

**The Health Care Industry in the Nashville MSA:
Its Scope and Impact on the Regional Economy**

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Executive Summary

Health care is a growth industry that is relatively immune to economic cycles. Over the years, the health care sector has been driving employment growth in the national economy, and considering the health care worker shortage across the United States along with 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 a unique example of a hub of the national health care industry. More than 33 major health care companies (public and private) have chosen Nashville as their home, and nearly half of investor-owned hospitals in the United States are owned or operated by companies headquartered in Nashville.

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 care information technology, and advanced biomedical research. This study presents two views 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, health care finance, and biomedical research, which operate on a local, national, or international basis. Also included in this study is a profile of Nashville Health Care Council (NHCC) member companies.

Major Findings and Key Trends

Nation

- **By 2012, one in every seven new jobs** in the nation will be in health care, and the resulting 2.5 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.
- **A total of 18.4 percent of the gross domestic product (GDP)** is projected to be health care expenditures in 2013, up from 15.7 percent in 2005.

Tennessee

- **Six of the 10 fastest growing occupations** in Tennessee are projected to be in health care by 2012.

Nashville MSA

- **Twenty-seven percent growth** is projected for health care occupations in the Nashville MSA between 2002 and 2012.
- For every 100 health care jobs created in 2004, 52 were in ambulatory services, 31 in nursing care facilities, and 17 in hospitals.

Core Health Care Industry in the Nashville MSA: Its Scope and Trends

Employment, Establishment, and Wages

- **In 2004, nearly 75,000 people were employed by Nashville's core health care sector**, 38 percent of which were in ambulatory services, 44 percent in hospitals, and 18 percent in nursing care facilities.
- Between 2001 and 2004, **a total of 493 new core health care establishments emerged** in Nashville, bringing the total to 2,237.
- **Wages totaling \$3.3 billion were paid in 2004** by the core health care industry in the Nashville MSA, with hospitals and ambulatory services accounting for 90 percent of those wages.

Core Health Care Spending in the Nashville MSA

- **More than 70 percent of core health care spending** goes to individuals as either payroll or proprietary income in the Nashville MSA, increasing the purchasing power of many people in the region.

Nashville Health Care Industry Cluster: Its Scope and Trends

Nashville-Based Health Care Headquarter Companies

- **In 2004, \$62 billion in revenues and 336,000 jobs** were accounted for worldwide by health care management companies headquartered in Nashville.
- **In 2004, 21 large publicly traded Nashville-headquartered companies** had combined worldwide employment of more than 312,000 and combined revenue of nearly \$60 billion.

Health Care Industry Cluster Employment and Office Space

- **In 2004, the health care industry cluster employed 94,346 people in the Nashville MSA**, making the health care industry cluster the largest nongovernmental employer in the region.
- **Thirteen of every 100 nonfarm employees** in the Nashville MSA were in health care.
- **Seventy-nine percent of Nashville health care industry cluster employment** was in the core health care industry.
- In 2004, the Nashville health care industry cluster occupied **26 million square feet of office space, 13 percent of Nashville's total commercial space.**

Employment Impact

- In 2004, the health care industry cluster in the Nashville MSA accounted for **154,800 jobs (direct, indirect, and induced).**
- This accounts for **six percent of Tennessee's and 22 percent of the Nashville MSA's nonfarm employment** in 2004.
- **One hundred industry cluster jobs creates an additional 64 jobs** in the Nashville economy.
- The Nashville health care industry cluster includes nearly **3,300 establishments.**

Personal Income Impact

- The Nashville health care industry cluster generated **\$8.4 billion (direct, indirect, and induced) in personal income** in 2004.
- **Every \$100 of personal income generated an additional \$33** in the local economy.
- Nashville health care industry cluster direct personal income was \$6.3 billion.
- Average income per health care industry cluster job is \$66,776, and average wage is \$44,517.
- This corresponds to nearly 18 percent of the Nashville MSA's and five percent of Tennessee's total personal income in 2004.

Business Revenue Impact

- The health care industry cluster in the Nashville MSA created **\$18.3 billion (direct, indirect, and induced) in business revenues in 2004.**
- **This corresponds to nearly 17.8 percent of the Nashville MSA's and 4.7 percent of Tennessee's total business revenues.**
- **Of this total, \$11.9 billion was directly** injected into the economy.
- Every \$100 of the health care cluster spending generates an additional \$54 in business revenues.

Fiscal Impact

- The Nashville health care industry cluster accounted for **an estimated \$459 million in state and local taxes in 2004.**
- This corresponds to nearly 19.2 percent of sales, residential property, and gasoline taxes collected in the Nashville MSA in 2004.
- The Nashville health care industry cluster accounts for one-fifth of total tax revenues collected within the Nashville MSA.

Health Care Financial Infrastructure / Access to Capital

- **For 1995-2005, Tennessee ranks third in a 13-state comparison in terms of venture capital** in medical devices, equipment, health services, and biotechnology.
- **Of the top 10 private equity deals/mergers in the health care sector in 2004, four involved Nashville-based health care companies and totaled \$3.8 billion.**

Nashville Health Care Council (NHCC) Member Companies: Cumulative Size and Impact

NHCC Member Impact on the Nashville MSA

- **In 2004, NHCC member companies employed 41,234 people** in the Nashville MSA.
- Their total Nashville-based **payroll is \$3.6 billion**.
- **The average annual wage per employee is \$86,300**, substantially higher than the average nonfarm wage in the Nashville MSA.

NHCC Member Office Space

- NHCC member companies in the Nashville MSA occupied **13 million square feet of office space** in 2004.

NHCC Member Nashville-Based Sales

- NHCC member companies generated **an estimated \$17 billion in Nashville based sales** in 2004.
- This corresponds to about **4.4 percent of Tennessee's business revenues**.

NHCC Members' Global Impact

- NHCC member companies **employed 838,788 people globally with a total payroll of \$37 billion**.
- NHCC member companies generated **\$179 billion in annual revenues from the operation of 4,319 sites globally**.

* This study is a detailed analysis of the Nashville MSA, which includes Cannon, Cheatham, Davidson, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Wilson, and Williamson counties.

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I. INTRODUCTION

Health care is a growth industry that is relatively immune to economic cycles. The recent Bureau of Labor Statistics (BLS, www.bls.gov) surveys indicate that the basic health care services sector is driving employment growth in the national economy. Considering the health care worker shortage across the United States, it is likely that this growth trend will continue. Moreover, the baby boomer generation is approaching retirement age in the next five to 10 years. Consequently, within the next 15 years, seniors (65+) will make up more than 28 percent of the adult population (www.census.gov). Therefore, as the demand for health care services increases, there will be a commensurate demand for health care workers.

Amid overall growth in the health care sector throughout the United States, Nashville provides a unique example of a hub of the national health care industry. More than 33 major health care companies (public and private) have chosen Nashville as their home, and according to an American Hospital Association survey, nearly half of investor-owned hospitals in the United States are owned or operated by companies headquartered in Nashville.¹

The scope of the health care industry in Nashville ranges from basic-service providers such as physicians, to more advanced biomedical research, to management firms operating on a national basis. This study presents two views of Nashville's health care industry: (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 such as management companies and biomedical research entities that operate on a regional or national basis. This approach is necessary because the presence and quality of both components profoundly affect the economic fundamentals in a region.²

¹ Source: 2003 American Hospital Association Annual Survey Database, ReferenceUSA, Mergent Online, and company Web sites.

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

Through a variety of methods, this study examines the reasons Nashville has become a salient 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 regional economy includes the Nashville MSA, which encompasses Cannon, Cheatham, Davidson, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Wilson, and Williamson counties. Wherever Nashville is mentioned in the study, it refers to the entire Nashville MSA. Furthermore, the study profiles the member companies of the Nashville Health Care Council and presents a benchmarking initiative that compares Nashville with 12 peer Metropolitan Statistical Areas (MSAs) using 31 health care related indicators. From a variety of sources, these data allow the Business and Economic Research Center (BERC) at Middle Tennessee State University to accurately answer not only the question of why Nashville has become a focal point in the national health care industry but also other related questions, such as the relationship between the health care industry and other sectors of the regional economy.

The rest of this study is organized as follows: section two presents an overview of trends in the core health care industry (ambulatory services, hospitals, and nursing and residential care facilities) in the nation, Tennessee, and the Nashville MSA. This section also compares trends in the core health care industry across these three geographical units. Section three briefly deals with the study's goals and methodology.

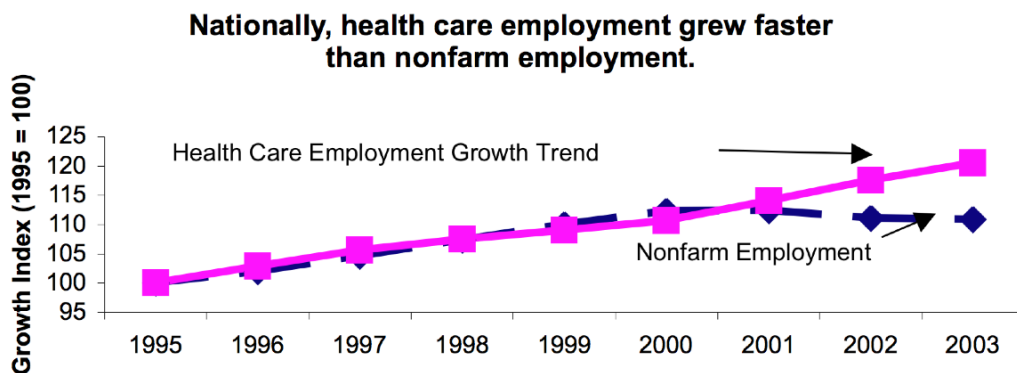
Section four puts trends in the core health care industry in the Nashville MSA under close scrutiny, exploring various aspects and growth dynamics of this industry. Section five adopts a broader view of the health care industry and assesses the scope, size, and impact of the health care industry cluster on Nashville's economy. Furthermore, this section highlights the importance of publicly traded health care management companies in Nashville's economy. Section six compares Nashville's core health care industry with that of 12 of its peer MSAs. Section seven explores the survey results of the Nashville Health Care Council member companies. Section eight presents the relative rankings of 13 MSAs with respect to health care business climate indicators and health care infrastructure indicators. The last section will provide technical information for various study components and survey material.

II. OVERVIEW OF THE CORE HEALTH CARE INDUSTRY

The concept of the core health care industry refers to health care services classified as such under the NAICS (North American Industrial Classification System): 621 (Ambulatory Services), 622 (Hospitals), and 623 (Nursing and Residential Care Facilities).³

II.1. National Trends

Concerning national trends in the core health care industry, increasing demand for health care services by the retiring baby boomer generation likely will fuel further growth in core health care industry employment. Nationally, the core health care industry has grown faster than nonfarm employment in the past few years.



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

Nationally, core health care industry employment grew more than 20 percent between 1995 and 2003. Moreover, core health care industry employment is projected to be the dominant source of employment growth by 2012. According to the Bureau of Labor Statistics, six health care occupations are projected to be in the top 10 fastest growing occupations in the U.S. **Health care occupations will account for one out of every seven new jobs, and the resulting 2.5 million additional workers will be spread throughout this large and**

³ For a detailed classification system, see the methodology section.

diverse sector from health care practitioners' offices, outpatient clinics, and hospitals to nursing and residential care facilities.⁴

Fastest-Growing Occupations in the U.S.: Employment Change (2002-2012)

	Employment		Change	
	2002	2012	Number	Percent
Medical assistants	365	579	215	59
Network systems and data communications analysts	186	292	106	57
Physician assistants	63	94	31	49
Social and human service assistants	305	454	149	49
Home health aides	580	859	279	48
Medical records and health information technicians	147	216	69	47
Physical therapist aides	37	54	17	46
Computer software engineers, applications	394	573	179	46
Computer software engineers, systems software	281	409	128	45
Physical therapist assistants	50	73	22	45

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

Furthermore, national health care expenditures are projected to reach around 18.4 percent of the gross domestic product (GDP) in 2013, up from 15.7 percent in 2005.⁵

This figure is in line with projected employment growth in this sector.

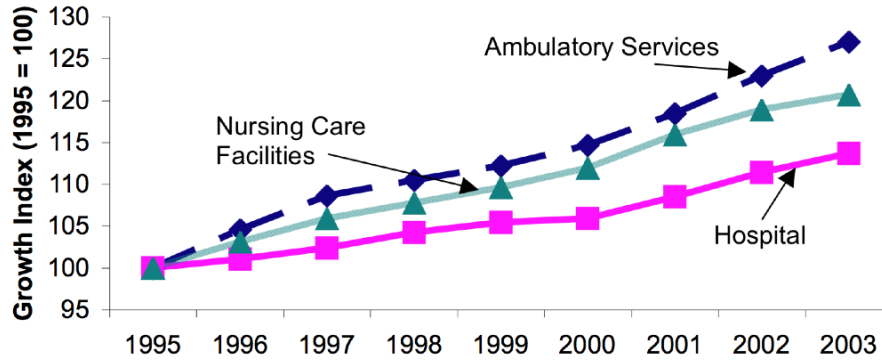
Among national health care sectors, the growth in ambulatory services and nursing care facilities outpaced the growth in hospital employment. Hospital employment grew only 14 percent while ambulatory services recorded 27 percent growth. Moreover, nursing care facilities recorded around 20 percent growth between 1995 and 2003.

Throughout the years, the national share of health care sectors in total employment has increased significantly; moreover, this increase gained momentum after 2000. However, the share of ambulatory services has been higher than that of both hospitals and nursing care facilities.

⁴ Employment projections are from U.S. Department of Labor, Bureau of Labor Statistics (www.bls.gov). Occupations include (a) health care practitioners and technicians and (b) health care support occupations.

⁵ Information is obtained from Modern Healthcare's *By the Numbers* (December 20, 2004).

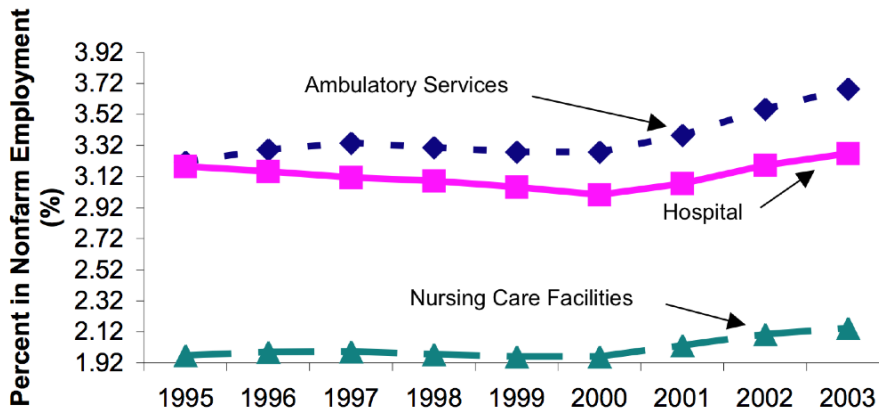
Among health care sectors nationally, growth of ambulatory services and nursing care facilities outpaced that of hospitals.



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

The 10-year growth trend and projected increase in the aging population suggest that the share of nursing and residential care facilities is likely to grow further.

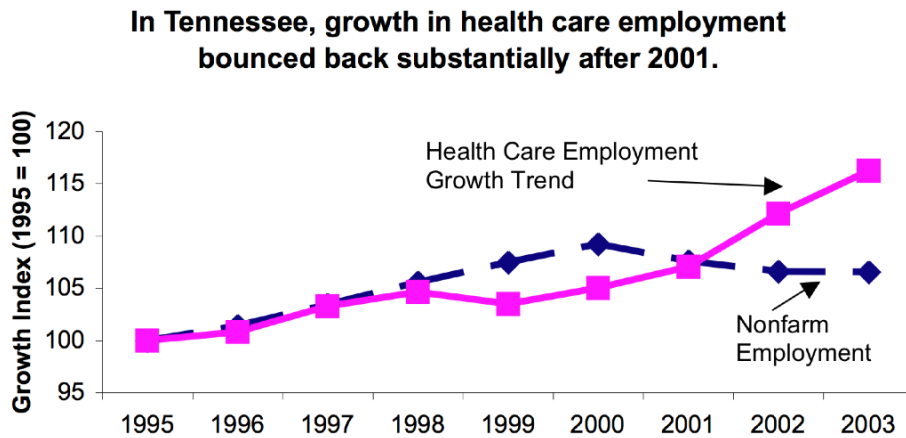
Similarly, share of health care sectors in nonfarm employment has increased over the years.



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

II.2. Trends in Tennessee

Tennessee's health care sector demonstrated significant resilience after a slow growth period between 1998 and 2001. Nonetheless, core health care employment grew 16 percent between 1995 and 2003. In the same period, overall nonfarm employment grew substantially less, just 7 percent.



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

As the share of seniors in the total population grows, the demand for health care services will likely increase dramatically. According to Census projections, the share of old age population (65+) in the adult population is expected to increase from 21 percent in 2000 to 29 percent in 2020 in Tennessee.

Similarly, six out of the 10 fastest growing occupations in Tennessee are in health care. The projected growth rate of these occupations is more than 50 percent.

