

# *Oakland County's Healthcare and Life Science Industry*

## **Industry overview and economic potential**

Prepared by: Scott D. Watkins, Senior Consultant  
Alexander L. Rosaen, Consultant

**Anderson Economic Group, LLC**

East Lansing | Chicago

1555 Watertower Place, Suite 100  
East Lansing, Michigan 48823  
Tel: (517) 333-6984  
Fax: (517) 333-7058

<http://www.AndersonEconomicGroup.com>

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## *I. Executive Summary*

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**PURPOSE OF REPORT** Oakland County, Michigan is home to many of the world’s leading automotive original equipment manufacturers and parts suppliers, as well as leading automotive design and research facilities. These businesses have propelled the county to prosperity over the past 100 years. However, as the global automotive industry restructures, Oakland County looks towards other emerging industries for a more balanced economy and continued prosperity.

Recent investments and expansions by healthcare and life science businesses in Oakland County offer a glimpse of this industry’s future role in the county’s economy. From a new proton beam cancer treatment center being built in Royal Oak, to the opening of a medical school in Rochester Hills, evidence of this industry’s potential abounds. However, until now, the county lacked a comprehensive analysis of the industry’s scope and scale.

This report illustrates the current state of the healthcare and life science industry in Oakland County; documents the economic benefits from investments in the industry; and projects future employment in the industry. This projection includes both consideration of what may happen in a “trend” growth model, and what the potential employment levels may be if industry promotion efforts are undertaken to leverage the current healthcare and life science industry assets in Oakland County.

**OVERVIEW OF REPORT**

This report begins with an overview of Oakland County’s current healthcare and life science industry (begins on page 6). This includes a clear definition of what types of businesses comprise the industry, how many people are employed in the industry, average industry wages, and how many establishments, both large and small, are in the industry and its sectors. Also included is a comparison of Oakland County’s healthcare and life science industry to that in other leading Michigan counties, as well as a review of Oakland County’s workforce and education in healthcare and life science.

Starting on page 21, we overview current projects and investments in healthcare and life science establishments and programs throughout Oakland County. These examples help show the direction that the industry is headed, as well as the economic benefits associated with growing the industry. To demonstrate these economic benefits, we more closely assess three specific projects: McLaren Health’s investment at POH in Pontiac, a proton beam therapy center at Beaumont Hospital in Royal Oak, and a new medical school at Oakland University in Rochester Hills.

The final section of the report, which begins on page 28, offers a look at how Oakland County’s healthcare and life science industry may grow over the next

decade. An employment projection model provides a sector by sector projection of employment through 2018, under both a trend model and a potential model. The latter assumes the county pursues plans to strengthen the industry and to capitalize on its current assets. The methodology behind these projections is described in “Appendix E: Employment Projection Model” and at “Cautions and Limitations” on page F-3.

**SUMMARY OF FINDINGS**

*Oakland County’s Current Healthcare and Life Science Industry*

An analysis of Oakland County’s healthcare and life science industry, which includes businesses ranging from scientific research and development, to medical offices, to nursing care facilities, shows that the county is among the leaders in nearly every aspect relative to other top counties in Michigan. For example:

- The industry had 93,584 employees in Oakland County, accounting for 12.8 percent of all private sector wage and salary employment in the county in 2006. Oakland’s employment in the industry ranked second only to Wayne County, which had 100,012 healthcare and life science industry employees in 2006.<sup>1</sup>
- Oakland County had over 4,300 establishments in the healthcare and life science industry in 2006, tops among the Michigan counties considered in this report. Wayne county, which led in employment, had nearly 1,000 fewer establishments.

**TABLE 1. Oakland County Healthcare and Life Science Industry, 2002-06**

Year	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments
2002	79,593	10.4%	\$3,285,290	\$41,276	3,909
...	...	...	...	...	...
2005	84,459	11.7%	\$3,940,735	\$46,659	4,239
2006	93,584	12.8%	\$4,722,371	\$50,461	4,324

Source: Anderson Economic Group, LLC.

- Oakland County had more establishments than any other county in the following sectors: pharmaceutical and medicine manufacturing; medical equipment and supply manufacturing; offices of health practitioners; outpatient care and medical labs. In the four remaining sectors the county ranked second in terms of total establishments.
- Employees in Oakland County’s healthcare and life science industry earned, on average, \$50,461 per year in 2006. This compares to a county-wide average of \$48,807 across all industries. Within the industry, average annual wages ranged

1. Ranking is among six counties in Michigan widely consider to have significant healthcare and life science industries. These counties, in addition to Oakland, are: Kalamazoo, Kent, Macomb, Washtenaw, and Wayne.

from \$88,768 for workers in the scientific research and development industry, to \$23,874 for nursing and residential care workers.

- Employment in Oakland County's healthcare and life science industry grew at an average annual rate of 4.1 percent from 2002 to 2006, compared to a 1.1 percent decline across all industries. The sector with the fastest employment growth rate was scientific research and development (49.0 percent average annual from 2002 to 2006). It was also the sector with the highest average annual wage.
- The workforce in the greater Detroit area, from which Oakland County employers attract talent, has 173,400 workers in healthcare and life science related occupations. These occupations pay an average annual wage of \$54,960, which is competitive with that offered in other leading centers of healthcare and life science, including Chicago and Cleveland.
- Nearly half of the college degrees awarded in 2006 in Michigan in the healthcare and life science fields were from colleges and universities in and around Oakland County, providing the industry with a significant source of new talent.

#### *Healthcare and Life Science Industry Momentum*

Oakland County's strong base of healthcare and life science establishment and employment, along with a skilled workforce and strong education programs, has helped fuel further growth in the county's industry. Among the current developments and investments in the county's industry are:

- The new Henry Ford West Bloomfield Hospital.
- A new surgical facility and St. Joseph Mercy Hospital in Pontiac.
- Phase I of the McLaren Health Care Village in Independence Township.
- Expansion at Beaumont's Troy and Royal Oak Campuses.
- The new St. John Health Providence Park Hospital
- The new Crittenton-Karmanos Cancer Center in Rochester Hills.
- Plans by McLaren Health to update and reuse available space at POH Hospital in Pontiac for nursing and medical care training programs, and research and laboratory space.
- The building of a proton beam cancer therapy center at Beaumont Hospital in Royal Oak, which our analysis estimates will support 1,422 construction jobs during the two year building period, and nearly 150 new jobs each year once in operation. The center, which will be one of only a handful in the country, will also help draw in patients and visitors from throughout the state and midwest, some of which will stay in the area for the duration of their treatment (up to 40 days), generating over \$23.1 million in new economic activity per year.
- A new medical school at Oakland University, which will open in 2010 and enroll 500 students when the program meets capacity. These students, along with new faculty for the program, will relocate to the region while in the program, generating new economic spending on everything from rent, to text books, to retail and entertainment. The medical school will also help Oakland

University attract clinical trials and new faculty research, which draws private and government funds to the region.

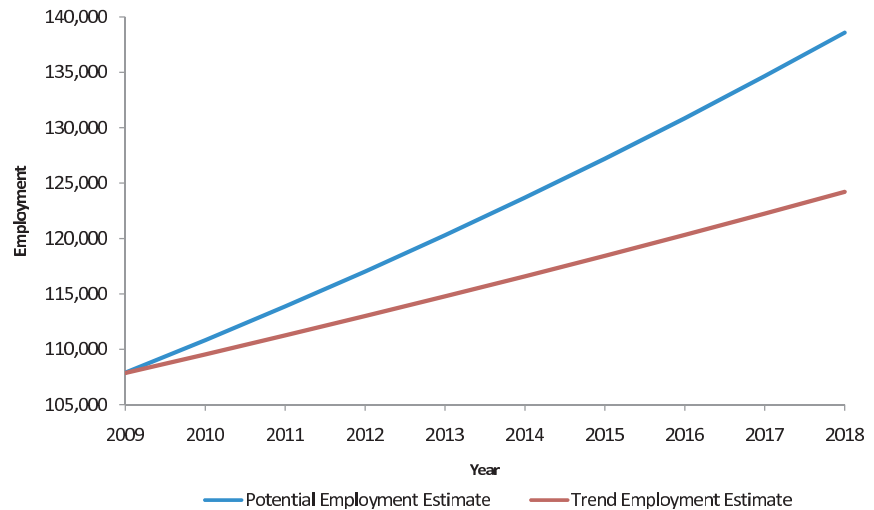
*Looking Ahead—Industry Employment Projections*

These new projects, along with other recent growth, suggest that the healthcare and life science industry has the potential to become an even more significant part of Oakland County’s economy. We considered these recent trends, along with future drivers of demand for each sector in the industry, and modeled the industry’s employment levels through 2018.

Under our “trend” projection, which assumes the industry grows to meet local demands with little or no economic development plan to promote the industry, we find:

- Employment in the industry grows at an average annual rate of 2.2 percent through 2018, resulting in the creation of 30,623 new jobs.

**FIGURE 1. Healthcare and Life Science Industry Employment Projections**



In our “potential” scenario projection, we assume the county promotes its healthcare and life science industry, helping existing businesses expand, and leveraging its current assets to attract new businesses to the region. Under this scenario the county’s healthcare and life science employment base grows beyond what local demand levels would support. This occurs as the industry attracts “medical tourists” to the region, and exports more pharmaceutical, medicine, medical equipment, and medical supply products to other regions. Under this scenario, we project:

- Employment grows at a 3.2 percent average annual rate through 2018, with significant additional growth in the manufacturing and scientific research and

development sectors, and moderate additional growth in medical services provided both to local populations and “medical tourists.”

- This 3.2 percent average annual growth rate creates 45,000 new jobs by 2018. This is nearly 15,000 more new jobs than would be created under the trend scenario.



## II. Healthcare and Life Science Industry in Oakland County

This section of our report will discuss the current healthcare and life science industry in Oakland County, with comparisons to the state and five Michigan counties—Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. These counties, along with Oakland, represent the leading healthcare and life science regions in the State of Michigan.

We have defined the healthcare and life science industry using the North American Industry Classification System (NAICS). With this, we identify specific industry sectors and can compare Census employment and earnings data on a county-by-county basis. The NAICS codes we have selected for this study are displayed in the table below. Further discussion of our methodology for industry definitions, along with detailed definitions of the industry subsectors, can be found in “Appendix A: Industry Definition” on page A-1.

**TABLE 2. Composition of Healthcare and Life Science Industry**

Industry Sector	NAICS Subsector	NAICS Subsector
Pharmaceutical & Medicine Manufacturing	3254	Pharmaceutical and Medicine Manufacturing
Medical Equipment & Supplies Manufacturing	3391	Medical Equipment and Supplies Manufacturing
Scientific Research & Development	5417	Scientific Research and Development Services
Offices of Health Practitioners	6211	Offices of Physicians
	6212	Offices of Dentists
	6213	Offices of Other Health Practitioners
Outpatient Care & Medical Laboratories	6214	Outpatient Care Centers
	6215	Medical and Diagnostic Laboratories
	6216	Home Health Care Services
	6219	Other Ambulatory Health Care Services
Medical/Surgical Hospitals	6221	General Medical and Surgical Hospitals
Specialty Hospitals	6222	Psychiatric and Substance Abuse Hospitals
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals
Nursing & Residential Care Facilities	6231	Nursing Care Facilities
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities
	6233	Community Care Facilities for the Elderly

Source: Anderson Economic Group, LLC

**INDUSTRY OVERVIEW**

**Employment, Establishments, and Payroll.** The healthcare and life science industry in Oakland County saw steady growth in employment, payroll, and establishments between 2002 and 2006. As displayed in Table 1 (executive summary), nearly 14,000 jobs and over 400 new establishments were added in the industry, helping to increase total payroll by over \$1.4 billion. The average

*Healthcare and Life Science Industry Snapshot, Oakland County (2006)*

Establishments: 4,324 (rank: #1)*
Employment: 93,584 (rank: #2)
2002-06 Avg Annual Employment Change: 4.1%
Average Annual Wage: \$50,461 (rank: #4)
2002-06 Avg Annual Wage Change: 5.2%

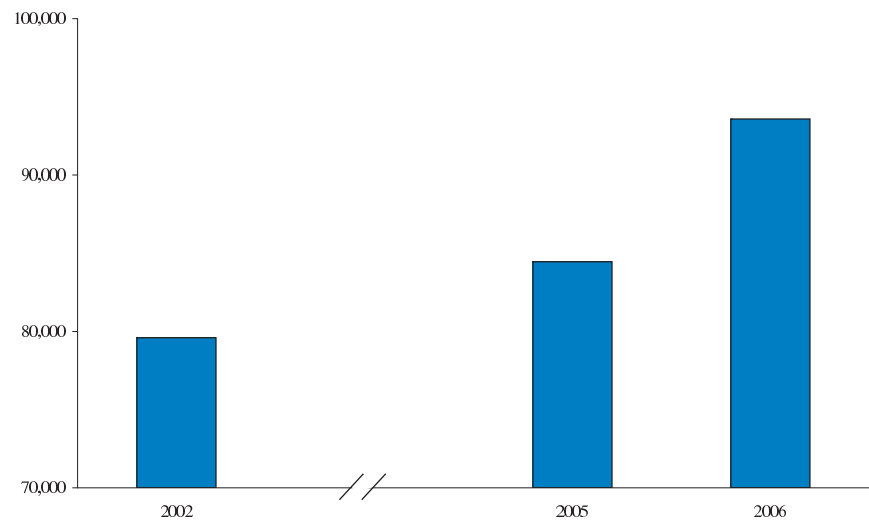
\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

wage of employees in the industry increased from \$41,276 in 2002 to \$50,461 in 2006. This equates to a 5.2 percent average annual wage increase, which compares favorably to the 2.0 percent average annual wage increase experienced across all industries in Oakland County from 2002 to 2006.

Oakland County also experienced growth in the share of total employment in the healthcare and life science industry from 2002 to 2006. This growth, from 10.4 percent to 12.8 percent, indicates that the industry is growing in

importance to the county's economic base.

**FIGURE 2. Employment in Healthcare and Life Science, Oakland County**



In 2002, the average number of employees per establishment in the healthcare and life science industry in Oakland County was 20.4. In 2006 this grew to 21.6 employees per establishment. This is an indicator of a strong industry that is experiencing growth in the number of establishments and growth in establishment size as measured by employment.

Growth in total payroll and average wages are also good signs for the healthcare and life science industry in Oakland County. This growth in pay indicates that the industry is adding more high paying jobs, increasing wages for current

employees, or both. Increasing wages in these industries are important for maintaining a competitive environment relative to other regions, and attracting new talent to the county.

**Comparison With Other Michigan Counties.** Compared to other leading counties in Michigan in 2006, Oakland County is at or near the top in healthcare and life science industry total employment, total payroll, and total number of establishments. As shown in Table 3, Oakland County also had a higher average industry wage than the State of Michigan as a whole.

**TABLE 3. Regional Comparison of Healthcare and Life Science Industry, 2006**

County	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments
<i>Oakland</i>	93,584	12.8%	\$4,722,371	\$50,461	4,324
Kalamazoo	23,764	21.9%	\$1,526,426	\$64,233	531
Kent	37,621	11.5%	\$1,497,237	\$39,798	1,232
Macomb	30,644	10.1%	\$1,268,257	\$41,387	1,765
Washtenaw	32,621	21.8%	\$1,661,642	\$50,938	823
Wayne	100,012	15.1%	\$5,635,112	\$56,344	3,384
State of Michigan	523,434	13.7%	\$24,464,325	\$46,738	21,270

Source: Anderson Economic Group, LLC.

Oakland County leads this group of counties in the number of establishments, but has the second lowest number of employees per establishment. This indicates that in Oakland County this industry is less likely to be dominated by a handful of large companies. The benefit of a wider base of establishments is the reduced risk of a collapse of an industry caused by a major employer leaving the area.

The sections below offer more detail on each of the major sectors of Oakland County’s healthcare and life science industry. Detailed data tables for each of the industry sectors can be found in “Appendix B: Industry Data” on page B-1.

**INDUSTRY SECTORS**

*Pharmaceutical and Medicine Manufacturing*

Establishments in this sector, which is comprised of NAICS code 3254, are engaged primarily in the production of medicine and medical drugs. This sector accounts for 1.1 percent of Oakland County’s total employment in the health-care and life science industry, and 1.6 percent of the county’s total annual payroll in the industry. Employment in this sector declined between 2002 and 2005, but increased by 9.4 percent from 2005 to 2006.

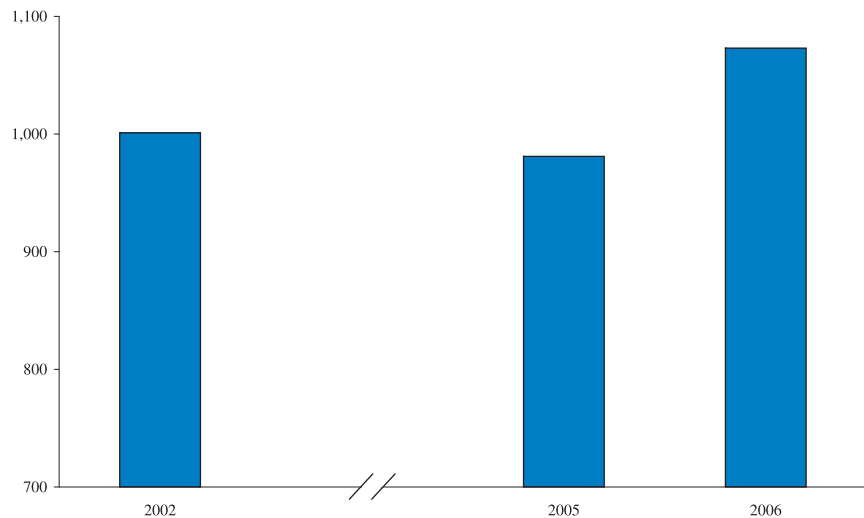
<i>Pharmaceutical and Medicine Manufacturing Snapshot, Oakland County (2006)</i>
Establishments: 10 (rank: 1)*
Employment: 1,073 (rank: #2)
2002-06 Avg Annual Employment Change: 1.8%
Average Annual Wage: \$72,404 (rank: #2)
2002-06 Avg Annual Wage Change: 9.7%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector was \$72,404—well above the average across all industries in the county (\$48,807) and the average for the overall healthcare and life science industry (\$50,461). Further, wages in the sector grew at an average annual rate of 9.7 percent between 2002 and 2006, compared to an average of 2.0 percent for all industries in Oakland County.

Compared to other leading counties in Michigan included in this study, Oakland County was second only to Kalamazoo County in total 2006 employment and payroll in this sector, and second only to Washtenaw County in average wages. With ten, Oakland County had the highest number of pharmaceutical and medicine manufacturing establishments of any county in this group.

**FIGURE 3. Employment in Pharmaceutical and Medicine Manufacturing Sector, Oakland County**



*Medical Equipment and Supplies Manufacturing*

This sector, which is comprised of NAICS code 3391, accounts for 0.7 percent of Oakland County’s total employment in the healthcare and life science industry, and 0.5 percent of the county’s total annual payroll in the industry. Establishments in this sector are engaged primarily in manufacturing medical

equipment and supplies. Employment in this sector has been steady, with a 0.3 percent annual average growth rate from 2002 to 2006.

**Medical Equipment and Supplies Manufacturing Snapshot, Oakland County (2006)**

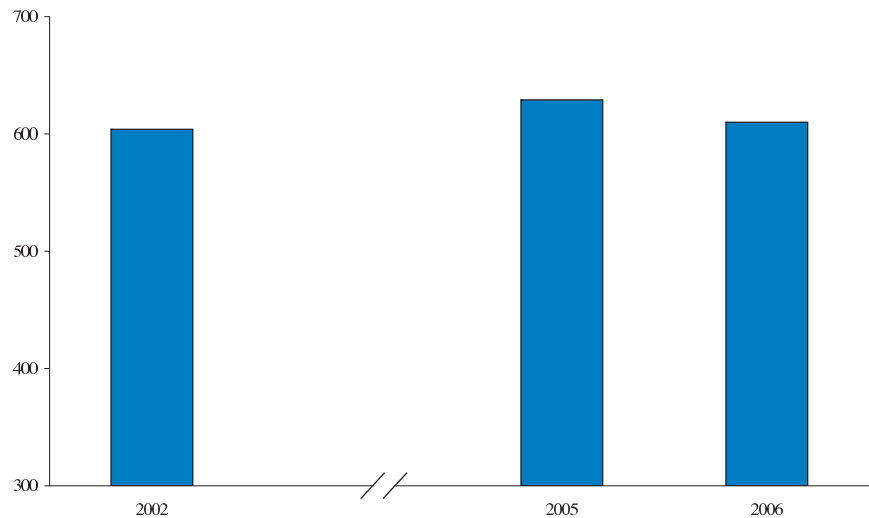
Establishments: 62 (rank: #1)*
Employment: 610 (rank: #4)
2002-06 Avg Annual Employment Change: 0.3%
Average Annual Wage: \$38,177 (rank: #6)
2002-06 Avg Annual Wage Change: 0.5%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector in 2006 was \$38,177, which was below the average across all industries in the county (\$48,807) and below the average for the overall healthcare and life science industry (\$50,461). Average wages in the sector fell from 2002 to 2005, before increasing by 7.5 percent from 2005 to 2006.

With 62 medical equipment and supply manufacturing establishments, Oakland County ranked top among the counties considered in this report. The majority of these establishments (61) were small in terms of employment, providing a diverse base with opportunities for expansion.

**FIGURE 4. Employment in Medical Equipment and Supplies Manufacturing Sector, Oakland County**



*Scientific Research and Development*

Establishments in this sector, which includes NAICS 5417, engage in conducting original research or the application of research findings to create new products. In 2006, this sector accounted for 10.6 percent of Oakland County’s total employment in the healthcare and life science industry, and 18.6 percent of the county’s total annual payroll in the healthcare and life science industry. Employment in this sector grew rapidly from 2002 to 2006, with an addition of 7,880 jobs.

