The Economic and Social Contributions of North Carolina's Health Systems and Hospitals

Technical Documentation

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Table of Contents

Introduction

Goals of Technical Documentation

The goal of this technical documentation is to describe how RTI International measured the full economic contribution, both direct and secondary (indirect and induced) impacts, of NCHA-member operations in North Carolina. To achieve this goal, we used a commercially available regional economic impact model called IMPLAN to estimate the size of secondary impacts.

To help readers understand how the economic impact analysis was conducted, we use the "question and answer" format below, which is recommended by the U.S. Bureau of Economic Analysis (BEA). The format was adapted from a publication provided by staff economists at BEA who are experts in regional economic impact modeling, including university impacts (Ambargis *et al.*, 2014).

General Questions

WHAT ECONOMIC MODEL IS USED TO ESTIMATE THE ECONOMIC IMPACTS?

A standard way to measure the total impact of an event that increases sales, spending, or other economic shocks is to quantify direct program, organization, and/or industry spending. However, focusing on only these direct expenses misses the value of other secondary economic activity. The U.S. Bureau of Economic Analysis (BEA) (2013) describe the secondary impacts in this way:

> an initial change in economic activity results in other rounds of spending—for example, building a new road will lead to increased production of asphalt and concrete. The increased production of asphalt and concrete will lead to more mining. Workers benefiting from these increases will spend more, perhaps by eating out at nicer restaurants or splurging more on entertainment (BEA, 2013).

Quantifying indirect and induced impacts provides a more complete picture of the full economic contributions of an organization or specific program. To illustrate an economic story and provide estimates of the size of the economic contributions made by North Carolina health systems and hospitals, this analysis used commercially available economic data and software called IMPLAN. IMPLAN is the leading provider of input/output data and software in the United States.

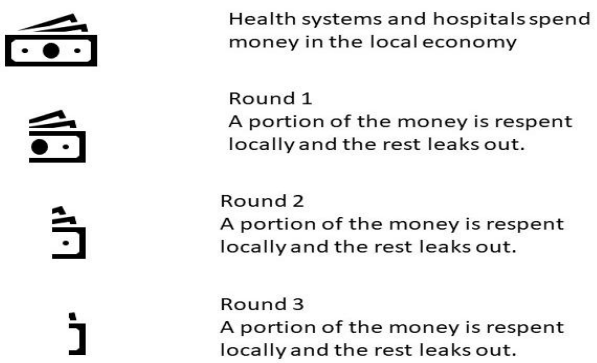
Input-output data represent the flow of money in an economy, primarily among industries. The interactions among industries in an economy can be arranged according to a particular accounting system called "input-output accounts." A

portion of the output (*i.e.* sales) of one industry will appear as the input (*i.e.* purchase) of other industries. These input-output accounts are used to build models that display the relationships between industries.

The main source of all I-O models in the United States is the Industry Economic Accounts produced by the Bureau of Economic Analysis (BEA). IMPLAN models are based on BEA data and contain more than 500 sectors representing private industries as well as government enterprises and administrative government sectors. Industry-level data elements include employment (both wage and salary employment and proprietors), labor income (both employee compensation and proprietor income), output, and intermediate input expenses. IMPLAN updates geographic and demographic data elements, such as household counts by nine household income categories, savings rates, commuting rates, and regional GDP, annually. BEA's Industry Economic Accounts' detailed IO tables are revised roughly every five years (IMPLAN, 2022).

The full economic contribution is frequently summarized by a ratio called a "multiplier." The ratio relates the total change in the economy to the initial change from the new spending.

Figure 1. [Spending Circulates in the Economy]



When a dollar is spent in the economy, only a portion remains locally; the rest is spent outside the local area. Multipliers relate the combined effect of a $1 change in sales to the output of all local industries. Money leaving the local economy for non-local purchases is often called "leakage." For example, when you purchase a beverage from a grocery store, a portion of the cost remains with the store, some goes to local transportation and warehousing, and some of the money is paid to the beverage producer, which may be located in another region. In this case, the multiplier adds up the amount of each dollar that remains in the local economy through numerous rounds of spending until all the money has left the local economy (Hughes, 2018). Figure 1 depicts these rounds of spending. Output multipliers typically range between 1 and 2.5.

IMPLAN uses underlying data about the economy to create multipliers for labor income, employment, and state GDP. We apply these multipliers to direct spending by health systems and hospitals to estimate total economic impacts.

WHAT TYPES OF IMPACTS ARE MODELED?