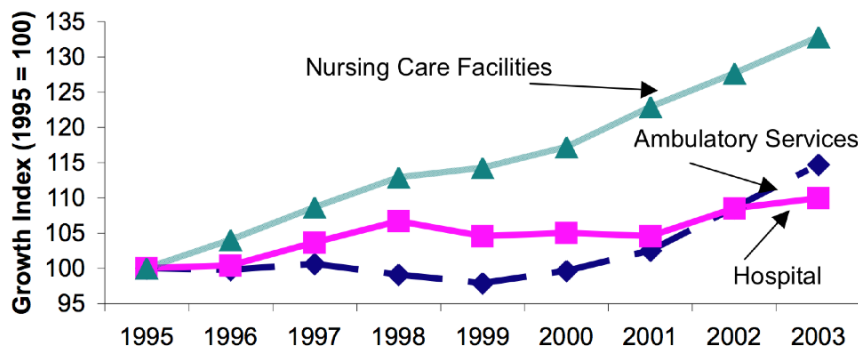
Fastest-Growing Occupations in Tennessee: Employment Change (2002-2012)

	Employment		Change	
	2002	2012	Number	Percent
Hazardous Materials Removal Workers	510	860	340	67
Sound Engineering Technicians	770	1,240	480	62
Medical Assistants	8,020	12,880	4,870	61
Fitness Trainers and Aerobics Instructors	2,420	3,850	1,430	59
Private Detectives and Investigators	70	100	40	57
Dental Assistants	5,380	8,410	3,030	56
Dental Hygienists	2,290	3,570	1,280	56
Directors, Religious Activities and Education	3,600	5,460	1,860	51
Physician Assistants	730	1,100	370	51
Medical Records and Health Information Technicians	2,770	4,170	1,400	50

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

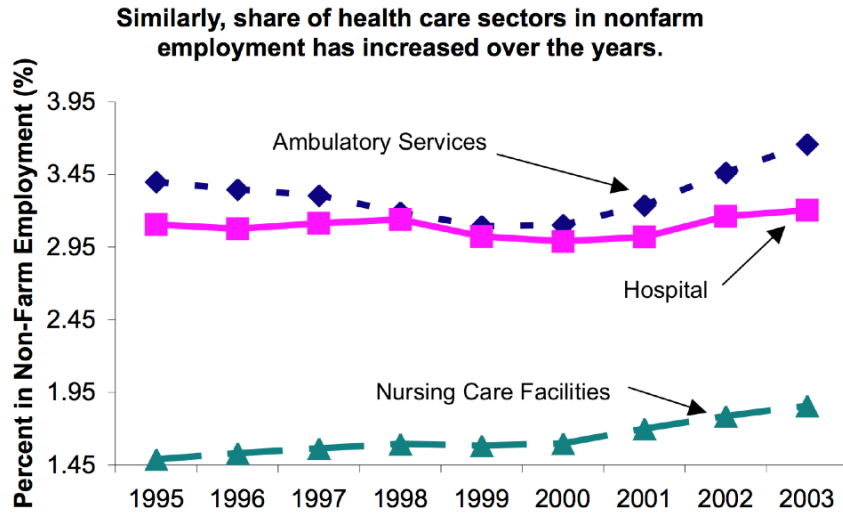
In Tennessee, between 1995 and 2003, the nursing care facilities sector grew markedly larger than the other two health care sectors: ambulatory services and hospitals. Nursing care facilities grew more than 32 percent. In contrast, ambulatory services recorded a growth rate of only 15 percent. Finally, hospitals grew at a much slower pace than the other two health care segments with a growth rate of just 10 percent.

Among health care sectors in Tennessee, growth of nursing care facilities outpaced that of hospitals and ambulatory services.



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

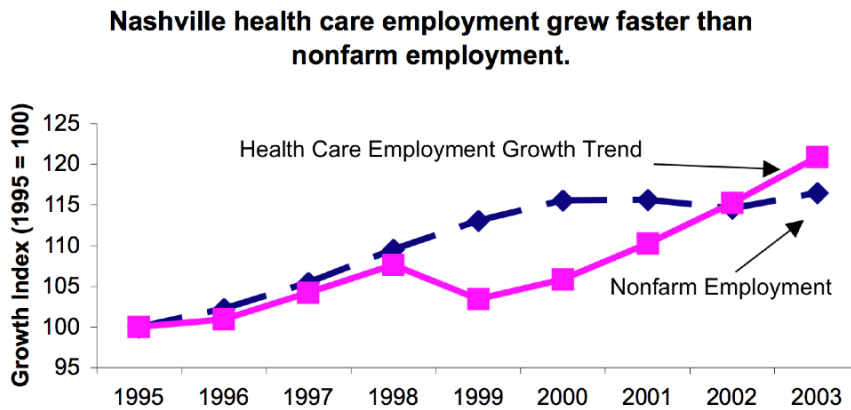
In Tennessee, the share of ambulatory services and nursing care facilities in nonfarm employment has been rising. Despite this increasing presence of ambulatory and nursing care facilities over the years, the share of hospitals has been somewhat stable by comparison.



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

II.3. Trends in the Nashville MSA

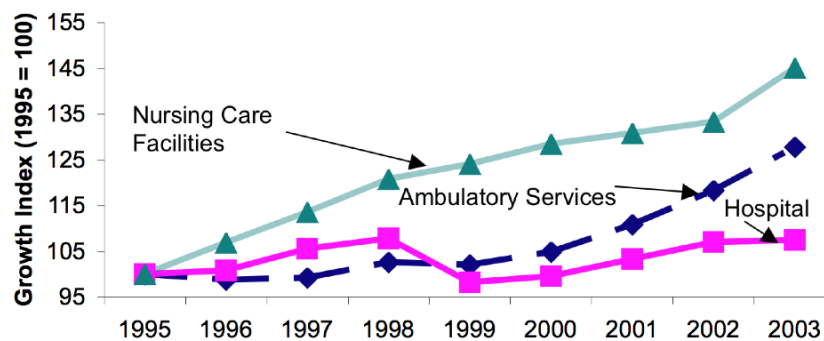
Nashville’s health care employment grew faster than total nonfarm employment. While nonfarm employment recorded a 17 percent growth rate between 1995 and 2003, Nashville’s health care employment recorded a 21 percent growth rate during the same period. As a result, Nashville’s health care sector added more than 11,000 jobs. Consequently, for every 100 nonfarm jobs created during this time, 11 were in the health care sector.



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

In line with national and state population growth trends, the share of seniors in the adult population in Davidson County is projected to reach 25.34 percent in 2020, up from 17.55 percent in 2000.⁶ Similarly, health care occupations in Nashville are expected to grow 27 percent between 2002 and 2012.⁷ This is a substantial growth rate compared to the projected growth rate of 20 percent in all occupations for the same time period.

Among health care sectors in Nashville, growth of ambulatory services and nursing care facilities outpaced that of hospitals.



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

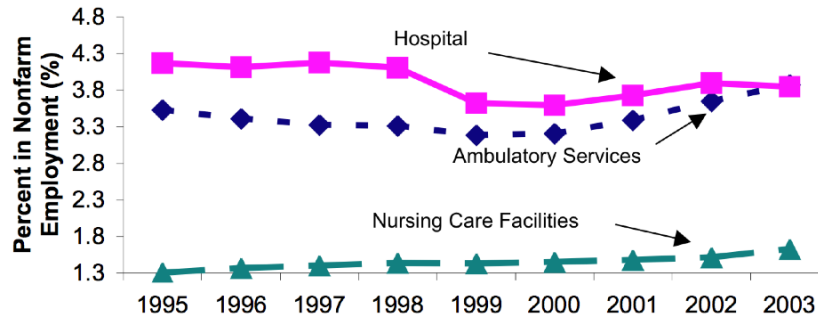
In Nashville's core health care industry, nursing care facilities and ambulatory services experienced a faster growth rate than hospitals. Nursing care facilities grew 45 percent during 1995-2003, but hospitals grew only 8 percent.

⁶ Data is from TACIR at <http://www.state.tn.us/tacir/population.htm>.

⁷ Tennessee Department of Labor and Workforce Development, Employment Security and Labor Research and Statistics divisions.

For every 100 health care jobs created, 52 were in ambulatory services, 31 in nursing care facilities, and 17 in hospitals. Considering the increasing projected share of seniors in the adult population, a considerable increase in employment growth in nursing and residential care facilities is not surprising.

Similarly, share of health care sectors in nonfarm employment in Nashville has increased over the years, except that of hospitals.

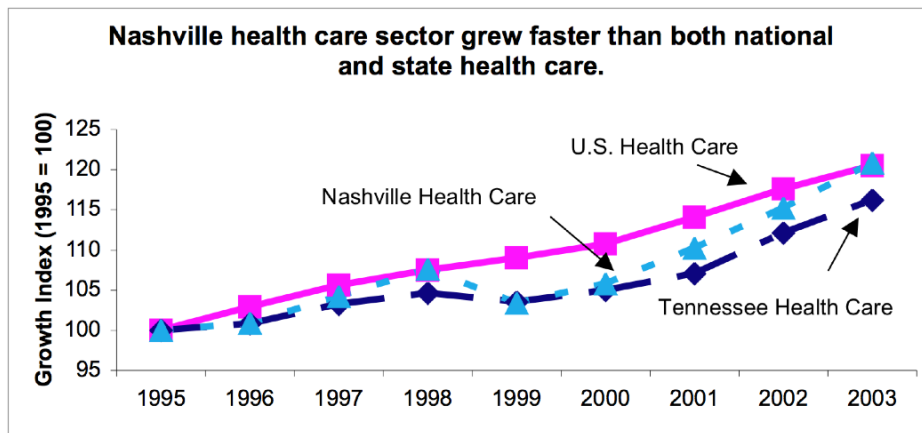


Source: Bureau of Labor Statistics (www.bls.gov) and BEREC calculations

The share of ambulatory services and nursing care facilities in the total nonfarm employment sector has increased throughout the years. However, this gain in Nashville’s health care industry has not been reflected in the share of hospitals in the nonfarm sector. Hospitals in the nonfarm employment sector have experienced a slight decline from 4.17 to 3.85 percent.

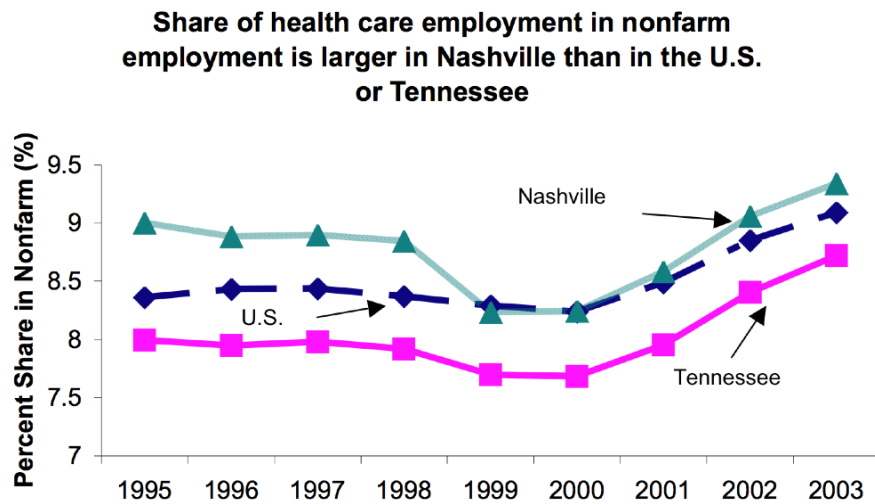
II.4. Comparative Perspective on Trends in the Core Health Care Industry

Employment growth in Nashville's core health care industry has been faster than that of national and state health care employment since 2000. Nashville's employment growth in the core health care industry surpassed national health care employment growth in 2003.



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

The core health care sector in Nashville plays a more prominent role in the region’s economy than it does in the state and national economies. For every 100 nonfarm jobs, there were nearly 10 core health care jobs in Nashville for 2003. The graph clearly shows that the employment share of the health care industry substantially declined in Nashville from 1998 to 2000. Although a similar decline was experienced in the U.S. and Tennessee, the decline was the largest in Nashville.



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

Not surprisingly, this period coincides with substantial health care spending cuts as a result of the 1997 Balanced Budget enactment. Nashville, as a national hub of the health care industry, was more affected than both the state and the nation by this enactment.

III. STUDY GOALS AND METHODOLOGY

III.1. Goals of the Study

The goals of this study are fivefold:

- What are the trends, scope, and impact of the core health care industry and the health care industry cluster on the regional economy?
- What is the economic significance to the region of Nashville’s health-care headquartered companies?
- How does Nashville’s health care industry compare with the health care industry in 12 of its peer MSAs?
- Where does the Nashville MSA rank relative to its 12 peer MSAs in the areas of health care business climate and infrastructure?
- What is the economic significance of the members of the Nashville Health Care Council (NHCC) on the regional economy?

III.2. Review of the 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 a recent study, “Economic Contribution of the Healthcare Industry to the City of Seattle (2004),” one in every five jobs in Seattle is tied to the health care sector. Considering the increasing share of national health care expenditures in GDP, this study highlights the challenges and opportunities the explosive demand for health care services creates for businesses, governments, and individuals.⁸

Because this industry seems impervious to business cycles, there has been an emergence of many regional studies that place the health care industry at the center of regional economic growth. For example, a recent study by Market Street Services, Inc., identified the health care

⁸ For a detailed assessment of the health care industry in Seattle, see Huckell/Weinman Associates (2004).

industry cluster in Nashville as a key industry cluster in the regional economy.⁹ Many studies, however, examine the health care sector from a perspective that narrowly focuses on the health care providers of ambulatory services, hospitals, and nursing and residential care facilities. These studies lack the necessary broader perspective of viewing health care providers as a core health care industry at the center of a health care industry cluster. The greater growth potential in the health care industry is expected to result from increasing interaction between the core health care industry and health care-related infrastructure industries, such as health care management, health care finance, and biomedical research.

The cluster perspective allows for a clearer understanding of not only health care providers but also industrial linkages to the core health care industry and their combined economic impact on a regional economy. The Seattle study is a good example of the cluster treatment applied to the economic impact of the health care industry on a regional economy. A 2001 study of the health care industry in Louisville also presents the health care issue from a broader perspective that provides interindustry linkages as well as a regional comparison.¹⁰ The critical conclusion reached by the Louisville and Seattle studies, which apply the cluster perspective, is that biotechnology and medical research play a substantial role in the development of the health care industry and consequently greatly affect the regional economy. This salient fact remained unnoticed by the studies that focused solely on health care providers without taking into consideration the industrial linkages.

Missing from this presentation of the health care industry cluster, however, is the growing role of health care management and health care services companies in the health care industry cluster. A classic example of the importance of management companies is seen in the growth of the health care industry in Nashville, where accumulated knowledge of health care management and entrepreneurship is a foundation for innovations and breakthroughs that fuel the ever-changing landscape of the health care industry on a national basis. A brief history of Nashville's health care industry attests to this fact (see the Nashville Health Care

⁹ For more information, see "The Target Business Analysis: Nashville, TN" (Market Street Services, Inc., 2005).

¹⁰ For more information, see Paul A. Coomes and Raj Narang (2001), *Louisville's Health-Related Economy: Size, Character, and Growth* (University of Louisville).

Council Web site, <http://www.healthcarecouncil.com>). Therefore, this study includes health care management companies as part of the health care industry cluster.¹¹

III. 3. Method and Data

Indicators for this study are collected from different sources. It is often difficult to find comparable figures for the peer MSAs because of data suppression. The BERC used different sources to estimate the comparable figures for these MSAs. This analysis is guided by the availability of health care-related indicators. Throughout this study, there may be some slight discrepancies in figures due to the estimation methods used by different employment surveys. The BERC consulted several sources to construct a time-series perspective on health care indicators for Nashville and the peer MSAs. The sources of data are presented in the appendix.

Selection of MSAs

In consultation with the NHCC, the BERC has identified 12 peer MSAs for Nashville. The BERC's selection of these MSAs was also guided by the literature (for example, see Coomes and Narang, 2001). These MSAs are Atlanta, Birmingham, Denver, Charlotte, Raleigh, Jacksonville, Indianapolis, Kansas City, MO, Richmond, Dallas, Columbus, and Louisville. These are major U.S. MSAs with substantial health care-related economic activity.

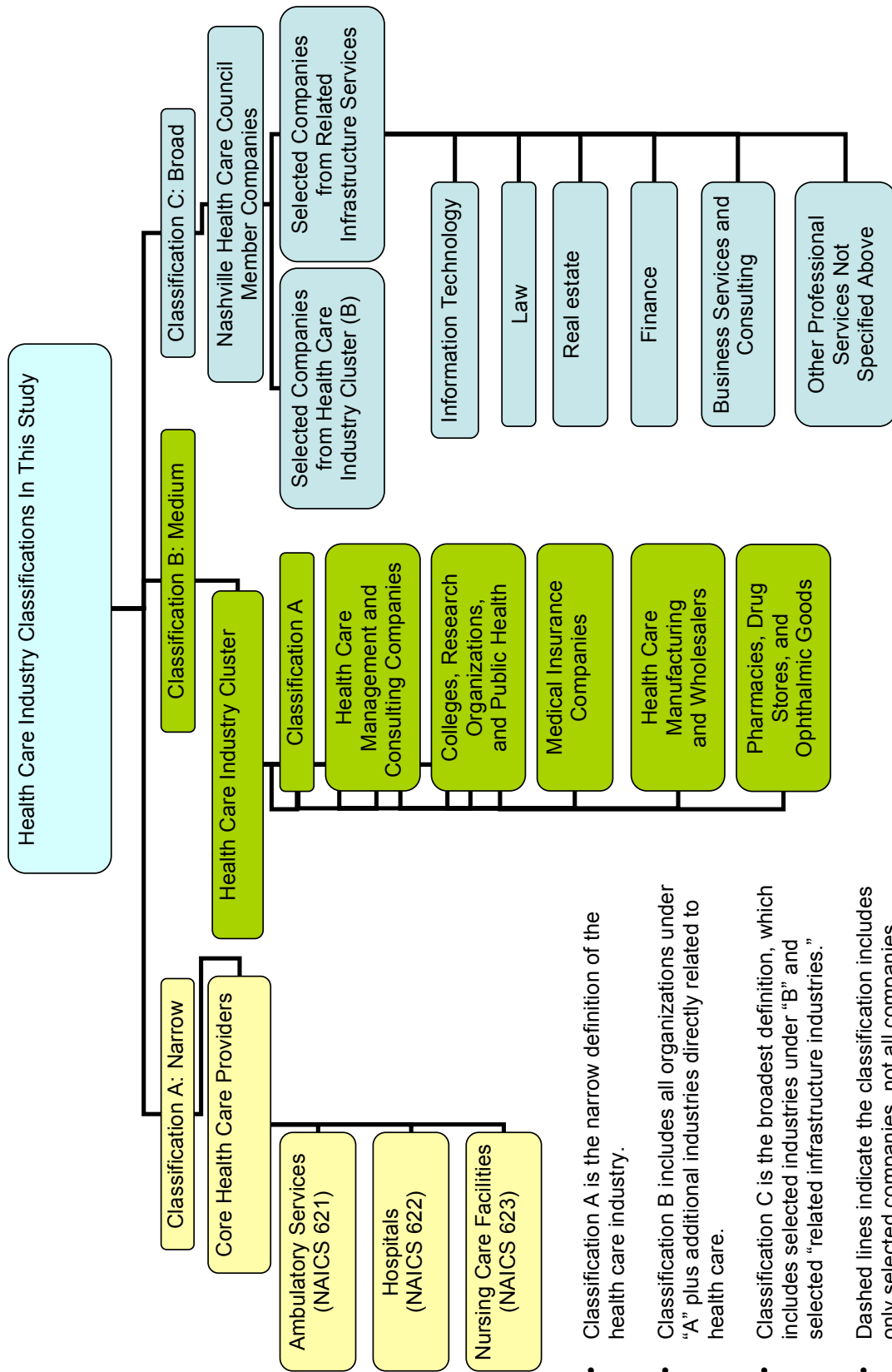
Survey Method

Since 1995, the NHCC has promoted the growth of the health care industry in Nashville. The NHCC has a unique member mix in that both health care and infrastructure (i.e., management, information technology, investment, and law) companies work together to forge strong ties to accelerate growth in the health care industry. The BERC conducted a survey to develop a profile of the NHCC member companies. For the survey instruments used, see the appendix.

