Louisville's Health-Related Economy: Size, Character, and Growth

A report for the
Greater Louisville Health Enterprises Network
www.healthenterprisesnetwork.com

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Executive Summary

The Greater Louisville Health Enterprises Network has invested in this economic monitoring system for Louisville's health-related economy. The system comprises a set of reliable data streams on the various dimensions of the health care economy. In this report we document those data streams and use the data to measure the current size of Louisville's health-related industry, characterize the industrial components, make comparisons to peer markets, and to observe trends, strengths and weaknesses.

We have assembled a large collection of objective industry-standard data that can be tracked on an annual basis, and which can provide policy-rich feedback on the status of the local industry. The scope is broad enough to reflect the many commercially important aspects of health, including basic delivery of health care to local residents, but also the many other supporting enterprises, such as insurance, education, management, information technology, manufacturing, research, and pharmaceuticals.

This report summarizes our findings. Among the most important are:

1. We have identified over two thousand area enterprises that can properly be classified as health-related. These include physician and dentist offices, hospitals, labs, nursing homes, manufacturers of medical supplies, health insurance carriers, research and management firms, education providers, and nonprofit and government support organizations.

2. The health industry in Louisville is large, accounting for more than one in ten jobs and payroll dollars in the metro area. Seven of the top twenty-one private employers in Louisville are in a health-related business, according to the latest *Business First Book of Lists*. It appears to be the largest regional industry in terms of annual payrolls.

3. We estimate that health-related enterprises in the Louisville area employ 72,000 persons, with an annual payroll of $2.3 billion.

4. The health-related economy in Louisville directly or indirectly pays at least $200 million per year in taxes to Kentucky and Indiana state governments and another $48 million to local governments in the metro area. The actual tax payments are larger, as we have not made estimates of property taxes or corporate income taxes paid by Louisville area companies.

5. Perhaps the most prominent aspect of Louisville's health care industry is the presence of several nationally important corporate headquarters. Humana and Vencor, particularly, gave Louisville a strong showing in business listings by *Fortune Magazine* and Dun and Bradstreet.

6. Louisville continues to hold its share of the national health care business even as Louisville's shares of national population and jobs fall. The Louisville metro has accounted for .5 percent of all US health services payroll throughout the last decade, while the metro's share of US population has fallen to below .4 percent.

7. Research and development activity in Louisville, while still relatively low, is growing rapidly. Louisville ranked third among the sixteen comparison metros in growth of federal research grants and contracts at medical schools between 1994 and 1999, and first in growth in overall university research expenditures between 1991 and 1999.

8. Louisville is also still a relatively minor player on the commercial discovery side, according to detailed data from the US Patent and Trademark Office. Cincinnati, Indianapolis and Raleigh lead the list of competitor markets. Like university research and development, however, Louisville did post a strong growth rate for the most recent five year period, ranking second among the sixteen markets.

9. Louisville is not prominent in the manufacturing of medical equipment and supplies, and has no presence in the lucrative pharmaceuticals business. Several of Louisville's prime competitors stand out in medical-related manufacturing activity, including Indianapolis, Kansas City, and Raleigh.

10. Louisville has at least eight institutions that provide specialized education and training for the health-related industry. This includes a medical and dental school, several undergraduate and graduate nursing schools, and four-year and two-year programs for therapists, technicians and assistants. These institutions collectively employ over 2,200 persons and have an annual payroll of over $150 million.

11. Louisville hospitals show up in a few national reputational rankings. The latest *US News and World Report* rankings of the top 50 hospitals by each of eighteen specialties only listed two Louisville hospitals. However, a recent ranking by Solucient gives high ratings to Jewish, Norton, and Baptist East hospitals.

The Health-Related Industry in Greater Louisville

Louisville's health-related industry comprises over twenty hospitals, hundreds of physi cian offices, clinics, labs, equipment manufacturers, insurance carriers, management and consulting firms, government and nonprofit support organizations, research operations and educational institutions. We estimate that there are over 2,000 health-related establishments in the Louisville MSA (metropolitan statistical area, which includes Bullitt, Jefferson and Oldham counties in Kentucky, plus Clark, Floyd, Harrison and Scott counties in Indiana).

These organizations collectively employ over 70,000 persons in the Louisville metro area, with an annual payroll of over $2 billion. We estimate that the health industry pays around $200 million in income, sales and provider taxes to Kentucky and Indiana state governments, and an additional $48 million in occupational taxes to local governments in the Louisville metro area. Actual tax payments are higher, as no data are available on corporate income tax payments and several other tax categories.

The table below provides estimates of the economic size of the health industry in the Louisville metro area, as of the latest year. The actual reference period varies somewhat by category, as some data are reported on different fiscal years and reporting cycles, but the reader can think of the estimates as a snapshot as of the year 2000. Much of the unadjusted raw data is provided in subsequent pages, as we examine the categories in more detail relative to Louisville's peer metros.

The industry is somewhat bigger than what we have been able to measure. We have relied upon published data, primarily from federal agencies and membership organizations. A more complete economic accounting could be made using business directories and mail surveys, though this would be an expensive undertaking. For example, assuming a good response rate, better estimates could be made of the economic activity of the more than two dozen nonprofit support organizations in the Louisville area that are health related. In the table below, except in the few cases where we had good data from other sources, we assumed that each of

The Health-Related Industry in Louisville
(estimates for latest year, metro area)

	Establis hments	Revenues or Expenditures	Jobs	Payroll	State Taxes*	Local Taxes**
Health Care Delivery						
Ambulatory (offices of physicians, outpatient centers, labs)	1,769	$1,877,592,287	22,571	$853,178,530	$68,424,918	$17,490,160
Hospitals	23	$1,943,302,242	24,220	$713,713,889	$57,239,854	$14,631,135
Nursing & Residential Homes	195	$596,175,413	13,248	$261,547,691	$30,514,931	$5,361,728
Related Enterprises						
Education and Academic Research (health science schools)	8	$175,161,736	2,278	$153,163,680	$12,283,727	$3,139,855
Private Research and Development, Life Sciences	15	$8,696,000	175	$2,976,000	$238,675	$61,008
Health Insurance Carriers	*2*	na	6,436	$260,930,000	$20,926,586	$5,349,065
Management Companies	1	na	720	$21,600,000	$1,732,320	$442,800
Manufacturing of Medical Equipment & Supplies	41	$59,908,000	565	$17,000,000	$1,363,400	$348,500
Nonprofit Support Organizations	24	$9,096,500	226	$7,910,000	$634,382	$162,155
Government - EMS, Health Departments, Indigent Care	6	$66,190,634	1,853	$46,333,443	$3,715,942	$949,836
Total	2,084	$4,736,122,812	72,292	$2,338,353,233	$197,074,736	$47,936,241

na: not applicable (under insurance carriers, for example, Humana system-wide revenues in 1999 were $10.1 billion; the jobs and payroll shown are those captured in Louisville)
Estimates of revenues, jobs, and payrolls for Health Care Delivery are extrapolated from the 1997 Economic Census, using compound growth rates calculated from historical data.
Estimates for educational institutions include 2000 budgetary data from four schools - University of Louisville, Spalding University, Bellarmine University, and Indiana University-
Estimates for insurance carriers include only Humana and Anthem. Estimates for management companies refer only to SHPS. Estimates for nonprofit support organizations obtained by identifying agencies from telephone directory, assuming 2 jobs per office @ $35,000 per year; except for two organizations where data available.
Estimates for government agencies calculated from published budget data from City of Louisville, Jefferson County Fiscal Court, and Kentucky State government.
* KY and IN income and sales taxes, plus KY hospital tax of 2.5% (assume 90% of NPR from KY hospitals), plus KY nursing home tax of 2% (assume 80% of revenues in KY)
** Local occupational tax only: 1.25% City/County plus .75% x .8 to JCPS.

the 24 nonprofit support organizations identified had two employees each earning $35,000 per year.

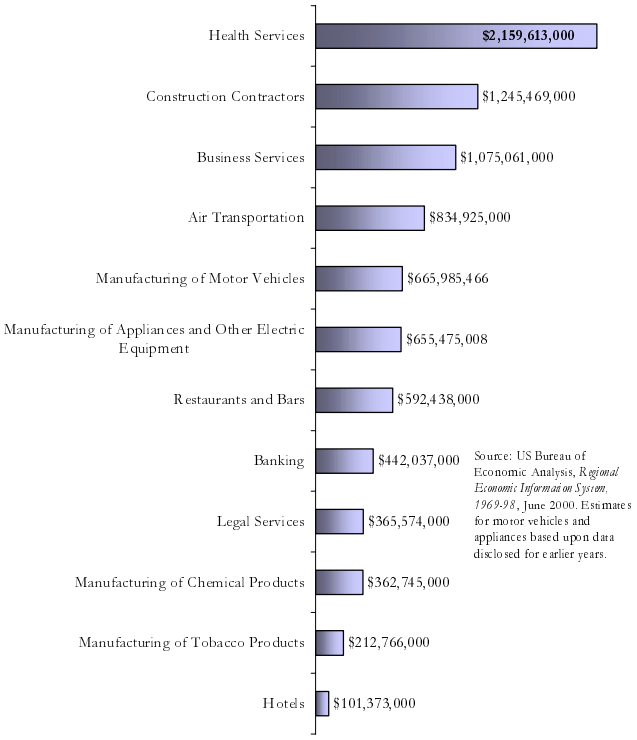
Similarly, a targeted business survey could identify the other major health insurance carriers and brokers, and management, IT, and consulting firms in the Louisville area. Many of these companies are not classified under health-related industries in federal databases, and hence except for the largest, escape our statistical net.

Health Care Delivery

When most people hear the term health industry or the like, they naturally think first of hospitals, doctors' offices, labs, and nursing homes. These institutions are the primary places where health care is ultimately delivered to patients. Indeed, the delivery organizations remain the largest economic components of the broader health industry.

