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The Healthcare Cluster in the Cleveland-Elyria-Mentor MSA, 2000-2005

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TECHNICAL REPORT

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EXECUTIVE SUMMARY

This study of the healthcare cluster in the Cleveland-Elyria-Mentor metropolitan statistical area provides a description of employment and payroll trends in two groups of industries — Core Providers of Healthcare and Healthcare Support Products and Services. Looking at the long-term and short-term trends, it analyzes employment, wages, and total payroll with the following results.

Long-Term Trends in Healthcare

- Healthcare industries play a dual role in any regional economy— (1) they serve the local population, which views the quality of local healthcare as an important amenity, and (2) they help the region compete in state, national, or even global markets to attract patients, research dollars, and the best specialists. Based on the national reputation of the Cleveland Clinic Foundation and the University Hospitals System, the Cleveland metropolitan area aims to create a healthcare cluster that will be competitive not only in Ohio but nationally and globally.
- From 1978 to 2003, the national population grew by 31 percent, while the national healthcare industry's employment increased 116 percent (1.63 ratio). In Cleveland, the population has remained almost unchanged (–3%), while the healthcare industry grew 80 percent (1.86 ratio). Therefore, during the long-term period, Cleveland's healthcare cluster grew faster than the national rate when controlling for the change of population.

Healthcare Trends in the Cleveland MSA and the U.S.: 2000-2005

- From 2000 to 2005, the national healthcare industry grew by 10.8 percent, increasing healthcare payroll by 15.1 percent (payroll grew 1.4 times faster than employment). During the same time, employment in Cleveland's healthcare cluster grew by only one percent, but was accompanied by a big jump in total payroll of 5.1 percent (or payroll grew 5.1 times faster than employment). Therefore, healthcare labor costs in Cleveland increased 3.5 times faster than in the U.S.
- In 2000, employment in the healthcare cluster in the Cleveland MSA accounted for 13.5 percent of total employment in comparison to an 11 percent share at the national level. Despite the slower short-term regional growth, the share of Cleveland's healthcare employment grew to 14.6 percent compared to 12 percent nationally. The share of the total payroll of healthcare industries in Cleveland increased from 12.6 percent in 2000 to 14.2 percent in 2005.

Dynamic of Healthcare Industries

- For this study, all industries in the healthcare cluster are divided in two groups: Core Providers of Healthcare and Healthcare Support Product and Services. The Core Providers of Healthcare include 23 industries that employ personnel engaged in providing healthcare services, such as hospitals, medical centers, offices of physicians and other healthcare specialists, outpatient and home healthcare centers, nursing care, continuing care, and residential healthcare facilities. Healthcare Support Products and Services includes 20 industries comprised of companies that manufacture supply products and provide support services for healthcare, such as pharmaceutical and medicine manufacturing; instruments, medical devices, and medical supplies; medical laboratories and diagnostic centers; medical insurance carriers; medical supplies wholesales and retail; and research and development services.

- Between 2000 and 2005, employment among the Core Providers of Healthcare services grew by 7.9 percent in Cleveland, while these industries increased employment by 12 percent nationally. During the same time period, Healthcare Support and Service industries lost 31 percent of their employment base in the Cleveland MSA, while nationally these industries grew by 5.7 percent.

- Among the Core Providers of Healthcare six industries were near the national average growth rate or outpaced their national counterparts; 11 others grew more slowly than nationally, two industries declined in Cleveland faster than nationally, and four industries lost employment while growing nationally.

- Healthcare Support Products and Services industries performed worse than the Core Providers in the Cleveland area and significantly lagged their national counterparts. Nine of 20 industries lost employment regionally while growing nationally; five industries lost a greater percentage of their employment base than their national counterparts; and three industries lost jobs at a slower rate than the nation as a whole.

The Largest Healthcare Industries

- The 19 largest healthcare industries held 93.8 percent of total healthcare cluster employment in 2000 and increased this share to 94.4 percent by 2005. The 12 largest industries hold 95.8 percent of the Core Providers' total employment. This share is slightly higher than the share of employment in the same industries at the national level (93%). However, the Cleveland MSA's share of the seven largest Healthcare Support industries differs significantly from the share of the same industries at the national level, 84.5 compared to 60.4 percent in 2005. This fact alone might suggest that our Healthcare Support Industries are highly specialized and have the potential to export products.

- There are a few significant structural differences to the healthcare cluster in the Cleveland MSA compared to the nation. Cleveland has a much higher share of employment in its General Medical and Surgical Hospitals, and this share is growing (38.8% in 2000 and 41.4% in 2005 compared to 32.7% and 32.1% nationally). At the same time, the share of employment in Offices of Physicians is smaller and declining compared to the national average (8.3% in 2000 and 8.1% in 2005 compared to 12.4% and 12.9% nationally). These two dynamics do not compensate for each other, but strongly suggest that many physicians in Cleveland are "institutionalized" within a hospital infrastructure.

High-Wage Healthcare Industries

- In 2005, 14 industries in the healthcare cluster paid higher wages than the average wage of all industries in the Cleveland MSA and in the nation. In 2005, average annual wages in the 12 top-paying industries ranged from $42,230 to $70,144. The annual average wages of the largest Core Providers of Healthcare grew from $31,274 in 2000 to $32,008 in 2005. The annual average wages of the seven largest industries among Healthcare Support Products and Services increased from $47,274 in 2000 to $53,392 in 2005.

Healthcare Industries that Produce the Most Products and Services

- The largest healthcare employers also contribute the most to the wealth of the region. Their total payroll, which serves as a proxy for gross product, reflects the structure of employment within the healthcare cluster. General Medical and Surgical Hospitals, leading the list of the largest contributors, had an annual payroll of $2.7 billion in 2005, which is $294 million or 12.1 percent more than in 2000. Offices of Physicians lost employment (–0.9%) and total payroll (–5.7%) between 2000 and 2005, but it remained among the largest industries with a total payroll of $732 million in 2005. The third largest industry, Nursing Care Facilities, had a total payroll of $501.3 million in 2005, which is 12.2 percent or $54.6 million more than in 2000.

- In 2005, 12 industries in the Cleveland MSA Healthcare Cluster had a regional employment share that was larger than their national employment share. These industries are considered to be those producing goods and services that are consumed outside the region. Three of these 12 industries are in manufacturing, and two have the highest location quotients (Surgical Appliance and Supplies Manufacturing: 3.75, and Instruments and Related Products Manufacturing: 1.97) and belong to the largest employers within the healthcare cluster.

- The Cleveland MSA healthcare cluster shows the different dynamics of employment, wages, and payroll among its two major groups of industries, Core Providers of Healthcare and Healthcare Support Products and Services. It shows strong growth in Core Providers and their export potential, which will create a steady demand for a future workforce. It also shows the unusual concentration and strength of some industries among Healthcare Support Products and Services.

Healthcare Occupations

- In terms of healthcare occupations, the Cleveland MSA, by and large, has a professional structure very similar to the average of the national economy. Similar to the nation, the largest growth was experienced by registered and licensed nurses' occupations. Other changes in occupations between 2000 and 2004 were insignificant with the exception of a big drop in Family and General Practitioners (–1,370 employees).

- The Cleveland healthcare cluster is an important part of the regional economy and creates a large local job market for researchers, doctors, nurses, and non-skilled workers. Despite the decline of total regional population, employment in the healthcare cluster grew even faster than the per capita national average and will continue to increase.

INTRODUCTION

The aging population of baby boomers triggered fast growth in the healthcare industry during the 1980s and 1990s. Employment in the U.S. industries affiliated with patient care more than doubled from 1978 to 2005 (125%), creating every seventh job in the national labor market. With strong support from the National Institutes of Health and the National Science Foundation, biomedical and life science research has triggered the growth of competitive healthcare clusters, anchoring them around the top research universities and hospitals. The traditional view of medical institutions as service providers has evolved into a vision of competitive clusters with excellence in a particular healthcare specialty and an affiliation with advanced research and applications.

Advancements in the bio-medical and life science sectors have given a boost to manufacturers of medical devices, instruments and laboratory equipment, pharmaceuticals, and medicine. Traditional manufacturing regions trying to re-apply the skills of their workforce to new science-based manufacturing are often affiliated with healthcare and medical research.

The healthcare industry plays a dual role in any regional economy— (1) it serves the local population, which views the quality of local healthcare as an important amenity, and (2) it helps the region compete in state, national, or even global markets to attract patients, research dollars, and the best specialists. High-quality healthcare can improve the reputation of a city or region, and healthcare institutions try to maintain and strengthen that reputation by building upon it as a competitive regional healthcare cluster.

The city of Cleveland and the Cleveland-Elyria-Mentor metropolitan statistical area (Cleveland MSA) have earned a national reputation for quality healthcare services. This is largely due to the Cleveland Clinic Foundation being ranked #1 in cardiology for 11 consecutive years and as the #4 best hospital in the United States by *U.S. News & World Report*. The University Hospital Health Systems is ranked #6 in pediatric medicine. The research excellence of the Cleveland Clinic and the Case Research Institute attracted more than $400 million in federal and industry awards in 2004 and resulted in nearly 600 patents issued in the last two years.[1] The healthcare providers builds upon their own research and applications and upon an intellectual infrastructure through the combined presence of Case Western Reserve University, Cleveland State University, and other regional educational institutions and local skilled workforce.

[1] www.teamneo.org

This report includes an overview of long-term trends in the healthcare cluster in the Cleveland MSA and in the nation; a description of the fluctuations in employment and wages over the last five years; an analysis of the largest and the highest wage industries; and an overview of the export industries that make up the core of the healthcare cluster. In addition to providing descriptive statistics about changes in the local healthcare industries, this report will serve as background information to our investigation of labor force training needs for healthcare occupations that can be addressed by local educational institutions.