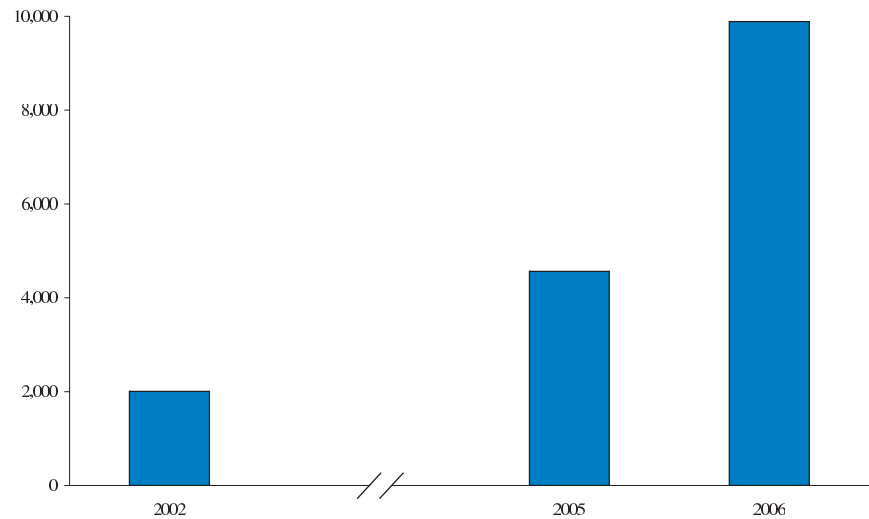
<i>Scientific Research and Development Snapshot, Oakland County (2006)</i>
Establishments: 72 (rank #2)*
Employment: 9,887 (rank: #2)
2002-06 Avg Annual Employment Change: 49.0%
Average Annual Wage: \$88,768 (rank: #3)
2002-06 Avg Annual Wage Change: 3.4%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector was \$88,768, well above the average across all industries in the county (\$48,807) and the average for the overall healthcare and life science industry (\$50,461). Further, wages in the sector grew at an average annual rate of 3.4 percent from 2002 to 2006, compared to a 2.0 percent growth rate for wages across all industries in Oakland County.

Oakland County had the second highest employment and total payroll in this sector among comparison counties in 2006. The county also had the second highest number of establishments (72), following only Washtenaw (85).

**FIGURE 5. Employment in Scientific Research and Development Sector, Oakland County**



*Offices of Health Practitioners*

This sector (NAICS codes 6211, 6212, and 6213) is comprised of establishments of health practitioners primarily engaged in the practice of medicine. This sector accounted for 25.7 percent of Oakland County’s total employment in healthcare and life science in 2006, and 31.8 percent of the county’s total annual payroll in the industry.

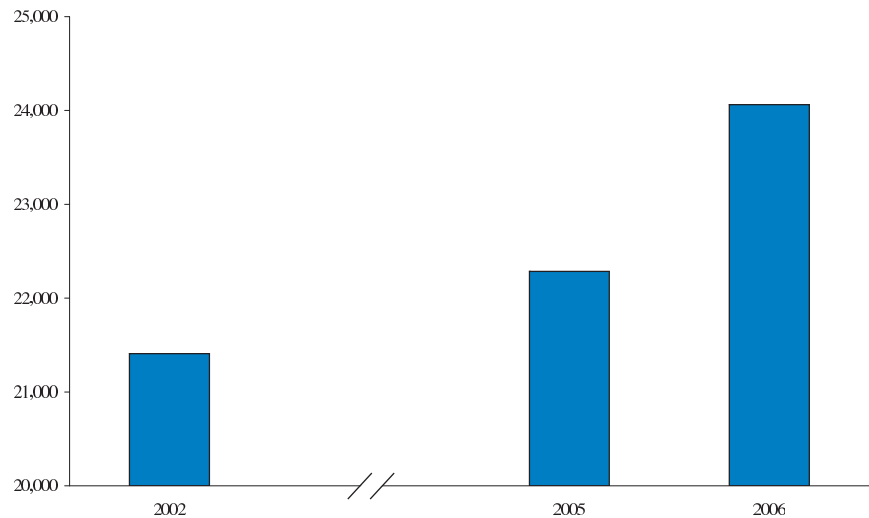
<i>Offices of Health Practitioners Snapshot, Oakland County (2006)</i>
Establishments: 3,274 (rank: #1)*
Employment: 24,062 (rank: #1)
2002-06 Avg Annual Employment Change: 3.0%
Average Annual Wage: \$62,449 (rank: #2)
2002-06 Avg Annual Wage Change: 3.6%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

In 2006, the average wage in the sector was \$62,449, which was above the average across all industries in the county (\$48,807) and the average for the overall healthcare and life science industry (\$50,461). This average wage ranked number two among the counties analyzed, just behind Washtenaw at \$62,466. Annual wages in the sector grew at an average annual rate of 3.6 percent from 2002 to 2006 in Oakland County. Within the sector those in offices of physicians made \$75,510 annually, those in offices of dentists made \$40,154, and those on other offices of health practitioners made \$59,106 per year, on average, in 2006.

This sector is a relative strength for Oakland County, leading the comparison counties in employment, annual payroll, and total establishments in 2006, and near the top in average wages.

**FIGURE 6. Employment in Offices of Health Practitioners Sector, Oakland County**



*Outpatient Care and Medical Laboratories*

This sector (NAICS 6214, 6215, 6216, and 6219) is comprised of establishments that provide outpatient care, medical diagnostic analysis, skilled nursing service in the home, or other ambulatory health care services. This sector accounted for 18.2 percent of Oakland County’s total employment in the health-care and life science industry, and 14.1 percent of the county’s total annual payroll in the industry, in 2006.

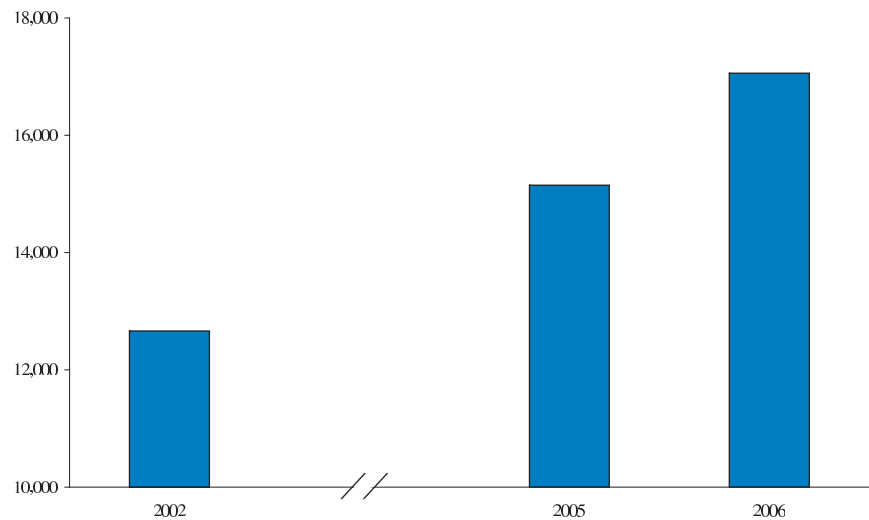
<i>Outpatient Care and Medical Laboratories Snapshot, Oakland County (2006)</i>
Establishments: 484 (rank: #1)*
Employment: 17,058 (rank: #1)
2002-06 Avg Annual Employment Change: 7.7%
Average Annual Wage: \$39,037 (rank #2)
2002-06 Avg Annual Wage Change: 4.8%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector was \$39,037, below the average across all industries in the county (\$45,352) and the average for the overall healthcare and life science industry (\$50,461). Average wages within the sector ranged from \$28,975 for home health care workers, to \$47,191 for outpatient care center workers. Wages in the sector grew at an average annual rate of 4.8 percent between 2002 and 2006.

When compared to other considered counties in Michigan, Oakland’s outpatient care and medical laboratories industry sector is a clear leader in total employment, payroll, and establishments, both large and small. With 17,058 employees the sector had nearly twice the overall employment of the next closest county, Wayne, which had 9,302 employees in the sector. No other county analyzed had more than 4,600 employees in the cluster.

**FIGURE 7. Employment in Outpatient Care and Medical Laboratories Sector, Oakland County**





*Medical and Surgical Hospitals*

This sector (NAICS 6221) is comprised of establishments licensed as general medical and surgical hospitals. In 2006, this sector accounted for 30.2 percent of Oakland County’s total employment in the healthcare and life science industry, and 26.7 percent of the county’s total annual healthcare and life science industry payroll. While employment in this sector declined between 2002 and 2005, it increased by 1.8 percent between 2005 and 2006.

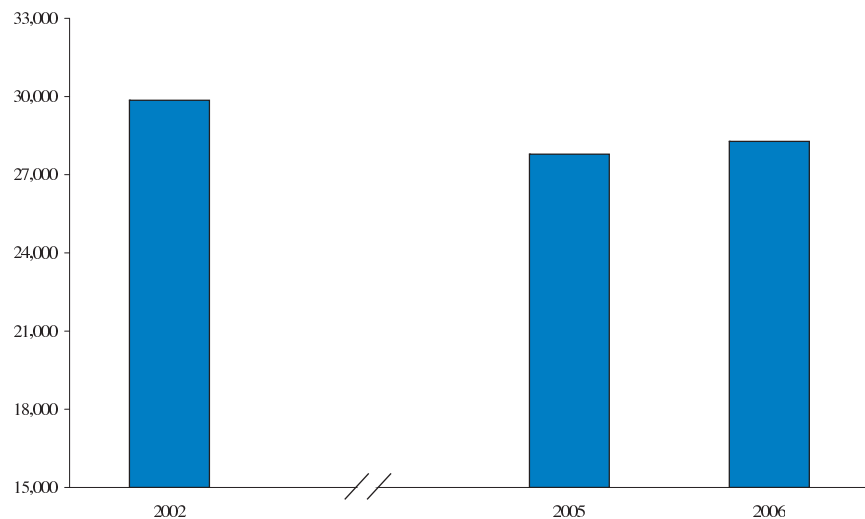
<i>Medical and Surgical Hospitals Snapshot, Oakland County (2006)</i>
Establishments: 12 (rank #2)*
Employment: 28,281 (rank: #2)
2002-06 Avg Annual Employment Change: -1.3%
Average Annual Wage: \$44,525 (rank: #3)
2002-06 Avg Annual Wage Change: 2.7%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector, for workers across all occupations, was \$44,525. This was just below the average across all industries in the county (\$48,807) and the average for the overall healthcare and life science industry (\$50,461) in the county. The average wage in the sector increased by 2.7 percent annually between 2002 and 2006.

Oakland County ranks high relative to comparison counties in this sector. In 2006, Oakland County had 28,281 employed in medical and surgical hospitals, second only to Wayne County with 34,875. Oakland also ranks second to Wayne in total payroll (\$1.26 billion to \$1.76 billion) and establishment (12 to 22).

**FIGURE 8. Employment in Medical and Surgical Hospitals Sector, Oakland County**



*Specialty Hospitals*

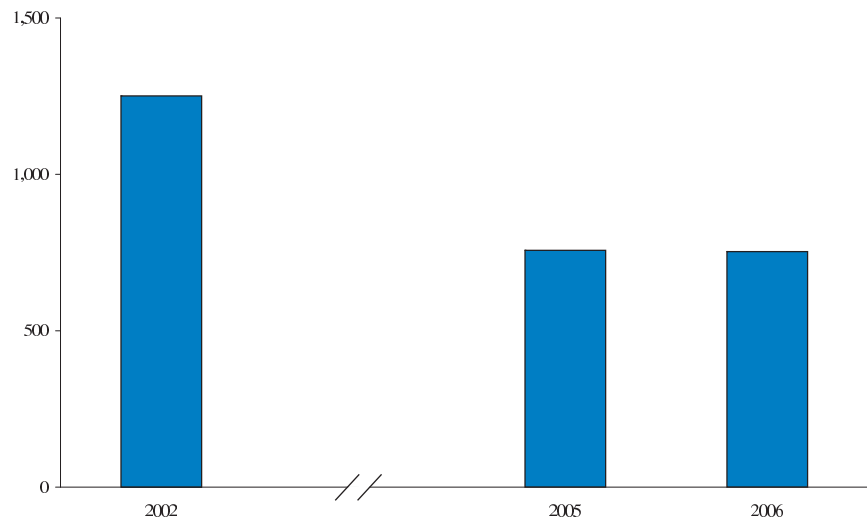
This sector (NAICS 6222 and 6223) is comprised of licensed psychiatric, substance abuse, and specialty hospitals, such as hospitals providing long-term care for the chronically ill. This sector accounted for 0.8 percent of Oakland County’s total employment in the healthcare and life science industry, and 0.7 percent of the county’s total annual payroll in the industry.

<i>Specialty Hospitals Snapshot, Oakland County (2006)</i>
Establishments: 5 (rank: #2)*
Employment: 753 (rank: #3)
2002-06 Avg Annual Employment Change: -11.9%
Average Annual Wage: \$43,600 (rank: #2)
2002-06 Avg Annual Wage Change: 3.5%

\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector was \$43,600 in 2006, which was just below the average across all industries in the county (\$48,807) and the average for the overall healthcare and life science industry (\$50,561). Wages in the sector grew at an average annual rate of 3.5 percent from 2002 to 2006. Oakland County had the second highest average wage in this sector among the comparison counties in 2006, following Wayne (\$56,535).

**FIGURE 9. Employment in Specialty Hospitals Sector, Oakland County**



*Nursing and Residential Care Facilities*

This sector, which includes nursing care facilities (NAICS 6231), mental health and substance abuse facilities (NAICS 6232), and community care facilities for the elderly (NAICS 6233), accounted for 12.7 percent of Oakland County’s total employment in the healthcare and life science industry, and 0.8 percent of the county’s total annual payroll in the industry. Total employment in this sector increased by 2.4 percent annually between 2002 and 2006.

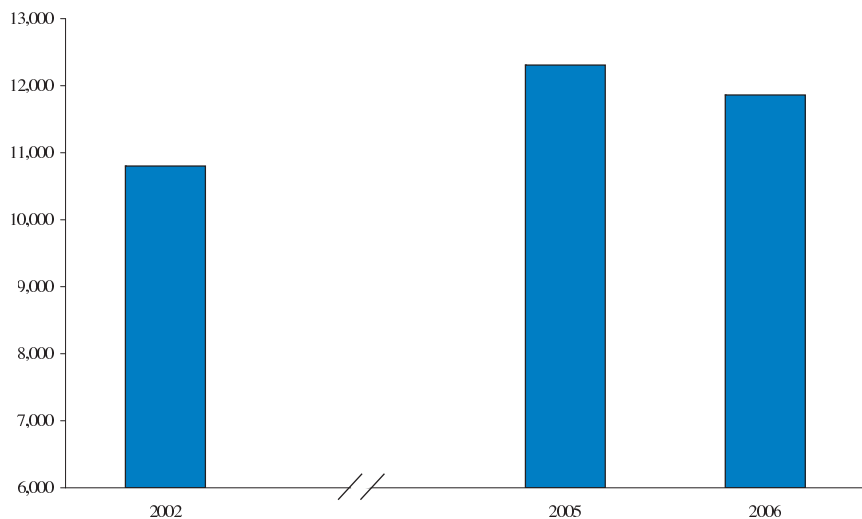
<p><i>Nursing and Residential Care Facilities Snapshot, Oakland County (2006)</i></p> <p>Establishments: 405 (rank: #2)*</p> <p>Employment: 11,860 (rank: #2)</p> <p>2002-06 Avg Annual Employment Change: 2.4%</p> <p>Average Annual Wage: \$23,874 (rank: #2)</p> <p>2002-06 Avg Annual Wage Change: 1.5%</p>
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\*Among the Michigan counties of Kalamazoo, Kent, Macomb, Washtenaw, and Wayne. Source: Anderson Economic Group, LLC

The average wage in the sector was \$23,874, which was well below the 2006 average across all industries in the county and the average for the overall healthcare and life science industry. Average wages within the sector ranged from \$25,973 for workers in nursing care facilities, to \$21,003 per year for workers in elder care communities. Wages in the overall sector grew at an average annual rate of 1.5 percent from 2002 to 2006.

Among comparison counties in 2006, Oakland County ranked second in sector employment (11,860 to Wayne’s 17,177), total payroll (\$283 million to Wayne’s \$393 million), and total establishments (405 to Wayne’s 611).

**FIGURE 10. Employment in Nursing and Residential Care Facilities Sector, Oakland County**



## WORKFORCE AND EDUCATION

With demand for goods and services from the healthcare and life science industry growing rapidly, along with the aging “boomer” population, more and more workers are finding careers available in the industry. However, education and training programs are just beginning to catch up with the demand, leaving some concerned that the labor pool will hinder growth opportunities in the healthcare and life science industry. Below is a look at how Oakland County is prepared to meet these demands.

### *Workforce*

One indicator of a region’s ability to attract and grow an industry is its current labor force and wages. The greater Detroit metro area, from which Oakland County’s healthcare and life science industry draws the majority of its employment, has a total of 1,953,120 workers, of which 8.9 percent are employed in healthcare and life science occupations. This is slightly more than in other recognized centers of health care and life science in the midwest, such as Minneapolis with 8.7 percent of total employment in the occupations, and Chicago with 7.97 percent of total employment in the occupations. Cleveland leads the way at 10.1 percent.

However, the wages in the greater Detroit area are higher than those for workers in Cleveland’s life science and healthcare occupations, and are on par with the wages paid in Chicago. Combined, this slightly lower concentration of employment in healthcare and life science occupations, and a competitive wage offering, suggest both opportunity for expanding the employment base through worker training and retraining, and through attracting workers from outside the region.

Workforce statistics are shown in Table 4 on page 18. For details on how the Metropolitan Statistical Areas (MSAs) were defined, see “Metropolitan Statistical Area Definitions” on page C-1. Information on the employment data used in this section can be seen in “Appendix C: Workforce and Education Data” on page C-1.

**TABLE 4. Healthcare and Life Science Employment and Wages, Selected Midwest Regions, 2007**

	Detroit MSA		Chicago MSA	
	Emps	Avg Wage	Emps	Avg Wage
Healthcare support	57,880	\$26,720	85,230	\$26,990
Life, physical, & social science	12,220	\$64,290	30,440	\$63,780
Healthcare practitioners and techs	103,300	\$69,680	188,120	\$64,670
<b>Healthcare and life sciences total</b>	<b>173,400</b>	<b>\$54,960</b>	<b>303,790</b>	<b>\$54,009</b>
<i>All occupations</i>	<i>1,953,120</i>	<i>\$46,410</i>	<i>3,809,460</i>	<i>\$45,710</i>

	Minneapolis MSA		Cleveland MSA	
	Emps	Avg Wage	Emps	Avg Wage
Healthcare support	44,880	\$29,190	34,960	\$24,730
Life, physical, & social science	21,560	\$65,780	8,300	\$57,420
Healthcare practitioners and techs	87,870	\$74,600	64,000	\$63,710
<b>Healthcare and life sciences total</b>	<b>154,310</b>	<b>\$60,160</b>	<b>107,260</b>	<b>\$50,518</b>
<i>All occupations</i>	<i>1,776,020</i>	<i>\$46,410</i>	<i>1,059,760</i>	<i>\$40,780</i>

	Nation	
	Emps	Avg Wage
Healthcare support	3,625,240	\$25,600
Life, physical, & social science	1,255,670	\$62,020
Healthcare practitioners and techs	6,877,680	\$65,020
<b>Healthcare and life sciences total</b>	<b>11,758,590</b>	<b>\$52,546</b>
<i>All occupations</i>	<i>134,354,250</i>	<i>\$40,690</i>

*Source: Anderson Economic Group, LLC. Base data provided by the Bureau of Labor Statistics, Occupational Employment Statistics May 2007.*

### *Workforce Educational and Training*

A region's current workforce is only one indicator of an ability to support an industry. Another important aspect is access to educational and training programs in related fields. Fortunately, Oakland County has a well educated population, with some 42 percent of the adult population holding a bachelor's degree or higher in 2006. This compares to 25 percent in the State of Michigan.<sup>2</sup> The county is also home to, or located very close to, a number of colleges and universities that train significant numbers of students each year in fields related to healthcare and life science.

As shown in Table 5 below, 11,482 degrees were awarded in 2006 in Oakland County, of which 2,687 were in programs related to healthcare or life science. Throughout the metro Detroit area there were a total of 14,432 degrees granted in the life science or healthcare fields for 2006, accounting for just under half the total in Michigan.

2. U.S. Census Bureau, 2006 American Community Survey.

**TABLE 5. Degrees Awarded by Program, 2005-2006**

<b>Program</b>	<b>Oakland County</b>	<b>Metro Detroit</b>	<b>State of Michigan</b>
Biological and biomedical sciences	92	1,139	2,842
Health professions and related clinical sciences	2,347	11,180	21,571
Physical sciences	22	447	1,093
Psychology	226	1,663	3,526
Science technologies/technicians	-	3	69
<b>Total healthcare and life science</b>	<b>2,687</b>	<b>14,432</b>	<b>29,101</b>
<b>Total, all programs</b>	<b>11,482</b>	<b>59,548</b>	<b>124,733</b>

*Source: Anderson Economic Group, LLC. Base data provided by The National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS) 2006.*

*Note: Includes all first and second majors and levels of awards (including certificates).*

In the coming years the number of healthcare and life science related degrees awarded in Oakland County can be expected to increase rather significantly, due in large part to new and expanded programs at the county’s largest postsecondary educational institutions—Oakland Community College and Oakland University.

Oakland County’s Oakland Community College (OCC) has an average annual enrollment of 74,000 students (degree and non-degree seeking) and is the largest community college in the state of Michigan. There are more than 100 two-year degree programs and over 45 one-year certificate programs offered. Programs in healthcare and life science fields include 23 two-year degree programs and 13 one-year certificate programs. OCC is also home to the largest nursing program in Michigan. Seven out of ten of the programs at OCC that have received accreditation from various national associations and state agencies are in the healthcare and life science field. Associations recognizing OCC include the American Dental Association, the Michigan Board of Nursing, and the American Medical Association.<sup>3</sup>

Oakland University (OU), as of fall 2007, had an enrollment of 18,000 students. The university offers 129 baccalaureate degree programs and 99 graduate degree and certificate programs. In addition, a new medical school will enroll students beginning in 2010, and is discussed further at “Oakland University School of Medicine” on page 24. Oakland University has a number of other programs related to healthcare and life science, including six baccalaureate programs at the School of Health Sciences, seven at the School of Nursing and one in biological sciences at The College of Arts and Sciences. Undergraduate stu-

3. Information gathered from <http://www.oaklandcc.edu>.

dents participating in these programs have access to an unique and extensive lab program where they work directly on university research from their classroom with experts in the field. OU has been recognized by the Carnegie Foundation for the quality and size of their doctoral and research programs which are likely to grow with the addition of the medical school and a university goal of increasing student enrollment to 25,000 by 2020.<sup>4</sup>

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4. Information gathered from <http://www4.oakland.edu>.