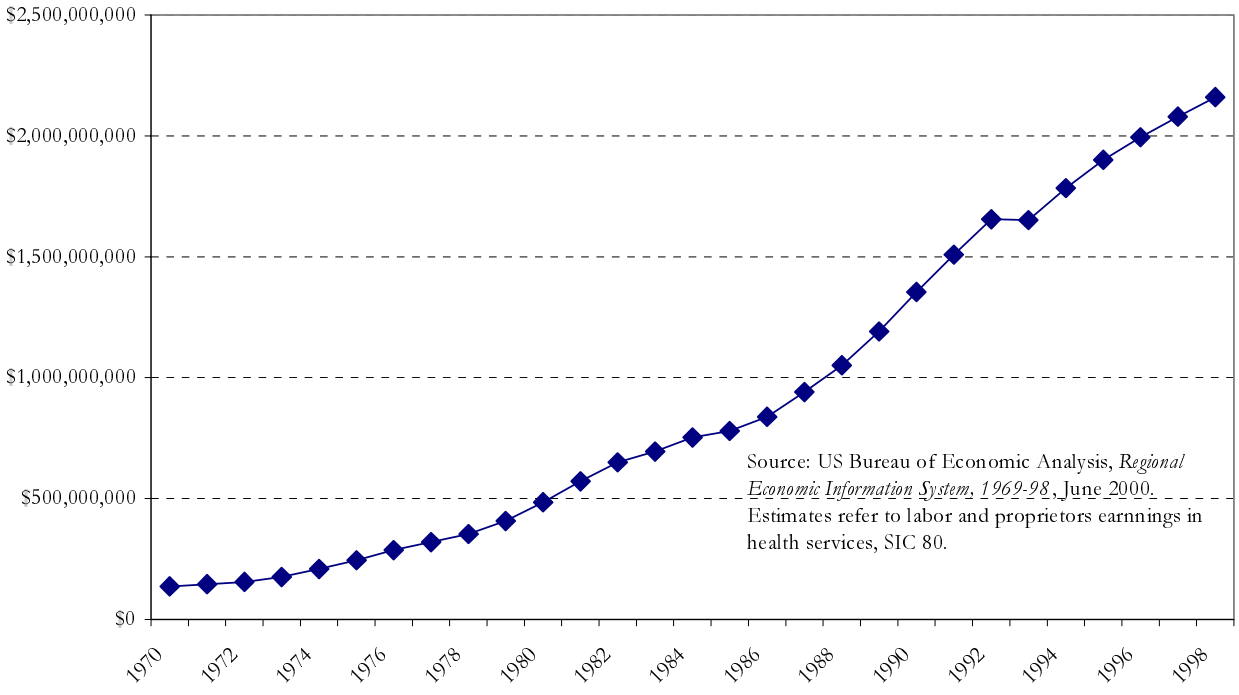
As one can quickly see from the accompanying charts, the health services industry in Louisville is very large and fast growing. With over $2 billion in annual payrolls, health services may be considered

Payrolls of Selected Industries
Louisville MSA, 1998



Source: US Bureau of Economic Analysis, *Regional Economic Information System, 1969-98*, June 2000. Estimates for motor vehicles and appliances based upon data disclosed for earlier years.

Payroll in Health Services Industry
Louisville MSA, 1970-98



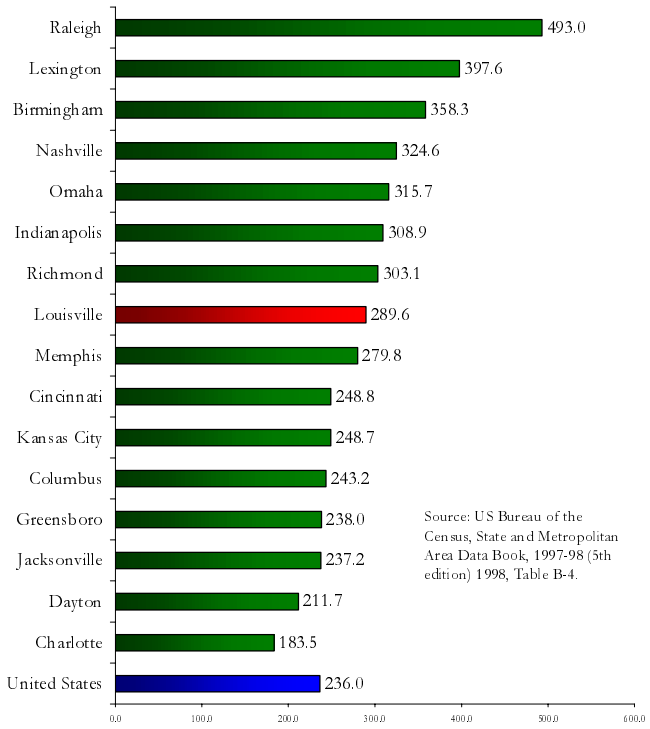
Source: US Bureau of Economic Analysis, *Regional Economic Information System, 1969-98*, June 2000.
Estimates refer to labor and proprietors earnnings in health services, SIC 80.

Physicians, by MSA, 1995

	Total	Office-Based	Total per 100,000 residents
Birmingham	3,183	1,966	358.3
Charlotte	2,367	1,936	183.5
Cincinnati	4,746	3,190	248.8
Columbus	3,489	2,234	243.2
Dayton	2,016	1,449	211.7
Greensboro	2,677	1,864	238.0
Indianapolis	4,559	2,882	308.9
Jacksonville	2,329	1,651	237.2
Kansas City	4,161	2,797	248.7
Lexington	1,730	1,111	397.6
Louisville	**2,857**	**2,016**	**289.6**
Memphis	2,985	1,952	279.8
Nashville	3,554	2,313	324.6
Omaha	2,119	1,340	315.7
Raleigh	4,914	2,534	493.0
Richmond	2,807	1,820	303.1
United States	617,362		236.0

Source: US Bureau of the Census, *State and Metropolitan Area Data Book, 1997-98 (*5th edition) Washington DC, 1998, Table B-4. Data compiled from records of American Medical Association.

Physicians per 100,000 Residents by MSA, 1995



the largest single industry in the Louisville. In terms of payrolls, the health services industry is several times larger than other prominent local industries, like air transportation, banking, hospitality, and car and truck manufacturing. And health services payrolls have been rising by over seven percent annually during the last decade.

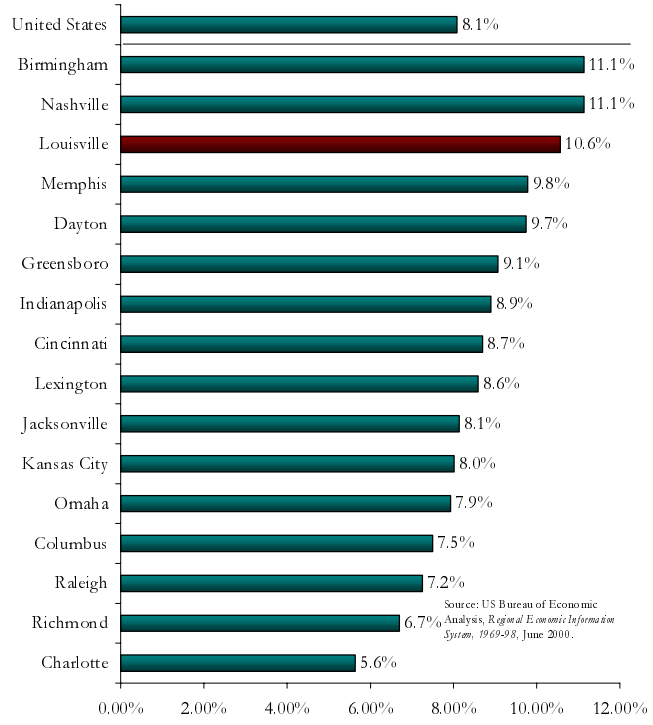
The summary table on page 3 provides more detailed industrial information, much of it derived from the recently released 1997 Economic Census. Physicians offices and labs account for nearly 1,800 business establishments in the Louisville area, easily the most pervasive of all categories studied. They are also a major source of employment, payroll, and taxes. Revenues were nearly $1.9 billion in 2000, and these offices employed over 22,000 persons with an annual payroll of $850 million. The payroll includes the wages and salaries of employees, plus the net income of the business proprietors.

The Louisville market has nearly 3,000 physicians, according to data published by the US Census Bureau in 1998. On a per resident basis, Louisville ranks squarely in the middle of the list of comparision markets. Nearly all the metros have a higher concentration of physicians than does the United States as a whole. Health care delivery is an urbanized service, particularly for more advanced treatment, and the national average is computed using data for rural areas. Note that the metros without a medical school - Charlotte and Jacksonville - have fewer physicians per resident than the national average.

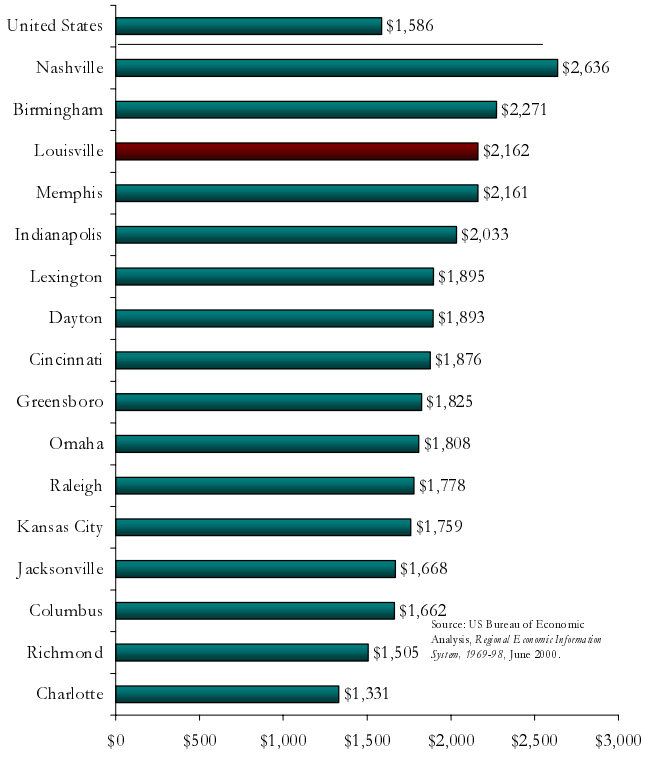
The ranking is topped by Raleigh and Lexington, two cities containing flagship research universities, as well as medical schools. Birmingham's high ranking is also no doubt related to the booming research and treatment activities at the University of Alabama complex there. Similarly, Nashville is bouyed by Vanderbilt's major medical school and hospital.

As with all the categories studied, we have estimated the amount of state and local taxes paid by the organizations. We are not able to measure corporate income or property tax payments, but have made estimates of individual income, sales, and oc-

Health Services Payroll as a Percentage of all Payroll for the Metro Area, 1998



Health Services Payroll Per Capita, 1998

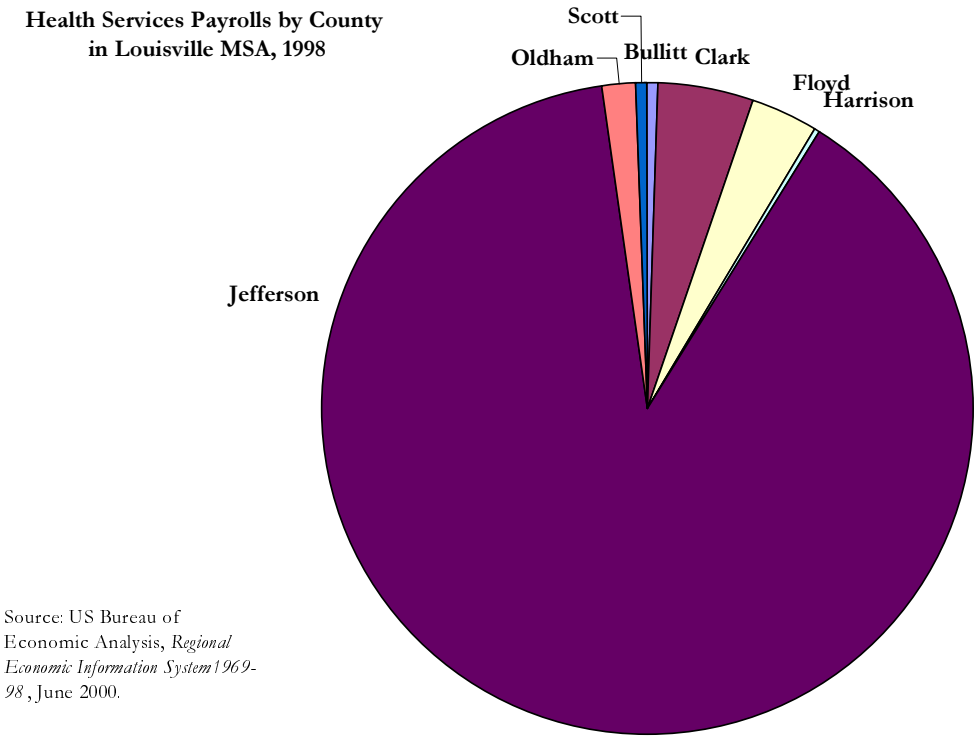


cupational tax payments - the most important sources of revenue for state and local governments in our area. There is no sales tax levied on physicians' services, but the payroll of their operations generates around $86 million annually in income and sales taxes to governments.