¹¹ For a sample of selected studies, see bibliography.

III.3.a. Definitions

Throughout this study, the BERC classifies Nashville's health care industry into three distinct categories: (1) core health care industry, (2) health care industry cluster, and (3) Nashville Health Care Council member companies. The chart on the next page indicates the relationship between these three categories of health care industry classification. A complete industry description by NAICS code will be presented in the appendix.



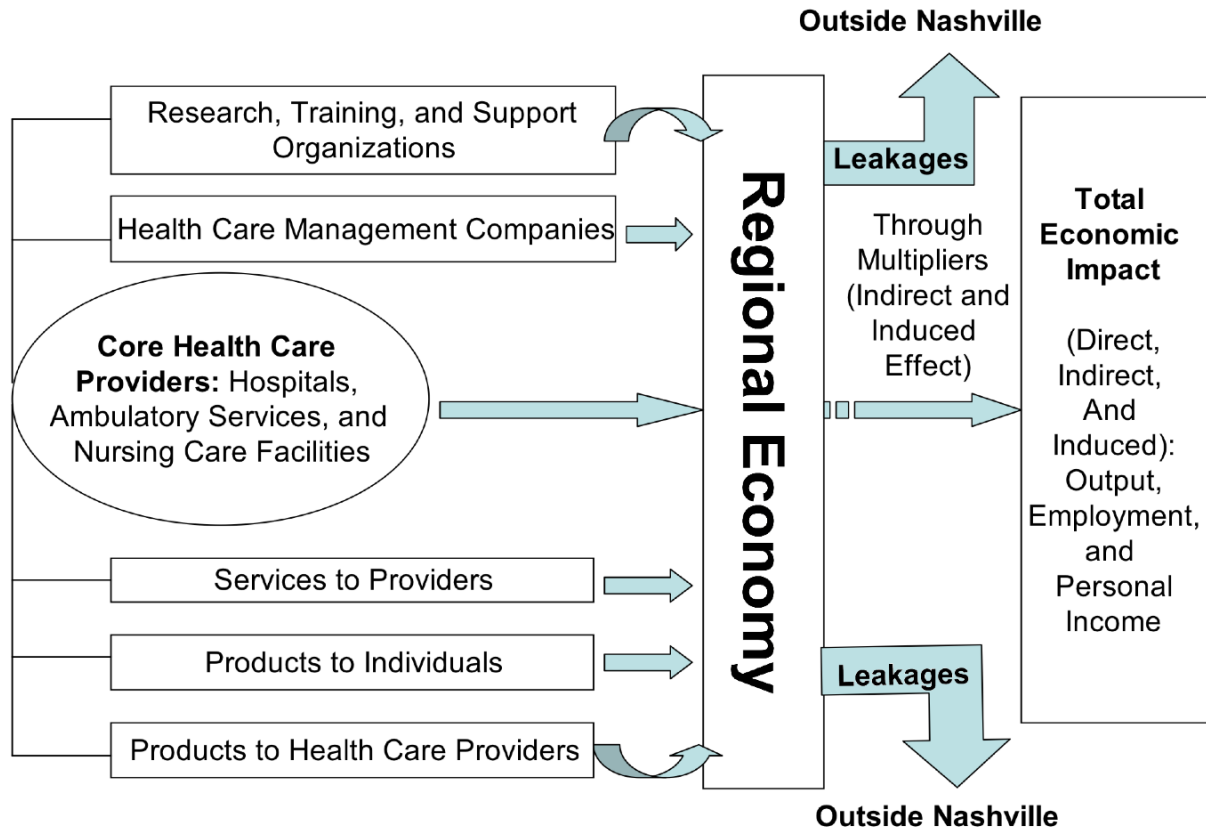
- Classification A is the narrow definition of the health care industry.
- Classification B includes all organizations under “A” plus additional industries directly related to health care.
- Classification C is the broadest definition, which includes selected industries under “B” and selected “related infrastructure industries.”
- Dashed lines indicate the classification includes only selected companies, not all companies.

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. The goal of this assessment is to highlight what happens if the entire health care industry cluster is removed from the regional economy. The BERC reports the direct, indirect, and induced economic impact of counterfactually removing the health care industry cluster from the economy.¹² The report presents three categories of impact: output, employment, and personal income. For each of these categories, the BERC also reports leakages out of Nashville and the relationship between the health care industry cluster and other sectors of the economy. The BERC made adjustments to the indirect and induced effect of the health care subsectors on each other within the health care industry cluster. The BERC assumes that IMPLAN (see appendix, page 83) regional purchasing coefficients (RPC) 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.

¹² Many economic impact analyses use the concept of “net new” to describe the economic impact of a project or institutions. In this study, the BERC has not adjusted employment figures to reflect the local provision of services. The reasons are twofold: (1) a recent patient-origin survey from the Tennessee Department of Health indicates that more than 83 percent of patient days are from outside the Nashville MSA, and (2) the BERC treated at least 10 percent of Nashville-based patient days as recapture given the fact that the Nashville MSA has some of the finest hospitals in the U.S.

Conceptual Framework for Impact Analysis



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

IV.1. Total Employment

Nashville’s core health care sector employs nearly 75,000 people, 38 percent of which are in ambulatory services, 44 percent in hospitals, and 18 percent in nursing care facilities. The core health care sector includes NAICS 621, 622, and 623. The share of ambulatory services has increased more than two percentage points between the years 2001 and 2004.

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

Year	Total	Ambulatory	% in Health care	Hospitals	% in Health care	Nursing Care	% in Health care
2001	66,767	23,727	35.54	31,172	46.69	11,868	17.78
2002	69,464	25,303	36.43	32,112	46.23	12,049	17.35
2003	72,538	27,334	37.68	32,311	44.54	12,894	17.78
2004	74,627	28,318	37.95	33,026	44.25	13,283	17.80

Source: Tennessee Department of Labor and Workforce Development and BERC estimates.

Employment by Occupation

A salient difference between employment in the health care sector and employment by health care occupations is that the former includes all occupations in the sector, ranging from accountant to medical doctor. However, health care occupations refer to medical professionals and allied health occupations and do not include occupations in health care education and research. Nonetheless, health care occupations account for about 8 percent of total occupations in the Nashville MSA.

Employment by Occupation in Nashville

	Total	% in Total
All Occupations	678,600	100.00
Management Occupations	43,190	6.36
Business and Financial Operations Occupations	25,020	3.69
Computer and Mathematical Science Occupations	13,310	1.96
Architecture and Engineering Occupations	9,000	1.33
Life, Physical, and Social Science Occupations	3,540	0.52
Community and Social Services Occupations	7,000	1.03
Legal Occupations	4,600	0.68
Education, Training, and Library Occupations	34,000	5.01
Arts, Design, Entertainment, Sports, and Media Occupations	10,660	1.57
Health care Practitioner and Technical Occupations	39,070	5.76
Health care Support Occupations	13,590	2.00
Protective Service Occupations	12,580	1.85
Food Preparation and Serving Related Occupations	56,970	8.40
Building and Grounds Cleaning and Maintenance Occupations	19,950	2.94
Personal Care and Service Occupations	10,910	1.61
Sales and Related Occupations	64,090	9.44
Office and Administrative Support Occupations	128,210	18.89
Farming, Fishing, and Forestry Occupations	600	0.09
Construction and Extraction Occupations	28,960	4.27
Installation, Maintenance, and Repair Occupations	28,540	4.21
Production Occupations	64,910	9.57
Transportation and Material Moving Occupations	59,910	8.83

Source: Tennessee Department of Labor and Workforce Development

IV.2. Sectoral Diversity

The health services sector (the core health care industry) is the fifth largest in Nashville's economy after government, professional and business services, manufacturing, and retail trade, representing about 11 percent of total nonfarm jobs.

Employment by Sector in Nashville MSA (2004)

	Employment ('000)	% Share in Total Nonfarm
Total Nonfarm	712.9	100.00
Natural Resource, Mining, and Construction	34.4	4.83
Manufacturing	83.7	11.74
Wholesale Trade	34.2	4.80
Retail Trade	83.1	11.66
Transportation and Utilities	27.8	3.90
Information	19.2	2.69
Financial Activities	44.3	6.21
Professional and Business Services	91.0	12.76
Social Services	2.7	0.38
Educational Services	20.8	2.92
Health Services*	74.6	10.46
Leisure and Hospitality	72.1	10.11
Other Services	29.5	4.14
Government	95.5	13.40

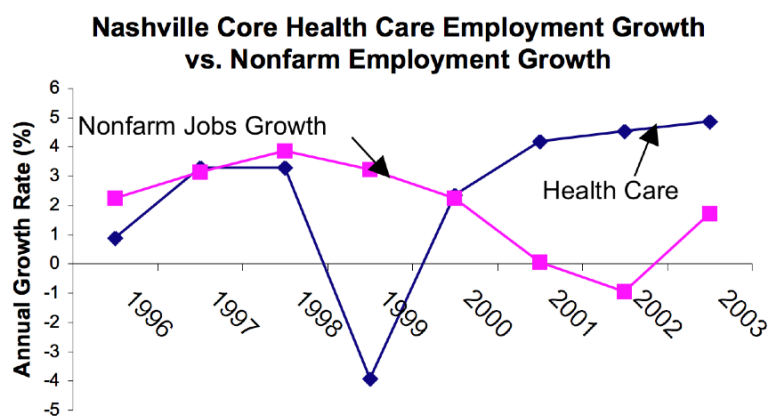
Source: Bureau of Labor Statistics (www.bls.gov) and BERC estimates.

*Health services refers to health care providers, which include ambulatory services, hospitals, and nursing care facilities.

IV.3. Growth Trend

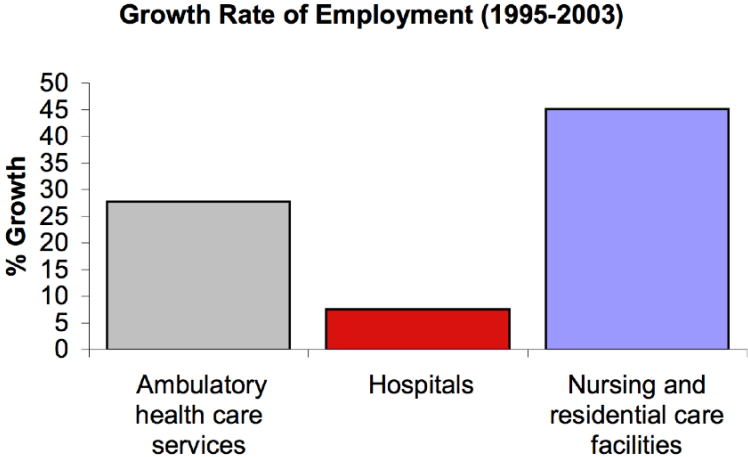
IV.3.a. Employment

Nashville's core health care jobs experienced robust annual growth after a sharp decline in 1999. Growth in core health care jobs has been substantially higher than in other nonfarm jobs since 1999. As explained previously, the 1997 Balanced Budget enactment led to a decline in health care employment for a short period of time.



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

Nashville nursing and residential care facilities experienced a phenomenal growth rate of 45 percent between 1995 and 2003. The aging population is more likely to generate additional growth in this area over the next decade.



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

IV.3.b. Establishments

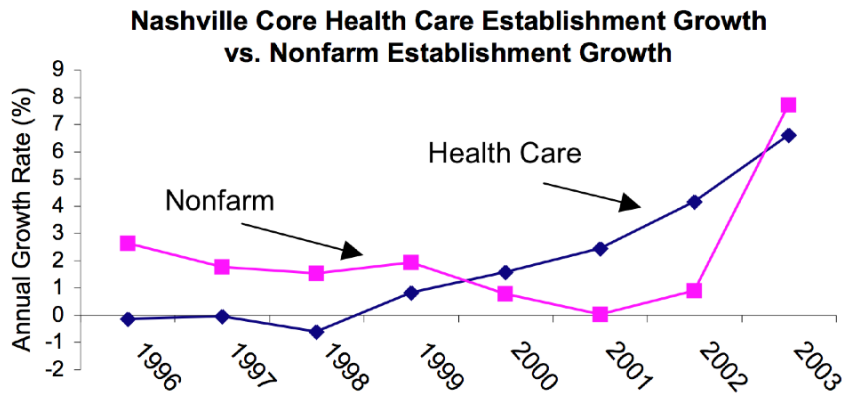
Ambulatory services account for almost 90 percent of establishments in the core health care industry. Nursing care facilities and hospitals account for about 10 percent of establishments. This table includes only health care establishments under NAICS 621, 622, and 623.

Trend in Core Health Care Establishments in the Nashville MSA (Ambulatory Services, Hospitals, and Nursing Home Facilities)

Year	Total	Ambulatory	% in Health care	Hospitals	% in Health care	Nursing Care	% in Health care
2001	0	1,890	89.93	46	2.18	166	7.89
2002	0	1,965	89.61	48	2.19	180	8.20
2003	0	2,360	89.20	56	2.13	230	8.68
2004	0	2,327	89.70	54	2.07	214	8.23

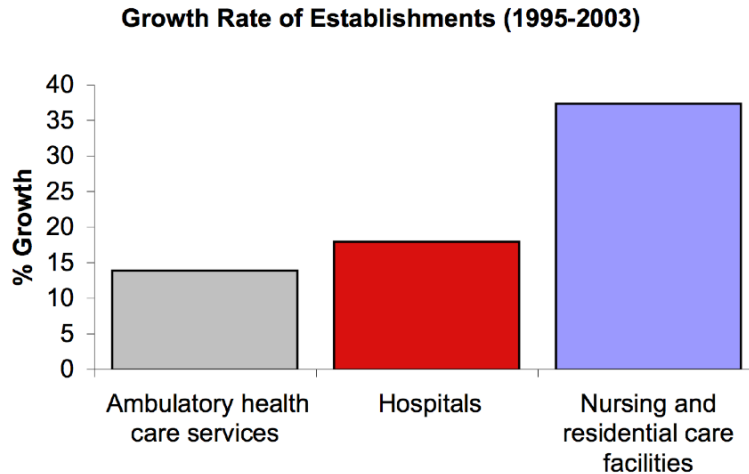
Source: Tennessee Department of Workforce Development and BEREC.

The number of health care establishments has increased steadily over the years since 1998. Total nonfarm establishments exhibited a slower growth rate but a sharp increase after 2002. **Between 2001 and 2004, 493 new health care establishments emerged in Nashville, for a total of 2,237.**



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

In terms of the number of establishments, nursing and residential care facilities grew more than 37 percent, substantially higher than the growth of hospitals and ambulatory services.



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

IV.3.c. Wages

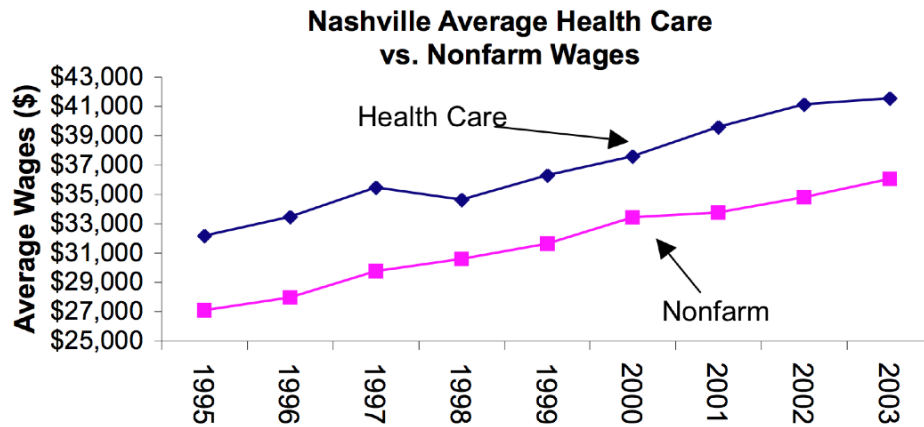
In 2004, wages in the core health care industry in Nashville totaled \$3.3 billion, with hospitals and ambulatory services accounting for 90 percent of those wages. Moreover, total wages across core health care industry segments increased between 2001 and 2004: in ambulatory services wages went from \$1.13 billion to \$1.43 billion; in hospitals wages increased from \$1.21 billion to \$1.49 billion; and in nursing care facilities wages rose from \$0.28 billion to \$0.34 billion. Of the three health care industry segments, the greatest increase in total wages was 26 percent in ambulatory services. Nursing care facilities then garnered a 25 percent wage increase, and wages increased 23 percent in the hospital segment.

