

CHAPTER TWO

# **Acute Care Hospital Resources and the Physician Workforce**



## Acute Care Hospital Resources

The dramatic differences in levels of acute care hospital resources that were documented in the national editions of the Dartmouth Atlas of Health Care persisted throughout the 1990s, although the medical industry has undergone a period of profound change.

This chapter addresses resource allocation in 1996, the most recent year for which data are available. Since that year, there has been significant consolidation of the hospital market in Michigan. These changes will undoubtedly be reflected in future analyses of the state's health care resources.

The numbers of acute care hospital beds, hospital employees, and registered nurses employed by acute care hospitals varied substantially among Michigan's hospital service areas. Generally the supply of hospital resources was higher in urban areas, where the population is declining but hospital beds are not being closed at a comparable rate, and in very rural areas, where the minimum number of beds necessary to operate an acute care facility can result in very high per capita supplies of beds. The numbers reported in this chapter include all Michigan hospital service areas, including those with very few residents who were members of Blue Cross Blue Shield of Michigan. In Chapter Three, only those hospital service areas with at least 10,000 BCBSM members are included in the analysis, in order to avoid the statistical instability inherent in using very small numbers.

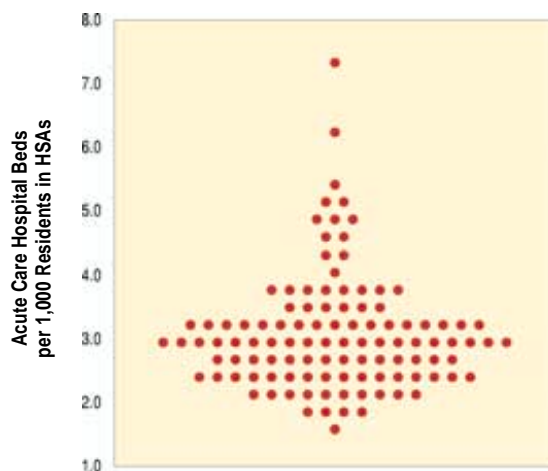
Data from the American Hospital Association and the Medicare program were used to estimate the number of staffed acute care hospital beds, full time equivalent hospital employees, and registered nurses employed in acute care hospitals allocated to the population of each hospital service area.

## Acute Care Hospital Beds

The number of acute care hospital beds per 1,000 residents of Michigan hospital service areas varied from less than 1.5 to 7.5. This pattern generally reflects higher ratios of hospital beds to residents in service areas that were in very rural or older urban parts of the state.

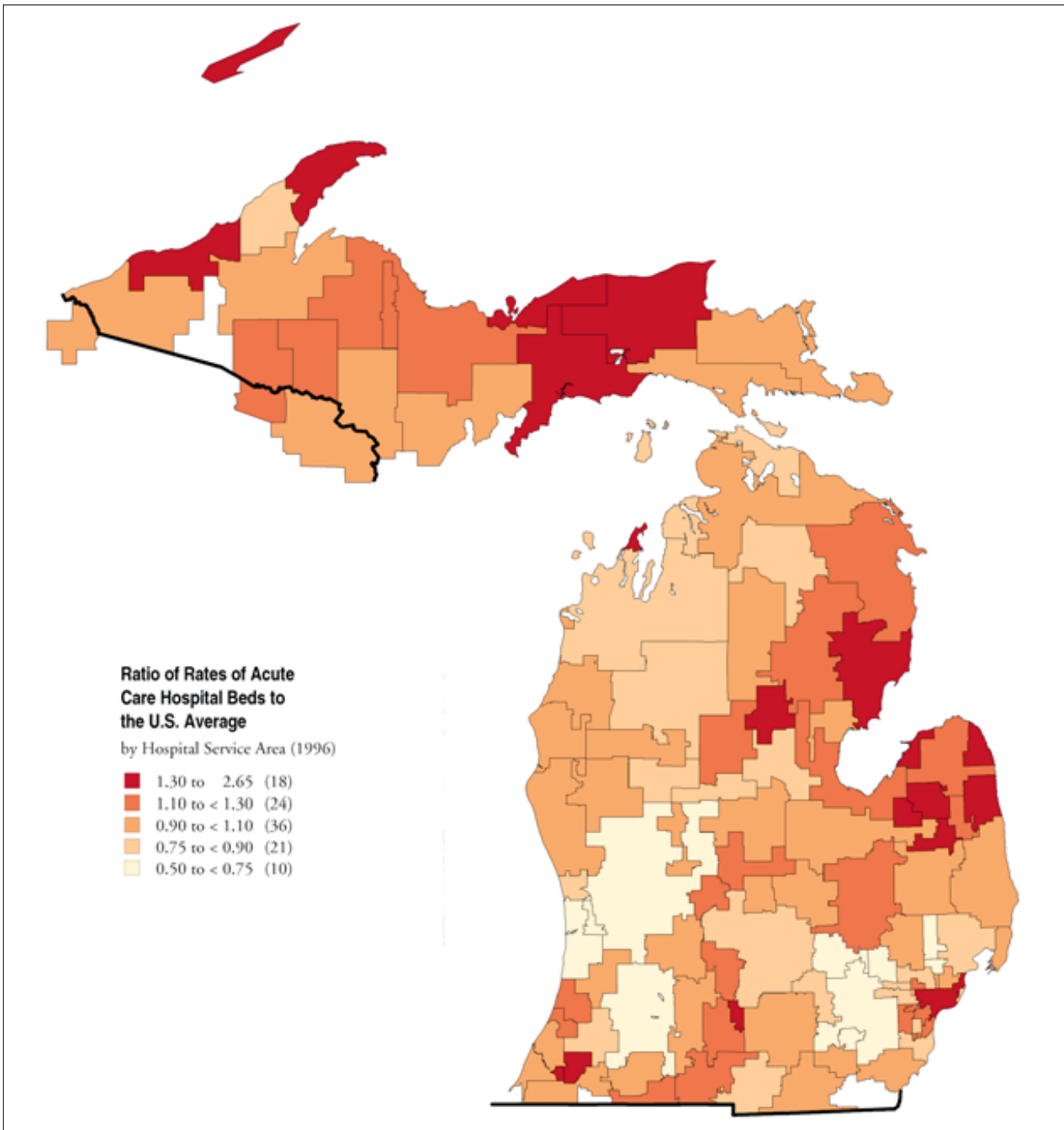
Among the large hospital service areas where the numbers of allocated acute care beds were higher than the United States and Michigan average of 2.8 beds per 1,000 residents were Tawas City (3.9); Detroit (3.9); Wyandotte (3.6); Southfield (3.4) and Flint (3.4).