Statistically, hospitals appear as roughly equal partners with physicians in the health care economy. Hospital revenues, jobs, and payroll are about the same as that of the physicians and labs category. The Louisville area has 23 hospitals, with nearly $2 billion in annual revenues. Hospitals are major employers, partly because they never close - three shifts of workers, seven days a week, 365 days a year. The state tax revenue estimate includes the 2.5 percent Kentucky provider tax on hospital revenues (applied only to the Kentucky hospitals in the Louisville metro area).

Finally, nursing homes also have a large economic footprint in Louisville. Like hospitals, they never close and hence support a surprisingly large number of jobs. With $260 million in payroll, the nursing home industry in Louisville is roughly the same size as Louisville's energy utility industry, over one-half the size of the banking industry, and twice the size of the local hotel industry. Nursing homes in Kentucky are subject to a 2 percent tax on receipts, and we have included estimates of that tax impact.

The health care delivery industry of course largely reflects the local demand for services. Health care is an important industry in even the smallest metro areas. Health care is primarily an urban industry, as large regional catchment areas are needed to cover the fixed costs of buildings, equipment and 24-hour staff. The urban concentration of health care has been reinforced over the past decade by the decline in travel costs, due to better and faster interstate highway access, falling real gas prices, and better fuel efficiency of cars. Larger metros, like Louisville, compete with other large metros in their regions for the most sophisticated and expensive health services of exurban residents. For example,



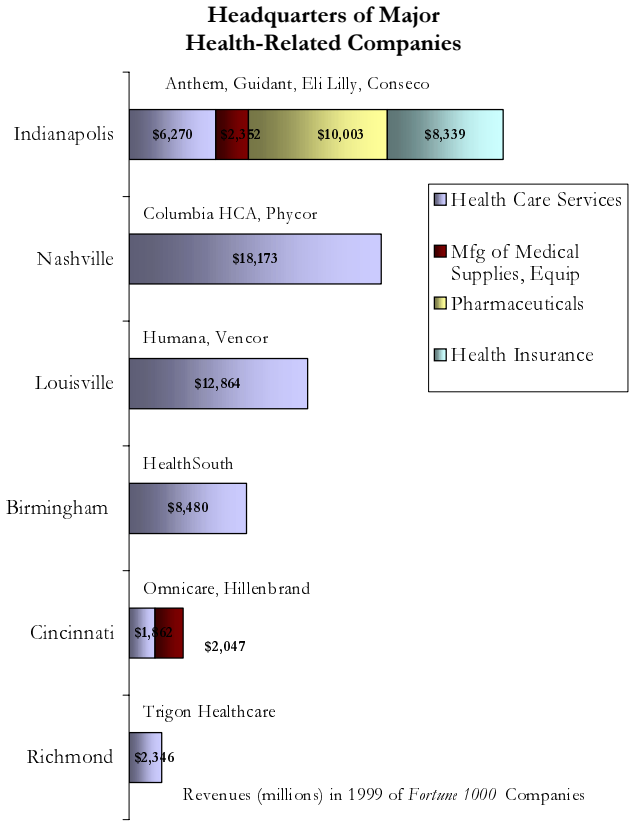
Source: US Bureau of Economic Analysis, *Regional Economic Information System 1969-98*, June 2000.

Louisville hospitals compete with those in Indianapolis, Cincinnati, Lexington, Nashville, Evansville, and St. Louis for physician referrals to perform coronary operations.

We do not know precisely how Louisville health care delivery organizations fare in this competition. (It would require a fairly involved research project that examines hospital discharges in each market.) Nevertheless, we can get a feel for Louisville's competitiveness by examining data on health care payrolls per capita in each metro. Markets that support a large health care payroll per resident presumably sell significant services to nonresidents. Louisville ranks third of the sixteen metros compared, with $2,162 in payroll per area resident - over $500 higher than the national average. Louisville's high ranking is in part due to the fact that its population is older on average than most of its competitors and hence demand more health care. But, clearly Louisville stands out in its health delivery industry.

As is evident from the above chart, health care is concentrated in the central county of the seven county Louisville MSA. Jefferson County, with its major clusters of hospitals and medical offices, accounted for 89 percent of the metro's health care payrolls in 1998. Clark County has the second highest concentration, with 5 percent of the total.

A rough estimate of the export portion of Louisville's health care market can be obtained by prorating the hospital and physician sales by the county of origin of patients, and adjusting sales per patient to reflect the fact that those who travel farthest typically are more sick and incur larger bills. About 20 percent of hospital patients in Louisville live outside the metro area. A sampling of billing records at Jewish Hospital indicates that nonresidents bills are on average 49 percent higher than that for residents. Also, about 69 percent of physician billing is believed to be related to hospital treatment, and physicians' practices account for 58 per-



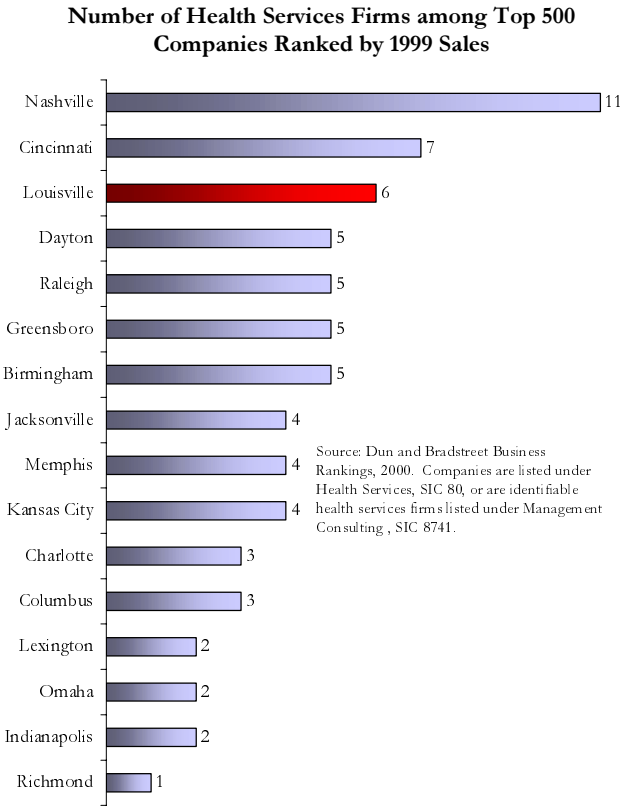
cent of all ambulatory care revenues. Using these factors, we estimate that $731 million of health care revenues and $286 million of health care payrolls are generated from treating patients that reside outside the Louisville MSA.

Another revealing indicator is to measure health services payrolls as a percentage of all payrolls in each metro. Again, Louisville ranks third highest, trailing only Birmingham and Nashville. Health services account for around 11 percent of all the earnings of workers and proprietors in these three markets - double the concentration of Charlotte, the last place market.

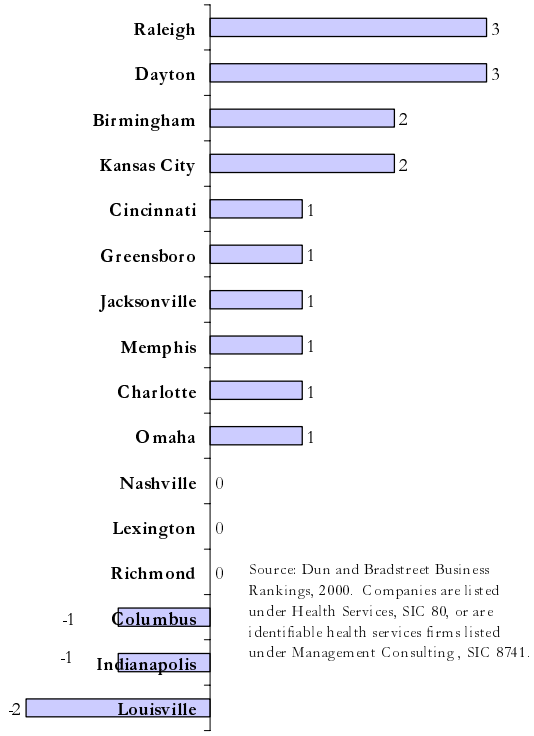
We have also examined national rankings of the largest health care firms. *Fortune Magazine* publishes an annual ranking of the 1000 largest firms based on company revenues. We searched the database over the various health-related industries and identified the headquarters cities for the largest firms. Six of the comparison cities had headquarters for major health-related firms. Louisville had two - Humana and Vencor - with combined revenues of over $12 billion in 1999. (Humana's $10 billion in revenues were classified incorrectly under health care services by *Fortune* - technically, HMOs should be classified as health insurance.)

Indianapolis had the highest number of major headquarters, four, and also the highest corporate revenues. Impressively, Indianapolis has a headquarters of a major company in all four industrial categories - heath care, manufacturing of medical supplies and equipment, pharmaceuticals, and health insurance. (Conseco is in the life insurance, health insurance and a number of other businesses. While its corporate headquarters is in Indianapolis, its medical operations are based in Rockford Illinois.) Nashville, with three major headquarters, was second. Birmingham, Cincinnati, and Richmond fill out the list.

Dun and Bradstreet also compiles a directory of the largest firms in each industry. Most of the largest hospital organizations are listed there under SIC 80 - health care services. However, many impor-



Change in Number of Health Services Firms among Top 500 Companies, Sales 1994 vs. 1999



tant hospital companies are (incorrectly) listed under SIC 8741 - management consulting. We searched over the top 500 health care firms, as well as the top 200 management consulting firms, to identify those based in the sixteen comparison metros. We found seventy-five large companies headquartered in one of our comparison metros. Nashville had the most firms by far - eleven - and also the largest, Columbia HCA with annual revenues of almost $19 billion. Cincinnati ranked second, with seven firms. Louisville ranked third, with six firms and almost $5 billion in annual revenue.

Dun and Bradstreet lists Vencor (now Kindred Healthcare), Jewish Hospital Healthcare Services, Baptist Healthcare Systems, Norton Hospitals, University Healthcare, and Transitional Hospital Corporation (a subsidiary of Vencor) among the largest 500 health care firms in the US. Rescare, also based in Louisville is listed under SIC 8331 (Job Training and Vocational Rehabilitation Services), and had revenues of $834 million.

