Regional and Racial Variation in Health Care among Medicare Beneficiaries

A Brief Report of the Dartmouth Atlas Project

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The Robert Wood Johnson Foundation's Aligning Forces for Quality program commissioned this special report by the Dartmouth Atlas Project to highlight the uneven quality of health care being delivered across America and the need to improve the quality of care and reduce disparities in health in every community. Aligning Forces for Quality is working to lift the overall quality of health care in targeted communities across America, and provide models for national reform.

Improving health and health care in communities

The U.S. health care system faces unprecedented challenges. Overall life expectancy has improved, but racial and socioeconomic disparities in mortality and health status have recently been widening. Many Americans fail to receive treatments of proven benefit—a burden that falls more heavily on racial minorities and low-income populations. The safety and reliability of care in hospitals, surgical centers, nursing homes and physician offices is far from assured. Patients often receive care from multiple different physicians with little coordination or assurance that their recommendations are understood by patients and their families. Health care costs—already the highest in the world—are growing at a rate that is unaffordable to an increasing share of patients and employers. The current systems of public funding for care are unsustainable at the same time that almost 50 million Americans lack health insurance.

In U.S. health care, it's not only who you are that matters; it's also where you live. As numerous studies and previous Dartmouth Atlas reports have documented, income and race are important determinants of both the health care patients receive and of patients' health care outcomes. Equally important is the health system providing care; regardless of race and income, patients receive very different care depending upon where they live.

This Dartmouth Atlas Project report extends a previous report on racial disparities in health care and health outcomes. The spring 2008 report found that the differences in health care by race were compounded by variation across states and hospital referral regions of patient residence. In this report, we present information on five indicators in much smaller areas of health care delivery: Dartmouth Atlas hospital service areas. Although variation in care and outcomes is high across the previously reported large regions, hospital service areas offer information at a level that corresponds to local systems of health care, often representing the community served by a single hospital. Although some hospital service areas are quite large—encompassing an entire city—these local areas provide important insights to support possible change and reform in health care delivery.

Examples of variation in care by hospital service area and by race are presented for four of the fourteen regions that are participating in the Robert Wood Johnson Foundation Aligning Forces for Quality (AF4Q) program. Complete information on the indicators for each of the AF4Q regions is available both in supplementary tables and on the Dartmouth Atlas website. This report shows that care varies substantially even within the AF4Q regions. Initiatives to improve care will be most successful if directed towards the specific health systems where the need for change is the greatest.

The major findings are as follows.

- The rate of leg amputation—a devastating complication of diabetes and peripheral vascular disease—is 4.7 times greater in blacks than in whites nationally. Rates of amputation differ by a factor of 3.4 among U.S. states and 1.6 among AF4Q regions. Most importantly, there was more than a fivefold variation in leg amputations for hospital services areas within AF4Q regions. Because poverty is an important risk factor for amputations, addressing these remarkable disparities in health outcomes will require attention to the full spectrum of health determinants, ranging from lower levels of schooling, limited health literacy, inadequate housing and lack of transportation, to inadequate access to high quality, well-coordinated primary and specialty care.

- For evidence-based services, such as appropriate testing for diabetes, disparities across states, AF4Q regions, and hospital service areas are substantially greater than the differences by race. In other words, geographic variation in the use of evidence-based services is often larger than racial disparities in care. Furthermore, there are some areas where blacks receive equal or better care than whites but where care for all patients is less than ideal. The data highlight opportunities to improve the quality of ambulatory care for both blacks and whites.

- Regions and hospital service areas differ dramatically in their use of the hospital as a site of care. Although blacks in most regions are somewhat more likely than whites to be hospitalized for conditions that could also be treated outside the hospital, the differences are much greater across regions. These findings (and other recent Dartmouth Atlas reports) underscore the importance of the local delivery system, and its relative emphasis on acute, inpatient care as opposed to ambulatory care, as a determinant of where patients receive care for exacerbations of chronic illness.

The findings highlight the importance of understanding health and health care within a local context and of efforts to explore and address the underlying causes of disparities within and across regions.

A Note on Methods

The methods used in this report were developed over a number of years and have been described in detail in peer-reviewed publications and in previous editions of the Dartmouth Atlas. The data are drawn from the enrollment and claims data of the Medicare program and are restricted to the fee-for-service population over age 65; HMO patients are not included in our analysis. A brief overview of the approach and measures is provided here. (For more detailed descriptions of the approach see either the Appendix on Methods, downloadable at www.dartmouthatlas.org/af4q.shtm, or Baicker 2004.) The analysis entails four basic steps.

Defining geographic areas to compare. The first step requires defining the relevant geographic areas under study. In this report we present data for three different geographic units: (1) States and the District of Columbia; (2) Aligning Forces for

Quality (AF4Q) sites, fourteen geographic regions which were selected by the Robert Wood Johnson Foundation for participation in the Aligning Forces for Quality program; and (3) Hospital Service Areas (HSAs) (n = 3,436), which are natural markets for health care defined on the basis of travel for common causes of hospitalization.

Defining the population under study. Each of the analyses presented in this report focuses on either the entire fee-for-service Medicare population eligible for both Part A and B and between the ages of 65 and 99 or a subset of that population at risk for a specific procedure or service. For example, the analysis of amputations examines the entire Medicare population, while the analyses of testing among diabetics are restricted to Medicare beneficiaries between the ages of 65 and 75 with a diagnosis of diabetes. The study population can be thought of as the denominator of the measure.

Defining the event. The analysis relies upon claims submitted by providers (hospitals, physicians and outpatient facilities in this case) for specific services delivered to the population eligible for the specific measure. For example, the analysis of amputations entailed identifying all hospital discharges of fee-for-service Medicare beneficiaries where an amputation of the leg was recorded. The event can be thought of as the numerator of the measure.

Calculating rates. Each of the measures is either a proportion (e.g. the proportion of diabetics receiving hemoglobin A1c testing) or a rate (e.g. the count of amputations experienced by Medicare beneficiaries). In the latter case, beneficiaries can have more than one event. When appropriate, statistical adjustments are carried out to account for differences in age, race and sex.

A note on how race was defined. Although the analysis of treatment and outcomes across all racial and ethnic groups is an important goal, the designation of race/ethnicity in the Medicare data is currently limited. We focus on the comparison of blacks and non-blacks for several practical reasons. Separate analyses of the Hispanic population are challenging because fewer than half of self-designated Hispanics are coded as such in the Medicare data, Hispanics constitute less than 6% of the elderly population, and they are highly clustered in a few communities. Although racial designation for Asians and American Indians is more accurate, their small numbers (less than 3%) also limit the precision of race-specific analyses. At the same time, excluding any of these populations from the regional comparisons in this report was judged to be undesirable. We therefore restricted the analyses in the current report to blacks and non-blacks, and, for ease of exposition, we refer to the non-black population as white. These challenges, and the future growth of the Hispanic population, underscore the importance of improving the coding of race and ethnicity.

Leg Amputation

Amputation of a leg is an infrequent but devastating complication of peripheral vascular disease and diabetes. Inadequate blood supply and nerve damage predispose patients to injury and to infection, which can fail to heal and which can sometimes only be treated by amputation. A broad array of environmental, social and behavioral factors place patients at risk for developing the underlying diseases and for losing a limb. These include smoking, obesity, a sedentary lifestyle, poor blood pressure control, and lack of access to high quality primary and specialty medical care. Rigorous attention to proper foot care is essential for those at risk, including daily self-examination, the use of specially-fitted shoes, and timely attention to what would otherwise be trivial injuries such as calluses, blisters or splinters. Poverty and race represent major risk factors for amputation. Among Medicare beneficiaries who have an amputation, more than 25% have a second amputation within a year and over 30% die within the same period (Dillingham 2005).

Nationally, rates of leg amputation decreased about 19% between 2003 and 2006 (Figure 1). However, leg amputation rates vary dramatically depending upon who you are and where you live. During the period 2003-06, in the fee-for-service Medicare population, blacks were on average more than four times more likely to undergo amputation than whites, but amputation rates varied substantially for both blacks and whites across states and were correlated at both the state and hospital service area level (r = 0.53 for the 100 HSAs with the most black Medicare enrollees) (Figure 2).

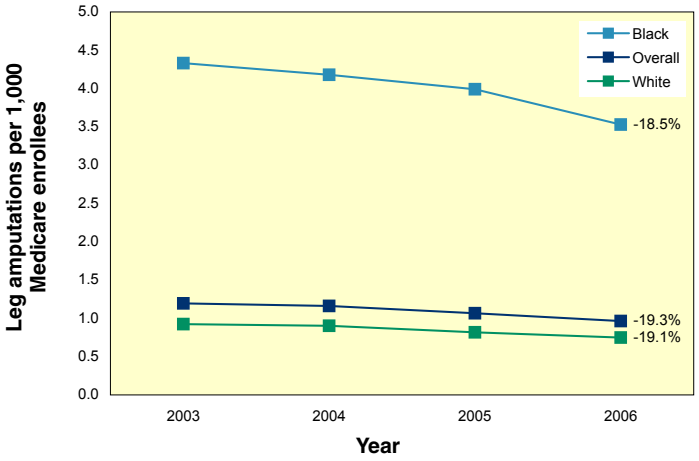


Figure 1. Trends in national rates of leg amputation among Medicare enrollees (2003 to 2006)

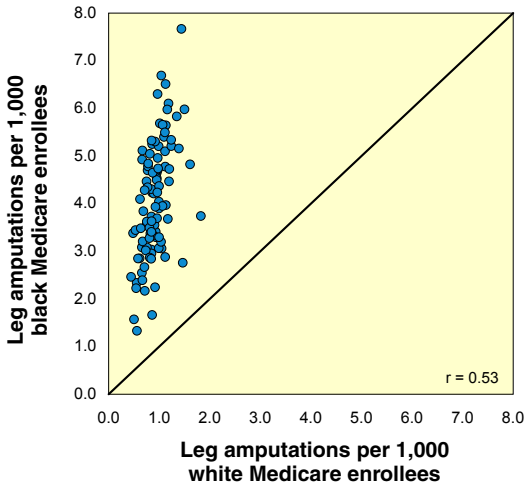
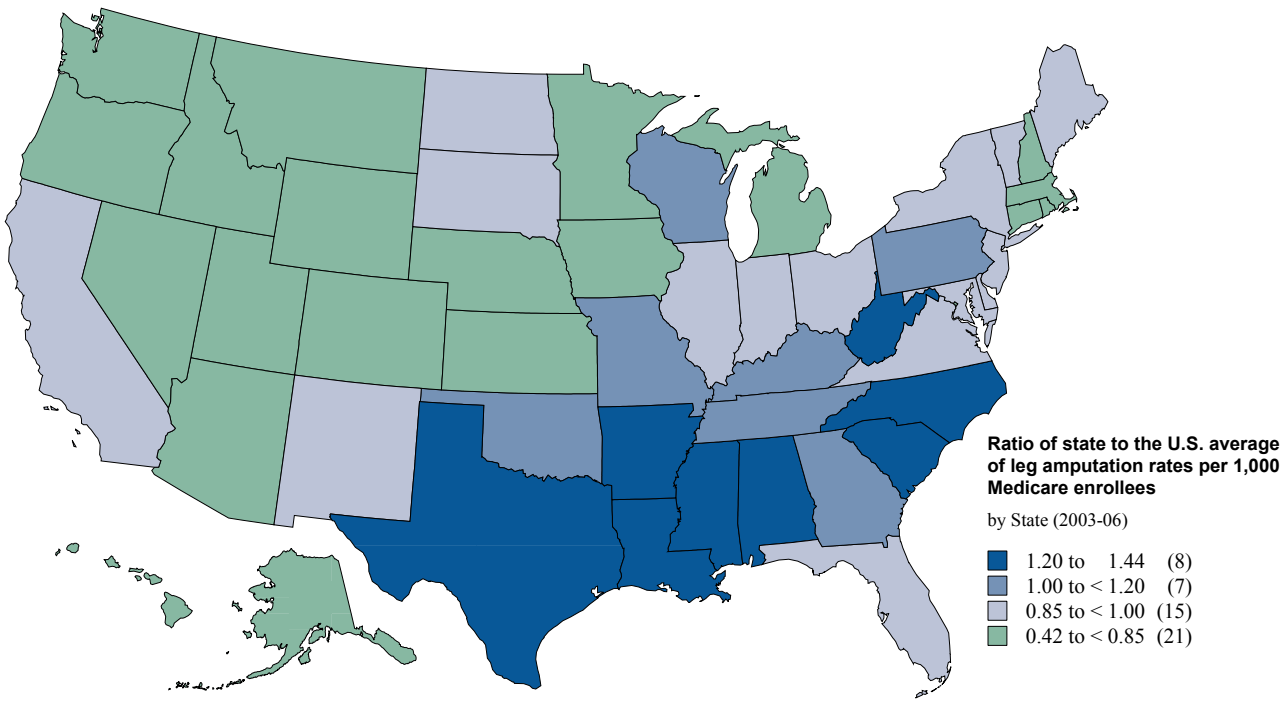


Figure 2. Relationship between rates of leg amputation among black and white Medicare enrollees in hospital service areas with 100 largest populations of black enrollees (2003-06)

The figure shows the strong correlation between black and white amputation rates. In all areas, the amputation rate was higher for blacks than whites. Rates for all hospital service areas with sufficient sample sizes to report are available from our web site.