Other hospital service areas in the state had substantially fewer allocated acute care hospital beds per 1,000 residents than the state and national averages, including Troy (1.8); Ann Arbor (1.8); Howell (1.9); Milford (1.9) and Grand Rapids (2.0).



**Figure 2.1. Acute Care Hospital Beds Allocated to Hospital Service Areas (1996)**

*The number of acute care hospital beds in Michigan hospital service ranged from less than 1.5 to 7.5, after adjustment for population differences in age and sex. Each point represents one hospital service area in Michigan.*



**Map 2.1. Acute Care Hospital Beds (1996)**

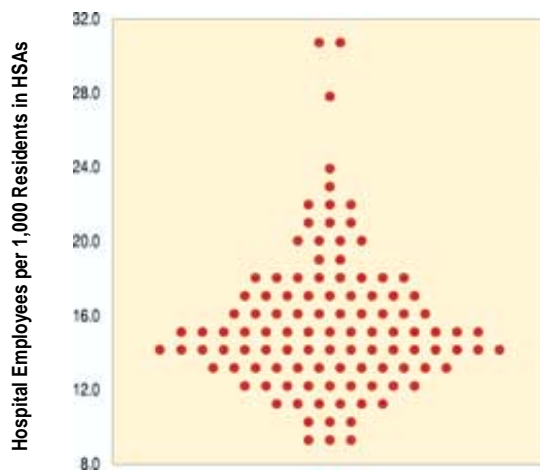
Eighteen hospital service areas had supplies of acute care hospital beds at least 30% higher than the United States average. Generally, these were urban or sparsely populated rural areas. Ten areas had allocated supplies of hospital beds more than 25% lower than the national average.

## Hospital Employees

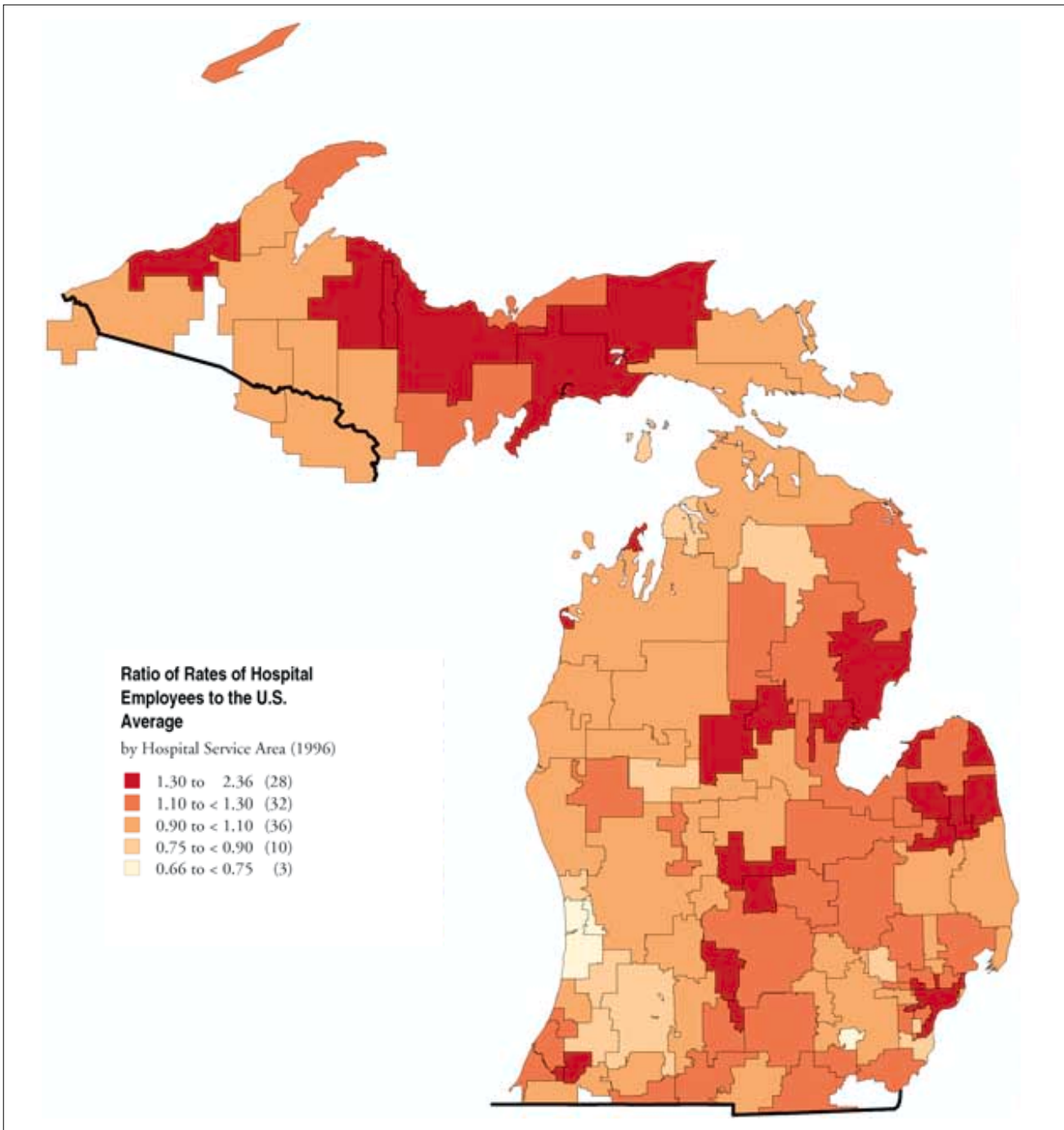
The number of full-time equivalent hospital employees per 1,000 residents of Michigan hospital service areas varied by a factor of three, from fewer than ten to more than 30. As with hospital beds, this pattern generally reflects higher ratios of hospital employees to residents in service areas that were in very rural or older urban parts of the state.

Among the large hospital service areas where the numbers of acute care hospital employees were substantially higher than the national average of 13.2 per 1,000 residents Southfield (22.4); Detroit (21.6); Tawas City (21.2); Madison Heights (18.3) and Garden City (18.3).