DEFINITION OF HEALTHCARE CLUSTER AND RESEARCH METHODOLOGY

The definition of the healthcare cluster used in this study is based on a review of a number of studies[2] that analyzed medical clusters in various regions of the country, including studies conducted in Ohio and Northeast Ohio.[3]

The Cleveland MSA healthcare cluster includes two types of industries. First, we included industries that were common to all of the studies we reviewed. Second, we added manufacturing and service industries that are comprised of companies producing goods and services relevant to healthcare and that were treated as part of a medical cluster by previous studies of Northeast Ohio. In addition, in two professional service industries (Testing Laboratories (NAICS 541380) and Research and Development in the Physical, Engineering and Life Sciences (NAICS 541710)), we reviewed companies' products and services and included in our analyses only data from companies that relate to the healthcare cluster. The list of industries that comprise the Cleveland MSA healthcare cluster is shown in Appendix A, Table A1.

A regional industry cluster is usually made up of three levels: (1) the core (or anchor) companies of an industry or industries that hold a competitive advantage, (2) related companies and industries that support the core (suppliers and customers), and (3) the regional institutions

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[2] *Economic Contribution of the Healthcare Industry to the City of Seattle*. Huckell/Weinman Associates, Inc. 2004; Smith, R.V. (2003). *Industry Cluster Analysis: Inspiring a Common Strategy for Community Development*. Central Pennsylvania Workforce Development Corporation. Part of Penn State's "Attracting and Retaining Young Adults to the Pennsylvania Heartland" http://www.extension.psu.edu/workforce/Briefs/INDclustAnal.pdf; *Southwestern Pennsylvania Industry Cluster Snapshot. Healthcare*. Three Rivers Workforce Investment Board, August 2003; *Biopharmaceutical Industry Contributions to State and U.S. Economics*. Milken Institute. October 2004. www.milkeninstitute.org; *Occupational Clusters, Careers, Career Majors, and Programs of Study*. Attachment C: Clustering Hierarchy for HOICC National Units of Analysis: Superclusters/Broad Groups/Units, 1997. www.ed.gov/pubs/Standards/attach_c.html

[3] *Industry-Based Competitive Strategies for Ohio: Managing Three Portfolios, Economic Development Strategies That Build from Current Strengths and Address Competitive Challenges*. Ohio: Deloitte and Cleveland State University, May 2005; Koo, J., 2005. *Occupation Analysis for the Greater Cleveland Area*. Center for Economic Development. Cleveland State University.

and resources that support core companies' competitive advantage (such as research institutions, skilled workforce, regional economic development policies, advanced infrastructure, etc.). This report focuses on the first two components of the cluster.

All industries in the healthcare cluster are divided in two major groups: Core Providers of Healthcare and Healthcare Support Products and Services. The Core Providers of Healthcare include 23 industries that employ personnel engaged in providing healthcare services, such as hospitals, medical centers, offices of physicians and other healthcare specialists, outpatient and home healthcare centers, nursing care, continuing care, and residential healthcare facilities. Healthcare Support Products and Services includes 20 industries comprised of companies that manufacture supply products and provide support services for healthcare, such as pharmaceutical and medicine manufacturing; instruments, medical devices, and medical supplies; medical laboratories and diagnostic centers; medical insurance carriers; medical supplies wholesale and retail; and research and development services.

The long-term trend analysis in this study is based on employment estimates from Moody's Economy.com. All of our short-term analyses are based on the Quarterly Census of Employment and Wages (technically called ES202) database, which contains company-level data collected by each state for unemployment compensation taxes. Nearly all employers with paid employees are required to file unemployment insurance reports to their respective states on a quarterly basis. This report uses ES202 data from the first quarter of 2000 through the first quarter of 2005 for employment, payroll, and average wages (calculated as total payroll divided by total employment).

Industries are analyzed at the six-digit NAICS level with the exception of a few that had data confidentiality restrictions.[4]

LONG-TERM TRENDS IN HEALTHCARE EMPLOYMENT

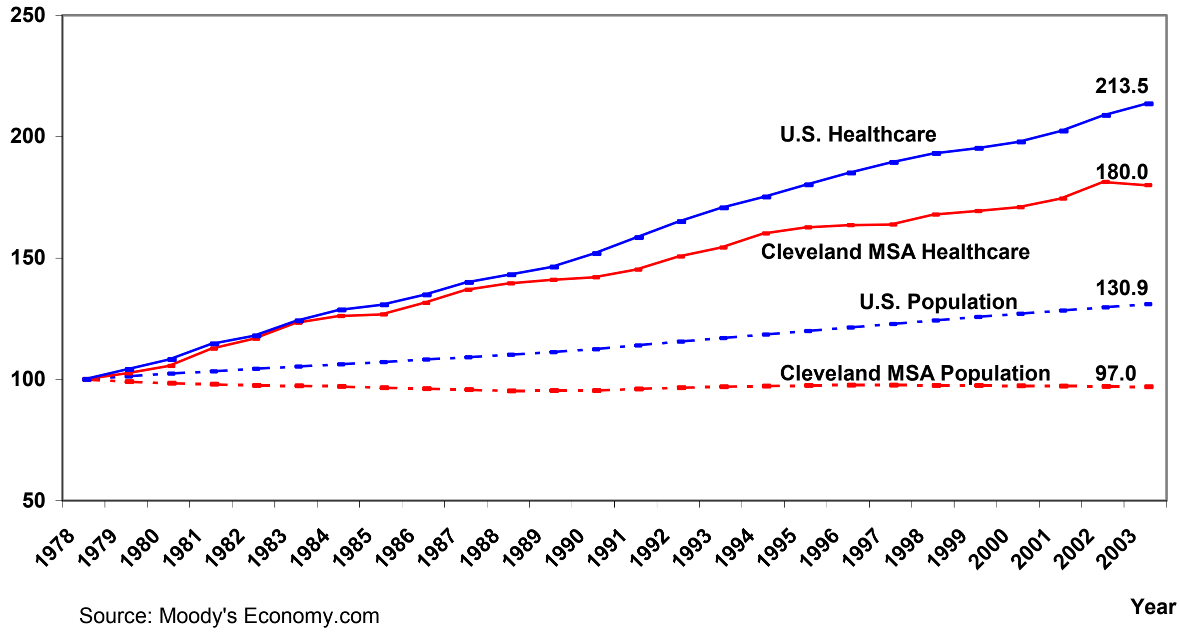
Despite the growth of healthcare industries nationally and the rising reputation of Cleveland's medical services, the regional loss of population significantly affects the dynamics of local healthcare industries. The population-serving healthcare industries in the Cleveland area grew at a slower pace than the same industries nationally. Long-term changes in

[4] The Pharmaceutical and Medicine Manufacturing Industries (NAICS 325411, 325412, 325413, 325414) and Other Outpatient Care Centers (NAICS 62149) could not be included at a six-digit level. The Pharmaceutical industries were included as a four-digit industry (NAICS 3254) using estimates from Economy.com, and Other Outpatient Care Centers industries were aggregated to the five-digit level to prevent disclosure of actual data at the company level.

healthcare employment are presented in Figure 1, where the Cleveland MSA and the U.S. employment and population are indexed to 1978.

The dynamic of the healthcare employment index[5] in the Cleveland MSA and the national trend shows that they closely follow changes in population. From 1978 to 2003, the national population grew 1.31 times, while the national healthcare industry's employment increased 2.14 times (1.63 ratio). Cleveland's population remained almost unchanged (0.97), while the healthcare industry employment grew 1.8 times (1.86 ratio).

Figure1: Index of Population and Core Providers of Healthcare Employment for the U.S. and the Cleveland MSA: 1978-2003
1978=100



Source: Moody's Economy.com
Bureau of Economic Analysis, U.S. Department of Commerce

This dynamic was true during the entire period of time from 1978 to 2003. Toward the end of this time period, from 1993 to 2003, the U.S. population grew by 12 percent, inducing national healthcare employment growth of 25 percent and creating a ratio of 1.12 healthcare employees per each person in the U.S. In the Cleveland MSA, population remains unchanged, while the healthcare grew by almost 17 percent, resulting in a corresponding ratio of 1.17 healthcare employees per capita in the Cleveland MSA. Therefore, the ratio of healthcare employment to population was higher in the Cleveland MSA than nationally. These dynamics describe the average changes for all healthcare industries. The detailed analysis of different clusters of healthcare industries follows in the next sections.

[5] In this chart, healthcare employment is represented only by the Core Providers of Healthcare industries due to the complexity of obtaining comparable national data for the Healthcare Support Products and Services industries.

HEALTHCARE TRENDS IN THE CLEVELAND METRO AREA AND THE U.S.: 2000-2005

Economic activities in the Cleveland MSA, measured in terms of employment and total payroll, declined between 2000 and 2005. Total employment in the Cleveland area fell by 6.4 percent between 2000 and 2005, while national employment grew by 1.4 percent. Similarly, total payroll declined by 6.8 percent in the Cleveland MSA in contrast to 2.2 percent growth in U.S. total payroll (Table 1). In contrast to this trend, the healthcare industry added 10.8 percent new jobs nationally, increasing healthcare's payroll by 15.1 percent. Each percentage point of growth in national healthcare employment increased the corresponding payroll by 1.4. During the same time, employment in the Cleveland healthcare cluster grew by only one percent, accompanied by a big increase in the total payroll of 5.1 percent. This allows us to speculate that, on average, healthcare labor costs in Cleveland increased 3.5 times faster than in the U.S.

Table 1: Employment and Payroll in the Cleveland MSA and the U.S., 2000-2005

	Employment			Payroll, (millions $)		
	Q1 2000	Q1 2005	% Change	Q1 2000	Q1 2005	% Change
Cleveland MSA Healthcare Cluster	147,725	149,189	1.0%	1,377	1,447	5.1%
Cleveland MSA Total	1,094,164	1,024,202	-6.4%	10,948	10,207	-6.8%
U.S. Healthcare Cluster	13,958,519	15,491,849	10.8%	145,040	166,961	15.1%
U.S. Total	127,237,676	128,971,018	1.4%	1,271,774	1,299,482	2.2%

Source: Quarterly Census of Employment and Wages (ES202)

In 2000, regional employment share in the healthcare cluster was higher than that nationally: employment in the healthcare cluster in the Cleveland MSA accounted for 13.5 percent of total employment in comparison to an 11 percent share at the national level (Table 2). Although healthcare employment in the Cleveland MSA grew more slowly than nationally from 2000 to 2005, the region still has a higher share of the healthcare employment and payroll than the average of the national economy.