### *III. Economic Momentum in the Industry*

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With a strong employment base, access to a skilled workforce, and an aging population demanding more healthcare services, it is not surprising that Oakland County's healthcare and life science industry continues to grow. Signs of this growth abound, and range from new facilities and hospital expansions, to more demand for nursing programs and a new medical school.

Recent expansions and growth in the County's healthcare and life science industry, which have been recently completed, are currently underway, or soon to be started, include:

1. McLaren Health Care Village—McLaren's health care village, a multi-phase project underway in Independence Township, broke ground in July 2007, and is expected to have the first phase completed in spring of 2009. The first phase will include a 135,000 medical office building with ambulatory surgery center, the 40,000 square foot Great Lakes Cancer Institute, as well as retail space. Phases II and III will add a 200 to 300 bed hospital, a heart center, and up to 100,000 square feet of additional medical office space. In total, the project could exceed 1 million square feet and \$600 million in investment.<sup>1</sup>
2. Henry Ford West Bloomfield Hospital—The new hospital, which is scheduled for completion in spring 2009, will add 300 beds when fully operational, and is scheduled to open with 192 beds. The \$360 million, 698,000 square foot project will occupy half of its 160 acre site, with the remaining land used for community recreation.<sup>2</sup>
3. Expansion at Beaumont Hospital's Troy and Royal Oak Campuses—A 687,000 square foot, \$213 million addition will add a new emergency center, critical care patient tower, loading dock, and power house to Beaumont Hospitals' Troy Campus.<sup>3</sup> At the Royal Oak campus a new four-story, 246,000 square-foot pavilion will expand emergency care and surgical space, and renovations in the north and central towers will upgrade operating rooms and better accommodate existing programs.
4. St. John Health Providence Park Hospital—This recently opened hospital adds nearly 400 beds to Oakland County, and is situated on a completely new medical campus that includes medical office buildings, a neurosciences institute, and orthopedic center with ambulatory surgical center. The site also features a new hotel for patients, their guests, and visiting staff and researchers.<sup>4</sup>

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1. Oakland Business Review, "Largest commercial construction projects in Oakland County," August 28, 2008.

2. *ibid.*

3. *ibid.*

4. *ibid.*



5. Crittenton-Karmanos Cancer Center—Crittenton Hospital and the Karmanos Cancer Institute first partnered in 2003, and are currently planning a 25,000 square foot, \$14 million cancer center in Rochester Hills. The facility, which is expected to open in fall 2009, will offer radiation oncology, chemotherapy, and clinical space. Crittenton Hospital also recently added a 20,000 square foot medical building, and is considering the addition of a new patient tower to allow for more private rooms.<sup>5</sup>
6. St. Joseph Mercy Oakland—A new 50,000 square-foot, two-story surgical pavilion is schedule for completion in fall of 2009. The total cost of the expansion is approximately \$60 million. The new space will accommodate 12 operating rooms and high-tech lab space to expedite testing. The new operating rooms will be double the size of the existing facilities, and fully integrate on-site diagnostic imaging technologies.<sup>6</sup>

Three other significant projects that will propel the county's life science and health care center forward include a new medical school at Oakland University, a Proton-Beam therapy center at Beaumont Hospital in Royal Oak, and new research and training facilities at McLaren Health's POH Regional Medical Center in Pontiac. These are discussed in more detail below to further illustrate how the aforementioned projects, and others, help grow the industry and contribute to the overall economy.

## **POH REGIONAL HOSPITAL RESEARCH AND TRAINING FACILITIES**

In late 2007 McLaren Health acquired POH Regional Medical Center in Pontiac with an eye towards the future. The hospital, which has extra capacity, presents a unique opportunity for the conversion of traditional-care space to new laboratory and training facilities. This aligns with projected shortages in nursing and medical technician workers, and a need to retrain workers as the region continues to become less reliant on manufacturing and automotive jobs.

POH has already established itself as one of the largest osteopathic teaching hospitals in the country, with 24 residency programs, and training relationships with Michigan State University, Kansas City University, and TOURO University.<sup>7</sup> Now, McLaren is looking to build on this, and is exploring opportunities to add nursing education programs and educational lab space for Oakland University and Oakland Community College students. The facilities would also be used to expose high school and middle school students to careers in medicine and health care through a variety of programs and outreach efforts.

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5. Oakland Business Review, "Rochester-based Crittenton eyes plans for \$100M patient tower," September 4, 2008.

6. [http://stjoesoakland.netreturns.biz/NewsReleases/Article\\_Detail.aspx?id=9e892fc2-22cf-43a0-80f7-3bd2f79f6218](http://stjoesoakland.netreturns.biz/NewsReleases/Article_Detail.aspx?id=9e892fc2-22cf-43a0-80f7-3bd2f79f6218). Accessed September 15, 2008.

7. POH Regional Medical Center Web Site, Education Overview Page, <http://www.pohmedical.or/body.cfm?id=36>. Accessed September 9, 2008.

The hospital also offers opportunity for medical research and development space. The buildings current laboratories and clinical space, if not needed for medical care, could be converted to research and development space. The Stowers Institute, which is housed in the old Menorah Hospital in Kansas City, Missouri, offers a model for such a conversion. The 1931 hospital building was acquired by the Stowers institute in the mid-1990s, and converted into a 600,000 square foot research center where work today focuses in advances in the medical and life sciences.

**BEAUMONT  
HOSPITAL PROTON  
BEAM CANCER  
THERAPY CENTER**

Beaumont Hospital plans to construct a new proton beam cancer center on its existing Royal Oak campus by the end of 2010. The center will be one of only a handful of proton beam treatment centers in the country. As such, Beaumont Hospitals estimates that, starting from their first full year of operation (planned for 2011) they will have 7-10 years of attracting “medical tourists” to the facility for treatment that is not yet widely available. Once proton beam facilities are more common, the region will still enjoy a “medical tourism” benefit: residents of Southeast Michigan not having to travel outside the region if they need proton beam therapy themselves, and the region will have had the opportunity to establish itself as a destination for treatment, and to move on to other innovative techniques.

*Construction Economic Impacts*

The approximately two years of construction for the proton-beam facility will support a large number of new jobs in the region. In total, 843 construction related jobs are estimated, plus another 579 jobs supported by non-payroll construction expenditures in the region. This yields a total employment impact of 1,422 jobs over the two year construction period.<sup>8</sup>

Construction employment at the site is expected to average 200 employees each year. These jobs will in turn support an additional 221 jobs each year, bring the total employment impact of construction labor at the facility to 843 over the two years. The construction process will also bring new spending to the region for materials, equipment, and other non-wage items. This spending is estimated to total \$36.71 million over the two years, with every \$1 million spent supporting 15.787 jobs, or 579 total jobs.

*Economic Impacts During Facility Operations*

Once built and operating, with its planned first full year of operations in 2011, the proton beam facility would create employment and add demand for goods and services to the economy.

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8. The construction jobs we cite here are equivalent to jobs of a single year duration, or “man-years” of employment.

**Employment Created by Facility Operations.** We estimate that the facility would add 148.5 new jobs to the tri-county area. The facility itself would employ about 100 full-time equivalent workers. Since the facility would be adding a new form of treatment to Beaumont Hospitals, we estimate that relatively little (about 5 percent) of this employment would be a substitute for existing employment (for example by workers in other cancer treatment facilities at Beaumont). Therefore, we estimate that the facility will create 95 net new jobs at the Beaumont Hospitals campus.

As these new workers spend their wages, we estimate that each new worker will indirectly support an additional 0.5631 jobs in the Oakland-Wayne-Macomb Counties region, for a total of 53.5 indirectly-supported new jobs in the area. This brings the total employment impact of the proton beam facility's operations to 148.5 new jobs in the tri-county area. See "Appendix D: Economic Impact Methodology" for detailed calculations.

**Added Economic Demand Due to Facility Operations and Visitors.** As detailed in Table 6 below, we estimate that the proposed proton beam facility and its visitors will add over \$23 million in net new economic demand to Oakland, Wayne, and Macomb Counties.

**TABLE 6. Annual Economic Demand Increase in Oakland, Wayne, and Macomb Counties**

Net New Demand Due to Facility Wages and Spending	\$17,019,202
Net New Visitor Spending in Region	\$6,093,750
<b>Total Net New Economic Demand</b>	<b>\$23,112,952</b>

Source: Analysis by Anderson Economic Group, LLC

This includes an increase of over \$17 million due to the wages of workers and over \$6 million due to spending by visitors to the region seeking treatment or area residents avoiding leaving the region for treatment. For detailed calculations and assumptions, see Appendix Table D-3, "Spending in Oakland-Macomb-Wayne Counties Region by Visitors due to Facility" and Appendix Table D-4, "Increase in Annual Economic Demand in Region due to Facility Operation" in Appendix D.

**OAKLAND  
UNIVERSITY SCHOOL  
OF MEDICINE**

Oakland University, in partnership with Beaumont Hospital, has received approval to open a new medical school, which will be named the Oakland University William Beaumont School of Medicine. The first class will start the program with 50 students in the fall of 2010, quickly ramping up to its full capacity of 125 students entering each year. This will result in a total 500 students attending the medical school for four years each by 2016. The partnership's approach will be for students to complete their classroom education in the sciences at

Oakland University, while Beaumont Hospital will run the clinical portion of the program.

This program’s economic benefits to the region will come from several sources, including the school’s operations (funded by tuition and research grants), spending by students while they are attending the school, and federal payments for graduate medical education, which compensate hospitals for training medical residents. We discuss these sources of economic impact further below, quantifying two of the main sources: the net economic impact of medical student tuition and living expenditures, and the federal payments potentially attracted to the area by an increase in the number of medical residents.

*Impact of Student Tuition and Spending*

The new medical school will draw new residents—the enrolled students—to the area, with each spending a significant amount of money on tuition, fees, living expenses, and other items.<sup>9</sup> Most of this spending will be net-new to the region. This is because there is an ample supply of students vying for each accredited medical school slot nation-wide, which will mean little-to-no “cannibalization” from Michigan’s other medical schools at Wayne State, the University of Michigan, and Michigan State University.

As shown in Table 7 below, we estimate the annual net economic impact on the tri-county area of these student expenditures to be over \$44.6 million in the schools first year of operation at full capacity, with 500 total students.

**TABLE 7. Annual Economic Impact of New Medical Student Tuition and Expenditures.**

Expenditure Category	Amount
Direct Impact of Tuition, Fees, and Healthcare Spending	\$22,663,955
Direct Impact of Student Living Expenditures	\$7,125,000
Indirect Impact (all industries)	\$14,894,478
<b>Total Net Economic Impact of Tuition and Living Expenditures</b>	<b>\$44,683,433</b>

*Memo: Figures in 2008 dollars. Analysis is for Oakland-Wayne-Macomb Counties region in medical school’s first year of full-capacity operation, 2016.  
Analysis: Anderson Economic Group, LLC*

See Appendix Table D-5, "Economic Impact of Oakland University Medical School Student Spending" for the details and assumptions of this estimate.

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9. Tuition will pay for a significant portion of the medical school’s operations, including faculty, buildings, and other school operations spending, with the remainder funded by research grants (discussed below) and charitable donations.

*Impact of Federal Graduate Medical Education Payments*

To facilitate the training of new doctors, private insurers and the federal government (through Medicare and Medicaid) make Graduate Medical Education (GME) payments to hospitals that agree to train medical students in residencies in their 5th and 6th year of their medical education. Students typically apply for medical residencies nation-wide and are matched to residency programs on a competitive basis. The precise amount of GME payments flowing to Michigan hospitals depends on the supply of (by hospitals) and demand for (by students) medical resident slots. It is outside the scope of this analysis to predict which hospitals will increase their offering of medical residency slots (and associated receipt of GME payments) in reaction to Oakland University's medical school bringing more medical students to the area. Nevertheless, we estimate the increase in economic activity due to GME payments under the assumptions that GME payments to Michigan would increase in proportion to the number of medical students added to the state by Oakland University, and that these payments would go to the Oakland-Macomb-Wayne Counties region in proportion to the percentage of Michigan's hospitals located there.

As shown in Table 8 below, we estimate that over \$64.3 million in additional, annual economic activity in all industries will be caused by increased GME payments to the tri-county area a result of Oakland University's medical school.

**TABLE 8. Annual Economic Impact of GME Payments.**

<b>Expenditure Category</b>	<b>Amount</b>
Direct Impact of GME Payments	\$42,872,985
Indirect Impact (all industries)	\$21,436,447
<b>Total Net Economic Impact of GME Payments</b>	<b>\$64,309,342</b>

*Memo: Figures in 2008 dollars. Analysis is for Oakland-Wayne-Macomb Counties region in medical school's first year of full-capacity operation, 2016.  
Analysis: Anderson Economic Group, LLC*

See Appendix Table D-6, "Economic Impact of GME Payments Due to Oakland University Medical School" for details and assumptions of this estimate.

*Economic Benefits of Medical Research*

Both Oakland University and Beaumont Hospitals have strong existing programs in scientific and medical research which will be enhanced by the new medical school. Increasing the amount of medical researchers associated with a the hospital will allow Beaumont Hospitals to increase its participation in medial clinical trials, and will allow Oakland University to further its involvement in such research. Clinical trials often bring with them a much higher level of research funding than other types of research due to the expense of recruiting, treating, and tracking a large enough number of patients over a long period of time. While some of the time Oakland University medical school faculty spend

engaged in running clinical trials will come at the expense of other research they might have done, most of the faculty will themselves be new to the region, and just as the wages of these new faculty and staff bring new economic activity, the research projects they direct will also be new to the region and state.

To illustrate the potential value of clinical and other scientific and medical research funding, consider the following examples of publicly-available information on National Institutes of Health (NIH) research grants.<sup>10</sup> In 2007, William Beaumont Hospital Research Institute received almost \$2.4 million in NIH research grants. The University of Central Florida, whose medical school opened in 2006, received over \$7 million in NIH grants and fellowships in 2007. Wayne State University received over \$62 million in NIH research grants in 2007.<sup>11</sup> These values, while not specific to Oakland University, show the potential size of the new economic activity that will be brought as a direct result of new research funds and clinical trial revenues.

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10. The National Institutes of Health are just one of many sources of research funding for medical researchers, including other government agencies and private companies funding clinical trials on pharmaceuticals and medical devices.

11. Source: NIH Research Portfolio Online Reporting Tool, accessible at <http://report.nih.gov/index.aspx>

## *IV. Industry Employment Projections and Potential*

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With an already well-established employment base, and a numbering of exciting new projects and programs underway, Oakland County's healthcare and life science industry is well positioned for growth. This growth will be driven by increasing demand for medical care by an aging population. It could be encouraged further by leveraging assets already in place, including an educated workforce, world-class hospitals, and leading-edge research. Building on these assets will position the county as a leader in the industry, helping to propel growth beyond the natural demand levels already projected for the industry as the local population ages.

To project employment for Oakland County's healthcare and life science industry we have assumed two scenarios:

1. *Trend*—In the “trend” scenario we assume Oakland County's healthcare and life science industry sees employment trends from 2002-2006 moderate and continue through 2009, and then change in line with what the U.S. Bureau of Labor Statistics projections for the entire country. Growth in the service based sectors is adjust down from the national projected level to account for slower expected population growth in Michigan compared to the nation as a whole.
2. *Potential*—The “potential” scenario assumes that Oakland County initiates and implements an economic development strategy to leverage the current strengths of its healthcare and life science industry. By doing so we assume the manufacturing and research sectors in Oakland will grow faster than expected nationally, and the medical services sectors will grow at the national average rates as visitors are drawn into the area to increase demand beyond what the slowly growing local populations would naturally support.

For more details on the model, please see “Appendix E: Employment Projection Model” on page E-1.

### **INDUSTRY-WIDE PROJECTIONS**

Our employment projection model for Oakland County's healthcare and life science industry show that the industry is likely to continue increasing its share of overall employment in the County, even without a concentrated effort to grow the industry. As shown in Table 9 on page 29, the industry is projected to grow at a 2.2 percent average annual rate from 2006 to 2018 under our trend scenario. This translates 30,623 new jobs in the healthcare and life science industry for Oakland County.

If Oakland County implements and succeeds with an economic development strategy targeting the healthcare and life science industry the job growth through 2018, under our potential projection, reaches 3.2 percent on an average annual basis. Under this scenario the County gains 45,000 new jobs in healthcare and life science industry sectors, an increase of nearly 15,000 jobs over the

trend projection. Further, our potential projection assumes more accelerated growth is achieved in the manufacturing and research sectors, helping to balance an industry that traditionally leans heavily on service oriented jobs.

**TABLE 9. Oakland County Healthcare and Life Science Industry Employment Projections**

Industry Sector	<u>Trend Scenario Projected</u>		<u>Potential Scenario Projected</u>	
	<u>Employment Change (2006-18)</u>	<u>Avg Annual Growth Rate</u>	<u>Employment Change (2006-18)</u>	<u>Avg Annual Growth Rate</u>
Pharmaceutical and Medicine Manufacturing	353	2.3%	620	3.9%
Medical Equipment and Supplies Manufacturing	6	0.1%	198	2.5%
Scientific Research and Development	4,378	2.5%	12,346	6.7%
Offices of Health Practitioners	5,541	1.7%	6,323	2.0%
Outpatient Care and Medical Laboratories	10,182	3.6%	12,296	4.3%
Medical and Surgical Hospitals	7,845	1.8%	9,152	2.1%
Specialty Hospitals	105	1.1%	134	1.4%
Nursing and Residential Care Facilities	2,214	1.5%	3,932	2.6%
<i>Total: Healthcare and Life Science Industry</i>	<u>30,623</u>	<u>2.2%</u>	<u>45,000</u>	<u>3.2%</u>

Source: Anderson Economic Group, LLC

The projected growth in Oakland County’s healthcare and life science industry is even more impressive considering that other industries in the region are likely see employment grow at a 0.5 percent average annual rate as the regional economy restructures, older populations retire, and productivity of workers increases. As a result of this slower overall growth rate, the healthcare and life science industry in Oakland County is projected to become a larger part of the overall economy--accounting for 16.0 percent of all employment by 2018 in the trend scenario, and 17.9 percent in the potential scenario (compared to 12.8 percent in 2006).

Below is a more detailed look at the projection for each sector within the overall healthcare and life science industry. Also, please see Table 17 on page D-4 and “Base Data for Growth Rate Assumptions” on page D-1 for information, as well as cautions and limitations, about the data and assumptions used in our projection model.

*Pharmaceutical and Medicine Manufacturing Employment*

This sector of Oakland County’s economy saw modest overall growth from 2002 to 2006. Growth should be expected to continue, and even accelerate as national and international demand for medical treatment increases in step with aging populations, and medical advances continue to expand the number of available pharmaceutical and medical treatment options. Further, safety con-



cerns and federal regulations are likely to limit the off-shoring of this type of manufacturing.

In 2006, Oakland County had the second largest employment total (behind Kalamazoo County) total in this sector among the six Michigan counties reviewed in this report. This established base, along with the county's local and regional access to leading educational programs, and the region's strong manufacturing roots, offers opportunity for the sector to grow faster in Oakland County than is expected nationally.

Under the trend scenario we project:

- Employment grows at an average annual rate of 3.0 percent from 2006 to 2009, and then continues to grow at an average annual rate of 2.2 percent from 2009 through 2018.
- 353 new jobs are added in the sector by 2018, which would create three new establishments assuming that the average number of employees per establishment holds steady at the 2006 level.

The potential scenario projects:

- 3.5 percent annual employment growth through 2009, followed by a slightly faster annual growth of 4.0 percent through 2018.
- A total of 620 new jobs, which is 267 more than in the trend scenario. These 267 additional jobs are enough for nearly three more establishments than under the trend scenario, again assuming average establishment size remains at approximately the 2006 level.

#### *Medical Equipment and Supplies Manufacturing*

Oakland County's medical equipment and supplies manufacturing sector added 25 jobs from 2002 to 2005, before losing 19 from 2005 to 2006. Demand for the goods produced by this sector should grow in coming years in step with the aging baby boomers. However, unlike pharmaceutical and medicine manufacturing, medical equipment and supplies are more easily produced in countries with lower wage levels, and are likely to be produced at the lowest possible costs to help counter the overall increases in medical care costs.

As Oakland County and the rest of southeast Michigan look to diversify their existing manufacturing economy from automotive to other sectors, there is definitely opportunity to attract medical equipment manufacturers, especially those with advanced processes requiring highly skilled employees. However, many such firms are also likely to be drawn to southwest Michigan, where Kent and Kalamazoo have significant medical equipment and supply manufacturing industry employment. Based on this, Oakland County has an opportunity to grow this sector at a rate slightly above the national average, if not by more.

Under the trend scenario we project:

- Employment holds steady but does not grow from 2006 to 2009, and then grows at an average annual rate of 0.1 percent from 2009 through 2018.
- Six new jobs are added in the sector by 2013, and 616 total by 2018. This would possibly create one new establishment at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 0.5 percent through 2009, followed by a faster annual growth of 3.0 percent through 2018.
- 192 more new jobs than in the trend scenario, for 198 total employment gain, and 20 total new establishments at the 2006 establishment size level.

#### *Scientific Research and Development*

The Scientific Research and Development sector of Oakland County's economy experienced explosive growth from 2002 to 2006, with employment growing at an average annual rate of 49 percent, and the addition of 14 new establishments, 7 of which employ more than 100 workers. Growth in the sector can be expected to continue as more spending is allocated towards scientific discovery, though to expect such rapid growth to continue in the long-term is unrealistic.

Based on 2006 employment levels, Oakland County is the leader in Michigan's scientific research and development industry. No other county among those analyzed had even half as many employees in the industry. This already established cluster workers, along with existing and planned research programs and Oakland University and the region's leading hospitals, and could draw in new scientific research and development businesses at a rate well above the expected national growth expectation.

Under the trend scenario we project:

- Employment grows at an average annual rate of 10.0 percent from 2006 to 2009, and then continues to grow at an average annual rate of 0.9 percent from 2009 through 2018.
- A total of 4,378 new jobs added by 2018. This would create almost 32 new establishments at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 10.0 percent through 2009, followed by a slower annual growth of 6.0 percent through 2018.
- A total of 7,968 more new jobs than in the trend scenario, for 12,346 total employment gain. This would result in 58 more new establishments than in the trend scenario.

