

Health Care Industry Nashville MSA 2019

Trends, Scope, and Impact on the Regional Economy

Dr. Murat Arik, Director

Business and Economic Research Center
Jones College of Business,
Middle Tennessee State University

Prepared for

Nashville Health Care Council



NASHVILLE
HEALTH CARE
COUNCIL

**MIDDLE
TENNESSEE**
STATE UNIVERSITY

JONES COLLEGE OF BUSINESS

Business and Economic Research Center

ACKNOWLEDGEMENTS

The author would like to thank Hayley Hovious, president of the Nashville Health Care Council; Jamie Lee, chief operating officer of the Nashville Health Care Council; Ryann Petit-Frere, former communications director of the Nashville Health Care Council; and Barbara Pieroni, for editing and feedback. My special thanks go to the following individuals who made a real difference in this project:

- Kyle Chandler, BERC graduate research assistant
- Patricia Hummel, BERC undergraduate research team
- Maiko Morgan, BERC graduate research team
- Corey Pendleton, BERC graduate research assistant
- Mariyam Sumaiya, BERC graduate research team
- Caleb Watts, BERC graduate research team

TABLE OF CONTENTS

<i>EXECUTIVE SUMMARY</i>	<i>4</i>
<i>I. INTRODUCTION</i>	<i>8</i>
<i>II. OVERVIEW OF THE CORE HEALTH CARE INDUSTRY</i>	<i>10</i>
<i>III. STUDY GOALS AND METHODOLOGY</i>	<i>19</i>
<i>IV. CORE HEALTH CARE INDUSTRY IN THE NASHVILLE MSA: ITS SCOPE AND TRENDS</i>	<i>24</i>
<i>V. NASHVILLE'S HEALTH CARE INDUSTRY CLUSTER (with COVID-19 Impact Assessment)</i>	<i>32</i>
<i>VI. COMPARATIVE PERSPECTIVE ON NASHVILLE'S HEALTH CARE INDICATORS</i>	<i>48</i>
<i>VII. NASHVILLE HEALTH CARE COUNCIL MEMBER COMPANIES</i>	<i>56</i>
<i>VIII. CONCLUSION</i>	<i>57</i>
<i>IX. SELECTED BIBLIOGRAPHY</i>	<i>58</i>
<i>X. APPENDIX</i>	<i>62</i>

THE HEALTH CARE INDUSTRY IN THE NASHVILLE MSA*:**EXECUTIVE SUMMARY****Executive Summary**

Health care is a growth industry that is relatively immune to economic cycles. A clear exception occurred in April 2020 with the COVID-19 shutdowns; the health care industry was affected. However, in the Nashville MSA the health care sector did recover more quickly than other parts of the economy. Over the years, the health care sector has been driving employment growth in the national economy. Considering such factors as the shortage of health care workers shortage across the United States and an increasingly aging population, it is likely that this trend will continue.

Amid overall growth in the health care sector throughout the United States, Nashville provides an exceptional example of a national health care industry hub. More than 30 major health care companies (public and private) have chosen Nashville as their home. In addition, five of the nation's 12 leading for-profit acute care hospitals and nursing management companies are in Nashville (ranking based on market capitalization), controlling approximately 34 percent of the investor-owned hospitals in the United States.

The scope of the health care industry in Nashville ranges from basic service providers, such as physicians, to major hospital management companies, large renal dialysis companies, health information technology services, and advanced life sciences research. This study presents two overviews of Nashville's health care industry: (1) the core health care industry, defined as ambulatory services, hospitals, and nursing and residential care facilities that provide care in the Nashville MSA*, and (2) the health care industry cluster, which encompasses the core health care industry and other related health care industries such as health care management companies, life sciences research, and professional services firms that operate on a local, national, or international basis. Also included in this study is (3) a profile of Nashville Health Care Council (The Council or NHCC) member companies.

* Nashville MSA includes Cannon, Cheatham, Davidson, Dickson, Macon, Maury, Robertson, Rutherford, Smith, Sumner, Trousdale, Wilson, and Williamson counties.

Executive Summary: Overview of the Core Health Care Industry

The concept of the core health care industry refers to health care services classified as such under NAICS (North American Industrial Classification System) codes: 621 (Ambulatory Services), 622 (Hospitals), and 623 (Nursing and Residential Care Facilities).

Nation

- **By 2029, one in every nine new jobs** in the nation will be in health care. The resulting 2.4 million additional workers will be spread across this large and diverse sector from health care practitioners' offices, outpatient clinics, and hospitals to nursing residential care facilities.
- **A total of 19.7 percent of the gross domestic product (GDP)** is projected to be health care expenditures by 2028, up from 17.7 percent in 2018.

Tennessee

- **One in every eight new jobs** in Tennessee is projected to be in health care by 2028.

Nashville MSA

- **For every 100 nonfarm jobs created, 13 were in the health care** sector between 2014 and 2019.
- **One in every 11 occupations was a health care occupation in 2019.**

Employment, Establishment, and Wages in the Nashville MSA

- **In 2019, over 133,000 people were employed by Nashville's core health care sector**, an increase of more than 26 percent from 2013.
- Between 2014 and 2019, there emerged **602 new core health care establishments** in Nashville, bringing the total to 3,731, up 19 percent from 2014.
- **Wages totaling \$7.75 billion were paid in 2019** by the core health care industry in the Nashville MSA, up 33 percent from 2014.
- The **average wage for health care occupations is \$64,353**, significantly higher than Nashville's average annual wage of \$52,170 in 2019.

Executive Summary: Overview of the Nashville Health Care Industry Cluster

The greater health care industry cluster in Nashville encompasses the core health care industry and other related health care industries such as health care management companies, life sciences research, and professional services firms that operate on a local, national, or international basis.

Nashville-Based Health Care Headquarter Companies

- **In 2019, there were 18 publicly traded health care companies headquartered in Nashville** with a combined worldwide employment of nearly 500,000 and revenue of more than \$95 billion.
- **In 2019, the 30 major Nashville-based public and private investor-owned health care management companies accounted for almost \$140 billion in revenue and over 460,000 jobs globally.**

Health Care Industry Cluster Employment

- **In 2019, the health care industry cluster directly employed 167,916 people in the Nashville MSA, up 33.35 percent from 2014**, making the health care industry cluster the largest employer in the region.
- **Sixteen of every 100 nonfarm employees** in the Nashville MSA were in health care.
- **The core health care industry represented 79.4 percent** of Nashville health care industry cluster employment.

Employment Impact

- In 2019, the Nashville MSA's health care industry cluster accounted for **328,598 jobs (direct, indirect, and induced), up 31.78 percent from 2014**.
- This accounts for **nearly 8.10 percent of Tennessee's and 24.54 percent of the Nashville MSA's nonfarm employment** in 2019.
- **Every 100 industry cluster jobs create an additional 96 jobs** in the Nashville economy.
- The Nashville health care industry cluster includes nearly **5,063 establishments, up 25.73 percent from 2014 to 2019**.

Personal Income Impact

- The Nashville health care industry cluster generated **\$32.62 billion (direct, indirect, and induced) in personal income** in 2019, up 44 percent from 2014.
- **Every \$100 of personal income generated an additional \$36** in the local economy.
- Nashville health care industry cluster direct personal income was \$23.91 billion in 2019.
- This corresponds to nearly **34.37 percent of the Nashville MSA's total personal income**.

Business Revenue and Fiscal Impact

- The health care industry cluster in the Nashville MSA created **\$66.89 billion (direct, indirect, and induced) in business revenues in 2019, increasing 59.66 percent from 2014**.
- **Of this total, \$39.62 billion was directly** injected into the economy.

- **Every \$100 of health care cluster spending generates an additional \$69** in business revenues.
- The Nashville health care industry cluster accounted for **an estimated \$2.5 billion in state and local taxes in 2019.**

Health Care Industry Cluster: Peer MSA Comparison

- Nashville ranks second among a group of 13 peer MSAs in terms of the **number of major health care industry cluster management companies** (both public and private), their revenues, and their employment.
- Nashville ranks **fifth in terms of business climate** and **third in relative health care competitiveness.**

Impact of COVID-19 on the Health Care Industry Cluster Employment

- Due to the **pandemic-related shutdown in April 2020, jobs lost numbered 14,423**, with a total (direct, indirect, and induced) loss of **31,151** jobs.

Executive Summary: Overview of the Nashville Health Care Council Member Companies

The Council Member Impact on the Nashville MSA

- **In 2019, the 316 Council member companies employed over 100,000 people** in the Nashville MSA, up 4.51 percent from 2014.
- **More than 80,000 of the Council member company jobs are related to health care.**

The Council Members' Global Impact

- The Council member companies **employed 658,342 people** globally.

I. INTRODUCTION

Health care is a growing industry that is relatively immune to economic cycles. The health care sector has been the only sector consistently adding jobs throughout the recent economic crisis. The only exception to this consistent growth originated with the COVID-19 shutdown in April 2020, when all sectors of the economy experienced a significant drop in employment. Historical employment data and recent Bureau of Labor Statistics (BLS, www.bls.gov) surveys indicate that the primary health care services sector is driving employment growth in the national economy. With the ongoing health care worker shortage across the United States, it is likely that this growth trend will continue. Moreover, the aging baby boomer generation is expected to increase the demand for health care services going forward, further increasing the demand for health care workers. Population projections (www.census.gov) suggest that the share of seniors (65+) in the total population will increase to nearly 22 percent by 2040, up from about 14 percent in 2013.

Amid overall growth in the health care sector throughout the United States, Nashville provides a unique example of national health care industry hub. More than 30 major health care companies (public and private) have chosen Nashville as their home. In addition, five of the nation's 12 leading for-profit acute care hospitals and nursing management companies are in Nashville (ranking based on market capitalization), controlling approximately 34 percent of the investor-owned hospitals in the United States.¹

The scope of the health care industry in Nashville ranges from basic service providers, such as physicians, to advanced life sciences research companies. This study considers Nashville's health care industry primarily through two lenses: (1) the core health care industry, defined as ambulatory services, hospitals, and nursing and residential care facilities, and (2) the health care industry cluster, which encompasses the core health care industry and other related health care industries, including management companies and health information technology. The study also considers (3) The Council member companies

This approach is necessary because the presence and quality of both components (core and cluster) profoundly affect a region's economic status.²

Through various methods, this study examines why Nashville has become a prominent locus in the national health care industry and analyzes the trends and scope of the core health care industry in Nashville from a comparative perspective. In addition, it provides a detailed assessment of the economic impact of the health care industry cluster on the regional economy. This study is a follow-up to studies completed in 2005, 2010, and 2015. The current study also includes a brief assessment of the impact of COVID-19 and on job losses in the Nashville Health Care Industry

¹ According to the 2020 American Hospital Association survey, the number of investor-owned hospitals is 1,233. See also Becker's Hospital Review (www.beckershospitalreview.com). The number of health care companies is extracted from ReferenceUSA and LexisNexis Academic Universe. BERC included only major headquarter companies in these estimates. These companies are part of the broadly defined Nashville health care industry cluster.

² Quality of health care providers is closely related to the quality of life in a region. Similarly, the presence and quality of health care-related industries are considered crucial to a region's business infrastructure.

Cluster, though they occurred after 2019. Furthermore, the study provides a benchmarking initiative that compares Nashville with 12 peer Metropolitan Statistical Areas (MSAs) using a host of selected health care-related indicators. Finally, the study profiles the member companies of the Nashville Health Care Council (The Council).

This study is a detailed analysis of the Nashville MSA, including Cannon, Cheatham, Davidson, Dickson, Macon, Maury, Robertson, Rutherford, Smith, Sumner, Trousdale, Wilson, and Williamson counties. Wherever Nashville is mentioned in the study, it refers to the entire Nashville MSA. Data from a variety of sources allow the Business and Economic Research Center (BERC) at Middle Tennessee State University to determine the reasons Nashville has become a focal point in the national health care industry, assess the relationship between the health care industry and other sectors of the regional economy, and address additional questions concerning Nashville's health care industry.

The rest of this study is organized as follows. Chapter two presents an overview of the core health care industry trends—comprising ambulatory services, hospitals, and nursing and residential care facilities—in Tennessee and the Nashville MSA. The chapter also compares trends in the core health care industry across these three geographical units. Chapter three briefly details the study's goals and methodology. Chapter four places trends in the core health care industry in the Nashville MSA under scrutiny, exploring various aspects and growth dynamics of this industry. Chapter five adopts a broader view of the health care industry and assesses the scope, size, and impact of the health care industry cluster on Nashville's economy. In addition, the chapter highlights the importance of publicly traded health care management companies in Nashville's economy. Chapter six compares Nashville's core health care industry with those of 12 of its peer MSAs. Chapter seven profiles The Council member companies. Chapter eight concludes the study. Chapters nine and ten provide a bibliography and technical information on various study components.

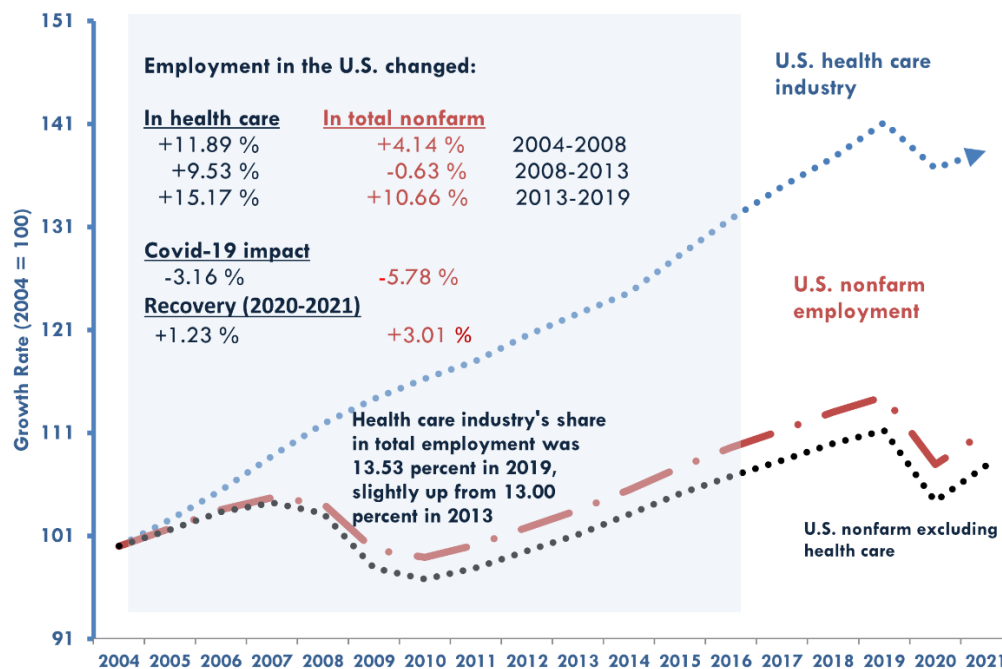
II. OVERVIEW OF THE CORE HEALTH CARE INDUSTRY³

The concept of the core health care industry refers to health care service providers classified as such under the NAICS (North American Industrial Classification System): 621 (Ambulatory Services), 622 (Hospitals), and 623 (Nursing and Residential Care Facilities).⁴

II.1. National Trends

Nationwide, increasing demand for health care services by the aging baby boomer generation likely will fuel further growth in core health care industry employment. According to Census Bureau population projections, the number of older adults will increase by 69 percent, from 56 to nearly 95 million, between 2020 and 2060. Nationally, the core health care industry grew significantly faster than nonfarm employment between 2004 and 2019.

National Trends in Health Care Employment (2004 = 100)



Sources: Bureau of Labor Statistics (www.bls.gov), County Business Patterns (www.census.gov), and BERC calculations

³ Most data in chapter two comes from government sources. The sources include: the Census Bureau, the Bureau of Labor Statistics, County Business Patterns database via Census Bureau, the Center for Medicare and Medicaid Services, the Tennessee Advisory Commission on Intergovernmental Relations, and Projections Central. BERC calculations are also included.

⁴ For a detailed analysis, see the methodology section.

Nationally, core health care industry employment grew nearly 15.17 percent between 2013 and 2019, while total nonfarm employment increased 10.66 percent. Nonfarm employment excluding health care increased almost 10 percent in the same period. In April 2020, employment in the national health care industry declined 3.16 percent, whereas total nonfarm employment experienced a 5.78 percent job loss. Nationally, after the April 2020 shock, both health care and nonfarm employment started adding jobs again.

The growth trend in employment in the health care sector since 1998 is expected to continue through 2029, when core health care industry employment is projected to be the dominant source of employment growth. Health care occupations are projected to add nearly 2.4 million new jobs nationally between 2019 and 2029. In this period, growth in health care occupations is expected to be 15 percent, higher than the average for all occupations. By 2029, the health care occupations share of total employment is projected to be 11 percent, a more than one percentage point increase from 2019. **Health care occupations will account for one in every nine new jobs. The resulting 2.4 million additional workers will be spread throughout this large and diverse sector from health care practitioners' offices, outpatient clinics, and hospitals to nursing and residential care facilities.**⁵ According to the Bureau of Labor Statistics, six of the top 10 fastest-growing occupations in the U.S. will be in health care.

Furthermore, national health care expenditures are expected to reach \$6 trillion by 2028, representing nearly 19.7 percent of the gross domestic product (GDP), up from 17.7 percent in 2018.⁶

Fastest growing occupations in the U.S., 2019 and projected 2029 (number in thousands)*				
	Employment		Change	
	2019	2029	Number	Percentage
Wind turbine service technicians	6	10	4	61%
Nurse practitioners	201	305	104	52%
Solar photovoltaic installers	11	17	6	51%
Occupational therapy assistant	45	61	16	35%
Statisticians	39	53	14	35%
Home health and personal care aides	3,162	4,236	1,075	34%
Physical therapist assistants	97	129	32	33%
Medical and health services managers	395	521	126	32%
Physician assistants	120	157	37	31%
Information security analysts	126	164	39	31%

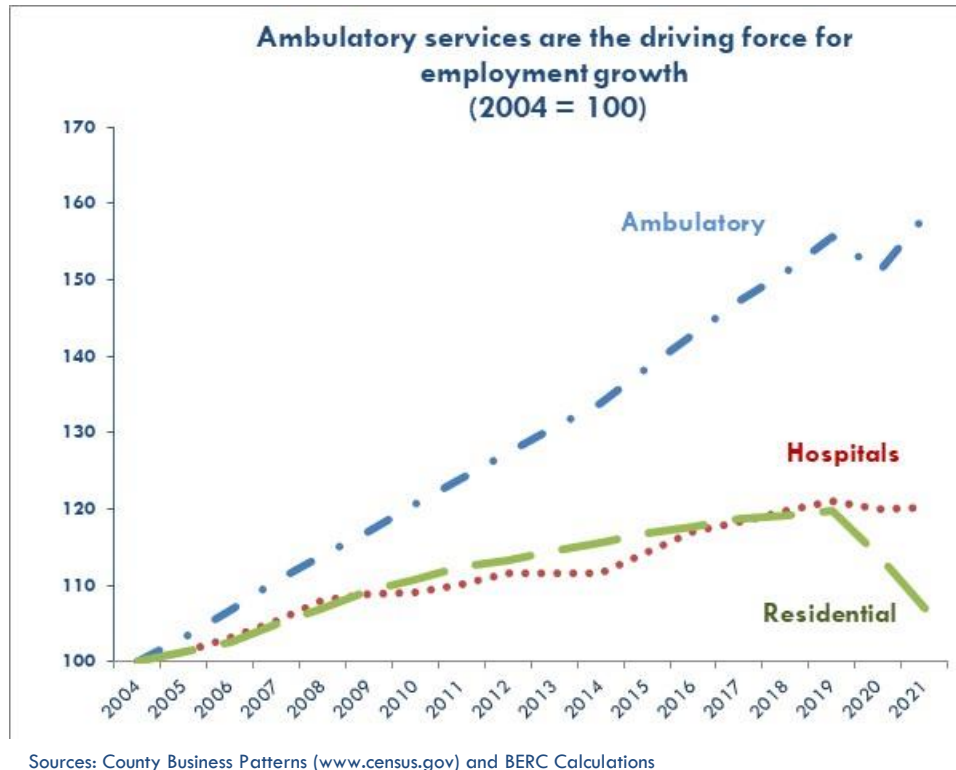
Source: U.S. Department of Labor, Bureau of Labor Statistics (www.bls.gov)

⁵ Employment projections are from the U.S. Department of Labor, Bureau of Labor Statistics (www.bls.gov).

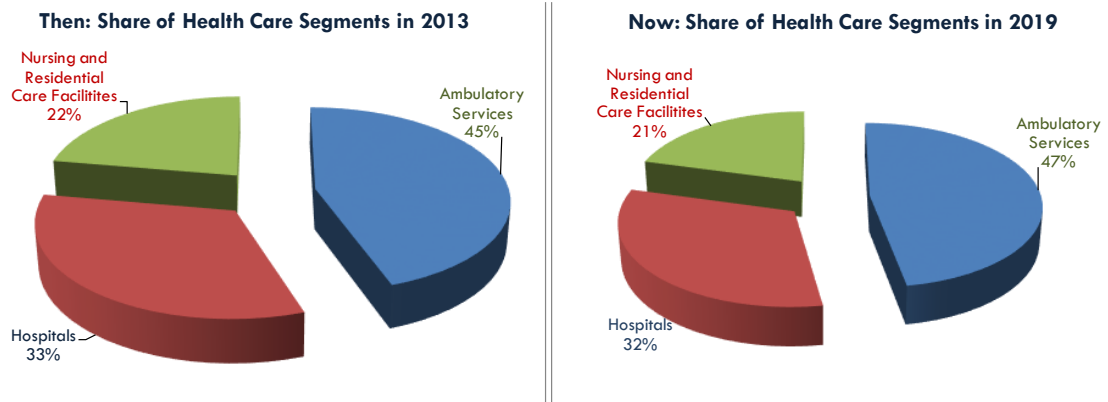
Occupations include (a) health care practitioners and technical occupations and (b) health care support occupations.