Table 2: Share of the Healthcare Cluster in the Cleveland MSA and the U.S., 2000-2005

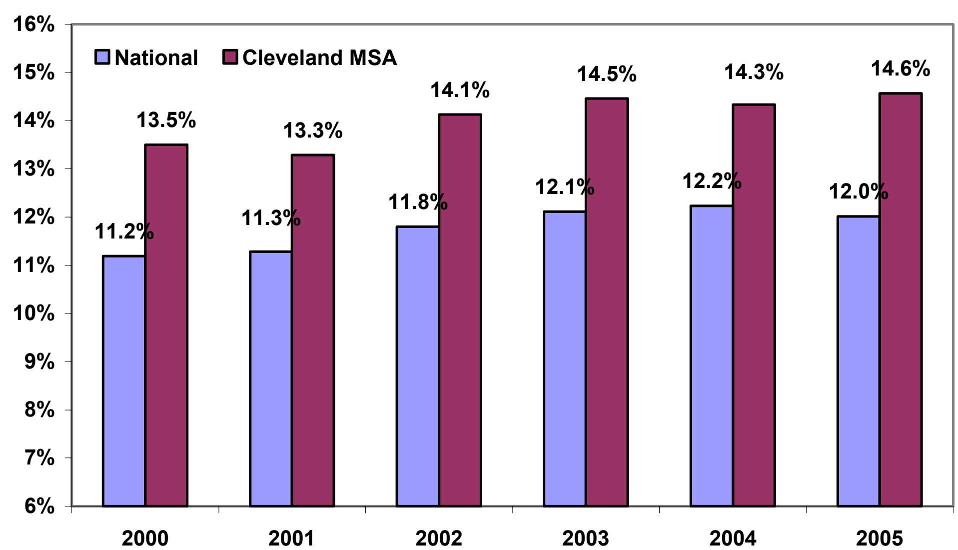
	Employment		Payroll, (millions $)	
	Q1 2000	Q1 2005	Q1 2000	Q1 2005
Percentage of Healthcare Cluster in the Cleveland MSA	13.5%	14.6%	12.6%	14.2%
Percentage of Healthcare Cluster in the U.S.	11.0%	12.0%	11.4%	12.8%

Source: Quarterly Census of Employment and Wages (ES202)

During 2000-2005, healthcare's share of employment in the Cleveland MSA increased from 13.5 percent to 14.6 percent and its share of the total payroll grew from 12.6 percent to 14.2 percent (adjusted for inflation).

From 2000 to 2005, there were no significant deviations from the overall trend in the healthcare employment shares (Figure 2). Healthcare employment in the national economy grew consistently from 2000 to 2004. The small decline in the national healthcare employment share in 2005 was the result of a slight decline in healthcare employment and slow growth in total employment nationally. The dynamic of Cleveland's share reflects the continued growth of employment in the healthcare cluster since 2001 with an annual decline in 2004. Total employment in the Cleveland MSA declined from 2000 to 2004, showing only a slight comeback in 2005.

Figure 2: Employment Shares of Healthcare Industries, 2000 and 2005



Source: ES202

In the following sections, we will examine the dynamic of the individual industries of the healthcare cluster and the changes in employment and wages for two groups of healthcare industries, the Core Providers of Healthcare and the Health Support Products and Services industries.

DYNAMIC OF HEALTHCARE INDUSTRIES IN THE CLEVELAND MSA AND THE NATION

The two groups of industries that comprise the healthcare cluster have shown different patterns of change in the Cleveland MSA and the U.S. (Table 3). Employment in Core Providers of Healthcare services grew by 7.9 percent from 2000 to 2005, adding 9,575 new jobs to the regional economy. In comparison, these industries increased their employment by 12 percent nationally. During the same time, Healthcare Support and Service industries lost 31 percent of their employment base in the Cleveland MSA, eliminating 8,111 jobs, while nationally these industries grew 5.7 percent.

Core Providers of Healthcare Industries

Within the 23 industries classified as Core Providers of Healthcare, 17 industries added employees between 2000 and 2005. Employment trends in six[6] industries were near the national average or outpaced their national counterparts. General Medical and Surgical Hospitals added 4,449 jobs, growing 7.8 percent in the Cleveland MSA compared to 8.7 percent nationally. This is followed by Nursing Care Facilities (13.3% and 4.4%, respectively), which created 2,511 new jobs, and Residential Mental Retardation Facilities (17.5% and 9.2%), which employed 578 people more in 2005 than in 2000. Out of the 17 growing industries, only General Medical and Surgical Hospitals pays average wages higher than the Cleveland MSA average; the other industries employ lower-skilled workers and with their expansion provide low-paying jobs for the region.

The 11[7] other Core Providers of Healthcare industries grew but at a much lower rate than their national counterparts. Among those, Home Healthcare Services industry grew the most, adding more than 1,200 jobs during last five years. Ten of the 17 growing industries added more than 100 employees between 2000 and 2005.

Four out of 23 Core Providers declined in the Cleveland MSA while growing nationally. These are:

- Offices of Physicians (declined –0.9% in Cleveland and grew 14.5% nationally)
- Offices of Optometrists (–10.9% and 9.8%, respectively)
- Offices of Mental Health Practitioners (–1.4% and 2.5%) and
- Ambulance Services (–12% and 22.4%)

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[6] The data on one of these six industries, All Other Miscellaneous Ambulatory Healthcare Services, are suppressed due to a confidentiality requirement.
[7] The data on one of these 11 industries, Specialty (except Psychiatric and Substance Abuse) Hospitals, are suppressed due to a confidentiality requirement.

Table 3: National and Cleveland MSA Healthcare Cluster Employment, 2000-2005

Industry Name	Cleveland MSA 2000	Cleveland MSA 2005	Cleveland MSA change	Cleveland MSA % change	National, 000 2000	National, 000 2005	National, 000 change	National, 000 % change
Core Providers of Healthcare	**121,521**	**131,096**	**9,575**	**7.9%**	**11,533,736**	**12,917,902**	**1,384,166**	**12.0%**
Offices of Physicians (except Mental Health Specialists)	12,263	12,148	-115	-0.9%	1,771,865	2,028,079	256,214	14.5%
Offices of Physicians, Mental Health Specialists	307	327	20	6.5%	37,061	42,277	5,216	14.1%
Offices of Dentists	5,913	6,292	379	6.4%	671,045	757,753	86,708	12.9%
Offices of Chiropractors	469	658	189	40.4%	91,680	111,224	19,544	21.3%
Offices of Optometrists	686	612	-75	-10.9%	85,801	94,168	8,367	9.8%
Offices of Mental Health Practitioners (except Physicians)	420	414	-6	-1.4%	51,414	52,677	1,263	2.5%
Offices of Physical, Occupational and Speech Therapists, & Audiologists	1,509	1,638	129	8.6%	148,110	204,750	56,641	38.2%
Offices of Podiatrists	362	374	12	3.3%	29,155	32,833	3,678	12.6%
Offices of All Other Miscellaneous Health Practitioners	513	624	111	21.7%	24,802	40,342	15,539	62.7%
Family Planning Centers	500	130	-369	-73.9%	24,427	20,388	-4,038	-16.5%
Outpatient Mental Health and Substance Abuse Centers	1,168	1,183	16	1.3%	157,348	183,139	25,791	16.4%
Other Outpatient Care Centers	3,409	3,524	115	3.4%	254,074	306,760	52,687	20.7%
Home Health Care Services	7,224	8,453	1,229	17.0%	633,567	804,165	170,598	26.9%
Ambulance Services	1,738	1,530	-208	-12.0%	106,862	130,781	23,919	22.4%
Blood and Organ Banks	723	775	52	7.2%	45,183	55,343	10,159	22.5%
All Other Miscellaneous Ambulatory Health Care Services	N/A	N/A	N/A	N/A	25,008	26,457	1,449	5.8%
General Medical and Surgical Hospitals	57,316	61,765	4,449	7.8%	4,651,620	5,057,509	405,889	8.7%
Psychiatric and Substance Abuse Hospitals	957	716	-241	-25.2%	249,572	241,027	-8,545	-3.4%
Specialty (except Psychiatric and Substance Abuse) Hospitals	N/A	N/A	N/A	N/A	149,610	184,093	34,483	23.0%
Nursing Care Facilities	18,864	21,375	2,511	13.3%	1,563,378	1,631,752	68,374	4.4%
Residential Mental Retardation Facilities	3,307	3,885	578	17.5%	400,017	436,875	36,858	9.2%
Residential Mental Health and Substance Abuse Facilities	1,096	1,266	169	15.4%	147,339	171,228	23,889	16.2%
Continuing Care Retirement Communities	2,296	2,545	249	10.9%	214,798	304,281	89,483	41.7%
Healthcare Support Products and Services	**26,205**	**18,093**	**-8,111**	**-31.0%**	**2,706,501**	**2,861,660**	**155,159**	**5.7%**
Pharmaceutical and Medicine Manufacturing	1,000	1,270	270	27.0%	282,000	288,000	6,000	2.1%
Electromedical and Electrotherapeutic Apparatus Manufacturing	560	388	-171	-30.6%	53,953	55,815	1,862	3.5%
Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	1,765	916	-850	-48.1%	68,906	58,512	-10,394	-15.1%
Analytical Laboratory Instrument Manufacturer	N/A	N/A	N/A	N/A	33,145	31,373	-1,773	-5.3%
Irradiation Apparatus Manufacturing	113	118	5	4.7%	12,150	11,337	-814	-6.7%
Laboratory Apparatus and Furniture Manufacturing	113	108	-5	-4.4%	15,377	13,721	-1,656	-10.8%
Surgical and Medical Instrument Manufacturing	1,019	908	-111	-10.9%	106,300	104,654	-1,645	-1.5%
Surgical Appliance and Supplies Manufacturing	2,727	2,552	-175	-6.4%	92,552	85,760	-6,792	-7.3%