*Offices of Health Practitioners*

This sector of Oakland County saw strong overall growth from 2002 to 2006, with significant gains coming in the most recent period (2005 to 2006). This growth should be expected to continue as life expectancies increase, the overall population ages, and cost pressures shift delivery of some medical care from inpatient facilities to doctor's offices. However, the strong growth in recent years may have outpaced what is now a slowing shift of populations to exterior ring suburbs, so continued rapid growth is unlikely

Growth of this sector in Oakland County is also not likely to meet or exceed national growth projections as demand is tied directly to population levels. Most of the population growth in the United States that is expected in coming years is projected to occur outside of the Midwest, which logically suggests that these areas will also see more growth in medical offices to keep pace with population levels. Oakland County should, however, capture a bit more than its fair share of this growth assuming it becomes established as a medical treatment destination within the region.

Under the trend scenario we project:

- Employment grows at an average annual rate of 2.0 percent from 2006 to 2009, and then continues to grow at an average annual rate of 1.7 percent from 2009 through 2018.
- A total of 5,541 new jobs added by 2018. This would create more than 750 new establishments at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 2.0 percent through 2009, with a consistent annual growth of 2.0 percent through 2018.
- A total of 782 more new jobs than in the trend scenario, for 6,323 total employment gain. This would result in 106 more new establishments than in the trend scenario.

*Outpatient Care and Medical Laboratories*

Not surprisingly, this sector has grown along with the offices of health practitioners sector, though at an even quicker rate in recent years. National projections by the BLS have the industry growing at a pace similar to that expected for the offices of health practitioners sections, but a bit faster as the home health care services component of the sector is expected to see higher increases in demand. This trend, along with some additional growth stemming from the county gaining a reputation as a medical care destination within the region should also occur in Oakland County. Current projects, like the McLaren Health Care Village and the Crittenton-Karmanos Cancer Center, will also accelerate growth in the short-term.

Under the trend scenario we project:

- Employment grows at an average annual rate of 8.3 percent from 2006 to 2009, and then continues to grow at an average annual rate of 2.6 percent from 2009 through 2018.
- 10,182 new jobs are added in the sector by 2013, and 27,240 total by 2018. This would create almost 289 new establishments at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 8.3 percent through 2009, followed by an annual growth of 3.4 percent through 2018.
- 2,114 more new jobs than in the trend scenario, for 12,296 total employment gain, and 349 total new establishments at the 2006 establishment size level.

#### *Medical and Surgical Hospitals*

While employment in this sector declined slightly from 2002 to 2006 in Oakland County, it will undoubtedly climb in coming years as new hospitals, including Henry Ford West Bloomfield and St. John Providence Park, open in the region.

Nationally this sector is expected to have steady employment growth from 2006 to 2016, though it should grow more slowly than other medical sectors as cost pressures result in more care being given in outpatient facilities. The growth in this sector is also closely tied to population growth, though successfully establishing the county as a destination for medical care can help propel growth beyond what the local population alone would support.

Under the trend scenario we project:

- Employment growth of 5.0 percent annually from 2006 to 2009, and then 1.1 percent annually from 2009 through 2018.
- A total of 7,845 new jobs added by 2018. This would create three new establishments at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 5.0 percent through 2009, followed by an annual growth of 1.5 percent through 2018.
- A total of 1,307 more new jobs than in the trend scenario, for 9,152 total employment gain. This would result in possibly one more new establishment than in the trend scenario.

#### *Specialty Hospitals*

This sector saw significant employment declines in Oakland County from 2002 to 2006, though most of this may likely be attributable to the loss of one large

establishment. Going forward, demand for this sector, and thus employment growth, is likely to be the same as that for medical hospitals (see above), though we don't anticipate accelerated growth in this sector as we are not aware of major new facilities opening in it.

Under the trend scenario we project:

- An average annual employment growth rate of 1.0 percent through 2009, followed by 1.1 percent average annual employment growth through 2018.
- 105 new jobs are added in the sector by 2013, and 858 total by 2018. This would create possibly one new establishment at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 1.0 percent through 2009, followed by a slightly faster annual growth of 1.5 percent through 2018.
- 29 more new jobs than in the trend scenario, for 134 total employment gain, and one new establishment at the 2006 establishment size level.

#### *Nursing and Residential Care Facilities*

This sector saw modest employment gains from 2002 to 2005 before losing nearly 450 employees from 2005 to 2006. This loss most impacted nursing and elderly care facilities, perhaps reflecting a shift towards more home care, an assumption supported by growth in home care employment. As Oakland County's and Metro Detroit's populations age, demand for the services of this sector should grow, though at a moderate pace as care and treatment improvements allow more people to receive home health care services in place of nursing care. Elder care communities should also continue to grow for similar reasons.

Under the trend scenario we project:

- Employment grows at an average annual rate of 0.9 percent from 2006 to 2009, and then continues to grow at an average annual rate of 1.6 percent from 2009 through 2018.
- A total of 2,214 new jobs added by 2018. This would create almost 76 new establishments at the 2006 employees per establishment ratio.

The potential scenario projects:

- Annual employment growth of 0.9 percent through 2009, followed by a faster annual growth of 2.9 percent through 2018.
- A total of 1,718 more new jobs than in the trend scenario, for 3,932 total employment gain. This would result in 59 more new establishments than in the trend scenario.

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## *Appendix A: Industry Definition*

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Our definition of the healthcare and life science industries is composed of specific industrial sectors. These sectors are identified by North American Industry Classification System (NAICS) codes, which is how the U.S. Census Bureau reports industry data.<sup>1</sup> Because there is not a universally accepted definition of healthcare and life science, we employed the following methodology to determine an accurate and concise definition:

1. Surveying existing definitions.

We reviewed definitions of the healthcare and life science industry used in relevant industry reports, analyses, and other materials.

2. Refining the selection.

We refined this list of previous definitions (as defined by NAICS codes) to be included in the definition. We based our decision at this step by looking at the sub-categories of each 4-digit code to determine if the bulk of that code was actually involved in the healthcare or life science industries.

### **REVIEW OF EXISTING DEFINITIONS**

In our first step, we reviewed past reports and other sources involving healthcare and life science industries to determine what industry sectors are most commonly included when defining them. We found that each document puts forth its own definition.

These definitions vary from focusing solely on life science technology (*Automation Alley's Annual Technology Industry Report* and *The Life Sciences Industry in Michigan* written by Anderson Economic Group), to a definition incorporating hospitals and medical personnel in a May 2006 report produced by Cleveland State University.<sup>2</sup>

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1. Our definition was done at the NAICS 4-digit level, as this is the most detailed level for which sufficient amounts of data is commonly available at the county level. An NAICS code can be between 2 and 6 digits, with each digit providing an additional level of detail. For example, NAICS code 325 represents chemical manufacturing, NAICS code 3254 represents pharmaceutical and medicine manufacturing, and 325411 represents medicinal and botanical manufacturing.

2. See:

Watkins, Scott and Sallee, Caroline. *Automation Alley Annual Technology Industry Report*. Anderson Economic Group, 2005, 2006, 2007.

Anderson, Patrick and Watkins, Scott. *The Life Sciences Industry in Michigan*. Anderson Economic Group, 2004.

Lendel, Iryna. *The Healthcare Cluster in the Cleveland-Elyria-Mentor MSA, 2000-2005*. Cleveland State University, 2006.

**SELECTING NAICS TO INCLUDE**

Upon reviewing the already established definitions from previous reports, we reviewed each 4-digit NAICS code listed for inclusion by examining the sub-categories to determine if they were actually related to the healthcare or life science industries. If we determined that a bulk of the employment was not related to these industries, we left that code out of the definition.

**ADDITIONAL METHODOLOGICAL NOTES**

Our definition was done using the 2002 NAICS codes at the 4-digit level, as this is the most detailed level for which sufficient amounts of data are commonly available at the county level. An NAICS code can be between 2 and 6 digits, with each digit providing an additional level of detail. For example, NAICS code 325 represents chemical manufacturing, NAICS code 3254 represents pharmaceutical and medicine manufacturing, and NAICS code 325411 represents medicinal and botanical manufacturing.

**ESTABLISHING INDUSTRY SECTORS**

After selecting the NAICS codes to include in the industry definition, we divided the 16 NAICS categories into eight industry sectors of similar NAICS categories. For example, NAICS 6211, 6212, and 6213 were grouped into one sector because they all represent independent offices of various types of health care practitioners. The complete list of industry sectors and the NAICS categories they are comprised of can be seen in the table below:

**TABLE 1. Composition of Healthcare and Life Science Industry**

<b>Industry Sector</b>	<b>NAICS Subsector</b>
Pharmaceutical & Medicine Manufacturing	3254 Pharmaceutical and Medicine Manufacturing
Medical Equipment & Supplies Manufacturing	3391 Medical Equipment and Supplies Manufacturing
Scientific Research & Development	5417 Scientific Research and Development Services
Offices of Health Practitioners	6211 Offices of Physicians
	6212 Offices of Dentists
	6213 Offices of Other Health Practitioners
Outpatient Care & Medical Laboratories	6214 Outpatient Care Centers
	6215 Medical and Diagnostic Laboratories
	6216 Home Health Care Services
	6219 Other Ambulatory Health Care Services
Medical/Surgical Hospitals	6221 General Medical and Surgical Hospitals
Specialty Hospitals	6222 Psychiatric and Substance Abuse Hospitals
	6223 Specialty (except Psychiatric and Substance Abuse) Hospitals
Nursing & Residential Care Facilities	6231 Nursing Care Facilities
	6232 Residential Mental Retardation, Mental Health and Substance Abuse Facilities
	6233 Community Care Facilities for the Elderly

Source: Anderson Economic Group, LLC.

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**DEFINITIONS OF INCLUDED NAICS CODES**

The following section includes a description of the 16 4-digit NAICS codes included in our definition. The descriptions are from the U.S. Census Bureau.

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

**3391 - Medical Equipment and Supplies Manufacturing.** “This industry comprises establishments primarily engaged in manufacturing medical equipment and supplies. Examples of products made by these establishments are laboratory apparatus and furniture, surgical and medical instruments, surgical appliances and supplies, dental equipment and supplies, orthodontic goods, dentures, and orthodontic appliances.”

**5417 - Scientific Research and Development Services.** “This industry group comprises establishments engaged in conducting original investigation undertaken on a systematic basis to gain new knowledge (research) and/or the application of research findings or other scientific knowledge for the creation of new or significantly improved products or processes (experimental development). The industries within this industry group are defined on the basis of the domain of research; that is, on the scientific expertise of the establishment.”

**6211 - Offices of Physicians.** “This industry comprises establishments of health practitioners having the degree of M.D. (Doctor of medicine) or D.O. (Doctor of osteopathy) primarily engaged in the independent practice of general or specialized medicine (e.g., anesthesiology, oncology, ophthalmology, psychiatry) or surgery. These practitioners operate private or group practices in their own offices (e.g., centers, clinics) or in the facilities of others, such as hospitals or HMO medical centers.”

**6212 - Offices of Dentists.** “This industry comprises establishments of health practitioners having the degree of D.M.D. (Doctor of dental medicine), D.D.S. (Doctor of dental surgery), or D.D.Sc. (Doctor of dental science) primarily engaged in the independent practice of general or specialized dentistry or dental surgery. These practitioners operate private or group practices in their own offices (e.g., centers, clinics) or in the facilities of others, such as hospitals or HMO medical centers. They can provide either comprehensive preventive, cosmetic, or emergency care, or specialize in a single field of dentistry.”

**6213 - Offices of Other Health Practitioners.** “This industry group comprises establishments of independent health practitioners (except physicians and dentists).”



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**6214 - Outpatient Care Centers.** “This industry comprises establishments with medical staff primarily engaged in providing general or specialized outpatient care. Centers or clinics of health practitioners with different degrees from more than one industry practicing within the same establishment (i.e., Doctor of medicine and Doctor of dental medicine) are included in this industry.”

**6215 - Medical and Diagnostic Laboratories.** “This industry comprises establishments known as medical and diagnostic laboratories primarily engaged in providing analytic or diagnostic services, including body fluid analysis and diagnostic imaging, generally to the medical profession or to the patient on referral from a health practitioner.”

**6216 - Home Health Care Services.** “This industry comprises establishments primarily engaged in providing skilled nursing services in the home, along with a range of the following: personal care services; homemaker and companion services; physical therapy; medical social services; medications; medical equipment and supplies; counseling; 24-hour home care; occupation and vocational therapy; dietary and nutritional services; speech therapy; audiology; and high-tech care, such as intravenous therapy.”

**6219 - Other Ambulatory Health Care Services.** “This industry group comprises establishments primarily engaged in providing ambulatory health care services (except offices of physicians, dentists, and other health practitioners; outpatient care centers; medical laboratories and diagnostic imaging centers; and home health care providers).”

**6221 - General Medical and Surgical Hospitals.** “This industry comprises establishments known and licensed as general medical and surgical hospitals primarily engaged in providing diagnostic and medical treatment (both surgical and nonsurgical) to inpatients with any of a wide variety of medical conditions. These establishments maintain inpatient beds and provide patients with food services that meet their nutritional requirements. These hospitals have an organized staff of physicians and other medical staff to provide patient care services. These establishments usually provide other services, such as outpatient services, anatomical pathology services, diagnostic X-ray services, clinical laboratory services, operating room services for a variety of procedures, and pharmacy services.”

**6222 - Psychiatric and Substance Abuse Hospitals.** “This industry comprises establishments known and licensed as psychiatric and substance abuse hospitals primarily engaged in providing diagnostic, medical treatment, and monitoring services for inpatients who suffer from mental illness or substance abuse disorders. The treatment often requires an extended stay in the hospital. These establishments maintain inpatient beds and provide patients with food services that meet their nutritional requirements. They have an organized staff of physicians and other medical staff to provide patient care services. Psychiatric, psychological, and social work services are available at the facility. These hospitals usually

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provide other services, such as outpatient services, clinical laboratory services, diagnostic X-ray services, and electroencephalograph services.”

**6223 - Specialty (except Psychiatric and Substance Abuse) Hospitals.** “This industry consists of establishments known and licensed as specialty hospitals primarily engaged in providing diagnostic and medical treatment to inpatients with a specific type of disease or medical condition (except psychiatric or substance abuse). Hospitals providing long-term care for the chronically ill and hospitals providing rehabilitation, restorative, and adjustive services to physically challenged or disabled people are included in this industry. These establishments maintain inpatient beds and provide patients with food services that meet their nutritional requirements. They have an organized staff of physicians and other medical staff to provide patient care services. These hospitals may provide other services, such as outpatient services, diagnostic X-ray services, clinical laboratory services, operating room services, physical therapy services, educational and vocational services, and psychological and social work services.”

**6231 - Nursing Care Facilities.** “This industry comprises establishments primarily engaged in providing inpatient nursing and rehabilitative services. The care is generally provided for an extended period of time to individuals requiring nursing care. These establishments have a permanent core staff of registered or licensed practical nurses who, along with other staff, provide nursing and continuous personal care services.”

**6232 - Residential Mental Retardation, Mental Health and Substance Abuse Facilities.** “This industry group comprises establishments primarily engaged in providing residential care (but not licensed hospital care) to people with mental retardation, mental illness, or substance abuse problems.”

**6233 Community Care Facilities for the Elderly.** “This industry comprises establishments primarily engaged in providing residential and personal care services for (1) the elderly and other persons who are unable to fully care for themselves and/or (2) the elderly and other persons who do not desire to live independently. The care typically includes room, board, supervision, and assistance in daily living, such as housekeeping services. In some instances these establishments provide skilled nursing care for residents in separate on-site facilities.”

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## *Appendix B: Industry Data*

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Exhibits in this section include:

1. Michigan Healthcare and Life Science Industry Detailed Data, 2006
2. Kalamazoo County Healthcare and Life Science Industry Detailed Data, 2006
3. Kent County Healthcare and Life Science Industry Detailed Data, 2006
4. Macomb County Healthcare and Life Science Industry Detailed Data, 2006
5. Washtenaw County Healthcare and Life Science Industry Detailed Data, 2006
6. Wayne County Healthcare and Life Science Industry Detailed Data, 2006
7. Oakland County Healthcare and Life Science Industry Detailed Data, 2006
8. Oakland County Healthcare and Life Science Industry Detailed Data, 2005
9. Oakland County Healthcare and Life Science Industry Detailed Data, 2002

