced a traumatic event, like the loss of a loved one, to enjoy camp activities and share their stories with children who have similar experiences and camp counselors, in a safe, understanding environment. One story that stands out is the story of a young boy who witnessed his brother die in a train accident. The boy originally came to an adult support group with his parents. The boy did not speak to anyone except his parents, and even then, it was only to communicate information about basic needs in short words or phrases. Compassion for U Congregational Wellness Network staff recommended Camp Care as a program that could help the boy. He went to Camp Care and participated in the trust-building exercises over the weekend and the evening memorial services, and over the course of the weekend, he began to open up to the other children and counselors. When the boy's mother saw him laughing and playing with other children, she fell to the ground in joy.

### *Southeastern Health Provides Opportunities in Healthcare to Underrepresented Students*

Southeastern Health and the University of North Carolina at Pembroke (UNC Pembroke) are working together to provide workforce development opportunities to underrepresented minority and disadvantaged students through the Clinical Health Summer Program (CHSP). CHSP, led by UNC Pembroke, is a 7-week internship program that allows future health professionals to gain practical experience and examine health careers in an actual healthcare setting. CHSP is one important component in a larger program at UNC Pembroke called the North Carolina Health Careers Access Program whose mission is to "increase the number of African Americans, Native Americans, Hispanics, Latinos, and individuals from educationally or economically disadvantaged background that are trained, educated, and employed in the health professions" (North Carolina Health Careers Access Program, 2017). The larger program offers a range of services and activities to UNC Pembroke students such as career information, counseling services, and educational workshops and seminars.

The CHSP program, in particular, provides students real-world, hands-on experience in a variety of healthcare settings, including outpatient, pediatric, and urgent care clinics, and students receive a stipend for their work. Southeastern Health, located in Lumberton, North Carolina, was one of the internship sites hosting 2 students from the 12-student 2016 cohort. The students learn about the day-to-day responsibilities of health professionals and how a health system operates. CHSP enables students to truly explore health professions during their postsecondary careers and strengthens the pipeline of future workers for North Carolina hospitals and beyond.

*Vidant Medical Center Empowers Youth with Disabilities with Project SEARCH*
**Project SEARCH 2016 Cohort**



In 2015, Vidant Medical Center launched a workforce program in partnership with RHA Health Services, Pitt County Schools, and the N.C. Division of Vocational Rehabilitation Services to help young people with disabilities secure health-related jobs.

The program, called Project SEARCH, is a nationally proven model developed by Cincinnati Children's Hospital that helps disabled individuals transition from high school to stable employment opportunities in the health sector. Participants receive training and job coaching and have the opportunity to explore different careers and job types. The national program has a 90% retention rate and a proven track record; 65% of its graduates attain employment. Project SEARCH provides services to students in the cohort program during high school and after they graduate, supporting them through their job search, job placement and even through the job-onboarding process to make sure the transition goes smoothly (Project SEARCH, 2017).

The Vidant program coordinator who started this program was inspired and saw alignment between Project SEARCH and Vidant's mission statement "to improve the health and well-being of eastern North Carolina." The program helps young people with disabilities in a very targeted, intentional way so that they can gain independence.

As a host business for Project SEARCH, Vidant serves as a physical training ground and experiential laboratory where students with disabilities can gain real-world experience. The medical center provides a dedicated classroom on–site for Pitt County schools to provide daily traditional classroom instruction. Students rotate through entry-level positions in various departments at the medical center, performing jobs such as stocking, scanning, grounds-keeping, food service and administrative tasks. More than 15 departments at the medical center have worked with students. The Vidant program coordinator who started this program noted that these students bring their own skill sets and like any of us can thrive given the right environment. As an added benefit, Vidant staff who have limited experience working with this population have received training and a first-hand appreciation for the students' unique skills and abilities.

By all reports, the experience at Vidant Medical Center has been extremely positive; several students from the first cohort have found gainful employment at Vidant and other health-related employers in the region. The program has gone so well that other entities in North Carolina that are interested in starting similar programs have contacted Vidant for information. Vidant continues to serve as a host business to meet the local demand for Project SEARCH.

### *Novant Health Breast-Screening Partnership*

As discussed earlier, impoverished rural populations face significant barriers to receiving effective healthcare. Preventative care is often costly and seen as unnecessary. Even when these populations can afford preventative care, transportation barriers, distance to healthcare facilities, and an inability to take time off from work to access healthcare present additional challenges that dissuade vulnerable populations from accessing preventative care.