Industry Name	Cleveland MSA 2000	Cleveland MSA 2005	Cleveland MSA change	Cleveland MSA % change	National, 000 2000	National, 000 2005	National, 000 change	National, 000 % change
Dental Equipment and Supplies Manufacturing	N/A	N/A	N/A	N/A	15,772	15,469	-303	-1.9%
Ophthalmic Goods Manufacturing	179	175	-4	-2.2%	34,671	31,058	-3,614	-10.4%
Dental Laboratories	475	467	-8	-1.7%	45,607	49,066	3,459	7.6%
Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	1,569	1,434	-135	-8.6%	140,907	169,655	28,749	20.4%
Ophthalmic Goods Merchant Wholesalers	94	64	-31	-32.5%	20,463	19,178	-1,284	-6.3%
Pharmacies and Drug Stores	11,954	6,190	-5,764	-48.2%	654,747	683,471	28,724	4.4%
Direct Health and Medical Insurance Carriers	2,468	2,027	-441	-17.9%	325,867	337,473	11,606	3.6%
Home Health Equipment Rental	308	236	-72	-23.5%	36,669	38,646	1,978	5.4%
Testing laboratories	306	215	-91	-29.7%	136,233	138,718	2,485	1.8%
Research and development in the Physical, Engineering and Life Sciences	365	407	42	11.4%	472,666	535,011	62,344	13.2%
Medical laboratories	572	411	-161	-28.1%	117,392	137,047	19,656	16.7%
Diagnostic Imaging Centers	248	198	-50	-20.3%	41,123	57,694	16,571	40.3%
Total Healthcare Cluster Employment	**147,725**	**149,189**	**1,464**	**1.0%**	**14,240,237**	**15,779,561**	**1,539,324**	**10.8%**
Total Employment	**1,094,164**	**1,024,202**	**-69,962**	**-6.4%**	**127,237,676**	**128,971,018**	**1,733,342**	**1.4%**

Source: ES202

Among these four industries, Offices of Physicians is the highest-paying and one of the 12 largest healthcare industries in the Cleveland MSA (which is also typical to all metro areas). Not only has employment in this industry decreased, but average annual wages also declined by –4.8 percent (–$3,056) during 2000-2005.

Lastly, two industries lost employment both locally and nationally, but at a much higher rate in the Cleveland MSA: Psychiatric and Substance Abuse Hospitals (–3.4% nationally and –25.2% in Cleveland) and Family Planning Centers (–16.5% and –73.9%, respectively).

More details on the wages and dynamics of indicators of the largest healthcare industries are in the following two sections.

Health Support Products and Services Industries

Between 2000 and 2005, the dynamic of the Health Support Products and Services industries changed. These industries performed worse than the Core Providers in Cleveland area and significantly lagged their national counterparts.

Nine of 20 industries lost employment regionally while growing nationally; five industries lost a greater percentage of their employment base than their national counterparts; and three industries lost jobs at a slower rate than the nation as a whole.

Pharmacies and Drug Stores experienced the biggest absolute decline in employment, losing 5,764 jobs or 48.2 percent of its 2000 employment base. Nationally, this industry grew 4.4 percent. The Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables industry lost 850 jobs, which is also almost half of its 2000 employment base. The third-largest drop in employment was experienced by the Direct Health and Medical Insurance Carriers industry, which lost 441 jobs or 17.9 percent of its employment base. Six other healthcare support industries lost more than 100 jobs each between 2000 and 2005.

One industry performed significantly better in the region than nationally: the Pharmaceutical and Medicine Manufacturing Industry, which employed about 1,000 people in 2000, grew to 1,270 by 2005 (an increase of 27%).[8] This industry grew only 2.1 percent nationally. Two other small industries performed better than or near the national averages in terms of employment. Irradiation Apparatus Manufacturing grew 4.7 percent in the Cleveland area while declining 6.7 percent nationally. Research and Development in the Physical, Engineering and Life Sciences added 42 jobs, growing 11.4 percent, which is similar to this industry's 13.2 percent national growth.

[8] Employment estimate from Moody's Economy.com

Overall, employment among the Core Providers of Healthcare grew despite the population decline and outperformed Healthcare Support Products and Services. Compared to the national economy, Core Providers in the Cleveland metro area grew at a much slower pace (7.9 % compared to 12%), and Healthcare Support industries declined while their national counterparts grew (–31% compared to 5.7%).

THE LARGEST HEALTHCARE INDUSTRIES IN THE CLEVELAND MSA

There are 19 industries[9] within Cleveland's healthcare cluster that employed more than 1,000 people in the first quarter of 2000 (Table 4). In two of these industries, employment fell to just below 1,000 by the first quarter of 2005. These 19 industries are important for two reasons. First, they are large employers with certain expectations as to the skills, educational level, and qualifications of the regional labor force. Second, these industries are comprised of companies that have a high concentration of employment within the region and might allow the sector to hold a competitive advantage due to the agglomeration effect of specialization.

Overall, the 19 largest healthcare employers held 93.8 percent of total healthcare cluster employment in 2000 and increased this share to 94.4 percent by 2005. In contrast, the share of the same industries within the healthcare cluster nationally held at 87 percent during 2000–2005. The 19 largest healthcare employers accounted for 13.5 percent of total Cleveland MSA employment in 2000 and 14.6 percent in 2005. These industries reported a lower share at the national level (11.2% in 2000 and 12.2% in 2005), which suggests that healthcare employment in the Cleveland MSA is more concentrated within a fewer large industries and thus creates a higher rate of specialization and better opportunity to develop a regional competitive advantage.

Among the 19 largest industries, 12 Core Providers of Healthcare services hold 95.8 percent of the Core Providers' total employment. This share is higher than the share of employment in the same industries at the national level (93%). However, the Cleveland MSA's share of the seven largest Healthcare Support Products and Services industries differs significantly from the share of the same industries at the national level, 85.9 compared to 61.8 percent in 2000 and 84.5 compared to 60.4 percent in 2005. This fact alone might suggest that our Healthcare Support Industries, in particular, are highly specialized and have the potential to export products.

There are a few significant structural differences of the healthcare cluster in the Cleveland MSA compared to the nation. Cleveland has a much higher share of employment in its General Medical and Surgical Hospitals, and this share is growing (38.8% in 2000 and 41.4% in 2005 compared to 32.7% and 32.1%, nationally). At the same time, the share of employment in Offices of Physicians is smaller and declining compared to the national average (8.3% in 2000 and 8.1% in 2005 compared to 12.4% and 12.9% nationally). These two dynamics do not compensate for each other, but strongly suggest that many physicians in Cleveland are "institutionalized" within a hospital infrastructure. This may be a result of high malpractice insurance cost, which is difficult

[9] Two of the 19 largest industries represent the summation of six-digit NAICS industries. They had to be aggregated because of confidentiality restrictions.

Table 4: Largest Healthcare Industries in the Cleveland MSA: 12 Core Providers and Seven Healthcare Support Industries

Industry Name	Cleveland MSA				National, 000			
	Shares in Healthcare Cluster		Change		Shares in Healthcare Cluster		Change	
	2000	2005	Absolute	Percent	2000	2005	Absolute	Percent
Total Core Providers of Healthcare	**121,521**	**131,096**	**9,575**	**7.9%**	**11,533,736**	**12,917,902**	**1,384,166**	**12.0%**
12 Largest Core Providers	**116,103**	**125,605**	**9,502**	**8.2%**	**10,720,023**	**12,017,073**	**1,297,050**	**12.1%**
Percentage of 12 Largest in Total Core Providers	**95.5%**	**95.8%**			**92.9%**	**93.0%**		
General Medical and Surgical Hospitals	38.8%	41.4%			32.7%	32.1%		
Nursing Care Facilities	12.8%	14.3%			11.0%	10.3%		
Offices of Physicians (except Mental Health Specialists)	8.3%	8.1%			12.4%	12.9%		
Home Health Care Services	4.9%	5.7%			4.4%	5.1%		
Offices of Dentists	4.0%	4.2%			4.7%	4.8%		
Other Outpatient Care Centers	2.3%	2.4%			1.8%	1.9%		
Residential Mental Retardation Facilities	2.2%	2.6%			2.8%	2.8%		
Continuing Care Retirement Communities	1.6%	1.7%			1.5%	1.9%		
Ambulance Services	1.2%	1.0%			0.8%	0.8%		
Offices of Physical, Occupational & Speech Therapists, & Audiologists	1.0%	1.1%			1.0%	1.3%		
Outpatient Mental Health and Substance Abuse Centers	0.8%	0.8%			1.1%	1.2%		
Residential Mental Health and Substance Abuse Facilities	0.7%	0.8%			1.0%	1.1%		
Total Healthcare Support Products and Services	**26,205**	**18,093**	**-8,111**	**-31.0%**	**2,706,501**	**2,861,660**	**155,159**	**5.7%**
7 Largest Healthcare Support Products and Services	**22,502**	**15,297**	**-7,205**	**-32.0%**	**1,671,279**	**1,727,526**	**56,247**	**3.4%**
Percentage of 7 Largest in Total Healthcare Support	**85.9%**	**84.5%**			**61.8%**	**60.4%**		
Pharmacies and Drug Stores	8.1%	4.1%			4.6%	4.3%		
Surgical Appliance and Supplies Manufacturing	1.8%	1.7%			0.6%	0.5%		
Direct Health and Medical Insurance Carriers	1.7%	1.4%			2.3%	2.1%		
Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	1.2%	0.6%			0.5%	0.4%		
Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	1.1%	1.0%			1.0%	1.1%		
Surgical and Medical Instrument Manufacturing	0.7%	0.6%			0.7%	0.7%		
Pharmaceutical and Medicine Manufacturing	0.7%	0.9%			2.0%	1.8%		
Total 19 Largest Industries	**138,605**	**140,901**	**2,296**	**1.7%**	**12,391,301**	**13,744,599**	**1,353,297**	**10.9%**
Total Healthcare Cluster Employment	**147,725**	**149,189**	**1,464**	**1.0%**	**14,240,237**	**15,779,561**	**1,539,324**	**10.8%**
Total Employment	**1,094,164**	**1,024,202**	**-69,962**	**-6.4%**	**127,237,676**	**128,971,018**	**1,733,342**	**1.4%**
Percentage of 19 Largest in Total Healthcare Cluster Employment	**93.8%**	**94.4%**			**87.0%**	**87.1%**		
Percentage of 19 Largest in Total Cleveland MSA Employment	**13.5%**	**14.6%**			**11.2%**	**12.2%**		

for small medical offices to absorb.