**TABLE 2. Michigan Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	7,752	0.2%	\$488,728	\$63,045	45	34	11
<b>Sector Total</b>			<b>7,752</b>	<b>0.2%</b>	<b>\$488,728</b>	<b>\$63,045</b>	<b>45</b>	<b>34</b>	<b>11</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	7,752	0.2%	\$385,609	\$49,743	372	359	13
<b>Sector Total</b>			<b>7,752</b>	<b>0.2%</b>	<b>\$385,609</b>	<b>\$49,743</b>	<b>372</b>	<b>359</b>	<b>13</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	38,624	1.0%	\$4,456,311	\$115,377	337	302	35
<b>Sector Total</b>			<b>38,624</b>	<b>1.0%</b>	<b>\$4,456,311</b>	<b>\$115,377</b>	<b>337</b>	<b>302</b>	<b>35</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	67,627	1.8%	\$4,431,214	\$65,524	6,819	6,777	42
	6212	Offices of Dentists	34,173	0.9%	\$1,352,601	\$39,581	4,361	4,357	4
	6213	Offices of Other Health Practitioners	20,796	0.5%	\$787,158	\$37,851	4,036	4,028	8
<b>Sector Total</b>			<b>122,596</b>	<b>3.2%</b>	<b>\$6,570,973</b>	<b>\$47,652</b>	<b>15,216</b>	<b>15,162</b>	<b>54</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	19,375	0.5%	\$822,352	\$42,444	807	774	33
	6215	Medical and Diagnostic Laboratories	7,010	0.2%	\$390,264	\$55,672	270	262	8
	6216	Home Health Care Services	28,555	0.7%	\$710,089	\$24,867	931	868	63
	6219	Other Ambulatory Health Care Services	8,070	0.2%	\$280,114	\$34,711	262	243	19
<b>Sector Total</b>			<b>63,010</b>	<b>1.6%</b>	<b>\$2,202,819</b>	<b>\$39,424</b>	<b>2,270</b>	<b>2,147</b>	<b>123</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	185,133	4.8%	\$7,997,158	\$43,197	154	13	141
<b>Sector Total</b>			<b>185,133</b>	<b>4.8%</b>	<b>\$7,997,158</b>	<b>\$43,197</b>	<b>154</b>	<b>13</b>	<b>141</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	5,375	0.1%	\$228,203	\$42,456	18	3	15
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	4,049	0.1%	\$166,086	\$41,019	23	12	11
<b>Sector Total</b>			<b>9,424</b>	<b>0.2%</b>	<b>\$394,289</b>	<b>\$41,738</b>	<b>41</b>	<b>15</b>	<b>26</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	47,747	1.3%	\$1,188,784	\$24,898	482	247	235
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	22,169	0.6%	\$418,898	\$18,896	1,683	1,666	17
	6233	Community Care Facilities for the Elderly	19,227	0.5%	\$360,756	\$18,763	670	636	34
<b>Sector Total</b>			<b>89,143</b>	<b>2.3%</b>	<b>\$1,968,438</b>	<b>\$20,852</b>	<b>2,835</b>	<b>2,549</b>	<b>286</b>
<b>2006 Healthcare and Life Sciences Total</b>			<b>523,434</b>	<b>13.7%</b>	<b>\$24,464,325</b>	<b>\$46,738</b>	<b>21,270</b>	<b>20,581</b>	<b>689</b>
2006 All Industries Total			3,819,537		\$151,504,380	\$39,666	235,750	-	-
2006 Healthcare and Life Sciences Share of Total			13.7%		16.1%		9.0%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 3. Kalamazoo County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	3,123	2.9%	\$205,493	\$65,800	3	1	2
<b>Sector Total</b>			<b>3,123</b>	<b>2.9%</b>	<b>\$205,493</b>	<b>\$65,800</b>	<b>3</b>	<b>1</b>	<b>2</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	2,015	1.9%	\$144,797	\$71,860	18	16	2
<b>Sector Total</b>			<b>2,015</b>	<b>1.9%</b>	<b>\$144,797</b>	<b>\$71,860</b>	<b>18</b>	<b>16</b>	<b>2</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	3,462	3.2%	\$575,301	\$166,176	17	16	1
<b>Sector Total</b>			<b>3,462</b>	<b>3.2%</b>	<b>\$575,301</b>	<b>\$166,176</b>	<b>17</b>	<b>16</b>	<b>1</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	1,931	1.8%	\$154,074	\$79,790	119	116	3
	6212	Offices of Dentists	902	0.8%	\$36,224	\$40,160	115	115	0
	6213	Offices of Other Health Practitioners	547	0.5%	\$16,804	\$30,720	125	125	0
<b>Sector Total</b>			<b>3,380</b>	<b>3.1%</b>	<b>\$207,102</b>	<b>\$61,273</b>	<b>359</b>	<b>356</b>	<b>3</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	1,113	1.0%	\$42,327	\$38,030	18	14	4
	6215	Medical and Diagnostic Laboratories	118	0.1%	\$6,015	\$50,975	6	6	0
	6216	Home Health Care Services	904	0.8%	\$18,672	\$20,655	22	20	2
	6219	Other Ambulatory Health Care Services	420	0.4%	\$9,384	\$22,343	9	8	1
<b>Sector Total</b>			<b>2,555</b>	<b>2.4%</b>	<b>\$76,398</b>	<b>\$29,901</b>	<b>55</b>	<b>48</b>	<b>7</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	5,756	5.3%	\$233,118	\$40,500	2	0	2
<b>Sector Total</b>			<b>5,756</b>	<b>5.3%</b>	<b>\$233,118</b>	<b>\$40,500</b>	<b>2</b>	<b>0</b>	<b>2</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	375	0.3%	\$15,188	\$40,501	1	0	1
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	75	0.1%	\$3,038	\$40,507	1	1	0
<b>Sector Total</b>			<b>450</b>	<b>0.4%</b>	<b>\$18,226</b>	<b>\$40,502</b>	<b>2</b>	<b>1</b>	<b>1</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	1,357	1.3%	\$33,814	\$24,918	14	6	8
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	688	0.6%	\$14,861	\$21,600	41	41	0
	6233	Community Care Facilities for the Elderly	978	0.9%	\$17,316	\$17,706	20	18	2
<b>Sector Total</b>			<b>3,023</b>	<b>2.8%</b>	<b>\$65,991</b>	<b>\$21,830</b>	<b>75</b>	<b>65</b>	<b>10</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>23,764</b>	<b>21.9%</b>	<b>\$1,526,426</b>	<b>\$64,233</b>	<b>531</b>	<b>503</b>	<b>28</b>
2006 All Industries Total			108,496		\$4,668,608	\$43,030	5,795	-	-
2006 Healthcare and Life Science Industry Share of Total			21.9%		32.7%		9.2%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 4. Kent County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	4	0.0%	\$205	\$51,250	1	1	0
<b>Sector Total</b>			<b>4</b>	<b>0.0%</b>	<b>\$205</b>	<b>\$51,250</b>	<b>1</b>	<b>1</b>	<b>0</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	1,127	0.3%	\$50,485	\$44,796	35	33	2
<b>Sector Total</b>			<b>1,127</b>	<b>0.3%</b>	<b>\$50,485</b>	<b>\$44,796</b>	<b>35</b>	<b>33</b>	<b>2</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	304	0.1%	\$16,659	\$54,799	8	7	1
<b>Sector Total</b>			<b>304</b>	<b>0.1%</b>	<b>\$16,659</b>	<b>\$54,799</b>	<b>8</b>	<b>7</b>	<b>1</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	5,111	1.6%	\$377,477	\$73,856	367	366	1
	6212	Offices of Dentists	2,581	0.8%	\$105,385	\$40,831	287	286	1
	6213	Offices of Other Health Practitioners	1,222	0.4%	\$41,489	\$33,952	228	228	0
<b>Sector Total</b>			<b>8,914</b>	<b>2.7%</b>	<b>\$524,351</b>	<b>\$58,823</b>	<b>882</b>	<b>880</b>	<b>2</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	1,587	0.5%	\$63,578	\$40,062	68	66	2
	6215	Medical and Diagnostic Laboratories	145	0.0%	\$15,882	\$109,531	15	15	0
	6216	Home Health Care Services	2,032	0.6%	\$43,675	\$21,494	36	30	6
	6219	Other Ambulatory Health Care Services	828	0.3%	\$27,556	\$33,280	19	16	3
<b>Sector Total</b>			<b>4,592</b>	<b>1.4%</b>	<b>\$150,691</b>	<b>\$32,816</b>	<b>138</b>	<b>127</b>	<b>11</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	13,759	4.2%	\$547,247	\$39,774	4	0	4
<b>Sector Total</b>			<b>13,759</b>	<b>4.2%</b>	<b>\$547,247</b>	<b>\$39,774</b>	<b>4</b>	<b>0</b>	<b>4</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	1,080	0.3%	\$32,832	\$30,400	2	0	2
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	1,081	0.3%	\$32,862	\$30,400	2	0	2
<b>Sector Total</b>			<b>2,161</b>	<b>0.7%</b>	<b>\$65,694</b>	<b>\$30,400</b>	<b>4</b>	<b>0</b>	<b>4</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	2,549	0.8%	\$57,419	\$22,526	17	7	10
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	1,454	0.4%	\$31,125	\$21,406	105	105	0
	6233	Community Care Facilities for the Elderly	2,757	0.8%	\$53,361	\$19,355	38	31	7
<b>Sector Total</b>			<b>6,760</b>	<b>2.1%</b>	<b>\$141,905</b>	<b>\$20,992</b>	<b>160</b>	<b>143</b>	<b>17</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>37,621</b>	<b>11.5%</b>	<b>\$1,497,237</b>	<b>\$39,798</b>	<b>1,232</b>	<b>1,191</b>	<b>41</b>
2006 All Industries Total			326,148		\$12,072,819	\$37,016	16,264	-	-
2006 Healthcare and Life Science Industry Share of Total			11.5%		12.4%		7.6%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 5. Macomb County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	4	0.0%	\$209	\$52,250	1	1	0
<b>Sector Total</b>			<b>4</b>	<b>0.0%</b>	<b>\$209</b>	<b>\$52,250</b>	<b>1</b>	<b>1</b>	<b>0</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	399	0.1%	\$16,080	\$40,301	34	34	0
<b>Sector Total</b>			<b>399</b>	<b>0.1%</b>	<b>\$16,080</b>	<b>\$40,301</b>	<b>34</b>	<b>34</b>	<b>0</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	859	0.3%	\$58,553	\$68,164	24	22	2
<b>Sector Total</b>			<b>859</b>	<b>0.3%</b>	<b>\$58,553</b>	<b>\$68,164</b>	<b>24</b>	<b>22</b>	<b>2</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	6,327	2.1%	\$405,863	\$64,148	566	561	5
	6212	Offices of Dentists	3,425	1.1%	\$142,150	\$41,504	450	450	0
	6213	Offices of Other Health Practitioners	2,265	0.7%	\$75,582	\$33,370	349	346	3
<b>Sector Total</b>			<b>12,017</b>	<b>4.0%</b>	<b>\$623,595</b>	<b>\$51,893</b>	<b>1,365</b>	<b>1,357</b>	<b>8</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	1,350	0.4%	\$58,341	\$43,216	58	54	4
	6215	Medical and Diagnostic Laboratories	332	0.1%	\$15,126	\$45,560	17	16	1
	6216	Home Health Care Services	2,508	0.8%	\$72,385	\$28,862	88	82	6
	6219	Other Ambulatory Health Care Services	350	0.1%	\$13,764	\$39,326	9	7	2
<b>Sector Total</b>			<b>4,540</b>	<b>1.5%</b>	<b>\$159,616</b>	<b>\$35,158</b>	<b>172</b>	<b>159</b>	<b>13</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	6,036	2.0%	\$243,817	\$40,394	6	2	4
<b>Sector Total</b>			<b>6,036</b>	<b>2.0%</b>	<b>\$243,817</b>	<b>\$40,394</b>	<b>6</b>	<b>2</b>	<b>4</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	175	0.1%	\$6,738	\$38,503	1	0	1
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	75	0.0%	\$2,888	\$38,507	1	1	0
<b>Sector Total</b>			<b>250</b>	<b>0.1%</b>	<b>\$9,626</b>	<b>\$38,504</b>	<b>2</b>	<b>1</b>	<b>1</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	4,178	1.4%	\$111,238	\$26,625	26	8	18
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	1,218	0.4%	\$24,451	\$20,075	97	95	2
	6233	Community Care Facilities for the Elderly	1,143	0.4%	\$21,072	\$18,436	38	37	1
<b>Sector Total</b>			<b>6,539</b>	<b>2.2%</b>	<b>\$156,761</b>	<b>\$23,973</b>	<b>161</b>	<b>140</b>	<b>21</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>30,644</b>	<b>10.1%</b>	<b>\$1,268,257</b>	<b>\$41,387</b>	<b>1,765</b>	<b>1,716</b>	<b>49</b>
2006 All Industries Total			303,912		\$12,006,792	\$39,507	19,074	-	-
2006 Healthcare and Life Science Industry Share of Total			10.1%		10.6%		9.3%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 6. Washtenaw County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	75	0.1%	\$5,835	\$77,800	2	2	0
<b>Sector Total</b>			<b>75</b>	<b>0.1%</b>	<b>\$5,835</b>	<b>\$77,800</b>	<b>2</b>	<b>2</b>	<b>0</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	174	0.1%	\$7,385	\$42,443	12	12	0
<b>Sector Total</b>			<b>174</b>	<b>0.1%</b>	<b>\$7,385</b>	<b>\$42,443</b>	<b>12</b>	<b>12</b>	<b>0</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	4,832	3.2%	\$408,870	\$84,617	85	79	6
<b>Sector Total</b>			<b>4,832</b>	<b>3.2%</b>	<b>\$408,870</b>	<b>\$84,617</b>	<b>85</b>	<b>79</b>	<b>6</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	3,121	2.1%	\$235,490	\$75,453	237	234	3
	6212	Offices of Dentists	1,240	0.8%	\$51,563	\$41,583	189	189	0
	6213	Offices of Other Health Practitioners	736	0.5%	\$31,334	\$42,573	140	140	0
<b>Sector Total</b>			<b>5,097</b>	<b>3.4%</b>	<b>\$318,387</b>	<b>\$62,466</b>	<b>566</b>	<b>563</b>	<b>3</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	238	0.2%	\$7,712	\$32,403	29	29	0
	6215	Medical and Diagnostic Laboratories	161	0.1%	\$7,867	\$48,863	9	9	0
	6216	Home Health Care Services	828	0.6%	\$18,831	\$22,743	33	32	1
	6219	Other Ambulatory Health Care Services	590	0.4%	\$29,764	\$50,447	13	11	2
<b>Sector Total</b>			<b>1,817</b>	<b>1.2%</b>	<b>\$64,174</b>	<b>\$35,319</b>	<b>84</b>	<b>81</b>	<b>3</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	17,041	11.4%	\$769,109	\$45,133	6	1	5
<b>Sector Total</b>			<b>17,041</b>	<b>11.4%</b>	<b>\$769,109</b>	<b>\$45,133</b>	<b>6</b>	<b>1</b>	<b>5</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	0	0.0%	\$0	#DIV/0!	0	0	0
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	199	0.1%	\$8,398	\$42,201	2	1	1
<b>Sector Total</b>			<b>199</b>	<b>0.1%</b>	<b>\$8,398</b>	<b>\$42,201</b>	<b>2</b>	<b>1</b>	<b>1</b>
<b>Nursing and Residential Care Facilities</b>									
	6231	Nursing Care Facilities	1,374	0.9%	\$37,552	\$27,330	22	16	6
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	459	0.3%	\$8,414	\$18,331	23	22	1
	6233	Community Care Facilities for the Elderly	1,553	1.0%	\$33,518	\$21,583	21	18	3
<b>Sector Total</b>			<b>3,386</b>	<b>2.3%</b>	<b>\$79,484</b>	<b>\$23,474</b>	<b>66</b>	<b>56</b>	<b>10</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>32,621</b>	<b>21.8%</b>	<b>\$1,661,642</b>	<b>\$50,938</b>	<b>823</b>	<b>795</b>	<b>28</b>
2006 All Industries Total			149,581		\$6,361,005	\$42,525	8,286	-	-
2006 Healthcare and Life Science Industry Share of Total			21.8%		26.1%		9.9%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns



**TABLE 7. Wayne County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	448	0.1%	\$23,920	\$53,393	9	8	1
<b>Sector Total</b>			<b>448</b>	<b>0.1%</b>	<b>\$23,920</b>	<b>\$53,393</b>	<b>9</b>	<b>8</b>	<b>1</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	645	0.1%	\$29,574	\$45,851	43	42	1
<b>Sector Total</b>			<b>645</b>	<b>0.1%</b>	<b>\$29,574</b>	<b>\$45,851</b>	<b>43</b>	<b>42</b>	<b>1</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	16,543	2.5%	\$1,952,074	\$118,000	40	33	7
<b>Sector Total</b>			<b>16,543</b>	<b>2.5%</b>	<b>\$1,952,074</b>	<b>\$118,000</b>	<b>40</b>	<b>33</b>	<b>7</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	10,363	1.6%	\$658,601	\$63,553	1,050	1,038	12
	6212	Offices of Dentists	4,921	0.7%	\$194,970	\$39,620	673	673	0
	6213	Offices of Other Health Practitioners	2,821	0.4%	\$90,119	\$31,946	548	547	1
<b>Sector Total</b>			<b>18,105</b>	<b>2.7%</b>	<b>\$943,690</b>	<b>\$52,123</b>	<b>2,271</b>	<b>2,258</b>	<b>13</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	4,506	0.7%	\$205,273	\$45,555	186	179	7
	6215	Medical and Diagnostic Laboratories	469	0.1%	\$33,499	\$71,426	41	41	0
	6216	Home Health Care Services	3,010	0.5%	\$86,977	\$28,896	125	117	8
	6219	Other Ambulatory Health Care Services	1,317	0.2%	\$45,355	\$34,438	26	22	4
<b>Sector Total</b>			<b>9,302</b>	<b>1.4%</b>	<b>\$371,104</b>	<b>\$39,895</b>	<b>378</b>	<b>359</b>	<b>19</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	34,875	5.3%	\$1,756,832	\$50,375	22	3	19
<b>Sector Total</b>			<b>34,875</b>	<b>5.3%</b>	<b>\$1,756,832</b>	<b>\$50,375</b>	<b>22</b>	<b>3</b>	<b>19</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	1,642	0.2%	\$99,773	\$60,763	5	1	4
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	1,275	0.2%	\$65,141	\$51,091	5	2	3
<b>Sector Total</b>			<b>2,917</b>	<b>0.4%</b>	<b>\$164,914</b>	<b>\$56,535</b>	<b>10</b>	<b>3</b>	<b>7</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	9,374	1.4%	\$255,334	\$27,239	97	51	46
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	5,516	0.8%	\$92,122	\$16,701	436	432	4
	6233	Community Care Facilities for the Elderly	2,287	0.3%	\$45,548	\$19,916	78	74	4
<b>Sector Total</b>			<b>17,177</b>	<b>2.6%</b>	<b>\$393,004</b>	<b>\$22,880</b>	<b>611</b>	<b>557</b>	<b>54</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>100,012</b>	<b>15.1%</b>	<b>\$5,635,112</b>	<b>\$56,344</b>	<b>3,384</b>	<b>3,263</b>	<b>121</b>
2006 All Industries Total			663,804		\$30,104,318	\$45,351	34,718	-	-
2006 Healthcare and Life Science Industry Share of Total			15.1%		18.7%		9.7%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 8. Oakland County Healthcare and Life Science Industry Detailed Data, 2006**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<u>Pharmaceutical and Medicine Manufacturing</u>									
	3254	Pharmaceutical and Medicine Manufacturing	1,073	0.1%	\$77,689	\$72,404	10	7	3
<b>Sector Total</b>			<b>1,073</b>	<b>0.1%</b>	<b>\$77,689</b>	<b>\$72,404</b>	<b>10</b>	<b>7</b>	<b>3</b>
<u>Medical Equipment and Supplies Manufacturing</u>									
	3391	Medical Equipment and Supplies Manufacturing	610	0.1%	\$23,288	\$38,177	62	61	1
<b>Sector Total</b>			<b>610</b>	<b>0.1%</b>	<b>\$23,288</b>	<b>\$38,177</b>	<b>62</b>	<b>61</b>	<b>1</b>
<u>Scientific Research and Development</u>									
	5417	Scientific Research and Development Services	9,887	1.4%	\$877,652	\$88,768	72	60	12
<b>Sector Total</b>			<b>9,887</b>	<b>1.4%</b>	<b>\$877,652</b>	<b>\$88,768</b>	<b>72</b>	<b>60</b>	<b>12</b>
<u>Offices of Health Practitioners</u>									
	6211	Offices of Physicians	12,896	1.8%	\$973,771	\$75,510	1,604	1,599	5
	6212	Offices of Dentists	6,917	0.9%	\$277,746	\$40,154	846	845	1
	6213	Offices of Other Health Practitioners	4,249	0.6%	\$251,140	\$59,106	824	822	2
<b>Sector Total</b>			<b>24,062</b>	<b>3.3%</b>	<b>\$1,502,657</b>	<b>\$62,449</b>	<b>3,274</b>	<b>3,266</b>	<b>8</b>
<u>Outpatient Care and Medical Laboratories</u>									
	6214	Outpatient Care Centers	5,030	0.7%	\$237,371	\$47,191	132	126	6
	6215	Medical and Diagnostic Laboratories	4,153	0.6%	\$186,819	\$44,984	80	76	4
	6216	Home Health Care Services	6,824	0.9%	\$197,723	\$28,975	227	214	13
	6219	Other Ambulatory Health Care Services	1,051	0.1%	\$43,985	\$41,851	45	42	3
<b>Sector Total</b>			<b>17,058</b>	<b>2.3%</b>	<b>\$665,898</b>	<b>\$39,037</b>	<b>484</b>	<b>458</b>	<b>26</b>
<u>Medical and Surgical Hospitals</u>									
	6221	General Medical and Surgical Hospitals	28,281	3.9%	\$1,259,208	\$44,525	12	1	11
<b>Sector Total</b>			<b>28,281</b>	<b>3.9%</b>	<b>\$1,259,208</b>	<b>\$44,525</b>	<b>12</b>	<b>1</b>	<b>11</b>
<u>Specialty Hospitals</u>									
	6222	Psychiatric and Substance Abuse Hospitals	562	0.1%	\$24,503	\$43,600	2	0	2
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	191	0.0%	\$8,328	\$43,602	3	2	1
<b>Sector Total</b>			<b>753</b>	<b>0.1%</b>	<b>\$32,831</b>	<b>\$43,600</b>	<b>5</b>	<b>2</b>	<b>3</b>
<u>Nursing and Residential Care Facilities</u>									
	6231	Nursing Care Facilities	5,760	0.8%	\$149,603	\$25,973	68	42	26
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	3,659	0.5%	\$82,277	\$22,486	262	258	4
	6233	Community Care Facilities for the Elderly	2,441	0.3%	\$51,268	\$21,003	75	71	4
<b>Sector Total</b>			<b>11,860</b>	<b>1.6%</b>	<b>\$283,148</b>	<b>\$23,874</b>	<b>405</b>	<b>371</b>	<b>34</b>
<b>2006 Healthcare and Life Science Industry Total</b>			<b>93,584</b>	<b>12.8%</b>	<b>\$4,722,371</b>	<b>\$50,461</b>	<b>4,324</b>	<b>4,226</b>	<b>98</b>
2006 All Industries Total			731,690		\$35,711,847	\$48,807	41,731	-	-
2006 Healthcare and Life Science Industry Share of Total			12.8%		13.2%		10.4%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 9. Oakland County Healthcare and Life Science Industry Detailed Data, 2005**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<i>Pharmaceutical and Medicine Manufacturing</i>									
	3254	Pharmaceutical and Medicine Manufacturing	981	0.1%	\$58,972	\$60,114	9	6	3
<b>Sector Total</b>			<b>981</b>	<b>0.1%</b>	<b>\$58,972</b>	<b>\$60,114</b>	<b>9</b>	<b>6</b>	<b>3</b>
<i>Medical Equipment and Supplies Manufacturing</i>									
	3391	Medical Equipment and Supplies Manufacturing	629	0.1%	\$22,337	\$35,512	69	68	1
<b>Sector Total</b>			<b>629</b>	<b>0.1%</b>	<b>\$22,337</b>	<b>\$35,512</b>	<b>69</b>	<b>68</b>	<b>1</b>
<i>Scientific Research and Development</i>									
	5417	Scientific Research and Development Services	4,563	0.6%	\$368,785	\$80,821	70	60	10
<b>Sector Total</b>			<b>4,563</b>	<b>0.6%</b>	<b>\$368,785</b>	<b>\$80,821</b>	<b>70</b>	<b>60</b>	<b>10</b>
<i>Offices of Health Practitioners</i>									
	6211	Offices of Physicians	12,352	1.7%	\$942,405	\$76,296	1,581	1,574	7
	6212	Offices of Dentists	6,164	0.9%	\$263,075	\$42,679	836	835	1
	6213	Offices of Other Health Practitioners	3,769	0.5%	\$129,467	\$34,350	777	776	1
<b>Sector Total</b>			<b>22,285</b>	<b>3.1%</b>	<b>\$1,334,947</b>	<b>\$59,903</b>	<b>3,194</b>	<b>3,185</b>	<b>9</b>
<i>Outpatient Care and Medical Laboratories</i>									
	6214	Outpatient Care Centers	4,386	0.6%	\$226,127	\$51,557	137	131	6
	6215	Medical and Diagnostic Laboratories	2,489	0.3%	\$103,235	\$41,476	82	80	2
	6216	Home Health Care Services	6,258	0.9%	\$172,993	\$27,643	208	196	12
	6219	Other Ambulatory Health Care Services	2,016	0.3%	\$65,870	\$32,674	50	46	4
<b>Sector Total</b>			<b>15,149</b>	<b>2.1%</b>	<b>\$568,225</b>	<b>\$37,509</b>	<b>477</b>	<b>453</b>	<b>24</b>
<i>Medical and Surgical Hospitals</i>									
	6221	General Medical and Surgical Hospitals	27,787	3.9%	\$1,269,628	\$45,691	13	2	11
<b>Sector Total</b>			<b>27,787</b>	<b>3.9%</b>	<b>\$1,269,628</b>	<b>\$45,691</b>	<b>13</b>	<b>2</b>	<b>11</b>
<i>Specialty Hospitals</i>									
	6222	Psychiatric and Substance Abuse Hospitals	572	0.1%	\$20,420	\$35,699	2	0	2
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	185	0.0%	\$6,633	\$35,854	2	1	1
<b>Sector Total</b>			<b>757</b>	<b>0.1%</b>	<b>\$27,053</b>	<b>\$35,737</b>	<b>4</b>	<b>1</b>	<b>3</b>
<i>Nursing and Residential Care Facilities</i>									
	6231	Nursing Care Facilities	5,989	0.8%	\$156,419	\$26,118	69	43	26
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	3,805	0.5%	\$83,863	\$22,040	261	257	4
	6233	Community Care Facilities for the Elderly	2,514	0.3%	\$50,506	\$20,090	73	69	4
<b>Sector Total</b>			<b>12,308</b>	<b>1.7%</b>	<b>\$290,788</b>	<b>\$23,626</b>	<b>403</b>	<b>369</b>	<b>34</b>
<b>2005 Healthcare and Life Science Industry Total</b>			<b>84,459</b>	<b>11.7%</b>	<b>\$3,940,735</b>	<b>\$46,659</b>	<b>4,239</b>	<b>4,144</b>	<b>95</b>
2005 All Industries Total			720,201		\$35,296,395	\$49,009	41,812	-	-
2005 Healthcare and Life Science Industry Share of Total			11.7%		11.2%		10.1%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