⁶ Health expenditure projections are from the Center for Medicare and Medicaid Services (www.cms.hhs.gov).

Among national health care sectors, growth in ambulatory services outpaced growth in both nursing care facilities and hospital employment. Hospital and nursing care facilities employment grew eight and five percent, respectively, while ambulatory services recorded 19 percent growth between 2013 and 2019.



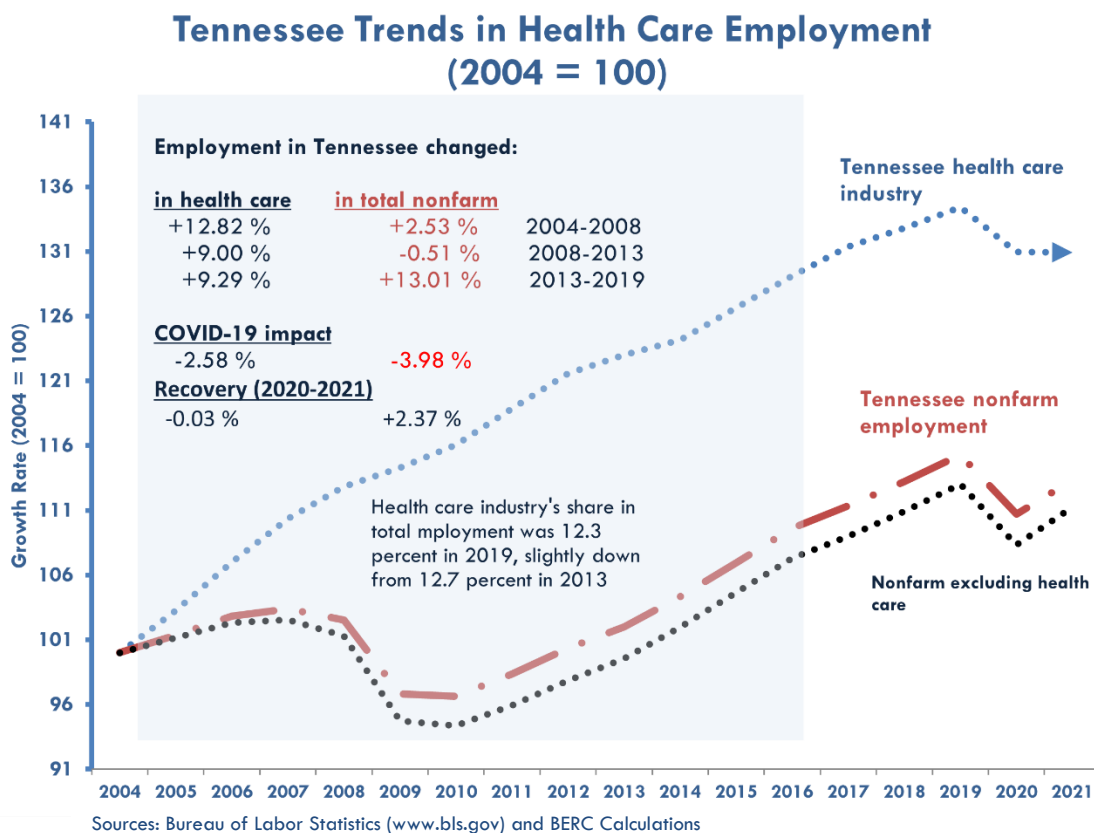
The share of ambulatory services in total national health care employment increased considerably since 2004. In 2013, ambulatory services accounted for 45 percent of total health care employment, hospitals 33 percent, nursing and residential care facilities 22 percent. From 2013 to 2019, the share of ambulatory services employment grew by two percent, with each of the other segments decreasing by one percent.



II.2. Trends in Tennessee

Looking back over time, Tennessee's health care sector demonstrated significant growth between 2004 and 2008. Core health care employment grew over 12 percent while nonfarm employment increased just under three percent. This growth trend continued from 2008 to 2013 when Tennessee's health care employment recorded nine percent growth while total nonfarm employment decreased by 0.51 percent.

Between 2013 and 2019, both health care services and nonfarm employment showed rigorous job growth. From 2013 to 2019, health care services employment grew over nine percent versus a 13 percent increase in total nonfarm. However, in April 2020, this growth trend was abruptly cut short by the pandemic, leading to a nearly three percent drop in health services employment and a four percent drop in total nonfarm employment. The recovery for health care services in Tennessee seems to be slower than for nonfarm employment in the state.



As previously noted, the growing share of seniors in the total population is likely to cause the ever-increasing demand for health care services to continue; a projected increase of 28 percent is expected between 2020 and 2040. According to Census Bureau projections, the share of the population older than 60 years in Tennessee will be over 24 percent by 2030

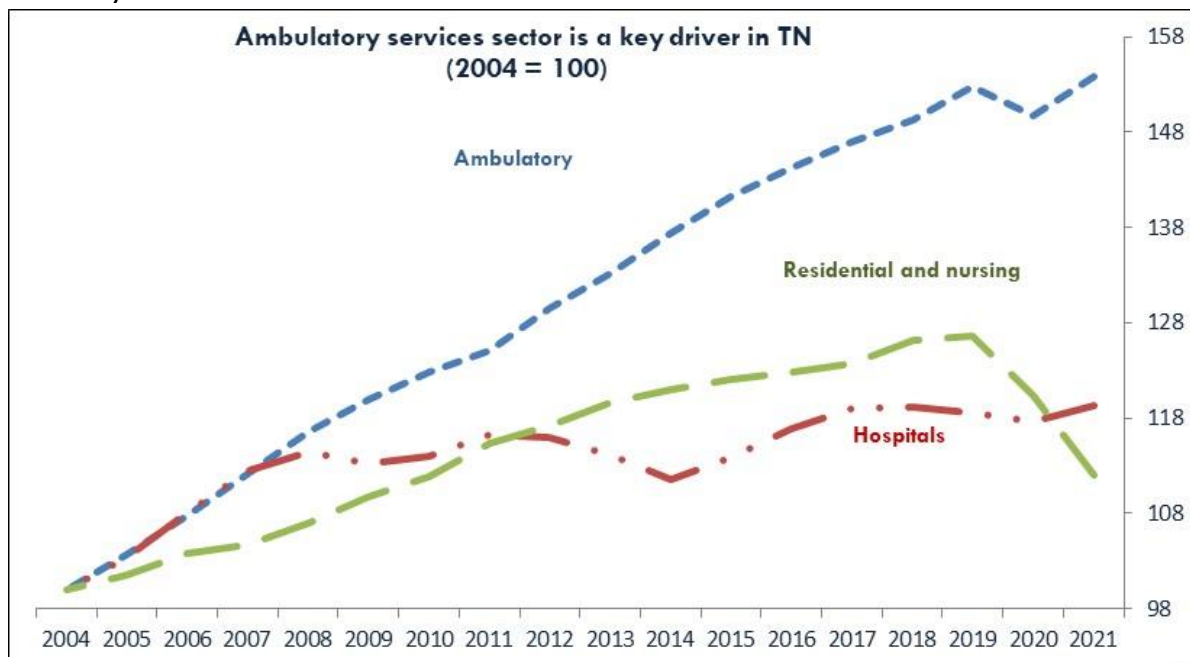
Health care occupations are projected to increase 15.44 percent from 2018 to 2028. Additionally, six out of the ten fastest-growing occupations in Tennessee are in health care. Overall, health care occupations are projected to add 30,530 new jobs, accounting for approximately one in every eight projected jobs between 2018 and 2028.

Fastest growing occupations in Tennessee, 2018 and projected 2028 (number in thousands)*

	Employment		Change	
	2018	2028	Number	Percentage
Forensic Science Technicians	510	850	340	67%
Biochemists and Biophysicists	710	1,150	440	62%
Craft Artists	40	60	20	50%
Phlebotomists	2,300	3,420	1,120	49%
Physician Assistants	2,120	3,070	950	45%
Personal Care Aides	23,930	34,180	10,250	43%
Medical Scientists, Except Epidemiologists	1,440	2,020	580	40%
Court Reporters	220	300	80	36%
Home Health Aides	5,270	7,190	1,920	36%
Nurse Practitioners	7,470	10,060	2,590	35%

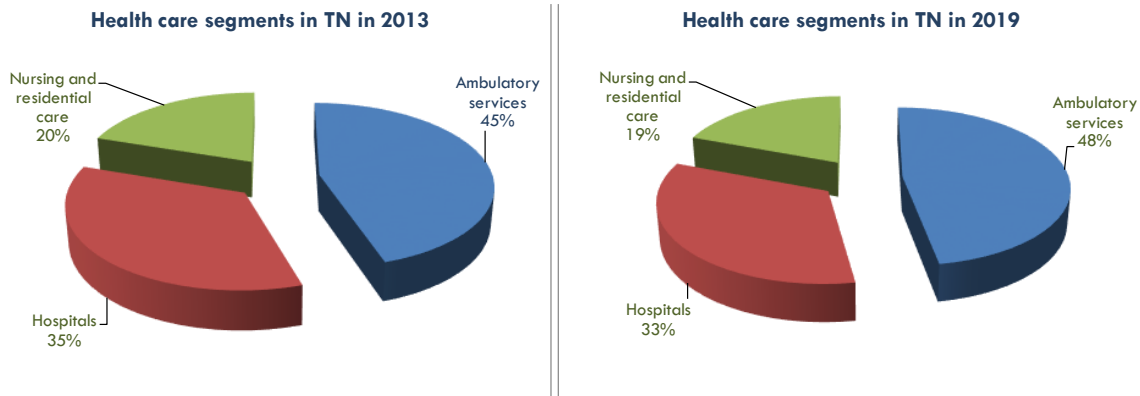
Source: State Occupational Projections at <http://www.projectioncentral.com>

In Tennessee, as in the U.S., the growth in health care employment was primarily driven by ambulatory services between 2004 and 2019. While hospitals and residential and nursing care services also recorded growth patterns, growth in these sectors was not as rigorous as in ambulatory services.



Sources: Tennessee Department of Labor and Workforce Development and BERG estimates

The ambulatory services sector has grown faster than the other two health care sectors. In Tennessee, the ambulatory services segment represents a larger share of the total health care sector than it does nationally. From 2013 to 2019, the hospital segment share decreased by two percentage points; the nursing and residential care segment decreased by one percentage point; ambulatory services increased, then, by three percentage points.



II.3. Trends in the Nashville MSA

Nashville's health care employment grew faster than total nonfarm employment between 2004 and 2008. While nonfarm employment recorded a 2.53 percent growth rate between 2004 and 2008, Nashville's health care employment recorded a 13 percent growth rate during the same period. This growth trend continued between 2008 and 2013. During that period, Nashville's health care sector recorded a nine percent growth rate. Between 2013 and 2019, there was still healthy growth rate for health care employment, though it was somewhat slower than growth in total nonfarm employment.

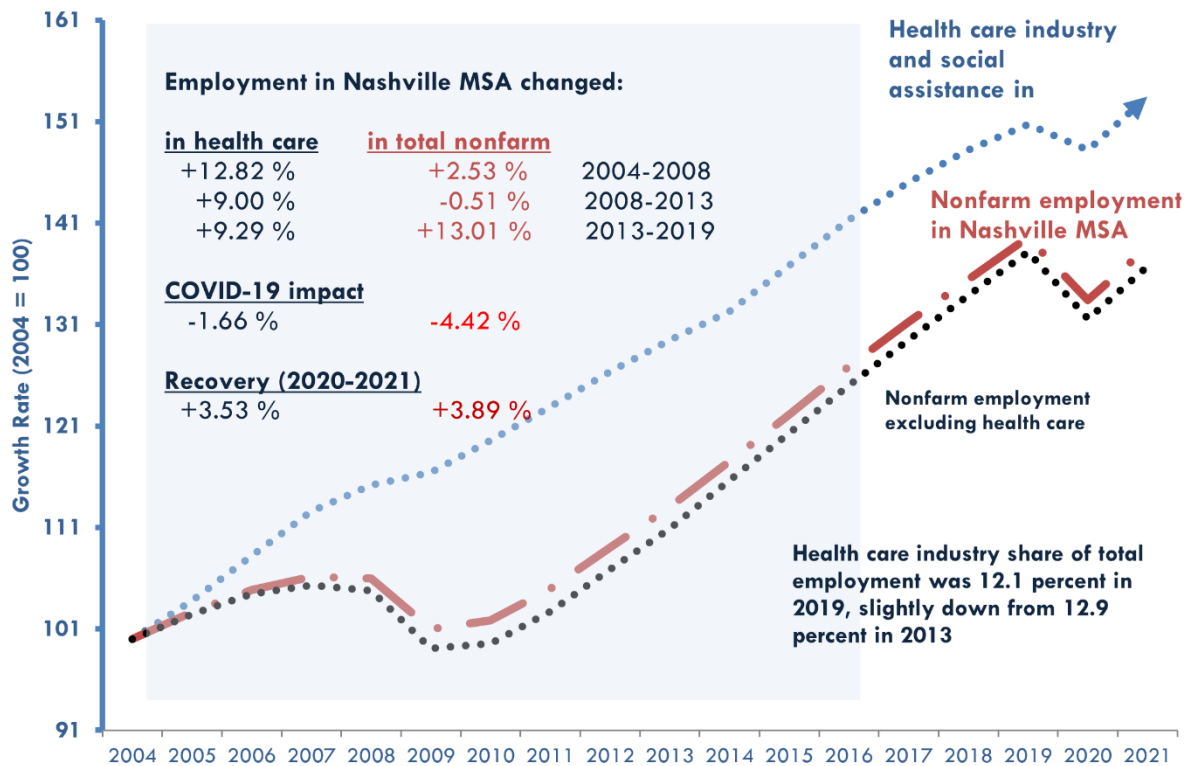
From a historical perspective, Nashville's health care sector grew 51 percent from 2004 to 2019, adding more than 43,000 jobs. Over this time, for every 100 nonfarm jobs, more than 14 were in health care. The period between 2013 and 2019 was active for Nashville's health services, which added nearly 18,000 jobs; for every 100 nonfarm jobs created during this period, nine were in health care.

In line with national and state population growth trends, the share of seniors in the adult population of Davidson County is projected to reach 14 percent in 2030, up from 12.5 percent in 2019, further increasing the demand for health care services.⁷

⁷ Data is from TACIR (Tennessee Advisory Commission on Intergovernmental Relations) at www.state.tn.us/tacir/population.htm.

In Nashville, health care occupations represented 9.5 percent of total jobs or one in every 11 occupations in 2019. In terms of the share of the health care sector in total nonfarm employment, one in every eight workers was employed by the health care industry.

Trends in Health Care Employment in Nashville MSA (2004 = 100)



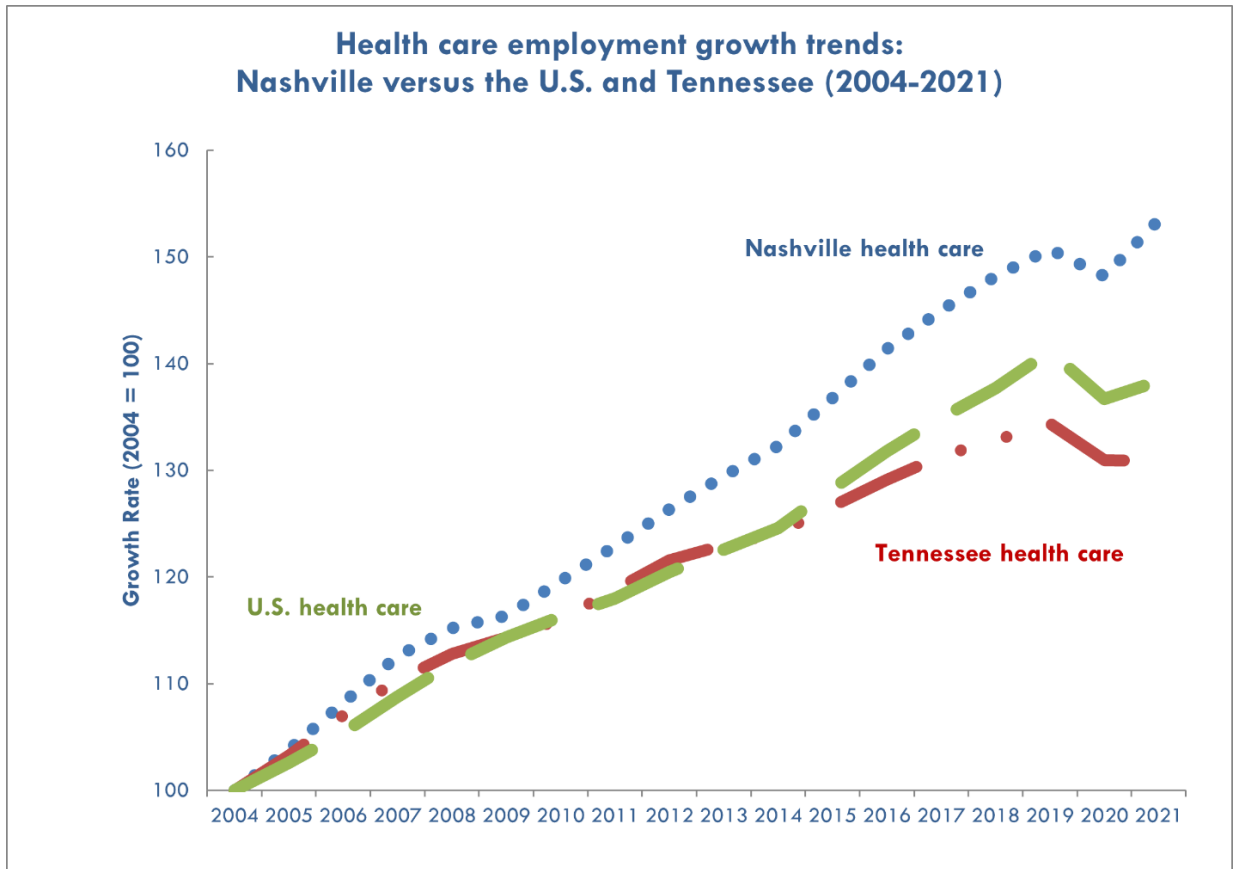
Sources: Bureau of Labor Statistics (www.bls.gov) and BERC Calculations

Over time, in health care employment in Nashville MSA, the ambulatory services segment share increased while the other two segment shares decreased. Ambulatory services employment increased about 35 percent, hospital employment increased 19 percent, and nursing care employment increased 26 percent between 2013 and 2019. The hospitals segment share in health care increased nearly three percentage points to 44.8 percent in 2019.

It is important to note all sectors in Nashville MSA experienced employment loss because of COVID-19 in April 2020. However, recovery has been much faster in the Nashville MSA than in the state or in the nation.

II.4. Comparative Perspective on Trends in the Core Health Care Industry

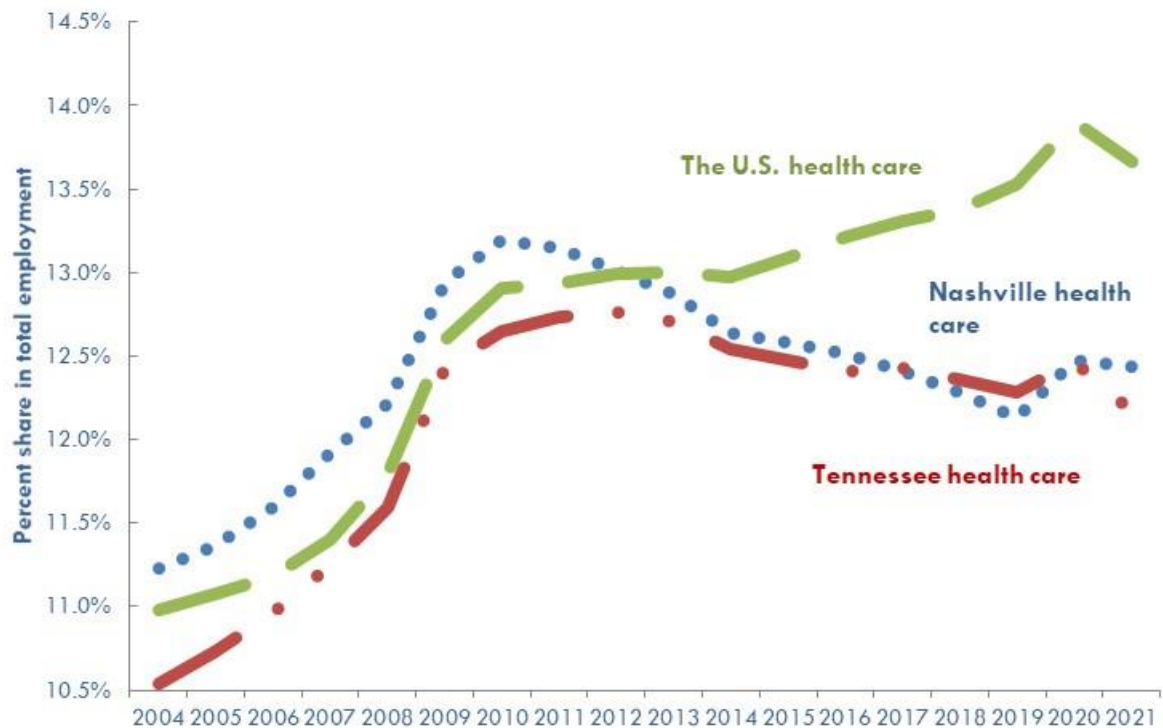
Employment growth in Nashville's core health care industry has been faster than state and national employment growth in that sector since 2004.