The IMPLAN model uses publicly available data to estimate and break down economic impacts into three separate effects:

1. Direct effects: Health system and hospital spending in economy,
2. Indirect effects: Health system and hospital suppliers local spending, and
3. Induced effects: Direct and indirect effects of health system and hospital and suppliers' employees' spending.

The combination of these economic effects is typically considerably larger than direct expenses.

- How are the "direct" impacts defined?

We evaluated the direct economic impact using the total value of operating expenses for NCHA-member hospitals using the most recent fiscal year of hospital expense and workforce data from the Healthcare Cost Study Information System (HCRIS) database, assembled by the Centers for Medicare & Medicaid Services, which contains actual expense data provided by hospitals. Approximately 50% of the data are from Fiscal Year (FY) 2024. If FFY 2024 data were missing, the analysis used FY 2023 or FY2022 data points.

For this study, we used the IMPLAN North Carolina state data package for data year 2024. NCHA impacts were reported in 2026 dollars.

- How are the "indirect" impacts defined (e.g., upstream, downstream, or a combination of upstream and downstream)?

We included upstream effects, referred to by IMPLAN as indirect effects, which measure the impact of local health systems and hospitals buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money either accrues in payments to value added or leaks from the local economy. We calculated the total impacts by applying direct effects to the multipliers. The indirect effects were added to the direct and induced effects to calculate the total effect.

- How are the "induced" impacts defined?

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

To estimate indirect and induced effects, RTI used a series of industry impact analyses to quantify in the contributions of hospital operations. We modeled operational expenses as spending on intermediate inputs and employee payroll and benefits were modeled as employee compensation. Capital expenses were modeled as industry output events for new construction (which includes site preparation and fixed equipment), building renovations and maintenance, movable capital, and real estate services.

It is important to clearly explain the relationship between direct spending and the supported indirect and induced impacts when presenting findings. Kapstein, Kim, & Eggeling (2014) clarifies "'supports' means that not all the jobs or value-added would necessarily vanish" without the direct activity, and that "'creation' indicates a net or incremental change while 'support' refers to an associated economic impact at a given point in time."

- What geographic regions are used to measure contributions?

The primary analysis considered the contribution to the state of North Carolina as a whole. RTI also considered the regional impacts of health systems and hospitals by examining five sub-regions of the state. **Table 1** lists the counties that comprised these regions.

Table 1. [**Sub-regions of North Carolina Used in Analysis**]

Eastern	North Central	Southwestern	Central	West
Beaufort	Chatham	Anson	Alamance	Alexander
Bertie	Durham	Cabarrus	Caswell	Alleghany
Bladen	Edgecombe	Cleveland	Davidson	Ashe
Brunswick	Franklin	Gaston	Davie	Avery
Camden	Granville	Iredell	Forsyth	Buncombe
Carteret	Harnett	Lincoln	Guilford	Burke
Chowan	Johnston	Mecklenburg	Randolph	Caldwell
Columbus	Lee	Rowan	Rockingham	Catawba
Craven	Nash	Stanly	Stokes	Cherokee
Cumberland	Orange	Union	Surry	Clay

Currituck	Person	Yadkin	Graham
Dare	Vance		Haywood
Duplin	Wake		Henderson
Gates	Warren		Jackson
Greene	Wilson		Macon
Halifax			Madison
Hertford			McDowell
Hoke			Mitchell
Hyde			Polk
Jones			Rutherford
Lenoir			Swain
Martin			Transylvania
Montgomery			Watauga
Moore			Wilkes
New Hanover			Yancey
Northampton			
Onslow			
Pamlico			
Pasquotank			
Pender			
Perquimans			
Pitt			
Richmond			
Robeson			
Sampson			
Scotland Sampson			
Tyrrell			
Washington			

Wayne

- What was the modeling methodology?

We created Individual projects for each region. Within these projects, there was the region of interest, such as the western region, and a region that represented the rest of North Carolina. Each project contained industry detailed analyses for hospital activities, employment events for facilities such as doctors' offices that were owned by the hospital or health system, and industry output events to representant construction and fixed and moveable equipment investments.

To estimate indirect and induced effects, RTI used a series of industry impact analyses to quantify in the contributions of hospital operations. There were two different detailed industry events for health system and hospital operations and these were each modeled twice for each region to account for private and nonprofit health systems and hospitals. Nonprofit health systems differ from for-profit ones from a modeling perspective because they have no proprietor employment, income, pay no taxes on production and imports, and have no property income. We modeled operational expenses as spending on intermediate inputs and employee payroll, benefits, and contract labor expenses were modeled as employee compensation.

Capital expenses were modeled as commodity output events for new construction (which includes site preparation and building renovations). We used more than 50 commodity output events to model investments in movable equipment and fixed including motor vehicles, surgical equipment and implements, and electromedical equipment.