Among the Core Providers of Healthcare, Cleveland's shares of Nursing Care Facilities and Other Outpatient Care Centers are also slightly higher than the national averages. Within the Healthcare Support Product and Services industries, the share of employment in Cleveland's Pharmacies and Drug Stores and Instrument and Related Products Manufacturing industries were higher than the national average in 2000 but declined to the point where the employment shares were similar to national shares by 2005.

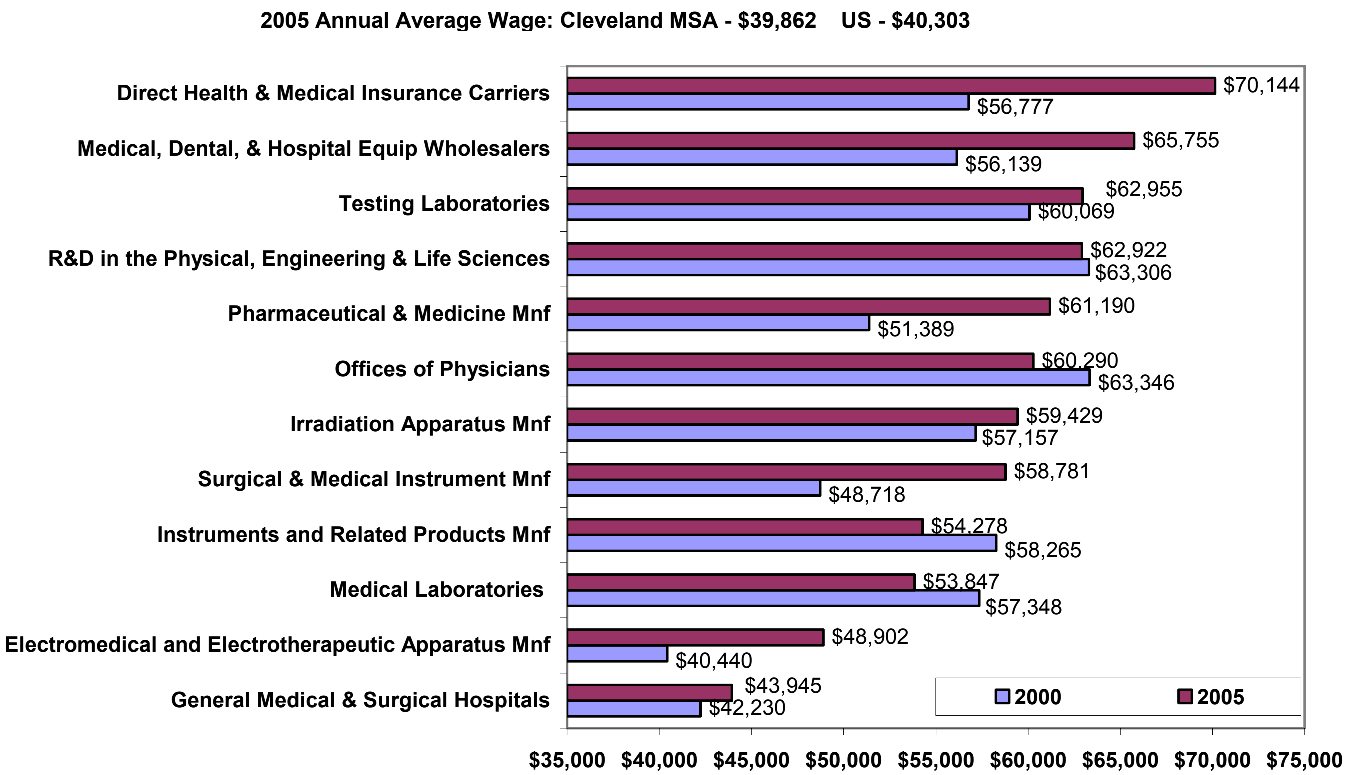
The simple concentration of employment within a single or a cluster of industries does not answer the question whether these industries are competitive or whether they might have an export potential. Average wages, total payroll, and location quotient might give additional suggestions as to how strong and productive these industries are and whether they are competitive regionally and nationally.

HIGH-WAGE HEALTHCARE INDUSTRIES IN THE CLEVELAND MSA

The 12 Top-Paying Healthcare Industries

In 2005, 14 industries in the healthcare cluster paid salaries higher than the annual average wage in the Cleveland MSA ($39,862) and in the nation ($40,303).[10]

Figure 3: Annual Average Wages in 12 Top-Paying Healthcare Industries, 2000-2005



As shown in Figure 3, the highest average wages, $70,144, were paid by Direct Health and Medical Insurance Carriers. This was followed by Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers ($65,755) and companies from the Testing Laboratories industry that relate to the healthcare cluster in the Cleveland MSA ($62,955). In 2005, average annual salaries in the 12 top-paying industries ranged from $42,230 to $70,144.

Four of the 14 highest-paying industries are among the Core Providers of Healthcare and 10 are among the Healthcare Support Products and Services. Two industries of the Core Providers are also among the largest employers in the healthcare cluster (General Medical

[10] In addition to the industries in Figure 3, two other industries paid wages higher than the average wage in the Cleveland MSA and the nation in 2005: All Other Miscellaneous Ambulatory Health Care Services (NAICS 621999), data for which are suppressed, and Psychiatric and Substance Abuse Hospitals (NAICS 622210), which saw a significant increase in wages in 2005 due to acquisition of one hospital by another company (*Plain Dealer*, September 23, 2004, p.B1).

Hospitals and Offices of Physicians); five are Healthcare Support industries that are among the seven largest employers in this category. In 2005, the 12 industries shown in Figure 3 employed 82,007 people, which captures 55 percent of total employment in the healthcare cluster that year.

Overall, between 2000 and 2004, wages in Cleveland's healthcare cluster increased 1.9% (from $37,913 to $38,638), despite a slight decline in average annual wages across all industries (–0.4%). The main increases occurred within the large industries. The 19 industries with the highest employment in the healthcare cluster experienced average wage increases of 7.3 percent, from $37,169 in 2000 to $39,886 in 2005.

Wages of the 19 Largest Healthcare Industries

Wages for the 19 largest employers in the local healthcare cluster ranged from $21,822 to $70,144 (Table 5). The annual average wages of the largest Core Providers of Healthcare increased from $31,274 in 2000 to $32,008 in 2005. With the exception of two major industries, Offices of Physicians, which paid $60,290, and General Medical and Surgical Hospitals, which paid $43,892, the annual average wages of other industries are fairly low, ranging from $21,822 in Home Healthcare Services to $36,383 in Other Outpatient Care Centers. The dynamic of the wages in the Core Providers differs significantly. Between 2000 and 2005, five industries increased wages, paying from four to 22.3 percent more in 2005 than in 2000. Six other industries decreased their wages (the decline ranged from 0.4 percent to 7.9 percent).

In terms of employment dynamics and wages, three industries among the largest Core Providers added more than 1,200 employees each: General Medical and Surgical Hospitals added 4,449 employees, paying them, on average, $43,892 in 2005; Nursing Care Facilities added 2,511 employees with an annual average wage of $23,453; and Home Healthcare Services added 1,229 new jobs paying an average of $21,822 in 2005.

The annual average wages of the seven largest employers among the Healthcare Support Products and Service industries increased from $47,274 in 2000 to $53,392 in 2005. Five of them pay very high wages compared to the healthcare average, reaching $56,000 in 2000 and $70,000 in 2005. These industries include: Direct Health and Medical Insurance Carriers (from $56,777 in 2000 to $70,144 in 2005), Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers (from $56,139 to $65,755), Pharmaceutical and Medicine Manufacturing (from $51,389 to $61,190), and Surgical and Medical Instrument Manufacturing (from $48,718 to $58,781).[11] Four of these high-paying industries raised their wages (and approximate productivity) from 17.1 to 23.5 percent. The biggest rise in wages was

[11] All annual average wages figures are adjusted for inflation

experienced by Pharmacies and Drug Stores (33.6%), which increased from $19,426 in 2000 to $25,955 in 2005.