Sources: Bureau of Labor Statistics (www.bls.gov), County Business Patterns (www.census.gov), and BERC Calculations

The core health care sector played a more prominent role in Nashville's economy than in the state and national economies from 2004 to 2011. More than 12 of every 100 Nashville nonfarm jobs in 2019 were core health care jobs. The following graph clearly shows that the employment share of the health care industry stabilized around 13 percent in 2011. The share of health care employment in the U.S. economy increased substantially after 2010.

**Percent share of health care employment in total nonfarm:
Nashville versus the U.S. and Tennessee**



Sources: Bureau of Labor Statistics (www.bls.gov), \\\County Business Patterns (www.census.gov), and BERC Calculations

III. STUDY GOALS AND METHODOLOGY⁸

III.1. Goals of the Study

The goals of this study are to address the following questions:

- What are the trends, scope, and impact of the core health care industry and health care industry cluster on the regional economy?
- What is the economic significance to the region of health care companies headquartered in Nashville?
- How does Nashville's health care industry compare with the health care industry in 12 of its peer MSAs?
- How does the Nashville MSA rank relative to its 12 peer MSAs in terms of selected health care indicators?
- What is the overall economic trend of health care services in the greater Nashville area, and how does this trend compare to the peer markets?
- What role has the Nashville Health Care Council (The Council or NHCC) played in promoting the health care industry in the greater Nashville area since 1995?

III.2. A Review of Selected Literature

Given the importance of the health care industry in the national and regional economies, many studies have treated this sector as an engine of growth. According to one recent study by the U.S. Bureau of Labor Statistics (BLS), "The healthcare industry is projected to add more jobs—over 4 million—than any other industry between 2012 and 2022. And it is projected to be among the fastest-growing industries in the economy."⁹ This growth has been steady through the years, including during the 2007-2009 recession, primarily because there is always a need for health care services no matter the economic climate. Between 2001 and 2016, the health care industry accounted for nine percent of the \$8.1 trillion national economic growth and 29 percent of the 14.4 million net new jobs (Cutler, 2018). This growth is anticipated to continue according to the U.S. Bureau of Labor Statistics (BLS):

⁸ Chapter three consulted the following resources: *The Economic Impacts of Indiana's Public and Private Hospitals and Outpatient Care Centers* by BioCrossroads, *The Economic Impact of Arizona's Hospitals on the State & Its Counties* by the L. William Seidman Research Institute, *Healthcare: Millions of Jobs Now and in the Future* by Torpey, *Lake Chelan Valley Healthcare Industry Assessment* by BergerABAM, and *Louisville's Health-Related Economy: Size, Character, and Growth*.

⁹ For more information, see Elka Torpey (2014), *Healthcare: Millions of Jobs Now and in the Future* (Bureau of Labor Statistics).

The health care and social assistance sector contains 7 of the 20 industries with the fastest growing real output. The offices of the physicians industry, the offices of other health practitioners industry, and the hospitals industry are 3 of the 7 fastest growing industries. (Lacey *et. al.* 2017).

In another BLS prediction, the health care and social assistance sector was projected to grow 15 percent, adding 2.4 million jobs between 2019 and 2029 (Bureau of Labor Statistics, 2020). The growing importance of the U.S. health care sector to the transitioning service-based economy should incentivize administrators and governmental officials to support and sustain this sector through policy and decision-making. The health care market is changing and requires structural considerations to ensure optimal potential.

Regional studies continue to place the health care industry at the center of regional economic growth. However, not all these studies examine the health care-related infrastructure industries such as health care management, life sciences research, professional services firms, and others. Some studies lack the necessary broader perspective—which views health care providers as a core health care industry at the center of a health care industry cluster. A few recent studies emphasize the importance of cluster linkages in the health care industry. A BioCrossroads study (2013), for example, *The Economic Impacts of Indiana's Public and Private Hospitals and Outpatient Care Centers*, examines a range of impacts by analyzing the key supplier industries to the sector and the overall extent of the sector-related effects. This study uses an input/output model to represent interrelationships among economic sectors as well as life sciences research.¹⁰

Greater growth potential in the health care industry is expected to result from increasing interaction between the core and health care-related infrastructure industries such as health care management, health care finance, life sciences research, and others. The cluster perspective allows for a clearer understanding of health care providers and other industry linkages to the core health care industry and their combined economic impact on a regional economy. A 2014 study of the health care industry in Lake Chelan Valley, Washington, uses a health care business cluster perspective to aid in measuring both current economic impact and projected impact with the implementation of a replacement hospital.¹¹ The critical conclusion reached by the BioCrossroads and Washington studies, which apply the cluster perspective, is that life sciences and medical research play a substantial role in the development of the health care industry and consequently greatly affect the regional economy. This significant fact was overlooked by studies that focused solely on health care providers without taking into consideration industry linkages.

Furthermore, often still missing from examination of the health care industry cluster is the growing role that health care management and health care services companies play in it. A perfect illustration of the importance of management companies is seen in the growth of the health care

¹⁰ For more information, see *The Economic Impacts of Indiana's Public and Private Hospitals and Outpatient Care Centers* (BioCrossroads 2013).

¹¹ For more information, see *Lake Chelan Valley Healthcare Industry Assessment* (BergerABAM 2014).

industry in Nashville, where accumulated knowledge of health care management and entrepreneurship is the foundation for innovation and breakthroughs that shape the ever-changing national health care industry landscape. A brief review of the history of Nashville's health care industry attests to this fact (Nashville Health Care Council, www.healthcarecouncil.com). Therefore, the present study includes health care management companies in the health care industry cluster.¹²

III. 3. Method and Data

Indicators for this study were collected from multiple sources. Data and figures for the Nashville MSA were more readily available than comparable figures for the peer MSAs in many cases; this in large part due to data suppression. In those cases, BERC accessed varied sources to calculate estimated comparable figures for these MSAs. This analysis is dictated by the availability of data for health care-related indicators. As a result, throughout the present study, there may be slight variations or discrepancies between estimated figures for a particular indicator due to the estimation methods used by different employment survey sources. BERC also consulted multiple sources to construct a time-series perspective on health care indicators for Nashville and the peer MSAs. The data sources are presented in the appendix.

Selection of Peer MSAs

In consultation with the Nashville Health Care Council and the Nashville Area Chamber of Commerce, BERC has identified 12 peer MSAs for Nashville: Atlanta, Birmingham, Charlotte, Columbus, Dallas, Denver, Indianapolis, Jacksonville, Kansas City (MO), Louisville, Raleigh, and Richmond, all major U.S. MSAs with substantial health care-related economic activity. BERC's selection of these MSAs was also informed by the literature (for example, see Coomes and Narang, 2001).

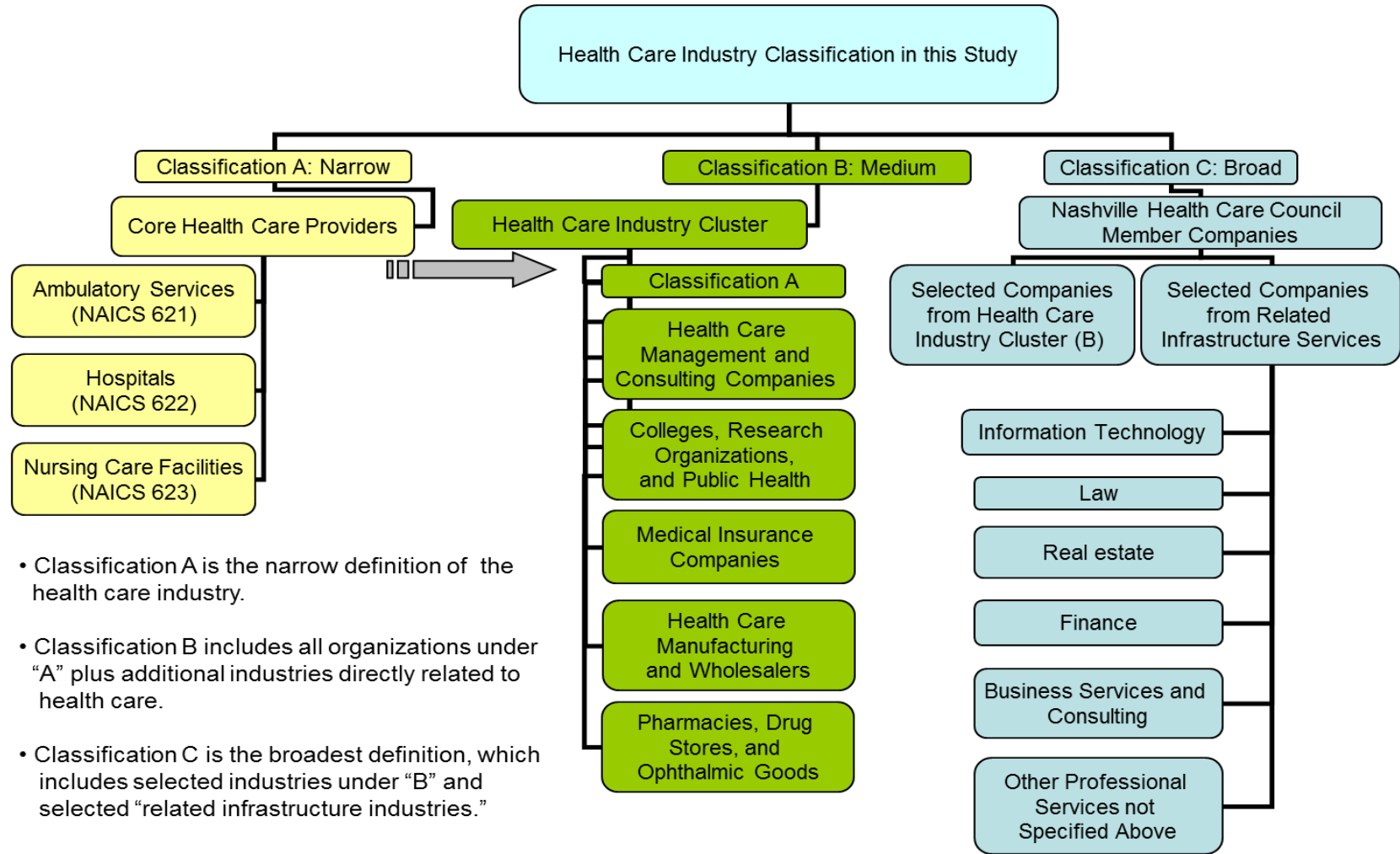
Survey Method

Since 1995, The Council has promoted the growth of the health care industry in Nashville. The Council has a unique member mix in that both health care and professional services (i.e., management, consulting, information technology, finance, and law) companies work together to forge strong ties to accelerate growth in the health care industry. In previous years' BERC studies of The Council, BERC employed a survey of members and analyzed results within the context of the report. Because of COVID-19 disruptions, the survey was not administered.

III.3.a. Definitions

Throughout this study, BERC classifies Nashville's health care industry into three distinct categories: (1) core health care industry/providers, (2) health care industry cluster, and (3) The Council member companies. The following chart indicates the relationships among these three categories of health care industry classifications. A complete industry description by NAICS code is presented in the appendix.

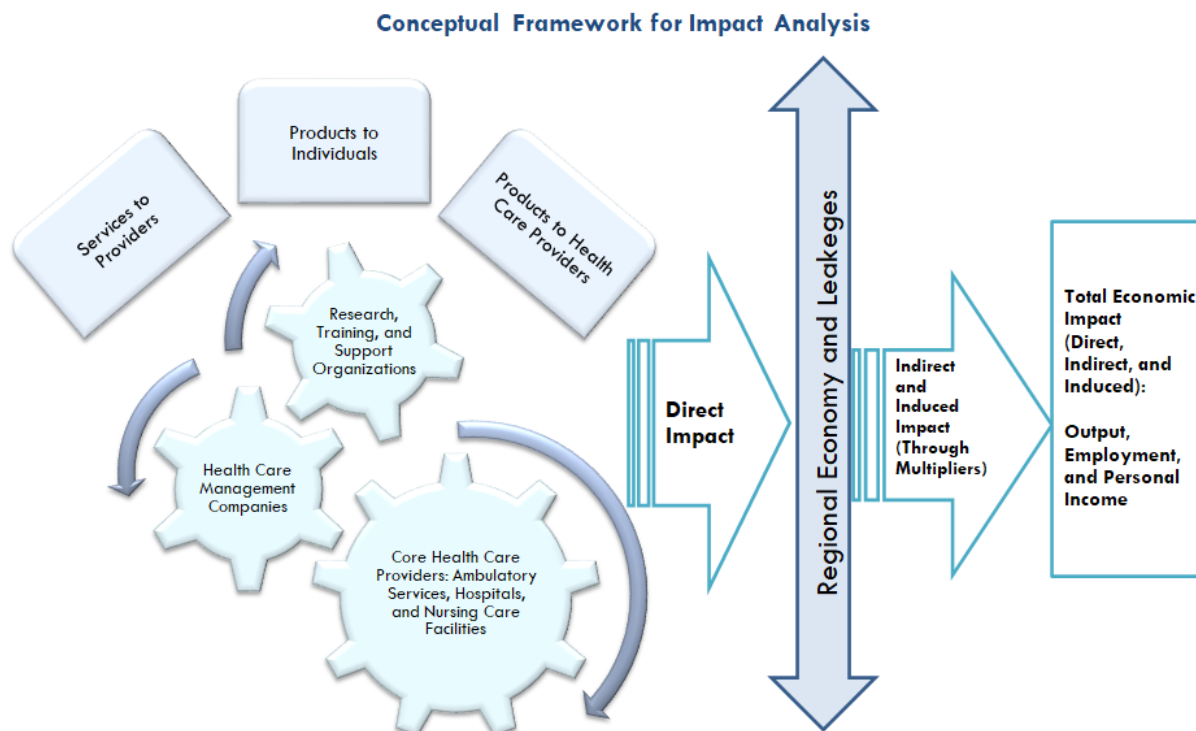
¹² For a sample of selected studies, see bibliography.



- Classification A is the narrow definition of the health care industry.
- Classification B includes all organizations under “A” plus additional industries directly related to health care.
- Classification C is the broadest definition, which includes selected industries under “B” and selected “related infrastructure industries.”

III.3.b. Conceptual Framework for Impact Analysis

The economic impact assessment of the health care industry is based on the health care industry cluster definition provided above. This assessment aims to highlight what happens if the entire health care industry cluster is removed from the regional economy. BERG reports the direct, indirect, and induced economic impact of counterfactually removing the health care industry cluster from the economy.¹³ The report presents three categories of impact: output, employment, and personal income. For each of these categories, BERG also reports leakages out of Nashville and the relationship between the health care industry cluster and other sectors of the economy. BERG adjusted the indirect and induced effects of the health care subsectors on each other within the health care industry cluster. BERG assumes that IMPLAN (see appendix) regional purchasing coefficients (RPCs) represent the current situation, and the differences between 100 percent local purchase and the default model RPCs determine the leakages outside of Nashville. To avoid double-counting, the core health care providers were not allowed to stimulate the health care sector and other subsectors in the cluster. The following chart shows the conceptual framework that highlights the procedure used to calculate the economic impact of the health care cluster.



¹³ See L. William Seidman Research Institute (2015), *The Economic Impact of Arizona's Hospitals on the State & Its Counties* (Arizona Hospital and Healthcare Association).

IV. CORE HEALTH CARE INDUSTRY IN THE NASHVILLE MSA: ITS SCOPE AND TRENDS¹⁴

IV.1. Total Employment

Nashville's core health care sector employed just over 133,400 people in 2019, up almost 27 percent from 2014. By segment, 45 percent are in ambulatory services, 41 percent in hospitals, and 15 percent in nursing care facilities. The core health care sector includes NAICS 621, 622, and 623. The share of hospital employment decreased almost three percentage points between the years 2014 and 2019.

Core Health Care Employment in Nashville MSA (NAICS 621, 622 and 623)

Years	Ambulatory	Hospitals	Nursing Care	Total
2008	34,000	42,300	14,000	90,300
2014	44,100	45,400	15,800	105,300
2019	59,500	54,000	19,900	133,400
Change (2008-2014)	29.71%	7.33%	12.86%	16.61%
Change (2014-2019)	34.92%	18.94%	25.95%	26.69%

Sources: Tennessee Department of Labor and Workforce Development and BERC Calculations
BERC used several data sources including IMPLANpro and County Business Patterns (www.census.gov) to estimate employment by segment.

Each Nashville MSA core health care industry sector segment experienced phenomenal growth over both the long and short terms. From 2008 to 2014, ambulatory services grew nearly 30 percent, nursing care almost 13 percent, and hospitals almost 7 percent. From 2014 and 2019, ambulatory services experienced an approximate 35 percent increase in employment, followed by nursing care with nearly 26 percent growth, and hospitals with approximately 19 percent.

¹⁴ Chapter four uses data from BERC estimate, IMPLANpro, Inc, the Bureau of Labor Statistics, the Tennessee Department of Labor and Workforce Development, the Census Bureau, and County Business Patterns database via the Census Bureau.

Employment by Occupation

The difference between the categories of employment in the health care sector and employment in health care occupations is that the former category (sector) includes all occupations in the sector, ranging from accountant to medical doctor. The category health care occupations refers to medical professionals and allied health occupations but does not include occupations in health care education and research. Nonetheless, in 2019, health care occupations account for about 9.57 percent of total occupations in the Nashville MSA. Overall, the average wage for health care occupations at \$64,353 is significantly higher than Nashville's average annual wage of \$52,170

Employment by Occupation in Nashville				
	Employment		Average Wage	Percent Difference from Nashville Average
	Total Number	Percent share	Average Wage	
All Occupations	965,690	100%	\$52,170	0.00%
Management Occupations	73,610	7.62%	\$112,770	116.16%
Business and Financial Operations Occupations	64,170	6.64%	\$66,820	28.08%
Computer and Mathematical Occupations	30,750	3.18%	\$79,120	51.66%
Architecture and Engineering Occupations	11,750	1.22%	\$75,210	44.16%
Life, Physical, and Social Science Occupations	7,790	0.81%	\$68,720	31.72%
Community and Social Service Occupations	12,120	1.26%	\$46,230	-11.39%
Legal occupations*	7,092	0.73%	\$96,627	185.21%
Educational Instruction and Library Occupations	44,100	4.57%	\$53,390	2.34%
Arts, Design, Entertainment, Sports, and Media Occupations	15,050	1.56%	\$59,970	14.95%
Healthcare Practitioners and Technical Occupations	63,940	6.62%	\$78,780	51.01%
Healthcare Support Occupations	28,460	2.95%	\$31,940	-38.78%
Protective Service Occupations	22,250	2.30%	\$42,210	-19.09%
Food Preparation and Serving Related Occupations	80,850	8.37%	\$24,180	-53.65%
Building and Grounds Cleaning and Maintenance Occupations	22,570	2.34%	\$31,230	-40.14%
Personal Care and Service Occupations	17,450	1.81%	\$29,630	-43.20%
Sales and Related Occupations	87,240	9.03%	\$44,660	-14.40%
Office and Administrative Support Occupations	137,620	14.25%	\$41,200	-21.03%
Construction and Extraction Occupations	34,470	3.57%	\$45,860	-12.10%
Installation, Maintenance, and Repair Occupations	36,980	3.83%	\$49,480	-5.16%
Production Occupations	63,550	6.58%	\$40,910	-21.58%
Transportation and Material Moving Occupations	101,980	10.56%	\$36,540	-29.96%

Source: https://www.bls.gov/oes/current/oes_34980.htm

IV.2. Sectoral Diversity

The health and social assistance sector (core health care industry + social assistance) representing about 12.13 percent or 126,900 of total non-farm jobs, is the second largest in Nashville's economy (after professional and business services). This was a significant increase from 2014, when the health and social assistance sector ranked third (after government and professional and business services¹⁵). Growth of nearly 14 percent from 2014 to 2019 indicates the sector continues as a pillar of Nashville's economy.

Employment by Sector in Nashville MSA (2019)			
	Employment		
	Number (thousands)	Growth from 2014 (%)	Current Share (%)
Total Non-farm	1,046.4	18.75%	100.00%
Mining, Logging and Construction	49.0	38.81%	4.68%
Manufacturing	84.8	8.86%	8.10%
Wholesale	42.7	5.69%	4.08%
Retail	101.4	8.45%	9.69%
Transportation and Utilities	57.1	47.55%	5.46%
Information	24.8	20.39%	2.37%
Financial Activities	71.1	25.62%	6.79%
Professional and Business Services	174.9	28.04%	16.71%
Educational Services	28.3	10.98%	2.70%
Health and Social Assistance	126.9	13.91%	12.13%
Leisure and Hospitality	121.6	27.06%	11.62%
Other Services	43.5	17.89%	4.16%
Government	120.3	7.41%	11.50%

Source: Bureau of Labor Statistics (www.bls.gov)

In this context, it is appropriate to address the perennial question of which sector ranks first in the Nashville MSA. In evaluating the ranking, employment is only one aspect of an economic sector's contribution to the regional economy. Business revenue, value-added, personal income, and indirect business taxes are additional, often overlooked, considerations. What follows is a guide for evaluating economic sector roles in the region's economy.¹⁶

¹⁵ NAICS (North American Industrial Classification System) 62 provides an aggregate view of health and social services. Social services include community services, individual and family services, and child day care services. For more information, see www.census.gov/eos/www/naics/.

¹⁶ IMPLANpro model is created for Nashville MSA, including 13 counties.

Contributing to Nashville's Economy: How Much?