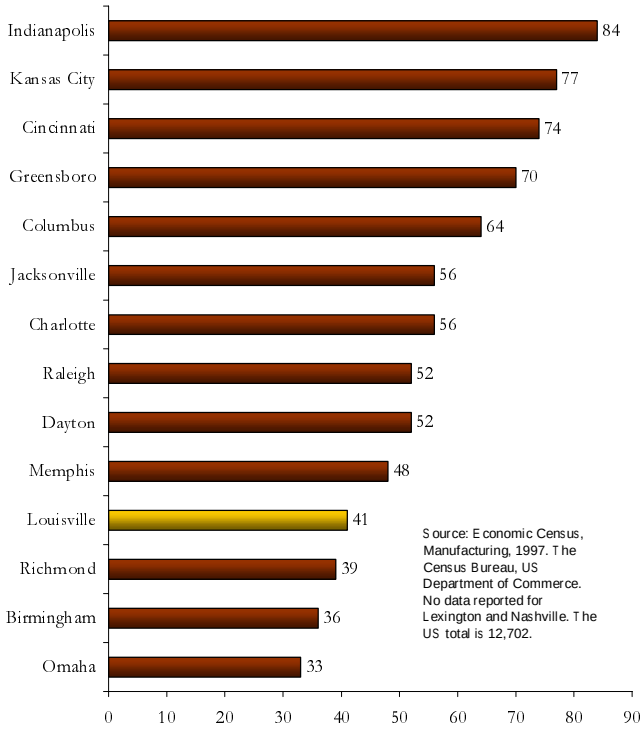
We compared the Dun and Bradstreet database in 2000 to that in 1995. The snapshots provide revenues for the 500 largest health care companies in 1999 and 1994, respectively. Louisville shows the greatest loss in large health care companies over that period. However, the comparison is dominated by one large corporate relocation. Columbia HCA was headquartered in Louisville in 1994, in its brief flirtation before moving to Nashville in 1995.

Revenues of Large Health Care Companies Based in Louisville, 1999

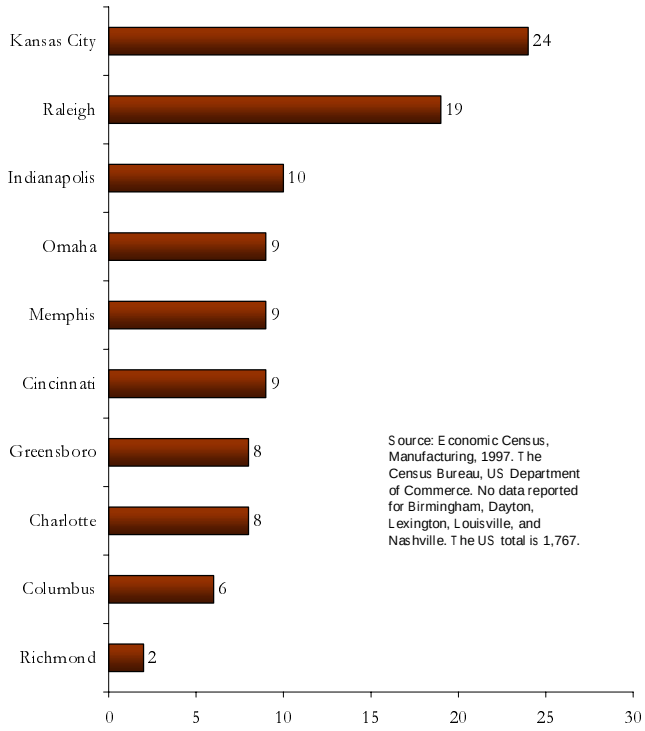
Vencor Inc	$2,999,739,000
Baptist Healthcare Systems	$650,585,667
Jewish Hospital Healthcare Services	$408,555,000
Norton Hospitals	$271,755,826
University Healthcare Inc	$240,687,478
Transistional Hospitals Corp (subsidiary of Vencor)	$211,600,000
Total	$4,782,922,971

Source: Dun and Bradstreet Business Rankings, 2000, Dun & Bradstreet, Inc
includes companies listed under Health Services (SIC 80) and apparent health care companies listed under Management Consulting (SIC 8741).

Number of Establishments, Medical Equipment and Supplies Manufacturing, 1997



Number of Establishments, Pharmaceutical and Medicine Manufacturing, 1997



Manufacturing

Health care has several direct linkages to manufacturing, including the production of surgical instruments, hospital supplies, and pharmaceuticals. Some hospital supplies - for example food, linens, disinfectants, light fixtures - are relatively generic and are difficult to track directly to health care. But specific industrial classifications exist for the manufacturing of Medical Equipment and Supplies (NAICS 3391) and Pharmaceuticals and Medicine (NAICS 3254).

The accompanying charts show the latest data on manufacturing activity, according to the 1997 Census of Manufacturing. Louisville has but 41 manufacturers of medical equipment, and no pharmaceutical plants. The Census reports that the Louisville firms had an annual payroll of $17 million for their 565 employees - twelfth highest of the sixteen markets. Memphis and Jacksonville were the leaders in medical equipment. Kansas City, Raleigh, and Indianapolis were the leaders in the number of pharmaceutical manufacturing establishments.

Health Insurance Carriers

The health insurance industry is linked inextricably with the health care delivery industry. Private health insurance today comes in two primary flavors - indemnity and managed care. Indemnity is the traditional model of insurance, where consumers (typically employees) pay premiums to an insurer who then is responsible for paying health care providers for (any allowable) treatment to the insured. The insurer pools many potential patients and thereby spreads and absorbs the risk that the health care costs for an individual will be more than his or her health insurance premiums. Blue Cross/Blue Shield was a classic example of an indemnity health insurance company. Enrollees may see any physician they choose. Because neither the insured individual nor the provider have much incentive to be frugal in their health care transaction - it is paid for by someone else - this model has been blamed for much of the escalation in national health care costs over the past two decades.

Headquarters of Fortune 1000 Health Insurance Companies

rank	company	headquarters	revenues, 1999
168	Humana	Louisville	$10,113,000,000
278	Anthem Insurance	Indianapolis	$6,270,000,000
597	Trigon Healthcare	Richmond, VA	$2,346,000,000

Source: *Fortune Magazine* (www.fortune.com)

Under managed care, the insurer agrees to maintain the health of an insured population for a fixed fee per person. Health Maintenance Organizations (HMOs) and Provider Preference Organizations (PPOs) are examples of managed care, and are in fact a blend of insurance and health care delivery. The organizations contract with physicians who agree to provide care at specified rates and also to submit to monitoring of their practices.

Nationally, health insurance premiums to private insurance companies were approximately $400 billion in 2000. Insurance company representatives, some through local agents, bid for and contract with employers and the premiums flow to large regional and national insurance carriers. Louisville has a number of important health insurance carriers, including one of the largest in the United States - Humana. Three of the sixteen comparison markets were headquarters to large US health insurance companies, according to the Fortune 1000 rankings. Humana ranked 168th among all US companies in 1999 revenues. Anthem, based in Indianapolis, ranked 278th. And Trigon, of Richmond, ranked 597.

We do not know precisely the size of other (smaller) health insurance companies based in Louisville, or the size of regional offices of companies based elsewhere. Dun and Bradstreet lists five other Hospital and Medical Service Insurance Plan companies (SIC 6324) and one health insurance carrier (SIC 6399) in their 2000 directory. They are, by reported local employment level, Southeastern Group (200), Anthem (150), Delta Dental (79), Compdent (64), Aetna-US Healthcare (55), Healthsource Kentucky (18) and Preferred Health Choice (12).

Because HMOs like Humana are both health insurers and health care providers, there are inconsistencies in the industrial classifications used in data sources. For example in the *Fortune* magazine listings and database, Humana is classified, along with Vencor, Anthem and Columbia HCA, as a health care company and not an insurance company. However, according to the North American Industrial Classification System (NAICS), health maintenance organizations should be classified as insurance carriers. In the 1997 Economic Census data, released last year, Humana is apparently counted as an insurance carrier (NAICS 524114) and not as a health care provider (NAICS 621111). These inconsistencies are important, as Humana's revenues, employment, and payrolls are large enough to qualitatively affect conclusions drawn about Louisville's performance in one of these health related subindustries.

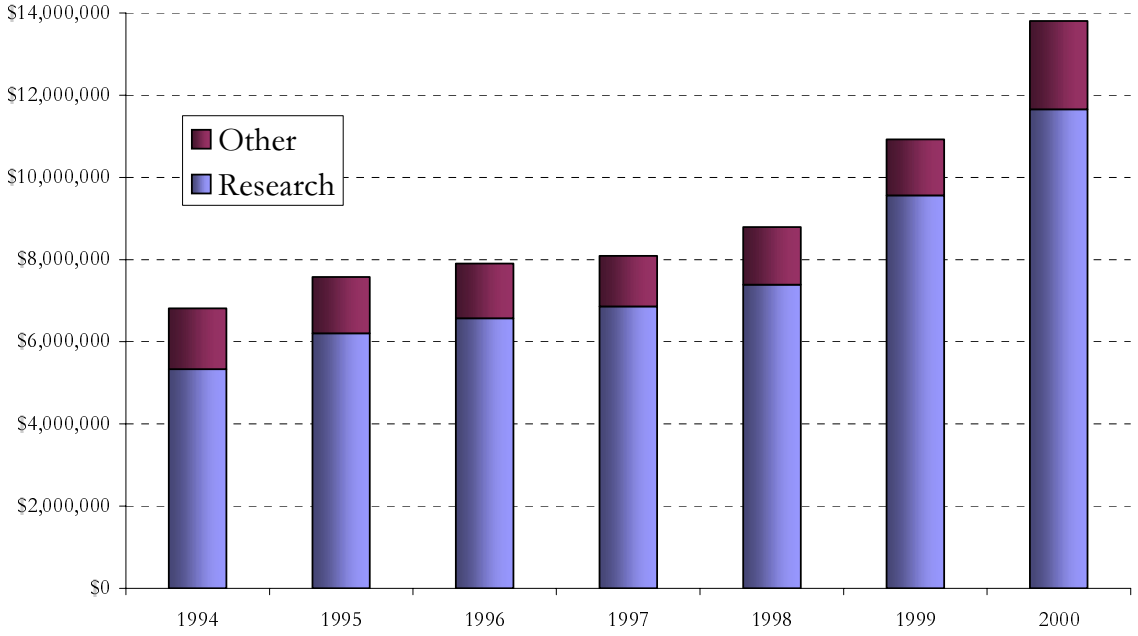
University Research and Development

University research is typically the foundation for emerging enterprises in the life sciences. Louisville is fortunate to have the University of Louisville, with its medical schools and its several ancillary doctoral-level academic departments. Their faculty do basic research, publish findings, train graduate students and medical residents, attract research grants, and sometimes start businesses. The externally funded research grants bring new dollars into the Louisville market. And the nationally and internationally competitive faculty add a layer of precious human capital to the local market.