**TABLE 10. Oakland County Healthcare and Life Science Industry Detailed Data, 2002**

Industry Sector	NAICS	Industry	Employment	Share of Total Employment	Total Payroll (1,000s)	Average Wage	Total Establishments	Small Est. (<=100)	Large Est. (>100)
<u>Pharmaceutical and Medicine Manufacturing</u>									
	3254	Pharmaceutical and Medicine Manufacturing	1,001	0.1%	\$50,025	\$49,975	8	5	3
<b>Sector Total</b>			<b>1,001</b>	<b>0.1%</b>	<b>\$50,025</b>	<b>\$49,975</b>	<b>8</b>	<b>5</b>	<b>3</b>
<u>Medical Equipment and Supplies Manufacturing</u>									
	3391	Medical Equipment and Supplies Manufacturing	604	0.1%	\$22,585	\$37,392	75	75	0
<b>Sector Total</b>			<b>604</b>	<b>0.1%</b>	<b>\$22,585</b>	<b>\$37,392</b>	<b>75</b>	<b>75</b>	<b>0</b>
<u>Scientific Research and Development</u>									
	5417	Scientific Research and Development Services	2,007	0.3%	\$156,011	\$77,733	58	53	5
<b>Sector Total</b>			<b>2,007</b>	<b>0.3%</b>	<b>\$156,011</b>	<b>\$77,733</b>	<b>58</b>	<b>53</b>	<b>5</b>
<u>Offices of Health Practitioners</u>									
	6211	Offices of Physicians	12,192	1.6%	\$810,155	\$66,450	1,499	1,489	10
	6212	Offices of Dentists	5,846	0.8%	\$235,683	\$40,315	779	778	1
	6213	Offices of Other Health Practitioners	3,371	0.4%	\$115,352	\$34,219	673	672	1
<b>Sector Total</b>			<b>21,409</b>	<b>2.8%</b>	<b>\$1,161,190</b>	<b>\$54,238</b>	<b>2,951</b>	<b>2,939</b>	<b>12</b>
<u>Outpatient Care and Medical Laboratories</u>									
	6214	Outpatient Care Centers	4,166	0.5%	\$167,729	\$40,261	120	110	10
	6215	Medical and Diagnostic Laboratories	2,586	0.3%	\$93,235	\$36,054	66	63	3
	6216	Home Health Care Services	5,231	0.7%	\$130,861	\$25,016	153	140	13
	6219	Other Ambulatory Health Care Services	681	0.1%	\$18,661	\$27,402	45	44	1
<b>Sector Total</b>			<b>12,664</b>	<b>1.7%</b>	<b>\$410,486</b>	<b>\$32,414</b>	<b>384</b>	<b>357</b>	<b>27</b>
<u>Medical and Surgical Hospitals</u>									
	6221	General Medical and Surgical Hospitals	29,855	3.9%	\$1,194,312	\$40,004	15	2	13
<b>Sector Total</b>			<b>29,855</b>	<b>3.9%</b>	<b>\$1,194,312</b>	<b>\$40,004</b>	<b>15</b>	<b>2</b>	<b>13</b>
<u>Specialty Hospitals</u>									
	6222	Psychiatric and Substance Abuse Hospitals	1,071	0.1%	\$40,747	\$38,046	4	1	3
	6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	180	0.0%	\$6,858	\$38,100	2	1	1
<b>Sector Total</b>			<b>1,251</b>	<b>0.2%</b>	<b>\$47,605</b>	<b>\$38,054</b>	<b>6</b>	<b>2</b>	<b>4</b>
<u>Nursing and Residential Care Facilities</u>									
	6231	Nursing Care Facilities	5,568	0.7%	\$138,909	\$24,948	66	40	26
	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	2,917	0.4%	\$59,493	\$20,395	254	252	2
	6233	Community Care Facilities for the Elderly	2,317	0.3%	\$44,674	\$19,281	92	89	3
<b>Sector Total</b>			<b>10,802</b>	<b>1.4%</b>	<b>\$243,076</b>	<b>\$22,503</b>	<b>412</b>	<b>381</b>	<b>31</b>
<b>2002 Healthcare and Life Science Industry Total</b>			<b>79,593</b>	<b>10.4%</b>	<b>\$3,285,290</b>	<b>\$41,276</b>	<b>3,909</b>	<b>3,814</b>	<b>95</b>
2002 All Industries Total			765,163		\$34,493,977	\$45,081	41,291	-	-
2002 Healthcare and Life Science Industry Share of Total			10.4%		9.5%		9.5%		

Source: Anderson Economic Group, LLC analysis of U.S. Census Bureau, County Business Patterns

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## *Appendix C: Workforce and Education Data*

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### **METROPOLITAN STATISTICAL AREA DEFINITIONS**

Below are the counties included in each Metropolitan Statistical Area (MSA) referenced in this report:

- Chicago—Cook, DeKalb, DuPage, Grundy, Kane, Kendall, McHenry, and Will
- Cleveland—Cuyahoga, Geauga, Lake, Lorain, and Medina
- Detroit—Lapeer, Livingston, Macomb, Oakland, St. Clair, and Wayne<sup>1</sup>
- Minneapolis—Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Pierce (WI), Ramsey, Scott, Sherburne, St. Croix (WI), Washington, and Wright

### **LIST OF EXHIBITS**

Exhibits in this section include:

1. Employment and Wages for Healthcare and Life Sciences Occupations - Detroit MSA 2007
2. Employment and Wages for Healthcare and Life Sciences Occupations - Minneapolis MSA 2007
3. Employment and Wages for Healthcare and Life Sciences Occupations - Cleveland MSA 2007
4. Employment and Wages for Healthcare and Life Sciences Occupations - Chicago MSA 2007
5. Employment and Wages for Healthcare and Life Sciences Occupations - Nation 2007

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1. The Detroit MSA, when referred to in “Workforce Educational and Training” on page 18 also includes all of the counties of Genesee, Monroe, and Washtenaw.

**TABLE 11. Employment and Wages for Healthcare and Life Sciences Occupations - Detroit MSA 2007**

Occupation Title	Employment	Average Wage	Occupation Title	Employment	Average Wage
<b>Life, Physical, and Social Science Occupations</b>	<b>12,220</b>	<b>\$64,290</b>	Recreational therapists	200	\$43,220
Biochemists and Biophysicists	30	-	Respiratory therapists	1,620	\$49,920
Microbiologists	50	\$58,550	Speech-language pathologists	1,530	\$70,050
Biological Scientists, All Other	180	\$59,760	Therapists, all other	420	\$50,980
Conservation Scientists	-	\$64,400	Veterinarians	680	\$88,980
Epidemiologists	-	\$63,660	Health diagnosing and treating practitioners, all other	750	\$71,600
Medical Scientists, Except Epidemiologists	440	\$67,430	Medical and clinical laboratory technologists	2,410	\$53,690
Life Scientists, All Other	-	\$59,480	Medical and clinical laboratory technicians	2,050	\$33,850
Physicists	60	\$103,820	Dental hygienists	4,060	\$61,700
Atmospheric and Space Scientists	-	\$96,560	Cardiovascular technologists and technicians	1,010	\$45,720
Chemists	810	\$57,810	Diagnostic medical sonographers	760	\$57,610
Materials Scientists	-	\$68,640	Nuclear medicine technologists	590	\$65,640
Environmental Scientists and Specialists, Including Health	360	\$57,640	Radiologic technologists and technicians	2,500	\$51,940
Geoscientists, Except Hydrologists and Geographers	-	\$60,810	Emergency medical technicians and paramedics	2,750	\$31,490
Physical Scientists, All Other	-	\$86,530	Dietetic technicians	290	\$28,640
Economists	80	\$76,870	Pharmacy technicians	4,760	\$28,350
Market Research Analysts	3,990	\$75,540	Psychiatric technicians	300	\$30,950
Survey Researchers	380	\$75,060	Respiratory therapy technicians	160	\$42,970
Clinical, Counseling, and School Psychologists	1,610	\$70,200	Surgical technologists	1,120	\$41,140
Urban and Regional Planners	370	\$60,200	Veterinary technologists and technicians	480	\$32,070
Social Scientists and Related Workers, All Other	170	\$73,220	Licensed practical and licensed vocational nurses	6,310	\$45,140
Biological Technicians	350	\$36,470	Medical records and health information technicians	1,750	\$34,260
Chemical Technicians	800	\$40,630	Opticians, dispensing	970	\$34,670
Environmental Science and Protection Technicians, Including Health	600	\$42,510	Orthotists and Prosthetists	-	\$69,640
Forensic Science Technicians	-	\$47,780	Health technologists and technicians, all other	1,960	\$39,830
Life, Physical, and Social Science Technicians, All Other	620	\$41,980	Occupational health and safety specialists	510	\$64,250
<b>Healthcare practitioners and technical occupations</b>	<b>103,300</b>	<b>\$69,680</b>	Occupational health and safety technicians	150	\$41,310
Chiropractors	440	\$79,560	Athletic trainers	200	\$40,150
Dentists, general	2,490	\$150,570	Healthcare practitioners and technical workers, all other	690	\$49,700
Orthodontists	70	-	<b>Healthcare support occupations</b>	<b>57,880</b>	<b>\$26,720</b>
Dietitians and nutritionists	880	\$46,350	Home Health Aides	15,080	\$20,550
Optometrists	590	\$105,800	Nursing Aides, Orderlies, and Attendants	19,260	\$26,330
Pharmacists	3,810	\$98,060	Psychiatric Aides	260	\$32,290
Anesthesiologists	460	\$206,270	Occupational Therapist Assistants	360	\$43,110
Family and general practitioners	2,370	\$157,410	Occupational Therapist Aides	-	\$25,790
Internists, general	990	\$171,340	Physical Therapist Assistants	1,130	\$37,410
Obstetricians and gynecologists	390	\$151,960	Physical Therapist Aides	680	\$23,640
Pediatricians, general	490	\$140,620	Massage Therapists	610	-
Psychiatrists	160	\$163,130	Dental Assistants	4,610	\$33,890
Surgeons	430	\$193,040	Medical Assistants	9,290	\$28,060
Physicians and surgeons, all other	5,910	\$118,340	Medical Equipment Preparers	400	\$30,060
Physician assistants	760	\$76,990	Medical Transcriptionists	880	\$34,240
Podiatrists	270	\$186,310	Pharmacy Aides	1,030	\$20,320
Registered nurses	36,730	\$64,670	Veterinary Assistants and Laboratory Animal Caretakers	1,040	\$22,570
Audiologists	180	\$72,010	Healthcare Support Workers, All Other	-	\$30,370
Occupational therapists	1,820	\$63,730			
Physical therapists	2,750	\$71,970			
Radiation therapists	230	\$65,860			
			<b>Total healthcare and life sciences occupations</b>	<b>173,400</b>	<b>\$54,960</b>
			<i>Total, all occupations</i>	<i>1,953,120</i>	<i>\$46,410</i>

Source: Anderson Economic Group, LLC analysis of Bureau of Labor Statistic's Occupational Employment Statistics, May 2007.

Note: A dash indicates suppressed information and not a null value.

**TABLE 12. Employment and Wages for Healthcare and Life Sciences Occupations - Minneapolis MSA 2007**

Occupation Title	Employment	Average Wage	Occupation Title	Employment	Average Wage
<b>Life, physical, and social science occupations</b>	<b>21,560</b>	<b>\$65,780</b>	Podiatrists	50	\$179,270
Animal scientists	90	\$62,930	Registered nurses	31,990	\$70,070
Food scientists and technologists	470	\$82,420	Audiologists	110	\$58,280
Soil and plant scientists	250	\$46,810	Occupational therapists	1,530	\$58,590
Biochemists and biophysicists	120	\$70,770	Physical therapists	1,840	\$65,090
Microbiologists	240	\$54,740	Radiation therapists	40	\$69,720
Zoologists and wildlife biologists	280	\$49,270	Recreational therapists	370	\$39,850
Biological scientists, all other	520	\$71,740	Respiratory therapists	620	\$57,000
Conservation scientists	250	\$58,070	Speech-language pathologists	1,660	\$56,420
Foresters	110	\$54,440	Therapists, all other	150	\$56,210
Epidemiologists	80	\$66,540	Veterinarians	660	\$81,380
Medical scientists, except epidemiologists	1,440	\$65,750	Health diagnosing and treating practitioners, all other	160	\$74,720
Life scientists, all other	570	\$74,380	Medical and clinical laboratory technologists	1,520	\$53,890
Physicists	-	\$93,790	Medical and clinical laboratory technicians	1,890	\$39,810
Atmospheric and space scientists	150	\$57,760	Dental hygienists	2,550	\$69,260
Chemists	1,490	\$66,950	Cardiovascular technologists and technicians	420	\$54,740
Materials scientists	-	\$88,360	Diagnostic medical sonographers	660	\$65,490
Environmental scientists and specialists, including health	1,010	\$59,920	Nuclear medicine technologists	190	\$68,230
Geoscientists, except hydrologists and geographers	190	\$59,560	Radiologic technologists and technicians	2,680	\$54,140
Hydrologists	240	\$70,080	Emergency medical technicians and paramedics	1,590	\$35,210
Economists	280	\$56,450	Dietetic technicians	120	\$36,540
Market research analysts	6,750	\$71,370	Pharmacy technicians	3,610	\$30,420
Survey researchers	220	\$49,640	Respiratory therapy technicians	-	\$53,200
Clinical, counseling, and school psychologists	1,840	\$60,120	Surgical technologists	930	\$45,800
Psychologists, all other	110	\$72,290	Veterinary technologists and technicians	1,140	\$31,200
Urban and regional planners	760	\$63,180	Licensed practical and licensed vocational nurses	8,810	\$41,170
Anthropologists and archeologists	-	\$62,240	Medical records and health information technicians	2,300	\$35,750
Social scientists and related workers, all other	310	\$68,310	Opticians, dispensing	1,220	\$35,360
Agricultural and food science technicians	380	\$40,030	Orthotists and prosthetists	50	\$71,910
Biological technicians	380	\$42,730	Health technologists and technicians, all other	720	\$46,890
Chemical technicians	660	\$41,810	Occupational health and safety specialists	700	\$67,420
Environmental science and protection technicians, including health	500	\$45,850	Occupational health and safety technicians	70	\$51,380
Forensic science technicians	80	\$38,040	Athletic trainers	90	\$43,630
Forest and conservation technicians	90	\$34,680	Healthcare practitioners and technical workers, all other	1,190	\$51,040
Life, physical, and social science technicians, all other	570	\$52,480	<b>Healthcare support occupations</b>	<b>44,880</b>	<b>\$29,190</b>
<b>Healthcare practitioners and technical occupations</b>	<b>87,870</b>	<b>\$74,600</b>	Home health aides	14,380	\$24,000
Chiropractors	580	\$72,170	Nursing aides, orderlies, and attendants	14,120	\$28,700
Dentists, general	1,200	\$151,200	Psychiatric aides	420	\$32,510
Oral and maxillofacial surgeons	100	\$197,680	Occupational therapist assistants	300	\$38,760
Orthodontists	-	-	Occupational therapist aides	40	\$33,200
Dietitians and nutritionists	580	\$52,980	Physical therapist assistants	640	\$39,280
Optometrists	430	\$122,070	Physical therapist aides	170	\$29,110
Pharmacists	3,110	\$105,610	Massage therapists	620	\$36,840
Anesthesiologists	810	\$192,690	Dental assistants	3510	\$39,490
Family and general practitioners	2,620	\$160,730	Medical assistants	4,080	\$32,670
Internists, general	680	\$180,870	Medical equipment preparers	850	\$33,940
Obstetricians and gynecologists	300	\$173,310	Medical transcriptionists	1,850	\$36,670
Pediatricians, general	660	\$163,050	Pharmacy aides	500	\$21,580
Psychiatrists	230	\$150,350	Veterinary assistants and laboratory animal caretakers	780	\$23,720
Surgeons	1010	-	Healthcare support workers, all other	2,620	\$31,270
Physicians and surgeons, all other	2,970	\$190,800			
Physician assistants	690	\$83,450			
			<b>Total healthcare and life sciences occupations</b>	<b>154,310</b>	<b>\$60,160</b>
			<i>Total, all occupations</i>	<i>1,776,020</i>	<i>\$46,410</i>

Source: Anderson Economic Group, LLC analysis of Bureau of Labor Statistic's Occupational Employment Statistics, May 2007.

Note: A dash indicates suppressed information and not a null value.

**TABLE 13. Employment and Wages for Healthcare and Life Sciences Occupations - Cleveland MSA 2007**

Occupation Title	Employment	Average Wage	Occupation Title	Employment	Average Wage
<b>Life, physical, and social science occupations</b>	<b>8,300</b>	<b>\$57,420</b>	Respiratory therapists	950	\$49,630
Biochemists and biophysicists	200	\$61,430	Speech-language pathologists	900	\$75,770
Microbiologists	40	\$46,380	Therapists, all other	120	\$46,480
Biological scientists, all other	-	\$45,960	Veterinarians	320	\$97,160
Conservation scientists	30	\$66,210	Health diagnosing and treating practitioners, all other	360	\$71,020
Medical scientists, except epidemiologists	-	\$68,840	Medical and clinical laboratory technologists	1,730	\$49,510
Physicists	70	\$95,800	Medical and clinical laboratory technicians	1,210	\$34,800
Chemists	1,190	\$61,040	Dental hygienists	1,360	\$62,250
Materials scientists	120	\$84,210	Cardiovascular technologists and technicians	550	\$52,910
Environmental scientists and specialists, including health	430	\$57,090	Diagnostic medical sonographers	380	\$53,990
Physical scientists, all other	-	\$95,860	Nuclear medicine technologists	140	\$65,900
Economists	50	\$84,760	Radiologic technologists and technicians	2,000	\$48,380
Market research analysts	1,820	\$65,530	Emergency medical technicians and paramedics	1,920	\$30,880
Survey researchers	340	\$26,830	Dietetic technicians	130	\$33,030
Clinical, counseling, and school psychologists	540	\$77,350	Pharmacy technicians	2,230	\$25,790
Psychologists, all other	70	\$68,800	Psychiatric technicians	160	\$35,510
Urban and regional planners	170	\$55,540	Respiratory therapy technicians	50	\$36,290
Social scientists and related workers, all other	-	\$66,000	Surgical technologists	800	\$37,590
Biological technicians	550	\$36,630	Veterinary technologists and technicians	530	\$29,500
Chemical technicians	1,000	\$44,860	Licensed practical and licensed vocational nurses	7,590	\$41,460
Social science research assistants	80	\$34,430	Medical records and health information technicians	1,260	\$35,460
Environmental science and protection technicians, including health	260	\$37,360	Opticians, dispensing	560	\$36,150
Life, physical, and social science technicians, all other	-	\$44,440	Orthotists and prosthetists	30	\$55,770
<b>Healthcare practitioners and technical occupations</b>	<b>64,000</b>	<b>\$63,710</b>	Health technologists and technicians, all other	1,080	\$38,440
Chiropractors	270	\$103,480	Occupational health and safety specialists	390	\$61,780
Dentists, general	740	\$137,720	Occupational health and safety technicians	60	\$47,630
Orthodontists	-	-	Athletic trainers	160	\$40,310
Dietitians and nutritionists	510	\$49,710	Healthcare practitioners and technical workers, all other	290	\$43,310
Optometrists	-	\$84,590	<b>Healthcare support occupations</b>	<b>34,960</b>	<b>\$24,730</b>
Pharmacists	1,880	\$104,460	Home health aides	9,740	\$20,140
Anesthesiologists	190	-	Nursing aides, orderlies, and attendants	14,590	\$24,060
Family and general practitioners	740	\$158,560	Occupational therapist assistants	390	\$50,440
Internists, general	540	\$133,820	Occupational therapist aides	40	\$24,750
Obstetricians and gynecologists	250	\$181,140	Physical therapist assistants	800	\$48,960
Pediatricians, general	680	\$147,370	Physical therapist aides	300	\$24,940
Psychiatrists	230	\$147,760	Massage therapists	410	\$31,870
Surgeons	340	\$195,730	Dental assistants	2,010	\$29,880
Physicians and surgeons, all other	1,610	\$160,010	Medical assistants	3,130	\$25,920
Physician assistants	560	\$79,410	Medical equipment preparers	510	\$28,740
Podiatrists	170	\$109,560	Medical transcriptionists	500	\$31,930
Registered nurses	25,070	\$60,670	Pharmacy aides	200	\$19,650
Audiologists	90	\$63,450	Veterinary assistants and laboratory animal caretakers	360	\$23,770
Occupational therapists	810	\$72,720	Healthcare support workers, all other	-	\$26,970
Physical therapists	1,540	\$72,500			
Radiation therapists	100	\$64,370	<b>Total healthcare and life sciences occupations</b>	<b>107,260</b>	<b>\$50,518</b>
Recreational therapists	160	\$41,630	<i>Total, all occupations</i>	<i>1,059,760</i>	<i>\$40,780</i>

Source: Anderson Economic Group, LLC analysis of Bureau of Labor Statistic's Occupational Employment Statistics, May 2007.

Note: A dash indicates suppressed information and not a null value.