	Employment			Business Revenue			Value Added (GDP)			Cumulative Ranking	
	Number (thousands)	Score	Rank	Total (millions)	Score	Rank	Total (millions)	Score	Rank	Average Score	Final Rank
Total	1,338.86	n/a	n/a	\$259,557	n/a	n/a	\$142,314	n/a	n/a	n/a	n/a
11 Ag, Forestry, Fish & Hunting	14.14	0.09	18	\$552	0.15	20	\$196	0.09	20	0.11	19
21 Mining	3.82	0.06	19	\$1,165	0.16	19	\$277	0.09	19	0.10	20
22 Utilities	3.49	0.06	20	\$3,088	0.20	17	\$1,315	0.13	18	0.13	18
23 Construction	80.55	0.63	9	\$12,381	0.48	7	\$6,702	0.47	9	0.53	9
31-33 Manufacturing	87.18	0.69	8	\$54,894	1.00	1	\$14,924	0.94	3	0.88	2
42 Wholesale Trade	43.95	0.28	13	\$15,482	0.58	6	\$8,948	0.64	6	0.50	11
44-45 Retail trade	112.30	0.87	3	\$11,104	0.44	8	\$7,207	0.51	8	0.61	7
48-49 Transportation & Warehousing	68.71	0.52	11	\$10,148	0.41	10	\$5,048	0.34	13	0.42	13
51 Information	28.25	0.17	16	\$10,813	0.43	9	\$5,057	0.34	12	0.31	14
52 Finance & insurance	73.16	0.56	10	\$22,027	0.77	4	\$10,597	0.75	5	0.70	5
53 Real estate & rental	63.90	0.47	12	\$23,815	0.82	3	\$15,563	0.95	2	0.75	4
54 Professional-scientific & tech services	107.47	0.84	4	\$18,706	0.68	5	\$12,704	0.86	4	0.80	3
55 Management of companies	24.56	0.14	17	\$4,956	0.25	16	\$3,407	0.23	16	0.21	16
56 Administrative & waste services	99.89	0.79	6	\$8,929	0.37	13	\$5,559	0.38	11	0.51	10
61 Educational services	28.36	0.17	15	\$2,121	0.18	18	\$1,482	0.14	17	0.16	17
62 Health & social services	137.93	0.96	1	\$26,219	0.87	2	\$19,171	0.99	1	0.94	1
71 Arts- entertainment & recreation	43.61	0.28	14	\$6,056	0.28	15	\$4,832	0.33	14	0.30	15
72 Accommodation & food services	119.73	0.91	2	\$9,430	0.38	12	\$5,667	0.39	10	0.56	8
81 Other services	93.52	0.75	7	\$7,875	0.34	14	\$4,768	0.32	15	0.47	12
92 Government & non NAICs	104.35	0.83	5	\$9,798	0.40	11	\$8,892	0.64	7	0.62	6

Employment, business revenue (value of production) and value added (GDP-equivalent) figures derived from IMPLANpro 2019 data for Nashville MSA

As the previous table demonstrates, employment is only one measure of the effect of economic activities on a region's economy. Although its ranking by employment is behind other sectors, health and social services ranks number one in the creation of economic value in the region. Overall, manufacturing ranks second and real estate and rental third¹⁷.

IV.3. Establishments

Ambulatory services account for more than 89 percent of establishments (a single business location of a company) in the core health care industry. Nursing care facilities and hospitals account for about 11 percent of establishments. The following table of establishments includes only health care establishments under NAICS 621, 622, and 623.

Core Health Care Establishments in Nashville MSA (NAICS 621, 622 and 623)

Years	Ambulatory	Hospitals	Nursing Care	Total
2008	2,417	52	234	2,703
2014	2,804	45	280	3,129
2019	3,324	60	347	3,731
Change (2008-2014)	16.01%	-13.46%	19.66%	15.76%
Change (2014-2019)	18.54%	33.33%	23.93%	19.24%

Source: BEREC estimates. BEREC used ImplanPro, County Business Patterns (www.census.gov) and additional data sources to estimate establishments by segment.

¹⁷ For detailed information about a specific sector, please see the North American Industrial Classification System (NAICS) at www.census.gov/eos/www/naics/.

The number of health care establishments experienced a significantly greater increase from 2014 to 2019, an increase of almost 20 percent, than from 2008 to 2014. **Between 2014 and 2019, a total of 602 new health care establishments emerged in Nashville, for a total of 3,731.**

IV.4. Wages

In 2019, wages in Nashville's core health care industry totaled \$7.75 billion, with hospitals and ambulatory services accounting for more than 92 percent of those wages. Moreover, total wages across core health care industry sector segments increased between 2014 and 2019: ambulatory services wages increased from \$2.59 billion to \$4.03 billion; hospital wages increased from \$2.77 billion to \$3.12 billion; and nursing care facilities wages rose from \$0.47 billion to \$0.60 billion. Of the three health care industry sector segments, ambulatory services experienced the greatest increase in total wages, approximately 56 percent. Nursing care wages increased almost 28 percent, and hospital wages increased 13 percent.

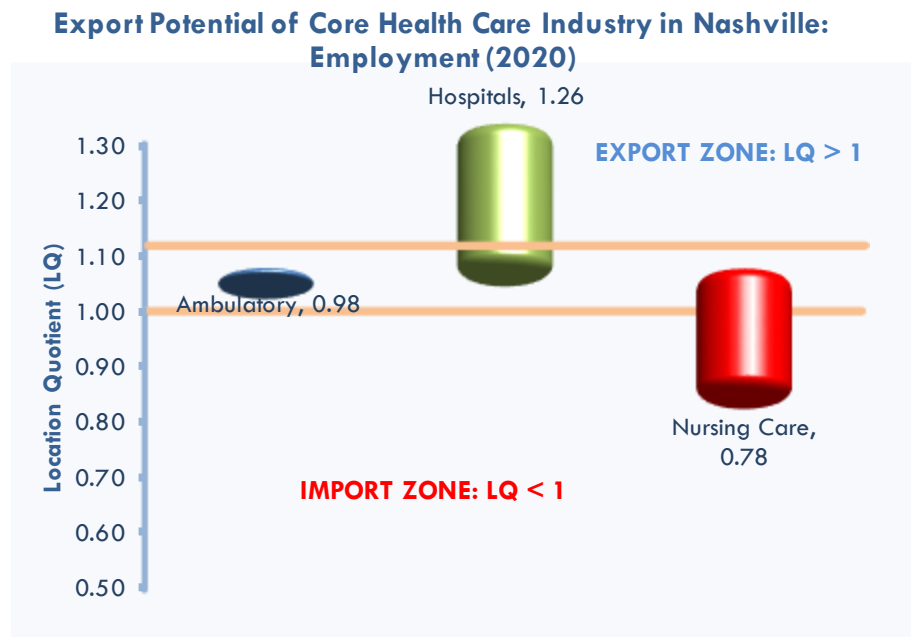
Core Health Care Wages in Nashville MSA (NAICS 621, 622 and 623) (Billion \$)

Years	Ambulatory	Hospitals	Nursing Care	Total
2008	\$1.87	\$2.45	\$0.39	\$4.71
2014	\$2.59	\$2.77	\$0.47	\$5.83
2019	\$4.03	\$3.12	\$0.60	\$7.75
Change (2008-2014)	38.50%	13.06%	20.51%	23.78%
Change (2014-2019)	55.60%	12.64%	27.66%	32.93%

Source: BERC estimates. BERC used ImplanPro, County Business Patterns (www.census.gov) and additional data sources to estimate wages by segment.

IV.5. Export Potential of Core Health Care Industry Segments

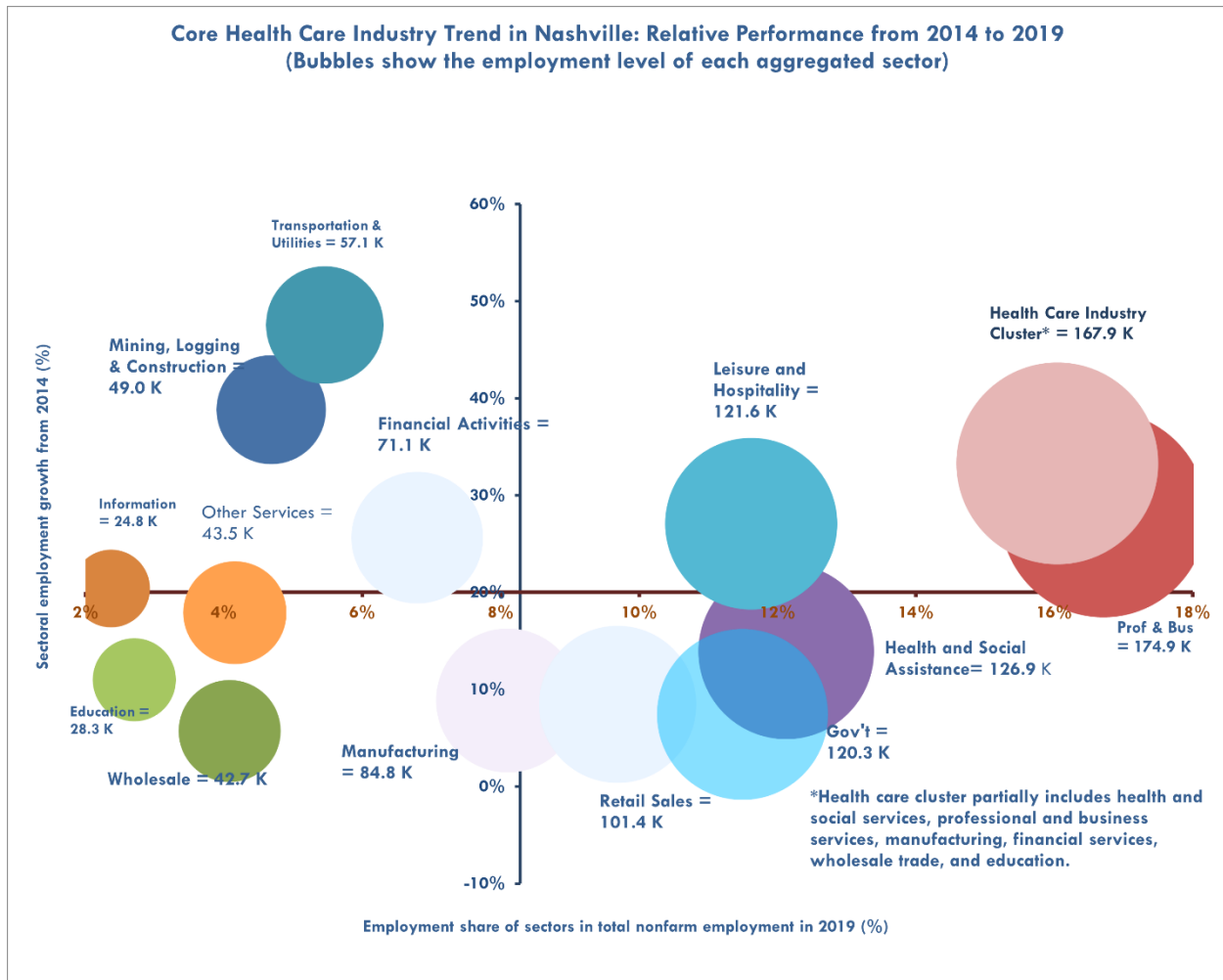
Location quotient (L.Q.) is often used to describe the relationship between the local and national economies. If the L.Q. for the industry is larger than 1, that industry has a larger presence in the local economy than its national economic counterpart. Hospitals employ a substantially greater percentage of people in the Nashville MSA than in the U.S. Consequently, these findings suggest that supply in the region exceeds local demand for hospitals and these health care establishments serve residents outside the Nashville MSA. In the case of ambulatory services, the findings indicate the supply and demand are equal.



Sources: Bureau of Labor Statistics (www.bls.gov) and BERC calculations

IV.6. Relative Growth Performance of Core Health Care Segments

The health care and social services sector grew faster than other sectors in the Nashville MSA (see the chart that follows). Growth in health care and social services (13.91%) was substantially lower than the average sector growth rate of 18.75 percent. However, its current (2019) share in total employment is six percentage points above the average for all sectors. In terms of the health care industry cluster, its growth from 2014 was substantially larger than many sectors in the local economy.¹⁸



¹⁸ See Chapter five for information about the health care industry cluster.

IV.7. Core Health Care Industry and the Local Economy

More than 75 percent of core health care spending goes to individuals as either payroll or proprietary income in the Nashville MSA. Real estate, pharmaceuticals, employment services, wholesale trade, and securities investments are the top five sectors that benefit most from the business expenditures of core health care establishments in Nashville. This is illustrated in the table that follows.

Where does a \$1 million core industry spending go in the local economy? (Major industries only)		
<i>Industry</i>	<i>Value</i>	<i>%</i>
Services to buildings and dwellings	\$4,645	0.46
Other basic organic chemical manufacturing	\$4,665	0.47
Office administrative services	\$4,884	0.49
Postal service	\$5,774	0.58
Management consulting services	\$6,319	0.63
Power generation and supply	\$6,533	0.65
Surgical and medical instrument manufacturing	\$6,894	0.69
Plastics plumbing fixtures and all other plastics	\$6,930	0.69
Management of companies and enterprises	\$7,657	0.77
Food services and drinking places	\$8,044	0.80
Other ambulatory health care services	\$9,401	0.94
Legal services	\$9,742	0.97
Securities- commodity contracts- investments	\$10,795	1.08
Wholesale trade	\$10,878	1.09
Employment services	\$11,995	1.20
Pharmaceutical and medicine manufacturing	\$13,099	1.31
Real estate	\$46,040	4.60
Other Sectors	\$106,798	10.68
<i>Institutions/Individuals</i>		
Employee Compensation	\$383,057	38.31
Proprietary Income	\$255,646	25.56
Other Property Income	\$70,934	7.09
Indirect Business Taxes	\$9,270	0.93
Total	\$1,000,000	100
Source: IMPLAN and BERC estimates.		
Note: Calculations are based on assumption that all spending occurs in the local economy.		

V. NASHVILLE'S HEALTH CARE INDUSTRY CLUSTER¹⁹ (with COVID-19 Impact Assessment)

To measure the economic impact of Nashville's health care industry cluster, BERC uses the counterfactual approach. This differs from the "net new concept" approach in that the counterfactual approach removes the whole health care industry cluster from the economy. It then measures the total economic impact that the subtraction generates across the remaining economy. In addition to the counterfactual approach, BERC uses employment by sector as an input when assessing the economic impact of the health care industry cluster. Finally, in the absence of detailed industry spending by zip code and vendor, BERC uses default regional purchasing coefficients to allow for outside leakage. Then BERC treats the outside leakages as the difference between the impact results with the default regional purchasing coefficients and the impact results with 100 percent local purchasing.

BERC assumes that each group of sectors in the health care industry cluster is not only closely linked to the core health care sector but that each sector also has its own independent effect on the local economy. Therefore, BERC measures the economic impact of the individual groups of sectors independent of each other and then adjusts the measure of the economic impact to take into consideration the indirect impact of the group on the core health care sector and vice versa. When the health care industry cluster is removed from the economy, BERC assumes that an economic shock to the core health care providers should not have a ripple effect on them. An adjustment for this purpose has been made to the study results.

In this study, BERC reports on the Nashville health care industry cluster's direct, indirect, and induced impacts. The direct impact refers to the current state of employment, sales, and personal income generated by the cluster in an economy. The indirect impact refers to the employment, sales, and personal income generated in the local economy by a business-to-business transaction. For example, a hospital purchases goods and services from local businesses for its operation. This hospital's spending in the local economy means additional jobs, business revenues, and personal income in other sectors. Induced impact refers to the employment, sales, and personal income generated in the local economy by employee spending. For example, a hospital employs and pays many individuals for their work at the hospital. These workers then spend their earnings in the local economy. This process generates additional jobs, business revenues, and personal income

¹⁹ Chapter five uses IMPLANpro, Inc as its prominent source of data. Figures from BERC Estimates, Census Bureau, LexisNexis Academic Universe, Reference USA, the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Nashville Chamber of Commerce are also used in the analysis of Nashville's Health Care Industry Cluster.

across the local economy. Finally, BEREC also estimates linkages between the health care industry cluster and other sectors in the local economy.

V.1. Employment

The Nashville health care industry cluster employs 167,917 people (2019), which corresponds to 16 of every 100 nonfarm employees in Nashville. Nashville health care industry cluster employment increased 33.3 percent from 2014. Among major aggregate sectors in the Nashville MSA, the health care industry cluster is second in employment, after professional and business services.

Nashville Health Care Industry Cluster: Employment and Average Wage		
Major Sectors	Employment*	Average Wage
Healthcare Management & Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	11,836	\$84,405
Healthcare Providers (NAICS 621, 622, 623)	133,411	\$69,446
Research, Training and Support Organizations		
<i>Educational (NAICS 6112, 6113, 6115)</i>	1,543	\$72,981
<i>Research and Public Health (NAICS 54171, 92312)</i>	6,502	\$58,544
Services to Providers (NAICS 524114)	2,811	\$95,158
Products to Healthcare Providers		
<i>Manufacturing (NAICS 3391, 3254)</i>	1,678	\$59,434
<i>Wholesalers (NAICS 42345, 42346, 4242)</i>	5,754	\$98,634
Products to Individuals (NAICS 44611, 44613)	4,382	\$43,850
Total	167,917	\$70,773

*BERC estimated employment figures from Tennessee Department of Labor and Workforce Development Database

As the table above indicates, the Nashville health care industry cluster consists of several groups of sectors, with health care providers (ambulatory services, hospitals, and nursing care facilities) at the core. **The core health care industry employs 79.4 percent of Nashville health care industry cluster employees.** The remaining 20.6 percent are shared among five major industry groups; the largest is health care management and consulting with 11,836 employees.

V.2. Establishments and Wages

The Nashville health care industry cluster, consisting of more than 5,000 establishments, accounts for \$11.9 billion in wages. From 2014 to 2019, the number of establishments increased by nearly 26 percent, while the cluster wages increased 65.09 percent over the same period. The average wage for the Nashville Health Care Industry Cluster is around \$70,773 in 2019. This average wage is significantly higher than Nashville's average nonfarm wage of \$57,105. Nashville's health care cluster average wage increased about 5.71 percent from 2014.

Nashville Health Care Cluster Profile: Wages and Establishments (2019)

Major Sectors	Wages (Million \$)	Establishments
Healthcare Management & Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	\$999.02	278
Healthcare Providers (NAICS 621, 622, 623)	\$9,264.88	3,555
Research, Training and Support Organizations		
<i>Educational (NAICS 6112, 6113, 6115)</i>	\$112.61	22
<i>Research and Public Health (NAICS 54171, 92312)</i>	\$380.65	107
Services to Providers (NAICS 524114)	\$267.49	17
Products to Healthcare Providers		
<i>Manufacturing (NAICS 3391, 3254)</i>	\$99.73	96
<i>Wholesalers (NAICS 42345, 42346, 4242)</i>	\$567.54	565
Products to Individuals (NAICS 44611, 44613)	\$192.15	423
Total	\$11,884.07	5,063

Source: BERC's estimates from Tennessee Department of Labor and Workforce Development Database.

V.3. Investor-Owned Health Care Management Companies (Publicly Traded)

Many studies examine the locational patterns of large corporate headquarters in the U.S. The findings suggest that the presence of large corporate headquarters provides substantial benefits to a regional economy since headquarters (1) bring high-paying jobs, (2) increase the competitive advantage of the host city, (3) promote innovative technologies through acquisition and dissemination of information, and (4) spur growth in critical infrastructure industries, such as law, finance, and other professional and business services.²⁰

In choosing the location of a large corporate headquarters, certain qualities of the host region are critical factors, primarily (1) a good quality of life, (2) major transportation and communication infrastructures, (3) a diverse economic base, (4) a sound financial infrastructure, (5) professional services, and (6) a highly skilled labor force.

As a center of corporate headquarter activities, Nashville presents a unique combination of these qualities. According to Klier and Testa's findings (2002), Nashville was one of the few large cities to experience phenomenal relocation of major corporate headquarters between 1990 and 2000. During this period, 16 large corporations chose Nashville as their new headquarters location for a growth rate of 177.8 percent. The Forbes 2014 annual survey named the Nashville MSA the 10th best city for business in the U.S. (www.forbes.com). In addition, Nashville is ranked 12th best city in MarketWatch's Top Cities for Business Growth. Since 2016, several other rankings highlight the prominent role the Nashville MSA plays in the national economy.²¹

²⁰ For a review of literature on locational patterns of company headquarters, see Thomas Klier and William Testa's (2002) "Location Trends of Large Company Headquarters during the 1990s," *Economic Perspectives* (Federal Reserve Bank of Chicago). For detailed information on the concept of cluster and competitive advantage, see Michael Porter's (2000) "Location, Competition, and Economic Development: Local Clusters in the Global Economy," *Economic Development Quarterly*, vol. 14, pp. 15-34.

²¹ Several recent rankings are available at <https://www.nashvillechamber.com/rankings>.

Nashville is truly *the* center for publicly traded national health care industry headquarters, with 18 major public companies calling it home. (Only publicly traded companies are included in this analysis.) As of 2019, an impressive 419 out of 1,233 investor-owned hospitals in the U.S. were owned or operated by Nashville-area hospital management companies. **In 2019, the 18 publicly traded health care industry cluster companies headquartered in Nashville counted revenues of more than \$95 billion and employed nearly 500,000 people worldwide.**²²

Nashville-Based Investor-Owned and Publicly Traded Health Care Management Companies

Company Name	Corporate Employee Size Actual	Corporate Sales Volume Actual	Ticker Symbol
HCA Health Care Inc	275,000	\$51,000,000,000	HCA
Community Health Systems Inc	70,000	\$33,408,153,000	CYH
Acadia Healthcare Co Inc	42,200	\$2,089,929,000	ACHC
Amedisys Inc*	21,000	\$2,071,519,000	AMED
Surgery Partners Inc	10,800	\$1,860,100,000	SGRY
National Healthcare Corp	13,432	\$1,028,217,000	NHC
Change Healthcare Inc	15,000	\$519,575,000	CHNG
Healthcare Realty Trust Inc	308	\$499,629,000	HR
Brookdale Senior Living	45,000	\$489,924,000	BKD
Diversicare Healthcare Svc Inc	4,800	\$475,718,000	DVCR
Tivity Health Inc	350	\$437,714,000	TVTY
Clover Health Investments Corp	74	\$401,968,000	CLOV
National Health Investors Inc	19	\$332,811,000	NHI
Healthstream Inc	1,069	\$244,826,000	HSTM
Community Healthcare Trust Inc	28	\$75,684,000	CHCT
Harrow Health Inc	125	\$48,871,000	HROW
Cumberland Pharmaceuticals Inc	90	\$37,441,000	CPIX
Imac Holdings Inc	139	\$12,822,000	IMAC
Total	499,434	\$95,034,901,000	

Source: Compiled from Reference USA, individual company websites, and SEC filings.