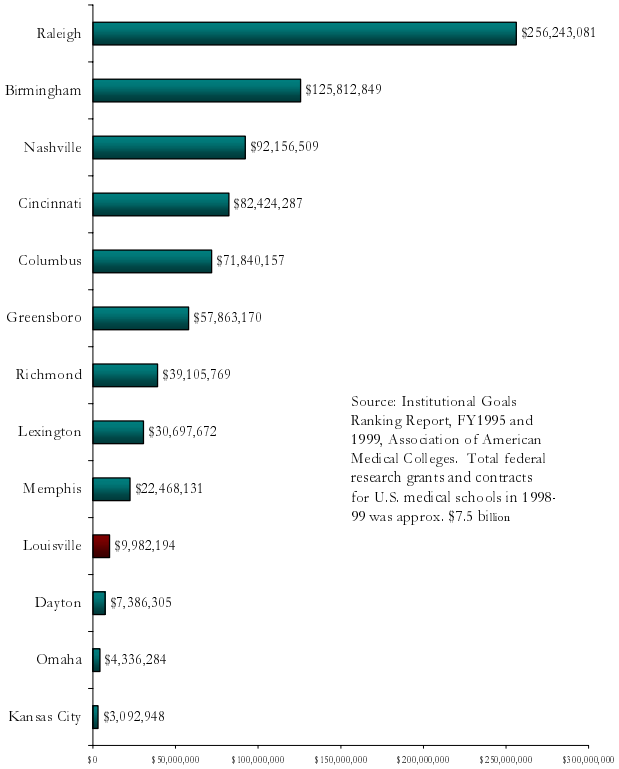
We have assembled four indicators of university research and development activity. First we present comparative data on federal research funding to medical schools. Second, we present data on all research and development expenditures by the

Growth in Federal Funding
University of Louisville Medical School
Fiscal Years, 1994 to 2000

Source: University of Louisville, Office of the Vice President for Research
fiscal years ending June 30

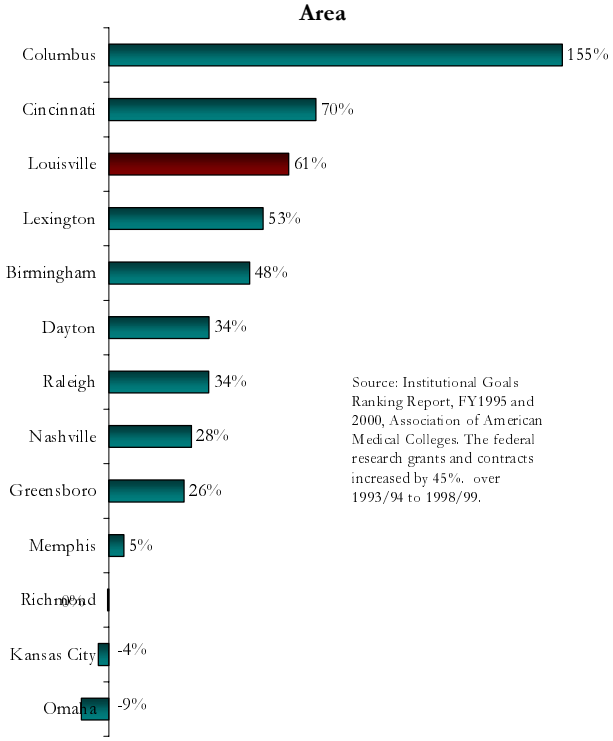


Federal Research Grants and Contracts Awarded to Medical Schools, by Metro Area, 1998-99



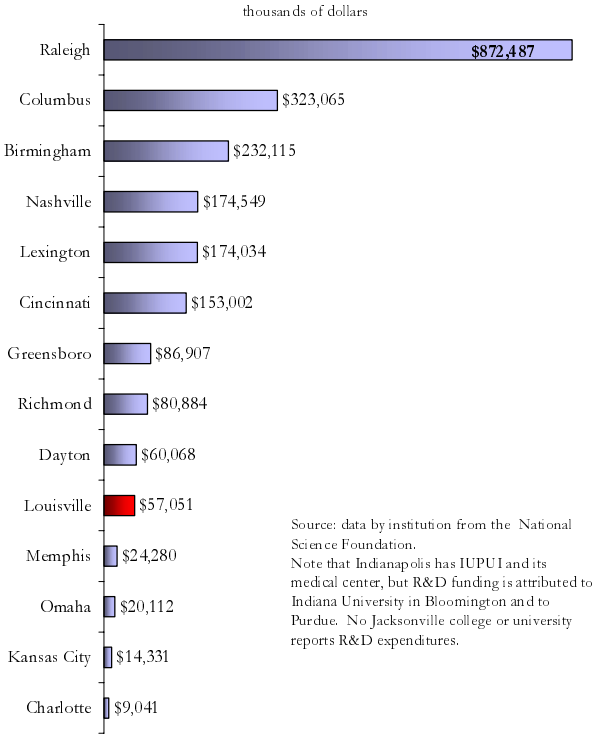
Source: Institutional Goals Ranking Report, FY1995 and 1999, Association of American Medical Colleges. Total federal research grants and contracts for U.S. medical schools in 1998-99 was approx. $7.5 billion

Federal Research Grants and Contracts Awarded to Medical Schools, Growth FY94 to FY99, Metro Area

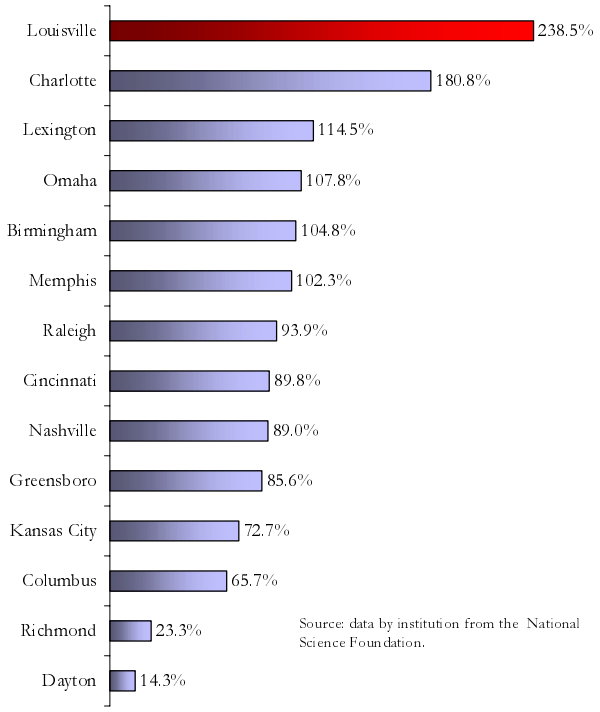


Source: Institutional Goals Ranking Report, FY1995 and 2000, Association of American Medical Colleges. The federal research grants and contracts increased by 45%. over 1993/94 to 1998/99.

Research and Development Expenditures, 1999 by Universities in the Metro Areas



Growth in Research and Development Expenditures, 1991 to 1999, by Universities in the Metro Areas



univeristies in the peer metros. This includes research activity outside the medical schools, for example in chemistry and engineering departments. Third, we examine the academic publication volume of university faculty. And finally, we look at the license and royalty payments earned by universities for the discoveries of their faculty.

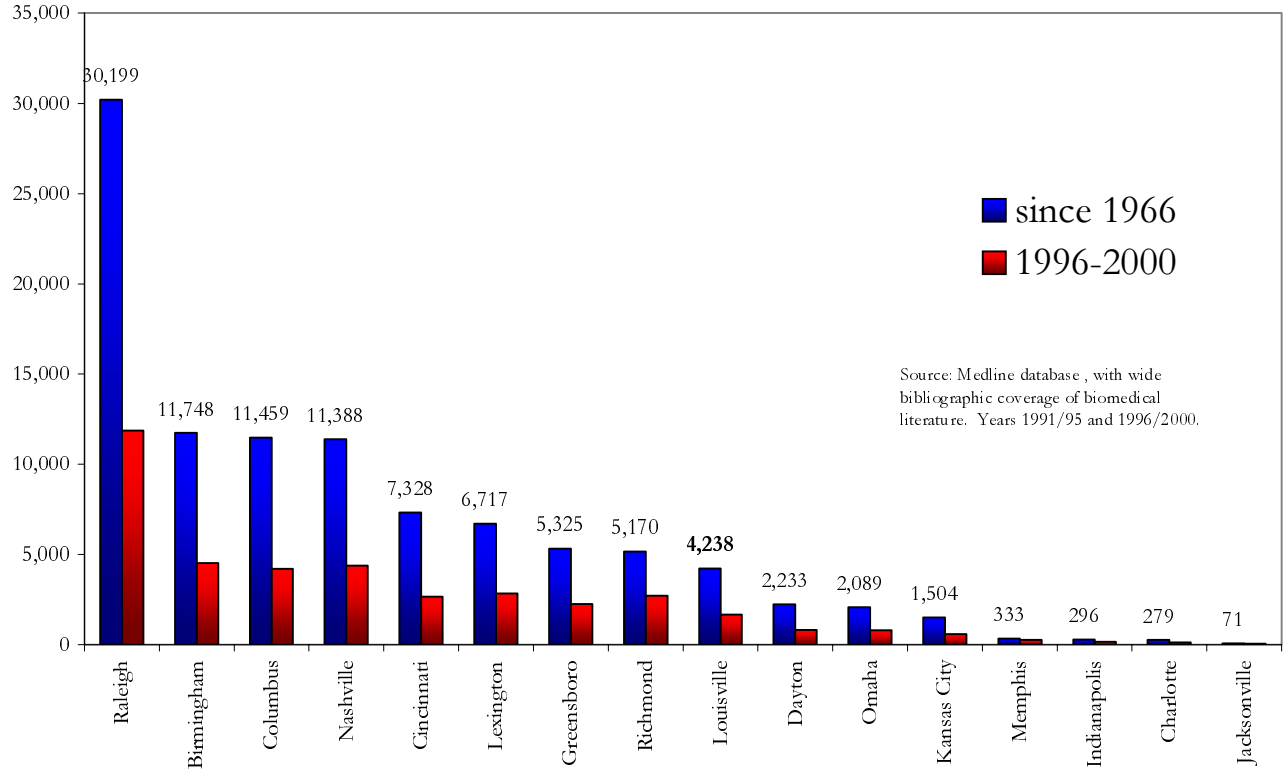
The medical school data is presented on the left page. All of the comparison markets except Jacksonville and Charlotte host a medical school. The medical school in Indianapolis is run jointly by Indiana and Purdue Universities, and the published data attribute the activity to faculty at the two flagship schools rather than Indiana University Purdue University Indianapolis (IUPUI), so valid comparisons are not possible.

Looking only at federal research dollars going to the medical schools, one can see that the University of Louisville medical school attracted around $10 million in federal funding in 1999, tenth highest among the comparison markets and only a fraction of that garnered by, say, Birmingham, Cincinnati, or Richmond. The good news is that the growth in funding at Louisville over the past five years was third highest of the medical schools in competitor markets. Funding grew by 61 percent, significantly higher than the 45 percent growth in funding nationally. The university's medical school ranked 95th out of 125 schools in federal research funding in fiscal year 1999, up from a ranking of 102 in fiscal year 1994.

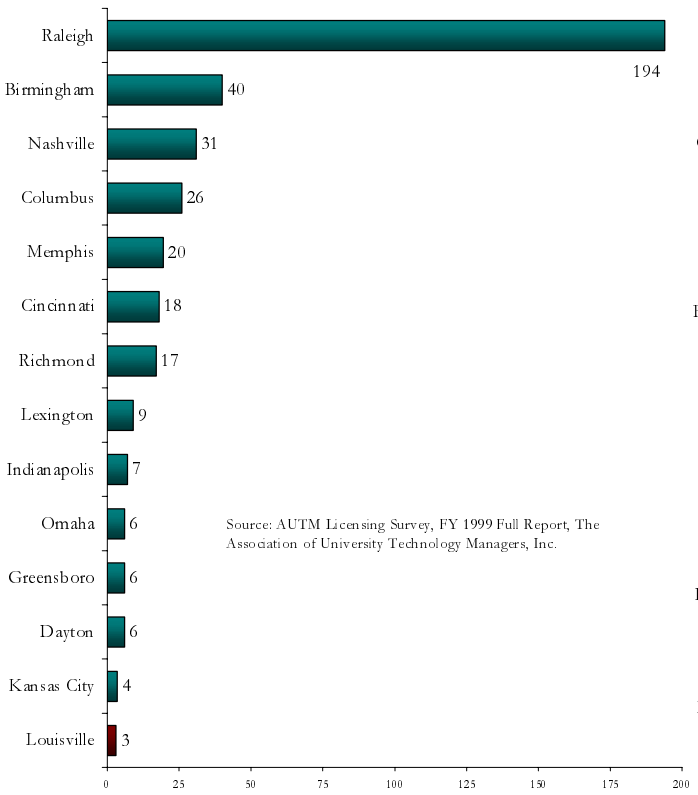
Moreover, using the more current data we have for the University of Louisville, we note that federal funding of medical school activities - research and other - in Louisville rose to nearly $14 million in (university) fiscal year 2000. The growth at the medical school is clear from the chart at the top of page 12, which shows a doubling of federal funding in the last six years.