Trend in Total Core Health Care Industry Wages in the Nashville MSA (NAICS 621, 622, 623) (Million \$)

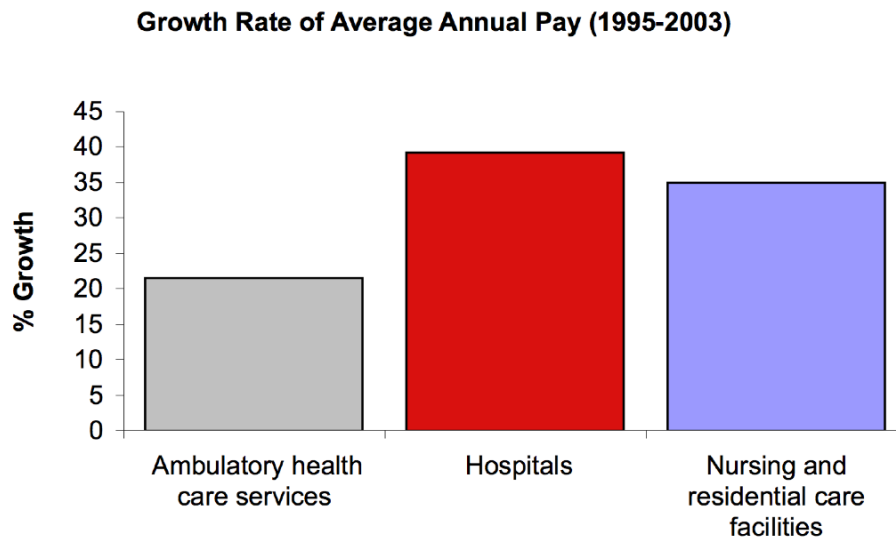
Year	Total	Ambulatory	% in Health care	Hospitals	% in Health care	Nursing Care	% in Health care
2001	2618.43648	1128.992583	43.11705062	1213.382547	46.33996493	276.061351	10.54298445
2002	2816.73311	1220.786331	43.34050417	1307.414211	46.41597766	288.532568	10.24351817
2003	2987.23657	1320.201776	44.19475141	1353.842989	45.32091641	313.191805	10.48433218
2004	3261.79734	1425.791354	43.71183140	1492.304428	45.75098550	343.701558	10.53718310

Sources: Tennessee Department of Workforce Development and BEREC.

Historically, Nashville’s health care sector commands higher wages than average nonfarm wages. According to this trend, the gap between health care and nonfarm wages is far from closing. In fact, the wage gap on average is more than \$5,000 (i.e., \$36,000 versus \$43,000). Wage growth in hospitals was larger than in the other two health care segments. Nonetheless, all three segments recorded substantial wage growth.



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

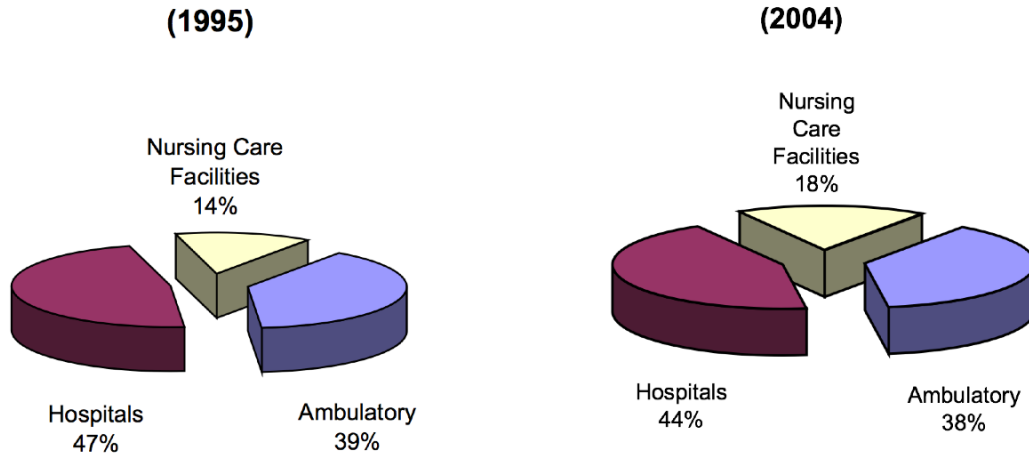


Sources: Bureau of Labor Statistics (www.bls.gov) and BERC calculations

IV.4. Changes in Nashville Core Health Care Industry Segments

Between 1995 and 2004, the employment share of nursing care facilities in the total core of health care employment increased dramatically, from 14 percent to 18 percent. This shift in the employment share indicates a growing demand for long-term care facilities.

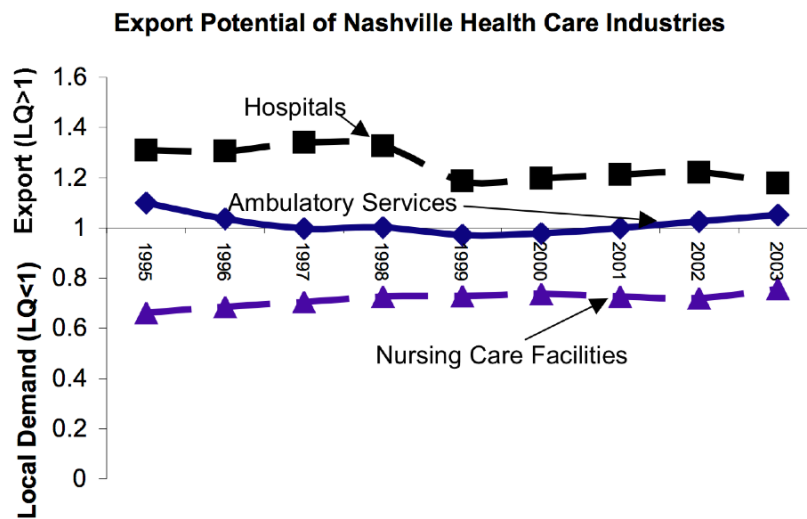
Share of Subsectors in Total Health Care Employment in Nashville



Sources: Tennessee Department of Labor and Workforce Development, Bureau of Labor Statistics (www.bls.gov), and BERC

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

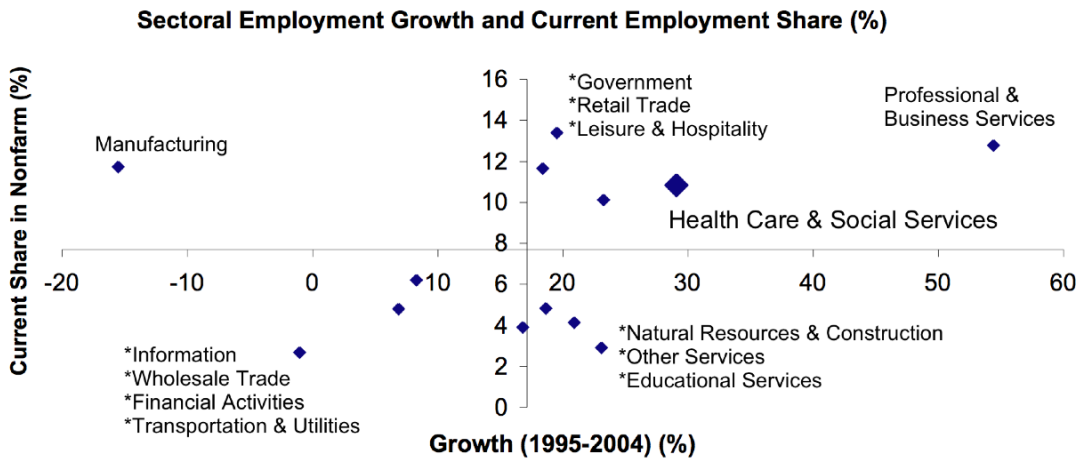
Location quotient (LQ) is often used to describe the relationship between the local economy and the national economy. If the LQ for an industry is larger than 1, then that industry has a larger presence in that local economy than its national economic counterpart. Ambulatory services and hospitals employ substantially more people in the Nashville MSA than in the national economic counterpart. Consequently, these findings indicate that supply in the region exceeds local demand for hospitals and ambulatory services. This fact suggests that these health care establishments serve residents outside the Nashville area. In the case of nursing care, Nashville area residents are most likely to use services in long-term care outside the local economy.



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 except for professional and business services in the Nashville MSA. Growth in health care and social services was substantially larger than the sector’s average growth rate of 17 percent. Furthermore, its current share in total employment is 7 percent above the sector’s average.



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

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

More than 70 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 investment are the top five sectors that benefit most from the business expenditures of health care companies in Nashville.

Where Does \$1 Million Core Industry Spending Go in the Local Economy? (Major Industries Only)

Industry	Value	%
Colleges, universities, and junior colleges	\$1,361	0.14
Glass and glass products except glass containers	\$1,452	0.15
Industrial gas manufacturing	\$1,531	0.15
Data processing services	\$1,566	0.16
Natural gas distribution	\$1,578	0.16
Couriers and messengers	\$1,588	0.16
Automotive equipment rental and leasing	\$1,593	0.16
Water, sewage, and other systems	\$1,622	0.16
Nondepository credit intermediation and related	\$1,625	0.16
Commercial machinery repair and maintenance	\$1,630	0.16
Other basic inorganic chemical manufacturing	\$1,668	0.17
Truck transportation	\$1,681	0.17
Petrochemical manufacturing	\$1,811	0.18
Other State and local government enterprises	\$1,843	0.18
Accounting and bookkeeping services	\$1,890	0.19
Computer systems design services	\$1,920	0.19
Lessors of nonfinancial intangible assets	\$1,967	0.20
Electromedical apparatus manufacturing	\$2,046	0.20
Air transportation	\$2,191	0.22
Monetary authorities and depository credit intermediaries	\$2,250	0.23
Commercial printing	\$2,271	0.23
Other support services	\$2,406	0.24
Advertising and related services	\$2,500	0.25
Machinery and equipment rental and leasing	\$2,593	0.26
Insurance carriers	\$3,386	0.34
Surgical appliance and supplies manufacturing	\$3,593	0.36
Telecommunications	\$3,839	0.38
Business support services	\$3,894	0.39
Maintenance and repair of nonresidential buildings	\$4,065	0.41
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
Other Sectors	\$43,438	4.34
Real estate	\$46,040	4.60
Institutions/Individuals		
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: IMPLANpro, Inc., and BERC estimates.

Note: Calculations are based on the assumption that all spending occurs in the local economy.

V. NASHVILLE'S HEALTH CARE INDUSTRY CLUSTER

The health care industry cluster encompasses the core health care industry and other, related health care industries such as health care management companies, health care finance, and biomedical research, which operate on a local, national, or international basis. In order to measure the economic impact of Nashville's health care industry cluster, the BERC uses the counterfactual approach. This is different from the "net new concept" in that the counterfactual approach removes the whole health care industry cluster from the economy and then measures the total economic impact that the subtraction generates across the remaining economy.

Besides the counterfactual approach, the BERC also 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, the BERC uses default regional purchasing coefficients to allow for outside leakage. Then the 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.

The 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, the 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 each group has on the core health care sector and vice versa.

When the health care industry cluster is removed from the economy, the BERC assumes that an economic shock to the core health care providers should not have a ripple effect on itself. An adjustment for this purpose has been made to the results of the study.

In this study, the BERC reports on the direct, indirect, and induced impact of the Nashville health care industry cluster. The **direct effect** refers to the current state of employment, sales, and personal income generated by the cluster in an economy. The **indirect effect** 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 to maintain their lifestyle. This process generates additional jobs, business revenues, and personal income across the local economy. Finally, the BERC also estimates linkages between the health care industry cluster and other sectors in the local economy.

V.1. Employment and Office Space

The Nashville health care industry cluster employs 94,346 people (2004), which corresponds to 13 of every 100 nonfarm employees in Nashville. The Nashville health care industry cluster is comparable in size to the government sector, which is the largest sector in the Nashville MSA (see table, page 32). **Additionally, the Nashville health care cluster accounts for 26 million square feet of office space, which corresponds to 13 percent of Nashville's total commercial space.**¹³

As the table on page 43 indicates, the Nashville health care industry cluster consists of diverse groups of sectors, with health care providers at the core. **The core health care industry employs 79 percent of Nashville health care industry cluster employees.** The rest (21 percent) are shared by five major industry groups, among which health care management and consulting organizations have the largest share with 6,033 employees.

¹³ This study does not differentiate between office, industrial, medical, and retail space. According to a quarterly MarketView report for Nashville by CB Richard Ellis, Nashville had approximately 206 million square feet of combined (retail, office, and industrial) space in the third quarter of 2005. For details, see www.cbre.com.

Nashville Health Care Industry Cluster: Employment and Office Space

Major Sectors	Employment*	Employment per 1,000 Sq. Ft.**	Office Space (Sq. Ft.)
Health Care Management & Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	6,033	4.10	1,471,463
Health Care Providers (NAICS 621, 622, 623)	74,627	4.10	18,201,748
Research, Training and Support Organizations			
Educational (NAICS 6112, 6113, 6115)	1,927	2.55	755,686
Research and Public Health (NAICS 54171, 92312)	3,317	2.55	1,300,621
Services to Providers (NAICS 524114)	628	4.10	153,150
Products to Health Care Providers			
Manufacturing (NAICS 333314, 3391, 3254)	1,595	3.03	526,375
Wholesalers (NAICS 42345, 42346, 4242)	2,430	1.28	1,898,438
Products to Individuals (NAICS 44611, 44613)	3,789	2.22	1,706,757
Total	94,346		26,014,238

Notes: *The BERC estimated employment figures from the Tennessee Department of Labor and Workforce Development Database. **Several studies were consulted to calculate employment density by major sectors, including Urban Land Institute studies. The BERC also used an in-house establishment survey to calculate employment density in several sectors where data are available. NAICS classifications were used.

V.2. Establishment and Wages

The Nashville health care industry cluster, consisting of nearly 3,300 establishments, accounts for \$4.3 billion in wages. The average health care industry cluster wage is \$44,517.

Nashville Health Care Cluster Profile: Wages and Establishments (2004)

Major Sectors	Wages (Million \$)	Establishments
Health Care Management and Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	\$450.05	149
Health Care Providers (NAICS 621, 622, 623)	\$3,261.80	2,594
Research, Training and Support Organizations		
Educational (NAICS 6112, 6113, 6115)	\$95.45	36
Research and Public Health (NAICS 54171, 92312)	\$135.11	35
Services to Providers (NAICS 524114)	\$45.27	23
Products to Health Care Providers		
Manufacturing (NAICS 333314, 3391, 3254)	\$56.01	56
Wholesalers (NAICS 42345, 42346, 4242)	\$128.68	157
Products to Individuals (NAICS 44611, 44613)	\$113.84	246
Total	\$4,286.20	3,296

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

V.3. Publicly Traded Health Care Management Companies

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 the regional economy since they (1) bring high-paying jobs, (2) increase the competitive advantage of the host cities, (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.¹⁴

Furthermore, the location decision of large corporate headquarters is also shaped by the presence of certain qualities in the host region, primarily (1) a good quality of life, (2) major transportation and communication infrastructure, (3) a diverse economic base, (4) a sound financial infrastructure, (5) professional services, and (6) a highly skilled labor force.

As a locus 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. More recently, Caremark Rx (the second largest pharmacy benefits manager in the country) moved its headquarters to Nashville in 2004, and in 2005 the Federal Reserve Bank of Chicago ranked Nashville as the number one city in America for headquarters growth.

Nashville is truly the center of gravity for national health care industry company headquarters with 33 major public and private companies calling it home.¹⁵ Nashville health care industry management company headquarters account for 39 percent of investor-owned hospitals in the United States. As of 2003, 424 out of 1,102 investor-owned hospitals in the U.S. were owned or operated by Nashville-area hospital management companies. **In 2004,**

¹⁴ 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.

¹⁵ Only companies with more than \$500,000 in revenue are included in this analysis.

Nashville health care management company headquarters' revenues totaled more than \$62 billion and employed nearly 336,000 people worldwide.¹⁶

From a different perspective, six of the top 10 investor-owned hospital chains by revenue as of 2004 are Nashville based (www.modernhealthcare.com). These six companies alone own and operate 357 hospitals.¹⁷ In addition, Murfreesboro-based National HealthCare is one of the largest skilled nursing chains by beds in the United States. According to the same source, Nashville-based Earl Swensson Associates and Gresham, Smith and Partners are two of the top 10 health care architecture firms in the U.S.

As this report will highlight in the venture capital section, Nashville-based health care companies have been involved in substantial private equity flows in the U.S. **For example, four of the top 10 private equity deals in the health care sector in 2004 involved Nashville-based health care companies, accounting for \$3.8 billion.¹⁸**

¹⁶ Source: 2003 American Hospital Association Annual Survey Database, ReferenceUSA, Mergent Online, and company Web sites.

¹⁷ These companies are HCA, Community Health Systems, Vanguard Health Systems, Iasis Healthcare, Ardent Health Services, and LifePoint Hospitals.

¹⁸ These companies are Vanguard Health Systems Inc. (\$1,750 million), Iasis Healthcare Corporation (\$1,400 million), Renal Care Group Inc. (\$345 million), and Ardent Health Services LLC (\$281 million). Source: XRoads Solution Group, July 2005, "A Sector Report: Healthcare Services Industry," www.xroadsllc.com.

Nashville is also a hub for publicly traded health care companies in the U.S. **As of 2004, the 21 such companies calling Nashville home had combined employment of more than 312,000 and combined revenue of nearly \$60 billion.** The following is a profile of these publicly traded health care management companies.

A Profile of Public Health Care Related Companies Headquartered in Nashville as of 2004

Company Name	Ownership	Corporate Employment ('000)	Total Sales (2004 Million\$)	Ticker Symbol
Caremark RX Inc.	Public	11.13	\$25,801.12	CMX
HCA Inc	Public	191.40	\$23,502.00	HCA
Community Health Systems Inc.	Public	31.10	\$3,332.64	CYH
Renal Care Group Inc.	Public	8.60	\$1,345.05	RCI
LifePoint Hospitals Inc.	Public	9.90	\$996.90	LPNT
Province Healthcare Co.	Public	8.40	\$882.91	LifePoint Hospitals
America Service Group Inc.	Public	7.43	\$665.10	ASGR
National Healthcare Corp.	Public	12.00	\$521.83	NHC
Psychiatric Solutions, Inc.	Public	9.10	\$487.19	PSYS
American Retirement Corp.	Public	9.25	\$447.61	ACR
American Homepatient Inc.	Public	3.00	\$335.82	AHOM
AmSurg Corp.	Public	1.48	\$334.31	AMSG
American Healthways, Inc.	Public	1.88	\$245.41	AMHC
Healthcare Realty Trust, Inc.	Public	0.16	\$227.20	HR
Symbion Inc.	Public	2.30	\$216.33	SMBI
Advocat Inc.	Public	4.96	\$202.82	AVCA
National Health Investors Inc.	Public	0.00	\$155.56	NHI
National Health Realty, Inc.	Public	0.00	\$20.60	NHR
Healthstream, Inc.	Public	0.15	\$20.10	HSTM
Kyzen Corp.	Public	0.03	\$6.01	KYZN
Medicsight Inc.	UK-Based	0.07	\$0.50	MSHT
Total		312.33	\$59,747.00	

Source: ReferenceUSA, Mergent Online, Hoovers.com, Nashville Health Care Council, Individual Company Web sites, and BEREC estimates. Note: The list includes health care providers, pharmaceutical companies, and medical equipment manufacturing companies. U.S. headquarters of Medicsight, Inc., are in Nashville.