Table 5: Annual Average Wages of the Largest Healthcare Industries in the Cleveland MSA

Industry Name	Emp 2005	Wages (in 2005$) 2000	2005	change	% change
12 Largest Core Providers of Healthcare	**126,115**	**$31,274**	**$32,008**	**$734**	**2.3%**
General Medical, Surgical, and Specialty Hospitals	62,275	$42,208	$43,892	$1,685	4.0%
Nursing Care Facilities	21,375	$23,682	$23,453	-$228	-1.0%
Offices of Physicians (except Mental Health Specialists)	12,148	$63,346	$60,290	-$3,056	-4.8%
Home Health Care Services	8,453	$22,195	$21,822	-$373	-1.7%
Offices of Dentists	6,292	$32,491	$34,906	$2,416	7.4%
Other Outpatient Care Centers	3,524	$32,561	$36,383	$3,822	11.7%
Residential Mental Retardation Facilities	3,885	$25,014	$23,042	-$1,973	-7.9%
Continuing Care Retirement Communities	2,545	$20,400	$22,018	$1,618	7.9%
Ambulance Services	1,530	$23,833	$23,746	-$87	-0.4%
Offices of Physical, Occupational and Speech Therapists, and Audiologists	1,638	$31,629	$30,168	-$1,462	-4.6%
Outpatient Mental Health and Substance Abuse Centers	1,183	$29,136	$35,622	$6,487	22.3%
Residential Mental Health and Substance Abuse Facilities	1,266	$28,792	$28,755	-$37	-0.1%
7 Largest Healthcare Support Product and Service Industries	**15,297**	**$47,274**	**$53,392**	**$6,118**	**12.9%**
Pharmacies and Drug Stores	6,190	$19,426	$25,955	$6,530	33.6%
Surgical Appliance and Supplies Manufacturing	2,552	$40,203	$37,638	-$2,565	-6.4%
Direct Health and Medical Insurance Carriers	2,027	$56,777	$70,144	$13,368	23.5%
Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	916	$58,265	$54,278	-$3,986	-6.8%
Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	1,434	$56,139	$65,755	$9,616	17.1%
Surgical and Medical Instrument Manufacturing	908	$48,718	$58,781	$10,063	20.7%
Pharmaceutical and Medicine Manufacturing	1,270	$51,389	$61,190	$9,801	19.1%
19 Largest Industries Healthcare Industries	**141,412**	**$37,169**	**$39,886**	**$2,718**	**7.3%**
Healthcare Cluster	**149,189**	**$37,913**	**$38,638**	**$726**	**1.9%**
Cleveland MSA	**1,024,202**	**$40,024**	**$39,862**	**-$162**	**-0.4%**

The only industry from the Healthcare Support group to gain employment, Pharmaceutical and Medicine Manufacturing, added 270 employees paying them, on average, $61,190 in 2005. The two industries that lost the most employees between 2000 and 2005 were Pharmacies and Drug Stores (–5,764 employees, annual average wages of $25,955 in 2005) and Electromedical and Electrotherapeutic Apparatus Manufacturing (–850 employees, annual average wages of $48,901 in 2005).

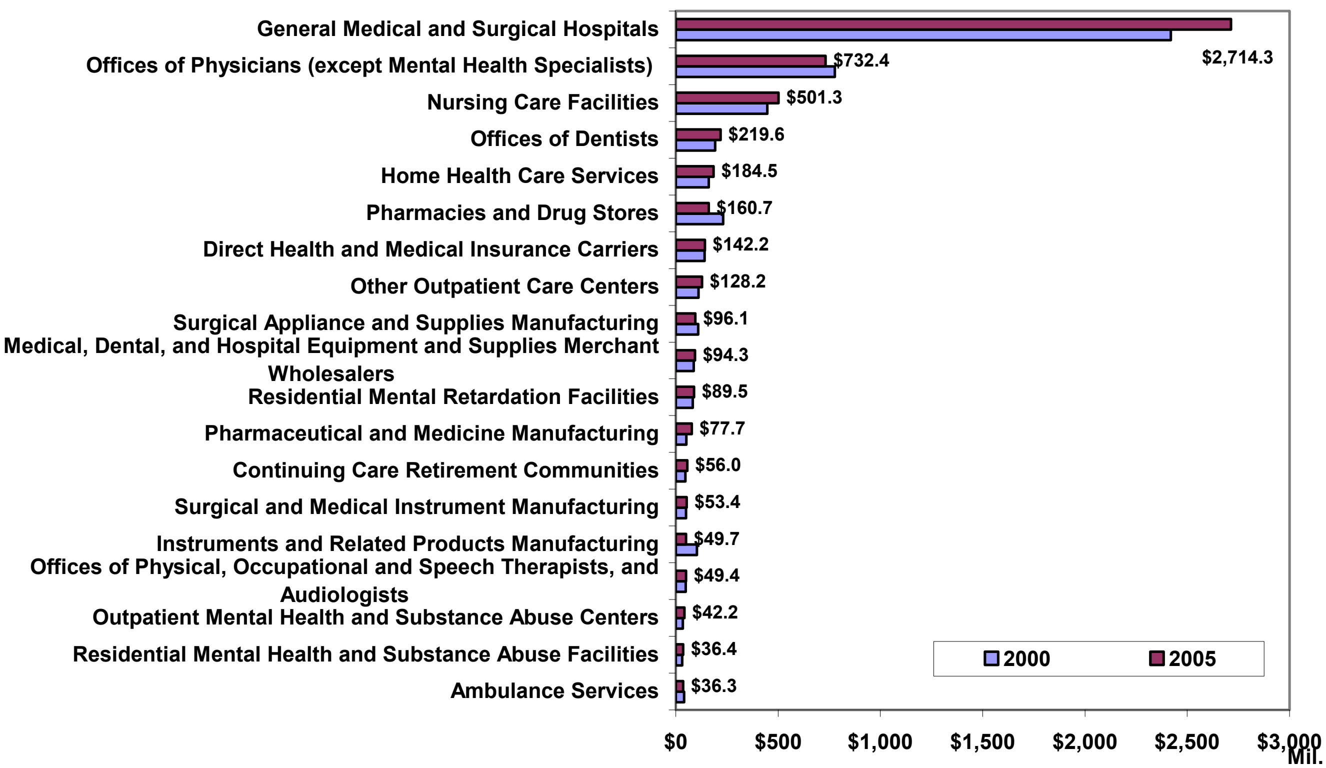
These differences are consistent with the different nature of the two groups of healthcare industries: Core Providers represent the population-serving service economy, while the Support Industries are primarily represented by manufacturing and sales industries, which follow the national trend of increasing their productivity by incorporating technology innovations.

HEALTHCARE INDUSTRIES THAT PRODUCE THE MOST PRODUCTS AND SERVICES

Annual Total Payroll

The largest healthcare employers also contribute the most to the wealth of the region. Their total payroll, which serves as a proxy for the regional gross product, replicates the structure of employment within the healthcare cluster (see Figure 4). The General Medical and Surgical Hospitals industry, by far the largest contributor, had an annual payroll of $2.7 billion in 2005, which is $294 million or 12.1 percent more than in 2000 after adjusting for inflation. Offices of Physicians is the second largest in terms of payroll, even though it lost employment (–0.9%) and total payroll (–5.7%) between 2000 and 2005. It accounts for a total annual payroll of $732 million in 2005. The third largest contributor to the total payroll (and the second largest employer), Nursing Care Facilities, had a total payroll of $501.3 million in 2005, which is 12.2 percent or $54.6 million more than in 2000.

Figure 4: Changes in Total Annual Payroll in the 19 Largest Healthcare Industries, 2000 and 2005
(Total Payroll in Million Dollars)



The largest increase in total payroll was experienced by two small industries, Pharmaceutical and Medicine Manufacturing, at 51.2 percent or $26.3 million, and Outpatient Mental Health and Substance Abuse Centers, 23.9 percent or $8.1 million. The biggest losses occurred in Pharmacies and Drug Stores, –$71.6 million (or –30.8%); Instruments and Related Products Manufacturing, –$53.2 million (–51.7%); Offices of Physicians (except Mental Health Specialists), –44.4 million (–5.7%); and Surgical Appliance and Supplies Manufacturing, –$13.6 million (–12.4%).

Location Quotient

In 2005, 12 industries (Table 6) in the Cleveland MSA Healthcare Cluster had a regional employment share that was larger than their national employment share.[12] These industries are considered to be those that produce goods and services consumed outside the region (i.e., outside of the Cleveland MSA) and their location quotient (ratio of these shares) is greater than one.

Table 6: Healthcare Export Industries

Industry Name	Employment 2005	2000-2005 Emp change	LQ 2005	2000-2005 LQ change
Surgical Appliance and Supplies Manufacturing	2,552	-175	3.75	0.32
Instruments and Related Products Manufacturing	916	-850	1.97	-1.01
Offices of All Other Miscellaneous Health Practitioners	624	111	1.95	-0.46
Blood and Organ Banks	775	52	1.76	-0.10
All Other Miscellaneous Ambulatory Health Care Services	350	142	1.67	0.70
Nursing Care Facilities	21,375	2,511	1.65	0.25
General Medical and Surgical Hospitals	61,765	4,449	1.54	0.10
Ambulance Services	1,530	-208	1.47	-0.42
Other Outpatient Care Centers	3,524	115	1.45	-0.11
Offices of Podiatrists	374	12	1.43	-0.01
Home Health Care Services	8,453	1,229	1.32	0.00
Irradiation Apparatus Manufacturing	118	5	1.31	0.23

Bolded are industries that belong to the 19 largest employers of the healthcare cluster

Three of these 12 industries are in manufacturing, and two of them have the highest location quotients of employment (Surgical Appliance and Supplies Manufacturing: 3.75, and

[12] This measure is also known as a location quotient (LQ). The interpretation of location quotient is as follows: if an industry has a higher concentration in a regional economy relative to the concentration of this industry in the national economy (LQ>1), then the industry is a part of the regional economic base and produces some products for export outside the region. Such response to external demand brings money into the region, where it is spent or re-invested in the production process, triggering further regional growth.

Instruments and Related Products Manufacturing: 1.97) and belong to the largest employers within the healthcare cluster. Unfortunately, they experienced declining employment — together they have lost 1,025 employees since 2000. Between 2000 and 2005, Instruments and Related Products Manufacturing Industry also saw its location quotient decrease by 1.01. However, while the Surgical Appliance and Supplies Manufacturing industry also lost its payroll location quotient (from 2.68 in 2000 to 1.33 in 2005), the Instruments and Related Products Manufacturing industry increased the payroll location quotient from 2.93 in 2000 to 3.48 in 2005.

Nine non-manufacturing export industries have varied employment numbers, but all of them, except Ambulance Services, grew from 2000 to 2005. The largest employers and fastest-growing industries, Nursing Care Facilities and General Medical and Surgical Hospitals, also increased their location quotient, which might indicate enlargement of their service area, whether it is within Northeast Ohio or nationally.

HEALTHCARE OCCUPATIONS IN THE CLEVELAND MSA

The occupational structure of the Cleveland MSA[13] healthcare industries confirms major findings of the industrial analyses in preceding sections. Similar to the industrial classification, occupations in healthcare are grouped into two major sectors: Healthcare Practitioners and Technical Occupations (29-000) and Healthcare Support Occupations (31-000). The primary data source for this analysis is BLS statistics by occupation. Overall, the healthcare occupations in the Cleveland MSA have higher total shares of occupations compared to the national shares. In 2004, the regional share of Healthcare Practitioners and Technical Occupations was 5.7 percent of all occupations, while the corresponding national share was five percent; the regional share of Healthcare Support Occupations was 3.1 percent compared to 2.6 percent nationally (Appendix B, Table B1).