Novant Health recognized this shortcoming and sought to address it through mobile breast cancer screening units. We spoke with Charnaye Bosley, from Novant Health, and Jacquaya Reel, of the Komen Foundation about the screening units. Through three grants totaling $232,666 from the Susan G Komen Foundation, Novant was able to fund breast cancer screening services in underserved communities. In total, Novant has eight physical locations and four mobile breast cancer screening units serving 13 underserved counties throughout North Carolina. These mobile units offer diagnostic services, such as 3D mammography, and health education. Each mobile unit is staffed with two health educators and multilingual representatives to assist non-English-speaking patients.

The breast cancer screening units focus on more than just diagnoses. The program aims to enroll uninsured and underinsured patients in the North Carolina Breast and Cervical Cancer Control Program prior to cancer diagnoses. Through this program, these uninsured and underinsured patients are provided free or low-cost screenings and follow-up.

Novant's breast cancer screening programs have significant impacts on patients' lives. One woman took her mother to a mobile breast cancer screening unit for screening services. The daughter did not realize that she was also at the age to begin regular breast cancer screening. The mobile unit provided both her and her mother with screening, and although her mother was fine, the daughter was diagnosed with early-stage breast cancer. Novant also provided her sister and daughter with genetic testing to determine if they were at higher risk for breast cancer. The genetic testing found that her daughter was at a higher risk for breast cancer and recommended the daughter begin breast cancer screening earlier in life.

By identifying breast cancer in vulnerable populations at earlier stages, educating patients about breast health, and identifying patients at higher risk for breast cancer, Novant's breast cancer screening program saves lives. As with similar programs, Novant's breast cancer screening program represents a new hospital philosophy. Novant does not wait for patients to come to them with health problems but instead goes directly to patients to engage with them, promote patient trust in Novant, and most importantly improve patient health by catching breast cancer at earlier stages when it can be treated more successfully.

*Cone Health Partnership for Community & Career Development: Union Square Campus in Greensboro, NC*

**Union Square Campus**



The Union Square Campus in Greensboro is the culmination of a strategic public-private partnership to better leverage the region's higher education assets and support workforce needs in high-demand, high-paying jobs in nursing and healthcare.

The project partners are:

- Cone Health,
- University of North Carolina at Greensboro (UNCG),
- North Carolina A&T University (NC A&T),
- Guilford Technical Community College,
- City of Greensboro,
- Guilford County,
- Redevelopment Commission of Greensboro, and
- South Elm Development Group.

The partnership came together over several years, beginning when Ed Kitchen, former city manager and CEO of the Bryan Foundation, started to convene leadership from university and community college partners. The group discussed ways to bring together their assets to do something innovative that would support regional economic development. Based on rising demand for nurses, the group ultimately decided on the idea of a single state-of-the-art campus for nursing training across institutions.

Early on, Cone Health administrators saw the opportunity this project would create for the health system to better connect with nursing programs at UNCG and NC A&T and to benefit the larger community. For example, nursing students could be trained on Cone Health's IT and other systems. As the community's largest private, not-for-private employer, Cone Health played a critical role, ultimately committing to move their nursing and simulation labs to the Union Square Campus. This was particularly significant at a time when the state was not investing in these programs.

The project was financed through about 15 different sources, including partners and local foundations. The City of Greensboro provided the land as a redevelopment site because the area needed a boost and contributed funds for a parking area. A state appropriation from the NC General Fund came late in the project.

From a workforce perspective, not only has the project allowed all students to access state-of-the-art equipment, but it also has provided an opportunity for younger students to interact with other health professionals at various stages in their careers.

From an economic development standpoint, the Union Square project is helping to revitalize a neglected part of the downtown area. Streetscaping associated with the project has improved the aesthetics of the area and some additional investment already has been spurred nearby.

The future vision is for the Union Square Campus to grow into a larger footprint with other educational and training assets that bring together partners from across the city. The same group of higher education stakeholders is meeting to discuss potential ideas for a second phase, which could include a cybersecurity training center, a design school, or a center focused on advanced manufacturing.

*Randolph Health CHC BetterCare Program*

**Lobby of Randolph Health CHC BetterCare Clinic**



In 2012, one of Randolph Health's strategic initiatives was to pursue wellness. They decided to purchase CHC BetterCare because it met this need through its innovative model of working with employers. We spoke with April Thorton and Wendel Lamason of Randolph Hospital about CHC BetterCare. CHC BetterCare had four to five clients at the time that it worked with locally. The new resources provided by this acquisition opened even more possibilities for the program. Now the program serves more than 30 clients in the region.