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

V.4.a. Employment Impact

The health care industry cluster's total employment impact is 154,800, which equals 22 percent of the Nashville MSA's and six percent of Tennessee's nonfarm employment in 2004. One hundred industry cluster jobs create an additional 64 jobs in the Nashville economy.

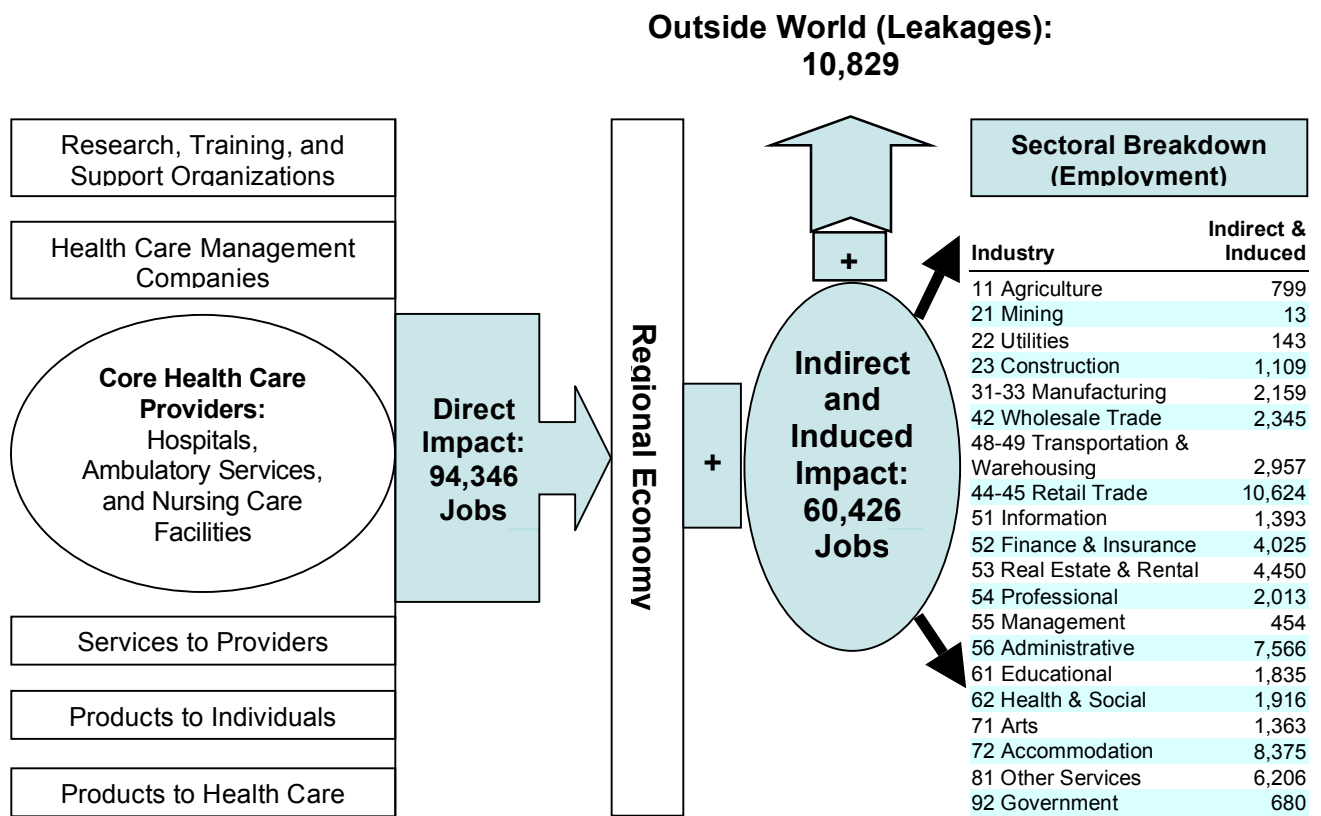
Employment Impact of Nashville Health Care Industry Cluster (in Thousands)

	Direct	Indirect	Induced	Total	Multiplier
Health Education	1.9	0.3	0.4	2.6	1.36
Health Care Services	74.6	15.4	36.6	126.6	1.70
Direct Medical Insurance	0.6	0.3	0.2	1.1	1.78
Health Care Management and Consulting Companies	6.0	0.8	1.7	8.5	1.40
Medical Device and Equipment Manufacturing	1.6	0.2	0.2	2.0	1.24
Medical Research and Public Health	3.3	0.7	0.8	4.8	1.46
Health Care Products Retail Stores (Pharmacies, etc.)	3.8	0.4	0.8	5.0	1.32
Health Care Wholesale	2.4	0.7	1.0	4.1	1.70
Health Care Industry Cluster Total	94.3	18.7	41.7	154.8	1.64

Sectoral Impact

The largest sector impacted by the health care industry cluster is retail trade with almost 11,000 jobs. Because of interregional transactions, Nashville’s health care industry cluster creates nearly 11,000 additional jobs across sectors outside Nashville.

Employment Impact of Nashville Health Care Cluster



Industry Linkages

For every 1,000 jobs in the Nashville health care industry cluster, an additional 113 jobs are created in retail trade, 89 jobs in accommodations, 80 in administrative services, 66 jobs in other services, 47 in real estate and rental property, 43 in finance and insurance, 31 in transportation, and two in utilities.

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

Industry	Indirect and Induced	Number of jobs created per 1,000 health care industry cluster jobs
44-45 Retail Trade	10,624	113
72 Accommodation	8,375	89
56 Administrative	7,566	80
81 Other Services	6,206	66
53 Real Estate & Rental	4,450	47
52 Finance & Insurance	4,025	43
48-49 Transportation & Warehousing	2,957	31
42 Wholesale Trade	2,345	25
31-33 Manufacturing	2,159	23
54 Professional	2,013	21
62 Health & Social	1,916	20
61 Educational	1,835	19
51 Information	1,393	15
71 Arts	1,363	14
23 Construction	1,109	12
11 Agriculture	799	8
92 Government	680	7
55 Management	454	5
22 Utilities	143	2
21 Mining	13	0

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

V.4.b. Output Impact

The total business revenue impact of the health care industry cluster is \$18.3 billion, \$11.9 billion of which is directly injected into the economy. This amount is equivalent to 17.8 percent of the Nashville MSA's and 8.4 percent of Tennessee's business revenues (www.BEA.gov).¹⁹ Every \$100 of health care cluster spending generates an additional \$54 in business revenues.

Output Impact of the Nashville Health Care Industry Cluster (2005 Million \$)

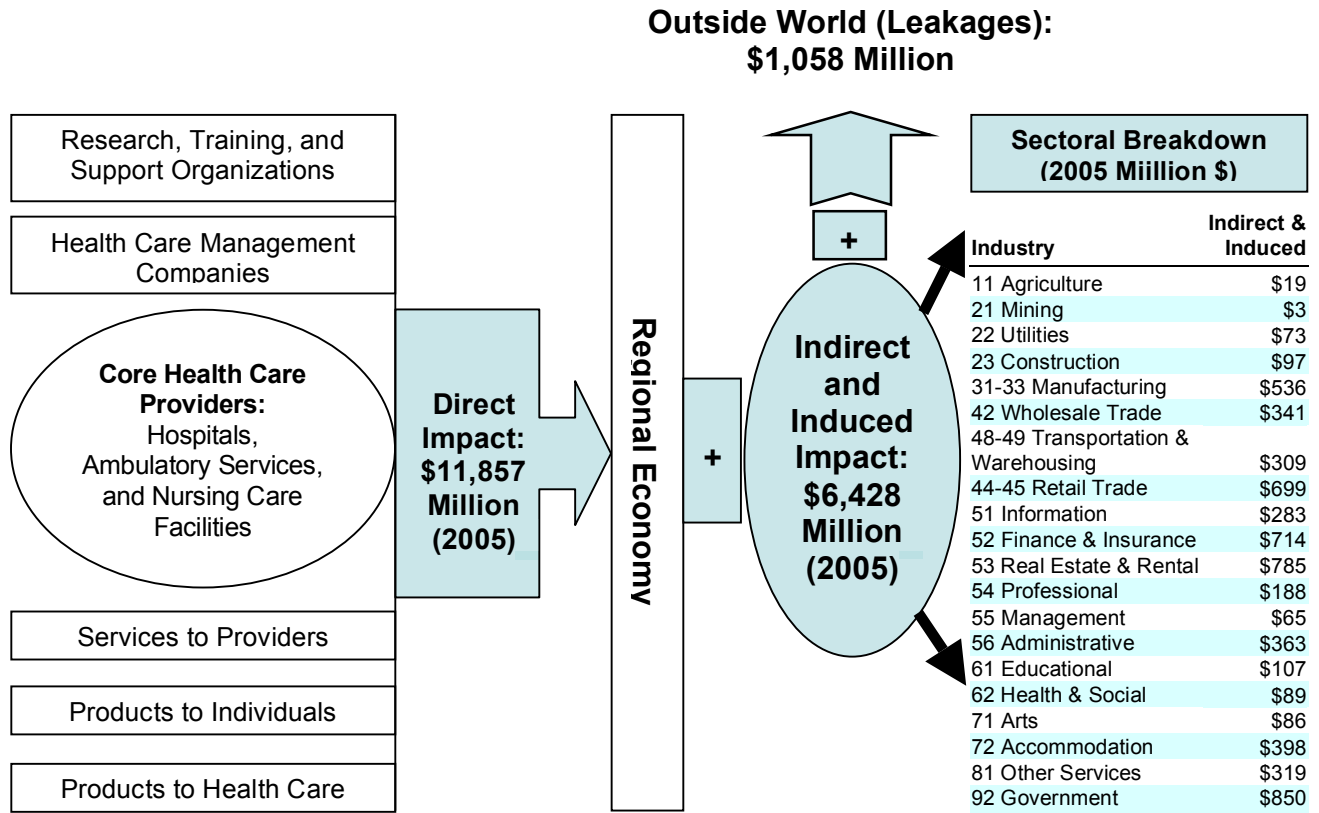
Impact Category	Direct	Indirect	Induced	Total	Multiplier
Health Education	\$120.7	\$32.9	\$45.7	\$199.3	1.65
Health Care Services	\$9,239.9	\$1,593.6	\$3,893.2	\$14,726.7	1.59
Direct Medical Insurance	\$122.6	\$34.2	\$23.9	\$180.7	1.47
Health Care Management & Consulting Companies	\$588.2	\$79.1	\$176.8	\$844.2	1.44
Medical Device & Equipment Manufacturing	\$542.4	\$25.2	\$21.0	\$588.6	1.09
Medical Research and Public Health	\$667.9	\$99.4	\$82.5	\$849.7	1.27
Health Care Products Retail Stores (Pharmacies, etc.)	\$244.1	\$51.6	\$84.7	\$380.4	1.56
Health Care Wholesale	\$331.0	\$73.4	\$110.8	\$515.3	1.56
Health Care Industry Cluster Total	\$11,856.8	\$1,989.4	\$4,438.6	\$18,284.8	1.54

¹⁹ Ratios for total business revenues and personal income are obtained from the IMPLAN model and applied to the Bureau of Economic Analysis figures. Gross regional product (GRP) for Nashville is calculated by using the following method: Nashville MSA GRP = (Tennessee's GRP/Tennessee's Personal Income) x Nashville MSA's Personal Income.

Sectoral Impact

The real estate and rental sector in Nashville greatly benefits from the health care industry cluster, garnering \$785 million in business revenues as a result. Moreover, leakage outside of Nashville is around \$1 billion across sectors.

Output Impact of Nashville Health Care Cluster



Industry Linkages

Every \$1,000 in business revenue generated by the health care industry cluster generates additional revenue of \$72 in government, \$66 in real estate and rental, \$60 in finance and insurance, and \$59 in retail trade. Other sectors seeing substantial benefits are manufacturing (\$45), accommodation (\$34), and administrative services (\$31). The impact on other sectors ranges from \$29 in wholesale to \$0.22 in mining.

Output Linkages between Health Care Industry Cluster and Major Sectors of Nashville's Economy

Industry	Indirect & Induced (million \$)	Revenues generated per \$1,000 health care industry cluster output
92 Government	\$850	\$71.65
53 Real Estate & Rental	\$785	\$66.22
52 Finance & Insurance	\$714	\$60.25
44-45 Retail Trade	\$699	\$58.94
31-33 Manufacturing	\$536	\$45.19
72 Accommodation	\$398	\$33.56
56 Administrative	\$363	\$30.63
42 Wholesale Trade	\$341	\$28.74
81 Other Services	\$319	\$26.90
48-49 Transportation & Warehousing	\$309	\$26.06
51 Information	\$283	\$23.88
54 Professional	\$188	\$15.82
61 Educational	\$107	\$9.02
23 Construction	\$97	\$8.19
62 Health & Social	\$89	\$7.52
71 Arts	\$86	\$7.27
22 Utilities	\$73	\$6.13
55 Management	\$65	\$5.52
11 Agriculture	\$19	\$1.60
21 Mining	\$3	\$0.22

V.4.c. Personal Income Impact

The Nashville health care industry cluster generates a total of \$8.4 billion in personal income for the local economy with \$6.3 billion directly injected. This corresponds to nearly 18 percent of the Nashville MSA's and five percent of Tennessee's total personal income in 2004. Moreover, every \$100 of personal income generates an additional \$33 in the local economy. The average income per health care industry cluster job is \$66,776.

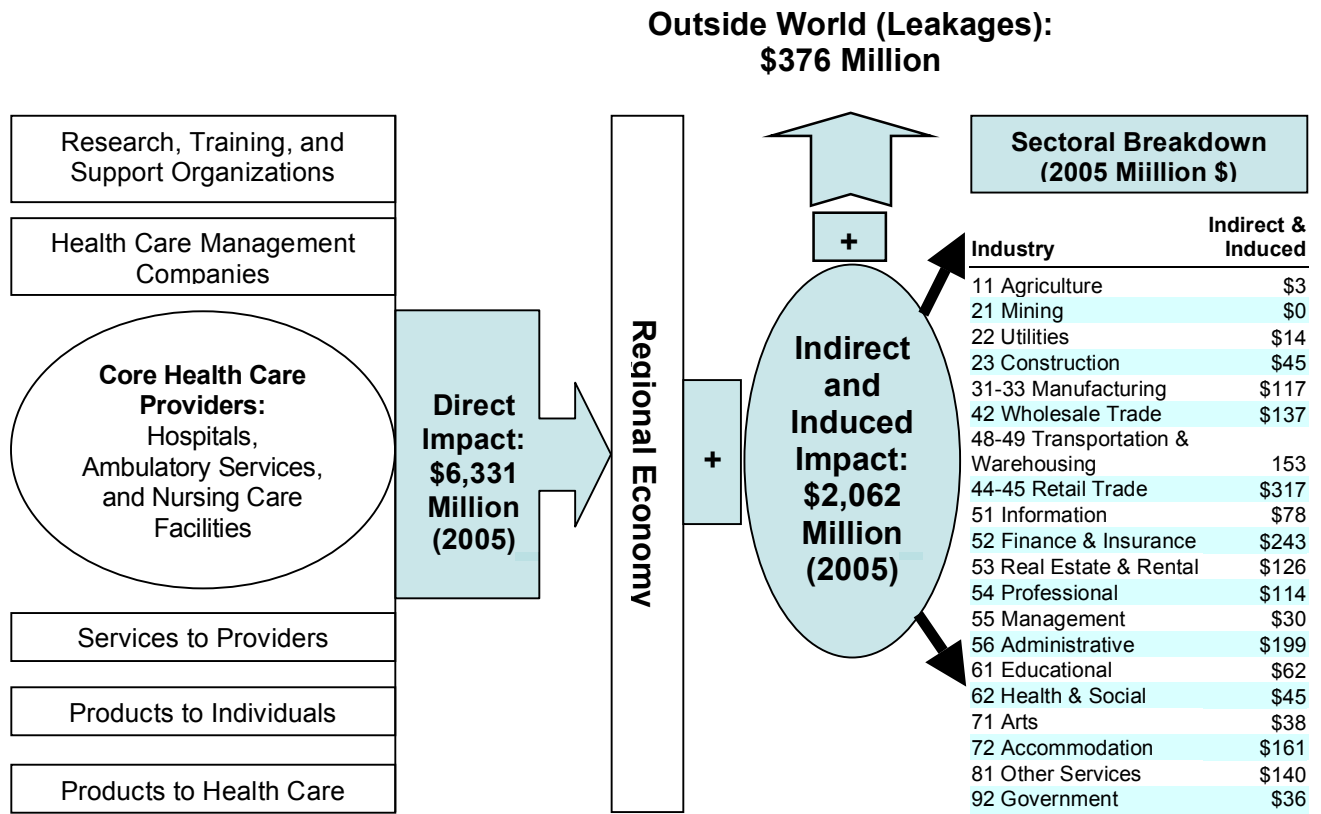
Personal Income (2005 Million \$)

	Direct	Indirect	Induced	Total	Multiplier
Health Education	\$71.1	\$10.1	\$14.3	\$95.5	1.34
Health Care Services	\$5,402.7	\$527.4	\$1,218.3	\$7,148.4	1.32
Direct Medical Insurance	\$34.1	\$13.6	\$7.5	\$55.2	1.62
Health Care Management and Consulting Companies	\$348.4	\$30.6	\$55.3	\$434.3	1.25
Medical Device and Equipment Manufacturing	\$100.8	\$9.1	\$6.6	\$116.5	1.16
Medical Research and Public Health	\$129.5	\$34.9	\$25.8	\$190.2	1.47
Health Care Products Retail Stores (Pharmacies, etc.)	\$110.9	\$18.6	\$26.5	\$155.9	1.41
Health Care Wholesale	\$133.5	\$28.7	\$34.7	\$196.8	1.47
Health Care Industry Cluster Total	\$6,330.8	\$673.1	\$1,388.9	\$8,392.8	1.33

Sectoral Impact

The largest sectoral impact is in retail trade with \$317 million. Total outside leakage is estimated at \$376 million across sectors.

Personal Income Impact of Nashville Health Care Cluster



Industry Linkages

Every \$1,000 in personal income earned in the health care industry cluster creates an additional \$50 in retail trade, \$38 in finance and insurance, and \$32 in administrative services. In addition, there are substantial impacts on accommodation (\$26), transportation and warehousing (\$24), other services (\$22), and wholesale trade (\$22). Finally, the impact on other sectors ranges from \$20 in the real estate and rental sector to \$0.04 in the mining sector.