Map 1. Leg amputation, by state (2003-06)

Ratio of overall state rate to the U.S. average															
0.42 to < 0.85				0.85 to < 1.00				1.00 to < 1.20				1.20 to 1.44			
Rates per 1,000 Medicare enrollees															
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
CT	0.92	2.73	0.75	VA	1.08	3.97	0.83	TN	1.30	4.39	1.05	LA	1.57	5.80	1.20
WA	0.92	2.43	0.73	IN	1.07	3.30	0.87	GA	1.30	4.99	0.95	MS	1.56	5.54	1.26
NH	0.91	n/a	n/a	NY	1.04	3.38	0.85	PA	1.23	3.32	1.01	SC	1.51	5.87	1.07
MA	0.90	2.24	0.73	OH	1.04	3.20	0.85	KY	1.23	3.43	1.00	AL	1.43	5.15	1.12
RI	0.89	2.43	0.71	SD	1.04	n/a	n/a	WI	1.16	3.82	0.90	TX	1.43	4.02	1.21
MI	0.89	2.87	0.73	IL	1.02	3.29	0.83	OK	1.14	3.49	0.91	NC	1.34	5.11	0.99
DC	0.88	3.34	0.46	NJ	1.02	3.50	0.81	MO	1.11	4.13	0.85	AR	1.33	5.41	0.97
HI	0.88	n/a	n/a	DE	1.00	3.43	0.80					WV	1.33	3.80	1.05
KS	0.87	2.41	0.69	VT	0.98	n/a	n/a								
AK	0.86	n/a	n/a	ND	0.97	n/a	n/a								
MN	0.85	2.03	0.66	CA	0.97	3.19	0.76								
IA	0.84	2.94	0.65	ME	0.95	n/a	n/a								
NE	0.84	1.91	0.67	MD	0.95	3.37	0.75								
AZ	0.82	2.34	0.65	FL	0.95	3.98	0.70								
OR	0.82	2.53	0.64	NM	0.93	1.63	0.75								
MT	0.82	n/a	n/a												
WY	0.79	n/a	n/a												
ID	0.70	n/a	n/a												
NV	0.69	1.43	0.58												
CO	0.64	1.69	0.51												
UT	0.46	n/a	n/a												

NOTE: The map shows the ratio of each state to the national average for leg amputation rates. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each state per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

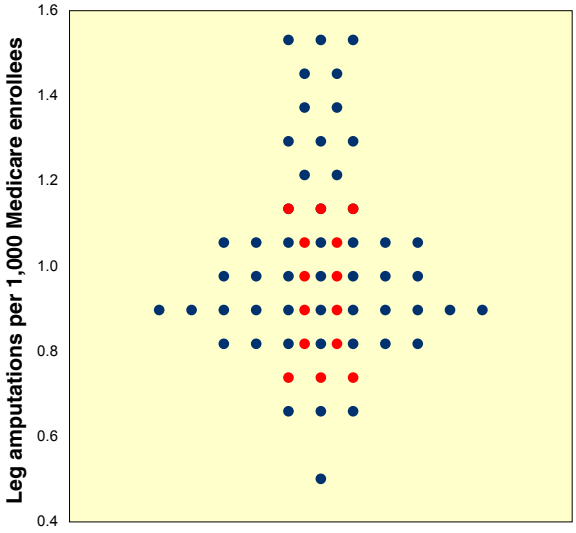


Figure 3. Leg amputations per 1,000 Medicare enrollees among AF4Q regions (red dots) and states (blue dots) (2003-06)

Region	Overall	Black	White
Wisconsin	1.16	3.82	0.90
Memphis, TN	1.12	4.40	0.70
South Central Pennsylvania	1.11	n/a	n/a
Western New York	1.07	1.96	0.96
Cincinnati, OH	1.07	3.56	0.85
Cleveland, OH	0.97	3.10	0.86
Maine	0.95	n/a	n/a
Western Michigan	0.89	3.37	0.69
Puget Sound, WA	0.89	2.47	0.71
Minnesota	0.85	2.03	0.66
Detroit, MI	0.84	2.84	0.69
Willamette Valley, OR	0.77	n/a	n/a
Kansas City, MO	0.75	2.72	0.58
Humboldt County, CA	0.71	n/a	n/a

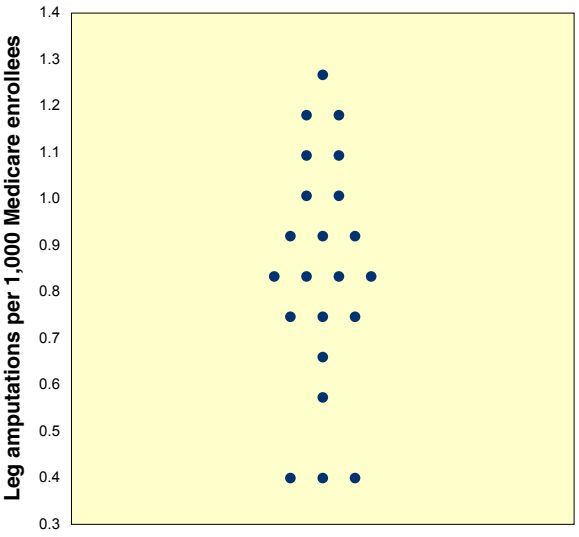
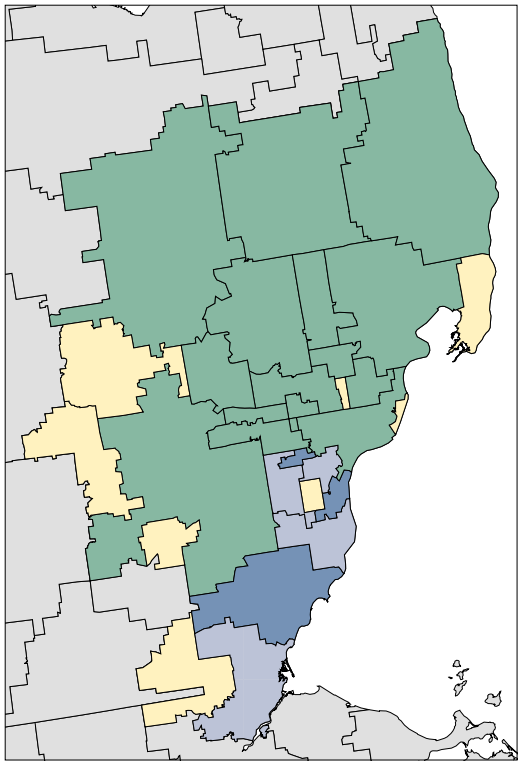


Figure 4. Leg amputation rates across the 30 hospital service areas in the Detroit, Michigan AF4Q region (2003-06)

The amputation rate for blacks was more than 5.5 per 1,000 in Louisiana, Mississippi and South Carolina but was less than 1.7 per 1,000 in Nevada and Colorado. Although the rates for whites were much lower, the disparities across states were similar; the amputation rates for whites in Mississippi and Louisiana were around 1.2 per 1,000 but were about half that in Nevada and Colorado (Map 1). Among AF4Q regions, the overall leg amputation rate varied from 0.71 per 1,000 in Humboldt County, California to 1.16 in Wisconsin. Among black enrollees, amputation rates varied more than twofold, from 2.0 to 4.4 per 1,000; among white enrollees, rates varied from 0.58 to 0.96 per 1,000 (Figure 3).

The AF4Q region in the Detroit, Michigan area includes a Medicare population of roughly 500,000 beneficiaries living within 30 hospital service areas. While the overall amputation rate for the Detroit region was 0.84 per 1,000 (2.84 for blacks and 0.69 for whites) during the period 2003-06, the rate varied markedly across hospital service areas, ranging from 0.36 in Rochester, Michigan to 1.27 in Monroe, Michigan (Figure 4). No hospital service area in the Detroit region had an overall amputation rate that was more than 20% above the national average (Map 2).



Ratio of HSA to the U.S. average of leg amputation rates per 1,000 Medicare enrollees

by Hospital Service Area (2003-06)

- 1.20 or more (0)
- 1.00 to < 1.20 (3)
- 0.85 to < 1.00 (4)
- 0.32 to < 0.85 (15)
- Insufficient data (8)

Map 2. Leg amputation in the Detroit, Michigan AF4Q region, by hospital service area (2003-06)

Ratio of overall HSA rate to the U.S. average											
0.32 to < 0.85				0.85 to < 1.00				1.00 to < 1.20			
Rates per 1,000 Medicare enrollees											
	Overall	Black	White		Overall	Black	White		Overall	Black	White
Flint	0.90	3.02	0.73	Trenton	1.06	n/a	n/a	Monroe	1.27	n/a	n/a
Livonia	0.89	n/a	n/a	Toledo, OH	1.05	3.63	0.85	Garden City	1.19	n/a	n/a
Port Huron	0.88	n/a	n/a	Wayne	1.05	2.68	1.06	Wyandotte	1.18	n/a	n/a
Detroit	0.85	2.88	1.12	Dearborn	0.98	n/a	n/a				
Warren	0.85	n/a	n/a								
Pontiac	0.84	3.65	0.60								
Royal Oak	0.80	3.75	0.56								
Milford	0.79	n/a	n/a								
Ann Arbor	0.77	2.34	0.62								
Mount Clemens	0.75	n/a	n/a								
Lapeer	0.67	n/a	n/a								
Farmington Hills	0.59	n/a	n/a								
Troy	0.44	n/a	n/a								
Southfield	0.41	n/a	n/a								
Rochester	0.36	n/a	n/a								

NOTE: The map shows the ratio of each hospital service area to the national average for leg amputation rates. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each hospital service area per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

Management of Diabetes: Hemoglobin A1c Measurement

Diabetes is a chronic illness that affects almost 21 million Americans. Between 5 and 10% of patients have type 1 diabetes, caused by the destruction of the insulin-producing cells in the pancreas. Type 2 diabetes is by far the most common type of diabetes, especially in the Medicare population, and is associated with older age, physical inactivity, and overweight. Patients with type 2 diabetes still produce insulin, but cannot use the insulin effectively. In both types of diabetes, blood sugar levels rise and, without treatment, serious complications can occur. Diabetes is the sixth leading cause of death and is associated with complications including blindness, stroke, heart attack, kidney failure and nerve damage. Clinical trials have shown that proper management of diabetes, including blood sugar and blood pressure control and attention to risk factors for heart disease—such as smoking and elevated cholesterol levels—can reduce the risk of complications.

To help foster improvement in the care of patients with diabetes, the Ambulatory Quality Alliance, representing a broad coalition of professional organizations, health plans, purchasers and government agencies, has recommended an initial set of quality measures for patients with diabetes. These include three measures of whether a diabetic patient has received specific diagnostic tests: testing of their hemoglobin A1c, a retinal exam, and testing of their cholesterol levels.

The average rate of hemoglobin A1c testing in the United States increased more than 3% from 2003 to 2006 (Figure 5). Figure 6 shows the relationship between black and white testing rates for the 100 U.S. hospital service areas with the greatest numbers of blacks. Blacks were less likely to receive annual hemoglobin A1c testing than whites, but the differences between blacks and whites varied substantially; and the difference across areas was greater than the differences in screening rates within every area.

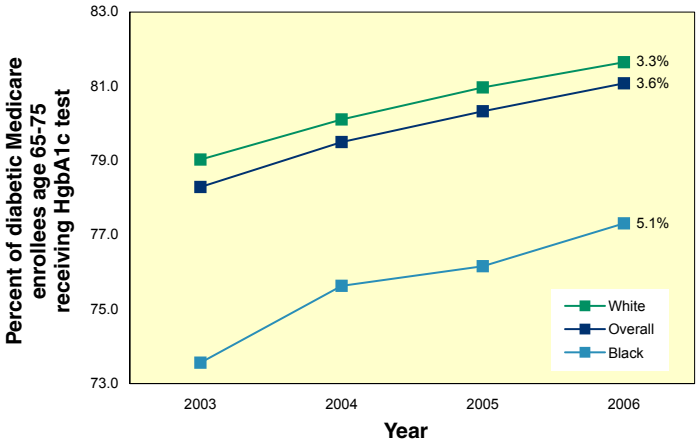


Figure 5. Trends in national rates of hemoglobin A1c testing among diabetic Medicare enrollees age 65-75 (2003 to 2006)

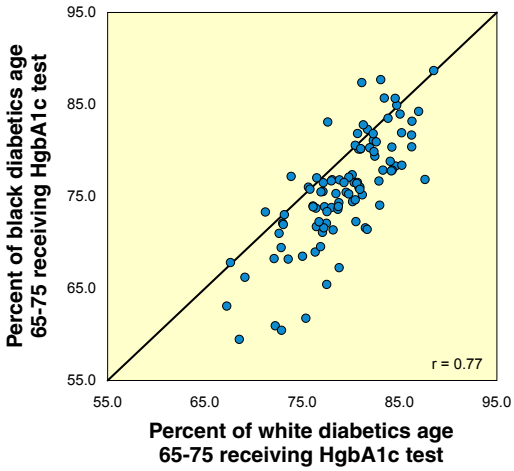
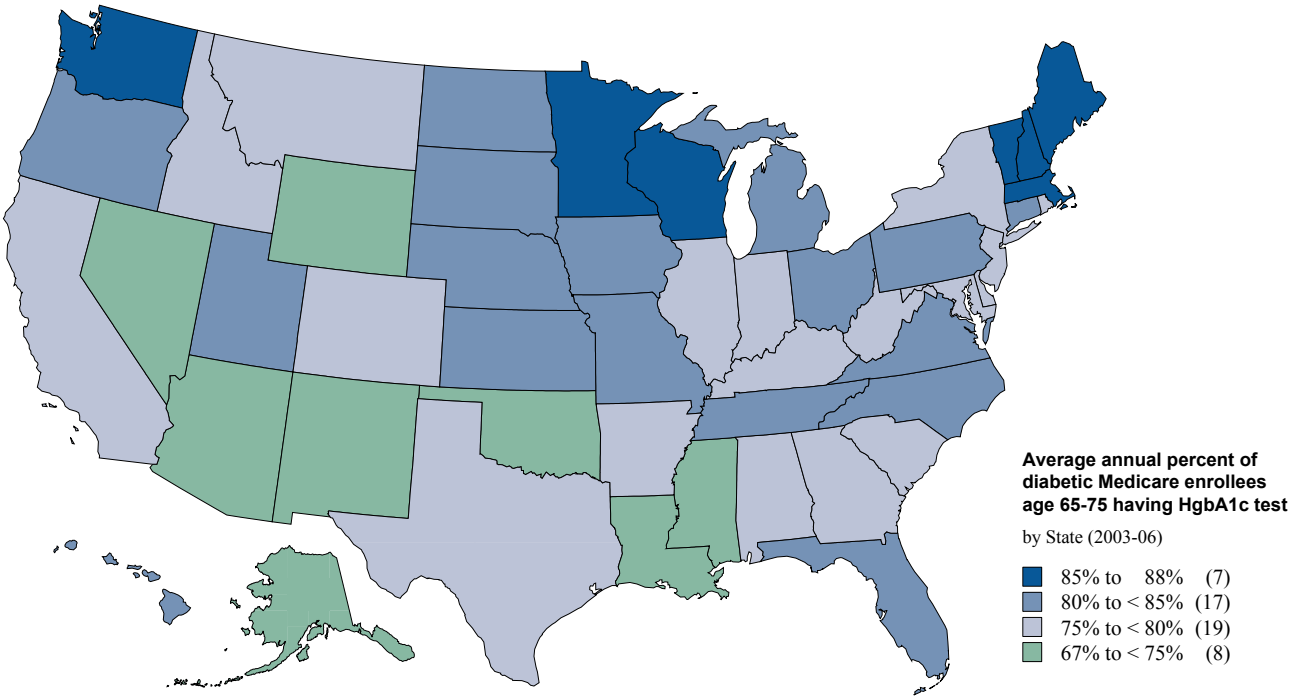


Figure 6. Relationship between rates of hemoglobin A1c testing among black and white diabetic Medicare enrollees age 65-75 in hospital service areas with 100 largest populations of black enrollees (2003-06)

The figure shows the proportion of diabetics age 65-75 receiving hemoglobin A1c testing for black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Rates for all hospital service areas with sufficient sample sizes to report are available from our web site.