Initially, self-insured companies came to the program because their costs were skyrocketing, and they were having a hard time coping with the changes in the healthcare marketplace. Textile companies were some of the first clients. Companies had brokers and traditional solutions, but the missing piece was a focus on employee wellness and

preventive care. CHC BetterCare is customizable to the needs of different employers, but it addresses the gap of employee wellness and preventative care. One key element of the program is that it provides an option for employers to have an on-site clinic at the workplace, which enhances access to preventative care and has a range of benefits for employees and employers alike. For example, employees do not have to worry about taking time off from work to visit a doctor. Employees also receive regular health screenings to catch any major health issues as they arise rather than letting them quietly worsen. Employers benefit because they have a happier, healthier workforce with less costly healthcare bills, reduced absenteeism, and even reduced turnover. The on-site clinics are not just viable for large employers, some small- to medium-sized employers in the county have found them to be cost-effective.

The CHC BetterCare program has also retrofit a "near-site" clinic that allows workers to access more substantial care with minimal wait times. Other services include health coaching for employees and pharmacy cost management support that supplies real-time cost information so that employers can identify "cost centers." The focus of the program to date has primarily on working with local companies, which supports economic stability by helping local companies thrive.

In talking with a local textiles manufacturer, we learned the program has clearly been a win-win for them. It positively affects their bottom line while improving the lives and well-being of their employees. As a result of the program, some employees have learned they have cancer or diabetes. Even employees who were hesitant to receive regular health screenings have been converted into fierce advocates for the program based on how it has personally improved their health. Some of these workers simple would not access care otherwise on a regular basis.

Overall, the program has touched roughly 15,000 individuals to date. Moving forward, Randolph Health is partnering with others in the county on a broader initiative called Healthy Randolph. The CHC BetterCare program is a key part of this effort.

# 6. DISCUSSION

First and foremost, hospitals provide care to those who need it. Although the role of hospitals in public health is well known, the economic impacts of hospitals are sometimes overlooked. Hospitals are a large industry; in 2015, NCHA members directly employed over 162,000 people in North Carolina and generated approximately $19.2 billion in state GDP. In many rural counties, the local hospital is the single largest employer, and 2 of North Carolina's top 10 employers are hospitals, namely, Carolinas HealthCare System and UNC Health Care System (Tippett, 2015).

Hospitals also drive economic activity in other industries through their spending on operations, payroll, and capital investment. Our analysis shows that North Carolina hospitals have substantial economic impacts throughout the state's economy. Those impacts are magnified when accounting for interindustry transactions. The economic activity of NCHA member hospitals and health systems is associated with $37.8 billion in state GDP and $22.4 billion in total labor income across the state, which corresponds to nearly 395,000 jobs across both the hospitals themselves and the various industries with which they interact.

Although these economic impacts are substantial, they do not fully encompass the economic and societal impacts hospitals have on their communities. Hospitals are not taxed, but they contribute to the public good through both unreimbursed medical care and community impacts. Their contributions through unreimbursed care take the form of bad debt, charity care, Medicaid losses, and Medicare losses. In 2015, these four unreimbursed costs totaled $3.6 billion across all North Carolina hospitals. Hospitals receive no reimbursement for these costs but continue to provide essential services to patients as part of their mission to serve patients and promote public health. Many of the patients covered by these unreimbursed costs come from the most vulnerable populations in North Carolina (NCHA, 2017c).

Hospitals around the state also participate in a variety of initiatives to advance public well-being and to support local communities. All the initiatives work to promote public health broadly by addressing various socioeconomic determinants of health and workforce issues. North Carolina hospitals do not stop serving patients when they walk out the door. Instead, these hospitals work to improve the underlying conditions that cause poor health, whether that means ensuring that patients have steady, reliable access to healthy food or providing programs that give North Carolina youth the tools they need to be successful and to break the cycle of poverty.

# References

AHR. (2017). About America's health rankings. Retrieved from
http://www.americashealthrankings.org/about/page/about-the-annual-report

Blue Ridge Institute for Medical Research. (2016). Ranking tables of NIH funding to US
medical schools in 2006-2015. Retrieved from
http://www.brimr.org/NIH_Awards/NIH_Awards.htm

Cincinnati Children's. (2017). *Project SEARCH*. Retrieved from
https://www.cincinnatichildrens.org/service/p/project-search

Conetoe Family Life Center. (n.d.) Home page. Retrieved from
http://www.conetoelife.org/what-we-do/#youth

FaithHealthNC. (2017a). Homepage. Retrieved from https://faithhealthnc.org/what-is-
faithhealthnc/

FaithHealthNC. (2017b). NC Way PowerPoint. Retrieved from https://faithhealthnc.org/nc-
way-powerpoint/

Feeding America. (n.d.). *Hunger and poverty facts and statistics*. Retrieved from
http://www.feedingamerica.org/hunger-in-america/impact-of-hunger/hunger-and-
poverty/hunger-and-poverty-fact-sheet.html

Gorman, R. (2015, October 9). *Reverend Richard Joyner named top ten CNN Hometown
Hero of 2015*. Vidant Health. Retrieved from
https://www.vidanthealth.com/vidant/newsroomdetail.aspx?id=19841

Health Poverty Action. (n.d.). *The cycle of poverty and poor health*. Retrieved from
https://www.healthpovertyaction.org/info-and-resources/the-cycle-of-poverty-and-
poor-health/

IMPLAN Group LLC. (2015a). IMPLAN system: Software North Carolina 2013 data.
Huntersville, NC: IMPLAN Group LLC.