Comparing the selected occupations in the Cleveland MSA[14] and in the U.S. shows that the structure of regional healthcare occupations, by and large, is very similar to the national level. Among the Healthcare Practitioners and Technical Occupations, our region has a higher percentage of Physicians and Surgeons (4.1% in the Cleveland MSA compared to 2.7% in the U.S.), Registered Nurses (37.5% and 36.1%), Licensed Practical and Licensed Vocational Nurses (12.4% and 10.9%), and Pharmacists (4.2% and 3.5%). Among the Healthcare Support Occupations, the Cleveland MSA has more Nursing Aides (45.7% and 42.2%) and Physical Therapist Assistants (2.8% and 1.7%). At the same time, the region has less Home Health Aides (15.2% in the Cleveland MSA and 18.9% in the U.S.).

Comparing the changes in healthcare occupations in the Cleveland MSA over time, according to the data of American Community Survey, the number of Cleveland MSA Healthcare Practitioners decreased by 1,183 (–1.9%) and the number of Healthcare Support Occupations grew by 7,733 (31.4%) (Appendix B, Table B2). In 2004, the largest employment within Healthcare Practitioners was the Registered Nurses occupation (19,954 or 31.8%), and within Healthcare Support Occupations the largest category was the Nursing, Psychiatric, and Home Health Aides occupation (22,577 or 69.8%).

The comparison of detailed occupations between 2000 and 2004 (Appendix B, Table B3) shows that the Cleveland MSA experienced the largest growth in Nursing Aides, Orderlies, and Attendants (by 2,180 or 16.3%), followed by Registered Nurses (by 960 employees or

[13] For the occupation analysis, we used the data on the Cleveland-Lorain-Elyria PMSA. This older definition includes Ashtabula County, which is the small county with 33,703 employees accounting for 3.3 percent of the total Cleveland PMSA employment.
[14] Not all the occupational data are available on the regional level, since the Bureau of Labor Statistics (BLS) does not publish data that do not meet the release standards.

4.3%) and Medical Assistants (by 680 or 23.1%). In comparison, these occupations nationally have different rates of growth; Nursing Aides, Orderlies, and Attendants and Medical Assistants increased less nationally, 12.7 and 11.7 percent, respectively. Registered nurses grew more nationally than regionally, increasing their employment by 6.8 percent.

Percentage-wise, the region increased employment of General Internists from 160 employees in 2000 to 580 in 2004 (362% growth), Medical Equipment Preparers from 160 to 650 employees (306%), and Medical and Clinical Laboratory Technologists from 1,050 to 1,520 (45%). The other five occupational sectors with significant employment growth were Licensed Practical and Licensed Vocational Nurses (420 employees or 5.8%), Medical Records and Health Information Technicians (290 or 37.2%), Speech-Language Pathologists (270 or 29%), Radiologist Technologists and Technicians (230 or 14.3%), and Emergency Technicians and Paramedics (200 or 15.6%).

At the same time, the biggest decline was observed among Family and General Practitioners, which dropped employment from 2,100 in 2000 to 730 in 2004 (–1,370 or –65.2%), followed by much smaller decrease in Opticians (–230 or –30.3%), Dietetic Technicians (from 130 to 100 or by –67.7%), Home Health Aides (–190 or –3.5%), and Physical Therapist Aides (–170 or –54.8%).

Nationally, there were no corresponding dramatic decreases in Family and General Practitioners or large increases in General Internists between 2000 and 2004. Compared to the regional employment decline of –65.2 percent in the Family and General Practitioners occupation, nationally it declined by only –18 percent. At the same time, while General Internists' employment increased 363 percent in the Cleveland MSA, nationally, this occupation's employment grew by only 9.3 percent. A much slower rate of growth was also experienced nationally by Medical Equipment Preparers (23% nationally compared to 306% regionally) and Medical and Clinical Laboratory Technologists (6.7% compared to 45%).

All these changes in occupational employment sectors occurred during a period of overall growth in the healthcare industry in the Cleveland MSA. The occupational changes may suggest a decline in specialists in particular professions, but also shifts between occupations due to changes in healthcare insurance coverage and malpractice insurance costs.

CONCLUSIONS

This report describes the structure of the healthcare cluster in the Cleveland MSA. While the long-term trends of the industries in the healthcare cluster are similar to their national counterparts, the short-term analysis shows that two groups of industries, the Core Providers of Healthcare and the Healthcare Support Products and Services, experienced changes of employment and payroll that differ from the national trends. From 2000 to 2005, the share of the healthcare cluster industries in the Cleveland MSA economy was higher than the national average, and despite the slower absolute growth of jobs compared to the national average of healthcare industries, the share remains high and constitutes a significant regional job market.

Since the population of the Cleveland MSA declined slightly between 2000 and 2005, industries that comprise the Core Providers of Healthcare and mainly provide population-serving healthcare services show sluggish growth in the total number of jobs. However, they grew faster than the national average, when controlling for population change. These industries include jobs with higher annual average wages, such as in General Medical and Surgical Hospitals, and primarily low-paid jobs in such industries as Nursing Care Facilities and Residential Mental Health and Retardation Facilities.

The Healthcare Support Products and Services industries lost about a third of their employment base, eliminating more than 8,000 jobs between 2000 and 2005, while their national counterparts grew at nearly a six percent rate. These industries include companies that manufacture medical devices, supplies, and provide sales and services for the Core Providers of Healthcare. Despite employment losses, these industries are a valuable part of the Cleveland area healthcare cluster since they require high skills, provide well-paying jobs, and significantly add to regional wealth. The uniqueness of this group of industries is described by two parameters: their employment is heavily concentrated in a few manufacturing industries and far exceeds the concentration of the same industries in the national economy (for example, Surgical Appliance and Supplies Manufacturing has an employment location quotient of 3.75 and Instruments and Related Product Manufacturing 1.97). The high concentration of employment within a few industries suggests a high rate of specialization and a strong potential to export their products and strengthen regional competitive advantage. Moreover, despite employment losses or slow growth, some Healthcare Support Products and Services industries were able to maintain their total annual payroll (which is the closest proxy for the output) and keep a high location quotient of payroll (in 2005, Surgical Appliance and Supplies Manufacturing had a payroll location quotient of 1.33, and Instruments and Related Product Manufacturing of 3.48).

In terms of healthcare occupations, the Cleveland MSA has professional structure very similar to the average of the national economy. Similar to the nation, the largest growth was experienced by registered and licensed nurses' occupations. Growing overall, some occupations had employment changes from 2000 to 2004 that might be influenced by healthcare insurance policies and the costs of malpractice insurance rather than by significant changes in the region's healthcare economy. For example, the large decline in the number of Family and General Practitioners was accompanied by the increase of General Internists.

The Cleveland healthcare cluster is an important part of the regional economy and creates a large job market for researchers, doctors, nurses, and non-skilled workers. Despite the decline in total population, employment in the healthcare cluster grew even faster than that of the per-capita national average. A workforce assessment will follow this study; it is intended to determine the actual needs for the future healthcare labor force and the responsiveness of training programs at local universities.

APPENDIX A

Table A1: Cleveland MSA Healthcare Cluster Industries

NAICS Code	Industry Name
Core Providers of Healthcare	
621111	Offices of Physicians (except Mental Health Specialists)
621112	Offices of Physicians, Mental Health Specialists
621210	Offices of Dentists
621310	Offices of Chiropractors
621320	Offices of Optometrists
621330	Offices of Mental Health Practitioners (except Physicians)
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists
621391	Offices of Podiatrists
621399	Offices of All Other Miscellaneous Health Practitioners
621410	Family Planning Centers
621420	Outpatient Mental Health and Substance Abuse Centers
62149	Other Outpatient Care Centers
621610	Home Health Care Services
621910	Ambulance Services
621991	Blood and Organ Banks
621999	All Other Miscellaneous Ambulatory Health Care Services
622110	General Medical and Surgical Hospitals
622210	Psychiatric and Substance Abuse Hospitals
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals
623110	Nursing Care Facilities
623210	Residential Mental Retardation Facilities
623220	Residential Mental Health and Substance Abuse Facilities
623311	Continuing Care Retirement Communities
Healthcare Support Products and Services	
3254	Pharmaceutical and Medicine Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334516	Analytical Laboratory Instrument Manufacturer
334517	Irradiation Apparatus Manufacturing
339111	Laboratory Apparatus and Furniture Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
423460	Ophthalmic Goods Merchant Wholesalers
446110	Pharmacies and Drug Stores
524114	Direct Health and Medical Insurance Carriers
532291	Home Health Equipment Rental
541380	Testing Laboratories
541710	Research and Development in the Physical, Engineering and Life Sciences
621511	Medical Laboratories
512	Diagnostic Imaging Centers