Other hospital service areas had substantially fewer hospital employees than the national average or the Michigan average of 15.3 per 1,000 residents, including Holland (9.7); Milford (10.7); Kalamazoo (10.7); Trenton (11.0) and Taylor (11.2).



**Figure 2.2. Hospital Employees Allocated to Hospital Service Areas (1996)**  
*The number of acute care hospital employees in Michigan hospital service areas ranged from fewer than ten to more than 30, after adjustment for population differences in age and sex. Each point represents one of the hospital service areas in Michigan.*



**Map 2.2. Full-Time Equivalent Hospital Employees (1996)**

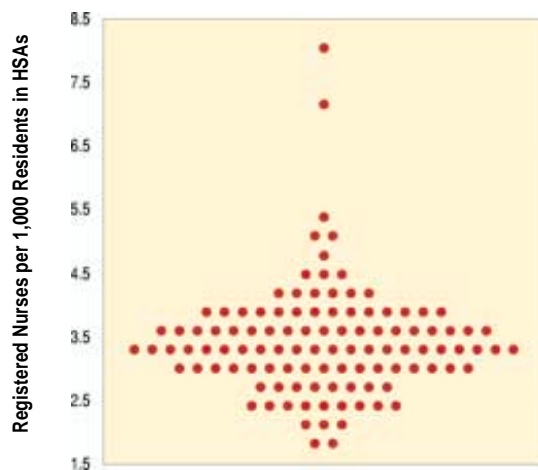
Twenty-eight hospital service areas had rates of hospital employees per 1,000 residents at least 30% higher than the United States average. Ten hospital service areas had rates more than 25% below the average.

## Registered Nurses Employed by Acute Care Hospitals

The number of registered nurses employed by acute care hospitals varied by a factor of four, from fewer than 2.0 to more than 8.0 per 1,000 residents. Employment of acute care nurses, like hospital employees in general, was highest in sparsely populated hospital service areas, although Detroit and Southfield also had relatively high rates of nurse employment.

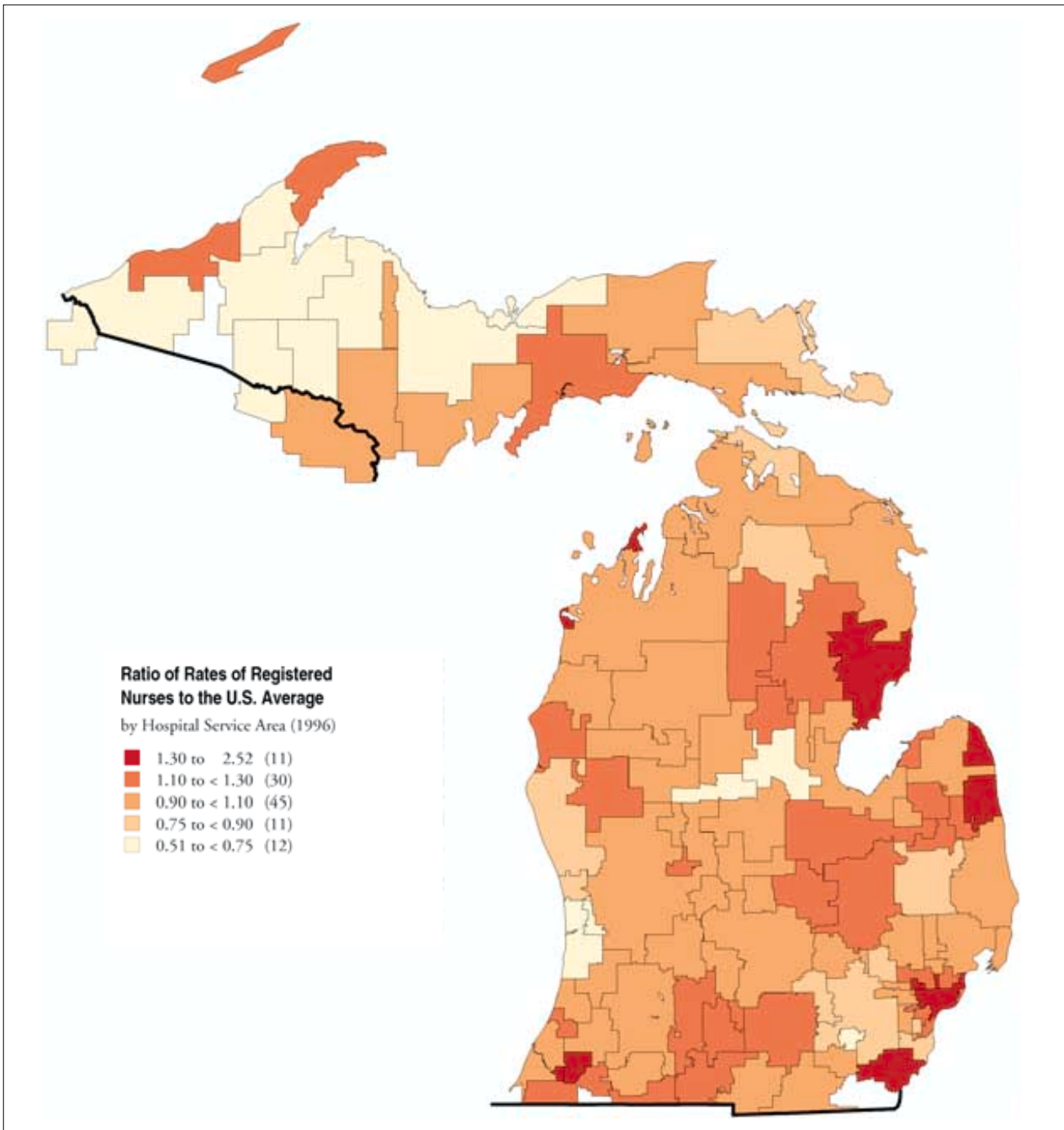
Among the large hospital service areas where employment of hospital-based acute care nurses was higher than the national average of 3.3 per 1,000 residents were Detroit (5.0); Southfield (5.0); Tawas City (4.5); Madison Heights (4.3) and Monroe (4.3).