North Carolina Department of Commerce. (2016). Quarterly Census of Employment and
Wages (QCEW) Largest Employers. *Labor & Economic Analysis Division*. Retrieved
from http://d4.nccommerce.com/QCEWLargestEmployers.aspx

North Carolina Hospital Association (NCHA). (2014). NCHA guidelines for reporting hospital
community benefits. NCHA: Cary, NC.

North Carolina Hospital Association (NCHA). (2017a). *About NCHA*. Retrieved from
https://www.ncha.org/about

North Carolina Hospital Association (NCHA). (2017b). NCHA mission. Retrieved from
https://www.ncha.org/about/mission

North Carolina Hospital Association (NCHA). (2017c). *North Carolina hospital community
benefits for FY 2015, for four major categories*. NCHA: Cary, NC.

Project SEARCH. (2017). *High school transition program*. Retrieved from
http://www.projectsearch.us/

Schuhmann, T. M., Healthcare Financial Management Association. (2009). *Hospital capital spending shifting and slowing even before the financial meltdown*. Retrieved from
https://www.costreportdata.com/HFM-CapitalSpending_NOV09.pdf

Stanford University. (2010). *Healthcare disparities & barriers to healthcare*. Retrieved from
http://ruralhealth.stanford.edu/health-pros/factsheets/disparities-barriers.html

Tippett, R. (2015). *NC in focus: Top employer by county, 2014 (Q2)*. Retrieved from
http://demography.cpc.unc.edu/2015/01/29/nc-in-focus-top-employer-by-county-2014/

U.S. Department of Commerce. (2016). Annual gross domestic product (GDP) by state. Bureau of Economic Analysis. Retrieved from
https://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=4&isuri=1&7003=200&7001=1200&7002=1&7090=70.

U.S. Department of Commerce. (2017). North Carolina. *Bureau of Economic Analysis*. Retrieved from
https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=37000&areatype=STATE&geotype=3

U.S. Department of Labor. (2016). Occupational Employment Statistics. *Bureau of Labor Statistics*. Retrieved from https://www.bls.gov/oes/current/naics4_622100.htm

U.S. Department of Labor. (2017). Consumer price index. *Bureau of Labor Statistics*. Retrieved from https://data.bls.gov/pdq/SurveyOutputServlet

U.S. Department of Labor. (2017). State and Area Employment, Hours, Earnings. *Bureau of Labor Statistics*. Retrieved from https://data.bls.gov/cgi-bin/dsrv?sm

# Appendix A:
# Detailed Data Methods

## A.1    Data Preparation

### *A.1.1 Operating Expenditures*

Operating expenditures data came from the FY 2015 expense summary report from NCHA. The data were retrieved from ANDI of NCHA. Total annual expenses reported by ANDI exclude bad debt and depreciation. Additionally, payroll and benefits were not considered operating expenditures and were subtracted from the total annual expenses listed in ANDI. The total annual expenditures excluding bad debt, depreciation, payroll, and benefits, were considered the total operating expenditures for each hospital. The expense summary report included data on 123 member hospitals of the NCHA. Of those 123 hospitals, 28 were missing data relevant to calculating their total expenditures, excluding bad debt, depreciation, payroll, and benefits. Before accounting for this missing data, the sum of total expenditures, excluding bad debt, depreciation, payroll, and benefits, across all hospitals was $11.1 billion in 2016 dollars, with an average total expenditure of $107.2 million.

We used two methods to account for missing data. First, when available, we summed quarterly data on total expenditures for each hospital and used these sums as the total expenditures for those hospitals. Total expenditure data for nine hospitals were calculated using this method. The nine hospitals were Broughton Hospital, Cape Fear Valley Hoke Hospital, Central Carolina Hospital, Central Regional Hospital, High Point Regional Health System, Mission Hospital, Murphy Medical Center, Rutherford Regional Medical Center, and Sandhills Regional Medical Center. Six of these nine hospitals did not have data for all four quarters. If one of these hospitals had fewer than four quarters of quarterly data, the quarters for which data were available were summed and used as the yearly total expenditure. This means that the total expenditures calculated for some hospitals using this method will represent less than a year's worth of expenditures. Although this portrayal of these nine hospitals' yearly total expenditures is not the most accurate, the lower total expenditures at these hospitals lend a conservativeness to the model and avoid making assumptions about how total expenditures fluctuate from quarter to quarter. If there were no quarterly data available for total expenditures for a hospital, we had to use an alternative method of estimating total expenditures.