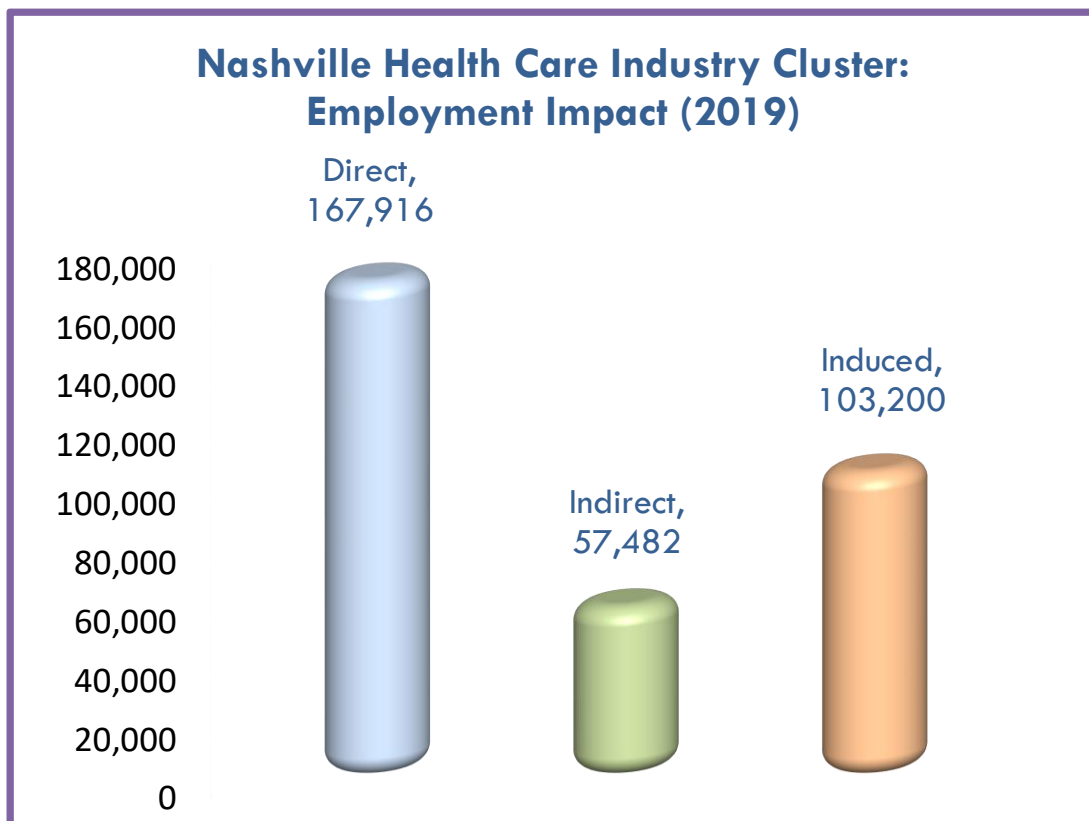
* Amedisys Inc has its headquarters in Baton Rouge, LA, and its senior executive offices in Nashville, TN

²² Source: 2020 American Hospital Association Annual Survey Database, ReferenceUSA, LexisNexis Academic Universe, *Becker's Hospital Review*, and company Web sites.

V.4. Economic Impact of the Nashville Health Care Cluster

V.4.a. Employment Impact

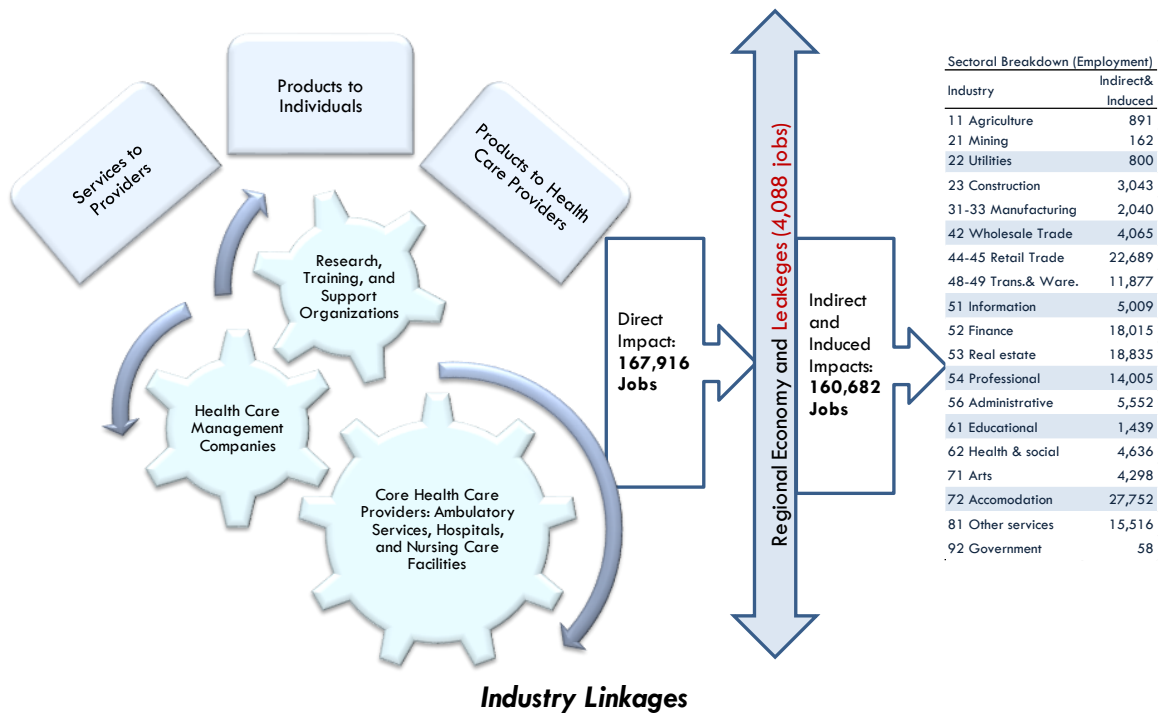
The health care industry cluster total employment impact is 328,598, which represents nearly nine percent of Tennessee's and 24.54 percent of the Nashville MSA's nonfarm employment in 2019. One hundred industry cluster jobs create an additional 96 jobs in the Nashville economy. The employment impact of Nashville's health care industry cluster increased 31.78 percent from 2014.



Sectoral Impact

The largest sectors impacted by the health care industry cluster are accommodation, retail trade, finance, and real estate, with almost 20,000 jobs each. Because of interregional transactions, Nashville's health care industry cluster creates nearly 4,088 additional jobs across sectors outside Nashville.

Employment Impact of Nashville Health Care Industry Cluster (2019)



For every direct 1,000 jobs in the Nashville health care industry cluster, an additional 165 jobs are created in the accommodation industry, 135 in retail trade, 112 in real estate, 107 in finance and insurance, 92 in other services, 83 in professional services, and 71 in transportation and warehousing

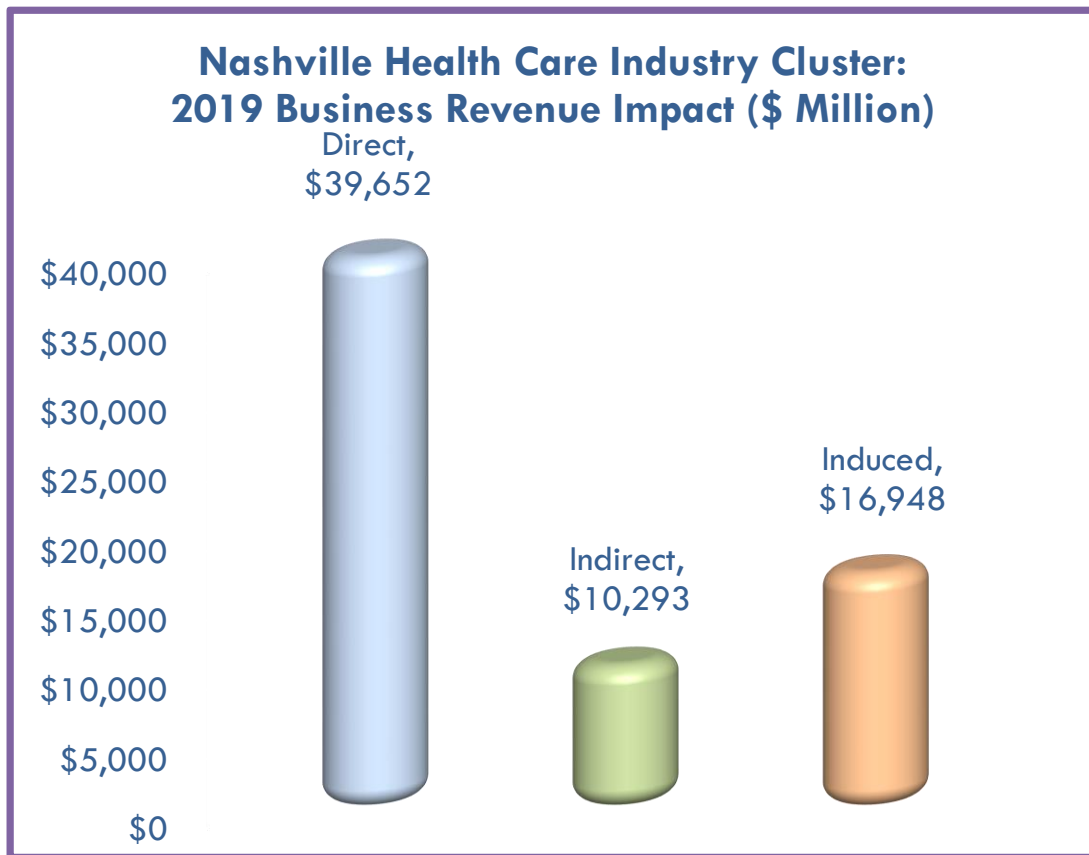
Employment Linkages Between Health Care Industry Cluster and Sectors of Nashville's Economy

Industry	Indirect & Induced	Number of jobs created per 1,000 health care industry cluster jobs
72 Accomodation	27,752	165
44-45 Retail Trade	22,689	135
53 Real estate	18,835	112
52 Finance	18,015	107
81 Other services	15,516	92
54 Professional	14,005	83
48-49 Trans. & Ware.	11,877	71
56 Administrative	5,552	33
51 Information	5,009	30
62 Health & social	4,636	28
71 Arts	4,298	26
42 Wholesale Trade	4,065	24
23 Construction	3,043	18
31-33 Manufacturing	2,040	12
61 Educational	1,439	9
11 Agriculture	891	5
22 Utilities	800	5
21 Mining	162	1
92 Government	58	0

Source: BERC's estimates based on IMPLANpro, Inc impact figures.

V.4.b. Business Revenue Impact

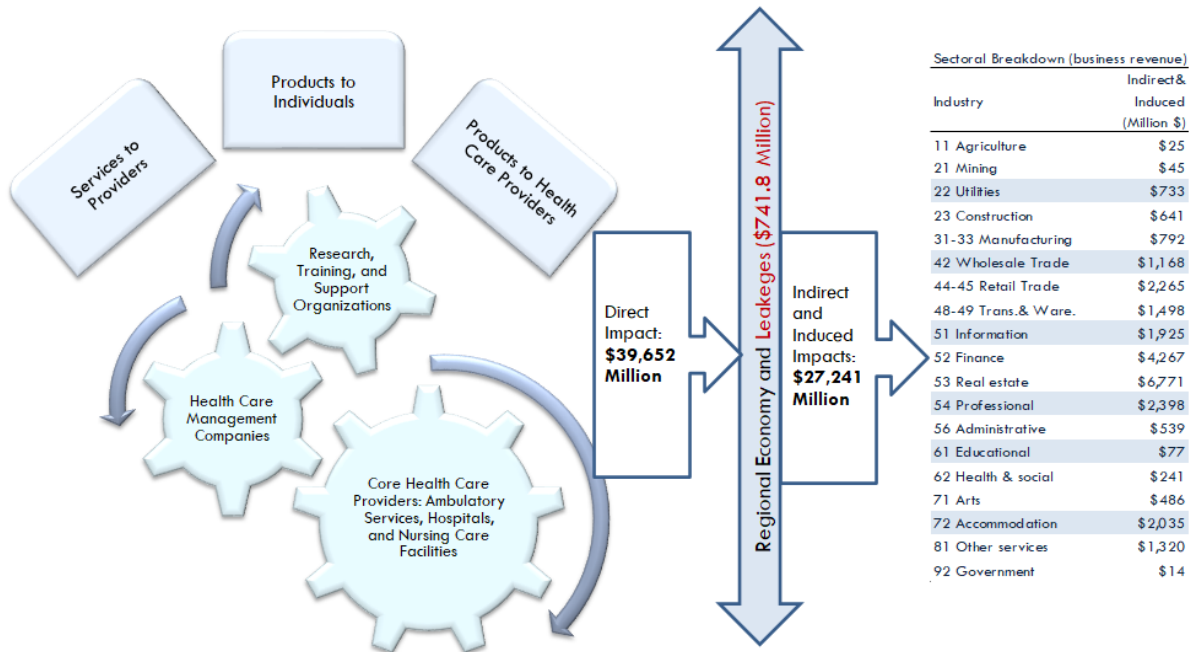
The total business revenue impact of the health care industry cluster is \$66.89 billion, \$39.652 billion of which is directly injected into the economy. The business revenue impact of Nashville's health care industry cluster increased 72.4 percent from 2014. This amount is equivalent to more than nine percent of Tennessee's and 26 percent of Nashville's total business revenues in 2019. Every \$100 in health care cluster spending generates an additional \$69 in business revenues.



Sectoral Impact

The real estate and financial sector in Nashville greatly benefit from the health care industry cluster, garnering over \$11 billion in business revenues therefrom. Moreover, leakage outside of Nashville is about \$741.8 million across sectors.

Business Revenue Impact of Nashville Health Care Industry Cluster (2019 Million \$)



Industry Linkages

Every \$1,000 in business revenue generated by the health care industry cluster generates additional revenue of \$171 in real estate, \$108 in finance, \$60 in professional services, and \$57 in retail trade. Other sectors seeing substantial benefits are accommodation (\$51), information (\$49), and transportation and warehousing (\$38). The impact on additional sectors ranges from \$33 in other services to \$1 in agriculture.

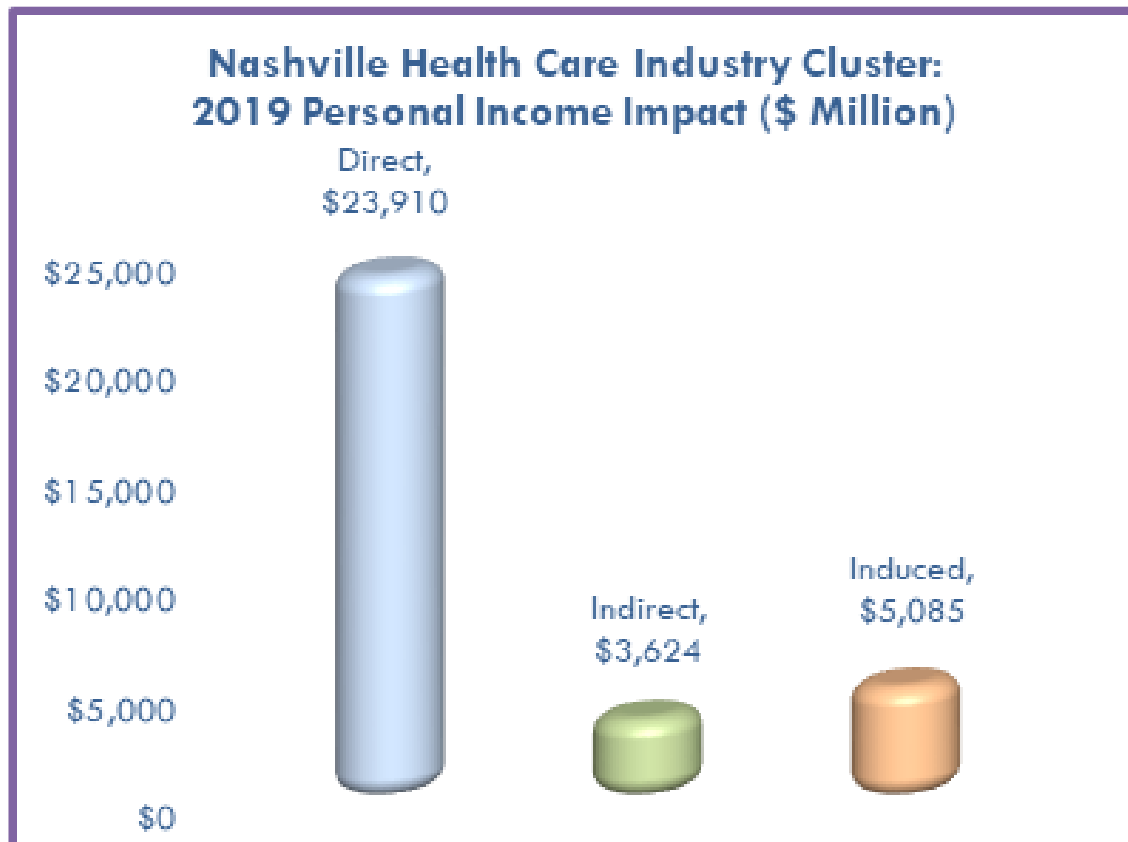
Business Revenue Linkages Between Health Care Industry Cluster and Sectors of Nashville's Economy

Industry	Indirect & Induced	Revenues generated per \$1,000 health care industry cluster business revenue
53 Real estate	\$6,771	171
52 Finance	\$4,267	108
54 Professional	\$2,398	60
44-45 Retail Trade	\$2,265	57
72 Accommodation	\$2,035	51
51 Information	\$1,925	49
48-49 Trans. & Ware.	\$1,498	38
81 Other services	\$1,320	33
42 Wholesale Trade	\$1,168	29
31-33 Manufacturing	\$792	20
22 Utilities	\$733	18
23 Construction	\$641	16
56 Administrative	\$539	14
71 Arts	\$486	12
62 Health & social	\$241	6
61 Educational	\$77	2
21 Mining	\$45	1
11 Agriculture	\$25	1
92 Government	\$14	0

Source: BERC's estimates based on IMPLANpro, Inc. impact figures.

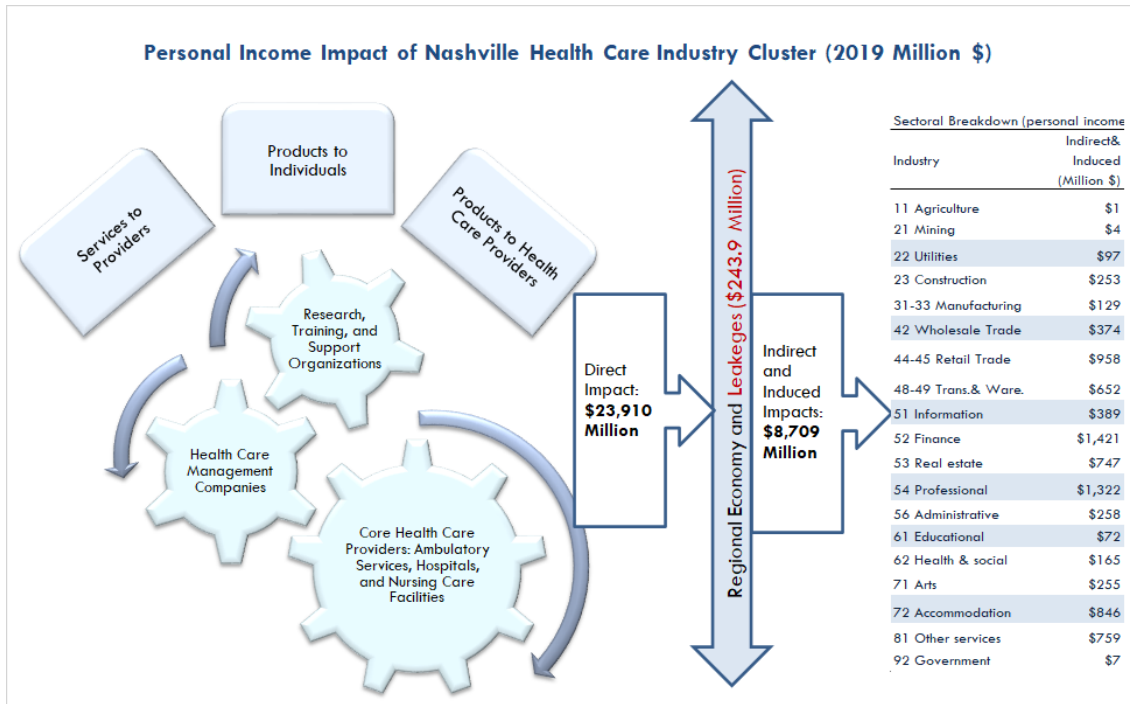
V.4.c. Personal Income

The Nashville health care industry cluster generates about \$32.62 billion in personal income for the local economy. This corresponds to 13.6 percent of Tennessee's and nearly 34.4 percent of the Nashville MSA's total personal income in 2019. Moreover, every \$100 of personal income generates an additional \$36 in the local economy. The personal income impact of Nashville's health care industry cluster increased 55 percent from 2014 to 2019.