Other large hospital service areas had substantially fewer hospital-employed registered nurses than the national average and Michigan average of 3.5, including Midland (2.3); Mount Pleasant (2.4); Holland (2.4); Marquette (2.4) and Taylor (2.5).



**Figure 2.3. Hospital-Based Registered Nurses Allocated to Hospital Service Areas (1996)**

*The acute care hospital-employed registered nurse workforce varied from fewer than 2.0 to more than 8.0 per 1,000 residents, after adjustments for differences in population age and sex. Each point represents one of the 109 hospital service areas in Michigan.*



**Map 2.3. Registered Nurses Employed in Acute Care Hospitals (1996)**

Eleven hospital service areas had rates of hospital-based registered nurses per 1,000 residents at least 30% higher than the United States average. Twelve areas had rates more than 25% below the average.

## The Physician Workforce

In 1970, there were 235,241 physicians active in patient care in the United States. By 1993, the number had increased to 469,603, an increase that was largely attributable to growth in medical schools, an increase in class sizes, and policies that encouraged international medical graduates to enter the professional workforce in the United States. In 1996, there were 495,507 physicians in active practice in the United States; about 17,000 physicians were members of the Michigan physician workforce. Although the per capita number of physicians was 188.9 per 100,000 residents of the United States, the workforce was not uniformly deployed; the workforce-to-population ratio varied by a factor of 3.8 among hospital referral regions. In Michigan, the supply of physicians, which averaged 183.2 per 100,000 residents in 1996, ranged from fewer than 120 per 100,000 to more than 350.

The uneven distribution of the physician workforce raises the question of whether the deployment patterns of physicians might be explained by differences in population need — that some areas might have many more physicians because residents of those areas are much sicker, on average, than residents of areas with fewer physicians per 100,000 residents. Research conducted in conjunction with the Atlas indicates that, in fact, very little of the variation in the physician workforce deployment can be explained by differences in population illness.

This chapter examines the physician workforce in Michigan's 109 hospital service areas. The data come from the American Medical Association, the American Osteopathic Association, and the Medicare program, and are for 1996. A clinically active physician is defined as one who reported that he or she spent at least 20 hours a week in patient care. The population count is the Claritas estimate for 1995.

The estimates of the number of physicians allocated to populations per 100,000 persons take into account patient migration across the boundaries of hospital service areas, using a method similar to that used for hospital beds. For example, medical specialists and primary care physicians were allocated on the basis of medical admissions.

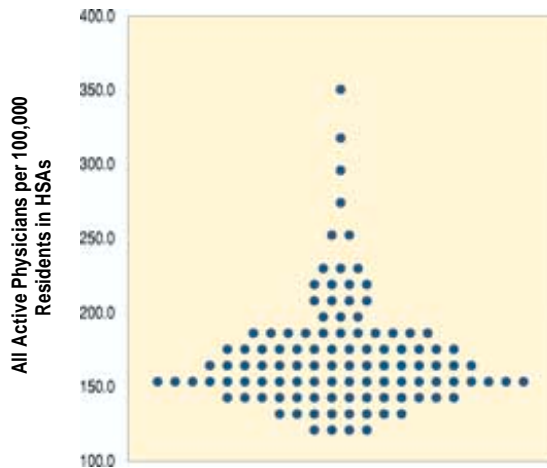
The estimates have been adjusted for differences in the age and sex of the populations of hospital service areas (see the Appendix on Methods).

## The Physician Workforce Active in Patient Care

In 1996, there were 495,507 physicians in active practice in the United States; about 17,000 of these were in the state of Michigan. The number allocated to hospital service areas in Michigan varied by a factor of 2.9, from fewer than 120 to more than 350 per 100,000 residents.

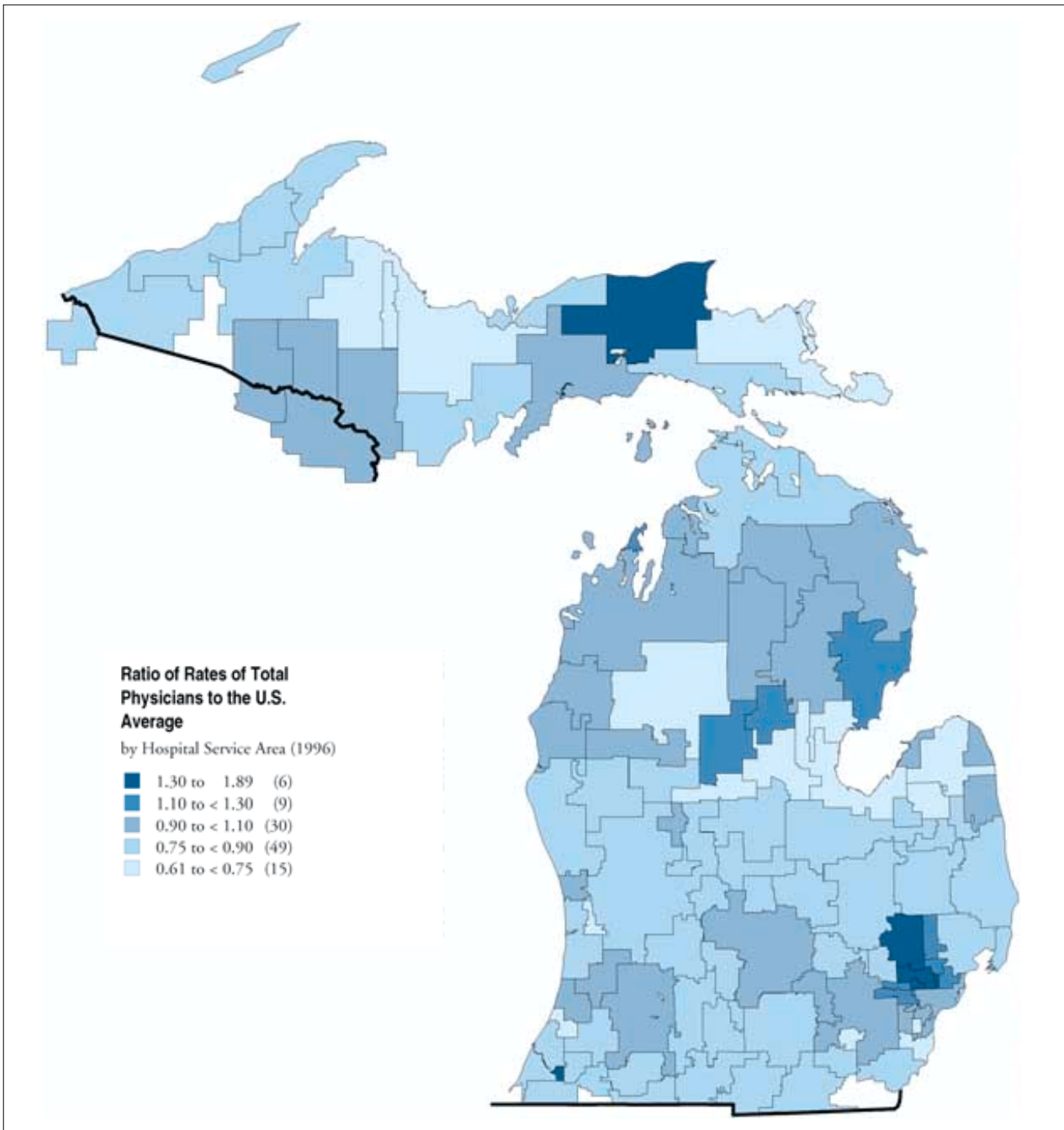
Among the large hospital service areas where the supplies of physicians active in patient care were substantially higher than the national average of 188.9 per 100,000 residents were Southfield (355.9); Royal Oak (319.0); Madison Heights (298.7); Pontiac (277.8) and Livonia (234.0).