Widening the scope, we organized data on *all* research expenditures at the universities based in our sixteen comparison metros. The charts above tell the story. The University of Louisville posted $57 million in research and development expenditures in FY 99, tenth highest. However, UL was first in growth over the last eight years. As research

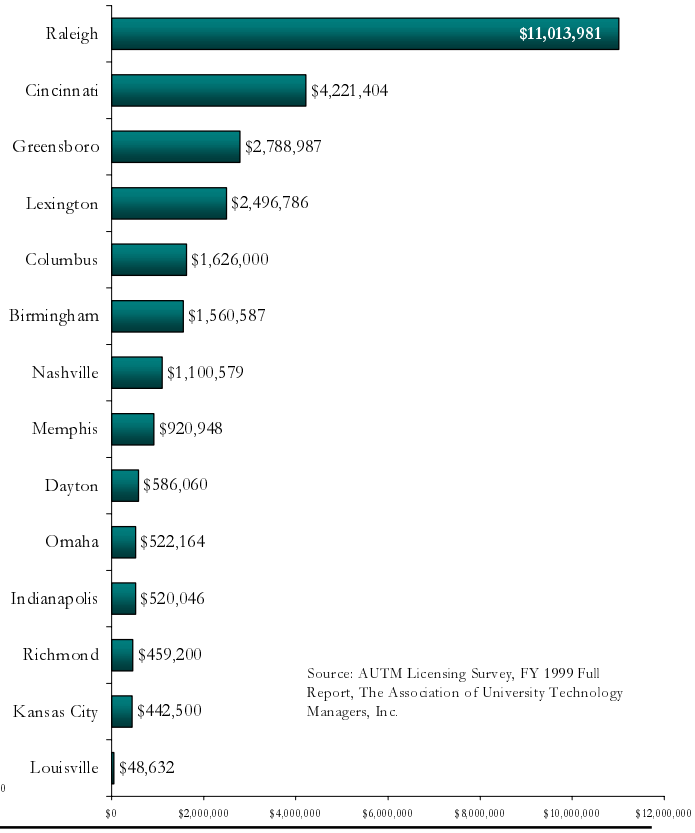
Number of Journal Articles Published by Medical School Faculty since 1966 and 1996-2000, by Metro Area



Licenses & Options Executed by Academic & Nonprofit Institutions Fiscal Year 1999



Adjusted Gross License Income Received by Academic & Nonprofit Institutions, Fiscal Year 1999



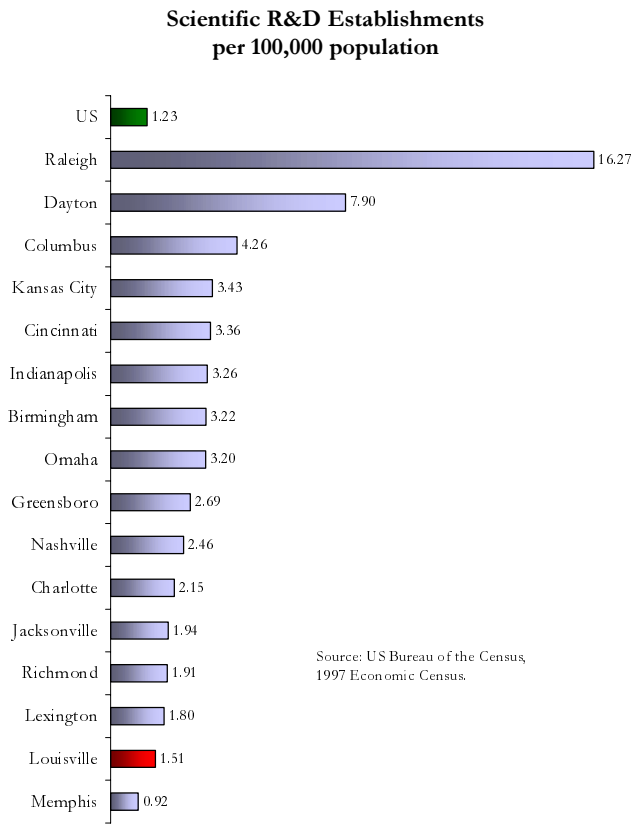
expenditures at UL are dominated by grants and contracts in the life sciences, it is clear that the critical 'discovery' component for health-related enterprises is on the upswing in Louisville.

A similar story emerges for academic publications. According to the Medline database, faculty at the University of Louisville published 1,659 journal articles between 1996 and 2000, ranking ninth among the schools tracked. The university ranked eighth in the growth of publications relative to its output in the prior five years.

According to the Association of University Technology Managers, the University of Louisville ranked last among the fourteen universities tracked in terms of income from licenses and royalties. The clear leader in this category is the Raleigh metro, which includes three major research universities - Duke, North Carolina State, and the University of North Carolina.

Income is net of license fees paid to other institutions. Totals for the Indianapolis, Kansas City, Memphis, and Omaha metro areas include half of the reported total for that state's university system despite the fact that the state flagship university is not located in that metro area. In each case, however, the metro area is home to the state university's medical school and medical research center.

The University of Louisville only recently set up an office to promote, track, and manage licensing of technologies spawned by its researchers, and hence report but $50,000 in royalty income in FY 1999. We know from university records that this number rose fivefold by FY 2000, and all signals point to strong growth in the next few years. The University of Kentucky, in Lexington, posted $2.5 million in royalty income in 1999, and is obviously much further along than UL in capitalizing on its research output. Interestingly, the University of Cincinnati - an urban school similar in many ways to UL - earns nearly twice as much from licensing than does UK, the flagship research university in Kentucky.



Private Research and Development

As of the 1997 Economic Census, Louisville had fifteen business establishments classified as 'Scientific Research and Development Services', NAICS 5417. Of the sixteen markets, only Lexington had fewer firms. And on a per capita basis, only Memphis had fewer firms. All the comparison markets except Memphis had more firms per capita than the national average, due to the urbanization of research and development activities.

According to the Economic Census, released in 2000, Louisville firms generated $8.7 million in revenues and supported 175 jobs with an annual payroll of about $3 million. Due to privacy laws, not all economic data is disclosed for all the metropolitan areas tracked here. Of the nine markets for which full disclosure was available, Louisville had the lowest number of employees, revenues and annual payroll. Louisville also had the lowest average annual earnings per job - $50,000 - about half that in the other markets.

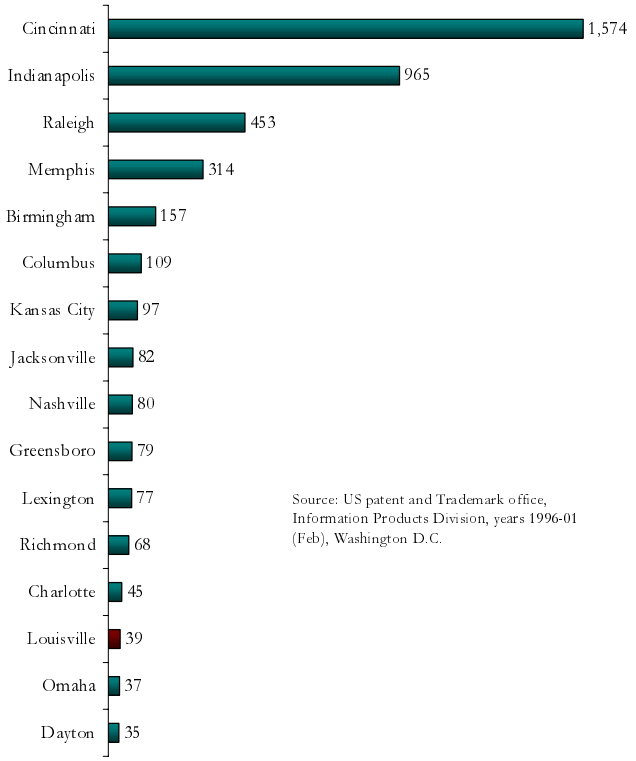
Patents Filed Under Broad 'Healthcare' Classification
by metro area, 1996-2001 (February)

Classification Title	Surgery	Optics: Eye Examining, Vision Testing And Correcting	X-Ray Or Gamma Ray Systems Or Devices	Drug, Bio-Affecting And Body Treating Compositions	Dentistry	Chemistry: Molecular Biology And Microbiology	Chemistry: Analytical And Immunological Testing
Classification Code	*128, 600, 604 606*	*351*	*378*	*424, 514*	*433*	*435*	*436*
Louisville	29	1	0	7	1	4	4
Birmingham	18	0	1	103	14	67	10
Charlotte	13	0	0	13	0	9	0
Cincinnati	748	0	5	960	8	40	14
Columbus	33	2	0	55	1	46	4
Dayton	12	1	2	15	1	1	2
Greensboro	45	3	2	70	2	47	6
Indianapolis	60	0	0	717	3	197	44
Jacksonville	48	28	0	11	1	1	1
Kansas City	14	0	1	63	0	25	8
Lexington	13	0	0	51	0	27	4
Memphis	199	5	2	107	3	23	3
Nashville	14	0	2	44	0	47	4
Omaha	8	0	0	19	0	10	13
Richmond	10	0	0	50	0	5	3
Raleigh	221	5	3	189	3	58	24

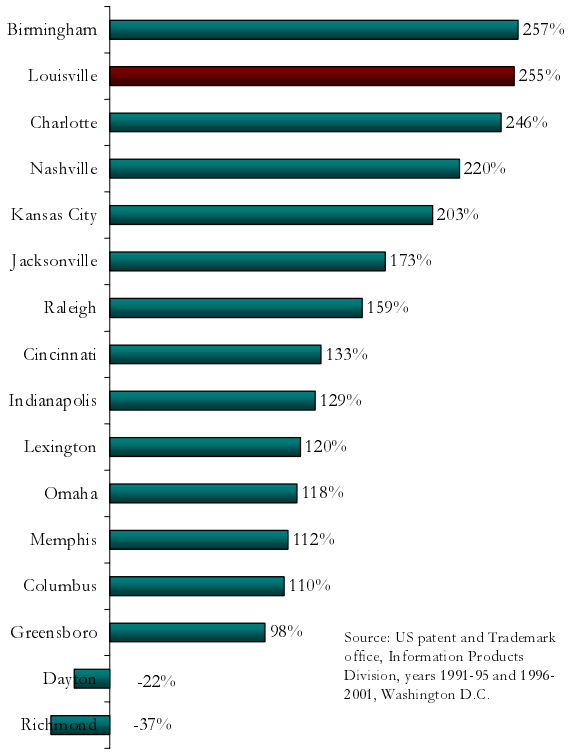
Classification Title	Chemistry: Natural Resins Or Derivatives; Peptides Or Proteins; Lignins Or Reaction Products Thereof	Surgery: Kinesitherapy	Surgery: Splint, Brace, Or Bandage	Surgery: Light, Thermal, And Electrical Application	Prosthesis (I.E., Artificial Body Members), Parts Thereof, Or Aids And Accessories Therefor	Genetic Engineering: Recombinant DNA Technology, Hyrid or Fused Cell Technology, and Related Manipulations of Nucleic Acids	TOTAL
Classification Code	*530*	*601*	*602*	*607*	*623*	*935*	
Louisville	3	0	6	0	1	0	46
Birmingham	33	0	0	11	0	0	213
Charlotte	0	5	21	1	1	0	35
Cincinnati	37	5	13	29	4	0	1,775
Columbus	22	1	0	6	0	0	141
Dayton	0	4	6	3	2	0	34
Greensboro	22	5	6	9	2	0	175
Indianapolis	135	6	0	2	12	0	1,021
Jacksonville	2	0	1	1	13	0	90
Kansas City	14	0	0	0	3	0	111
Lexington	11	0	0	1	5	1	95
Memphis	8	1	7	2	49	0	342
Nashville	15	0	0	0	0	0	111
Omaha	3	0	0	1	0	0	50
Richmond	12	5	0	1	1	0	68
Raleigh	25	1	7	3	52	0	503

Source: US Patent and Trademark office, Information Products Division, years 1996-2001(Feb), Washington D.C.