The second method imputes the total expenditures based on the number of beds at a hospital and the average total expenditures per bed for hospitals with a similar number of total beds in the same U.S. Department of Agriculture (USDA) consolidated regional category. All hospitals were grouped into three regional categories: rural, urban, and suburban. Hospitals were also grouped into those with fewer than 50 beds, those with between 50 and 200 beds, and those with more than 200 beds. Together, these two sets of

groupings create nine subgroups of hospitals. Medians of total expenditures per bed for each of the nine subgroups were calculated using existing data. To estimate the total expenditures of the hospitals with missing data, the median for the subgroup to which the hospital belonged was multiplied by the number of beds at that hospital. For example, if a rural hospital with 30 beds was missing data, we calculated the total expenditures by multiplying the median total expenditures per bed for rural hospitals with fewer than 50 beds by the 30 beds at the hospital that was missing data. This calculation was done for each hospital that was missing data and for which no quarterly data were available.

After accounting for missing data, total expenses, excluding bad debt, depreciation, payroll, and benefits, for all hospitals totaled $11.9 billion. The average of total expenses, excluding bad debt, depreciation, payroll, and benefits, per hospital in 2016 dollars was $97.1 million.

### A.1.2 Payroll and Benefits

Data on payroll and benefits were part of the operating expenditures data but were not included in the calculation of total expenditures. We had data on payroll and benefits for 104 NCHA member hospitals. Nineteen NCHA members were missing payroll and benefits data. Payroll and benefits expenses for these member hospitals were imputed using the same bed size and category method used to impute operating expenditure data. Before imputation, total payroll and benefits for all member hospitals was $10.5 billion in 2016 dollars. The average total payroll and benefits per hospital was nearly $100.8 million before imputation. After imputation, total payroll and benefits for all member hospitals was $11.1 billion in 2016 dollars, and the average total payroll and benefits per hospital was $90.7 million.

### A.1.3 Capital Expenditures

NCHA provided data on capital expenditures for each member hospital for FY 2013 through FY 2015. We augmented these data with quarterly capital expenditures data when available. Quarterly data for each FY were summed to create a yearly total. In some cases, capital expenditure data were only available for some of quarters of each FY. In this case, we summed the available data and used the data in place of a yearly total. For example, if a hospital was missing FY 2015 capital expenditures data but had data for quarters one through three of FY 2015, the sum of the three quarters of data was treated as total capital expenditures in FY 2015. After augmenting the yearly data with quarterly data, we inflated capital expenditures to 2016 values and averaged them to create a 3-year average of capital expenditures in 2016 dollars for each hospital. At this point, 16 hospitals were missing capital expenditures for all three FYs. We imputed 3-year averages of capital expenditures for these three hospitals using the same imputation method described for operating expenditures. Before imputation, total capital expenditures were $1.64 billion in 2016 dollars with an average of $15.2 million per hospital. After imputation, total capital

expenditures were $1.72 billion in 2016 dollars with an average of $13.9 million per hospital.

### A.1.4 Employment

We retrieved data on employment from ANDI. Employment data were available for 90 out of 123 hospitals. We used the same imputation method used for operating expenditures for employment. Before imputation, the average number of employees per hospital was 1,409, and the total number of employees was 126,775. After imputation, the average number of employees per hospital was 1,317, and the total number of employees was 162,025. Although imputing missing values caused the total number of employees to increase, it caused the average number of employees per hospital to decrease. This result occurs because the majority of hospitals with missing employment data were smaller hospitals with low imputed values of employees.

### A.1.5 Revenues

We retrieved data on revenues from ANDI. Revenue data were available for 98 out of 123 hospitals. We used the same imputation method used for operating expenditures for revenues. Before imputation, average revenue per hospital was $289.6 million, and total revenue was $28.3 billion. After imputation, average revenue per hospital was $253 million, and total revenue was $31.1 billion. Again, imputation caused the value of total revenue to increase, but average revenue decreased because the majority of hospitals with missing data were smaller hospitals with lower revenues.

## A.2   IMPLAN Model Runs

Based on conversations with NCHA, sector 475 and sectors 477 through 483 were identified as sectors that NCHA members would fall in. These sectors were aggregated into a single NCHA members sector. The relevant sectors are listed in Table A-1.