APPENDIX B

Table B1: National and the Cleveland PMSA Healthcare Employment by Occupations, 2004

pation Code	Occupation Title	National		Cleveland PMSA	
		Emp	% of Emp	Emp	% of Emp
00-0000	**All Occupations**	**129,146,700**		**1,087,080**	
29-0000	**Healthcare practitioners and technical occupations**	**6,469,920**	**100% (5.0%)**	**61,760**	**100% (5.7%)**
29-1011	Chiropractors	22,730	0.4%	190	0.3%
29-1021	Dentists, general	86,360	1.3%	850	1.4%
29-1022	Oral and maxillofacial surgeons	4,380	0.1%		
29-1023	Orthodontists	5,670	0.1%		
29-1024	Prosthodontists	550	0.0%		
29-1029	Dentists, all other specialists	3,220	0.0%		
29-1031	Dietitians and nutritionists	47,820	0.7%	570	0.9%
29-1041	Optometrists	23,190	0.4%	110	0.2%
29-1051	Pharmacists	226,200	3.5%	2,600	4.2%
29-1061	Anesthesiologists	26,140	0.4%		
29-1062	Family and general practitioners	108,800	1.7%	730	1.2%
29-1063	Internists, general	50,500	0.8%	740	1.2%
29-1064	Obstetricians and gynecologists	22,100	0.3%	210	0.3%
29-1065	Pediatricians, general	26,870	0.4%		
29-1066	Psychiatrists	22,500	0.3%	160	0.3%
29-1067	Surgeons	55,390	0.9%		
29-1069	Physicians and surgeons, all other	174,270	2.7%	2,510	4.1%
29-1071	Physician assistants	63,140	1.0%	600	1.0%
29-1081	Podiatrists	6,940	0.1%	150	0.2%
29-1111	Registered nurses	2,338,530	36.1%	23,190	37.5%
29-1121	Audiologists	9,830	0.2%		
29-1122	Occupational therapists	86,710	1.3%	820	1.3%
29-1123	Physical therapists	145,210	2.2%	1,130	1.8%
29-1124	Radiation therapists	14,040	0.2%	130	0.2%
29-1125	Recreational therapists	23,350	0.4%	220	0.4%
29-1126	Respiratory therapists	94,500	1.5%	1,030	1.7%
29-1127	Speech-language pathologists	93,200	1.4%	1,200	1.9%
29-1129	Therapists, all other	8,380	0.1%	80	0.1%
29-1131	Veterinarians	48,290	0.7%	370	0.6%
29-1199	Health diagnosing and treating practitioners, all other	60,410	0.9%		
29-2011	Medical and clinical laboratory technologists	154,180	2.4%	1,520	2.5%
29-2012	Medical and clinical laboratory technicians	143,610	2.2%	1,610	2.6%
29-2021	Dental hygienists	158,130	2.4%		
29-2031	Cardiovascular technologists and technicians	43,320	0.7%	440	0.7%
29-2032	Diagnostic medical sonographers	42,500	0.7%	360	0.6%
29-2033	Nuclear medicine technologists	18,120	0.3%	130	0.2%
29-2034	Radiologic technologists and technicians	183,960	2.8%	1,840	3.0%
29-2041	Emergency medical technicians and paramedics	191,070	3.0%	1,480	2.4%
29-2051	Dietetic technicians	24,210	0.4%	100	0.2%
29-2052	Pharmacy technicians	265,190	4.1%	2,810	4.5%
29-2053	Psychiatric technicians	62,960	1.0%	170	0.3%
29-2054	Respiratory therapy technicians	21,970	0.3%	100	0.2%
29-2055	Surgical technologists	82,070	1.3%	480	0.8%
29-2056	Veterinary technologists and technicians	61,110	0.9%		
29-2061	Licensed practical and licensed vocational nurses	706,360	10.9%	7,660	12.4%
29-2071	Medical records and health information technicians	159,580	2.5%	1,070	1.7%
29-2081	Opticians, dispensing	66,000	1.0%	530	0.9%
29-2091	Orthotists and prosthetists	4,960	0.1%	50	0.1%

Occupation Code	Occupation Title	National		Cleveland PMSA	
		Emp	structure	Emp	structure
29-2099	Health technologists and technicians, all other	69,710	1.1%	290	0.5%
29-9011	Occupational health and safety specialists	35,950	0.6%	110	0.2%
29-9012	Occupational health and safety technicians	10,560	0.2%	190	0.3%
29-9091	Athletic trainers	14,450	0.2%	400	0.6%
29-9099	Healthcare practitioners and technical workers, all other	50,760	0.8%	200	0.3%
31-0000	**Healthcare support occupations**	**3,307,150**	**100% (2.6%)**	**34,060**	**100% (3.1%)**
31-1011	Home health aides	625,770	18.9%	5,180	15.2%
31-1012	Nursing aides, orderlies, and attendants	1,395,030	42.2%	15,580	45.7%
31-1013	Psychiatric aides	56,600	1.7%		
31-2011	Occupational therapist assistants	21,000	0.6%	450	1.3%
31-2012	Occupational therapist aides	5,390	0.2%		
31-2021	Physical therapist assistants	57,650	1.7%	960	2.8%
31-2022	Physical therapist aides	41,430	1.3%	140	0.4%
31-9011	Massage therapists	34,200	1.0%		
31-9091	Dental assistants	268,950	8.1%		
31-9092	Medical assistants	369,430	11.2%	3,620	10.6%
31-9093	Medical equipment preparers	40,200	1.2%	650	1.9%
31-9094	Medical transcriptionists	93,670	2.8%		
31-9095	Pharmacy aides	45,630	1.4%		
31-9096	Veterinary assistants and laboratory animal caretakers	70,210	2.1%	830	2.4%
31-9099	Healthcare support workers, all other	182,000	5.5%	2,020	5.9%

Source: Bureau of Labor Statistics, U.S. Department of Labor

Table B2: The Cleveland PMSA Healthcare Employment by Major Occupations, 2000 and 2004

Occupation Title	2000	2004		Absolute change	Percent change
Total (Employed civilian population 16 years and over)	**1,057,292**	**1,034,731**		-22,561	-2.1%
Management, professional, and related occupations, Total	**88,570**	**95,120**		6,550	7.4%
Professional and related occupations					
Healthcare practitioner and technical occupations; Total	63,938	62,755	100%	-1,183	-1.9%
Health diagnosing and treating practitioners and other technical occupations; Total		40,654	64.8%		
Physicians and surgeons		8,005	12.8%		
Registered nurses		19,954	31.8%		
Therapists		5,006	8.0%		
Other health diagnosing and treating practitioners and technical occupations		7,689	12.2%		
Healthcare practitioner and technical occupations		22,101	35.2%		
Service occupations; Total					
Healthcare support occupations; Total	24,632	32,365	100%	7,733	31.4%
Nursing, psychiatric, and home health aides		22,577	69.8%		
Occupational and physical therapist assistants and aides		758	2.3%		
Other healthcare support occupations		9,030	27.9%		

Source: American Community Survey, U.S. Census Bureau

Table B3: The Cleveland PMSA Healthcare Employment by Detailed Occupations, 2000 and 2004

Occupation Code	Occupation Title	2000	2004	Absolute Change	Percent Change
00-0000	**All Occupations**	**1,005,210**	**1,087,080**	**81,870**	**8.1%**
29-0000	**Healthcare Practitioners and Technical Occupations**	**62,080**	**61,760**	**-320**	**-0.5%**
29-1011	Chiropractors	N/A	190		
29-1021	Dentists, general	N/A	850		
29-1031	Dietitians and Nutritionists	430	570	140	32.6%
29-1041	Optometrists	N/A	110		
29-1051	Pharmacists	1,970	2,600	630	32.0%
29-1062	Family and General Practitioners	2,100	730	-1,370	-65.2%
29-1063	Internists, General	160	740	580	362.5%
29-1064	Obstetricians and gynecologists	N/A	210		
29-1066	Psychiatrists	180	160	-20	-11.1%
29-1069	Physicians and surgeons, all other	N/A	2,510		
29-1071	Physician Assistants	460	600	140	30.4%
29-1081	Podiatrists	N/A	150		
29-1111	Registered Nurses	22,230	23,190	960	4.3%
29-1122	Occupational Therapists	710	820	110	15.5%
29-1123	Physical Therapists	1,130	1,130	0	0.0%
29-1124	Radiation Therapists	90	130	40	44.4%
29-1125	Recreational Therapists	180	220	40	22.2%
29-1126	Respiratory Therapists	970	1,030	60	6.2%
29-1127	Speech-Language Pathologists	930	1,200	270	29.0%
29-1129	Therapists, all other	N/A	80		
29-1131	Veterinarians	330	370	40	12.1%
29-2011	Medical and Clinical Laboratory Technologists	1,050	1,520	470	44.8%
29-2012	Medical and Clinical Laboratory Technicians	1,650	1,610	-40	-2.4%
29-2031	Cardiovascular Technologists and Technicians	430	440	10	2.3%
29-2032	Diagnostic Medical Sonographers	260	360	100	38.5%
29-2033	Nuclear Medicine Technologists	120	130	10	8.3%
29-2034	Radiologic Technologists and Technicians	1,610	1,840	230	14.3%
29-2041	Emergency Medical Technicians and Paramedics	1,280	1,480	200	15.6%
29-2051	Dietetic Technicians	310	100	-210	-67.7%
29-2052	Pharmacy Technicians	2,740	2,810	70	2.6%
29-2053	Psychiatric Technicians	60	170	110	183.3%
29-2054	Respiratory Therapy Technicians	160	100	-60	-37.5%
29-2055	Surgical Technologists	540	480	-60	-11.1%
29-2061	Licensed Practical and Licensed Vocational Nurses	7,240	7,660	420	5.8%
29-2071	Medical Records and Health Information Technicians	780	1,070	290	37.2%
29-2081	Opticians, Dispensing	760	530	-230	-30.3%
29-2091	Orthotists and prosthetists	N/A	50		
29-2099	Health technologists and technicians, all other	N/A	1,160		
29-9010	Occupational Health and Safety Specialists and Technicians	220	400	180	81.8%
29-9099	Healthcare practitioners and technical workers, all other	N/A	190		
29-9091	Athletic Trainers	120	200	80	66.7%
31-0000	**Healthcare Support Occupations**	**30,340**	**34,060**	**3,720**	**12.3%**

Occupation Code	Occupation Title	2000	2004	Absolute Change	Percent Change
31-1011	Home Health Aides	5,370	5,180	-190	-3.5%
31-1012	Nursing Aides, Orderlies, and Attendants	13,400	15,580	2,180	16.3%
31-2011	Occupational Therapist Assistants and Aids	430	450	20	4.7%
31-2021	Physical Therapist Assistants	700	960	260	37.1%
31-2022	Physical Therapist Aides	310	140	-170	-54.8%
31-9092	Medical Assistants	2,940	3,620	680	23.1%
31-9093	Medical Equipment Preparers	160	650	490	306.3%
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	630	830	200	31.7%
31-9099	Healthcare support workers, all other	N/A	2,020		

Source: Bureau of Labor Statistics, U.S. Department of Labor