Total Number of Patents Filed under Healthcare Classifications, 1996-2001



Growth in Number of Healthcare Patents Filed by Metro Area, 1991-95 to 1996-2001



Nationally, private scientific research and development is a $37 billion business annually, with 11,100 firms employing 302,000 persons. About two-thirds of that R&D business is in the life sciences component, which includes chemistry, earth sciences, biology, medicine, and agriculture. To avoid disclosing economic activity of a few large firms, the Census Bureau does not provide breakouts for life science R&D receipts, payroll, or employment for most of our comparison metros. The Bureau does provide the number of establishments in each metro and we have summarized that data here, expressed in number of establishments per 100,000 residents.

Health-Related Patents Registered

The US Patent and Trademark Office compiles data on all patents registered, by product classification, and by the county of residence of the (first) patent holder. We have organized their data on patents under seventeen health-related product categories, and for the sixteen metro areas.

Louisville's patent production is the health area ranks in about the same position as in university research and in private R&D activity - near the bottom. Cincinnati easily tops the ranking, partly due to the tremendous volume of Proctor and Gamble-related patents for skin treatments and the like. Indianapolis, home of the Eli Lilly pharmaceuticals company, has the second highest number of patents. On the facing page, we have provided some of the details from the patent database. This shows the types of patents that have been granted in each market.

There are seventeen US patent classifications which fall under broad 'Healthcare' category, and we have collapsed them to thirteen descriptive classifications. The list was obtained from Dr. Bill Brown at the Information Products Division. The patent is associated with the city where the inventor lived at the time of issue; that is not necessarily where the inventive activity occurred. Also, sometimes inventors live outside a city in a suburb or town, but they use the name of the nearby city on the patent

as their residence. There exists duplication and repetition of certain patents numbers, because the same patent number can be filed under several US classifications. For instance, patent number 6,156,734 is filed under four US classifications for the city of Indianapolis.

We have adjusted the patent data to determine the number of unique patents by market. The good news is that Louisville is second only to Birmingham in the growth rate for patents. Louisville inventors more than tripled their patent production in the second half of the nineties, from 11 to 39 unique patents.

Measures of Health Care Quality

There is now a lively national industry to produce ratings, rankings, benchmarking, and consistent data on the quality of health care in hospitals around the United States. We have identified two sources, and have scanned the listings for hospitals in the sixteen metro areas. See Appendix B for a compilation of the rated hospitals.

The most comprehensive, at least in the scope of health services rated, is the annual America's Best Hospitals rankings by *US News and World Report*. Unfortunately, in the latest release, they report rankings for only the top fifty hospitals in each of fifteen specialties, half as many as in their rankings from five years earlier. In the summary table, we present rankings among the top 100 hospitals in 1995 and the top 50 hospitals in 2000.

Louisville does not make much of a showing in the USNWR hospital rankings. One hospital was rated as 94th best in endocrinology in 1995 and one hospital was rated 26th in rheumatology in 2000. The highest ratings went to hospitals in Raleigh, Nashville, Birmingham, Indianapolis, and Columbus - all homes to their states' main medical schools.

Another rating/ranking service is kinder to Louisville area hospitals. *Modern Healthcare* magazine publishes a listing of the top 100 hospitals in the US, with specialty rankings in cardiovascular, orthopedic, stroke and critical care treatments. The ratings are actually produced by Solucient, a health care consulting firm that analyzes detailed treatment data from the Medicare program. They rate highly the services of Jewish Hospital (cardiovascular, orthopedic), Norton Healthcare (stroke), and Baptist East Hospital (orthopedic). In all, Louisville hospitals accounted for four of the thirty-eight highly rated hospitals among the sixteen comparison markets. Other metros with many highly rated hospitals include Birmingham, Cincinnati, Columbus, and Indianapolis.

The Monitoring System: Data Sources, Measurement Issues

Greater Louisville Inc has targeted Louisville's health-related industry as a key engine for economic growth in the region. The health and logistics industries were the two sectors identified by the 1997 Visioning Report as holding the most promise to compete well nationally, to launch new companies, and to help the community meet many of its other goals. The Greater Louisville Health Enterprises Network was recently founded to provide an umbrella organization for communication, strategic planning, and marketing of Greater Louisville's health-related economic mission. The network, made up of the top industry leaders in Louisville, funded this project so that a good measurement system would be in place as strategies are pursued.

A primary objective of this project is to identify a set of reliable measures of Louisville's health-related economy. We have sought to find data sources that are (i) considered accurate by those in the industry (ii) available for other markets and (iii) produced over time, and annually if possible. These are the measures we used in the first part of the report to quantify Louisville's health-related industry. In this section, we document those sources more carefully and discuss some of the messy measurement issues.

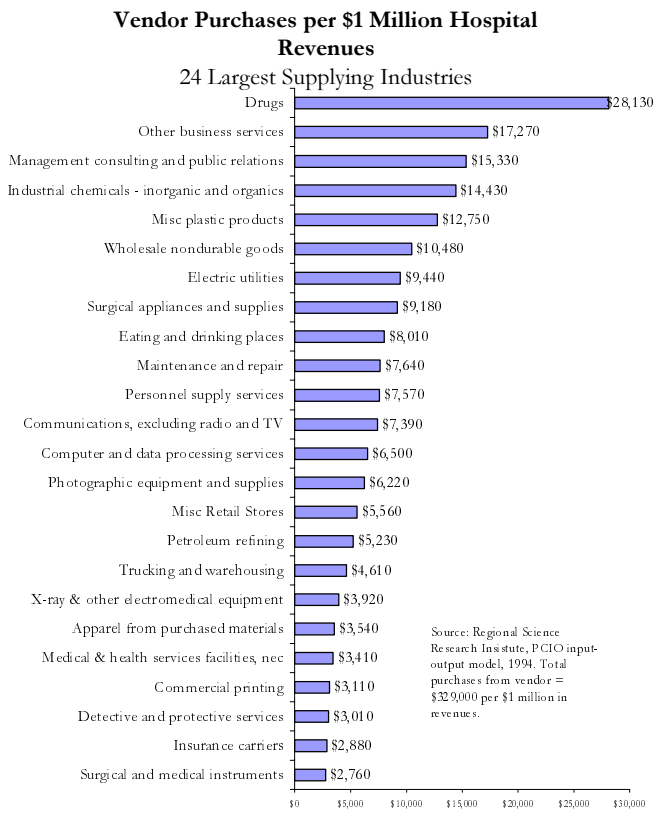
Definition of Health-Related Industry

The health-related economy includes all organizations that directly care for people's health, but also the rings of organizations that sell equipment, supplies, research, education, and other services to the health care providers. The direct health care providers are easiest to identify statistically – physicians, nurses, hospitals, labs, nursing homes. Some of the supporting enterprises are also unambiguous – pharmaceutical companies, health insurance providers, medical schools, manufacturers of surgical appliances.

The more exhaustive list of supporting organizations, however, includes activities that are not exclusively linked to health care. For example, Louisville has a number of law firms that specialize in medical practices, several information technology and data processing operations that do most of their business with hospitals, and even management consultants that work primarily with physicians' practices. These enterprises sell services that are also sold to non-health care clients.

One can get an idea of the industrial linkages to health care by examining the major purchases of hospitals. Our input-output model of Louisville predicts that area hospitals induce purchases of $329,000 in supplies, equipment and services per million dollars of revenues. About $183,000 of that is believed to be purchased from local vendors, the remainder from other markets.

Beyond the input-output approach to allocating vendor purchases to industries we have no economi-



cally feasible way to determine what share of the business of local accounting, law, public relations, plumbing, food service firms and the like is tied to the health industry. One cannot distinguish the health care component of these operations statistically, as all their activity is categorized in federal databases as legal, IT, management consulting and the like. Hence, we have excluded these supporting industries from the current analysis of the health industry in Louisville.

Geographic scope of analysis

The available data to track health-related economic activity varies in its level of aggregation. There is good annual data on medical school research and other activity, and this can therefore be tracked at the institution level. Substantial data on hospitals is available at the institution level, also. Data on beds, employees, revenues, and payrolls for each hospital can be either acquired directly or estimated with good precision. Patent data is available at the patent-holder level. Other economic data are available only at the county or metropolitan area level of detail, some only every five years.

We have compared economic activity in the Louisville metro to that in fifteen other Metropolitan Statistical Areas (MSAs): Birmingham, Charlotte, Cincinnati, Columbus, Dayton, Greensboro, Indianapolis, Jacksonville, Kansas City, Lexington, Memphis, Nashville, Omaha, Raleigh, and Richmond. This list includes all the metros we track and highlight quarterly in our Economic Performance Index for Cities, as well as neighboring Lexington. See Appendix A for the definitions and population sizes of the comparison metros.

Data Elements of the Monitoring System

We have identified the following data elements that can be used to track the health industry, and have been used to support this study.

1. Payroll, health services industry (SIC 80), by county and metro, US Bureau of Economic Analysis, *Regional Economic Information System, 1969-98*, June 2000, annual (www.bea.doc.gov).

2. Number of firms, by employment size class, by detailed health-related industrial category, by county and metro, US Bureau of the Census, *County Business Patterns*, annual (www.census.gov).

3. Revenues, number of firms, employment and payrolls, by very detailed health-related industrial category, metro areas, US Bureau of the Census, *Census of Service Industries*, 1997, 1992, 1987, every five years (www.census.gov).

4. Number of beds, patients, revenues, employees, payrolls by hospital (financial data typically reported only for nonprofit hospitals), American Hospital Association, annual.

5. Number of beds, patients, revenues, employees, payrolls for hospitals, by metropolitan area, 1998, American Hospital Association, *Hospital Statistics, 2000,* annual.

6. Reputational rankings for hospitals, by specialty, by metro, *US News and World Report*, annual (www.usnwr.com).
   Also, *Modern Healthcare* magazine has an annual rating for the top 100 hospitals by category (www.modernhealthcare.com).

7. Research grants to medical schools, by specialty and source of funding, American Association of Medical Colleges *1999 Institutional Goals Ranking Report*, annual.

8. University research and development expenditures, by source of funds, all US universities, National Science Foundation, Division of Science Resource Studied, annual (www.nsf.gov/sbe/srs.