Sectoral Impact

The largest sectoral impact is in finance and insurance with \$1,421 million. Other notable sectors benefiting from the Nashville health care industry cluster are professional, scientific, and technical services (\$1,322 million), health and social services (\$165 million), administrative (\$258 million), and accommodation (\$846 million). Total outside leakage is estimated at \$243.9 million across sectors.



Industry Linkages

Every \$1,000 in personal income earned in the health care industry cluster creates an additional \$59 in finance, \$55 in professional services, and \$40 in retail trade. In addition, there are substantial impacts on accommodation (\$35), other services (\$32), and real estate (\$31). Finally, the impact on other sectors ranges from \$16 in the information sector to \$3 in the educational sector.

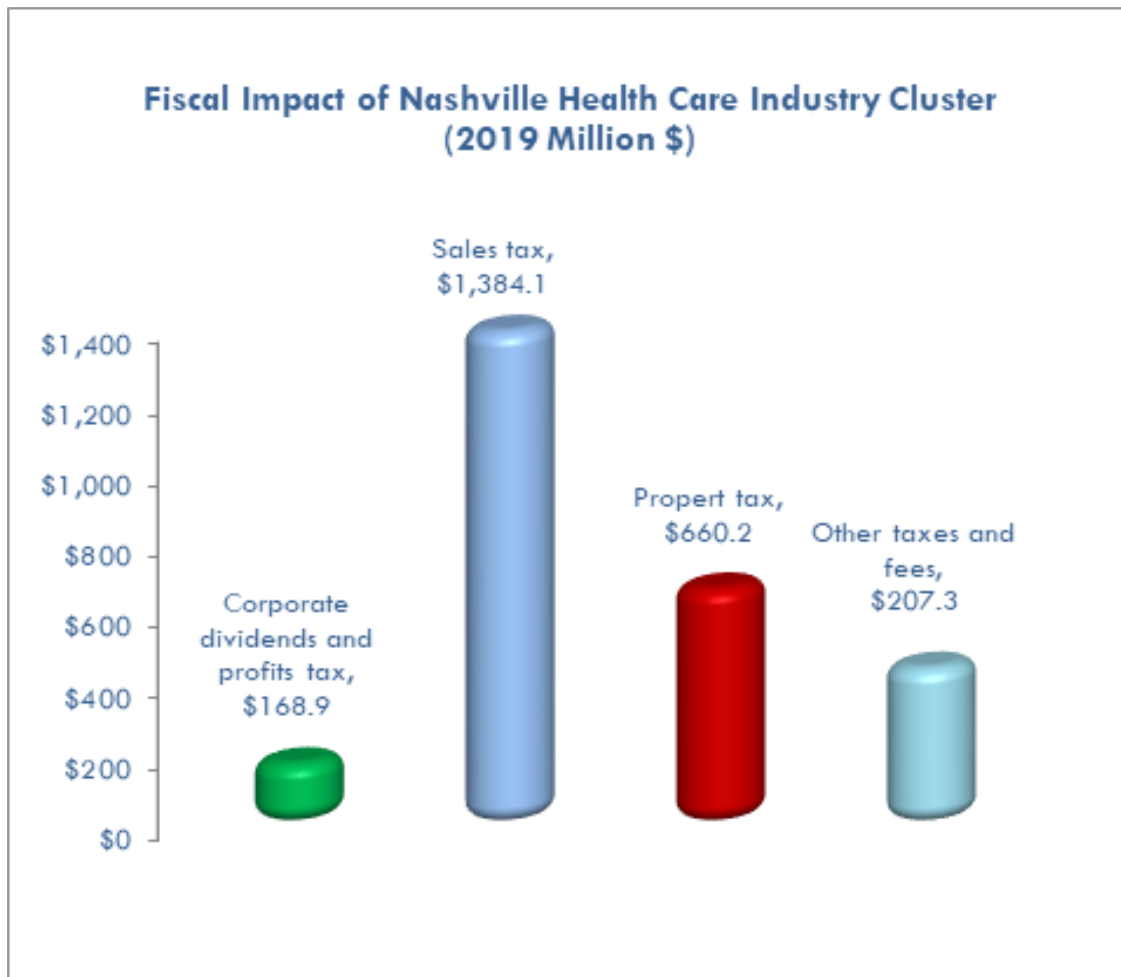
Personal Income Linkages Between Health Care Industry Cluster and Sectors of Nashville's Economy

Industry	Indirect & Induced	Personal income created by sector per \$1,000 personal income in health care industry cluster
52 Finance	\$1,421	59
54 Professional	\$1,322	55
44-45 Retail Trade	\$958	40
72 Accommodation	\$846	35
81 Other services	\$759	32
53 Real estate	\$747	31
48-49 Trans. & Ware.	\$652	27
51 Information	\$389	16
42 Wholesale Trade	\$374	16
56 Administrative	\$258	11
71 Arts	\$255	11
23 Construction	\$253	11
62 Health & social	\$165	7
31-33 Manufacturing	\$129	5
22 Utilities	\$97	4
61 Educational	\$72	3
92 Government	\$7	0
21 Mining	\$4	0
11 Agriculture	\$1	0

Source: BER's estimates based on IMPLANpro, Inc. impact figures.

V.5. Fiscal Impact of the Nashville Health Care Industry Cluster

The Nashville health care industry cluster accounts for nearly \$2.65 billion in state and local taxes. Of this amount, more than half stems from sales tax, while property tax, corporate dividends and profit taxes, and other taxes and fees make up the remainder. Compared to 2014, the fiscal impact of Nashville's health care industry cluster is up nearly 76.7 percent in 2019. From a comparative perspective, this figure represents nearly 10 percent of all taxes collected in Tennessee and nearly 29 percent of all taxes collected in the Nashville MSA in 2019.



V.6. Impact of COVID-19 on Health Care Industry Cluster Employment

The health care industry, which is relatively immune to most economic and financial crises, was hit hard by the pandemic-related shutdown in April 2020. Between December 2019 and April 2020, the Nashville health care industry cluster lost 14,423 jobs. In the same period, nearly one billion dollars in wages were wiped out from the local economy.

Nashville Health Care Industry Cluster: Employment, Establishment and Wages - COVID-19 Impact (April 2020 Shutdown)

Major Sectors	Employment Change (April 2020-December 2019)	Change in Wages (April 2020-December 2019)
Health Care Management and Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	-1,833	-\$138,616,959
Health Care Providers (NAICS 621, 622, 623)	-11,961	-\$789,461,883
Research, Training and Support Organizations Educational (NAICS 6112, 6113, 6115)	42	\$3,017,868
Research and Public Health (NAICS 54171, 92312)	-197	-\$11,572,568
Services to Providers (NAICS 524114)	186	\$14,930,034
Products to Health Care Providers Manufacturing (NAICS 3391, 3254)	-224	-\$13,247,584
Wholesalers (NAICS 42345, 42346, 4242)	-397	-\$37,248,128
Products to Individuals (NAICS 44611, 44613)	-39	-\$1,736,358
Total	-14,423	-\$973,935,578

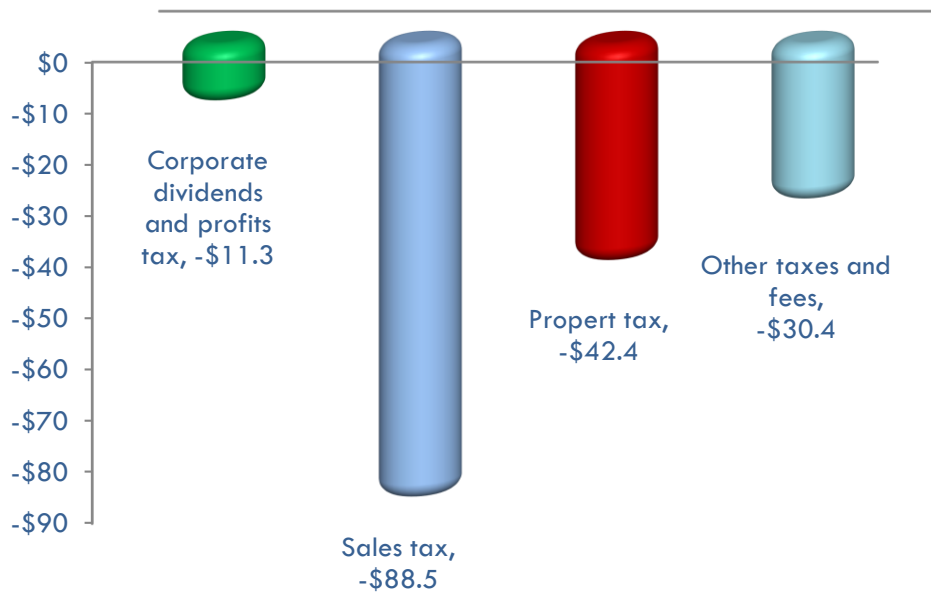
These direct job losses resulted in

- 31,151 total job losses (direct, indirect, and induced). The pandemic-related job losses represent about 0.77 percent of Tennessee's and 2.33 percent of the Nashville MSA's nonfarm employment in 2020.
- \$5.8 billion in business revenue losses (direct, indirect, and induced) in 2020, about 0.79 percent of Tennessee's and 2.22 percent of the Nashville MSA's total business revenue in 2020.
- \$3.0 billion in personal income losses (direct, indirect, and induced) in 2020, representing about 1.25 percent of Tennessee's and 3.16 percent of the Nashville MSA's total personal income in 2020.

The pandemic-related job losses in the health care industry cluster had a significant impact on local and state government revenues, too:

- Local and state governments lost nearly \$173 million in tax revenues in 2020.

Fiscal Impact of COVID-19 on Nashville Health Care Industry Cluster (2020 Million \$)



V.7. COVID-19 Impact and Recovery

Is there a sign of recovery after the employment losses? As highlighted in chapter two, the health care sector is bouncing back faster than the nonfarm employment in Nashville MSA after April 2020. Between April 2020 and June 2020, the Nashville health care cluster had already added more than 5,000 jobs, suggesting that the sector is rebounding quickly.

Nashville Health Care Industry Cluster: Employment, Establishment and Wages - April 2020 - June 2020 Recovery

Major Sectors	Employment (April 2020)	Employment (June 2020)	Recovery (April 2020 - June 2020)
Health Care Management and Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	10,003	10,327	324
Health Care Providers (NAICS 621, 622, 623)	121,450	126,482	5,032
Research, Training and Support Organizations Educational (NAICS 6112, 6113, 6115)	1,585	1,514	-71
Research and Public Health (NAICS 54171, 92312)	6,305	6,349	44
Services to Providers (NAICS 524114)	2,997	2,826	-171
Products to Health Care Providers Manufacturing (NAICS 3391, 3254)	1,454	1,480	26
Wholesalers (NAICS 42345, 42346, 4242)	5,357	5,310	-47
Products to Individuals (NAICS 44611, 44613)	4,343	4,512	169
Total	153,494	158,800	5,306

V.8. Health Care Industry Cluster Growth Over the Years

What drives growth in the health care industry cluster? Is it employment in the industry or the number of establishments? What is the growth trend in the health care industry cluster? To answer these questions, we first look at direct employment, wages, and establishments over the years. The table below suggests that both establishments and employment are growing over time, although employment grew faster than establishments. This means that employment per establishment has also grown over time.

**Nashville MSA Health Care Industry Cluster:
Direct Employment and Establishments Over the Years**

Year	Establishments	Wages (Millions 2019\$)	Employment
2004	3,296	\$5,800.58	94,346
2008	3,582	\$7,145.22	113,453
2014	4,072	\$7,774.24	125,918
2019	5,063	\$11,884.07	167,917
2004-2008 % change	8.68%	23.18%	20.25%
2008-2014 % change	13.68%	8.80%	10.99%
2014-2019 % change	24.34%	52.86%	33.35%

How does the impact of the Nashville health care industry cluster grow over the years? The following table provides a historical perspective on the growth of the health care industry cluster. The table below suggests that:

- The health care industry cluster has grown significantly over the years
- Nashville MSA's aggregate indicators also have increased substantially
- However, growth in the health care industry cluster has been significantly higher than the growth of Nashville MSA.

**Nashville MSA Health Care Industry Cluster:
Economic and Fiscal Impact Over the Years
(Direct, Indirect, & Induced)**

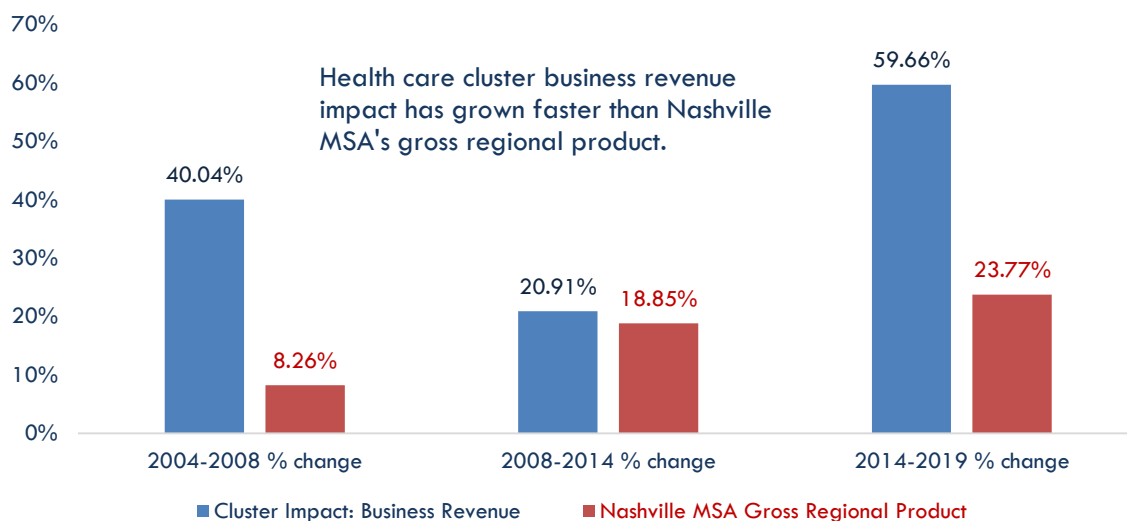
Year	Business Revenue (Millions 2019\$)	Personal Income (Millions 2019\$)	Total Taxes (Millions 2019\$)	Employment
2004	\$24,745.10	\$11,358.11	\$621.60	154,800
2008	\$34,652.86	\$15,850.74	\$1,370.82	211,059
2014	\$41,897.58	\$22,712.43	\$1,610.28	249,345
2019	\$66,893.00	\$32,619.00	\$2,420.50	328,598
2004-2008 % change	40.04%	39.55%	120.53%	36.34%
2008-2014 % change	20.91%	43.29%	17.47%	18.14%
2014-2019 % change	59.66%	43.62%	50.32%	31.78%

**Nashville MSA
Economic and Demographic Indicators Over the Years**

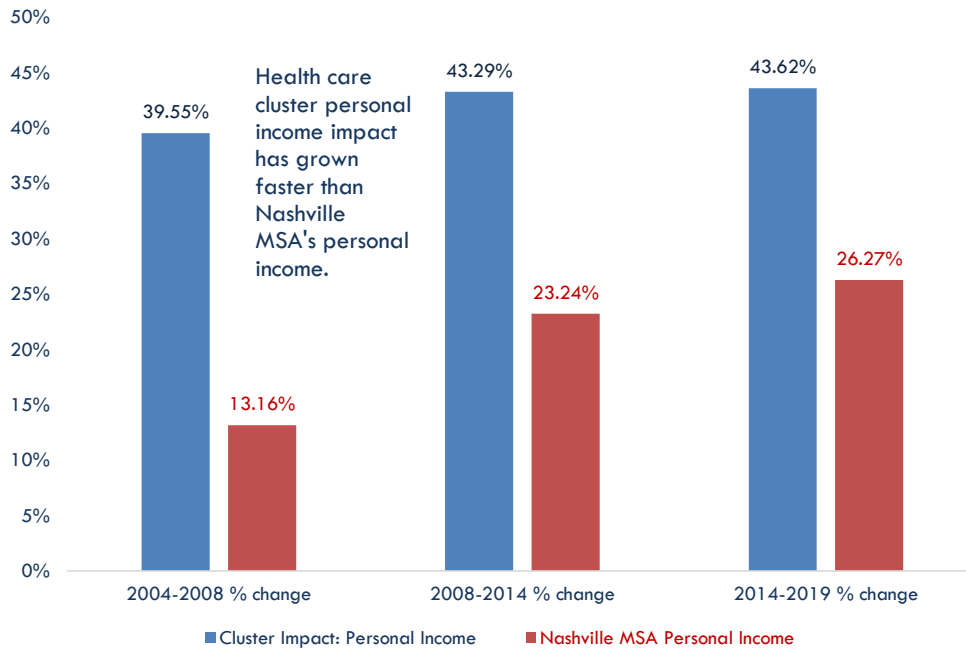
Year	Population (Thousands)	Personal Income (Millions 2019\$)	Gross Regional Product (Millions 2019\$)	Total Employment
2004	1,455	\$67,566.59	\$88,197.73	985,143
2008	1,602	\$76,456.63	\$95,481.02	1,066,090
2014	1,768	\$94,222.82	\$113,482.92	1,173,936
2019	1,934	\$118,979.47	\$140,454.14	1,414,852
2004-2008% change	10.14%	13.16%	8.26%	8.22%
2008-2014 % change	10.36%	23.24%	18.85%	10.12%
2014-2019 % change	9.39%	26.27%	23.77%	20.52%

Source: Tennessee Department of Labor and Workforce Development and BERC estimates. BERC used multiple data sources including IMPLANpro, Woods & Poole, FRED, and Census Bureau County Business Patterns to estimate employment by segment

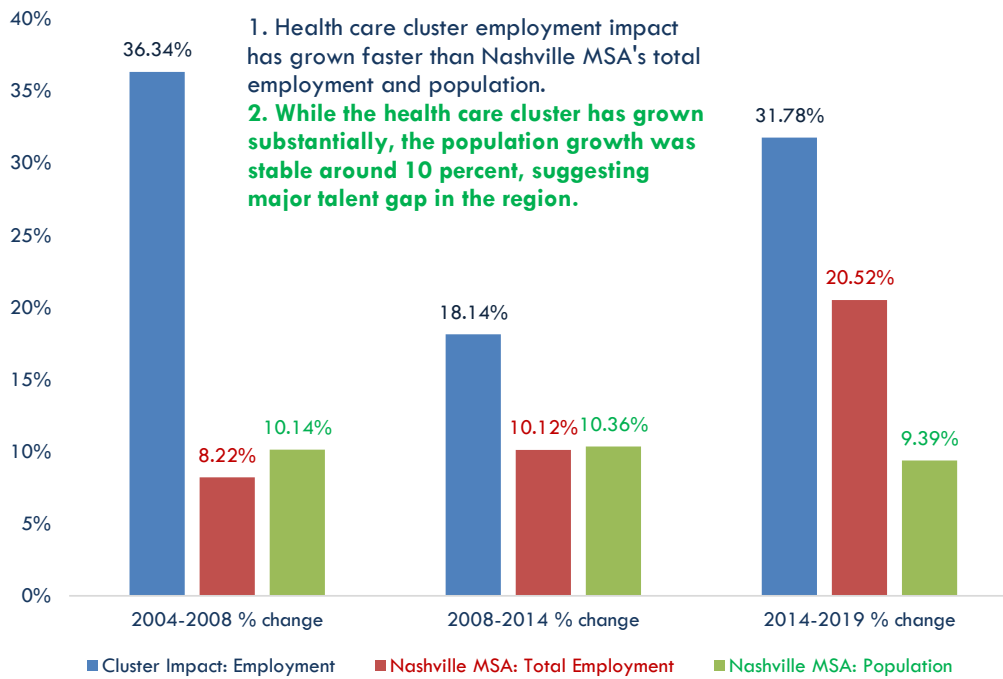
**Growth Dynamics:
Nashville Health Care Industry Cluster vs. Nashville MSA**



Growth Dynamics: Nashville Health Care Industry Cluster vs. Nashville MSA



Growth Dynamics: Nashville Health Care Industry Cluster vs. Nashville MSA



VI. COMPARATIVE PERSPECTIVE ON NASHVILLE'S HEALTH CARE INDICATORS²³

VI.1. Employment Growth and Export Potential

Indicators of health care employment suggest the Nashville MSA has a reasonable health care industry presence compared to its peer MSAs. Nashville's health care employment per capita is the second largest among the peers, with 48 employees per 1,000 people. The employment share of the health care sector is the eighth largest among the peers, with 12 percent in 2020. Finally, in terms of health care employment growth from 2013, the Nashville MSA ranks ninth with 7.61 percent.

Comparative Perspective on Selected Health Care Indicators

	Export Potential*		Health Care Employment		
	Health Care Export Capacity (Location Quotient 2020)	Percent Change Export Capacity (2013-2020)	Health Care Employment per Capita	Health Care Employment Share (%)	Health Care Employment Growth (%)
Atlanta	0.80	-7.55%	34	10.61%	12.54%
Birmingham	1.09	-5.90%	44	14.47%	-17.96%
Charlotte	0.60	-39.56%	29	7.94%	-14.99%
Columbus	0.99	0.60%	44	13.24%	11.62%
Dallas	0.78	-19.10%	39	10.34%	0.58%
Denver	0.72	-10.12%	32	9.52%	8.01%
Indianapolis	1.05	-0.88%	48	13.98%	18.50%
Jacksonville	1.00	-13.80%	46	13.35%	8.98%
Kansas City	0.97	-16.12%	44	12.85%	105.85%
Louisville	0.92	19.21%	45	12.29%	56.19%
Nashville	0.90	-14.53%	48	12.00%	7.61%
Raleigh	0.81	0.05%	26	10.73%	21.96%
Richmond	1.02	-8.09%	52	13.54%	-4.88%

*A score greater than "1" indicates that the MSA is exporting healthcare services. A score less than "1" indicates that healthcare services are primarily used by residents.