Other large hospital service areas had physician workforces much smaller than either the national average or the Michigan average of 183.2 per 100,000 residents, including Mount Pleasant (121.0); Marquette (122.9); Taylor (129.9); Sault Ste Marie (132.9) and Trenton (134.4).



**Figure 2.4. Age and Sex Adjusted Numbers of Physicians Allocated to Hospital Service Areas (1996)**

*The number of physicians in active practice per 100,000 residents ranged from fewer than 120 to more than 350, after adjusting for differences in population age and sex. Each point represents one of the 109 hospital service areas in Michigan.*



**Map 2.4. The Physician Workforce (1996)**

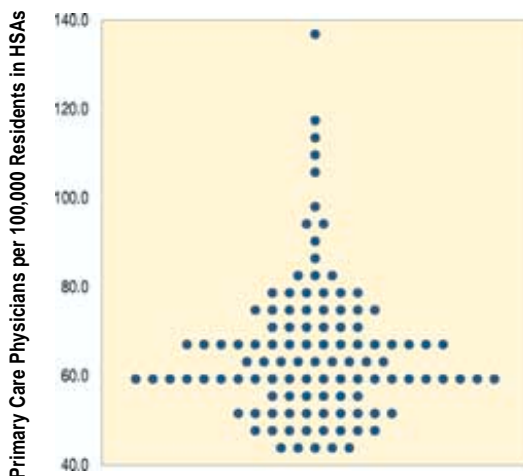
Six hospital service areas had physician workforces at least 30% higher than the national average. Fifteen areas had workforces more than 25% lower than the average.

## Physicians in Primary Care

Between 1970 and 1996, the number of active primary care physicians increased by about 65%, although the proportion of physicians who were in primary care — 35% — did not. In 1996 there were about 6,300 physicians in Michigan's primary care workforce. There were an average of 65.0 primary care physicians per 100,000 residents of the United States; in Michigan, the average was 66.6. The distribution of the primary care workforce, however, varied by a factor of 3.5, from about 40 to almost 140 per 100,000 residents.

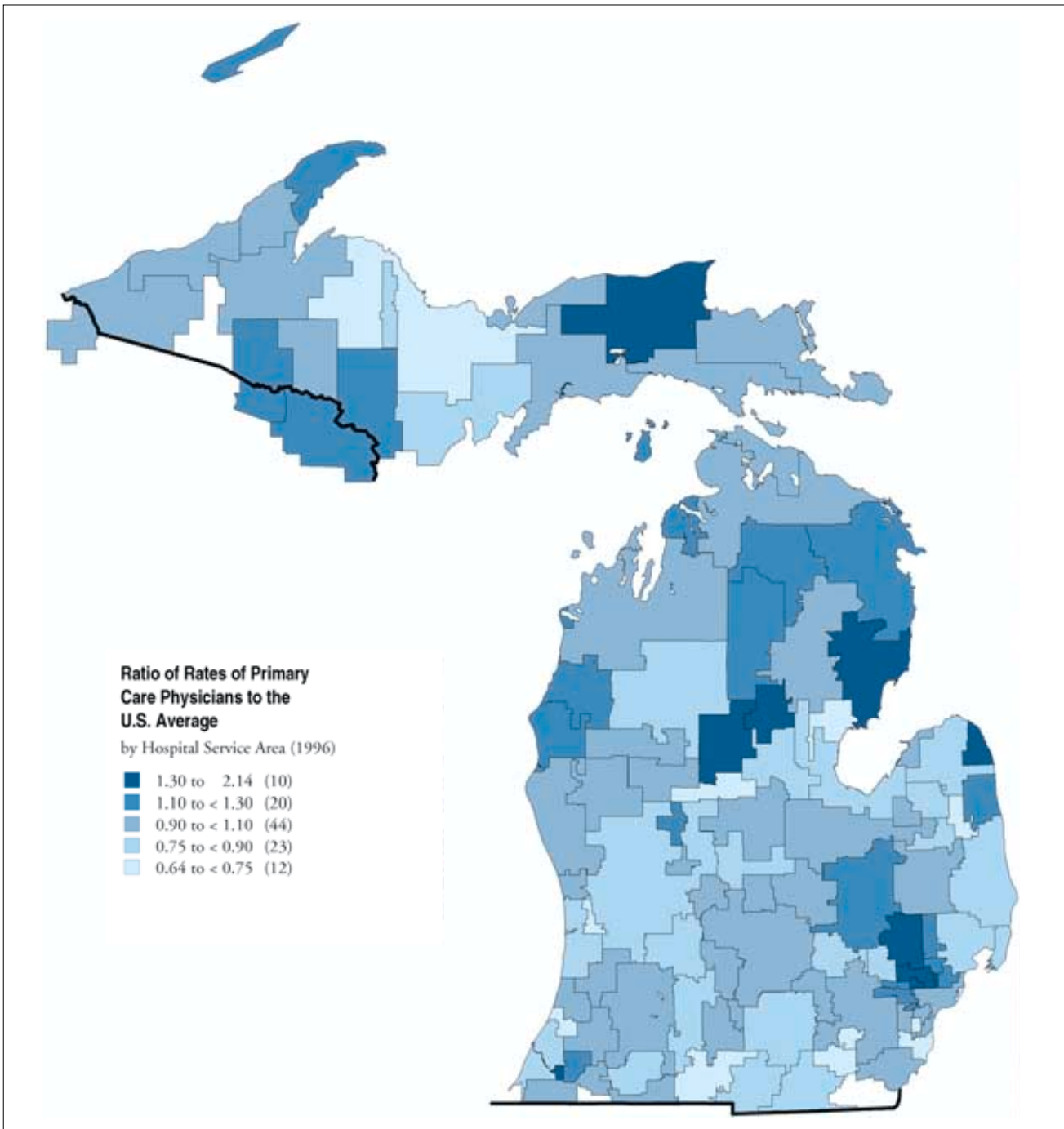
Among the large hospital service areas that had more than 100 primary care physicians per 100,000 residents were Southfield (138.8); Royal Oak (113.0); Madison Heights (105.2); Pontiac (92.7) and Tawas City (90.5).