Input Data

Prepping Input data

HOW MANY HOSPITALS PROVIDED DATA AND HOW WAS MISSING DATA ESTIMATED?

NCHA provided data for 133 facilities. Five health systems operate more than one hospital under the same Medicaid Provider Identification number. Information for healthcare systems with more than one hospital was reported by facility based on the number of facility beds.

The average North Carolina hospital, based on HCRIS data, has approximately 174 hospital beds with metro areas having a higher average than micro areas, which have a higher average than nonmetro areas. Of the 133 hospitals,

approximately 13% are in nonmetropolitan areas, approximately 19% are in micro areas, and approximately 67% are in metro areas. Hospitals in nonmetropolitan areas tend to be smaller on average with half of hospitals having fewer than 50 beds. Furthermore, 100% of hospitals with 200 or more beds are concentrated in micro or metro areas, and 83% are in metro areas. Information about hospital size by location is presented in **Table 2**.

Table 2. North Carolina Hospital Facilities by Location

Number of Beds	Nonmetropolitan	Micropolitan	Metropolitan	Total
0–49	9	2	25	36
50–199	9	19	39	67
200+	0	5	25	30
Total	**18**	**26**	**89**	**133**

Source: RTI International based on information from the state of North Carolina licensure data.

Operating Expenses

Operating expenses are regularly incurred expenses necessary for day-to-day operations. These expenses include supplies, utilities, management services, and legal services. RTI used the Total Operating Expenses line from the HCRIS report and subtracted all labor expenses to arrive at operating expenses that were intermediate goods and services.

Hospitals were separated by their operating type to account for different levels of taxation and spending patterns. Although North Carolina does not exempt nonprofit organizations from sales and use taxation, they may claim a refund of sales and use taxes for qualified expenses. This refund is limited to $31.7 million each year. Nonprofits also are exempt from state income taxes but must pay income taxes on unrelated business income such as the operation of cafeterias (North Carolina Department of Revenue, n.d.).

Auxiliary Businesses

NCHA-member health systems and hospitals often provide operate facilities that may be separate from the hospital itself. Other facilities include the following:

- Pharmacies
- Offices of physicians
- Offices of dentists

- Offices of other health practitioners
- Outpatient care centers
- Medical and diagnostic laboratories
- Home healthcare services
- Other ambulatory healthcare services
- Nursing and community care facilities

Since our last report, RTI sought a methodology to improve our estimates of facilities that are owned by health system or hospitals and operated independently. To accomplish this objective, RTI pulled data from Dun & Bradstreet to identify businesses who were owned by hospitals and healthcare systems. Dun & Bradstreet is a global business intelligence company that provides business databases and estimates of employment. RTI has access to this proprietary data via our library services division.

Using this Dun & Bradstreet, we identified 480 facilities. These records provided an estimated number of jobs associated with each facility. However, in 167 instances just one job was reported with a facility. This methodology underestimates the true employment for these facilities but provides a more accurate account of these businesses than previous methodology.[1] This updated methodology attributes all reported hospital jobs to hospital activities and counts these independent businesses as additional jobs and economic activity. This change was motivated by the paper, "Economic Contributions of Florida Hospital in 2021" produced by the Florida Hospital Association (UF/IFAS Economic Contributions of Florida Hospitals in 2021).

Due to the change in methodology, the 2026 report results are not directly comparable to those produced in 2022. The clearest difference is in the level of total employment at the state and regional levels.

The past methodology allocated 5% of hospital employee compensation and operating expenses to business activities such as skilled nursing facilities, doctors' offices and other businesses owned by healthcare system and hospitals. This methodology reduced the employment in the formal hospital sector and shifted it to auxiliary businesses. The lower compensation levels in these other

[1] For our past report, RTI relied on information hospitals reported to the American Hospital Association (AHA) to identify which hospitals operate these auxiliary facilities. Once these other business activities were identified, RTI apportioned 10% of total operating expenses to each of these activities. For instance, if a hospital operates a medical office building and a nursing facility, 80% of hospital operational expenses were attributed to the hospital and 10% were attributed to the office building and 10% to the nursing facility.

sectors resulted in IMPLAN overestimating the overall employment. In the 2026 version of the model, we have maintained all hospital employment in that sector and estimated additional employment for hospital-owned businesses. These differences are depicted in **Table 3**.