**Personal Income Linkages between Health Care Industry Cluster
and Major Sectors of Nashville's Economy**

Industry	Indirect & Induced (million \$)	Personal income created by sector per \$1,000 personal income in health care industry cluster
44-45 Retail Trade	\$317	\$50.05
52 Finance & Insurance	\$243	\$38.42
56 Administrative	\$199	\$31.46
72 Accommodation	\$161	\$25.49
48-49 Transportation & Warehousing	\$153	\$24.20
81 Other Services	\$140	\$22.15
42 Wholesale Trade	\$137	\$21.71
53 Real Estate & Rental	\$126	\$19.85
31-33 Manufacturing	\$117	\$18.49
54 Professional	\$114	\$17.95
51 Information	\$78	\$12.39
61 Educational	\$62	\$9.73
62 Health & Social	\$45	\$7.15
23 Construction	\$45	\$7.05
71 Arts	\$38	\$6.06
92 Government	\$36	\$5.64
55 Management	\$30	\$4.76
22 Utilities	\$14	\$2.15
11 Agriculture	\$3	\$0.40
21 Mining	\$0	\$0.04

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

The Nashville health care industry cluster accounts for \$459 million in state and local sales tax and residential property tax. This corresponds to nearly 19.2 percent of sales, residential property, and gasoline taxes collected within the Nashville MSA. The Nashville health care industry cluster accounts for one-fifth of the total tax revenues collected within the Nashville MSA. The BERC estimates the sales tax figures by using the BLS consumer expenditure survey. The BERC estimates that taxable spending is about 48 percent of gross income. The BERC excluded many business-related taxes and fees from this calculation.

Estimated Fiscal Impact of Nashville Health Care Industry Cluster

Major Sectors	Personal Income*	Estimated Sales Tax**	Estimated Residential Property Tax****	Estimated Gasoline Tax***	Total Fiscal Impact (Million \$)
Health Care Management & Consulting (NAICS 551, 5412, 5415, 5416, 561, 813920)	\$434,300,000	\$18,750,896	\$4,869,362	\$148,281	\$23.77
Health Care Providers (NAICS 621, 622, 623)	\$7,148,400,000	\$308,632,063	\$80,147,709	\$2,440,640	\$391.22
Research, Training and Support Organizations					
Educational (NAICS 6112, 6113, 6115)	\$95,500,000	\$4,123,211	\$1,070,744	\$32,606	\$5.23
Research and Public Health (NAICS 54171, 92312)	\$190,200,000	\$8,211,882	\$2,132,518	\$64,939	\$10.41
Services to Providers (NAICS 524114)	\$55,200,000	\$2,383,259	\$618,901	\$18,847	\$3.02
Products to Health Care Providers					
Manufacturing (NAICS 333314, 3391, 3254)	\$116,500,000	\$5,029,886	\$1,306,196	\$39,776	\$6.38
Wholesalers (NAICS 42345, 42346, 4242)	\$196,800,000	\$8,496,837	\$2,206,517	\$67,192	\$10.77
Products to Individuals (NAICS 44611, 44613)	\$113,835,686	\$6,730,980	\$1,747,947	\$53,228	\$8.53
Total	\$4,286,201,532	\$362,359,014	\$94,099,895	\$2,865,509	\$459.32

Notes: (a) The BERC's estimate of fiscal impact represents only three categories: (1) sales tax due to consumer expenditure, (2) residential property tax, and (3) gasoline tax. This calculation excludes the following major taxes and fees: (1) sales tax due to business-to-business transactions, (2) commercial property tax, (3) excise tax, (4) tax on income and dividends, and (5) any type of fees collected in the Nashville MSA. (b) Total sales tax (local and state), residential property tax, and gasoline tax collected in the Nashville MSA amount to \$2.393 billion, of which the Nashville MSA health care industry cluster accounts for 19.21 percent. *Personal income includes direct, indirect and induced personal income. **Sales tax estimates are based on total personal income and the following assumptions: (1) The BERC utilizes the Bureau of Labor Statistics Consumer Expenditure Survey to calculate the portion of income subject to sales tax as well as how income is distributed across expenditure categories, and (2) the BERC applies an effective tax rate of 8.87 percent to the taxable income to estimate the sales tax. Overall, the BERC assumes that 47.8 percent of total income is subject to sales tax. ***Gasoline tax is estimated from total state gasoline tax using personal income ratios. ****Residential property tax in the Nashville MSA is estimated at around \$535.147 million in 2004. BERC used an income-weighted ratio to calculate the share of the Nashville MSA's health care industry cluster.

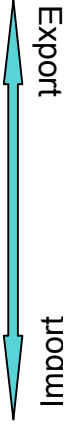
VI. NASHVILLE’S CORE HEALTH CARE INDUSTRY FROM A COMPARATIVE PERSPECTIVE

VI.1. Export Potential (Services Provided to People Not Living in the Nashville MSA)

The Nashville MSA’s health care industry overall has better export potential than 10 comparable MSAs. The long-term care facilities segment, however, currently cannot accommodate local demand, as suggested by its location quotient ($LQ < 1$). The aging population is likely to increase the demand for long-term care facilities.

Export Potential of Specific Health Care Sectors by MSA

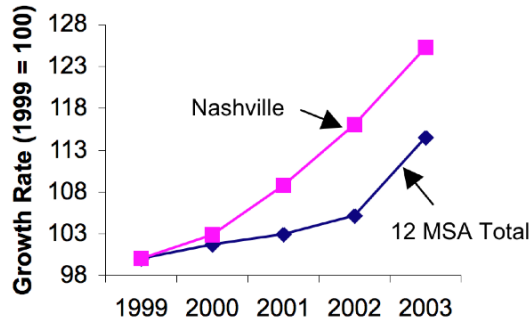
MSA	Ambulatory Services	Hospitals	Nursing Care	Total Health Care
Louisville	1.08	1.17	0.93	1.08
Nashville	1.05	1.18	0.76	1.03
Birmingham	1.04	1.18	0.77	1.03
Jacksonville	1.03	1.12	0.87	1.02
Indianapolis	0.93	1.09	0.87	0.97
Kansas City	1.01	0.95	0.87	0.95
Columbus	0.98	0.81	1.04	0.93
Dallas	1.03	0.75	0.73	0.86
Richmond	0.95	0.76	0.79	0.84
Denver	0.96	0.63	0.66	0.77
Atlanta	0.84	0.82	0.44	0.74
Charlotte	0.76	0.34	0.82	0.62
Raleigh	0.84	0.37	0.61	0.62



Notes: Ranked by total health care sector. A score over “1” indicates that MSA is exporting goods and services in that sector. A score less than “1” indicates that goods and services in that sector are primarily used by domestic consumption. Source: Bureau of Labor Statistics and BERC estimates.

VI.2. Growth Trend

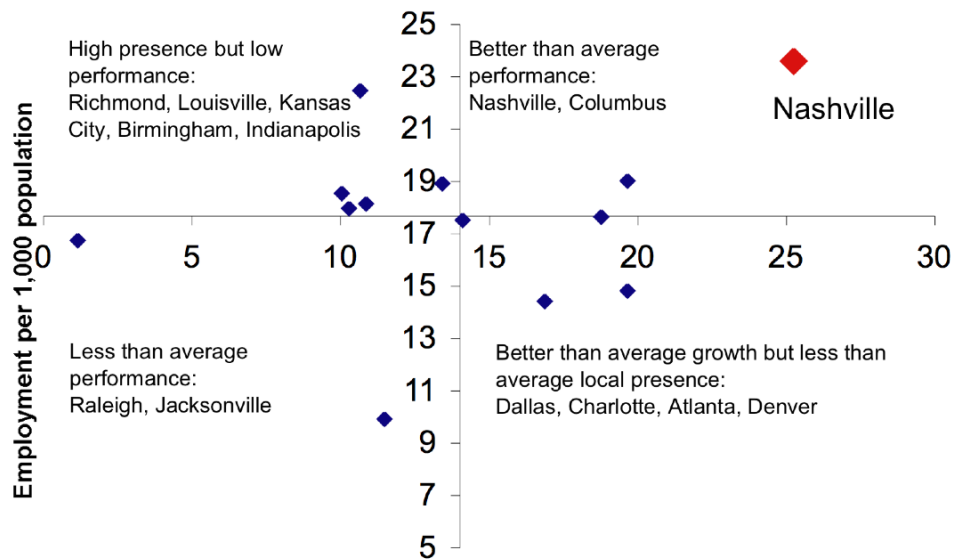
Growth Trend of Ambulatory Health Service Employment: Nashville vs. 12 MSAs



VI.2.a. Ambulatory Services

The growth of Nashville’s ambulatory health services outpaced all of the other 12 MSAs. A similar trend is visible in hospital employment growth. However, in the area of nursing care facilities, the 12 MSAs showed faster growth than Nashville. The Nashville MSA performs better than the 12 other MSAs in terms of growth and employment per 1,000 people in ambulatory services.

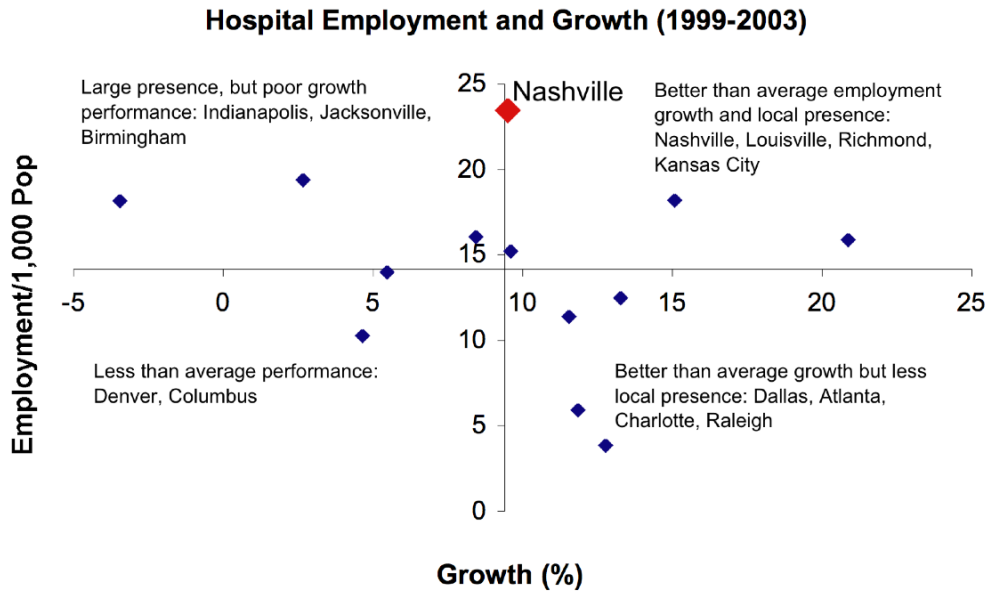
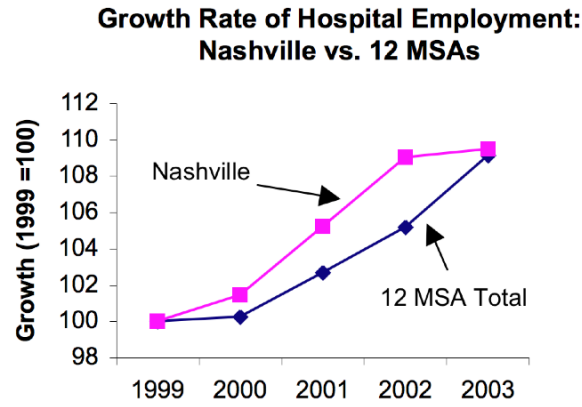
Ambulatory Services Employment and Growth (1999-2003)



Growth (%): Lines intersect at the averages of 13 MSAs

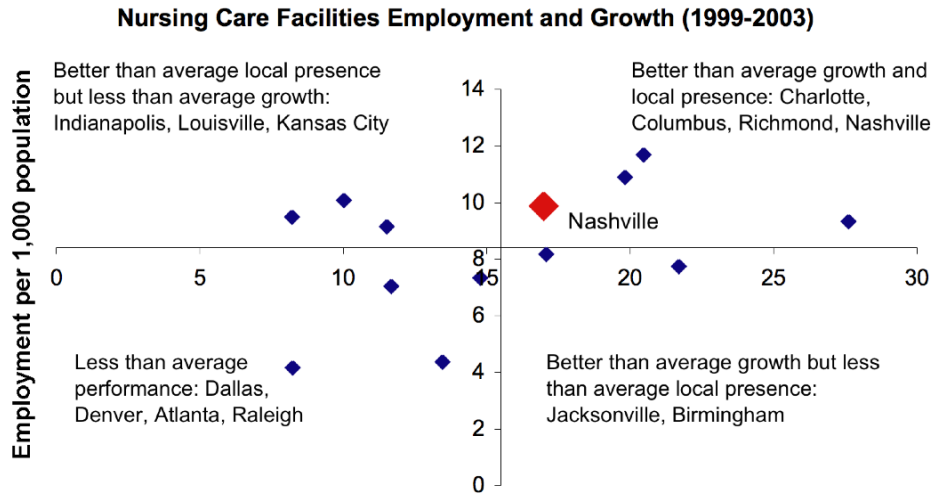
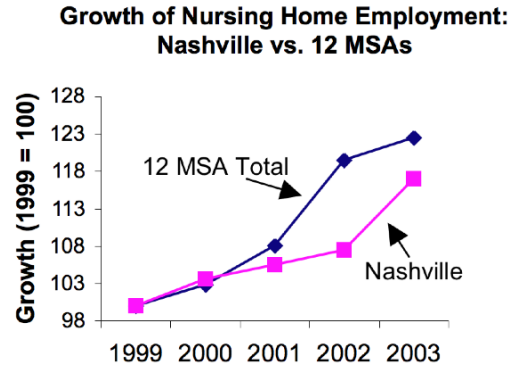
VI.2.b. Hospitals

The Nashville MSA performs better than average in hospital employment growth.



VI.2.c. Nursing and Residential Care Facilities

Nashville's performance is better than average in the area of nursing care facilities employment and growth; however, it lags behind Charlotte, Columbus, and Richmond.



Growth (%): Lines intersect at the averages of 13 MSAs

VI.3. Headquarters and Their Global Impact

Nashville ranks first among the 13 MSAs in terms of number of major health care management companies (both public and private), their revenues, and employment.

Comparative Perspective on Health Care Headquarter Companies* (Public and Private)

MSAs	Number of Headquarters	Total Revenues (2004 Billion \$)	Total Employment ('000)	Composite Score	Rank
Nashville	33	\$62.1	335.7	0.95	1
Dallas	39	\$26.8	229.8	0.83	2
Columbus	12	\$69.6	78.9	0.60	3
Indianapolis	12	\$43.5	112.1	0.59	4
Atlanta	43	\$7.2	55.6	0.54	5
Louisville	9	\$19.6	119.0	0.46	6
Denver	23	\$4.9	33.8	0.40	7
Birmingham	13	\$13.1	77.1	0.40	8
Richmond	7	\$18.4	23.9	0.31	9
Charlotte	9	\$8.3	48.0	0.30	10
Raleigh	13	\$1.1	9.8	0.26	11
Kansas City	7	\$1.8	9.5	0.21	12
Jacksonville	3	\$1.5	3.4	0.18	13

Notes: * Companies with greater than \$500,000 in annual revenue. Source: Mergent Online, ReferenceUSA, Individual Company Websites, Hoovers.com, and BERC estimates. Note: Composite score includes relative rankings of each MSA with regard to (1) the number of headquarter companies, (2) their total revenues, and (3) their total number of employees.

VI.4. Health Care Occupations

Nashville ranks fourth among the 13 MSAs in terms of percent of health care occupations in total occupations.

Health Care Practitioners and Support Occupations

MSA	Health Care Occupations as Percent in Total	Total
Birmingham	9.17	41,700
Louisville	8.58	46,180
Raleigh	7.89	53,600
Nashville	7.76	52,660
Kansas City	7.61	71,460
Indianapolis	7.59	66,240
Columbus	7.47	64,020
Richmond	7.33	40,370
Jacksonville	6.69	36,400
Charlotte	6.50	53,150
Denver	5.92	67,180
Dallas	5.58	105,650
Atlanta	5.50	119,310

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

VI.5. Venture Capital Flow

Tennessee ranks third among 12 states in terms of venture capital flow in medical devices, equipment, health services, and biotechnology. The total value of venture capital in these areas between 1995 and 2005 in Tennessee was more than \$1 billion. Because of data availability, state-level figures are used. However, the major MSAs in these states are the primary recipients of these capital flows.

Venture Capital Flow by State between 1995 and 2005* in Medical Devices and Equipment, Health Services, and Biotechnology (Million \$)

MSAs	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005**	Total (1995-2005) Rank***	
Tennessee (Nashville)	\$143.7	\$101.9	\$68.6	\$72.0	\$324.3	\$102.0	\$39.3	\$58.2	\$57.9	\$63.7	\$27.1	\$1,058.8	3
Alabama (Birmingham)	\$13.4	\$8.9	\$94.2	\$31.6	\$3.7	\$26.2	\$7.7	\$20.4	\$4.5	\$35.7	\$0.0	\$246.3	10
Colorado (Denver)	\$56.7	\$28.8	\$36.5	\$59.5	\$62.4	\$126.6	\$181.9	\$106.1	\$77.3	\$89.9	\$59.5	\$885.1	5
Florida (Jacksonville)	\$13.9	\$44.2	\$45.4	\$127.3	\$143.6	\$126.3	\$59.3	\$36.2	\$36.0	\$33.4	\$16.0	\$681.7	7
Georgia (Atlanta)	\$32.6	\$111.7	\$116.7	\$64.0	\$153.3	\$91.4	\$116.0	\$125.9	\$53.3	\$80.4	\$13.8	\$959.0	4
Indiana (Indianapolis)	\$0.0	\$1.4	\$4.2	\$0.0	\$4.0	\$19.5	\$7.6	\$13.6	\$23.9	\$50.9	\$1.5	\$126.6	12
Kentucky (Louisville)	\$0.1	\$1.3	\$14.4	\$18.3	\$2.0	\$19.8	\$17.3	\$12.4	\$1.7	\$46.4	\$17.0	\$150.7	11
Missouri (Kansas City)	\$15.7	\$13.9	\$9.6	\$45.0	\$3.5	\$36.1	\$34.9	\$41.7	\$30.4	\$26.1	\$41.1	\$298.1	9
North Carolina (Charlotte & Raleigh)	\$50.2	\$104.7	\$107.3	\$106.9	\$198.5	\$320.1	\$206.9	\$265.2	\$176.1	\$184.9	\$77.6	\$1,798.4	1
Ohio (Columbus)	\$6.7	\$14.2	\$22.6	\$23.2	\$71.2	\$58.6	\$26.6	\$42.3	\$27.9	\$9.5	\$35.0	\$337.8	8
Texas (Dallas)	\$35.9	\$117.1	\$125.9	\$147.0	\$101.8	\$106.0	\$169.3	\$108.3	\$111.6	\$121.9	\$51.6	\$1,196.5	2
Virginia (Richmond)	\$150.3	\$82.8	\$55.5	\$124.5	\$87.2	\$186.9	\$56.5	\$4.3	\$18.7	\$30.9	\$4.0	\$801.6	6
U.S. Total	\$1,853.6	\$2,420.6	\$3,262.4	\$3,638.9	\$5,052.1	\$8,207.2	\$5,870.9	\$5,369.5	\$5,431.8	\$6,190.0	\$2,873.6	\$50,170.6	

Source: PricewaterhouseCoopers/Venture Economics/National Venture Capital Association MoneyTree(tm) Survey
 Notes: *Data reflect the venture capital flow in the following sectors: (1) medical devices and equipment, (2) health services, and (3) biotechnology. **2005 values include the first two quarters. ***Ranking is based on the cumulative value (1995-2005).