Map 3. Hemoglobin A1c testing among diabetic Medicare enrollees age 65-75, by state (2003-06)

Percent of diabetics age 65-75 receiving HgbA1c test															
67% to < 75%				75% to < 80%				75% to < 80%				80% to < 85%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
LA	74.9	73.6	75.5	DE	80.0	77.0	80.7	ND	84.8	n/a	n/a	WI	87.6	82.5	87.9
AZ	74.0	74.2	74.0	MD	79.9	75.9	81.6	IA	84.6	82.7	84.6	VT	87.3	n/a	n/a
MS	73.7	73.2	73.9	WV	79.7	74.6	79.9	NC	83.7	82.7	84.0	ME	87.0	n/a	n/a
WY	73.3	n/a	n/a	NY	79.6	73.2	80.7	OR	83.5	89.5	83.4	MN	86.4	80.0	86.5
NV	73.1	72.3	73.2	ID	79.5	n/a	n/a	CT	82.9	79.5	83.3	NH	86.3	n/a	n/a
OK	73.0	74.5	72.9	IN	79.4	71.2	80.3	KS	82.8	74.9	83.3	WA	85.4	77.5	85.6
NM	70.0	71.2	70.0	GA	79.0	77.7	79.4	HI	82.7	n/a	n/a	MA	85.3	83.7	85.4
AK	67.3	n/a	n/a	KY	78.9	80.3	78.8	NE	82.6	78.6	82.7				
				RI	78.8	71.1	79.3	MI	82.5	76.5	83.5				
				CO	78.3	62.2	79.1	TN	82.4	77.8	83.2				
				SC	78.2	77.0	78.8	PA	82.3	74.9	83.0				
				MT	78.1	n/a	n/a	SD	82.3	n/a	n/a				
				IL	78.0	66.7	80.1	UT	81.6	n/a	n/a				
				TX	77.9	76.7	78.1	VA	81.5	78.2	82.7				
				AL	77.6	76.1	78.0	OH	81.2	76.8	81.8				
				NJ	76.4	70.6	77.6	MO	80.7	75.0	81.4				
				AR	75.9	73.9	76.3	FL	80.0	77.4	80.3				
				CA	75.6	69.2	76.1								
				DC	75.3	75.0	77.5								

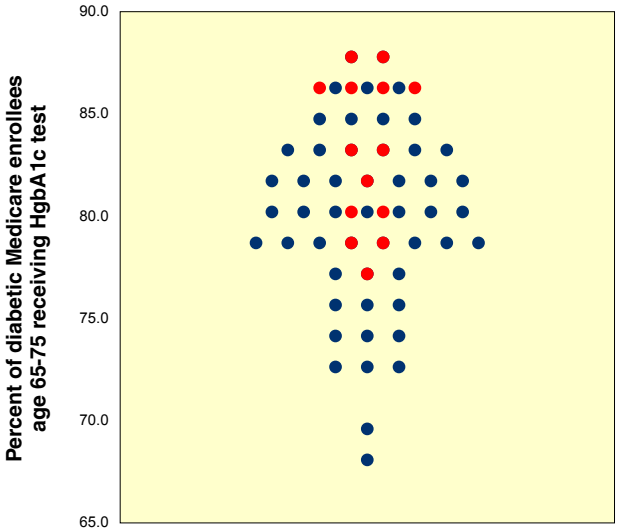


Figure 7. Percent of diabetic Medicare enrollees age 65-75 receiving hemoglobin A1c testing among AF4Q regions (red dots) and states (blue dots) (2003-06)

Region	Overall	Black	White
South Central Pennsylvania	88.5	n/a	n/a
Wisconsin	87.6	82.5	87.9
Maine	87.0	n/a	n/a
Minnesota	86.4	80.0	86.5
Western Michigan	86.2	80.5	86.5
Puget Sound, WA	85.6	78.3	85.9
Willamette Valley, OR	83.9	89.9	83.7
Western New York	83.1	78.6	83.7
Cincinnati, OH	81.9	78.2	82.4
Detroit, MI	80.7	75.2	82.5
Kansas City, MO	80.7	70.6	82.7
Cleveland, OH	79.4	74.8	81.5
Memphis, TN	78.3	74.5	82.3
Humboldt County, CA	76.5	n/a	n/a

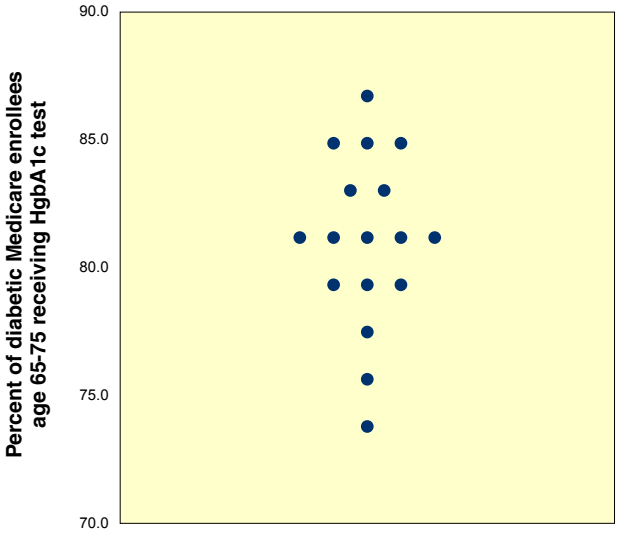
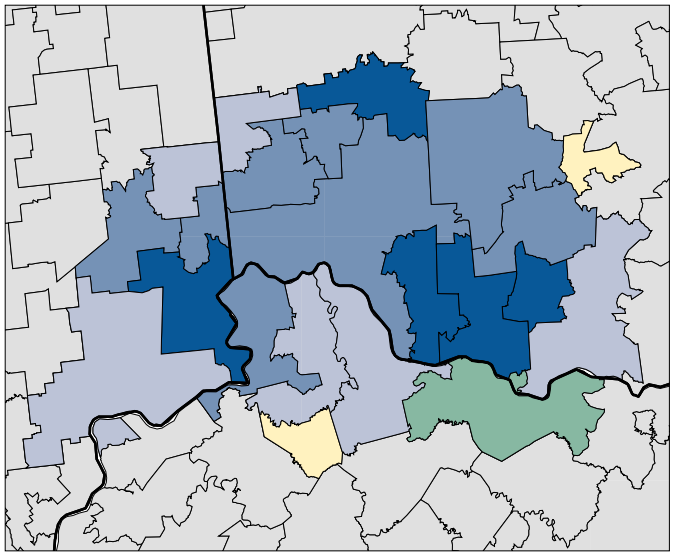


Figure 8. Hemoglobin A1c testing rates across the 19 hospital service areas of the Cincinnati, Ohio AF4Q region (2003-06)

Overall rates of hemoglobin A1c testing among states ranged from 67% to 88% during the period 2003-06. The greatest gaps in testing rates were in Illinois (white rate = 80%; black rate = 67%) and Colorado (white rate = 79%; black rate = 62%). The smallest gaps were in Mississippi and Arizona (Map 3). Among AF4Q regions, the percent of diabetics receiving hemoglobin A1c testing ranged from 76.5% in Humboldt County, California to 88.5% in South Central Pennsylvania. In Kansas City, the rate among black diabetics was almost 15% lower than the rate among whites (Figure 7).

Within the 19 hospital services located in the Cincinnati, Ohio AF4Q region, overall rates of hemoglobin A1c testing varied from 74% in Maysville, Kentucky to 86% in Batavia, Ohio during the period 2003-06. Only the Cincinnati hospital service area had a sufficient number of black diabetics to report race-specific rates. In that area, the screening rate among white diabetics was 84%; the rate among black diabetics was 78%.



Map 4. Hemoglobin A1c testing in the Cincinnati, Ohio AF4Q region, by hospital service area (2003-06)

Percent of diabetics age 65-75 receiving HgbA1c test							
74% to < 75%		75% to < 80%		80% to < 85%		85% to 86%	
	Overall		Overall		Overall		Overall
Maysville, KY	74.1	Oxford, OH	79.7	Hillsboro, OH	83.4	Batavia, OH	86.0
		Fort Thomas, KY	79.0	Cincinnati, OH	82.8	Georgetown, OH	85.2
		Covington, KY	78.5	Middletown, OH	81.6	Lawrenceburg, IN	85.1
		Madison, IN	78.2	Florence, KY	81.5	Kettering, OH	85.1
		West Union, OH	75.8	Hamilton, OH	81.4		
				Wilmington, OH	80.7		
				Batesville, IN	80.7		

Management of Diabetes: Blood Lipids Testing

Cardiovascular disease occurs at a much higher rate in diabetics than in the non-diabetic population. Some, although not all, of this excess incidence is related to cholesterol abnormalities. The Dartmouth Atlas reports the measure of appropriate cholesterol testing approved by the Ambulatory Quality Alliance: the proportion of diabetics who receive at least one low-density lipoprotein-cholesterol (LDL_C) test at least once every two years.

The average rate of blood lipids testing in the United States increased about 6% from 2003 to 2006. The rate among black diabetics increased nearly 10%; however, a large gap remained between testing rates among black and white diabetics (Figure 9). Among the 100 U.S. hospital service areas with the greatest numbers of blacks, the relationship between testing rates among black and white diabetics was strong (r = 0.72). Whites were more likely than blacks to receive a blood lipids test at least every other year within individual hospital service areas, but blacks in some areas were more likely to have their cholesterol tested than whites in other areas (Figure 10).

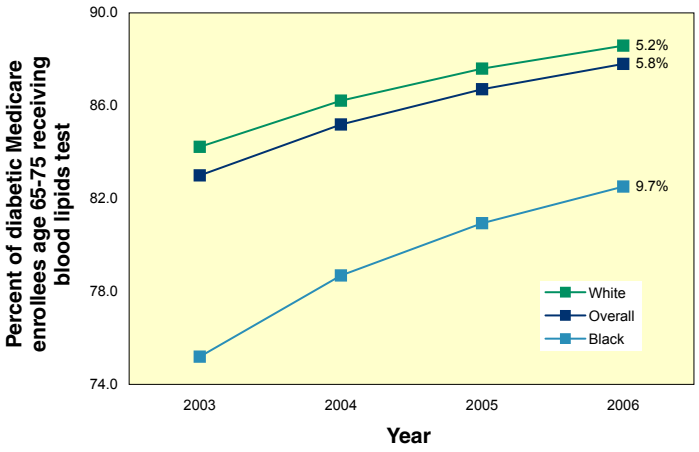


Figure 9. Trends in national rates of blood lipids testing among diabetic Medicare enrollees age 65-75 (2003 to 2006)

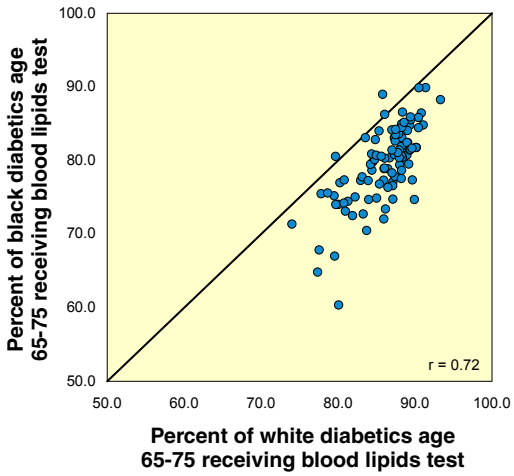
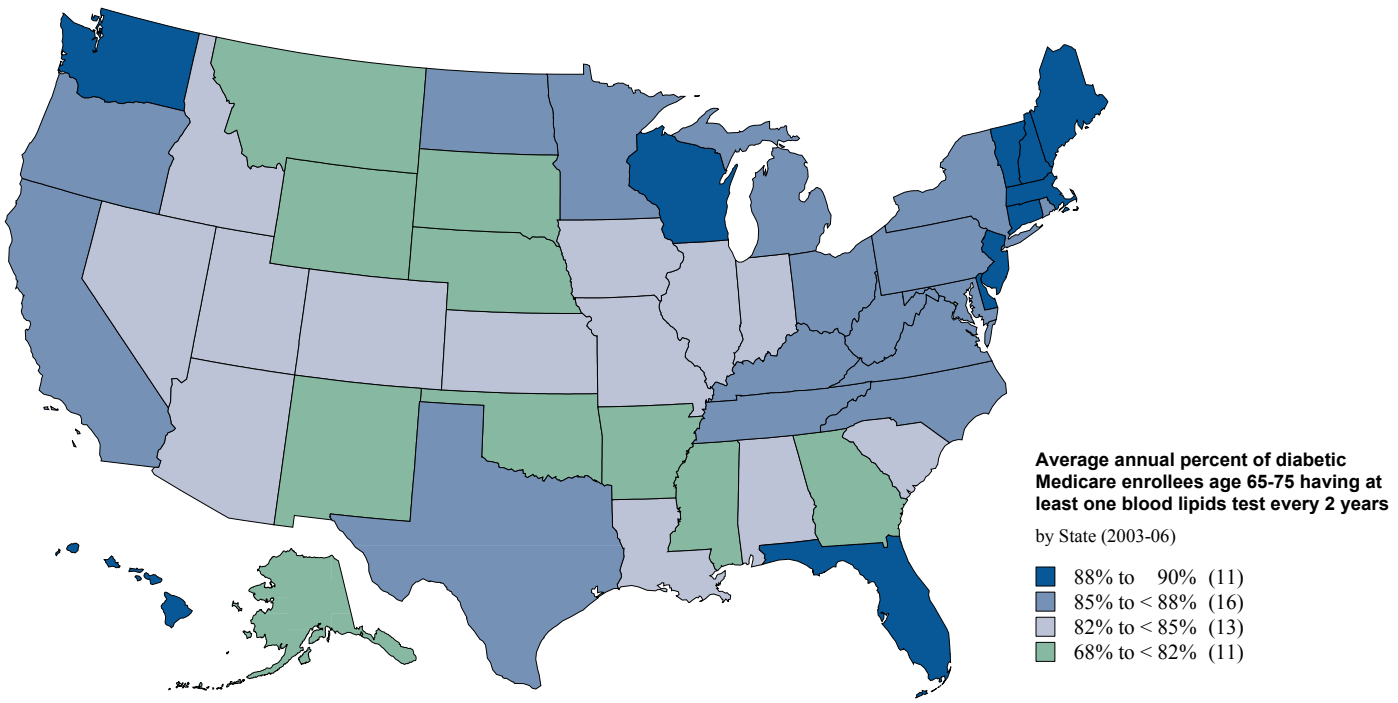


Figure 10. Relationship between rates of blood lipids testing among black and white diabetic Medicare enrollees age 65-75 in hospital service areas with 100 largest populations of black enrollees (2003-06)

The figure shows the proportion of diabetics age 65-75 receiving blood lipids testing for black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Rates for all hospital service areas with sufficient sample sizes to report are available from our web site.