Other large hospital service areas had fewer than 50 primary care physicians per 100,000 residents, including Marquette (41.8); Coldwater (44.3); Trenton (44.5); Mount Pleasant (46.4) and Taylor (46.9).



**Figure 2.5. Physicians in Primary Care Allocated to Hospital Service Areas (1996)**

*The number of primary care physicians in active practice ranged from about 40 to almost 140 per 100,000 residents, after adjusting for differences in population age and sex. Each point represents one of the 109 hospital service areas in Michigan.*



**Map 2.5. Primary Care Physicians (1996)**

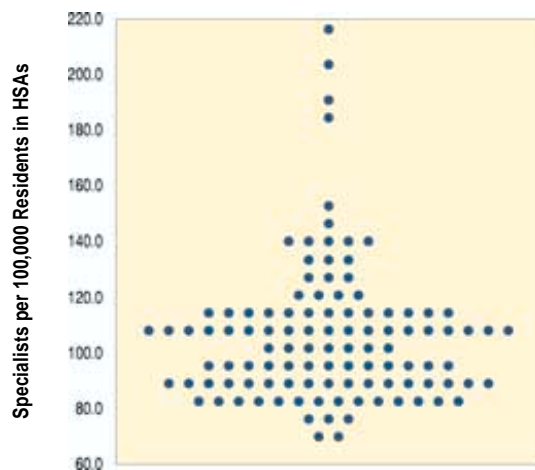
Ten hospital service areas had primary care workforces at least 30% higher than the national average; 12 had primary care workforces more than 25% below the average.

## Specialists

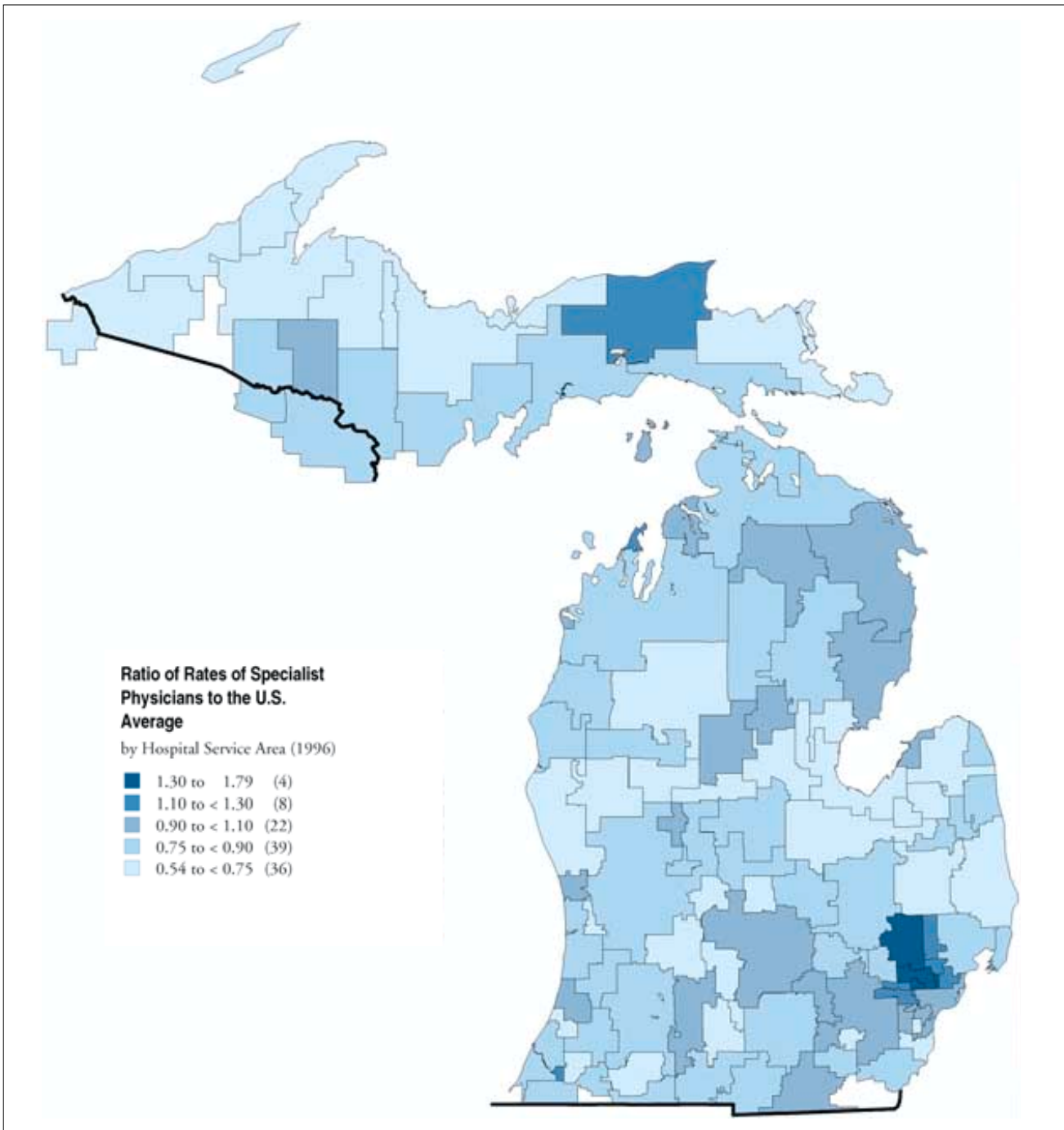
In 1996, clinically active physicians who were identified as specialists represented about 65% of the workforce, in spite of efforts to encourage medical graduates to enter primary care. In Michigan, almost 11,000 of the 17,000 physicians in the workforce were specialists. Nationally, there were 121.7 specialists per 100,000 residents; in Michigan, the average number was somewhat lower: 115.6. Within the state, the distribution of specialists varied from about 115 to almost 220 per 100,000 residents.