**TABLE 14. Employment and Wages for Healthcare and Life Sciences Occupations - Chicago MSA 2007**

Occupation Title	Employment	Average Wage	Occupation Title	Employment	Average Wage
<b>Life, physical, and social science occupations</b>	<b>30,440</b>	<b>\$63,780</b>	<b>Registered nurses</b>	<b>66,670</b>	<b>\$65,010</b>
Food scientists and technologists	520	\$71,940	Audiologists	190	\$62,250
Soil and plant scientists	40	\$60,160	Occupational therapists	2,540	\$73,630
Microbiologists	360	\$58,680	Physical therapists	4,540	\$77,760
Biological scientists, all other	220	\$73,120	Radiation therapists	330	\$73,640
Conservation scientists	70	\$57,080	Recreational therapists	1,000	\$35,740
Foresters	70	\$58,220	Respiratory therapists	2,520	\$50,150
Epidemiologists	-	\$55,200	Speech-language pathologists	3,590	\$69,630
Medical scientists, except epidemiologists	650	\$73,500	Therapists, all other	1,250	\$43,340
Life scientists, all other	180	\$56,290	Veterinarians	1,210	\$78,450
Physicists	1,520	\$96,550	Health diagnosing and treating practitioners, all other	2,970	\$74,480
Atmospheric and space scientists	-	\$53,560	Medical and clinical laboratory technologists	4,490	\$50,250
Chemists	1,720	\$68,950	Medical and clinical laboratory technicians	4,580	\$39,080
Materials scientists	600	\$88,150	Dental hygienists	4,500	\$64,710
Environmental scientists and specialists, including health	1,810	\$71,530	Cardiovascular technologists and technicians	1,220	\$50,330
Geoscientists, except hydrologists and geographers	-	\$69,470	Diagnostic medical sonographers	860	\$62,580
Physical scientists, all other	630	\$89,170	Nuclear medicine technologists	400	\$64,460
Economists	340	\$89,810	Radiologic technologists and technicians	4,050	\$55,320
Market research analysts	9,970	\$62,170	Emergency medical technicians and paramedics	7,350	\$36,170
Survey researchers	470	\$45,370	Dietetic technicians	1,160	\$23,840
Clinical, counseling, and school psychologists	3,240	\$62,670	Pharmacy technicians	8,930	\$27,530
Psychologists, all other	110	\$92,270	Psychiatric technicians	1,770	\$34,370
Sociologists	-	\$75,370	Respiratory therapy technicians	350	\$39,250
Urban and regional planners	520	\$79,030	Surgical technologists	2,300	\$44,330
Historians	-	\$44,710	Veterinary technologists and technicians	1,890	\$34,010
Social scientists and related workers, all other	350	\$68,000	Licensed practical and licensed vocational nurses	12,910	\$43,450
Agricultural and food science technicians	350	\$33,240	Medical records and health information technicians	5,370	\$31,470
Biological technicians	1,060	\$38,320	Opticians, dispensing	2,280	\$30,330
Chemical technicians	880	\$43,760	Orthotists and prosthetists	-	\$74,650
Nuclear technicians	30	\$70,920	Health technologists and technicians, all other	3,660	\$40,120
Social science research assistants	230	\$47,780	Occupational health and safety specialists	430	\$61,780
Environmental science and protection technicians, including health	1,460	\$49,780	Occupational health and safety technicians	210	\$46,750
Forensic science technicians	420	\$58,090	Athletic trainers	650	\$48,020
Forest and conservation technicians	130	\$47,590	Healthcare practitioners and technical workers, all other	3,080	\$46,170
Life, physical, and social science technicians, all other	1,130	\$48,090	<b>Healthcare support occupations</b>	<b>85,230</b>	<b>\$26,990</b>
<b>Healthcare practitioners and technical occupations</b>	<b>188,120</b>	<b>\$64,670</b>	Home health aides	16,820	\$21,790
Chiropractors	1,120	\$99,260	Nursing aides, orderlies, and attendants	32,840	\$23,860
Dentists, general	3,290	\$139,790	Psychiatric aides	320	\$25,130
Orthodontists	-	\$210,880	Occupational therapist assistants	1,190	\$47,160
Dentists, all other specialists	-	\$174,380	Occupational therapist aides	360	\$34,470
Dietitians and nutritionists	1,190	\$48,080	Physical therapist assistants	1,400	\$46,540
Optometrists	1,250	\$101,900	Physical therapist aides	1,620	\$26,070
Pharmacists	5,470	\$94,080	Massage therapists	1,470	\$48,100
Anesthesiologists	1,090	\$157,110	Dental assistants	7,880	\$32,020
Family and general practitioners	2,100	\$131,330	Medical assistants	8,700	\$29,700
Internists, general	1,550	\$141,630	Medical equipment preparers	760	\$29,400
Obstetricians and gynecologists	420	\$153,430	Medical transcriptionists	1,420	\$35,500
Pediatricians, general	870	\$108,920	Pharmacy aides	-	\$22,330
Psychiatrists	380	\$105,430	Veterinary assistants and laboratory animal caretakers	1,520	\$23,920
Surgeons	2,390	\$157,900	Healthcare support workers, all other	8,190	\$31,610
Physicians and surgeons, all other	5,940	\$136,910			
Physician assistants	1,330	\$66,970	<b>Total healthcare and life sciences occupations</b>	<b>303,790</b>	<b>\$54,009</b>
Podiatrists	150	\$103,150	<i>Total, all occupations</i>	<i>3,809,460</i>	<i>\$45,710</i>

Source: Anderson Economic Group, LLC analysis of Bureau of Labor Statistic's Occupational Employment Statistics, May 2007.

Note: A dash indicates suppressed information and not a null value.

**TABLE 15. Employment and Wages for Healthcare and Life Sciences Occupations - Nation 2007**

Occupation Title	Employment	Average Wage	Occupation Title	Employment	Average Wage
<b>Life, physical, and social science occupations</b>	<b>1,255,670</b>	<b>\$62,020</b>	Pediatricians, general	28,890	\$145,210
Animal scientists	4,210	\$54,290	Psychiatrists	21,790	\$147,620
Food scientists and technologists	9,910	\$62,580	Surgeons	50,260	\$191,410
Soil and plant scientists	10,270	\$62,970	Physicians and surgeons, all other	237,400	\$155,150
Biochemists and biophysicists	19,490	\$85,290	Physician assistants	67,160	\$77,800
Microbiologists	14,610	\$66,430	Podiatrists	9,320	\$119,790
Zoologists and wildlife biologists	17,830	\$58,480	Registered nurses	2,468,340	\$62,480
Biological scientists, all other	27,070	\$66,240	Audiologists	11,360	\$63,660
Conservation scientists	16,570	\$57,220	Occupational therapists	91,920	\$65,540
Foresters	10,510	\$54,030	Physical therapists	161,850	\$71,520
Epidemiologists	3,960	\$63,600	Radiation therapists	14,620	\$71,990
Medical scientists, except epidemiologists	87,440	\$74,160	Recreational therapists	23,240	\$38,330
Life scientists, all other	12,470	\$66,930	Respiratory therapists	101,180	\$50,930
Astronomers	1,520	\$98,200	Speech-language pathologists	103,810	\$63,740
Physicists	13,980	\$99,900	Therapists, all other	11,580	\$52,930
Atmospheric and space scientists	8,750	\$78,960	Veterinarians	50,790	\$84,090
Chemists	79,860	\$68,520	Health diagnosing and treating practitioners, all other	44,350	\$80,980
Materials scientists	9,740	\$77,930	Medical and clinical laboratory technologists	163,270	\$52,410
Environmental scientists and specialists, including health	80,070	\$63,870	Medical and clinical laboratory technicians	145,890	\$36,110
Geoscientists, except hydrologists and geographers	31,390	\$84,100	Dental hygienists	168,600	\$64,910
Hydrologists	7,670	\$70,250	Cardiovascular technologists and technicians	46,980	\$46,530
Physical scientists, all other	23,300	\$88,210	Diagnostic medical sonographers	46,770	\$60,590
Economists	12,740	\$86,700	Nuclear medicine technologists	20,410	\$65,380
Market research analysts	220,740	\$66,980	Radiologic technologists and technicians	200,370	\$51,150
Survey researchers	22,140	\$42,880	Emergency medical technicians and paramedics	201,200	\$30,870
Clinical, counseling, and school psychologists	95,120	\$68,150	Dietetic technicians	24,540	\$26,680
Industrial-organizational psychologists	1,240	\$86,610	Pharmacy technicians	301,950	\$27,560
Psychologists, all other	9,470	\$83,610	Psychiatric technicians	60,690	\$31,640
Sociologists	3,680	\$67,330	Respiratory therapy technicians	17,610	\$41,590
Urban and regional planners	35,040	\$60,480	Surgical technologists	86,000	\$38,800
Anthropologists and archeologists	5,250	\$55,490	Veterinary technologists and technicians	73,240	\$28,920
Geographers	1,010	\$66,440	Licensed practical and licensed vocational nurses	719,240	\$38,940
Historians	3,600	\$54,630	Medical records and health information technicians	165,590	\$31,450
Political scientists	3,940	\$90,050	Opticians, dispensing	62,420	\$33,480
Social scientists and related workers, all other	30,410	\$69,720	Orthotists and prosthetists	5,600	\$64,280
Agricultural and food science technicians	19,280	\$35,520	Health technologists and technicians, all other	73,730	\$39,870
Biological technicians	69,110	\$40,240	Occupational health and safety specialists	46,460	\$61,310
Chemical technicians	64,450	\$42,420	Occupational health and safety technicians	10,260	\$46,200
Geological and petroleum technicians	13,060	\$55,330	Athletic trainers	14,970	\$40,720
Nuclear technicians	5,920	\$65,850	Healthcare practitioners and technical workers, all other	53,640	\$47,710
Social science research assistants	16,070	\$38,120	<b>Healthcare support occupations</b>	<b>3,625,240</b>	<b>\$25,600</b>
Environmental science and protection technicians, including health	33,950	\$42,190	Home health aides	834,580	\$20,850
Forensic science technicians	12,030	\$50,310	Nursing aides, orderlies, and attendants	1,390,260	\$23,920
Forest and conservation technicians	26,900	\$35,770	Psychiatric aides	58,310	\$26,080
Life, physical, and social science technicians, all other	59,910	\$41,230	Occupational therapist assistants	25,130	\$45,180
<b>Healthcare practitioners and technical occupations</b>	<b>6,877,680</b>	<b>\$65,020</b>	Occupational therapist aides	7,640	\$28,930
Chiropractors	27,190	\$81,390	Physical therapist assistants	59,120	\$44,340
Dentists, general	85,260	\$147,010	Physical therapist aides	43,350	\$24,080
Oral and maxillofacial surgeons	5,040	\$178,440	Massage therapists	45,920	\$40,330
Orthodontists	5,350	\$185,340	Dental assistants	283,680	\$32,280
Prosthodontists	380	\$169,360	Medical assistants	434,540	\$28,270
Dentists, all other specialists	4,490	\$120,360	Medical equipment preparers	43,790	\$27,940
Dietitians and nutritionists	52,800	\$50,030	Medical transcriptionists	86,990	\$32,120
Optometrists	24,900	\$101,840	Pharmacy aides	49,630	\$21,120
Pharmacists	253,110	\$98,960	Veterinary assistants and laboratory animal caretakers	71,190	\$22,180
Anesthesiologists	31,030	\$192,780	Healthcare support workers, all other	191,110	\$29,620
Family and general practitioners	113,250	\$153,640			
Internists, general	46,260	\$167,270			
Obstetricians and gynecologists	21,340	\$183,600			
			<b>Total healthcare and life sciences occupations</b>	<b>11,758,590</b>	<b>\$52,546</b>
			<i>Total, all occupations</i>	<i>134,354,250</i>	<i>\$40,690</i>

Source: Anderson Economic Group, LLC analysis of Bureau of Labor Statistic's Occupational Employment Statistics, May 2007.

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## *Appendix D: Economic Impact Methodology*

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Please see the following pages for the below listed appendix tables.

- Employment Impact of Facility Construction, Oakland-Macomb-Wayne Counties Region
- Employment Impact During Facility Operation, Oakland-Macomb-Wayne Counties Region
- Spending in Oakland-Macomb-Wayne Counties Region by Visitors due to Facility
- Increase in Annual Economic Demand in Region due to Facility Operation
- Economic Impact of Oakland University Medical School Student Spending
- Economic Impact of GME Payments Due to Oakland University Medical School

**Appendix Table D-1: Employment Impact of Facility Construction, Oakland-Macomb-Wayne Counties Region**

		2009	2010	Total
<b>Employment in Facility Construction</b>	Direct employment construction (FTE) (a)	200	200	400
	Direct-effect employment multiplier (b)	* 1.1072	* 1.1072	* 1.1072
	Indirect employment in Michigan due to construction	221	221	443
	<b>Total Employment Impact of Construction Labor</b>	<u>421</u>	<u>421</u>	<u>843</u>
<b>Employment Due to Non-Payroll Construction Expenditures</b>	<i>Construction Spending in Region (millions)</i> (c)	Total Spending		
	Proton Beam	\$ -	\$ 2.00	\$ 2.00
	Material	\$ 2.35	\$ 2.35	\$ 4.69
	Major Equipment	\$ 3.73	\$ 3.73	\$ 7.47
	Subcontracts	\$ 11.58	\$ 11.58	\$ 23.16
	Other Non-wage	\$ 0.69	\$ 0.69	\$ 1.39
	Total non-payroll expenditures in region	<u>\$ 18.35</u>	<u>\$ 18.35</u>	<u>\$ 36.71</u>
<i>Employment Impact of Purchases</i>				
Expenditure-employment multiplier (d)	* 15.787	* 15.787	* 15.787	
<b>Total Employment Impact of Construction Purchases</b>	<u>290</u>	<u>290</u>	<u>579</u>	
<b>SUMMARY</b>	<i>Employment</i>			
	Employment Impact of Construction	421	421	843
	Employment Impact of Materials Purchases	290	290	579
	<b>TOTAL AREA EMPLOYMENT IMPACT</b>	<u>711</u>	<u>711</u>	<u>1,422</u>

Source for base spending and employment data: Beaumont Hospital.  
 Analysis of spending categories and regional spending: Anderson Economic Group LLC

Notes:

- (a) Estimated by AEG using employment data provided by Beaumont Hospital citing 400 total construction jobs.
- (b) The indirect employment effect is calculated using a multiplier from the federal Bureau of Economic Analysis' RIMS II data series, which shows 2.1072 total jobs created in the Oakland-Macomb-Wayne Counties region for each job created in the construction industry; the multiplier to calculate the indirect employment effect separately is one minus that number or 1.1072.
- (c) AEG estimated the portion of construction spending on each category from previous experience analyzing construction projects, and proportion of spending on each task they expect to be sourced locally based on professional judgment. See table below notes section.
- (d) The indirect employment effect of expenditures is calculated using a multiplier provided by the federal Bureau of Economic Analysis' RIMS II data series, which shows that for every \$1 million of expenditures by final purchasers in the Oakland-Macomb-Wayne Counties region construction industry, 15.7870 jobs are created in the area's economy.

<u>Task</u>	<u>Spending In Region</u>
Proton Beam	2%
Material	80%
Major Equipment	80%
Subcontracts	90%
Other Non-wage	80%

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**Appendix Table D-2: Employment Impact During Facility Operation, Oakland-Macomb-Wayne Counties Region**

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## Directly-Created Jobs

Total Directly-Created FTE Jobs	100.0	
Substitution from existing treatment staff	5%	
Jobs moved or eliminated by substitution	<u>(5.0)</u>	
<i>Net new direct FTE jobs</i>		<u>95.0</u>

## Indirectly-Created Jobs due to Plant Employment

Additional Jobs Indirectly Created	Direct-Effect Employment Multiplier:	x 0.5631	<u>53.49</u>
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**TOTAL JOB CREATION** **148.5**

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Source: Direct employment estimated by Beaumont Hospital.  
Analysis by Anderson Economic Group LLC.

*Note on Multipliers: we use the Direct Effect Employment and Earnings multipliers for the Ambulatory Health Care Services industry in a region including Oakland, Macomb, and Wayne Counties to characterize the impact of continuing operations, 2005 RIMS II Series from the U.S. Bureau of Economic Analysis.*

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**Appendix Table D-3: Spending in Oakland-Macomb-Wayne Counties Region by Visitors due to Facility**


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**Patients**
*Geographic Origin of Patients*

Annual Number of Visitors	(a)	1,500
% of total from region (tri-county area)	(b)	75%
Number From Region		1,125
Number From Outside Region (of original 1500)		375

*Local Patient Counterfactuals (patient's actions if there were no proton beam facility)*

Number From Region (see above)		1,125
% who would still come to the area for some other treatment	(c)	25%
Number of locally-based patients who are not net-new		281
Number of locally-based patients who are net new (of 1125 from region)		844

*Non-Local Patient Counterfactuals (patient's actions if there were no proton beam facility)*

Number Not From Region (see above)		375
% of non-locals who would not get treatment in region without proton beam	(d)	100%
Number of non-local patients who are net-new to the region		375
Number of non-local patients who are not net-new (of 375 from region)		0

*Lodging Requirements of Net-New, Non-Local Patients*

**Appendix Table D-4: Increase in Annual Economic Demand in Region due to Facility Operation**

<b>Impact of Facility Employment</b>	Net new employment at facility	(a)	95	
	Average wage of new jobs	(b)	\$85,000 x	
	Aggregate Earnings of net new facility employees		\$8,075,000	
	Direct-Effect Earnings Multiplier	(c)	1.5631	
	Net new earnings in region due to employment at facility		\$12,622,033	
	Proportion of income spent	(d)	92% x	
	Proportion of spending in area	(e)	75% x	
	Total Increase in Economic Demand in Area from Facility Employment			\$8,709,202
<b>Impact of Operational Spending</b>	Estimated operational spending	(f)	\$15,000,000	
	Less aggregate wages (see above)		<u>(\$8,075,000)</u>	
	Non-wage operational spending		\$6,925,000	
	% of operational spending in tri-county area	(g)	75%	
	Direct spending in region by facility		\$5,193,750	
	Final demand output multiplier	(h)	1.6	
				\$8,310,000

**Total Net New Demand in Region from Operations** **\$ 17,019,202**

*Memo: The region analyzed is composed of Oakland, Wayne, and Macomb counties.*

**Notes:**

- (a) See appendix table D-2 for detailed calculation.
- (b) Average wage estimated by Beaumont Hospitals. This wage is consistent with the average wage of physicians offices in Oakland County in the US Census Bureau's County Business Patterns dataset.
- (c) The Bureau of Economic Analysis's RIMS II multiplier series for 2005 shows \$1.5631 in earnings in the Oakland-Macomb-Wayne Counties region for each \$1 in earnings increase in the Ambulatory Health Care Services Industry.
- (d) The U.S. Bureau of Labor Statistics' Consumer Expenditures Survey estimates that households in middle quintile for income in the U.S. (household income
- (e) AEG estimate based on professional judgement.
- (f) There are no publicly available estimates for operational spending for proton beam facilities, and an estimate from Beaumont Hospital and ProCure (the company that would be contracted to operate the facility) was not available at the time of this analysis' publication. For a facility such as this (a \$35 million building with \$125 in specialized equipment and 100 full-time equivalent employees) we assume \$15 in operating expenditures is a conservative estimate.
- (g) Assumption based on AEG professional experience.
- (h) Assumption based on AEG professional experience and examination of the Bureau of Economic Analysis's RIMS II multiplier series for the tri-county area, which shows multipliers between 1.5 and 2 for various spending categories likely to be included in operational spending for a medical treatment facility.

**Appendix Table D-5: Annual Economic Impact of Oakland University Medical School, First Full-Capacity Year (2016)**

<b>Direct Impact of Student Tuition and Spending</b>	Number of Students	(a)	500	
	Estimated Tuition, Fees, and Health Insurance	(b)	\$ 45,328	
	Total Student Tuition, Fees and Healthcare Expenditures			\$ 22,663,955
	Substitution	(c)	0%	\$ -
	Net New Student Expenditures (Tuition, Fees, and Healthcare)			\$ 22,663,955
	Number of Students	(a)	500	
	Estimated Per-Student Living Expenditures in Region	(d)	\$ 15,000	
	Total Student Living Expenditures in Region			\$ 7,500,000
	Substitution	(e)	5%	\$ (375,000)
	Net New Student Living Expenditures			\$ 7,125,000
	Direct Impact of Tuition and Student Spending			\$ 29,788,955
<b>Indirect Impact of Student Tuition and Spending</b>	Direct Impact of Tuition and Student Spending (see above)			\$ 29,788,955
	Indirect Economic Multiplier	(f)	0.5	
	Indirect Impact of Tuition and Student Spending			\$ 14,894,478
<b>Total Annual Economic Impact of Student Tuition and Spending</b>				<b>\$ 44,683,433</b>

*Memo: Figures are in 2008 dollars.*

Notes:

- (a) Source: Oakland University.
- (b) This estimate does not reflect any statement or promise by Oakland University. It is based on the median tuition, fees, and health insurance paid at private medical schools nationwide in the 2007-2008 school year, increased by 5.2% annually (the average annual increase in median tuition fees and healthcare between 2000 and 2007) to 2008. This figure (the estimated tuition, fees, and healthcare expenses for a hypothetical 2008 start date) is conservative since it is expected to rise faster than inflation to 2016. Source: American Association of Medical Colleges' Tuition and Student Fees Survey.
- (c) It is our judgment that substitution (the amount of spending that is not net-new to the region) will be zero for tuition, fees, and healthcare expenses associated with attending medical school. There is very little chance of Oakland University reducing enrollment at any other medical school in Michigan because there is tremendous demand for medical education nationwide: according to the American Association of Medical Colleges, there were over 30 applicants for every medical school matriculant in the United States. Source: AAMC <http://www.aamc.org/data/facts/2007/2007school.htm>
- (d) AEG estimate based professional judgment. Assumes students spend approximately \$15,000 per year in the region in 2008 dollars on rent, food, and other expenses.
- (e) Substitution in living expenses comes from students that would otherwise have stayed in the region and worked or enrolled in a non-medical school graduate program rather than going to medical school if Oakland University's medical school were not to open. The tremendous demand for medical school slots (shown in note (c) above) indicates that a student admitted to any medical school is likely to attend there, regardless of location. Thus, we assume that very few students at Oakland University's medical school will be students from the region who would only attend OU if admitted there and would otherwise not attend medical school.
- (f) The Bureau of Economic Analysis' RIMS II Input-Output Multipliers series for the Oakland-Wayne-Macomb Counties Region shows final-demand-output multipliers between 1.4 and 2.4, though most are around 1.6-1.8. This means that a \$1 increase in demand in most industries in the region results in an increase \$1.6-\$1.8 in total output as the original \$1 is re-spent in the region. We use 1.5 as a conservative estimate for the average impact of student tuition, fees, healthcare, and living expenses, implying \$0.50 in additional, indirect output in all other industries in the region resulting from the original \$1 in net new spending.



**Appendix Table D-6: Economic Impact of GME Payments Due to Oakland University Medical School**

<b>Direct Impact of GME Payments</b>	GME payments to Michigan Hospitals, 2004	(a)	\$796,110,943	
	Payment Inflation to 2008	(b)	1.04	
	Increase in medical students in MI due to OU medical school	(c)	19.9%	
	Total Potential Increase in Michigan GME Payments due to OU	(d)	\$164,895,748	
	% in region	(e)	26%	\$ 42,872,895
<b>Indirect Impact of GME Payments</b>	Direct Impact of Tuition and Student Spending (see above)			\$ 42,872,895
	Indirect Economic Multiplier	(f)	0.5	
	Indirect Impact of Tuition and Student Spending			\$ 21,436,447
 <b>Total Annual Economic Federal GME Payments</b>				<b>\$64,309,342</b>

*Memo: Figures are in 2008 dollars.*

Notes:

- (a) GME payments (payments by the federal government and private insurers to compensate hospitals for graduate medical education) in Michigan for residencies associated with Michigan State University's medical school at 32 hospitals. Data from Michigan State University's College of Human Medicine and Michigan's Department of Community Health, cited in "The Economic Impact of Michigan State University" by Caroline M. Sallee, Alex L. Rosaen, and Patrick L. Anderson of Anderson Economic Group, LLC.
- (b) Assumes 1% annual increase between 2004 and 2008. We use this conservative figure (lower than inflation) because the payment amount is set by the U.S. government, and may not fully reflect rises in general prices or medical costs.
- (c) Assumes 500 total students at Oakland University's medical school, spread over 4 years. Taken as a percentage of the state of Michigan's 628 medical school matriculants in 2007. Source: AAMC <http://www.aamc.org/data/facts/2007/2007school.htm>
- (d) Assumes an increase in GME payments to the state of Michigan proportional to the number of students added to the state by Oakland University's medical school. These new medical students are likely also new to the nation because demand for medical education is so high compared to the number of applicants (see note (c) in appendix table D-5). Therefore, these students will likely pursue medical net new residencies somewhere in the U.S.. We have no reason to believe that the State of Michigan is more or less likely than other states to attract these students to residencies.
- (e) The Oakland-Wayne-Macomb Counties region has 40 of the State of Michigan's 154 establishments in the "General medical and surgical hospital" industry, according to the U.S. Census Bureau's 2006 County Business Patterns data series (26% of the total). Many of which would likely see an increase in medical residents due to OU's medical school as some students consider geography in their residency application decisions. We do not know how these hospitals will react to Oakland University's medical school in terms of increasing the number of medical residents they take on. We use 26% of the implied potential impact of increasing Michigan's number medical students as a figure representative of a possible outcome. The figure could be much higher as hospitals take advantage of the close proximity of this source of residents, or lower if area hospitals do not have the ability or desire to take on more residents due to OU's medical school.
- (f) The Bureau of Economic Analysis' RIMS II Input-Output Multipliers series for the Oakland-Wayne-Macomb Counties Region final-demand-output multiplier for the "Hospitals and nursing and residential care facilities" industry is 2.0055. This means that a \$1 increase in demand in most industries in the region results in an increase \$2.0055 in total output as the original \$1 is re-spent in the region.