**Table A-1. NCHA Member Sector Composition**

| IMPLAN Sector | IMPLAN Description | NAICS Code | Relevant Industries: 6-Digit NAICS Names |
|---|---|---|---|
| 475 | Offices of physicians | 6211 | 621111 Offices of Physicians (except Mental Health Specialists)<br>621112 Offices of Physicians, Mental Health Specialists |
| 477 | Offices of other health practitioners | 6213 | 621310 Offices of Chiropractors (NOT RELEVANT)<br>621320 Offices of Optometrists<br>621330 Offices of Mental Health Practitioners (except Physicians)<br>621340 Offices of Physical, Occupational and Speech Therapists, and Audiologists<br>621391 Offices of Podiatrists (NOT RELEVANT)<br>621399 Offices of All Other Miscellaneous Health Practitioners |

(continued)

**Table A-1. NCHA Member Sector Composition (continued)**

| IMPLAN Sector | IMPLAN Description | NAICS Code | Relevant Industries: 6-Digit NAICS Names |
|---|---|---|---|
| 478 | Outpatient care centers | 6214 | 621410 Family Planning Centers<br>621420 Outpatient Mental Health and Substance Abuse Centers<br>621491 HMO Medical Centers<br>621492 Kidney Dialysis Centers<br>621493 Freestanding Ambulatory Surgical and Emergency Centers<br>621498 All Other Outpatient Care Centers |
| 479 | Medical and diagnostic laboratories | 6215 | 621511 Medical Laboratories<br>621512 Diagnostic Imaging Centers |
| 480 | Home health care services | 6216 | 621610 Home Health Care Services |
| 481 | Other ambulatory health care services | 6219 | 621910 Ambulance Services<br>621991 Blood and Organ Banks<br>621999 All Other Miscellaneous Ambulatory Health Care Services |
| 482 | Hospitals | 622 | 622110 General Medical and Surgical Hospitals<br>622210 Psychiatric and Substance Abuse Hospitals<br>622310 Specialty (except Psychiatric and Substance Abuse) Hospitals |
| 483 | Nursing and community care facilities | 6231, 6233 | 623110 Nursing Care Facilities (Skilled Nursing Facilities)<br>623311 Continuing Care Retirement Communities<br>623312 Assisted Living Facilities for the Elderly |

NAICS: North America Industry Classification System

We used the bill-of-goods approach to allocate NCHA member expenditures across sectors receiving payments. Payroll data were considered a change to labor income and were entirely allocated to labor income. For operating expenditures and capital expenditures, we altered IMPLAN spending patterns for the aggregate NCHA members sector. First, spending patterns for the aggregated NCHA sector were pulled from IMPLAN. Because IMPLAN's spending pattern does not account for payroll expenses, the spending pattern multipliers do not sum to one. In our method, payroll was accounted for using a labor income change, so it was necessary to adjust the spending pattern multipliers to sum to one. Next, the sectors were identified as a recipient of either operating expenditures or capital expenditures. The sectors identified as receiving capital expenditures were zeroed out, and their values were distributed across the remaining sectors proportionately. The adjusted spending patterns were then multiplied by the operating expenditures to allocate operating expenditures across the various sectors.

The sectors that were identified as capital expenditures and zeroed out were handled separately. The spending pattern multipliers for these sectors were adjusted based on data

on capital expenditures from the Healthcare Financial Management Association (HFMA). The HFMA data separated capital expenditures into three categories: plant, property, and equipment. According to the HFMA data, 4% of capital expenditures went to property, 51% went to plant, and the remaining 45% went to equipment. The real estate sector (IMPLAN sector 440) was used to represent property and was allocated 4% of capital expenditures, and the construction of new healthcare structures sector (IMPLAN sector 52) was used to represent plant and received 51% of capital expenditures. Sectors for medical equipment and motor vehicles represented equipment. To allocate the remaining 45% of capital expenditures across these sectors, the original spending patterns were adjusted to sum to one. These adjusted multipliers were then multiplied by 45% of capital expenditures to allocate the remaining capital expenditures.

## A.3   Postprocessing

The exact formulas used to adjust the direct, indirect, and induced effects reported by IMPLAN are summarized in Table A-2.

**Table A-2.   Postprocessing Adjustments to IMPLAN Outputs**

| Type of Impact | Employment | Labor Income | State Gross Domestic Product (Value Added) | Gross Revenues (Output) |
|---|---|---|---|---|
| Direct effect | Total employment from ANDI data adjusted for missing values | Total payroll from ANDI data adjusted for missing values | Difference between total revenue from ANDI data adjusted for missing values and operating expenditures | Total revenue from ANDI data adjusted for missing values |
| Indirect effect | Sum of the direct and indirect effects reported by IMPLAN | Sum of the direct and indirect effects reported by IMPLAN | Sum of the direct and indirect effects reported by IMPLAN | Sum of the direct and indirect effects reported by IMPLAN |
| Induced effect | Induced effect reported by IMPLAN | Induced effect reported by IMPLAN | Induced effect reported by IMPLAN | Induced effect reported by IMPLAN |
| Total effect | Sum of the above values | Sum of the above values | Sum of the above values | Sum of the above values |