Sources: BLS, Census Bureau, and BEREC estimates

Furthermore, the Nashville MSA's health care industry ranks eighth in export potential among the 13 comparable MSAs. A score greater than one "1" (L.Q. > 1) suggests an MSA is exporting health care services; that is, residents from other areas are traveling to the region to use its health

²³ Chapter six acquired data from BEREC Estimates, LexisNexis Academic Universe, ReferenceUSA, County Business Patterns, Bureau of Labor Statistics, and PricewaterhouseCoopers/Venture Economics/National Venture Capital Association Money Tree Survey to establish a comparative perspective on Nashville's health care indicators.

care services. The Nashville MSA showed a negative growth trend with a 14.53 percent decrease from 2013 to 2020.

VI.2. Health Care Industry Cluster Headquarters and Global Impact

Nashville ranks second among the 13 MSAs in terms of the number of major health care industry cluster management companies (both public and private), their revenues, and their employment. Nashville's global impact is quite substantial, with more than 460,000 jobs and \$139.75 billion in annual business revenues generated by investor-owned health care management companies.

Comparative Perspective on Health Care Cluster Headquarters* (Public and Private)

MSAs	Number of Cluster Headquarters*	Total Employment ('000)	Total Revenues (2020 Billion \$)**	Composite Score***	Rank
Atlanta	53	169.07	\$38.56	0.64	3
Birmingham	12	52.99	\$12.96	0.31	10
Charlotte	17	180.21	\$30.44	0.46	5
Columbus	18	113.46	\$17.24	0.42	7
Dallas	65	471.33	\$332.85	0.96	1
Denver	26	53.56	\$14.80	0.47	4
Indianapolis	20	101.98	\$13.01	0.43	6
Jacksonville	6	10.26	\$4.00	0.23	13
Kansas City	16	33.49	\$10.92	0.35	8
Louisville	9	103.25	\$12.40	0.31	11
Nashville	30	460.40	\$139.75	0.87	2
Raleigh	14	48.48	\$5.98	0.32	9
Richmond	8	28.32	\$3.86	0.25	12

Source: ReferenceUSA

*List includes health care industry cluster companies as defined throughout this study.

**To be consistent across all MSAs, employment and business revenues are directly taken from the source without making company-level adjustment.

***Composite score includes relative rankings of each MSA with regard to (1) number of headquarter companies, (2) total revenues, and (3) total number of employees.

VI.3. Health Care Occupations

Nashville ranks eighth among the 13 MSAs in percent of health care occupations among all occupations. Nashville ranks seventh among the 13 peer MSAs in health care occupations per 1,000 people **and fifth overall in health care occupations.**

Health Care Practitioners and Support Occupations						
MSAs	Total	Health Care Occupations as Percent of Total	Health Care Occupations per Capita	Average Score	Rank	
Atlanta	2,632,850	7.96%	54	0.07	7	
Birmingham	497,560	11.86%	43	0.96	4	
Charlotte	1,211,240	8.30%	45	0.12	12	
Columbus	1,026,540	10.69%	34	0.78	10	
Dallas	3,588,450	8.58%	53	0.17	6	
Denver	1,457,420	8.76%	49	0.21	8	
Indianapolis	1,019,100	10.82%	50	0.81	1	
Jacksonville	683,490	10.40%	37	0.71	11	
Kansas City	1,031,300	10.59%	37	0.75	9	
Louisville	614,720	10.22%	51	0.65	3	
Nashville	965,690	9.57%	47	0.44	5	
Raleigh	621,270	8.44%	40	0.14	13	
Richmond	625,850	10.52%	51	0.74	2	

Note: Healthcare occupations per 1,000 people.

Source: Bureau of Labor Statistics (www.bls.gov)

VI.4. Venture Capital Flow

Nashville ranks fourth among 13 MSAs in venture capital flow in medical devices, equipment, health services, and biotechnology. In the Nashville MSA, the total value of venture capital in these industry fields between 2004 and 2019 was about \$1.62 billion.

Venture Capital Flow between 2004 and 2019* in Medical Devices and Equipment, Health Services, and Biotechnology

MSAs	2004-2009	2010-2014	2004-2014	2014-2019	2004-2019	Rank**
Atlanta	\$655,510,000	\$488,640,000	\$1,144,150,000	\$560,500,000	\$1,585,520,000	5
Birmingham	\$102,860,000	\$15,000,000	\$117,860,000	\$34,300,000	\$152,160,000	10
Charlotte	\$279,000,000	\$1,000,000	\$280,000,000	\$6,520,000	\$286,520,000	8
Columbus	\$99,520,000	\$36,130,000	\$135,650,000	\$83,309,997	\$215,799,997	9
Dallas	\$472,809,998	\$883,450,000	\$1,356,259,998	\$1,090,130,000	\$2,373,329,998	3
Denver	\$3,811,009,999	\$4,776,040,000	\$8,587,049,999	\$9,214,139,998	\$16,468,769,997	1
Indianapolis	\$126,490,000	\$114,620,000	\$241,110,000	\$252,090,000	\$460,480,000	7
Jacksonville	\$10,510,000	\$270,000	\$10,780,000	\$5,530,000	\$16,040,000	13
Kansas City	\$28,490,000	\$57,580,000	\$86,070,000	\$11,590,000	\$96,810,000	11
Louisville	\$53,320,000	\$64,110,000	\$117,430,000	\$393,060,000	\$477,490,000	6
Nashville	\$324,640,000	\$374,940,000	\$699,580,000	\$962,320,000	\$1,617,460,000	4
Raleigh	\$1,708,150,000	\$1,077,380,000	\$2,785,530,000	\$2,618,919,999	\$5,198,719,999	2
Richmond	\$45,290,000	\$5,910,000	\$51,200,000	\$0	\$51,200,000	12
U.S. Total	\$3,921,039,999	\$4,812,440,000	\$8,733,479,999	\$9,302,979,995	\$234,320,119,996	

Source: PricewaterhouseCoopers/Venture Economics/National Venture Capital Association Money Tree Survey

*Data reflect the venture capital flow in the following sectors: (1) medical devices and equipment, (2) health services, and (3) biotechnology.

**Ranking is based on the cumulative value (2004-2019).

2019 Total Venture Capital by MSA

Nashville MSA ranks fifth of the 13 MSAs in total venture capital investments for 2019. Nashville accounted for about \$1.62 billion in venture capital investments and totaled 78 venture capital investment deals between 2004 and 2019. These figures reflect total venture capital investments in all sectors within the MSA.

**2004-2019 MSA Venture Capital Investments
(Biotech, Medical Devices, Medical Services)**

MSAs	Number of Deals	Total Venture		
		Capital Invested (Billion \$)	Composite Score	Rank
Atlanta	79	1.58552	0.5424	4
Birmingham	9	0.15216	0.2562	11
Charlotte	15	0.28652	0.2767	10
Columbus	46	0.21580	0.3699	7
Dallas	101	2.37333	0.6435	3
Denver	177	16.46877	0.9907	1
Indianapolis	62	0.46048	0.4360	6
Jacksonville	4	0.01604	0.2393	13
Kansas City	20	0.09681	0.2827	8
Louisville	12	0.47749	0.2768	9
Nashville	78	1.61746	0.5405	5
Raleigh	148	5.19872	0.8441	2
Richmond	10	0.05120	0.2547	12

Source: <https://www.pwc.com/>

Venture Capital by Sectoral Breakdown

The total value of venture capital in Nashville MSA between 2004 and 2019 was \$33.61 million in medical equipment, \$616.18 million in health services, and \$33.01 million in biotechnology. Nashville MSA's share of venture capital in health services of total U.S. health services venture capital was 1.24 percent. Nashville is a clear leader in access to funding for health care services companies.

MSA	Medical Equipment (Million \$)	Health Services (Million \$)	Biotechnology (Million \$)	All other medical investment (Million \$)
Nashville	\$33.61	\$616.18	\$33.01	\$285.47
Birmingham	\$0.00	\$20.50	\$55.08	\$1.00
Denver	\$995.72	\$103.35	\$746.90	\$13,772.55
Jacksonville	\$0.00	\$5.50	\$1.03	\$2.98
Atlanta	\$576.47	\$145.10	\$103.85	\$511.15
Indianapolis	\$92.70	\$65.23	\$15.58	\$206.16
Louisville	\$1.35	\$43.96	\$100.00	\$188.22
Kansas City	\$18.57	\$2.47	\$1.30	\$70.70
Charlotte	\$40.52	\$123.00	\$0.00	\$0.00
Raleigh	\$1,210.74	\$144.00	\$809.76	\$1,679.48
Columbus	\$62.77	\$38.00	\$9.08	\$58.87
Dallas	\$169.93	\$432.11	\$278.39	\$782.40
Richmond	\$14.41	\$2.00	\$0.00	\$32.79
U.S. Total	\$49,724.84	\$42,445.46	\$11,414.23	\$69,596.52
MSA	Medical Equipment % in U.S. Total	Health Services % in U.S. Total	Biotechnology % in U.S. Total	All other medical investment % in U.S. Total
Nashville	0.0676%	1.2392%	0.0664%	0.4102%
Birmingham	0.0000%	0.0412%	0.1108%	0.0014%
Denver	2.0025%	0.2078%	1.5021%	19.7891%
Jacksonville	0.0000%	0.0111%	0.0021%	0.0043%
Atlanta	1.1593%	0.2918%	0.2088%	0.7344%
Indianapolis	0.1864%	0.1312%	0.0313%	0.2962%
Louisville	0.0027%	0.0884%	0.2011%	0.2704%
Kansas City	0.0373%	0.0050%	0.0026%	0.1016%
Charlotte	0.0815%	0.2474%	0.0000%	0.0000%
Raleigh	2.4349%	0.2896%	1.6285%	2.4132%
Columbus	0.1262%	0.0764%	0.0183%	0.0846%
Dallas	0.3417%	0.8690%	0.5599%	1.1242%
Richmond	0.0290%	0.0040%	0.0000%	0.0471%

Source: <https://www.pwc.com/>

VI.5. Where does the Nashville MSA stand relative to its peers?

For academic and public policy purposes, studies analyze quality of life, business climate, infrastructure, and socioeconomic productivity across cities. While many of these studies take a comprehensive approach to indicators and coverage areas, others focus on a single issue, such as education.²⁴ The resulting rankings serve many purposes: business groups use them as marketing tools, policymakers address deficiencies in their respective regions, and individuals and businesses factor these rankings into their relocation decisions. Thus, from multiple perspectives, rankings play an important role in understanding socioeconomic dynamics across regions.

A brief review of current rankings, for example, demonstrates that Nashville is in the top 10 among comparable MSAs in terms of infrastructure and human capital.²⁵ Recently, Tennessee ranked the 7th most business-friendly state in 2019.²⁶ Furthermore, Franklin, Tennessee, is ranked among the best cities for startup companies.²⁷ In keeping with this approach, the current study provides rankings of 13 comparable MSAs in health care services. The study uses two categories of ranking: health care business climate and health care infrastructure. For ranking purposes, BERC identified 12 health care business climate indicators and 18 health care infrastructure indicators.

The selection of indicators was affected by (1) availability of reliable data across peer MSAs (some data sources and indicators have changed since previous BERC studies of The Council were reported) and (2) literature on business climate and infrastructure indicators. Before ranking, each indicator was converted to a unitless relative score bounded between zero and one [0, 1]. These relative scores were then averaged across indicators for each MSA within the given category (business climate or infrastructure).

BERC's final rankings are based on two fundamental assumptions: (1) each indicator contributes equally to the final score for a given category (no weights are assigned to the indicators), and (2) each indicator's contribution to a given category is linear.

²⁴ For a review of literature on different aspects of city rankings, see Fred Carstensen et al. (2001), *The Second MetroHartford Regional Performance Benchmark*, Connecticut Center for Economic Analysis, University of Connecticut, Storrs, CT.

²⁵ See Carstensen et al. (2001). These rankings are based on 56 comparable MSAs in the U.S.

²⁶ Tennessee Score and Ranking (<https://www.cnbc.com/2021/07/13/top-states-for-business-tennessee.html>)

²⁷ For a list of rankings, see Nashville Area Chamber of Commerce at www.nashvillechamber.com

VI.5.a. Health Care Business Climate Indicators

The health care business climate in Nashville is substantially better than in the 12 other MSAs.

HealthCare Business Climate Indicators	Atlanta	Birmingham	Charlotte	Columbus	Dallas	Denver	Indianapolis	Jacksonville	Kansas City	Louisville	Nashville	Raleigh	Richmond
Health care employment share (% , 2014)	7.02%	10.58%	7.67%	9.55%	7.33%	7.92%	9.56%	9.23%	8.58%	9.40%	8.98%	7.67%	8.72%
Health care employment per 1,000 people (2014)	30	46	29	46	33	38	45	39	42	46	41	34	43
Health care pay (average \$, 2020)	\$58,940	\$48,570	\$55,130	\$53,880	\$56,335	\$62,760	\$58,300	\$57,220	\$55,330	\$52,325	\$55,360	\$56,540	\$59,200
Health care occupations (% , 2020)	7.96%	11.86%	8.30%	10.69%	8.58%	8.76%	10.82%	10.40%	10.59%	10.22%	9.57%	8.44%	10.52%
Health care occupations per 1,000 people (2020)	54	43	45	34	53	49	50	37	37	51	47	40	51
Total public health care cluster headquarters' employment ('000)	158.57	59.57	6.91	72.58	465.55	122.95	41.45	40.84	52.80	212.71	245.31	4.05	31.96
Total public health care cluster headquarters' revenue (billion \$)	\$20.30	\$9.22	\$2.13	\$8.62	\$74.71	\$11.34	\$9.19	\$7.42	\$18.04	\$19.19	\$16.26	\$0.59	\$13.53
Number of public health care cluster headquarters (2020)	47	13	11	14	79	27	20	11	25	12	40	13	11
Health care export capacity (LQ, 2020)	0.797	1.087	0.597	0.995	0.777	0.715	1.051	1.003	0.966	0.923	0.901	0.806	1.017
Health care export capacity (LQ, 2014)	0.863	1.155	0.987	0.989	0.961	0.796	1.060	1.164	1.151	0.775	1.055	0.806	1.107
Change in export capacity (2014-2020)	-0.075	-0.059	-0.396	0.006	-0.191	-0.101	-0.009	-0.138	-0.161	0.192	-0.145	0.001	-0.081
Health care employment growth (% , 2014-2020)	14.70%	8.50%	16.34%	10.10%	14.46%	12.88%	10.38%	11.32%	10.94%	9.51%	12.12%	13.84%	10.63%

VI.5.b. Health Care Infrastructure Indicators

Nashville's performance is better than the average of the 13 MSAs in hospital beds per capita, number of 4-year colleges, per capita income, and venture capital in health services.

HealthCare Infrastructure Indicators	Atlanta	Birmingham	Charlotte	Columbus	Dallas	Denver	Indianapolis	Jacksonville	Kansas City	Louisville	Nashville	Raleigh	Richmond	
Hospital beds per 100,000 people (2020)		174.0	432.2	212.3	231.4	175.4	155.5	270.3	234.5	254.0	362.8	273.7	330.8	243.7
Number of teaching hospitals (2020)		13	8	5	9	17	16	11	6	10	3	5	5	3
Number of 4-year colleges (2020)		20	5	17	13	24	7	16	8	20	5	14	11	5
Per capita income (\$,2019)		\$54,557	\$53,374	\$53,916	\$52,477	\$58,725	\$67,236	\$56,360	\$51,421	\$55,009	\$52,134	\$60,680	\$57,851	\$58,628
Physicians per 100,000 people (state level, 2019)		228.7	217.1	229.5	292.7	224.8	285.7	230.8	265.2	250.4	230.9	253.1	229.5	263.2
Unemployment rate (% ,Annual average 2020)		6.9%	5.5%	7.3%	7.0%	7.1%	7.5%	6.6%	6.2%	6.2%	6.7%	6.9%	6.4%	6.7%
Venture capital in biotechnology-MSA level (% of total, 2004-19)		0.209%	0.1108%	0.000%	0.018%	0.560%	1.502%	0.031%	0.0021%	0.003%	0.201%	0.066%	2.435%	0.000%
Venture deals in biotechnology-MSA level (% of total, 2004-19)		0.450%	0.2425%	0.000%	0.242%	0.312%	1.732%	0.485%	0.0693%	0.069%	0.035%	0.208%	2.598%	0.000%
Venture capital in health services-MSA level (% of total, 2004-19)		1.271%	0.1796%	1.078%	0.333%	3.786%	0.905%	0.571%	0.0482%	0.022%	0.385%	5.398%	1.262%	0.018%
Venture deals in health services-MSA level (% of total, 2004-19)		1.325%	0.2649%	0.662%	0.662%	8.079%	1.325%	2.252%	0.2649%	0.397%	0.927%	7.020%	0.265%	0.132%
Venture capital in medical equipment-MSA level (% of total, 2004-19)		1.358%	0.0000%	0.095%	0.148%	0.400%	2.346%	0.218%	0.0000%	0.044%	0.003%	0.079%	1.908%	0.034%
Venture deals in medical equipment-MSA level (% of total, 2004-19)		1.293%	0.0000%	0.231%	0.785%	0.716%	2.701%	0.716%	0.0000%	0.346%	0.092%	0.439%	1.639%	0.208%
All other medical investment venture capital-MSA level (% of total, 2004-19)		0.734%	0.0014%	0.000%	0.085%	1.124%	19.789%	0.296%	0.0043%	0.102%	0.270%	0.410%	2.413%	0.047%
All other medical investment deals-MSA level (% of total, 2004-19)		1.101%	0.0489%	0.000%	0.245%	0.758%	44.349%	0.538%	0.0734%	0.220%	0.367%	0.416%	2.691%	0.171%
Venture capital deals (Biotech, Med. Equip., Med. Serv.)-MSA level (% , 2004-19)		0.68%	0.06%	0.12%	0.09%	1.01%	7.03%	0.20%	0.01%	0.04%	0.20%	0.69%	2.22%	0.02%
Venture capital investments (Biotech, Med. Equip., Med. Serv.)-MSA level (% , 2004-19)		0.99%	0.11%	0.19%	0.58%	1.27%	2.22%	0.78%	0.05%	0.25%	0.15%	0.98%	1.86%	0.13%
Economic Diversity (2019)		0.9227	0.9135	0.9209	0.9102	0.9217	0.9221	0.9150	0.9117	0.9161	0.9098	0.9165	0.9140	0.9155
Change in diversity (% , 2014-2019)		0.02%	-0.21%	0.23%	-0.18%	0.08%	-0.02%	-0.07%	0.01%	0.00%	-0.08%	0.21%	-0.05%	0.10%

VI.5.c. Relative Rankings

For health care business climate, the Nashville MSA ranks third among the 13 MSAs; Indianapolis ranks first, Richmond second, and Louisville fourth. (Nashville moved from first to third since the 2010 study). In health care infrastructure Nashville MSA ranks fourth of the 13 MSAs. Finally, in overall relative health care competitiveness, Nashville ranks third among the 13 MSAs; Denver ranks first, Dallas second, and Indianapolis fourth. There were significant shifts in ranking for many in the peer group.

MSA	Business Climate Rankings *		Health Care Infrastructure Rankings**		Overall Rankings	
	Average Score***	Relative Rank	Average Score***	Relative Rank	Average Score***	Relative Rank
Atlanta	0.49	10	0.53	5	0.51	5
Birmingham	0.54	5	0.34	11	0.44	9
Charlotte	0.27	13	0.38	8	0.33	13
Columbus	0.50	7	0.37	9	0.43	10
Dallas	0.54	6	0.60	3	0.57	2
Denver	0.44	11	0.74	1	0.59	1
Indianapolis	0.63	1	0.45	6	0.54	4
Jacksonville	0.49	9	0.33	12	0.41	12
Kansas City	0.49	8	0.43	7	0.46	8
Louisville	0.55	4	0.30	13	0.43	11
Nashville	0.57	3	0.55	4	0.56	3
Raleigh	0.31	12	0.61	2	0.46	7
Richmond	0.58	2	0.37	10	0.47	6

*Based on the linear combination of standardized scores of 12 indicators presented above.

**Based on the linear combination of standardized scores of 18 indicators presented above.

***The BERCC assumes each indicator contributes to the average score equally. Selected indicators are closely related to health care business environment and infrastructure. Data availability and timeliness were key criteria used in data selection process.

VII. NASHVILLE HEALTH CARE COUNCIL MEMBER COMPANIES

VII.1. Nashville Health Care Council Member Companies

The Nashville Health Care Council (The Council or NHCC) member companies are diverse, ranging from direct health care providers and health care management, health information technology, and health care finance companies to such professional service providers as law and architecture firms. In BERC's previous studies of The Council, a BERC survey was used for member companies to report their health care-related employment, sales, office space, federal research money, payroll, and operating sites, both in Nashville and overall. Past surveys also included a *CEO Confidence Survey*, highlighting member company CEOs' evaluations of current economic conditions and business outlook. Unfortunately, because of the pandemic, the survey instrument was not used. Consequently, the present BERC study does not provide the additional analysis based on self-reporting of the members.

The Council member companies constitute a diverse group that includes representation beyond the core health care provider and the health care industry cluster classifications. This classification distinction is significant and influences interpretation of data and analysis.

VII.2. The Council Member Companies—Employment and Establishment

As of November 2019, The Council had 316 member companies, a 19 percent increase from 2014. NHCC member companies employ 100,653 people in the Nashville MSA, up more than 4.5 percent from 2014. Total health care-related local employment of the member companies is estimated at around 80,498.