Among the large hospital service areas that had more than 150 specialists per 100,000 residents were Southfield (219.5); Royal Oak (205.8); Madison Heights (192.9); Pontiac (183.8) and Livonia (152.6).

Other hospital service areas had fewer than 80 specialists per 100,000 residents, including Sault Ste Marie (72.1); Mount Pleasant (73.9); Marquette (80.2); Lapeer (80.7) and Taylor (82.0).



**Figure 2.6. Specialist Physicians Allocated to Hospital Service Areas (1996)**  
*The number of specialist physicians per 100,000 residents ranged from fewer than 70 to almost 220 residents, after adjusting for differences in population age and sex. Each point represents one of the 109 hospital service areas in Michigan.*



**Map 2.6. Specialist Physicians (1996)**

Four hospital service areas had specialist workforces at least 30% higher than the national average. Thirty-six areas had primary care workforces more than 25% below the average.

**Chapter Two**  
**Table Note**

All measures of allocated hospital resources are expressed in rates per 1,000 residents. The physician supply is expressed in rates per 100,000 residents. All rates are adjusted for differences in the age and sex of populations. Estimates of allocated hospital employees and registered nurses are expressed as full-time equivalents (FTEs).

See the Appendix on Methods for details on the methods used for allocating resources, estimating populations and adjusting rates, and for other details concerning the rates in these tables.

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**Acute Care Hospital Resources and the Physician Workforce by Hospital Service Areas (1996)**

HSA City	Resident Population (1996)	Acute Care Hospital Beds per 100 Residents (1996)	Hospital Employees per 1,000 Residents (1996)	Registered Nurses per 1,000 Residents (1996)	Total Physicians per 100,000 Residents (1996)	Primary Care Physicians per 100,000 Residents (1996)	Specialists per 100,000 Residents (1996)
Adrian	65,207	2.8	14.9	3.1	164.3	52.2	111.2
Albion	15,882	4.4	17.3	4.2	146.5	59.0	86.3
Allegan	23,737	2.9	11.7	3.0	175.2	66.6	107.2
Alma	47,936	2.8	13.7	3.2	165.4	68.3	95.8
Alpena	45,890	3.2	14.9	3.4	188.0	74.0	113.3
Ann Arbor	514,402	1.8	12.6	2.7	191.3	68.5	121.9
Bad Axe	19,982	3.2	15.1	3.0	128.3	50.1	77.2
Battle Creek	112,961	3.0	13.4	3.9	169.6	56.6	112.1
Bay City	119,132	3.1	16.1	3.3	137.0	50.7	85.5
Berrien Center	1,018	7.5	31.2	8.2	256.7	119.2	137.0
Big Rapids	30,320	2.4	10.9	3.0	146.1	59.5	85.9
Cadillac	50,120	2.3	14.0	3.1	138.5	53.2	84.2
Caro	12,948	4.6	16.5	3.2	158.2	65.6	91.2
Carson City	15,967	3.4	17.8	3.4	149.3	54.4	94.1
Cass City	10,189	5.1	21.1	3.8	133.7	50.0	83.1
Charlevoix	18,082	2.4	10.5	3.2	191.4	73.0	117.0
Charlotte	28,189	3.1	17.8	3.2	147.3	59.1	86.8
Cheboygan	17,033	2.2	13.1	2.7	163.6	64.4	98.0
Chelsea	20,493	2.2	13.6	2.9	172.6	59.6	111.9
Clare	32,163	3.7	17.9	3.5	225.4	99.3	125.1
Coldwater	42,846	3.2	15.1	3.7	151.0	44.3	106.2
Crystal Falls	4,731	3.2	13.6	2.2	178.3	58.9	118.4
Dearborn	165,292	3.1	16.8	3.7	195.4	69.1	125.4
Deckerville	4,754	4.2	19.1	4.5	181.0	75.7	105.0
Detroit	1,098,646	3.9	21.6	5.0	174.6	60.0	113.7
Dowagiac	14,220	4.6	20.4	5.5	162.2	71.8	89.2
Escanaba	41,570	2.6	16.1	3.4	159.0	56.8	101.2
Farmington Hills	98,755	2.4	14.9	3.3	216.7	73.8	141.9
Flint	491,578	3.4	16.8	3.9	167.3	73.6	92.3
Frankfort	3,978	3.0	17.9	4.4	199.9	84.4	115.4
Fremont	26,277	2.8	15.6	3.7	143.0	59.5	81.8
Garden City	72,231	3.3	18.3	4.2	205.9	72.5	132.6
Gaylord	29,273	2.4	11.5	2.8	203.3	81.9	120.4
Gladwin	14,629	3.7	19.6	3.6	228.1	92.7	134.4
Grand Haven	49,265	2.2	11.1	2.5	178.6	64.9	112.6
Grand Rapids	727,338	2.0	12.2	3.2	156.4	58.0	97.3
Grayling	35,112	2.6	14.9	3.7	185.8	76.3	108.8
Greenville	17,520	2.7	15.8	3.9	158.3	60.4	96.6
Grosse Pointe	53,771	2.4	13.9	3.6	155.2	47.7	106.1