Map 5. Blood lipids testing among diabetic Medicare enrollees age 65-75, by state (2003-06)

Percent of diabetics age 65-75 receiving blood lipids test

68% to < 82%				82% to < 85%				85% to < 88%				88% to 90%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
GA	81.5	76.3	83.4	UT	84.8	n/a	n/a	NY	87.7	79.5	89.1	FL	89.8	85.3	90.4
DC	81.1	80.3	86.7	IL	84.6	74.1	86.5	MN	87.6	71.8	87.8	NH	89.5	n/a	n/a
MT	81.1	n/a	n/a	IA	84.4	81.2	84.4	ND	87.4	n/a	n/a	DE	88.9	84.4	90.1
SD	80.5	n/a	n/a	SC	84.2	80.6	85.8	PA	87.2	78.1	88.0	ME	88.9	n/a	n/a
NE	80.3	76.2	80.5	IN	84.1	75.6	85.0	MD	87.2	82.6	89.1	VT	88.7	n/a	n/a
AR	80.0	73.0	81.3	NV	83.7	81.0	83.9	OH	87.2	81.6	88.0	WI	88.5	80.3	88.9
OK	78.8	76.9	78.9	CO	83.4	74.4	83.9	MI	86.9	79.3	88.3	CT	88.5	81.1	89.4
NM	77.9	74.6	78.0	MO	83.3	77.2	84.0	OR	86.9	84.9	86.9	HI	88.3	n/a	n/a
MS	75.9	72.7	77.6	ID	83.0	n/a	n/a	TX	86.8	82.4	87.4	MA	88.2	82.2	88.6
AK	74.2	n/a	n/a	LA	82.8	79.3	84.4	RI	86.4	80.7	86.7	NJ	88.2	81.6	89.5
WY	68.0	n/a	n/a	AL	82.3	77.0	83.9	CA	86.4	78.4	87.0	WA	88.2	77.7	88.5
				AZ	82.1	82.0	82.1	VA	85.9	80.4	87.7				
				KS	82.1	70.5	82.9	TN	85.8	78.6	87.0				
								WV	85.6	77.9	85.8				
								KY	85.6	81.3	85.9				
								NC	85.0	80.1	86.7				

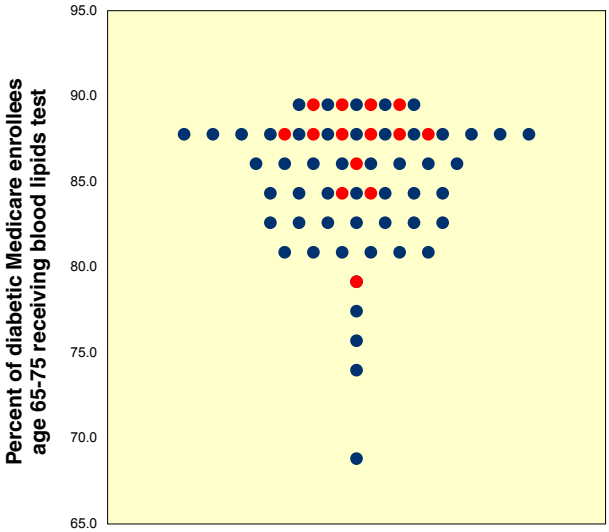


Figure 11. Percent of diabetic Medicare enrollees age 65-75 receiving blood lipids testing among AF4Q regions (red dots) and states (blue dots) (2003-06)

Region	Overall	Black	White
South Central Pennsylvania	90.4	n/a	n/a
Western New York	89.5	85.4	90.0
Western Michigan	88.9	83.4	89.3
Maine	88.9	n/a	n/a
Wisconsin	88.5	80.3	88.9
Puget Sound, WA	88.2	78.1	88.7
Humboldt County, CA	87.6	n/a	n/a
Minnesota	87.6	71.8	87.8
Willamette Valley, OR	87.5	84.8	87.6
Cincinnati, OH	87.3	81.2	88.1
Cleveland, OH	86.4	80.8	89.0
Detroit, MI	84.9	76.7	87.5
Kansas City, MO	84.8	76.2	86.5
Memphis, TN	79.9	76.9	83.1

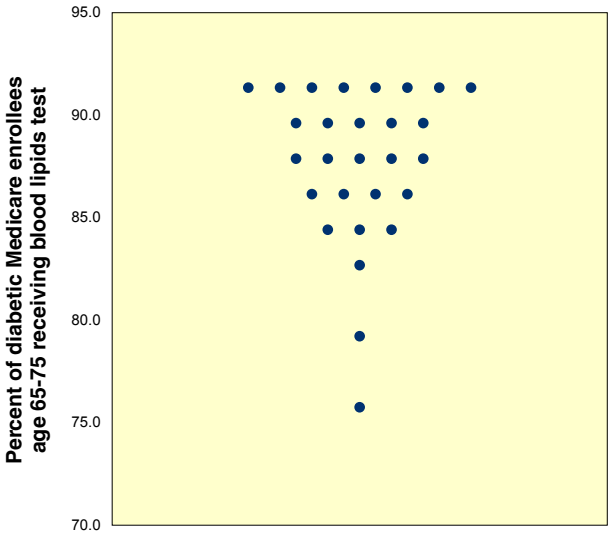
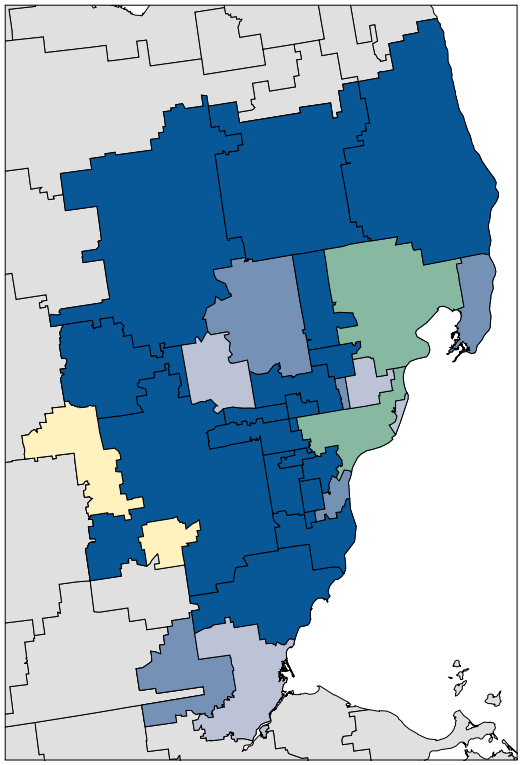


Figure 12. Blood lipids testing rates across the 30 hospital service areas of the Detroit, Michigan AF4Q region (2003-06)

Among states rates of blood lipids testing varied by a factor of 1.3, from 68% to 90%. The greatest gaps in testing rates were in Minnesota (white rate = 88%; black rate = 72%) and Kansas (white rate = 83%; black rate = 71%). Rates for whites and blacks were about equal in Arizona (Map 5). Among AF4Q regions, the percent of diabetics receiving a cholesterol test ranged from 80% in Memphis to 90% in South Central Pennsylvania. In Minnesota, the rate among black diabetics was 18% lower than the rate among whites (Figure 11).

Among the 30 hospital service areas located in the Detroit AF4Q region, overall rates of blood lipids testing varied from 75.5% to 92% during the period 2003-06 (Figure 12). In the eight areas with large enough black populations to support race-specific rates, screening rates were highest in Flint, Michigan (90% for black and 91% for white diabetics) and lowest in Detroit (74% for blacks and 80% for whites) (Map 6).



Map 6. Blood lipids testing in the Detroit, Michigan AF4Q region, by hospital service area (2003-06)

Percent of diabetics age 65-75 receiving blood lipids test

75% to < 82%				82% to < 85%				85% to < 88%				88% to 93%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
Mount Clemens	79.3	n/a	n/a	Toledo, OH	84.4	80.6	85.6	Wyandotte	87.6	n/a	n/a	Garden City	92.2	n/a	n/a
Detroit	75.5	74.0	80.1	Warren	84.1	n/a	n/a	Madison Heights	86.4	n/a	n/a	Trenton	91.9	n/a	n/a
				Milford	83.6	n/a	n/a	Pontiac	86.3	82.2	87.1	Troy	91.5	n/a	n/a
				Grosse Pointe	82.3	n/a	n/a	St. Clair	86.3	n/a	n/a	Monroe	91.4	n/a	n/a
								Sylvania, OH	86.1	n/a	n/a	Taylor	91.2	n/a	n/a
												Dearborn	91.2	n/a	n/a
												Livonia	91.2	n/a	n/a
												Flint	91.1	89.9	91.4
												Ann Arbor	90.2	85.6	90.7
												Royal Oak	90.1	87.4	90.5
												Port Huron	89.7	n/a	n/a
												Farmington Hills	89.6	n/a	n/a
												Wayne	89.0	86.0	89.8
												Lapeer	88.7	n/a	n/a
												Rochester	88.6	n/a	n/a
												Howell	88.4	n/a	n/a
												Southfield	88.4	86.9	90.9

Management of Diabetes: Eye Examination

In people with both insulin-dependent and non-insulin-dependent diabetes, randomized trials have confirmed that yearly retinal exams and treatment of vascular eye disease reduce the risk of blindness. The Dartmouth Atlas reports the measure approved by the Ambulatory Quality Alliance: the percent of diabetics having an annual eye exam.

The percent of diabetic Medicare enrollees undergoing eye examination in the United States increased slightly from 2003 to 2006. The greatest increase was among black diabetics; however, the average rate of eye examination among blacks remained substantially lower than the average rate among whites (Figure 13). The relationship between testing rates among black and white diabetics was strong among the 100 U.S. hospital service areas with the greatest numbers of blacks. Blacks were less likely to have their eyes examined than whites, but the difference across areas was greater than the differences in screening rates within every area but one (Figure 14).

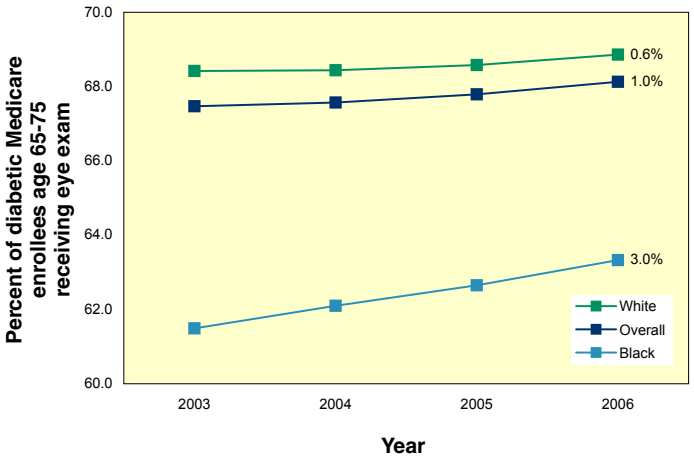


Figure 13. Trends in national eye examination rates among diabetic Medicare enrollees age 65-75 (2003 to 2006)