Nashville Health Care Council Member Companies: Local Presence

Sectors	Number	Local Employment	Health Care Related Local Employment
Health Care Providers	79	40,728	40,728
Health Care Management and Consulting	83	49,366	37,025
Information	14	1,331	346
Education, Insurance, Financial Services & Real Estate	44	4,445	1,156
Wholesalers	6	4,092	1,064
Support Services	12	370	96
Others	78	321	83
Total	316	100,653	80,498

VII.3. Global Footprint

According to BERC estimates, 212 NHCC member companies support 658,342 jobs globally, of which 555,153 are health care related.

Nashville Health Care Council Member Companies: Global Footprint			
Sectors	Number	Global Employment	Health Care-Related Global Employment
Health Care Providers	68	299,833	299,833
Health Care Management and Consulting	72	330,831	248,123
Information	6	15,225	3,959
Education, Insurance, Financial Services & Real Estate	41	6,193	1,610
Retail & Wholesalers	8	4,843	1,259
Others	17	1,417	368
Total	212	658,342	555,153

VIII. CONCLUSION

Nashville is truly at the center of the health care industry in the nation. Indicators reported in this study demonstrate that Nashville's health care industry has a substantial impact on the MSA's economy and plays a critical role in shaping the future of the health care industry landscape across the globe. The presence of health care company headquarters and flow of venture and private equity capital to the Nashville area attest to this critical role. Nashville Health Care Council member companies are vital to the Nashville MSA economy. Since the establishment of the Nashville Health Care Council, the membership has grown significantly as has the impact of the Nashville health care industry cluster on the Nashville MSA economy.

IX. SELECTED BIBLIOGRAPHY

- Arik, M. (2015). The healthcare industry in the Nashville MSA: Its scope and impact on the regional economy. Nashville: Middle Tennessee State University Business and Economic Research Center.
- Arik, M., & Penn, D. A. (2010). The healthcare industry in the Nashville MSA: Its scope and impact on the regional economy. Nashville: Middle Tennessee State University Business and Economic Research Center.
- Aronson, J. C., Blatt, C. M., & Aronson, T. B. (2016). Restoring ecosystem health to improve human health and well-being: physicians and restoration ecologists unite in a common cause. *Ecology and Society*, 21(4).
- Anderson, G. F., Hussey, P., & Petrosyan, V. (2019). It's still the prices, stupid: Why the U.S. Spends So Much on Health Care, and a Tribute to Uwe Reinhardt. *Health Affairs*, 38(1), 87-95.
- Bennett, E. E., & Higgins, T. L. (2016). Systems that Teach: Medical Education and the Future Healthcare Workforce. *New Horizons in Adult Education and Human Resource Development*, 28(2), 40-49.
- Bentley, T. G., Effros, R. M., Palar, K., & Keeler, E. B. (2008). Waste in the U.S. Healthcare System: A Conceptual Framework. *The Milbank Quarterly*, 86(4), 629-659.
- Bergman, Edward M., and Edward J. Feser. *Industrial and Regional Clusters: Concepts and Comparative Advantages*. Morgantown, WV: Regional Science Institute, West Virginia University, 1999. *The Web Book of Regional Science*. www.rri.wvu.edu/WebBook/Bergman-Feser/contents.htm.
- Berry, L. L. (2019). Service innovation is urgent in healthcare. *AMS Review*, 9(1-2), 78-92.
- Berry, Suzanne L., and Stan Spurlock. *Measuring the Impact of the Healthcare Sector on a Local Economy: Sharkey-Issaquena County, Mississippi*. Prepared for Mississippi Hospital Association. September 2002.
- BioCrossroads. *The Economic Impacts of Indiana's Public and Private Hospitals and Outpatient Care Centers*. Indianapolis: Battelle Technology Partnership Practice, 2013.
- Bovbjerg, R.R. (2014). *Literature Review in Brief: Healthcare Occupational Training and Support Programs Under the Affordable Care Act*.
- Boyce, T., Brown, C. (2019). *Economic and social impacts and benefits of health systems*. World Health Organization. Regional Office for Europe.
- Bureau of Labor Statistics. (2019, September 4). *Employment Projections – 2018-2028* [News Release]. Retrieved from <https://www.bls.gov/news.release/pdf/ecopro.pdf>
- Bush, R. W. (2007). Reducing waste in U.S. health care systems. *JAMA: Journal of the American Medical Association*, 297(8), 871-874.
- Carstensen, Fred, et al. *Second MetroHartford Regional Performance Benchmark*. Connecticut Center for Economic Analysis, University of Connecticut. Storrs, CT. 2001.

Center for Healthcare Economics and Policy. (2017). Nashville Region Health Competitiveness Initiative. Nashville Area Chamber of Commerce.

Center for Economic Development Research. *The Economic Contributions of Baptist Health Systems of South Florida*. University of South Florida. March 2001.

Chase, Robert A. *The Biotechnology and Medical Device Industry in Washington State: An Economic Analysis*. Prepared for the Washington Biotechnology and Biomedical Association. Kirkland, WA: Huckell/Weinman Associates, December 2002.

Chase, Robert A. *Economic Contribution of the Healthcare Industry to the City of Seattle*. Prepared for the City of Seattle Office of Economic Development. Kirkland, WA: Huckell/Weinman Associates, September 2004.

Clower, Terry L., and Bernard L. Weinstein. *The Dallas/Fort Worth Health Industry: Economic Impact and Growth*. University of North Texas. November 1998.

Coomes, Paul A., and Raj Narang. *Louisville's Health-Related Economy: Size, Character, and Growth*. Prepared for Greater Louisville Health Enterprises Network. Louisville, KY. May 2001.

Cutler, D. M. (2018). The good and bad news of healthcare employment. *JAMA: Journal of the American Medical Association*, 319(8), 758-759.

Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. *Future Healthcare Journal*, 6(2), 94.

Doeksen, Gerald A., and Val Schott. *The Economic Importance of the Health Care Sector on a Rural Economy*. Oklahoma State University. 2002.

Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural USA. *Public health*, 129(6), 611-620.

Evans, Garen K. *East Central Mississippi Health Network: Economic Impact Analysis*. Community Resource Development Publication No: CRD05-011. Mississippi State University. September 2004.

Flaherty, E., & Bartels, S. J. (2019). Addressing the community-based geriatric healthcare workforce shortage by leveraging the potential of interprofessional teams. *Journal of the American Geriatrics Society*, 67(S2), S400-S408.

Fulton, B. D. (2017). Health care market concentration trends in the United States: Evidence and policy responses. *Health Affairs*, 36(9), 1530-1538.

Harris, Thomas, et al. *Economic Impact and Linkages of the Local Health Sector on the Economy of Lander County, Nevada, 2000*. University of Nevada, Reno. January 2004.

Helsø, A. L. K., Pierri, M. N., & Wang, A. Y. (2019). *The Economic Impact of Healthcare Quality*. International Monetary Fund.

Higgins, Scott E., and Kristy Karl. *Measuring the Impact of the Healthcare Sector on Swain County, North Carolina*. Western Carolina University. 2003. Business and Economic Research Center, Jennings A. Jones College of Business | MTSU 79 Chapter IX: Bibliography

Himmelstein, K. E., & Venkataramani, A. S. (2019). Economic vulnerability among U.S. female healthcare workers: Potential impact of a \$15-per-hour minimum wage. *American Journal of Public Health*, 109(2), 198-205.

IQVIA.a (2018). *The National Economic Impact of Physicians. (National Report)*. The American Medical Association. Retrieved at: <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/2018-ama-economic-impact-study.pdf>

IQVIA.b (2018). *The Economic Impact of Physicians in Tennessee*.

Klier, Thomas, and William Testa. "Location Trends of Large Company Headquarters during the 1990s." *Economic Perspectives*. 2002.

Lazarus, William F., and David A. Nelson. *Renville County: Economic Impact of the Healthcare Sector*. University of Minnesota. October 16, 2002.

Lacey, T. A., Toossi, M., Dubina, K. S., & Gensler, A. B. (2017). *Projections overview and highlights, 2016-26. Monthly Labor Review (BLS)*, 140

Lake Chelan Valley Healthcare Industry Assessment. Prepared for Port of Chelan County. Wenatchee, WA: BergerABAM, September 2014.

Ljungbeck, B., & Forss, K. S. (2017). Advanced nurse practitioners in municipal healthcare as a way to meet the growing healthcare needs of the frail elderly: a qualitative interview study with managers, doctors and specialist nurses. *BMC nursing*, 16(1), 63.

L. William Seidman Research Institute. *The Economic Impact of Arizona's Hospitals on The State & Its Counties*. Tempe, AZ: Arizona Hospital and Healthcare Association, 2015.

Market Street Services Inc. *Target Business Analysis: Nashville, TN. Atlanta, GA*. 2005 and 2010.

Metropolitan Chicago Healthcare Council. *The Economic Impact of Chicago's Hospitals on the Metropolitan Chicago Area*. 2004.

Minnesota IMPLAN Group Inc. *IMPLAN*.

Moon, M. C., Hills, R., & Demiris, G. (2018). Understanding optimisation processes of electronic health records (EHRs) in select leading hospitals: a qualitative study. *BMJ Health & Care Informatics*, 25(2).

Murray, C. J., Frenk, J., Murray, C. J., Frenk, J., Danaei, G., Ding, E. L., & McCormick, D. (2010). Ranking 37th measuring the performance of the U.S. healthcare system. *New England Journal of Medicine*, 362(2), 98.

Nashville Area Chamber of Commerce's Research. (2015). *Strengthen the Middle Tennessee Region 2020: Building a Vital Workforce to Sustain Economic Growth and Expand Opportunity*. JP Morgan Chase & Co.

Partnership for Michigan's Health. *The Economic Impact of Health Care in Michigan*. Second Edition. June 2005.

Porter, Michael. *The Competitive Advantage of Nations*. New York: The Free Press, 1990.

Porter, Michael. "Location, Competition, and Economic Development: Local Clusters in the Global Economy." *Economic Development Quarterly*. Vol. 14, pp-15-34. 2000.

Sahni, N., Kumar, P., Levine, E., & Singhal S. (2019). The productivity imperative for healthcare delivery in the United States. McKinsey.

<https://www.mckinsey.com/~media/McKinsey/Industries/Healthcare%20Systems%20and%20Services/Our%20Insights/The%20productivity%20imperative%20for%20healthcare%20delivery%20in%20the%20United%20States/The-productivity-imperative-for-healthcare-delivery-in-the-United-States.ashx>

Shortell, S. M. (2016). Bending the cost curve: a critical component of health reform. *Journal of the American Medical Association*, 302(11), 1223–1224.

Schieber, S. J., & Nyce, S. A. (2018). *Healthcare USA: A Cancer on the American Dream*. Wills Tower Watson.

<https://poseidon01.ssrn.com/delivery.php?ID=193021116117100007105084082113064018050053039063074059107020121074026015125096015122062055115111018120051030089028081029007029011005029023065113125093068094031001028030057095106103097071110112002107127123125120108019080068022012080086094009003004115&EXT=pdf>

Tennessee State Plan on Aging October 1, 2017 - September 30, 2021 (2017).

Torpey, Elka. *Healthcare: Millions of Jobs Now and in the Future*. Bureau of Labor Statistics, 2014. Web. 15 Mar. 2015.

U.N. Desa (2016). *Transforming our world: The 2030 agenda for sustainable development*.

Washington State Hospital Association. *The Business of Caring: The Economic Impact of Hospitals in Washington State*. Seattle, Washington. October 2003.

X. APPENDIX

X.1. Data Sources

Data Sources Consulted	Web Link
Bureau of Labor Statistics	www.bls.gov
State Occupational Projections	www.projectionscentral.com
Census Bureau	www.census.gov
Tennessee Advisory Commission on Intergovernmental Realtions (TACIR)	www.state.tn.us/tacir
Tennessee Department of Labor and Workforce Development	www.state.tn.us/labor-wfd
University of Tennessee, State Data Center	cber.bus.utk.edu
Nashville Health Care Council	www.healthcarecouncil.com
American Hospital Association Annual Survey Database	www.aha.org
ReferenceUSA	www.referenceusa.com
IMPLANpro, Inc.	www.impan.com
CBRE CB Richard Ellis	www.cbre.com
Urban Land Institute (Serveral study findings on employment density)	www.uli.org
Bureau of Economic Analysis	www.bea.gov
PricewaterhousCoopers/Venture Economics/National Venture CapitalAssociation Money Tree Survey	www.pwcmoneytree.com
MTSU Business and Economic Research Center (Survey)	www.mtsu.edu/~BERC
Nashville Chamber of Commerce	www.nashvillechamber.com
Expansion Management	www.expansionmanagement.com
Business Facilities	www.businessfacilities.com
LexisNexis Academic Universe	www.lexisnexis.com
Healthguideusa	www.healthguideusa.org
Conference Board	www.congerence-board.org
Federal Reserve Bank of Philidelphia	www.philadelphiafed.org

X.2. IMPLAN Model Information

- The impact of the health care industry cluster on the Nashville economy includes the direct employment, business sales, and income generated by the health care industry cluster and the additional or secondary impacts of all economic activity related to such employment and business sales. Secondary impacts fall into two general categories: **indirect effects** including all employment, business sales, or income generated by the interaction of local businesses with the health care industry cluster and by suppliers to local business transactions, and **induced effects**, including all spending by health care industry cluster employees in the local economy
- To quantify secondary impacts, a method called "input-output analysis" was employed using the IMPLAN Model developed by the Minnesota IMPLAN Group, Inc. IMPLAN is a predictive model based on regional accounting matrices; it simulates the inter-industry transactions occurring for any additional increase in demand in a regional economy. In this case, the increase in demand is attributed to the presence of the health care industry cluster and has been measured by jobs, business sales, and personal income. This study also employs a hybrid approach, which means that it combines the use of a survey to gather information on direct impacts with the use of input-output analysis to calculate subsequent secondary impacts.
- Direct Effects
 - The direct effects of health care industry cluster employment include the total number of reported full-time employees of health care industry establishments.
 - The direct effect of income includes the total reported pre-tax staff payroll of the health care industry cluster.
 - The direct effect of business sales includes the total spending of the health care industry cluster to purchase goods and services in the local economy.
- Indirect Effects
 - Indirect effects include all employment, business sales, or income generated by the interaction of local businesses with the health care industry cluster and by suppliers to local business transactions.
- Induced Effects
 - Induced effects include all employment, business sales, or income generated by the spending of health care industry cluster employees in the local economy.

X.3. Health Care Industry Classifications

Detailed Health Care Industry Cluster Definitions²⁸

Core Health Care Providers

1. **Ambulatory Services (NAICS 621):** Industries that provide service directly or indirectly to ambulatory patients and do not usually provide inpatient services.

²⁸ Abstracted from 2007 US NAICS Manual. *North American Industry Classification System—United States. 2007*, at <http://www.census.gov/epcd/www/naics.html>

2. **Hospitals (NAICS 622):** Industries that provide medical, diagnostic, and treatment services including physician, nursing, and other health services to inpatients and the specialized accommodation services required by inpatients.

3. **Nursing Care Facilities (NAICS 623):** Industries that provide residential care combined with nursing, supervisory, or other types of care as required by the residents.

Health Care Management and Consulting Companies

1. **Management of Companies and Enterprises (NAICS 551):** Industries of three main types: (1) those that hold the securities of (or other equity interests in) companies and enterprises; (2) those (except government establishments) that administer, oversee, and manage other establishments of the company or enterprise but do not hold the securities of these establishments; and (3) those that both administer, oversee, and manage other establishments of the company or enterprise and hold the securities of (or other equity interests in) these establishments.

2. **Accounting, Tax Preparation, Bookkeeping, and Payroll Services (NAICS 54121):** Establishments primarily engaged in providing services such as auditing accounting records, designing accounting systems, preparing financial statements, developing budgets, preparing tax returns, processing payrolls, bookkeeping, and billing.

3. **Computer Systems Design and Related Services (NAICS 5414):** Establishments primarily engaged in providing expertise in the field of information technologies through one or more of the following activities: (1) writing, modifying, testing, and supporting software to meet the needs of a particular customer; (2) planning and designing computer systems that integrate computer hardware, software, and communication technologies; (3) onsite management and operation of clients computer systems and/or data processing facilities; and (4) other professional and technical computer-related advice and services.

4. **Administrative and Support Services (NAICS 561):** Establishments engaged in activities that support the day-to-day operations of other organizations.

5. **Management, Scientific, and Technical Consulting Services (NAICS 5416)**

a. **Management Consulting Services (NAICS 54161):** Establishments primarily engaged in providing advice and assistance to businesses and other organizations on management issues.

b. **Other Scientific and Technical Consulting Services (NAICS 541690):** Establishments primarily engaged in providing advice and assistance to businesses and other organizations on scientific and technical issues (except environmental issues), such as biological consulting services.

6. **Professional Organizations (NAICS 813920):** Establishments primarily engaged in promoting the professional interests of their members and the profession as a whole.

Colleges, Research Organizations, and Public Health

1. **Junior Colleges (NAICS 6112):** Establishments primarily engaged in furnishing academic or academic and technical courses and granting associate's degrees, certificates, or diplomas below the bachelor's level.

2. **Colleges, Universities, and Professional Schools (NAICS 6113):** Establishments primarily engaged in furnishing academic courses and granting degrees at bachelor's or graduate levels.

3. **Technical and Trade Schools (NAICS 6115):** Establishments primarily engaged in offering vocational and technical training in a variety of technical subjects and trades.

4. Scientific Research and Development Services (NAICS 5417): Establishments engaged in conducting original investigations undertaken on a systematic basis to gain knowledge (research) and/or applying research findings or other scientific knowledge to create new or significantly improved products or processes (experimental development).

5. Administration of Public Health Programs (NAICS 92312): Government establishments primarily engaged in the planning, administration, and coordination of public health programs and services, including environmental health activities, mental health programs, categorical health programs, health statistics, and immunization services.

Medical Insurance Companies

1. Direct Health and Medical Insurance Carriers (NAICS 524114): Establishments primarily engaged in initially underwriting (i.e., assuming the risk and assigning premiums for) health and medical insurance policies.

Health Care Manufacturing and Wholesalers

1. Optical Instrument and Lens Manufacturing (NAICS 333314): Establishments primarily engaged in one or more of the following: (1) manufacturing optical instruments and lens, such as binoculars, microscopes (except electron or proton), telescopes, prisms, and lenses (except ophthalmic); (2) coating or polishing lenses (except ophthalmic); and (3) mounting lenses (except ophthalmic).

2. Medical Equipment and Supplies Manufacturing (NAICS 3391): Establishments primarily engaged in manufacturing medical equipment and supplies.

3. Pharmaceutical and Medicine Manufacturing (NAICS 3254): Establishments primarily engaged in one or more of the following: (1) manufacturing biological and medicinal products; (2) processing (i.e., grading, grinding, and milling) botanical drugs and herbs; (3) isolating active medicinal principals from botanical drugs and herbs; and (4) manufacturing pharmaceutical products intended for internal and external consumption in such forms as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions.

4. Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers (NAICS 42345): Establishments primarily engaged in the merchant wholesale distribution of professional medical equipment, instruments, and supplies (except ophthalmic equipment and instruments and goods used by ophthalmologists, optometrists, and opticians).

5. Ophthalmic Goods Merchant Wholesalers (NAICS 42346): Establishments primarily engaged in the merchant wholesale distribution of professional equipment, instruments, and/or goods sold, prescribed, or used by ophthalmologists, optometrists, and opticians.

6. Drugs and Druggists' Sundries Merchant Wholesalers (NAICS 4242): Establishments primarily engaged in the merchant wholesale distribution of biological and medical products, botanical drugs and herbs, and pharmaceutical products intended for internal and external consumption in such forms as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions.

Pharmacies, Drug Stores, and Ophthalmic Goods

1. Pharmacies and Drug Stores (NAICS 44611): Establishments known as pharmacies and drug stores engaged in retailing prescription or nonprescription drugs and medicines.

a. **Optical Goods Stores (NAICS 44613):** Establishments primarily engaged in one or more of the following: (1) retailing and fitting prescription eyeglasses and contact lenses, (2) retailing prescription eyeglasses in combination with the grinding of lenses to order on the premises, and (3) selling nonprescription eyeglasses.

X.4. Definitions and Ranking Procedure

Location Quotient (L.Q.)

The location quotient is the most commonly utilized method in regional economic analysis. The L.Q. is a measure of an industry's concentration in a local economy relative to the national average or any other reference unit.

Ranking Procedure

Health care indicators are classified into two categories: (1) health care business climate and (2) health care infrastructure indicators.

$$LQ = \frac{\frac{E_{La}}{E_L}}{\frac{E_{Na}}{E_N}}$$

Where E_{La} = refers to industry "a's" employment in the local economy,
 E_L = refers to total employment in the local economy,
 E_{Na} = refers to industry "a's" employment in the national economy, and
 E_N = refers to total employment in the national economy.

(1) Health care business climate indicators: BEREC identified 14 indicators that reflect the overall trend in the health care sector in a given economy. Choices of these indicators are based on the review of the literature and the availability of indicators.

(2) Health care infrastructure indicators: BEREC identified 22 indicators that measure the capacity of the local economy to lay the foundation for the growth of the health care industry. In addition to direct health care-related indicators, BEREC included per capita personal income and unemployment rate in this category.

Standardization Procedure

To compare these MSAs using a diverse set of indicators, BEREC converted each indicator into a unitless indicator. This procedure makes it possible to get a summary indicator for each category across MSAs. The method used to assign a relative score for each MSA for a given indicator is called cumulative normal distribution, which places each MSA for a given indicator between 0 and 1, depending on how MSA's value is related to the average standard deviation of a given series.