Table 3. Estimated Employment Differences between Methodologies

Employment Category	2022 Estimate	2026 Estimate	Difference
Hospitals	122,548	208,949	86,402
Estimate of other health facilities operated by health systems and hospitals	131,110	0	-131,110
Dun Bradstreet Estimate of Healthcare facilities owned by health systems and hospitals	0	16,139	16,139
Construction	14,501	9,207	-5,294
Total Direct Employment	268,159	234,295	-33,864

Capital Investment

IS THE IMPACT OF HOSPITAL SPENDING ON NEW CONSTRUCTION, EQUIPMENT, AND LAND ESTIMATED?

Yes. Capital expenses are long-term investments in durable medical equipment, construction of new buildings, and structural improvements to existing facilities. For this study, RTI used six different categories of capital investments from the HCRIS study:

1. Land purchases
2. Land improvements
3. Construction of new facilities and fixtures
4. Building improvements
5. Fixed equipment
6. Moveable equipment

For the 2026 analysis, construction impacts are treated separately from healthcare and hospital facilities to clarify that, although funded by healthcare organizations, they are indirect to healthcare delivery.

AVERAGING CAPITAL EXPENSES THROUGH TIME

A 4-year average of capital expenses from 2021–2024 was created to represent a "typical" year's capital expense by health systems and hospitals. Land purchases were adjusted to reflect the actual value of professional services associated with land sales such as realtor fees, inspections, and legal fees. RTI used 5.5% of the total purchase price to quantify these expenses. Real estate commissions are usually 5-6 percent of the total transaction value.[2] The values for land improvements, construction of new facilities, and building improvements were combined and modeled in IMPLAN sector 42, construction of new healthcare facilities. Fixed and moveable equipment values were combined and measured using the hospital industry investment spending pattern.

Missing Data

Thirty-one facilities were missing employee compensation information. These variables consisted of employee wages, benefits, and expenses incurred to hire contract workers. Most of these facilities were small, nonmetropolitan hospitals. To impute these missing data for employee compensation and operating expenses, RTI used the median of the category average and multiplied this figure by the total number of hospital beds.

There also were five hospitals that did not report any capital expenses. We did not impute any data for these missing capital expenses because we believe it is plausible that these facilities did not engage in any construction or remodeling activities during this period.

Community Benefits

NCHA provided data by health systems and hospitals on their community benefits, which are goods and services that address a community need. Community benefits include charity care, covering costs that Medicare and Medicaid do not cover; and writing off uncollectable debt. Other forms of community benefits come in the form of graduate medical education; research; and population health, in-kind benefits, and community health improvement activities. Data from the HCRIS database on uncompensated care and uncollectible debt were used to estimate community benefits for facilities that did not report these figures to NCHA.

These community benefits were not directly modeled in this study as they primarily represent a reduction in revenue, not direct outlays.

Nicasto, S. 2022. "The Average North Carolina Real Estate Commission in 2022" https://listwithclever.com/average-real-estate-commission-rate/north-carolina/

Results

Total Economic Impacts

WHAT ECONOMIC INDICATORS ARE STUDIED AND WHAT DO THEY MEAN?

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

- State gross domestic product (GDP): State GDP is the value of total output less the value of intermediate goods and materials or supplies that are used in producing them. Also referred to as "value-added." State GDP is often used to describe the overall size of the economy.
- Labor income: Includes employee compensation (wages and benefits) and proprietor income, which consists of income from self-employed individuals and independent business owners. Labor income indicates how much additional personal income is created by health systems and hospitals.
- Employment: Consists of all full-time, part-time, and temporary positions. Jobs are typically studied as an annual average.

ARE THE RESULTS REASONABLE GIVEN THE SIZE AND STRUCTURE OF THE STATE ECONOMY?

This study was last produced using 2022 data and expressed in 2024 dollars. At that time, RTI estimated hospitals and auxiliary healthcare facilities contributed about $40 billion in state gross domestic product (GDP), a common measure of the size of the economic value added. This value was about 6% of total GDP. In the most recent version of the report, health systems and hospitals contributed $52 billion in state gross domestic product (GDP), which was about 6% of total GSP. We believe these values are reasonable.

If we examine just direct impacts, RTI's 2026 figures are similar to those reported by the Bureau of Economic Analysis for the United States. BEA reports that hospitals generated 2.4% of total national GDP. Our study, which includes more activity than just hospitals, estimated this value to be 2.9%.

TAXES

IMPLAN estimates tax data for industries at the special district, sub-county, county, state, and federal levels. These estimates are based on tax data that lags one or two years behind the model year. For example, a 1-year lag for 2024

IMPLAN data means that the underlying data have a reference year of 2023. Timeliness is especially relevant for knowing whether changes in tax laws or economic conditions are reflected in the IMPLAN dataset.

The NCHA study presents the direct, indirect, and induced tax impacts at the local/county and state level for the five regions.