9. University royalty receipts, health-related innovations, Association of University Technology Managers Licensing Survey, annual.

10. Journal articles published by faculty in each medical school, Medline database, accessible by faculty and staff through the university library.

11. Patents issued to firms and individuals, by invention type/class, by metro, US Patent and Trademarks Office, updated continuously, with annual summaries (www.uspto.gov).

12. Sales and employment, largest businesses, for health-related industrial categories, by metro, *Dun and Bradstreet Business Rankings*, annual. For more detail, see *D&B Regional Business Directory* for largest companies by industry in Kentucky metros.

13. Ranking in national trade publications for company headquarters, by metro, *Fortune Magazine* (www.fortune.com).

Other References

Paul Coomes and Barry Kornstein, *The Economic and Fiscal Impact of Louisville's Medical Center*, September 1996, University of Louisville, 22 pages.

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual 1987*, 703 pages.

Executive Office of the President, Office of Management and Budget, *North American Industry Classification System, United States 1997*, 1998, 1247 pages.

Growth Strategies Organization, *Economic Development Strategy for the Greater Louisville Region*, September 1996, 39 pages.

Regional Science Research Institute, PCIO input-output model of the Louisville metro economy, 1994.

Component Counties of 15 Competitor Metros

Area Code*	MSA / Counties	Population 1999
71000	**Birmingham, AL**	**915,077**
01009	Blount, AL	47,411
01073	Jefferson, AL	657,422
01115	St. Clair, AL	63,852
01117	Shelby, AL	146,392
71520	**Charlotte-Gastonia-Rock Hill, NC-SC**	**1,417,217**
37025	Cabarrus, NC	124,844
37071	Gaston, NC	185,169
37109	Lincoln, NC	58,895
37119	Mecklenburg, NC	648,400
37159	Rowan, NC	126,585
37179	Union, NC	115,144
45091	York, SC	158,180
71640	**Cincinnati, OH-KY-IN PMSA**	**1,627,509**
39015	Brown, OH	41,576
39025	Clermont, OH	178,749
39061	Hamilton, OH	840,443
39165	Warren, OH	153,292
21015	Boone, KY	83,356
21037	Campbell, KY	87,203
21077	Gallatin, KY	7,437
21081	Grant, KY	20,805
21117	Kenton, KY	147,221
21191	Pendleton, KY	13,959
18029	Dearborn, IN	48,011
18115	Ohio, IN	5,457
71840	**Columbus, OH**	**1,489,487**
39041	Delaware, OH	103,679
39045	Fairfield, OH	126,723
39049	Franklin, OH	1,027,821
39089	Licking, OH	136,485
39097	Madison, OH	41,348
39129	Picaway, OH	53,431
72000	**Dayton-Springfield, OH**	**958,698**
39023	Clark, OH	144,962
39057	Greene, OH	149,149
39109	Miami, OH	98,721
39113	Montgomery, OH	565,866
73120	**Greensboro-Winson Salem-High Point, N**	**1,179,384**
37001	Alamance, NC	121,100
37057	Davidson, NC	142,852
37059	Davie, NC	32,693
37067	Forsyth, NC	288,810
37081	Guilford, NC	391,380
37151	Randolph, NC	123,410
37169	Stokes, NC	43,894
37197	Yadkin, NC	35,245
73480	**Indianapolis, IN**	**1,536,665**
18011	Boone, IN	44,835
18057	Hamilton, IN	172,094
18059	Hancock, IN	55,617
18063	Hendricks, IN	98,826
18081	Johnson, IN	112,724
18095	Madison, IN	130,990
19097	Marion, IN	810,946
18109	Morgan, IN	67,003
18145	Shelby, IN	43,630
73600	**Jacksonville, FL**	**1,056,332**
12019	Clay, FL	141,353
12031	Duval, FL	738,483
12089	Nassau, FL	56,811
12109	St. Johns, FL	119,685
73760	**Kansas City, MO-KS**	**1,755,899**
29037	Cass, MO	83,099
29047	Clay, MO	180,111
29049	Clinton, MO	19,522
29095	Jackson, MO	654,484
29107	Lafayette, MO	32,810
29165	Platte, MO	71,688
29177	Ray, MO	23,759
20091	Johnson, KS	440,198
20103	Leavenworth, KS	71,766
20121	Miami, KS	27,083
21209	Wyandotte, KS	151,379
	Lexington, KY	**455,617**
	Bourbon, KY	19,363
	Clark, KY	32,457
	Fayette, KY	243,785
	Jessamine, KY	37,300
	Madison, KY	67,690
	Scott, KY	32,249
	Woodford, KY	22,773
74520	**Louisville, KY-IN**	**1,005,849**
21029	Bullitt, KY	60,955
21111	Jefferson, KY	672,900
21185	Oldham, KY	45,821
18019	Clark, IN	95,121
18043	Floyd, IN	72,243
18061	Harrison, IN	35,376
18143	Scott, IN	23,433
74920	**Memphis, TN-AR-MS**	
47047	Fayette, TN	
47157	Shelby, TN	
47167	Tipton, TN	
05035	Crittenden, AR	
28033	De Soto, MS	
75360	**Nashville, TN**	
47021	Cheatham, TN	
47037	Davidson, TN	
47043	Dickson, TN	
47147	Robertson, TN	
47149	Rutherford, TN	
47165	Sumner, TN	
47187	Williamson, TN	
47189	Wilson, TN	
75920	**Omaha, NE-IA**	
31025	Cass, NE	
31055	Douglas, NE	
31153	Sarpy, NE	
31177	Washington, NE	
19155	Pottawattamie, IA	
76640	**Raleigh-Durham-Chapel Hill, NC**	
37037	Chatham, NC	
37063	Durham, NC	
37069	Franklin, NC	
37101	Johnston, NC	
37135	Orange, NC	
37183	Wake, NC	
76760	**Richmond-Petersburg, VA**	
51036	Charles City, VA	
51041	Chesterfield, VA	
51053	Dinwiddie, VA	
51075	Goochland, VA	
51085	Hanover, VA	
51087	Henrico, VA	
51127	New Kent, VA	
51145	Powhatan, VA	
51149	Prince George, VA	
51570	Colonial Heights city, VA	
51670	Hopewell city, VA	
51730	Petersburg city, VA	
51760	Richmond city, VA	

* Federal Information Processing Standards (FIPS) codes, for metropolitan areas defined as of June 30, 1996; and for counties as of January 1, 1990.

America's Best Hospitals Rankings by Practice (top 100 in 1996, top 50 in 2000)

Metros	AIDS	Cancer	Cardiology/ Heart	Endocrinology/ Hormonal Disorders	Gastroenteritis/ Digestive disorders	Geriatrics	OB-GYN	Neurology	Ort
Birmingham	69	81	13		52	64			
Cincinnati			46,47	50				46	
Columbus	55	100	78	32	98	78	43	60	
		26					30,31		
Indianapolis	79, 89	16	54, 62	60	17	69	53	76	
		10	27,48	36	15		40	40	
Kansas City				71	76		95		
Lexington		72		90	78		96	87	
		18							
Louisville				94					
Memphis									
Nashville	39	24	58	14	35	47	32	84	
		27	23	12	35		20	32	
Omaha	62	21				65	57		
Raleigh	14, 44	8, 31	5, 60	13, 35	6, 46	4, 52	7, 21	11, 66	
		5,41	5	14,24	8,33	4,23	8,14	11	
Richmond	90	65		99	53	85	71	88	

Numbers in Red Color represent rankings for year 2000

Source: *US News and World Report*, 2000 and Americas Best Hospitals, 1996

Note: The year 1996 rankings rank the top 100 hospitals due to a detailed edition published by US News and World Report called 'America's Best Hospit however, the year 2000 rankings are from the regular print edition, with only top 50 ranked hospitals in various specialties. Additionally, some specialties l dropped while others have been added since 1995. For example, rankings in AIDS figure in 1995 only, while Respiratory Diseases and Kidney Disorders added in year 2000 edition.

No Dayton hospitals appeared in the rankings

America's Best Hospitals Rankings by Practice (top 100 in 1996, top 50 in 2000), continued

Metros	Otolaryngology/ENT	Rheumotology	Urology	Ophthalmology / Eyes	Pediatrics	Psychiatry	Rehabilitation	
		7						
Birmingham								
	19				9			
Cincinnati					**12**			
	64	70	91				9	
Columbus	**29,35**		**47**				**8**	
	27, 81	42	14					
Indianapolis	**41**	**47**	**14**					
			54					
Kansas City								
Lexington								
Louisville		**26**						
					20			
Memphis								
	14	37	79					
Nashville	**11**		**18**					
	47	59						
Omaha								
	18, 22	6, 33	6, 83	10		11		
Raleigh	**22,27**	**10**	**6,24**			**9**		
		71	88					
Richmond								

Solucient's 100 Top Hospitals, 2000

Top 100 Hospitals - General

Major Teaching Hospital with 400+ Beds

Cincinnati	Christ Hospital
Columbus	Ohio State University Medical Center
Dayton	Good Samaritan Hospital and Health Center
Nashville	Vanderbilt University Hospital

Large Community Hospitals with 250+ Beds

Cincinnati	Mercy Hospital Anderson
Jacksonville	Memorial Hospital of Jacksonville

Top 100 Hospitals - Cardiovascular

Teaching Hospitals with Cardiovascular Residency Programs

Birmingham	University of Alabama Hospital
Cincinnati	University Hospital
Louisville	Jewish Hospital

Teaching Hospitals without Cardiovascular Residency Programs

Birmingham	St. Vincent's Hospital
Birmingham	Baptist Medical Center - Montclair
Cincinnati	St. Elizabeth Medical Center - South (Edgewood KY)
Cincinnati	Christ Hospital
Columbus	Grant/Riverside Methodist Hospitals - Riverside Campus
Columbus	Mount Carmel Medical Center
Raleigh	Wake Medical Center

Nonteaching Hospitals

Nashville	Centennial Medical Center
Raleigh	Rex Healthcare

Top 100 Hospitals - Orthopedic

Teaching Hospitals with Orthopedic Residency Programs

Louisville	Jewish Hospital

Teaching Hospitals without Orthopedic Residency Programs

Birmingham	Montclair Baptist Medical Center
Greensboro	Forsyth Medical Center
Nashville	St. Thomas Health Services
Omaha	Nebraska Methodist hospital

Community Hospitals

Charlotte	Presbyterian-Orthopaedic Hospital
Lexington	St. Joseph Hospital
Louisville	Baptist Hospital East
Nashville	Centennial Medical Center & Parthenon Pavilli

Top 100 Hospitals - Stroke

Teaching Hospitals with Neurology Residency Programs

Louisville	Norton Healthcare

Teaching Hospitals without Neurology Residency Programs

Birmingham	Montclair Baptist Medical Center
Cincinnati	Bethseda North Hospital
Indianapolis	Community Hospitals Indianapolis
Indianapolis	St. Vincent Hospital and Health Services
Kansas City	St. Luke's Hospital

Community Hospitals

Lexington	St. Joseph Hospital
Nashville	Centennial Medical Center

Top 100 Hospitals - ICU

Teaching Hospitals without Critical Care Residencies

Indianapolis	Community Hospital East
Indianapolis	Saint Vincent Hospital & Health Services
Nashville	Baptist Hospital

Source: Modern Healthcare Magazine (www.modernhealthcare.com)