# Appendix B:
# Description of Data and Information Sources

## B.1  State of Health in North Carolina

▪ **America's Health Rankings**

– **Description**: "For nearly 3 decades, America's Health Rankings has provided an analysis of national health on a state-by-state basis by evaluating a historical and comprehensive set of health, environmental and socioeconomic data to determine national health benchmarks and state rankings. America's Health Rankings employs a unique methodology, developed and annually reviewed and overseen by a Scientific Advisory Committee of leading public health scholars. The data in the report come from well-recognized outside sources such as the Centers for Disease Control and Prevention, American Medical Association, FBI, Dartmouth Atlas Project, U.S. Department of Education and Census Bureau." (http://www.americashealthrankings.org/)

– **Use**: Contextual data on the state of healthcare in North Carolina and how North Carolina ranks compared with other states.

– **URL**: http://www.americashealthrankings.org/explore/2016-annual-report/state/NC

▪ **Blue Ridge Institute for Medical Research**

– **Description**: "The information contained in the Award files was obtained from the Research Portfolio Online Reporting Tool (RePORT) from the National Institutes of Health. For reasons that are unclear, the Mayo Clinic is not designated as a School of Medicine and its awards are not attributed to specific departments. However, BRIMR has included the Mayo Clinic in the Medical School rankings from data included in the All Organizations file. This file was also used to calculate the rankings for all Institutions, Cities, Principal Investigators, and other Health Sciences Schools. Please report any discrepancies between the Blue Ridge Institute files and the NIH files to Webmaster@brimr.org. The Award Data correspond to the US Government fiscal year. Awards and R&D contracts for 2013 correspond to those granted from 1 October 2012-30 September 2013." (http://www.brimr.org/NIH_Awards/NIH_Awards.htm)

– **Use**: Data on NIH awards to North Carolina medical schools. Used to add context to the state of healthcare in North Carolina and medical research in the state.

– **URL**: http://www.brimr.org/NIH_Awards/2016/NIH_Awards_2016.htm

## B.2  Impact Analysis

▪ **Advocacy Needs Data Initiative (ANDI)**

– **Description:** "As a result of NCHA's Policy Development Committee recognizing the need to have current data to effectively support and strengthen advocacy efforts on behalf of North Carolina's hospitals, the Advocacy Needs Data Initiative (ANDI) was created. ANDI is a secure, password-protected, web-based survey tool that collects financial and workforce data. Since 2003, participating hospitals have had access to free, online, benchmark and trend reports. One of these is the Community Benefit Report that shows unreimbursed costs of treating patients with government insurance and the uninsured. Hospitals voluntarily post their

community benefits reports on the NCHA public community benefits web page. Another report is the Estimated Economic Impact Report, which shows the estimated impact on hospital jobs, services, and the community if a hospital were to close. ANDI is made possible through the generous support of The Duke Endowment." (https://www.ncha.org/data)

– **Use:** The underlying spending data that are used as the key input into the economic model. Also, the number of beds for each hospital was used for multiple imputation methods.

– **URL:** N/A; data accessed through a data-sharing agreement with NCHA.

▪ **IMPLAN data and model for the state of North Carolina, 2013**

– **Description**: "IMPLAN is a world leader in providing economic impact data and modeling to governments, universities, and public and private sector organizations for assessing the economic impacts of project decisions in all industry sectors. When you need to know how businesses, projects, or policies interact with and shape the economy, IMPLAN is here to help." (http://www.implan.com/company/)

– **Use**: Interindustry transactions and associated multipliers used to calculate the impact of NCHA members' annual operating expenditures, payroll, and capital expenditures.

– **URL**: Proprietary data and model purchased from IMPLAN.

▪ **American Community Survey, 2015**

– **Description:** "The American Community Survey (ACS) is an ongoing survey that provides vital information on a yearly basis about our nation and its people. Information from the survey generates data that help determine how more than $400 billion in federal and state funds are distributed each year." (https://www.census.gov/programs-surveys/acs/about.html).

– **Use:** 2015 population estimates used to calculate per capita values at the county and NCHA district levels.

– **URL:** https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

▪ **Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2015**

– **Description:** "The Quarterly Census of Employment and Wages (QCEW) program publishes a quarterly count of employment and wages reported by employers covering more than 95 percent of U.S. jobs available at the county, Metropolitan Statistical Area (MSA), state and national levels by detailed industry." (https://www.bls.gov/cew/cewover.htm).