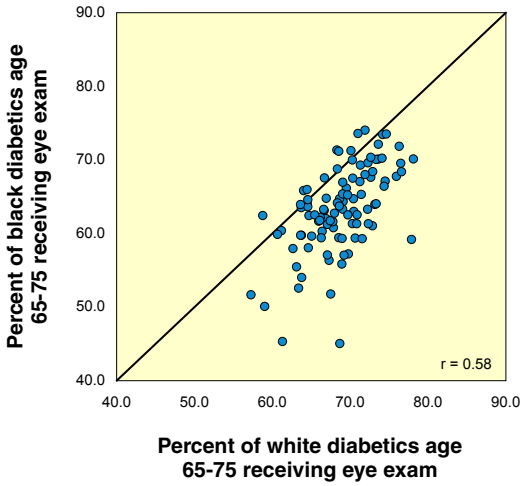
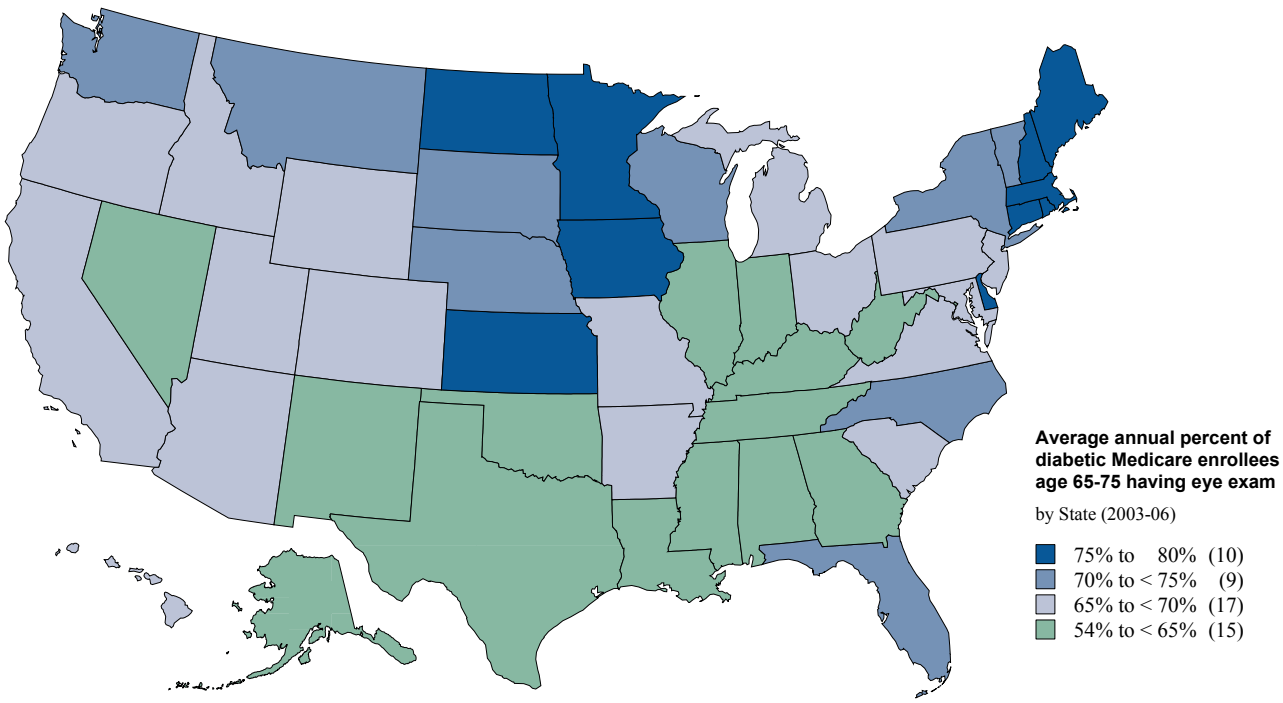


Figure 14. Relationship between rates of eye examination among black and white diabetic Medicare enrollees age 65-75 in hospital service areas with 100 largest populations of black enrollees (2003-06)

The figure shows the proportion of diabetics age 65-75 receiving eye examinations for black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among blacks was lower than the rate among whites. Rates for all hospital service areas with sufficient sample sizes to report are available from our web site.



Map 7. Eye examination among diabetic Medicare enrollees age 65-75, by state (2003-06)

Percent of diabetics age 65-75 receiving eye examination

54% to < 65%				65% to < 70%				70% to < 75%				75% to 80%			
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
AL	64.9	62.6	65.7	**OR**	69.5	69.5	69.5	**NE**	74.0	72.3	74.0	**ME**	79.9	n/a	n/a
KY	64.5	67.2	64.3	**HI**	69.3	n/a	n/a	**VT**	73.2	n/a	n/a	**ND**	77.6	n/a	n/a
NM	64.4	67.6	64.4	**VA**	69.0	65.3	70.2	**WI**	72.1	64.1	72.5	**NH**	77.1	n/a	n/a
TX	64.4	59.6	65.1	**AR**	68.8	61.5	70.1	**MT**	70.9	n/a	n/a	**IA**	76.7	73.4	76.7
OK	64.4	61.3	64.6	**PA**	68.8	61.4	69.4	**WA**	70.7	63.8	70.9	**DE**	75.9	70.8	77.2
WV	64.2	59.8	64.3	**NJ**	68.7	63.8	69.7	**SD**	70.6	n/a	n/a	**RI**	75.8	64.7	76.4
IL	64.2	54.6	65.9	**SC**	68.0	65.5	69.0	**NC**	70.5	69.4	70.9	**MN**	75.6	62.9	75.8
DC	64.2	63.6	68.2	**MO**	67.7	60.4	68.5	**FL**	70.5	66.6	71.0	**KS**	75.4	66.3	76.0
IN	63.8	59.7	64.2	**UT**	67.6	n/a	n/a	**NY**	70.0	62.9	71.2	**MA**	75.4	74.6	75.4
TN	63.6	58.9	64.4	**CA**	67.1	62.0	67.5					**CT**	75.1	70.0	75.7
GA	63.5	58.2	65.5	**WY**	66.9	n/a	n/a								
MS	63.4	58.7	65.8	**MD**	66.8	60.5	69.4								
LA	62.6	57.8	64.8	**AZ**	66.6	62.0	66.7								
NV	59.7	59.7	59.6	**ID**	66.4	n/a	n/a								
AK	54.4	n/a	n/a	**CO**	66.3	62.3	66.5								
				OH	65.9	61.5	66.5								
				MI	65.8	62.2	66.5								

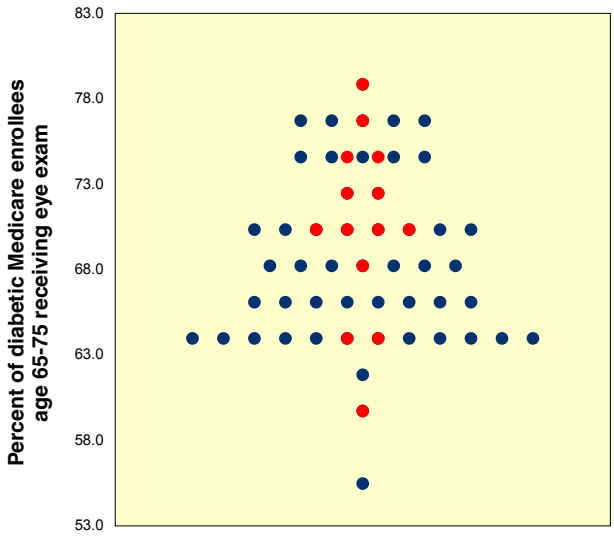


Figure 15. Percent of diabetic Medicare enrollees age 65-75 receiving eye examinations among AF4Q regions (red dots) and states (blue dots) (2003-06)

Region	Overall	Black	White
Maine	79.9	n/a	n/a
Humboldt County, CA	77.2	n/a	n/a
Minnesota	75.6	62.9	75.8
South Central Pennsylvania	74.1	n/a	n/a
Wisconsin	72.1	64.1	72.5
Kansas City, MO	72.0	65.4	73.3
Puget Sound, WA	70.0	62.6	70.4
Western New York	69.8	61.0	70.9
Willamette Valley, OR	69.4	70.5	69.4
Western Michigan	69.3	66.0	69.5
Cleveland, OH	68.4	64.1	70.4
Detroit, MI	65.0	61.3	66.2
Cincinnati, OH	63.7	57.4	64.6
Memphis, TN	59.5	53.2	66.1

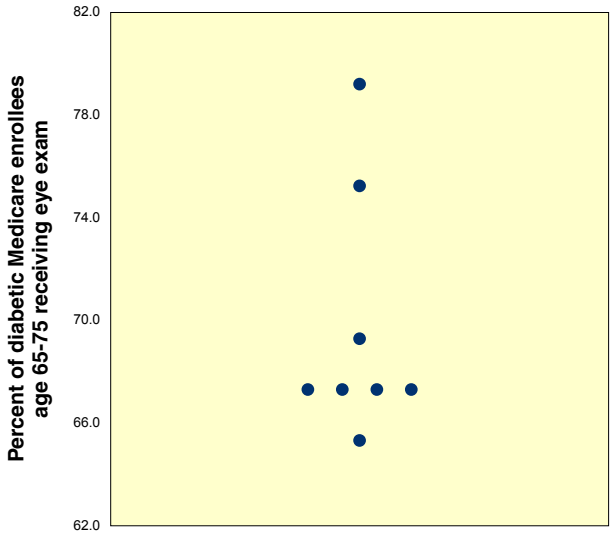
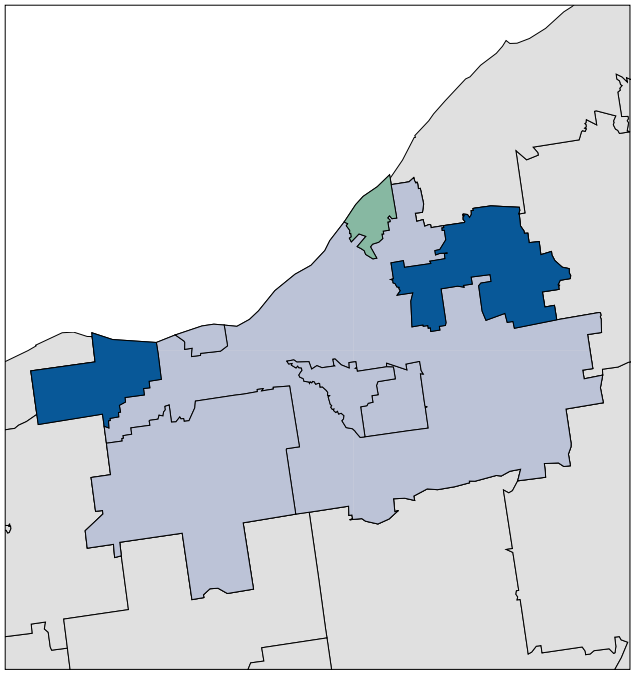


Figure 16. Eye examination rates across the eight hospital service areas of the Cleveland, Ohio AF4Q region (2003-06)

Among states, rates of eye examination among diabetics varied from less than 60% in Alaska and Nevada to almost 80% in Maine, North Dakota and New Hampshire. The greatest gaps in testing rates were in Minnesota (white rate = 76%; black rate = 63%) and Illinois (white rate = 66%; black rate = 55%) (Map 7). Among the fourteen AF4Q regions, the percent of diabetics having eye examinations ranged from 59.5% in Memphis to 80% in Maine. The rate among black diabetics was more than 15% lower than the rate among whites in Minnesota and Memphis (Figure 15).

Among the eight hospital service areas located in the Cleveland, Ohio AF4Q region, overall rates of eye examination varied from 65% in Euclid, Ohio to 80% in Mayfield Heights during the period 2003-06 (Figure 16). The Cleveland hospital service area was the only area with a sufficient number of blacks to allow reporting of race-specific rates. In Cleveland, the rate among white diabetics (69%) was 7% higher than the rate among blacks (64%).



Average annual percent of diabetic Medicare enrollees age 65-75 having eye exam

by Hospital Service Area (2003-06)

- 75% to 81% (2)
- 70% to < 75% (0)
- 65% to < 70% (5)
- 64% to < 65% (1)

Map 8. Eye examination in the Cleveland, Ohio AF4Q region, by hospital service area (2003-06)

Percent of diabetics age 65-75 receiving eye examination							
64% to < 65%		65% to < 70%		70% to < 75%		75% to 81%	
	Overall		Overall		Overall		Overall
Euclid	64.6	Parma/Middleburg Heights	69.4			Mayfield Heights	80.2
		Bedford	67.2			Westlake	75.7
		Cleveland	67.1				
		Lakewood	66.5				
		Garfield Heights	66.4				

Ambulatory Care-Sensitive Hospitalization Rates

Many hospital admissions are for medical conditions—such as poorly controlled diabetes or worsening heart failure—which can be treated in either the inpatient or the outpatient setting, and for which hospitalization can often be prevented by better outpatient management. Although the same can be said for most medical causes of hospitalization, clinicians have identified a group of diagnoses referred to as "ambulatory care-sensitive" conditions. While it may feel safer and easier for the physician, or be the only option for a patient with inadequate home or community-based support, discretionary admissions to the hospital pose a risk to patients and a substantial cost to society. Hospitalization rates for these—and for most medical conditions—are highly correlated with the local supply of hospital beds.

Discharge rates for ambulatory care-sensitive conditions decreased about 7% between 2003 and 2006 (Figure 17). Comparing rates in the 100 U.S. hospital service areas with the largest black populations, it is clear that the rates for blacks and whites were highly correlated during the period 2005-06 (r = 0.76) and that the general pattern of higher rates for blacks than whites held true, though five areas had relatively equal rates for blacks and whites (whose dots fall along the 45-degree line). Two regions (Bronx, New York and Meridian, Mississippi) had lower hospitalization rates for blacks than whites (Figure 18).