Venture Capital by Sectoral Breakdown

Total value of venture capital in Tennessee between 1995 and 2005 was \$235 million in medical equipment, \$706 million in health services, and \$119 million in biotechnology. Tennessee's share of venture capital in health services in U.S. health services venture capital was 9.21 percent. Much of this amount flowed to the Nashville MSA. This assigns a clear leadership position to Nashville in access to funding for health care services companies.

Venture Capital Flow by State between 1995 and 2005 (Million \$)

	Medical Equipment	Health Services	Biotechnology
MSAs			
Tennessee (Nashville)	\$234.54	\$705.48	\$118.73
Alabama (Birmingham)	\$37.70	\$129.82	\$78.78
Colorado (Denver)	\$213.72	\$39.61	\$631.84
Florida (Jacksonville)	\$177.84	\$429.80	\$74.07
Georgia (Atlanta)	\$411.60	\$315.96	\$231.38
Indiana (Indianapolis)	\$14.67	\$33.97	\$77.95
Kentucky (Louisville)	\$27.90	\$49.71	\$73.04
Missouri (Kansas City)	\$192.01	\$64.20	\$41.91
North Carolina (Charlotte & Raleigh)	\$497.54	\$234.06	\$1,066.80
Ohio (Columbus)	\$137.26	\$15.42	\$185.14
Texas (Dallas)	\$237.97	\$406.59	\$551.93
Virginia (Richmond)	\$110.37	\$576.88	\$114.30
U.S. Total	\$15,427.39	\$7,664.05	\$27,079.12
% in U.S. Total			
Tennessee (Nashville)	1.52	9.21	0.44
Alabama (Birmingham)	0.24	1.69	0.29
Colorado (Denver)	1.39	0.52	2.33
Florida (Jacksonville)	1.15	5.61	0.27
Georgia (Atlanta)	2.67	4.12	0.85
Indiana (Indianapolis)	0.10	0.44	0.29
Kentucky (Louisville)	0.18	0.65	0.27
Missouri (Kansas City)	1.24	0.84	0.15
North Carolina (Charlotte & Raleigh)	3.23	3.05	3.94
Ohio (Columbus)	0.89	0.20	0.68
Texas (Dallas)	1.54	5.31	2.04
Virginia (Richmond)	0.72	7.53	0.42

Source: PricewaterhouseCoopers/Thomson Venture Economics/National Venture Capital Association MoneyTree(tm) Survey and BEREC estimates

VII. NASHVILLE HEALTH CARE COUNCIL (NHCC) MEMBER COMPANIES

VII.1. Survey Methodology

The BERC mailed surveys to 111 NHCC member companies with follow-up reminders from the NHCC. Consequently, 35 companies responded with a response rate of 31 percent. The BERC estimated the missing figures using company databases (e.g., ReferenceUSA, Mergent Online), individual member company Web sites, and other sources (e.g., the NHCC surveys). Through these methods of extrapolation, the BERC prepared profiles for 90 member companies.

The NHCC has a diverse group of member companies, ranging from direct health care providers to health care management companies to health care IT to health care finance to such professional service providers as law and architecture firms. The BERC survey asked companies to report their health care related employment, sales, office space, federal research money, payroll, and operating sites—both in Nashville and total.

The survey responses were then processed to fit the following broader industry categories defined by the BERC to protect confidentiality: (1) health care education; (2) health care finance, real estate, insurance, and investment; (3) health care information technology and other support; (4) health care management and consulting; (5) health care providers; and (6) medical equipment (manufacturing, wholesale, and retail sale). The survey materials are provided in the appendix.

Because the NHCC member companies represent a diverse group, they are different from the previous two classifications of the health care industry presented in this report: core health care providers and health care industry cluster. Core health care providers is a narrow definition of the sector that includes only companies providing direct services to individuals. Health care industry cluster includes the first group of companies plus companies that are directly linked to the core providers sector. The NHCC member companies are more diverse than the previous two classifications in terms of the industry segment. Readers should review this study with these salient differences between the three groups in mind.

VII.2. Employment and Payroll by Type of Company: NHCC Members

NHCC member companies employ 41,234 people in the Nashville MSA. The total Nashville-based payroll is \$3.6 billion. The average payroll per employee is \$86,030, substantially higher than the average nonfarm wage in the Nashville MSA. According to the Bureau of Economic Analysis (www.bea.gov) figures, the average annual wage in the Nashville MSA in 2003 was \$35,449. Considering the difference, NHCC member companies command substantial purchasing power in the Nashville MSA. This has profound implications for the local tax base.

Many NHCC member companies are large corporate headquarters and health care management companies. These companies employ highly skilled individuals who are experts in their respective fields. As previously discussed, these are some of the benefits that corporate headquarters bring to a region.

There are many studies that highlight the role of corporate citizenship in a community. Large companies, especially in health care, traditionally make substantial contributions to local charities, civic organizations, and local governments as well as individuals through direct cash donations, volunteer time, matching employee donations, in-kind contributions, and charity care. Unfortunately, this survey was not designed to address corporate citizenship of NHCC member companies.

Employment and Payroll by Type of Company: NHCC Members (as of May 2005)

Aggregate Industry Classification	Nashville Employment	Nashville Payroll	Payroll per Employee
Health Care Education*	1,604	\$68,482,336	\$42,695
Health Care Finance, Real Estate, Insurance and Investment	4,807	\$705,097,968	\$146,681
Health Care Information Technology and Other Support	219	\$18,964,194	\$86,594
Health Care Management and Consulting Companies	5,087	\$457,703,934	\$89,975
Health Care Providers** Medical Equipment (Manufacturing, Wholesale and Retail Sale)	28,820	\$2,263,053,740	\$78,525
	697	\$34,025,619	\$48,817
Total	41,234	\$3,547,327,791	\$86,030

Notes: *Health care education component of Vanderbilt Medical Center is included under health care providers. **Management component of HCA, Inc., is included under health care providers.

VII.3. Revenues and Office Space by Type of Company: NHCC Members

NHCC member companies occupy more than 13 million square feet of office space in the Nashville MSA. This study does not differentiate between the different types of commercial spaces NHCC member companies occupy. The 13 million square feet could be in any combination of retail, office, industrial, or medical office space.²⁰ As of the third quarter of 2005, retail space in the Nashville MSA occupies 29.937 million square feet, office space 26.137 million square feet, and industrial space 150.276 million square feet.²¹ NHCC member companies occupy about 7.4 percent of office and industrial space in the Nashville MSA.

Total Nashville-based sales of NHCC member companies are estimated at around \$17 billion, which corresponds to about 4.4 percent of Tennessee’s business revenues.

Revenues and Office Space by Type of Company: NHCC Members

Aggregate Industry Classification	Office Space in Nashville MSA***	Sales in Nashville MSA
Health Care Education*	631,123	\$287,215,527
Health Care Finance, Real Estate, Insurance, and Investment	2,126,727	\$2,047,713,136
Health Care Information Technology and Other Support	54,750	\$59,360,850
Health Care Management and Consulting Companies	1,112,706	\$1,251,297,553
Health Care Providers**	9,154,100	\$7,272,437,509
Medical Equipment (Manufacturing, Wholesale and Retail Sale)	74,500	\$6,109,766,510
Total	13,153,906	\$17,027,791,085

Notes: *Health care education component of Vanderbilt Medical Center is included under health care providers. **Management component of HCA, Inc., is included under health care providers. ***Nashville Health Care Council member companies account for more than 13 million square feet of office space in Nashville, of which 83 percent is based on survey-based response, while the remaining 17 percent is estimated using an employment density figure of 250 square feet per employee. This figure is used by many buildout studies and corresponds to national average office space per employee. We must, however, acknowledge that for many member companies employment square footage per employee is most likely to fluctuate between 200 and 800, representing ambulatory services/hospitals and wholesales, respectively. Source: MTSU BERC Survey of Nashville Health Care Council member companies, ReferenceUSA, Mergent Online, individual company Web sites, and various literature on employment density by sectors.

²⁰ For a review of the Nashville office market, see quarterly reports at <http://www.colliers.com/Markets/Nashville/> and <http://www.cbre.com/USA/Research/Market+Reports/Local+Reports+Worldwide/globalresearch.htm>.

²¹ See CB Richard Ellis MarketView reports for Nashville at <http://www.cbre.com/USA/Research/Market+Reports/Local+Reports+Worldwide/globalresearch.htm>.

VII.4. Nashville Operating Sites and Federal Research Money by Type of Company:

NHCC Members

NHCC member companies have 331 health care related operating sites in the Nashville MSA. Nashville operating sites include all operating sites besides the main operating site. Therefore, this calculation of operating sites does not include the main office.

NHCC member companies received federal research grants totaling \$267 million in 2004.

Nashville Operating Sites and Federal Research Money by Type of Company: NHCC Members

Aggregate Industry Classification	Federal Research Money	Nashville Operating Sites
Health Care Education*	\$117,000	3
Health Care Finance, Real Estate, Insurance and Investment	\$0	2
Health Care Information Technology and Other Support		
Health Care Management and Consulting Companies	\$10,000	216
Health Care Providers**	\$267,300,000	100
Medical Equipment (Manufacturing, Wholesale and Retail Sale)		10
Total	\$267,427,000	331

Notes: *Health care education component of Vanderbilt Medical Center is included under health care providers. **Management component of HCA, Inc., is included under health care providers.

VII.5. Global Impact of NHCC Member Companies

NHCC member companies employ 838,788 people globally with a total payroll of \$37 billion. Moreover, NHCC member companies' total sales equal \$179 billion annually from the operation of 4,319 sites globally.

The reader should keep in mind two issues concerning the calculation of employment, payroll, and revenues of NHCC member companies when reading the following table: (1) data are missing for some companies (the BEREC consulted several sources to capture the global impact of NHCC member companies), and (2) in cases where companies reported total employment and monetary figures rather than health care related figures, the BEREC took into account total employment, revenue, and payroll (whether health care related or not).

Global Impact of NHCC Member Companies

Aggregate Industry Classification	Global Employment****	Total Operating Sites	Total Payroll (Million \$)***	Total Sales (Million \$)***
Health Care Education*	1,604	2	\$46	\$1
Health Care Finance, Real Estate, Insurance and Investment	273,437	9	\$67	\$932
Health Care Information Technology and Other Support	10,182		\$0	\$40
Health Care Management and Consulting Companies	66,718	3,326	\$1,170	\$8,797
Health Care Providers**	339,077	708	\$11,652	\$79,952
Medical Equipment (Manufacturing, Wholesale and Retail Sale)	147,770	274	\$24,095	\$89,906
Total	838,788	4,319	\$37,028	\$179,627

Notes: *Health care education component of Vanderbilt Medical Center is included under health care providers. **Management component of HCA, Inc., is included under health care providers. ***Data are missing for some companies.

****Data include both health care and non-health care related figures.

The table below clearly demonstrates that NHCC member companies have substantial worldwide impact on both health care related and other businesses. When compared with countries in terms of total revenues, NHCC member company revenues rank 31st out of 173 countries for which recent gross domestic product (GDP) data are available.

Country Rank by Gross Domestic Product (GDP 2004) (in Billions U.S. \$)

Country	2004 GDP	Rank by GDP
United States	\$11,668	1
Japan	\$4,623	2
Germany	\$2,714	3
United Kingdom	\$2,141	4
France	\$2,003	5
Switzerland	\$359	17
Belgium	\$350	18
Sweden	\$346	19
Turkey	\$302	20
Austria	\$290	21
Greece	\$203	28
Finland	\$187	29
Ireland	\$184	30
NHCC Member Companies	\$180	31
Portugal	\$168	32

Source: World Development Indicators (World Bank)

VIII. WHERE DOES THE NASHVILLE MSA STAND RELATIVE TO ITS PEER MSAs?

There are many studies for both academic and public policy purposes that analyze quality of life, business climate, infrastructure, and socioeconomic productivity across cities. While many of these studies are comprehensive in terms of their use of indicators and coverage area, some focus on a single issue, such as education.²² The rankings serve many purposes: business groups use them as a marketing tool, policymakers address the deficiencies in their respective regions, and individuals and businesses make their relocation decisions based on these rankings. From these perspectives, the rankings play an important role in understanding socioeconomic dynamics across regions.

A glance at various rankings of Nashville demonstrates that Nashville is in the top 10 among comparable MSAs in terms of infrastructure ranking and human capital ranking.²³ Over the years, *Expansion Management* and *Business Facilities* magazines have ranked Nashville among the top metro areas in which to do business, and Nashville has topped *Expansion Management's* list of the 50 hottest cities for business expansion and relocation two years consecutively in 2005 and 2006.²⁴ Along similar lines, this study provides rankings of 13 comparable MSAs in the area of health care services. This study uses two categories of ranking: health care business climate and health care infrastructure. For ranking purposes, the BERC identified 15 indicators for the health care business climate and 16 for health care infrastructure.

Selection of indicators was affected by (1) availability of reliable data across peer MSAs and (2) literature on business climate and infrastructure indicators. Before rankings, each indicator is converted to a unitless relative score bounded between zero and one [0, 1]. These relative scores are then averaged across indicators for each MSA within the given category (business climate or infrastructure).

²² 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.

²³ See Carstensen et al. (2001). These rankings are based on 56 comparable MSAs in the U.S.

²⁴ For a list of rankings, see Nashville Area Chamber of Commerce at <http://www.nashvillechamber.com/>.

The BEREC'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.

VIII.1. Health Care Business Climate Indicators

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

Health Care Business Environment

MSAs	Kansas										Richmond Average			
	Atlanta	Birmingham	Charlotte	Columbus	Dallas	Denver	Indianapolis	Jacksonville	City	Louisville		Nashville	Raleigh	
BAMCE	14.43	17.99	14.82	19.03	17.65	17.53	18.56	16.75	18.14	18.93	23.60	9.92	22.48	17.68
BAMGR	16.87	10.29	19.66	19.66	18.77	14.11	10.04	1.15	10.84	13.42	25.24	11.48	10.65	14.01
BEPAMS	0.84	1.04	0.76	0.98	1.03	0.96	0.93	1.03	1.01	1.08	1.05	0.84	0.95	0.96
BEPH	0.82	1.18	0.34	0.81	0.75	0.63	1.09	1.12	0.95	1.17	1.18	0.37	0.76	0.86
BEPNF	0.44	0.77	0.82	1.04	0.73	0.66	0.87	0.87	0.87	0.93	0.76	0.61	0.79	0.78
BHCE	12.49	18.17	5.92	13.98	11.40	10.29	19.37	16.04	15.21	18.19	23.46	3.87	15.88	14.17
BHESTE	9.76%	11.62%	8.38%	11.03%	10.17%	9.98%	12.07%	11.65%	11.16%	12.42%	13.76%	9.20%	10.71%	10.92%
BHGR	13.26	-3.47	11.84	5.47	11.54	4.65	2.66	8.43	9.60	15.07	9.51	12.77	20.87	9.40
BHMHPR	\$36.86	\$34.48	\$37.11	\$35.60	\$31.32	\$37.19	\$34.66	\$32.67	\$34.40	\$34.63	\$35.54	\$36.49	\$34.27	\$35.02
BHOTNF	5.50	9.17	6.50	7.47	5.58	5.92	7.59	6.69	7.61	8.58	7.76	7.89	7.33	7.20
BHQCTE	55.60	77.10	47.98	78.90	229.80	33.80	112.10	3.40	9.49	119.00	335.70	9.77	23.90	87.43
BHQCTR	\$7.20	\$13.10	\$8.27	\$69.60	\$26.80	\$4.90	\$43.50	\$1.51	\$1.77	\$19.60	\$62.10	\$1.10	\$18.40	\$21.37
BNHQC	43	13	9	12	39	23	12	3	7	9	33	13	7	17
BNURCE	4.36	7.75	9.32	11.69	7.35	7.05	10.07	8.18	9.16	9.49	9.88	4.18	10.89	8.41
BNURGR	13.45	21.69	27.62	20.47	14.77	11.68	10.02	17.09	11.52	8.21	16.99	8.24	19.81	15.50

Health Care Business Climate Data Guide

Health Care Business Climate Data Guide

Abbreviation	Short Description	Long Description	Source	Year
	Current ambulatory services employment per capita	Ambulatory services employment per 1,000 population	Bureau of Labor Statistics (BLS)	2004
BAMGR	Growth rate of ambulatory services (%)	Growth rate of ambulatory services employment between 1999 and 2003	BLS	2004
BEPAMS	Export potential of ambulatory services (LQ)	Location quotient of employment in ambulatory services	BERC, BLS	2004
BEPH	Export potential of hospitals (LQ)	Location quotient of employment in hospitals	BERC, BLS	2004
BEPNF	Export potential of nursing facilities (LQ)	Location quotient of employment in nursing care facilities	BERC, BLS	2004
BHCE	Current hospital employment per capita	Hospital employment per 1,000 population	BLS	2004
BHESTE	Health care employment share (%)	Percent of health care and social services employment in total nonfarm employment	BLS	2005
BHGR	Growth rate of hospital employment (%)	Growth rate of hospital employment between 1999 and 2003	BLS	2004
BHMHPR	Health care pay rate (\$/H)	Hourly pay rate for health managers occupation	BLS	2005
BHOTNF	Health care occupations (%)	Percent of healthcare occupations in total regional occupations	BLS	2005
BHQCTE	Total employment ('000)	Total employment of health care headquartered companies	ReferenceUSA, Mergent Online, other sources	2004
BHQCTR	Total revenues (billion \$)	Total revenues of health care headquartered companies	ReferenceUSA, Mergent Online, other sources	2004
BNHQC	Number of headquarters	Number of public and private health care headquartered companies	ReferenceUSA, Mergent Online, other sources	2005
BNURCE	Current nursing care facilities employment per capita	Nursing care facilities employment per 1,000 population	BLS	2004
BNURGR	Growth rate of nursing care facilities (%)	Growth rate of nursing care facilities employment between 1999 and 2003	BLS	2004

VIII.2. Health Care Infrastructure Indicators

Nashville's performance is better than the average of the 13 MSAs in health care cost, unemployment rate, top hospital rankings, venture capital in health services, medical devices and equipment, medical articles per capita, and number of four-year colleges.