– **Use:** Used QCEW data to compare headcounts in hospital system sectors to employment full-time equivalents (FTEs) in IMPLAN. This headcount-to-FTE ratio was used to impute employment FTEs for certain hospitals.

– **URL:** QCEW Data Viewer https://data.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables

- **Healthcare Financial Management Association data on capital spending, 2007**

  – **Description**: "With more than 40,000 members, the Healthcare Financial Management Association (HFMA) is the nation's premier membership organization for health care finance leaders. HFMA builds and supports coalitions with other health care associations and industry groups to achieve consensus on solutions for the challenges the U.S. health care system faces today. Working with a broad cross-section of stakeholders, HFMA identifies gaps throughout the health care delivery system and bridges them through the establishment and sharing of knowledge and best practices. We help health care stakeholders achieve optimal results by creating and providing education, analysis, and practical tools and solutions. Our mission is to lead the financial management of health care." (https://www.hfma.org/about/)

  – **Use**: HFMA data on the allocation of capital expenditures among property, plant, and equipment were used to allocate NCHA member capital expenditures across different IMPLAN sectors. Appendix A contains a detailed description of this process.

  – **URL**: https://www.costreportdata.com/HFM-CapitalSpending_NOV09.pdf

- **NCHA district assignments**

  – Description: NCHA member hospitals and healthcare systems are organized into six geographic districts.

  – **Use:** Summarize the expenditure data by geographic "source" of impact.

  – **URL:** https://www.ncha.org/about/member-hospitals.

- **Urban/suburban/rural county designations**

  – Description: Developed on behalf of NCHA by consulting firm Ascendient, these county designations have been adjusted from the USDA Economic Research Service's Rural-Urban Continuum Code Classifications, which are based on metropolitan statistical area (MSA)/non-MSA populations. Definitions are as follows:

    o Rural
      - <25,000 = Small rural
      - 25,000–75,000 = Rural
      - 75,000–200,000 nonadjacent to a county of at least 200,000 = Rural suburban

    o Suburban
      - 75,000–200,000 adjacent to a county of at least 200,000 = Suburban
      - 200, 000–500,000 = Large suburban

    o Urban
      - 500,000–1,000,000 = Urban
      - >1,000,000 = Large urban

  – Use: Summarize the expenditure data by "source" of impact where source is urban, suburban, and rural counties.

– <u>URL</u>: Ascendient classifications provided directly to RTI by NCHA. Original USDA data located at https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/.

## B.3   Other

▪ **Headline Consumer Price Index**

– **Description:** Bureau of Labor Statistics Consumer Price Index—All Urban Consumers

– **Use:** Adjust reported dollar values to 2016 values.

– **URL:** https://www.bls.gov/cpi/home.htm

# Appendix C:
# Interview Contacts

| Interviewee | Organization | Profile |
|---|---|---|
| Dr. Derek Raghavan | Levine Cancer Institute (Carolinas HealthCare) | Carolinas HealthCare System's Mobile Lung Cancer Screening Unit |
| Melissa Wheeler | Carolinas HealthCare | Carolinas HealthCare System's Mobile Lung Cancer Screening Unit |
| Melissa Lewis | Ashe Memorial Hospital | Ashe Memorial Hospital Pantry |
| Dr. Teresa Cutts | FaithHealthNC | FaithHealthNC |
| Jeremy Moseley | FaithHealthNC | FaithHealthNC |
| Paula Faria | Wake Health | FaithHealthNC |
| Kahla Hall | Vidant Health | Vidant Health and Conetoe Family Life Center Break the Chain of Poverty and Poor Health |
| Michelle Cherry | Vidant Health | Vidant Health and Conetoe Family Life Center Break the Chain of Poverty and Poor Health |
| Reverend Dean Carter | Southeastern Health | Southeastern Health Compassion for U Wellness Program |
| Charnaye Boseley | Novant Health | Novant Health Breast-Screening Partnership |
| Jacquaya Reel | Susan G. Komen Foundation | Novant Health Breast-Screening Partnership |
| No One Interviewed | No One Interviewed | Southeastern Health Provides Opportunities in Health Care to Underrepresented Students |
| Lisa Lassiter | Vidant Health | Vidant Medical Center Empowers Youth with Disabilities with Project Search |
| Ed Kitchen | Bryan Foundation | Cone Health Partnership for Community & Career Development: Union Square Campus in Greensboro, NC |
| Tim Rice | Cone Health | Cone Health Partnership for Community & Career Development: Union Square Campus in Greensboro, NC |
| Wendel Lamason | Randolph Hospital | Randolph Health CHC BetterCare Program |
| AEC Textiles | AEC Textiles | Randolph Health CHC BetterCare Program |
| April Thorton | Randolph Hospital | Randolph Health CHC BetterCare Program |