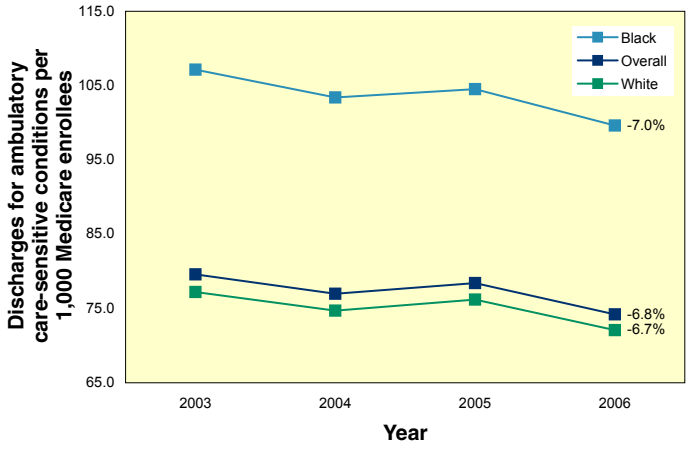


Figure 17. Trends in national discharge rates for ambulatory care-sensitive conditions among Medicare enrollees (2003 to 2006)

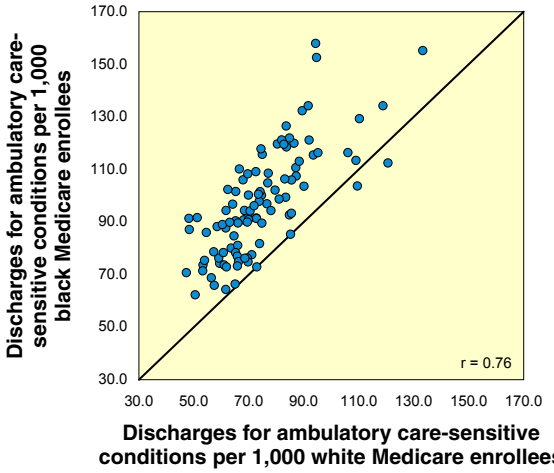
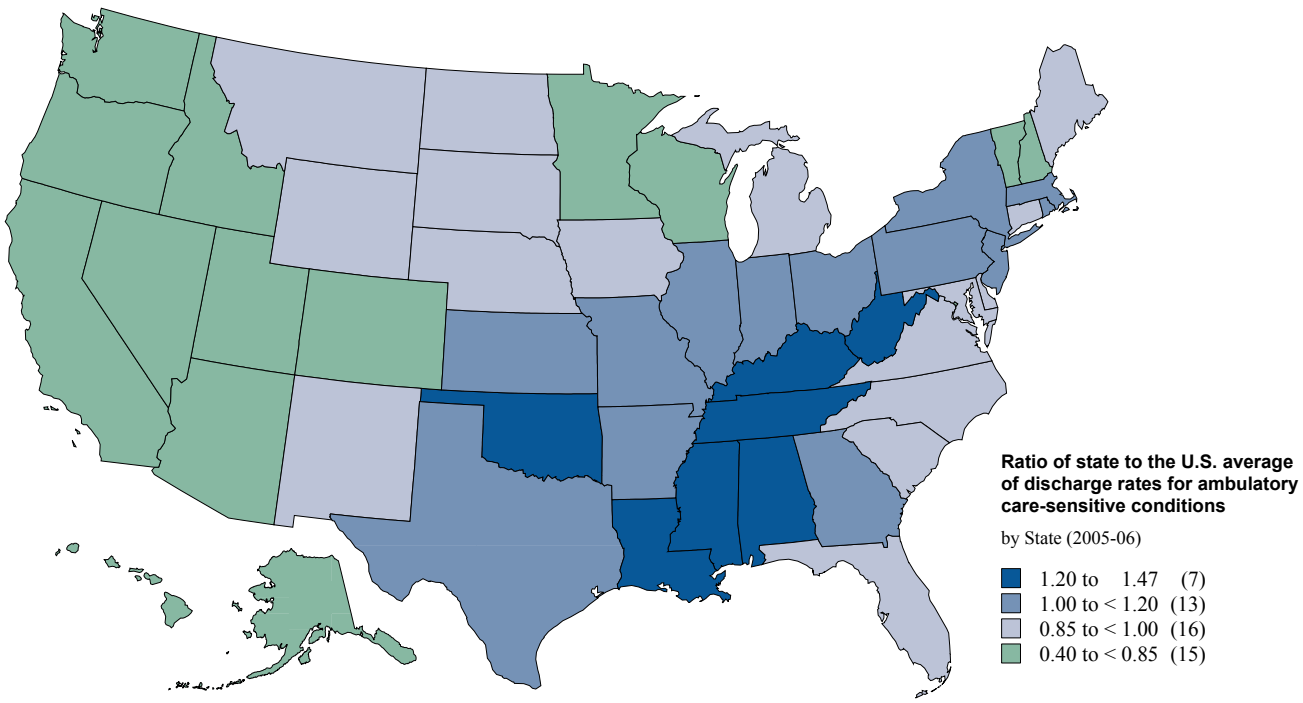


Figure 18. Relationship between discharge rates for ambulatory care-sensitive conditions among black and white Medicare enrollees in hospital service areas with 100 largest populations of black enrollees (2005-06)

The figure shows discharge rates for ambulatory care-sensitive conditions among black and white Medicare enrollees. Dots along the 45-degree line represent areas where white and black rates were equal; dots below the line represent areas where the rate among whites was higher than the rate among blacks. Rates for all hospital service areas with sufficient sample sizes to report are available from our web site.



Map 9. Hospitalization for ambulatory care-sensitive conditions, by state (2005-06)

Ratio of overall state rate to the U.S. average															
0.40 to < 0.85				0.85 to < 1.00				1.00 to < 1.20				1.20 to 1.47			
Rates per 1,000 Medicare enrollees															
	Overall	Black	White		Overall	Black	White		Overall	Black	White		Overall	Black	White
NV	63.4	76.4	62.0	MI	76.3	110.2	73.2	AR	91.5	106.2	90.5	WV	111.9	115.4	109.6
WI	62.9	94.7	60.9	ND	74.1	n/a	n/a	IL	87.6	129.4	83.9	KY	110.4	103.6	109.5
NH	62.7	78.7	60.9	MD	73.8	100.5	71.3	OH	86.1	110.3	84.1	LA	105.8	125.6	107.1
DC	62.4	91.3	44.9	SD	73.6	n/a	n/a	MO	85.1	108.6	83.0	MS	105.6	125.5	107.7
MN	61.9	78.8	60.1	SC	73.4	90.5	73.2	TX	84.4	100.6	83.1	TN	94.8	102.6	94.8
CA	61.9	97.2	59.3	NC	72.7	90.6	71.8	NJ	81.5	119.9	78.1	OK	93.1	94.2	91.8
AK	60.3	41.5	59.5	NE	71.4	86.5	69.5	PA	81.3	116.3	78.5	AL	92.3	100.5	93.9
AZ	58.7	68.0	57.2	DE	69.3	96.0	66.9	IN	80.9	99.4	79.1				
VT	56.6	n/a	n/a	IA	69.1	91.9	67.1	GA	79.9	90.9	81.3				
CO	55.0	60.3	53.7	WY	68.8	41.4	67.0	RI	79.5	100.0	77.4				
ID	53.5	79.5	52.0	FL	68.5	95.7	66.3	MA	79.3	93.6	77.4				
WA	50.1	65.0	48.7	MT	68.4	n/a	n/a	KS	79.1	89.4	77.4				
OR	48.9	49.7	47.6	VA	67.6	79.6	67.5	NY	77.5	102.9	75.4				
UT	45.2	68.3	43.9	CT	66.6	82.3	65.0								
HI	30.8	33.8	29.9	ME	65.3	58.7	63.5								
				NM	64.9	65.6	63.4								

NOTE: The map shows the ratio of each state to the national average for discharge rates for ambulatory care-sensitive conditions. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each state per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

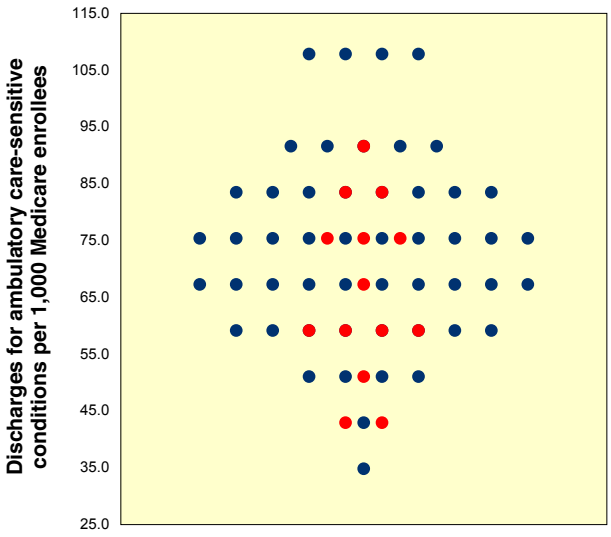


Figure 19. Discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees among AF4Q regions (red dots) and states (blue dots) (2005-06)

Region	Overall	Black	White
Cleveland, OH	88.5	122.6	85.0
Detroit, MI	85.2	114.4	82.6
Cincinnati, OH	81.1	98.5	79.6
Western New York	75.8	94.4	74.2
Kansas City, MO	74.8	95.3	73.2
Memphis, TN	74.2	101.2	71.2
Maine	65.3	58.7	63.5
Wisconsin	62.9	94.7	60.9
Minnesota	61.9	78.8	60.1
Western Michigan	59.8	74.7	58.3
South Central Pennsylvania	57.8	88.1	56.0
Humboldt County, CA	49.1	n/a	n/a
Puget Sound, WA	46.9	67.3	45.5
Willamette Valley, OR	45.4	48.0	44.2

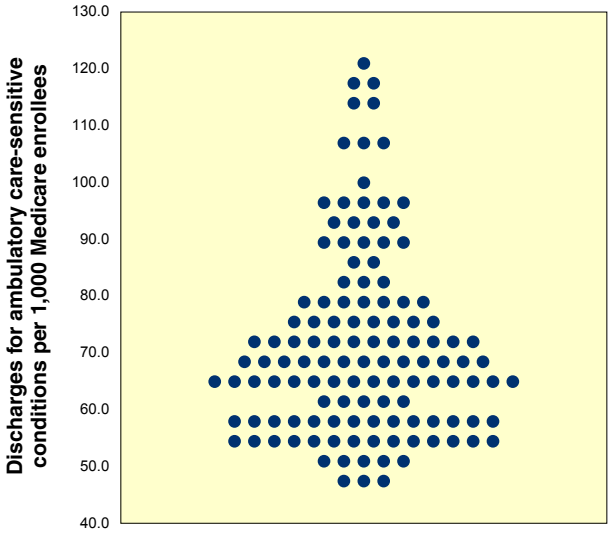
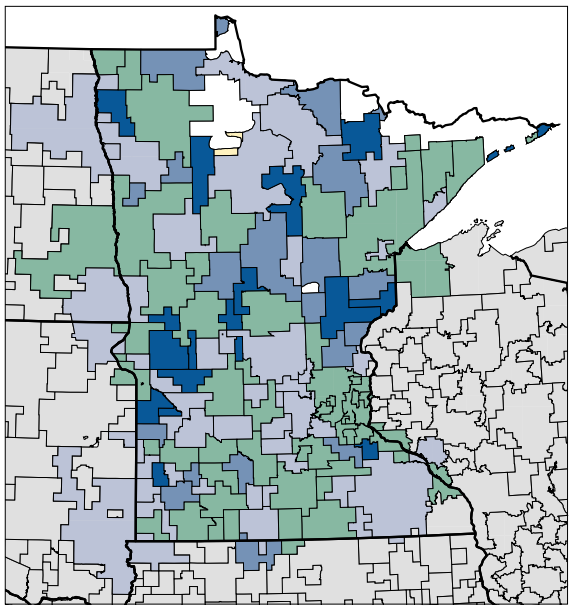


Figure 20. Discharge rates for ambulatory care-sensitive conditions across the 126 hospital service areas in the Minnesota AF4Q region (2005-06)

Two to threefold variations in ambulatory care-sensitive hospitalization rates were found across U.S. states (Map 9) and AF4Q regions (Figure 19). States with particularly high rates of hospitalization for ambulatory care-sensitive conditions during the period 2005-06 included West Virginia, Kentucky, Louisiana and Mississippi, all with rates over 100 discharges per 1,000 Medicare enrollees. States with particularly low rates included Oregon, Utah and Hawaii, with rates under 50 per 1,000. The rates for blacks were higher than for whites in all but four states.

The rates of ambulatory care-sensitive hospitalizations among AF4Q regions ranged from a low of 45.4 in Oregon's Willamette Valley to 88.5 in Cleveland. In Minnesota, the rate was 61.9 per 1,000 enrollees (78.8 for blacks and 60.1 for whites), but overall rates among the 126 hospital service areas within the state varied almost threefold, from 45.7 per 1,000 in Redwood Falls to 122.7 in Madison (Figure 20). Only three Minnesota HSAs had a sufficient number of black enrollees to report race-specific hospitalization rates for ambulatory care-sensitive conditions: Minneapolis (black rate = 87.1, white rate = 51.7), St. Paul (black rate = 71.3, white rate = 48.7) and Robbinsdale (black rate = 55.1, white rate = 56.7).

Ratio of overall HSA rate to the U.S. average							
0.59 to < 0.85		0.85 to < 1.00		1.00 to < 1.20		1.20 to 1.61	
Rates per 1,000 Medicare enrollees							
	Overall		Overall		Overall		Overall
Faribault	64.6	Sisseton, SD	76.3	Sleepy Eye	90.8	Madison	122.7
Springfield	64.5	Austin	75.9	Moose Lake	90.7	Sandstone	118.5
Fergus Falls	64.1	Cloquet	75.9	Ada	90.4	Elbow Lake	116.4
Hastings	64.0	Bigfork	75.9	Slayton	89.4	Benson	114.2
Ortonville	64.0	Glencoe	74.5	International Falls	88.9	Morris	113.3
Princeton	64.0	Monticello	74.2	Canby	87.6	Dawson	108.5
New Prague	63.7	Virginia	73.9	Wadena	85.5	Warren	106.9
Winona	63.4	Bemidji	72.8	Hibbing	83.5	Long Prairie	106.4
Farmington	61.7	Glenwood	72.6	Roseau	81.5	Grand Marais	98.8
Aurora	60.7	Graceville	72.4	Brainerd	81.1	Tyler	97.9
Worthington	60.7	Breckenridge	72.4	Rush City	80.5	Bagley	97.3
Waseca	60.5	Crosby	72.2	Fosston	80.5	Cook	97.1
Duluth	60.5	Grand Forks, ND	72.1	Northfield	79.7	Mora	96.9
Wheaton	59.3	Chisago City	71.9	Tracy	79.4	Cannon Falls	95.5
Little Falls	58.5	Buffalo	71.9	Estherville, IA	79.2	Starbuck	94.2
Ivanhoe	58.3	Shakopee	71.3	Onamia	78.8	Melrose	94.0
Grand Rapids	58.3	Granite Falls	71.2	Aitkin	77.2	Staples	94.0
Robbinsdale	57.9	St. Peter	70.8	Cambridge	76.6	Deer River	91.8
Marshall	57.6	St. Cloud	70.6				
Willmar	57.4	Arlington	69.6				
Luverne	57.1	Fairmont	68.9				
Burnsville	57.1	Baudette	68.8				
Stillwater	57.1	Owatonna	68.7				
Alexandria	57.0	Crookston	68.6				
Perham	56.8	Sauk Centre	67.8				
Karlstad	56.8	Wabasha	67.6				
Lake City	56.4	St. James	67.5				
Red Wing	55.9	Montevideo	67.3				
Forest Lake	55.9	Waconia	67.1				
Windom	55.6	Detroit Lakes	67.1				
Jackson	55.5	Madelia	66.9				
Blue Earth	54.8	Westbrook	66.7				
Hallock	54.3	Hendricks	66.7				
Thief River Falls	54.2	Olivia	66.6				
New Ulm	53.9	Sioux Falls, SD	66.2				
Hutchinson	53.8	Two Harbors	66.1				
Minneapolis	53.6	Litchfield	65.9				
Mankato	53.5	Appleton	65.5				
Maplewood	53.3	Pipestone	65.2				
Albert Lea	52.9	Rochester	65.0				
Paynesville	52.8						
Ely	52.5						
Park Rapids	51.1						
St. Paul	50.2						
St. Louis Park	49.8						
Lakefield	49.5						
Fargo ND/Moorhead MN	48.0						
Le Sueur	47.9						
Redwood Falls	45.7						



Map 10. Discharge rates for ambulatory care-sensitive conditions in the Minnesota AF4Q region, by hospital service area (2005-06)

NOTE: The map shows the ratio of each hospital service area to the national average for discharge rates for ambulatory care-sensitive conditions. The column headers (in colors which correspond to the map legend) reflect the ratios displayed in the map, while the numbers in the table itself give the actual rates for each hospital service area per 1,000 Medicare enrollees overall, and for black and white Medicare enrollees.