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## *Appendix E: Employment Projection Model*

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### **METHODOLOGY**

To estimate employment for Oakland County’s health care and life sciences industry 5-years from now and 10-years from now, under both a “trend” and a “potential” scenario, we created an employment projection model that:

1. Uses 2006 employment by industry subsector as a base employment level on which projections are made.

2. Uses two average-annual growth rate assumptions for each subsector.

The first average-annual growth rate assumption covers 2006 to 2009, and considers recent trends at the local level, and our knowledge of ongoing or new projects influencing employment in the subsectors.

The second average-annual growth rate assumption covers 2009 to 2018, and takes into consideration national level employment projections made by the BLS, the relative strengths and weaknesses of Oakland County’s healthcare and life sciences subsectors, and local level demographic and workforce factors.<sup>1</sup> In our “trend” projection we assume growth during this period tracks closely with the national trend. In our “potential” projection we assume Oakland County leverages regional strengths in the healthcare and life sciences industry and has success in promoting the industry further.

See “Base Data for Growth Rate Assumptions” below for the reasoning behind our specific assumptions, by subsector.

3. Estimates the number of establishments added or lost in each subsector by assuming establishment size remains consistent with 2006 levels through 2018.
4. Assumes little or no change to the current business, regulatory, and legal conditions that prevail today. While some change in these areas is likely, it is difficult, if not impossible, to predict the extent of the change and its impacts on regional employment. For example, some change in our national system of medical insurance is possible, if not likely. However, the direction of such change is likely to be heavily influenced by factors outside of economic conditions, and can therefore not reliably be included in our model.
5. Assumes continued contraction in Michigan’s overall economy in the next two to three years, followed by modest growth over the long run.

Please also see “Cautions and Limitations” on page F-3.

### **BASE DATA FOR GROWTH RATE ASSUMPTIONS**

Below are the base data that, along with our industry and regional economic analysis, informed the short- and long-term employment change assumptions for each healthcare and life sciences industry sector.

**Pharmaceutical and Medicine Manufacturing.** From 2002 to 2006 this sector grew at an average annual rate of 1.75 percent, with a 9.38 percent rate of growth in the most recent year (2005 to 2006) in Oakland County. National-

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1. National employment by industry projections were obtained from the U.S. Bureau of Labor Statistics Employment Projections Program, 2006-2016., and adjusted by Anderson Economic Group based on local economic and demographic conditions and expected trends.

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level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 2.2 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Pharmaceutical and Medicine Manufacturing Employment” on page 4-29, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Medical Equipment and Supplies Manufacturing.** From 2002 to 2006 in Oakland County, this sector grew at an average annual rate of 0.2 percent, with a -3.0 percent rate of growth in the most recent year (2005 to 2006). National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 0.1 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Medical Equipment and Supplies Manufacturing” on page 4-30, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Scientific Research and Development.** From 2002 to 2006 this sector grew dramatically at an average annual rate of 49.0 percent, with a 116.7 percent rate of growth in the most recent year (2005 to 2006) in Oakland County. However, national-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 0.9 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Scientific Research and Development” on page 4-31, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Offices of Health Practitioners.** In Oakland County, this sector grew at an average annual rate of 3.0 percent from 2002 to 2006, with a 8.0 percent rate of growth in the most recent year (2005 to 2006). National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 2.2 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Offices of Health Practitioners” on page 4-32, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Outpatient Care and Medical Laboratories.** From 2002 to 2006 this sector grew at an average annual rate of 7.7 percent in Oakland County, with a 12.6 percent rate of growth in the most recent year (2005 to 2006). National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 3.4 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Outpatient Care and Medical Laboratories” on page 4-32, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Medical and Surgical Hospitals.** From 2002 to 2006 this sector declined at an average annual rate of 1.3 percent in Oakland County, with a 1.8 percent rate of growth in the most recent year (2005 to 2006). National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 1.5 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Medical and Surgical Hospitals” on page 4-33, underlie the

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growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Specialty Hospitals.** In Oakland County, this sector declined at an average annual rate of 11.9 percent from 2002 to 2006, with a 0.5 percent rate of decline in the most recent year (2005 to 2006). National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 1.5 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Specialty Hospitals” on page 4-33, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**Nursing and Residential Care Facilities.** From 2002 to 2006 this sector grew at an average annual rate of 2.4 percent, with a 3.6 percent rate of decline in the most recent year (2005 to 2006) in Oakland County. National-level employment data from the Bureau of Labor Statistics calls for this sector to grow at a 2.1 percent average annual rate from 2006 to 2016. These data, along with the conditions described in “Nursing and Residential Care Facilities” on page 4-34, underlie the growth rate assumptions noted in that same section, and shown in Table 1 on page E-4.

**TABLE FOR  
EMPLOYMENT  
PROJECTION MODEL**

The tables on the following page provides a more detailed look at our projections under both the trend and the potential scenarios.

**TABLE 1. Trend Scenario - Oakland County Healthcare and Life Sciences Industry Employment Projection**

Industry Sector	Base Data for Assumptions			Assumed Growth Rates		Actual Emp Base	Employment Projections			
	2002-06 Annual Rate of Change	2005-06 Annual Rate of Change	2006-16 BLS National Projection	AEG Est 2006 - 09	AEG Est 2009 - 18	2006	2013	2018	2006-18 Annual Rate of Change	2006-18 Change in Estabs*
<i>Pharmaceutical and Medicine Manufacturing</i>										
Pharmaceutical and Medicine Manufacturing	1.8%	9.4%		3.0%	2.2%	1,073	1,279	1,426		3.3
<b>Sector Total</b>	<b>1.8%</b>	<b>9.4%</b>	<b>2.2%</b>	<b>3.0%</b>	<b>2.2%</b>	<b>1,073</b>	<b>1,279</b>	<b>1,426</b>	<b>2.3%</b>	<b>3.3</b>
<i>Medical Equipment and Supplies Manufacturing</i>										
Medical Equipment and Supplies Manuf.	0.2%	-3.0%		0.0%	0.1%	610	612	616		0.6
<b>Sector Total</b>	<b>0.2%</b>	<b>-3.0%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>610</b>	<b>612</b>	<b>616</b>	<b>0.1%</b>	<b>0.6</b>
<i>Scientific Research and Development</i>										
Scientific Research and Development Services	49.0%	116.7%		10.0%	0.9%	9,887	13,640	14,265		31.9
<b>Sector Total</b>	<b>49.0%</b>	<b>116.7%</b>	<b>0.9%</b>	<b>10.0%</b>	<b>0.9%</b>	<b>9,887</b>	<b>13,640</b>	<b>14,265</b>	<b>2.5%</b>	<b>31.9</b>
<i>Offices of Health Practitioners</i>										
Offices of Physicians	1.4%	4.4%		1.4%	1.6%	12,896	14,327	15,510		325.1
Offices of Dentists	4.3%	12.2%		2.5%	1.6%	6,917	7,937	8,593		205.0
Offices of Other Health Practitioners	6.0%	12.7%		3.0%	1.9%	4,249	5,006	5,500		242.6
<b>Sector Total</b>	<b>3.0%</b>	<b>8.0%</b>	<b>2.2%</b>	<b>2.0%</b>	<b>1.7%</b>	<b>24,062</b>	<b>27,270</b>	<b>29,603</b>	<b>1.7%</b>	<b>753.9</b>
<i>Outpatient Care and Medical Laboratories</i>										
Outpatient Care Centers	4.8%	14.7%		8.0%	1.6%	5,030	6,752	7,309		59.8
Medical and Diagnostic Laboratories	12.6%	66.9%		12.0%	1.9%	4,153	6,291	6,912		53.1
Home Health Care Services	6.9%	9.0%		7.0%	3.8%	6,824	9,705	11,694		162.0
Other Ambulatory Health Care Services	11.5%	-47.9%		3.0%	1.6%	1,051	1,224	1,325		11.7
<b>Sector Total</b>	<b>7.7%</b>	<b>12.6%</b>	<b>3.4%</b>	<b>8.3%</b>	<b>2.6%</b>	<b>17,058</b>	<b>23,971</b>	<b>27,240</b>	<b>3.6%</b>	<b>288.9</b>
<i>Medical and Surgical Hospitals</i>										
General Medical and Surgical Hospitals	-1.3%	1.8%		5.0%	1.1%	28,281	34,203	36,126		3.3
<b>Sector Total</b>	<b>-1.3%</b>	<b>1.8%</b>	<b>1.5%</b>	<b>5.0%</b>	<b>1.1%</b>	<b>28,281</b>	<b>34,203</b>	<b>36,126</b>	<b>1.8%</b>	<b>3.3</b>
<i>Specialty Hospitals</i>										
Psychiatric and Substance Abuse Hospitals	-14.9%	-1.7%		1.0%	1.1%	562	606	640		0.3
Specialty (except Psych & Sub Abuse) Hsptls	1.5%	3.2%		1.0%	1.1%	191	206	217		0.4
<b>Sector Total</b>	<b>-11.9%</b>	<b>-0.5%</b>	<b>1.5%</b>	<b>1.0%</b>	<b>1.1%</b>	<b>753</b>	<b>811</b>	<b>858</b>	<b>1.1%</b>	<b>0.7</b>
<i>Nursing and Residential Care Facilities</i>										
Nursing Care Facilities	0.9%	-3.8%		-0.3%	1.0%	5,760	5,937	6,240		5.7
Resid. Mental Health, Substance Abuse Felts	5.8%	-3.8%		3.3%	1.6%	3,659	4,298	4,653		71.2
Community Care Facilities for the Elderly	1.3%	-2.9%		0.3%	2.9%	2,441	2,758	3,182		22.8
<b>Sector Total</b>	<b>2.4%</b>	<b>-3.6%</b>	<b>2.1%</b>	<b>0.9%</b>	<b>1.6%</b>	<b>11,860</b>	<b>12,993</b>	<b>14,074</b>	<b>1.5%</b>	<b>75.6</b>
<b>Healthcare and Life Science Industry Total</b>	<b>4.1%</b>	<b>10.8%</b>		<b>4.8%</b>	<b>1.6%</b>	<b>93,584</b>	<b>114,779</b>	<b>124,207</b>	<b>2.2%</b>	<b>1,414.9</b>
<i>All Industries Total</i>	-1.1%	1.6%		-0.2%	0.7%	731,690	747,888	774,433	0.5%	2,437.8
<i>Healthcare and Life Science Industry Share of Total</i>	na	na		na	na	12.8%	15.3%	16.0%		

\* Assumes number of employees per establishment remains consistent with 2006 level

**TABLE 2. Potential Scenario - Oakland County Healthcare and Life Sciences Industry Employment Projection**

Industry Sector	Base Data for Assumptions			Assumed Growth Rates		Actual Emp Base	Employment Projections			
	2002-06 Annual Rate of Change	2005-06 Annual Rate of Change	2006-16 BLS National Projection	AEG Est 2006 - 09	AEG Est 2009 - 18	2006	2013	2018	2006-18 Annual Rate of Change	2006-18 Change in Estabs*
<u>Pharmaceutical and Medicine Manufacturing</u>										
Pharmaceutical and Medicine Manufacturing	1.8%	9.4%		3.5%	4.0%	1,073	1,392	1,693		5.8
<b>Sector Total</b>	<b>1.8%</b>	<b>9.4%</b>	<b>2.2%</b>	<b>3.5%</b>	<b>4.0%</b>	<b>1,073</b>	<b>1,392</b>	<b>1,693</b>	<b>3.9%</b>	<b>5.8</b>
<u>Medical Equipment and Supplies Manufacturing</u>										
Medical Equipment and Supplies Manuf.	0.2%	-3.0%		0.5%	3.0%	610	697	808		20.1
<b>Sector Total</b>	<b>0.2%</b>	<b>-3.0%</b>	<b>0.1%</b>	<b>0.5%</b>	<b>3.0%</b>	<b>610</b>	<b>697</b>	<b>808</b>	<b>2.5%</b>	<b>20.1</b>
<u>Scientific Research and Development</u>										
Scientific Research and Development Services	49.0%	116.7%		10.0%	6.0%	9,887	16,614	22,233		89.9
<b>Sector Total</b>	<b>49.0%</b>	<b>116.7%</b>	<b>0.9%</b>	<b>10.0%</b>	<b>6.0%</b>	<b>9,887</b>	<b>16,614</b>	<b>22,233</b>	<b>6.7%</b>	<b>89.9</b>
<u>Offices of Health Practitioners</u>										
Offices of Physicians	1.4%	4.4%		1.4%	2.0%	12,896	14,554	16,068		394.6
Offices of Dentists	4.3%	12.2%		2.5%	1.7%	6,917	7,968	8,669		214.3
Offices of Other Health Practitioners	6.0%	12.7%		3.0%	2.2%	4,249	5,065	5,648		271.2
<b>Sector Total</b>	<b>3.0%</b>	<b>8.0%</b>	<b>2.2%</b>	<b>2.0%</b>	<b>2.0%</b>	<b>24,062</b>	<b>27,587</b>	<b>30,385</b>	<b>2.0%</b>	<b>860.3</b>
<u>Outpatient Care and Medical Laboratories</u>										
Outpatient Care Centers	4.8%	14.7%		8.0%	2.9%	5,030	7,104	8,196		83.1
Medical and Diagnostic Laboratories	12.6%	66.9%		12.0%	3.7%	4,153	6,747	8,091		75.9
Home Health Care Services	6.9%	9.0%		7.0%	3.8%	6,824	9,705	11,694		162.0
Other Ambulatory Health Care Services	11.5%	-47.9%		3.0%	2.0%	1,051	1,243	1,373		13.8
<b>Sector Total</b>	<b>7.7%</b>	<b>12.6%</b>	<b>3.4%</b>	<b>8.3%</b>	<b>3.4%</b>	<b>17,058</b>	<b>24,799</b>	<b>29,354</b>	<b>4.3%</b>	<b>348.9</b>
<u>Medical and Surgical Hospitals</u>										
General Medical and Surgical Hospitals	-1.3%	1.8%		5.0%	1.5%	28,281	34,748	37,433		3.9
<b>Sector Total</b>	<b>-1.3%</b>	<b>1.8%</b>	<b>1.5%</b>	<b>5.0%</b>	<b>1.5%</b>	<b>28,281</b>	<b>34,748</b>	<b>37,433</b>	<b>2.1%</b>	<b>3.9</b>
<u>Specialty Hospitals</u>										
Psychiatric and Substance Abuse Hospitals	-14.9%	-1.7%		1.0%	1.5%	562	615	662		0.4
Specialty (except Psych & Sub Abuse) Hsptls	1.5%	3.2%		1.0%	1.5%	191	209	225		0.5
<b>Sector Total</b>	<b>-11.9%</b>	<b>-0.5%</b>	<b>1.5%</b>	<b>1.0%</b>	<b>1.5%</b>	<b>753</b>	<b>823</b>	<b>887</b>	<b>1.4%</b>	<b>0.9</b>
<u>Nursing and Residential Care Facilities</u>										
Nursing Care Facilities	0.9%	-3.8%		-0.3%	1.0%	5,760	5,937	6,240		5.7
Resid. Mental Health, Substance Abuse Felts	5.8%	-3.8%		3.3%	5.0%	3,659	4,903	6,257		186.0
Community Care Facilities for the Elderly	1.3%	-2.9%		0.3%	3.3%	2,441	2,801	3,295		26.2
<b>Sector Total</b>	<b>2.4%</b>	<b>-3.6%</b>	<b>2.1%</b>	<b>0.9%</b>	<b>2.9%</b>	<b>11,860</b>	<b>13,641</b>	<b>15,792</b>	<b>2.6%</b>	<b>134.3</b>
<b>Healthcare and Life Science Industry Total</b>	<b>4.1%</b>	<b>10.8%</b>		<b>4.9%</b>	<b>2.8%</b>	<b>93,584</b>	<b>120,300</b>	<b>138,584</b>	<b>3.2%</b>	<b>2,079.2</b>
<i>All Industries Total</i>	-1.1%	1.6%		-0.2%	0.7%	731,690	747,888	774,433	0.5%	2,437.8
<i>Healthcare and Life Science Industry Share of Total</i>	<i>na</i>	<i>na</i>		<i>na</i>	<i>na</i>	<i>12.8%</i>	<i>16.1%</i>	<i>17.9%</i>		

\* Assumes number of employees per establishment remains consistent with 2006 level

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## *Appendix F: About Anderson Economic Group; Copyright, Cautions, and Limitations*

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### **ABOUT ANDERSON ECONOMIC GROUP**

Anderson Economic Group, LLC is a consulting firm that specializes in economics, public policy, financial valuation, market research, and land use economics. AEG's past clients include:

- *Governments* such as the states of Michigan, North Carolina, and Wisconsin; the cities of Detroit, Cincinnati, Norfolk, and Fort Wayne; counties such as Oakland County, Michigan, and Collier County, Florida; and authorities such as the Detroit-Wayne County Port Authority.
- *Corporations* such as LS Power, GM, Ford, Delphi, Honda, Taubman Centers, PG&E Generating, SBC, Gambrinus, Labatt USA, and InBev USA.
- *Nonprofit organizations* such as Michigan's University Research Corridor, Michigan State University, Wayne State University, the Van Andel Institute, the Michigan Manufacturers Association, the International Mass Retailers Association, the American Automobile Manufacturers Association, Automation Alley, and the Michigan Chamber of Commerce.

For more information about AEG visit: <http://www.AndersonEconomicGroup.com>.

### **PROJECT TEAM**

This project was managed by Scott D. Watkins, a senior consultant with Anderson Economic Group (AEG), and completed under the direction of Patrick L. Anderson, Principal and CEO. Alex Rosaen, consultant, contributed the majority of the economic impact analysis for the Proton Beam facility and Oakland University's School of Medicine. Cameron VanWyngarden, consultant, and Lauren Hathaway, senior analyst, contributed to the research and writing of the report.

**Scott D. Watkins.** Mr. Watkins is a Senior Consultant with Anderson Economic Group, LLC, with expertise in economic, industry, and market analyses, as well as public policy. Additionally, Mr. Watkins is Anderson Economic Group's Controller and IT Director.

Among the clients for whom he has worked are the Michigan Manufacturers Association, Michigan State University, Wayne State University, Michigan Chamber of Commerce, Michigan Retailers Association, Collier County, Florida; and the West Virginia High Technology Consortium Foundation. Recent reports by Mr. Watkins include: "Economic Impacts from 2008 Detroit Tigers' Game Attendance," "Automation Alley's Annual Technology Industry Report" 2007 edition and "Benchmarking for Success: Education Performance among the American States." He has also provided testimony to the Michigan House of Representatives on matters of education finance, and is the editor of the book *The State Economic Handbook*, as published by Palgrave Macmillan in 2008 and 2009.

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Mr. Watkins holds an M.B.A. from the Eli Broad College of Business at Michigan State University. He also has a B.A. in marketing from Eli Broad College of Business and a B.A. in international relations from the James Madison College, both at Michigan State University.

**Alexander L. Rosaen.** Mr. Rosaen is a Consultant at Anderson Economic Group, working in the Public Policy, Fiscal, and Economic Analysis practice areas. Mr. Rosaen's background is in applied economics and public finance.

Mr. Rosaen's recent work includes several economic and fiscal impact analyses, including of proposed real estate developments, power plants, and infrastructure projects; an analysis of the impact of federal tax incentives on the freight rail industry; and an analysis of the economic contribution that research universities make in the State of Michigan.

Prior to joining Anderson Economic Group, Mr. Rosaen worked for the Office of Retirement Services (part of the Michigan Department of Management and Budget) for the Benefit Plan Design group. He has also worked as a mechanical engineer for Williams International in Walled Lake, Michigan.

**Patrick L. Anderson.** Mr. Anderson founded the consulting firm of Anderson Economic Group in 1996, and serves as a Principal and Chief Executive Officer in the company.

Mr. Anderson's views are often cited in news reports throughout the United States, and his articles have been published by *The Wall Street Journal*, *The Detroit News*, *The Detroit Free Press*, *American Outlook*, *Business Economics*, and other publications. His book *Business Economics and Finance* was published in 2004, and his paper on "Pocketbook Issues and the Presidency" was awarded the Edmund Mennis Award for the best contributed paper in 2004 by the National Association for Business Economics. Mr. Anderson also contributed the chapter on commercial damages to the book *Litigation Economics*, published in 2005, and is the executive editor of the *State Economic Handbook 2008*.

Prior to founding Anderson Economic Group, Mr. Anderson served as the Chief of Staff of the Michigan Department of State, and as Deputy Budget Director for the State of Michigan under Governor John Engler. Prior to his involvement in State Government, Mr. Anderson served as an officer in Alexander Hamilton Life Insurance, an economist for Manufacturers National Bank of Detroit, and a graduate fellow with the Central Intelligence Agency in Washington DC.

Mr. Anderson is a graduate of the University of Michigan, where he earned a Master's degree in public policy and a Bachelor's degree in political science. He is a member of the National Association for Business Economics and the National Association of Forensic Economists. The Michigan Chamber of Com-



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merce awarded Mr. Anderson its 2006 *Leadership Michigan Distinguished Alumni* award for his civic and professional accomplishments.

**CAUTIONS AND  
LIMITATIONS**

The analysis and projections in this report are based on available data, professional judgement, and numerous assumptions regarding future events. Because economic, market, and industrial conditions change; data can prove incomplete or misleading; and government policies are outside our control; we cannot warrant that actual employment changes during the period will, in total or in specific industry sectors, align with those projected in this report. We recommend careful consideration be given to actual market and industry conditions by any person using portions of this analysis in any investment decision, and do not guarantee the future outcome of any business venture, government policy, or legal or regulatory proceeding.

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