WHAT DATA EXIST TO SUPPORT RESULTS?

Compared to the previous version of this report, there were two clear differences: average annual construction spending fell from $2.7 billion to $1.8 billion and hospital employee compensation rose from $15.7 billion to $21.3 billion. We believe that both changes are realistic. To support this conclusion, we examined recent industry trends. IBIS World Reports published a report in 2025 that indicated hospital construction in the United States had declined between 2020 and 2023 as the pandemic delayed and eliminated construction projects. As profitability increased in 2024, construction projects were restarted. Since the data for this project are from 2021–2024, this decline in construction activities is present in our data.

The pandemic also had important impacts on hospital compensation. Our numbers depict a 32% increase in total employee wages, benefits, and amounts paid for contract labor. Ninety-nine percent of the data used for this report was directly reported by hospitals. Premier Advisory Services, a healthcare consulting service in Charlotte, NC, recently reported that average hospital hourly wage rates increased by 34% since 2019 and agency rates increased by 63% in the same time period (Premier Data: Healthcare Workforce Insights Heading into 2025).

Supporting Documents

Notes

METROPOLITAN AND MICROPOLITAN DEFINITIONS

Metropolitan and micropolitan statistical areas consist of a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core. Each metropolitan statistical area must have at least one urbanized area of 50,000 or more inhabitants. Each micropolitan statistical area must have at least one urban cluster of at least 10,000 but less than 50,000 population. Counties in which at least 50 percent of the population resides within urban areas of 10,000 or more population, or that contain at least 5,000 people within a single urban area of

10,000 or more population, are identified as a "central counties"). Counties that are not located adjacent to a metropolitan or micropolitan core are considered rural for this study.

https://www.census.gov/programs-surveys/metro-micro/about.html

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Technical Glossary

Definitions of Effects

Direct effect: The total output, value added, labor income, or jobs associated with the money spent by individuals, businesses, and other institutions for patient care, research, and education that is provided by NCHA-member hospitals.

Indirect effect: The additional total output, value added, labor income, or jobs created by the first-round money spent by NCHA members and the subsequent rounds of money spent among local businesses. The money could be spent in the first round on items such as medical devices, lab equipment, computer supplies, and public outreach campaigns. Subsequent indirect effects include the money spent further upstream on items such as electronic parts for medical devices and computers.

Induced effect: The additional total output, value added, labor income, or jobs created as employees at NCHA-member institutions spend labor income at retail clothing stores, restaurants, movie theatres, and other local businesses. Other additional induced effects occur because additional jobs are created for other local businesses, leading to the new employees at those businesses spending their labor income at retail clothing stores, restaurants, movie theatres, and other local businesses.

Definitions of Economic Impact Variables

Full-time equivalent (FTE): Full-time equivalent employees equal the number of employees on full-time schedules plus the number of employees on part-time schedules converted to a full-time basis. The number of full-time equivalent employees in each industry is the product of the total number of employees and the ratio of average weekly hours per employee for all employees to average weekly hours per employee on full-time schedules. An industry's full-time equivalent employment will be less than the number of its employees on full- and part-time schedules, unless it has no part-time employees.

Jobs: An industry-specific mix of the average annual full-time, part-time, and seasonal employment supported by NCHA hospitals. As with effects, jobs are classified as direct, indirect, or induced. A job in IMPLAN = the annual average of monthly jobs in that industry (this is the same definition used by the Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics, and U.S. Bureau of Economic Analysis nationally). Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. A job can be either full time or part time. IMPLAN jobs can be converted to FTEs.

Labor income: All forms of employment income such as employee compensation (wages, salaries, and benefits) and proprietor income. As with effects, labor income is classified as direct, indirect, or induced.

Total federal tax impact: All federal taxes generated by economic activity.

Total output: Output represents the value of industry production. In IMPLAN, these are annual production estimates for the year of the data set and are in producer prices. For manufacturers, this would be sales plus/minus the change in inventory. For service sectors, production = sales. For retail and wholesale trade, output = gross margin and not gross sales. As with effects, outputs are classified as direct, indirect, or induced.

Total state and local tax impact: All state and local taxes generated by economic activity.

Total value added: This variable is the contribution to the state and U.S. gross domestic product. Total value added includes employee salaries, employee retirement and health benefits, and all payroll taxes. In addition, certain sales and property taxes and other operational fees are included. Total value added is distinguished from total output because it excludes non-salary, tax, and operational fee–related operating expenses. Examples of these expenses include supplies and equipment, heating and air conditioning, and other maintenance expenses. As with effects, value added is classified as direct, indirect, or induced.