The Relationship between the Quality of Health Care and Health Care Spending

A major focus of the Dartmouth Atlas of Health Care has been to explore the relationship between the quality of health care and health care spending. To put the findings of the current report in context, we briefly summarize some of the key findings of this earlier work. A list of further readings and references is provided at the end of the report.

Unwarranted variations and the categories of care. Some variations in practice are clearly justified. "Unwarranted" refers to variations in practice or spending that cannot be explained on the basis of illness, strong scientific evidence, or well-informed patient preferences. The Dartmouth Atlas Project distinguishes three categories of care (Wennberg 2002). ***Effective care*** consists of evidence-based services such as hemoglobin A1c testing for diabetics. Variations in effective care reflect failure to deliver needed care. ***Preference-sensitive care*** encompasses treatment decisions where the options have quite different risks and benefits and where patients' attitudes toward these risks may vary. For example, the decision to undergo bypass surgery for heart disease is likely to improve chest pain but carries a small but real risk of causing memory loss. The Dartmouth Atlas Project has long argued for informed patient choice: ensuring that patients are able to choose based on their own preferences. Finally, ***supply-sensitive care*** refers to services where the supply of a specific resource (such as the number of hospital beds per capita) has a major influence on utilization rates. The frequency of physician visits, ambulatory care-sensitive hospitalization rates and the propensity to use specialists are all examples of supply-sensitive care.

Variations in spending and the quality of care. Although there are differences in both illness rates and prices across U.S. states and regions, most of the differences in spending are due to differences in the quantity of supply-sensitive services provided to similar patients. Medicare beneficiaries in higher spending states and regions spend much more time in the hospital (e.g. have higher rates of ambulatory care-sensitive hospitalizations), have more frequent physician visits overall, are more likely to have a specialist as their predominant provider, and are much more likely to see multiple different physicians. However, higher spending is not associated with better care. On the contrary, patients in higher spending regions are somewhat less likely to receive evidence-based treatments (effective care) and are no more likely to receive elective major surgical procedures (preference-sensitive care) (Wennberg 2002; Fisher 2003a; Baicker 2004). Studies that followed patients with selected serious conditions such as heart attacks over time found that survival was slightly worse in the higher spending regions (Fisher 2003b). Recent studies focused on the care of patients with serious chronic illness at the end of life revealed greater than twofold differences in spending across major U.S. academic medical centers, almost entirely explained by differences in the use of supply-sensitive care (Wennberg 2008). These studies have led many to conclude that the U.S. has important opportunities to improve the efficiency of care.

Implications for reform and for improving the quality of care. The strategies for reform that emerge from this work include the following: developing better scientific evidence on the effectiveness of medical treatments and on how best to provide care for patients with chronic illness; ensuring informed patient choice; fostering local organizational accountability for bringing providers together to improve the quality and costs of care; further development of performance measures that can support improvement efforts; reforming the payment system to reduce current incentives for overuse; and careful attention to managing the growth of the physician workforce. Additional details and evidence are available online (www.dartmouthatlas.org) and in the references.

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Appendix Table

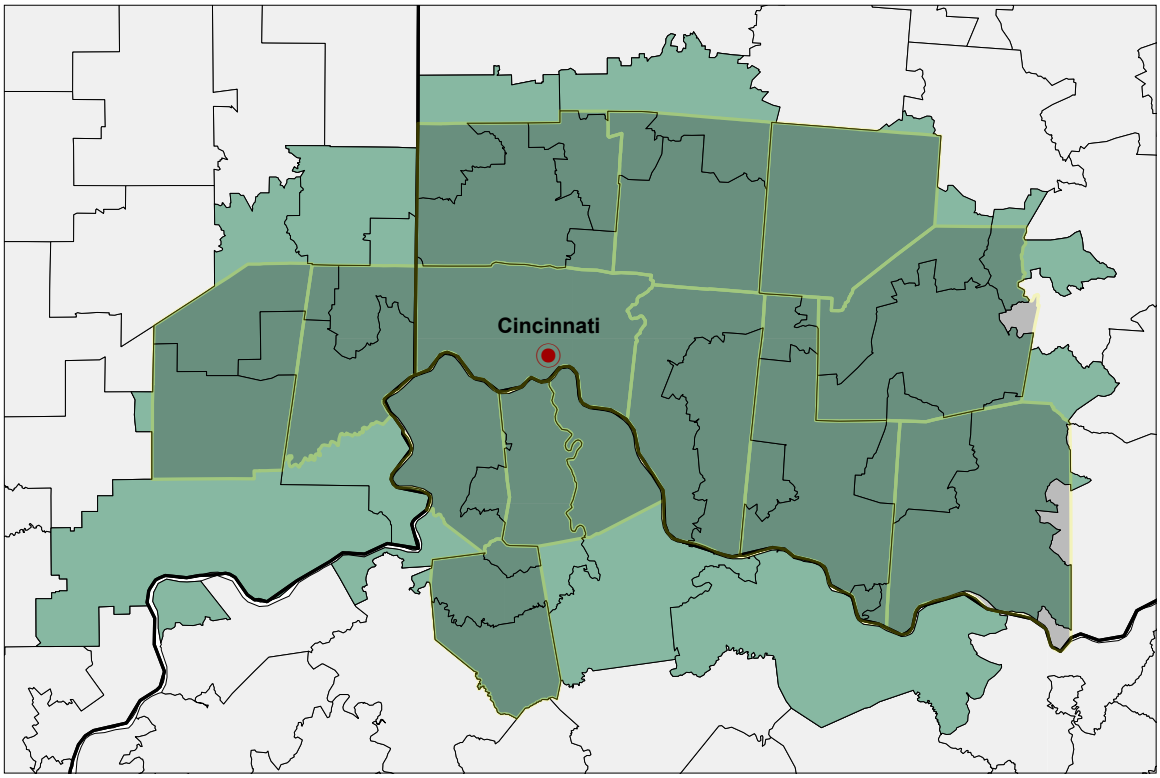
Short description	Label	Definition
Leg Amputation	Leg amputations per 1,000 Medicare enrollees (2003-06)	Numerator: MedPAR claims for inpatient leg amputation procedures (ICD-9 codes 84.15-84.17). Denominator: fee-for-service (FFS) Medicare enrollees age 65-99. Measure is average over four years.
Diabetes: HgbA1c Testing	Average annual percent of diabetic Medicare enrollees age 65-75 having HgbA1c test (2003-06)	Numerator: diabetics age 65-75 having one or more HgbA1c tests during measurement year. Denominator: diabetics age 65-75 enrolled in FFS Medicare. Measure is average over four years. Since our May 2008 report, this measure has been brought into alliance with HEDIS specifications. With these changes, the rates are somewhat lower. The relative performance of states and regions is very similar to the May results.
Diabetes: Lipid Testing	Average annual percent of diabetic Medicare enrollees age 65-75 having blood lipids test (2003-06)	Numerator: diabetics age 65-75 having at least one low-density lipoprotein-cholesterol (LDL_C) test during measurement year or previous year. Denominator: diabetics age 65-75 enrolled in FFS Medicare. Measure is average over four years. Since our May 2008 report, this measure has been brought into alliance with HEDIS specifications.
Diabetes: Eye Exam	Average annual percent of diabetic Medicare enrollees age 65-75 having eye exam (2003-06)	Numerator: diabetics age 65-75 having a retinal or dilated eye exam by eye care professional in measurement year, or a negative retinal exam in the previous year. Denominator: diabetics age 65-75 enrolled in FFS Medicare. Measure is average over four years. Since our May 2008 report, this measure has been brought into alliance with HEDIS specifications.
ACS Discharges	Discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees (2005-06)	Numerator: MedPAR claims for discharges for ambulatory care-sensitive conditions (convulsions, COPD, pneumonia, asthma, CHF, hypertension, angina, cellulitis, diabetes, gastroenteritis, kidney/urinary tract infections, dehydration). Denominator: FFS Medicare enrollees age 65-99. Measure is average over two years.

Aligning Forces for Quality Communities

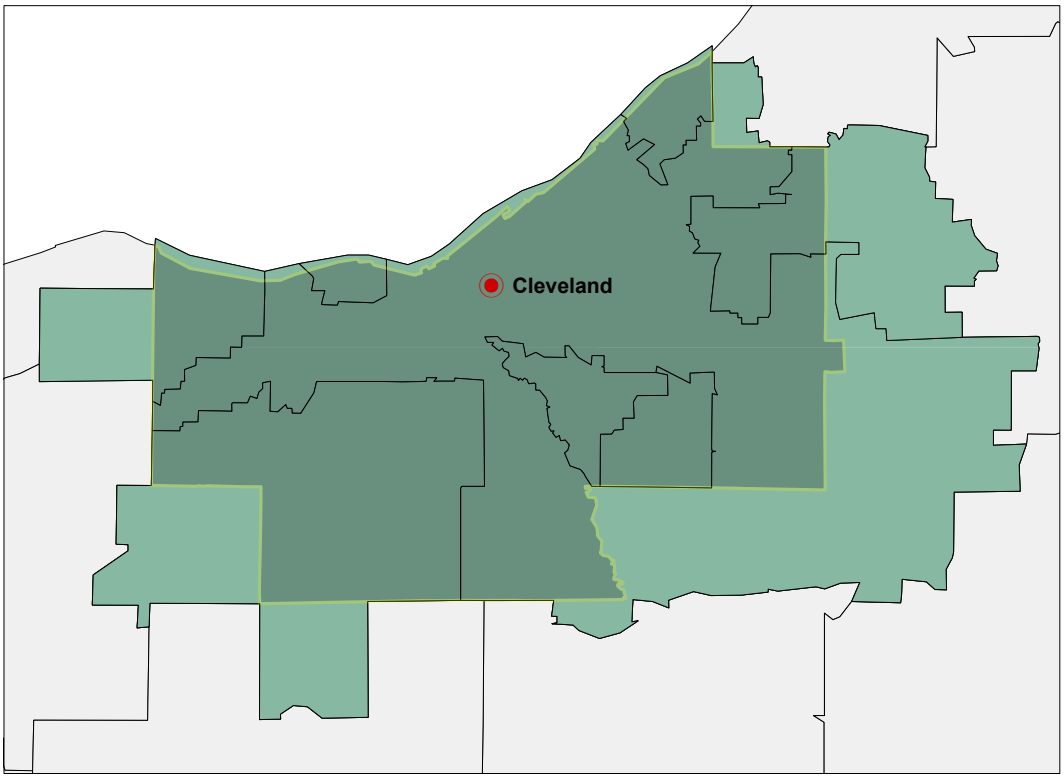
Community	Counties
Cincinnati, OH	*In Ohio* Hamilton County Clermont County Warren County Butler County Brown County Adams County Clinton County Highland County *In Kentucky* Boone County Kenton County Campbell County Grant County *In Indiana* Dearborn County Ripley County
Cleveland, OH	Cuyahoga County
Detroit, MI	Wayne County Oakland County Macomb County St. Clair County Livingston County Washtenaw County Monroe County
Humboldt County, CA	Humboldt County
Kansas City, MO	*In Kansas* Johnson County Wyandotte County *In Missouri* Jackson County Platte County Clay County
Maine	Statewide (all counties in the state)
Memphis, TN	Shelby County
Minnesota	Statewide (all counties in the state)

Community	Counties
Puget Sound	King County Kitsap County Pierce County Snohomish County Thurston County
Willamette Valley, OR	Multnomah County Washington County Marion County Polk County Yamhill County Clackamas County Linn County Benton County Lane County
Western Michigan	Mason County Lake County Osceola County Oceana County Newaygo County Mecosta County Montcalm County Muskegon County Ottawa County Kent County Ionia County Allegan County Barry County
Western New York	Cattaraugus County Alleghany County Erie County Genesee County Niagara County Orleans County Wyoming County Chautauqua County
Wisconsin	Statewide (all counties in the state)
South Central Pennsylvania	Adams County York County