Venture capital indicators are state-level indicators. However, a substantial portion of these funds flow to the major MSAs in their respective states.

Health Care Infrastructure Indicators

MSAs	Kansas										Richmond Average			
	Atlanta	Birmingham	Charlotte	Columbus	Dallas	Denver	Indianapolis	Jacksonville	City Louisville	Nashville		Raleigh		
IBH50R	0.47	0.72	0.00	0.85	0.59	0.92	0.58	0.30	0.00	0.36	0.64	0.65	0.00	0.47
ICPDENV	\$81	\$65	\$83	\$76	\$83	\$108	\$73	\$64	\$79	\$65	\$69	\$80	\$70	\$77
ICPDHR	\$497	\$559	\$464	\$618	\$628	\$820	\$525	\$467	\$854	\$473	\$323	\$536	\$494	\$558
ICPDV	\$62	\$59	\$63	\$65	\$73	\$76	\$68	\$63	\$81	\$62	\$60	\$76	\$60	\$67
IFMRD	\$22	\$148	\$0	\$35	\$96	\$58	\$0	\$0	\$0	\$23	\$47	\$123	\$30	\$45
IHBPC	230.4	581.3	281.1	330.8	285.8	263.1	389.7	294.0	429.9	501.9	452.5	384.8	598.6	386.5
IN4YCOLL	20	6	12	11	14	13	7	5	12	5	12	8	5	10
INTEACHH	9	10	5	10	17	18	9	6	15	6	5	6	4	9
IPCIN03	\$29,037	\$24,526	\$26,691	\$26,402	\$29,970	\$31,801	\$27,330	\$23,821	\$26,636	\$25,300	\$27,009	\$28,693	\$26,520	\$27,210
IPHPC	223.8	364.7	203.3	294.1	220.3	279.5	322.8	267.0	272.1	307.4	322.5	431.7	318.2	294.42
IUNEMP	5.4%	3.9%	5.5%	4.9%	5.0%	5.3%	4.5%	4.2%	5.8%	5.8%	4.3%	4.6%	3.7%	4.84%
IVCSB-State	0.85	0.29	3.94	0.68	2.04	2.33	0.29	0.27	0.15	0.27	0.44	3.94	0.42	1.23
IVCSHS-State	4.12	1.69	3.05	0.20	5.31	0.52	0.44	5.61	0.84	0.65	9.21	3.05	7.53	3.25
IVCSME-State	2.67	0.24	3.23	0.89	1.54	1.39	0.10	1.15	1.24	0.18	1.52	3.23	0.72	1.39
IMEDAR	2.41	10.91	0	6.54	1.71	5.11	7.24	0	2.78	3.64	7.06	24.73	0.01	5.55
IMEDPA	0.131	0.147	0.08	0.296	0.081	0.179	0.681	0.045	0.099	0.052	0.079	0.673	0.091	0.20

Health Care Indicators Data Guide

Health Care Indicators Data Guide

Abbreviation	Short Description	Long Description	Source	Year
IBH50R	Top 50 hospital rankings (Index)	A composite score based on availability and quality of 12 major program areas	BERC, U.S. News and World Report	2005
ICPDENV	Cost per dental visit (\$)	Average dollars billed per incident, not including prescription medication	City and Places Ranking	2003
ICPDHR	Cost per daily hospital room (\$)	Average dollars billed per incident, not including prescription medication	City and Places Ranking	2003
ICPDV	Cost per doctor visit (\$)	Average dollars billed per incident, not including prescription medication	City and Places Ranking	2003
IFMRD	Medical research R&D per capita	Federally funded medical research R&D per 1,000 population	BERC, National Science Foundation	2002
IHBPC	Hospital beds per capita	Numbers of beds per 100,000 residents	City and Places Ranking	2001
IN4YCOLL	Number of 4-year colleges	Number of 4-year colleges, universities, and campuses	National Center for Education Statistics	2002
INTEACHH	Number of teaching hospitals	Number of hospitals that are accredited to train physicians	City and Places Ranking	2001
IPCIN03	Per capita income (\$)	Per capita personal income	City and Places Ranking	2003
IPHPC	Physicians per capita	Total number of accredited physicians, generalists and specialists, in an area per 100,000 residents	City and Places Ranking	2003
IUNEMP	Unemployment rate (%)	Percent of people unemployed	Bureau of Labor Statistics	July-05
IVCSB-State	Venture capital in biotechnology (%)	Share of biotechnology investment in the total U.S. biotechnology investment	MoneyTree Survey	1995-2005
IVCSHS-State	Venture capital in health services (%)	Share of health services investment in total U.S. health services investment	MoneyTree Survey	1995-2005
IVCSME-State	Venture capital in medical (%)	Share of medical equipment investment total U.S. medical equipment investment	MoneyTree Survey	1995-2005
IMEDAR	Per capita medical articles	Total medical articles per 1,000 population	Medline Database	1995-2005
IMEDPA	Per capita medical patents	Total medical patents per 1,000 population	U.S. Patent and Trademark office	1995-1999

VIII.3. Relative Rankings

In the health care business climate, the Nashville MSA ranks first among the 13 MSAs while Louisville ranks second, Columbus third, and Indianapolis fourth. In health care infrastructure, Nashville ranks second after Raleigh, followed by Birmingham (third) and Dallas (fourth). Finally, in overall relative health care competitiveness, Nashville tops the chart while Birmingham ranks second, Columbus third, Indianapolis fourth, and Louisville fifth.

MSAs	Health Care Business Climate Relative Rankings*		Health Care Infrastructure Relative Rankings**		Overall Rankings	
	Average Score***	Relative Rankings	Average Score***	Relative Rankings	Average Score	Relative Rankings
Nashville, TN MSA	0.80	1	0.62	2	0.71	1
Birmingham, AL MSA	0.54	5	0.59	3	0.57	2
Columbus, OH MSA	0.63	3	0.47	8	0.55	3
Indianapolis, IN MSA	0.55	4	0.48	7	0.52	4
Louisville, KY MSA	0.64	2	0.39	12	0.52	5
Richmond, VA MSA	0.54	6	0.49	6	0.51	6
Dallas, TX MSA	0.49	7	0.52	4	0.50	7
Raleigh, NC	0.26	13	0.66	1	0.46	8
Atlanta, GA MSA	0.38	11	0.49	5	0.44	9
Jacksonville, FL MSA	0.43	9	0.40	11	0.42	10
Denver, CO MSA	0.36	12	0.47	9	0.42	11
Charlotte, NC MSA	0.41	10	0.41	10	0.41	12
Kansas City MO MSA	0.47	8	0.33	13	0.40	13

Notes: *Based on the linear combination of standardized scores of 15 indicators presented above. **Based on the linear combination of standardized scores of 16 indicators presented above. ***The BERC assumes that each indicator contributes to the average score equally. The selected indicators are closely related to health care business environment and infrastructure. The data availability and timeliness were two key criteria used in the data selection process.

IX. CONCLUSION

Nashville is truly the locus of the health care industry in the nation. Indicators utilized 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 the flow of venture and private equity capital to the Nashville area confirm this. A missing but important factor from this analysis is the impact of corporate citizenship of these global companies on the local economy. Finally, a detailed analysis of the dynamic interaction between core health care industries and biotechnology companies is suggested to highlight additional growth opportunities in the Nashville health care industry.

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XI. APPENDIX

XI.1. Data Sources

Data Sources Consulted	Web Link
Bureau of Labor Statistics	www.bls.gov
Modern Healthcare	www.modernhealthcare.com
State Occupational Projections	www.projectionscentral.com
Census Bureau	www.census.gov
Tennessee Advisory Commission on Intergovernmental Relations (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
Mergent Online	www.mergentonline.com/
XRoads Solution Group	www.xroadsllc.com
Hoovers	www.hoovers.com
IMPLANpro, Inc.	www.implan.com
CB Richard Ellis	www.cbre.com
Urban Land Institute (Several study findings on employment density)	www.uli.org
Bureau of Economic Analysis	www.bea.gov
U.S. News and World Report	www.usnews.com
PricewaterhouseCoopers/Venture Economics/ National Venture Capital Association Money Tree Survey	www.pwcmoneytree.com
MTSU Business and Economic Research Center (Survey)	www.mtsu.edu/~BERC
World Bank	www.worldbank.org
Nashville Chamber of Commerce	www.nashvillechamber.com
Expansion Management	www.expansionmanagement.com/
Business Facilities	www.businessfacilities.com
City and Places Ranking	(hard copy)
Medline Database	www.ncbi.nlm.nih.gov
U.S. Patent and Trademark Office	www.uspto.gov/

XI.2. Nashville Health Care Council Member Survey

**Middle Tennessee State University and Nashville Health Care Council:
Health Care Industry Survey**

Please provide an estimate of the following for your business operations in the Nashville MSA (Davidson, Dickson, Cheatham, Robertson, Rutherford, Sumner, Williamson, and Wilson counties).

Company Name: _____ **Contact Name & Phone Number (or e-mail):** _____

Part A: Employees, Annualized Payroll, and Gross Revenues from Your Health Care Operations (Please estimate (your best guess is fine) for the latest year available): Fiscal Year: __

Health Care Operations	Total (from all sites)	Nashville MSA (%)
1. Please estimate the current number of employees in your health care operations (#)		
2. Please estimate total annualized payroll for your health care related operations (\$)		
3. Please estimate your gross sales from health care related operations (\$)		
4. Number of health care related operating sites (#)		
5. Please estimate the square footage of space your company occupies in the Nashville area (#)		
6. Please estimate the amount of federal research grant funding your health care operations received (\$)		

Part B: The NAICS (North American Industry Classification System) Category under Which Your Health Care Operations Are Classified (Please mark all that apply):

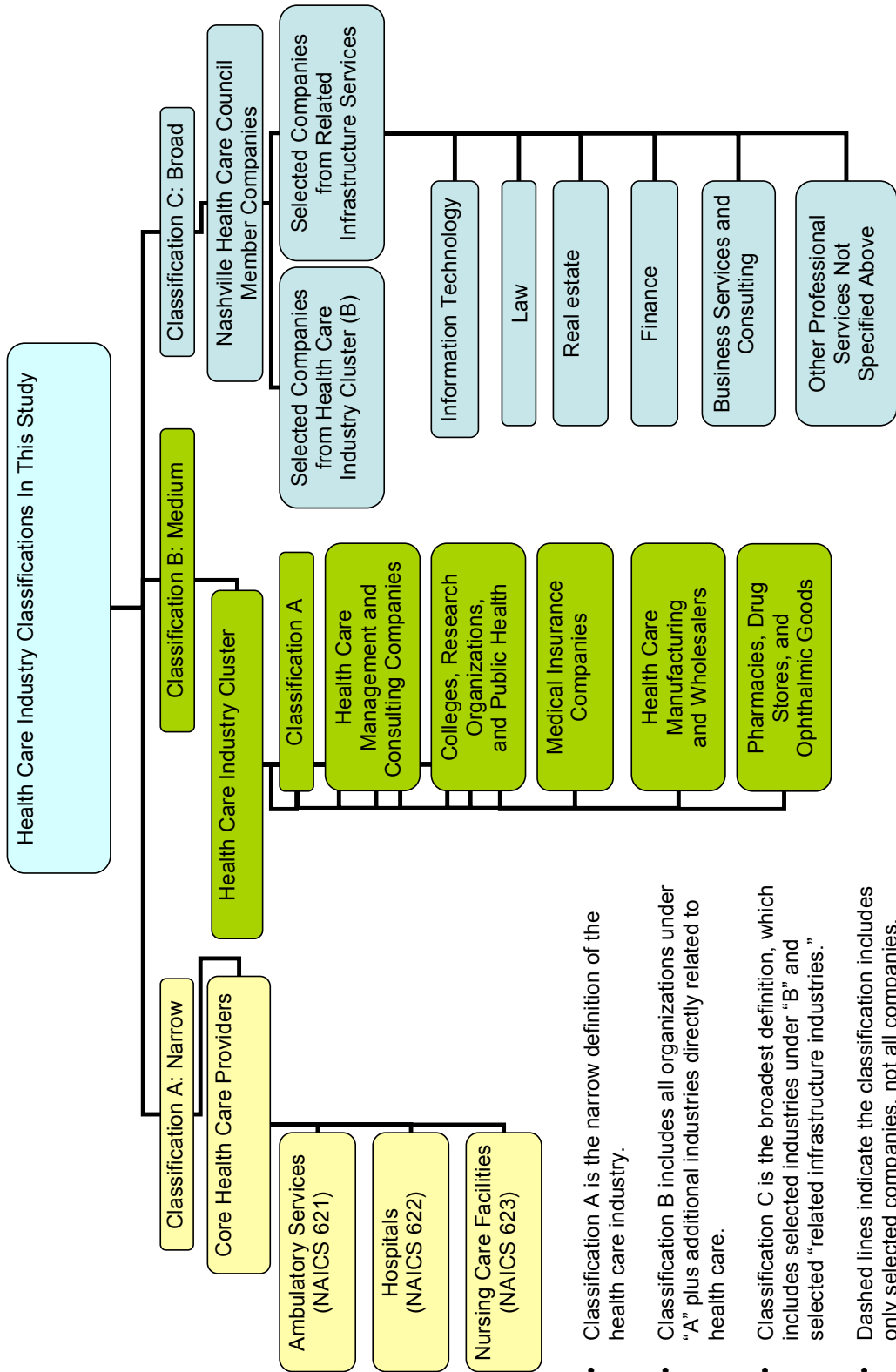
NAICS	Description
<i>Healthcare Management</i>	
<input type="checkbox"/>	551 Management of Companies and Enterprises
<i>Healthcare Providers</i>	
<input type="checkbox"/>	621 Ambulatory Healthcare Services
<input type="checkbox"/>	622 Hospitals
<input type="checkbox"/>	623 Nursing and Residential Care Facilities
<i>Research, Training and Support Organizations</i>	
<input type="checkbox"/>	6112 Community and Technical Colleges
<input type="checkbox"/>	6113 Colleges, Universities and Professional Schools
<input type="checkbox"/>	6115 Technical and Trade Schools
<input type="checkbox"/>	54171 Commercial and Noncommercial Research Organizations
<input type="checkbox"/>	92312 Administration of Public Health Programs
<i>Services to Providers</i>	
<input type="checkbox"/>	524114 Direct Health and Medical Insurance Carriers
<i>Products to Healthcare Providers</i>	
<input type="checkbox"/>	333314 Optical Instruments and Lens Manufacturing
<input type="checkbox"/>	3391 Medical Equipment and Supplies Manufacturing
<input type="checkbox"/>	3254 Pharmaceutical and Medicine Manufacturing
<input type="checkbox"/>	42345 Medical Equipment and Supplies Wholesalers
<input type="checkbox"/>	42346 Ophthalmic Goods Merchant Wholesalers
<input type="checkbox"/>	4242 Druggists' Goods Merchant Wholesalers
<i>Products to Individuals</i>	
<input type="checkbox"/>	44611 Pharmacies and Drug Stores
<input type="checkbox"/>	44613 Optical Goods Stores
<i>Other Healthcare Support Companies (i.e., Law, IT, Professional Services)</i>	
<input type="checkbox"/>	Other (Please specify): _____

XI.3. IMPLAN Model Information

- The impact of the healthcare industry cluster on the Nashville economy includes not only the direct employment, business sales, and income generated by the healthcare industry cluster but also 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 healthcare industry cluster and by suppliers to local business transactions, and induced effects including all spending by healthcare industry cluster employees in the local economy.
- To quantify secondary impacts, a method called “input-output analysis” was employed through the use of 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 healthcare 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 healthcare industry cluster employment include the total number of reported full-time employees of healthcare industry establishments.
 - The direct effect of income includes the total reported pre-tax staff payroll of the healthcare industry cluster.
 - The direct effect of business sales includes the total spending of the healthcare 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 healthcare 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 healthcare industry cluster employees in the local economy.

XI.4. Health Care Industry Classifications



- 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."
- Dashed lines indicate the classification includes only selected companies, not all companies.

Detailed Health Care Industry Cluster Definitions²⁵

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.
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)

²⁵Abstracted from 2002 US NAICS Manual. *North American Industry Classification System—United States*. 2002, at <http://www.census.gov/epcd/www/naics.html>.

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.

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.

Colleges, Universities, and Professional Schools (NAICS 6113):

Establishments primarily engaged in furnishing academic courses and granting degrees at bachelor's or graduate levels.

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

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).

2. **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

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.

XI.5. Definitions and Ranking Procedure

Location Quotient (LQ)

The location quotient is the most commonly utilized method in regional economic analysis.

The LQ is a measure of an industry's concentration in a local economy relative to the national average or any other reference unit.

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

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.

Ranking Procedure

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

- (1) Health care business climate indicators: The BERC identified 15 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 literature and availability of indicators.

- (2) Health care infrastructure indicators: The BERC identified 16 indicators that measure the capacity of the local economy to lay the foundation for growth of the health care industry. In addition to direct health care related indicators, the BERC included per capita personal income and unemployment rate in this category.

Standardization Procedure

In order to compare these MSAs using a diverse set of indicators, the BERC 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 that MSA's value is related to the average and standard deviation of a given series.