HSA City	Resident Population (1996)	Acute Care Hospital Beds per 1,000 Residents (1996)	Hospital Employees per 1,000 Residents (1996)	Registered Nurses per 1,000 Residents (1996)	Total Physicians per 100,000 Residents (1996)	Primary Care Physicians per 100,000 Residents (1996)	Specialists per 100,000 Residents (1996)
Hancock	25,054	2.5	13.9	2.0	158.7	65.9	92.1
Harbor Beach	5,432	6.1	27.6	4.8	189.0	86.7	102.1
Hastings	43,131	2.6	12.8	3.0	148.3	58.5	88.6
Hillsdale	38,155	2.5	14.2	3.5	164.3	57.7	105.3
Holland	105,253	2.1	9.7	2.4	153.4	51.7	101.0
Howell	54,664	1.9	14.4	3.5	151.6	54.4	96.2
Ionia	23,212	3.3	14.0	3.4	150.7	59.7	89.6
Iron Mountain	41,426	2.7	14.5	3.0	189.4	79.3	109.7
Iron River	9,024	3.2	13.1	2.3	175.9	72.1	104.8
Ironwood	22,406	2.9	12.2	2.4	158.8	66.8	91.3
Ishpeming	11,527	3.6	20.6	3.2	137.5	52.5	84.0
Jackson	160,276	3.0	17.1	4.0	158.5	52.8	104.9
Kalamazoo	290,747	2.1	10.7	3.0	173.2	62.8	109.4
L'Anse	10,463	2.9	13.9	2.2	142.2	61.7	79.9
Lakeview	4,459	2.7	15.6	3.5	199.0	78.8	118.7
Lansing	420,872	2.3	16.1	3.1	184.7	70.4	113.4
Lapeer	87,337	3.1	13.4	2.8	142.0	59.8	80.7
Laurium	12,653	3.9	17.0	3.6	169.1	84.2	84.2
Livonia	188,387	2.4	14.1	3.1	234.0	80.5	152.6
Ludington	28,505	2.9	14.5	3.7	175.6	74.3	100.2
Madison Heights	53,821	2.9	18.3	4.3	298.7	105.2	192.9
Manistee	21,253	2.8	13.9	3.2	177.5	78.1	99.3
Manistique	9,513	5.4	23.1	3.9	176.5	67.6	107.8
Marlette	8,307	3.8	20.0	3.7	142.5	49.3	92.4
Marquette	51,395	3.3	17.8	2.4	122.9	41.8	80.2
Marshall	23,371	3.6	15.2	4.2	147.9	59.2	87.6
Midland	89,083	2.1	12.1	2.3	139.6	51.1	87.5
Milford	112,012	1.9	10.7	2.8	163.0	56.1	106.1
Monroe	84,667	3.0	16.6	4.3	165.7	59.1	105.7
Mount Clemens	355,911	2.5	14.8	3.2	162.3	58.3	103.1
Mount Pleasant	50,720	2.5	13.0	2.4	121.0	46.4	73.9
Munising	6,277	5.0	15.1	2.4	151.6	65.0	85.1
Muskegon	180,780	2.9	13.1	2.6	145.5	61.7	82.3
Newberry	9,056	4.9	21.7	3.4	248.8	109.3	137.8
Niles	56,745	3.1	13.8	3.7	162.8	67.4	94.4
Northport	1,583	4.8	31.1	7.0	212.0	65.2	145.9
Ontonagon	5,224	4.7	24.3	3.6	156.4	67.2	87.9
Owosso	62,794	2.7	16.9	3.8	156.6	59.8	95.5
Paw Paw	28,373	2.1	11.2	3.3	165.1	66.0	97.6
Petoskey	66,993	2.9	12.5	3.4	165.4	59.4	105.1
Pigeon	7,063	3.8	20.1	3.9	183.4	70.8	111.4
Pontiac	341,004	2.6	14.8	3.4	277.8	92.7	183.8
Port Huron	137,266	2.7	12.4	3.1	142.2	50.9	90.4
Reed City	24,012	2.6	14.0	3.5	171.4	64.1	106.2
Rochester	114,999	2.0	12.4	3.0	218.1	79.0	138.3

HSA City	Resident Population (1996)	Acute Care Hospital Beds per 1,000 Residents (1996)	Hospital Employees per 1,000 Residents (1996)	Registered Nurses per 1,000 Residents (1996)	Total Physicians per 100,000 Residents (1996)	Primary Care Physicians per 100,000 Residents (1996)	Specialists per 100,000 Residents (1996)
Royal Oak	341,076	2.3	16.4	3.9	319.0	113.0	205.8
Saginaw	231,288	2.9	15.6	3.8	150.0	59.0	89.9
Saline	16,978	1.4	8.8	1.7	124.9	42.8	81.4
Sandusky	8,551	3.6	17.7	3.8	156.6	48.7	107.2
Sault Ste Marie	37,295	2.8	12.8	2.9	132.9	59.3	72.1
South Haven	24,123	3.2	14.1	3.4	182.2	68.4	112.5
Southfield	49,511	3.4	22.4	5.0	355.9	138.8	219.5
St. Clair	28,598	2.9	14.5	3.4	152.9	57.4	94.5
St. Johns	17,605	2.5	17.2	3.5	147.9	65.2	81.3
St. Joseph	108,943	2.8	15.3	3.4	163.9	56.5	106.4
Standish	12,500	3.1	18.6	3.5	135.9	45.4	89.8
Sturgis	27,099	3.6	17.1	3.8	161.9	64.0	96.6
Tawas City	32,915	3.9	21.2	4.5	220.6	90.5	129.3
Taylor	76,128	2.5	11.2	2.5	129.9	46.9	82.0
Tecumseh	23,696	2.9	14.9	3.1	154.8	48.7	105.3
Three Rivers	31,877	2.7	13.1	3.0	150.1	58.4	90.3
Traverse City	141,750	2.3	13.4	3.0	178.1	66.9	110.2
Trenton	95,683	2.4	11.0	2.6	134.4	44.5	89.1
Troy	119,024	1.8	12.4	3.2	211.5	75.1	135.6
Warren	228,755	3.0	15.9	3.9	223.6	80.2	142.6
Watervliet	14,817	3.3	15.8	3.8	127.0	47.1	78.8
Wayne	185,335	3.3	15.2	3.4	180.9	67.5	112.4
West Branch	33,936	3.3	14.6	3.6	173.8	65.2	107.5
Wyandotte	148,774	3.6	17.3	4.2	176.4	62.2	113.2
Zeeland	18,268	2.0	9.3	1.9	115.3	47.0	66.6
Michigan	9,733,167	2.8	15.3	3.5	183.2	66.6	115.6
United States	269,442,661	2.8	13.2	3.3	188.9	65.0	122.9