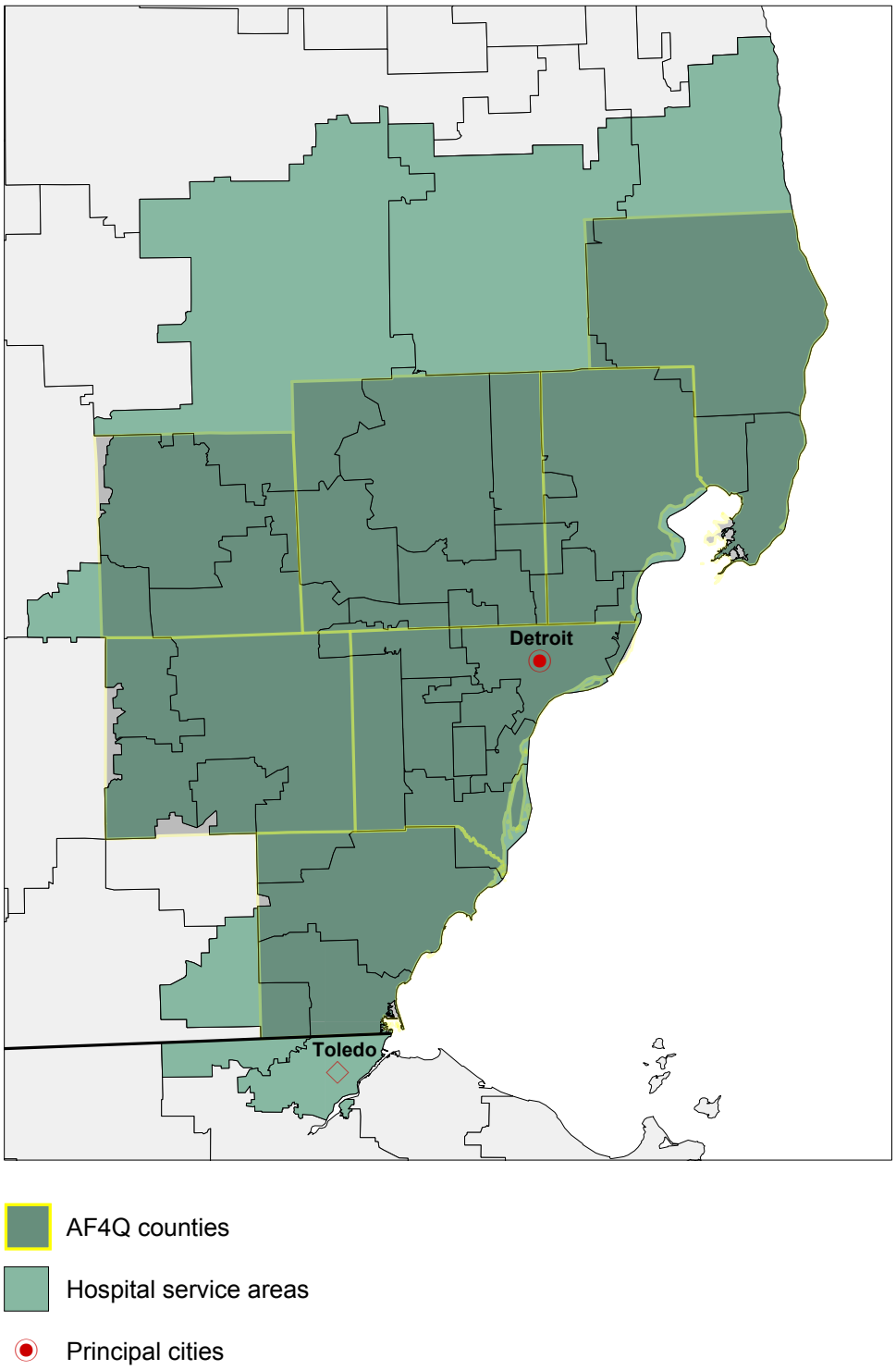
Hospital Service Areas in the Cincinnati, Ohio AF4Q Region



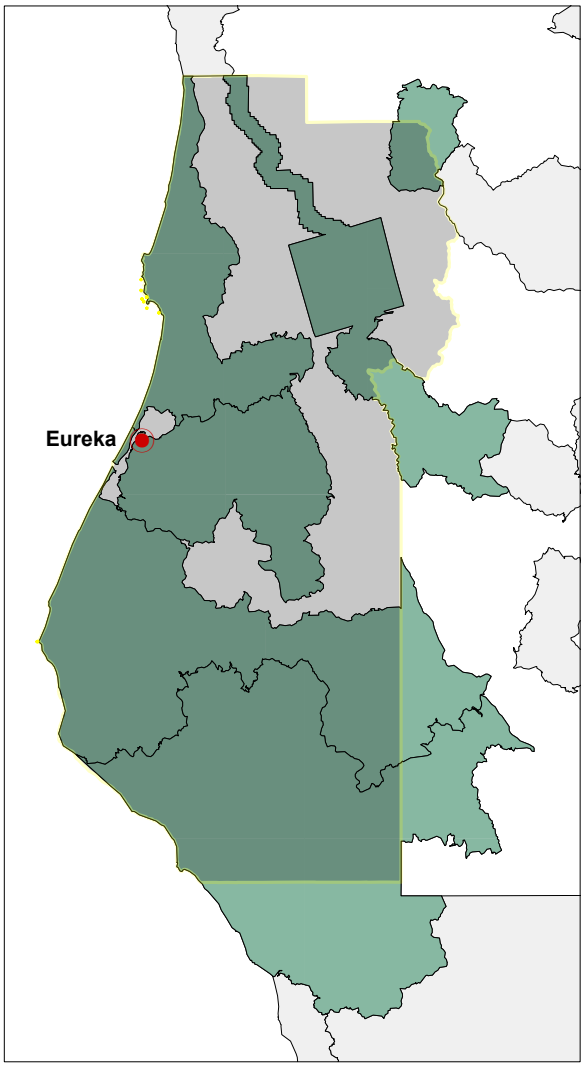
Hospital Service Areas in the Cleveland, Ohio AF4Q Region



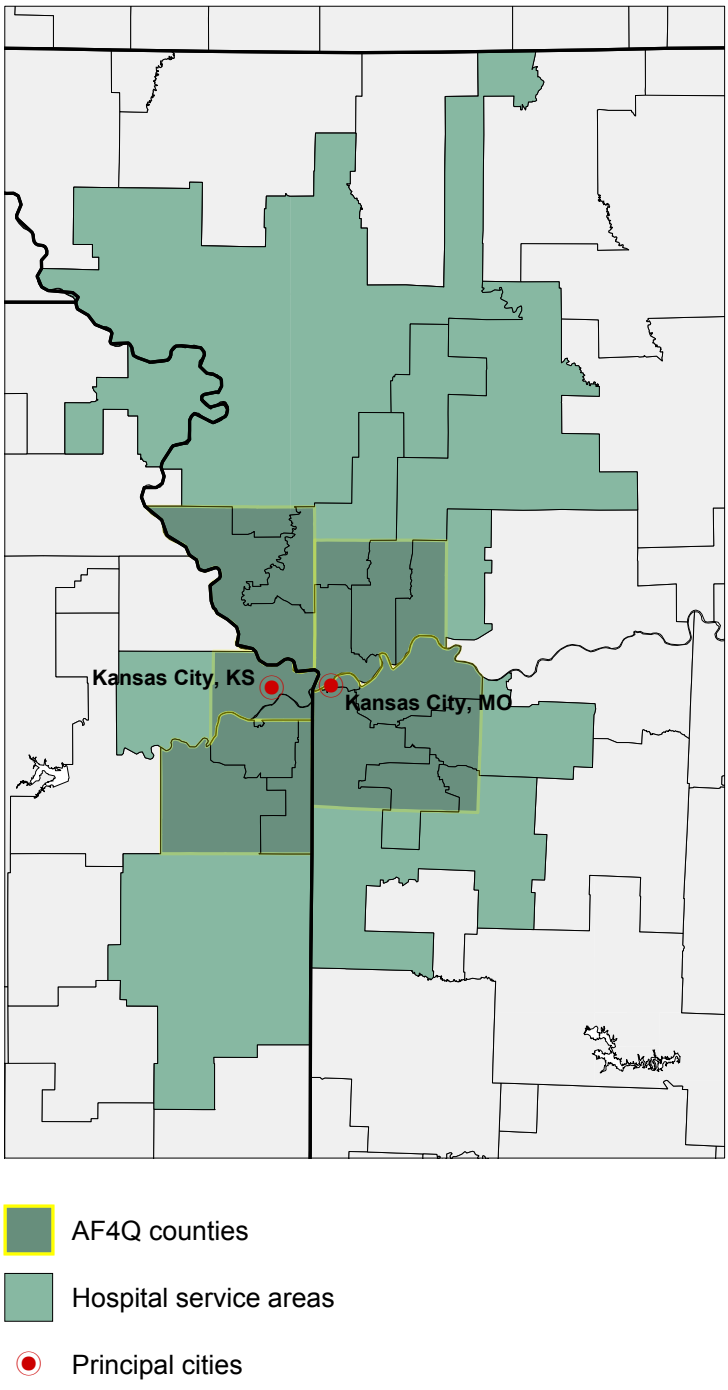
Hospital Service Areas in the Detroit, Michigan AF4Q Region



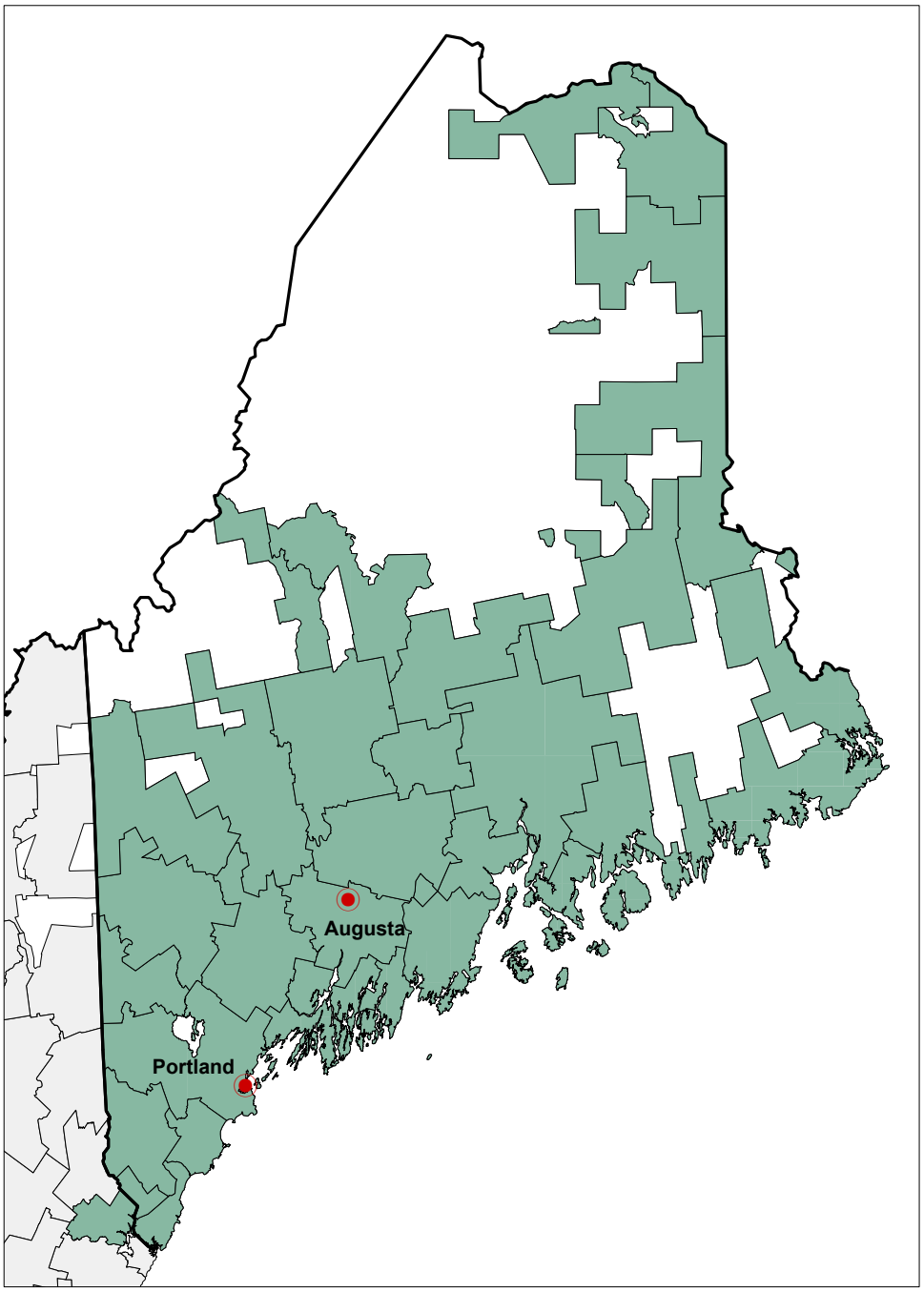
Hospital Service Areas in the Humboldt County, California AF4Q Region



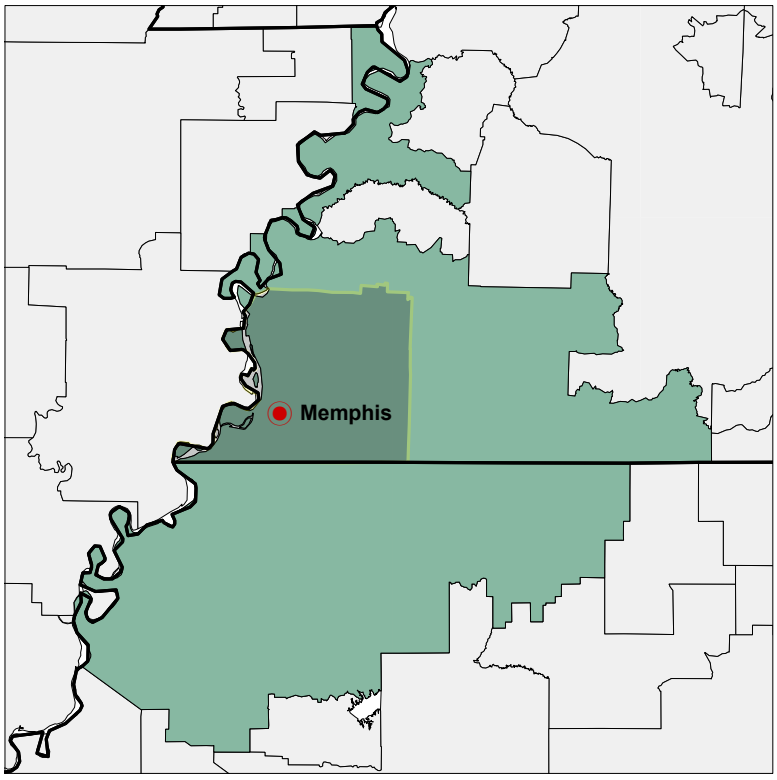
Hospital Service Areas in the Kansas City, Missouri AF4Q Region



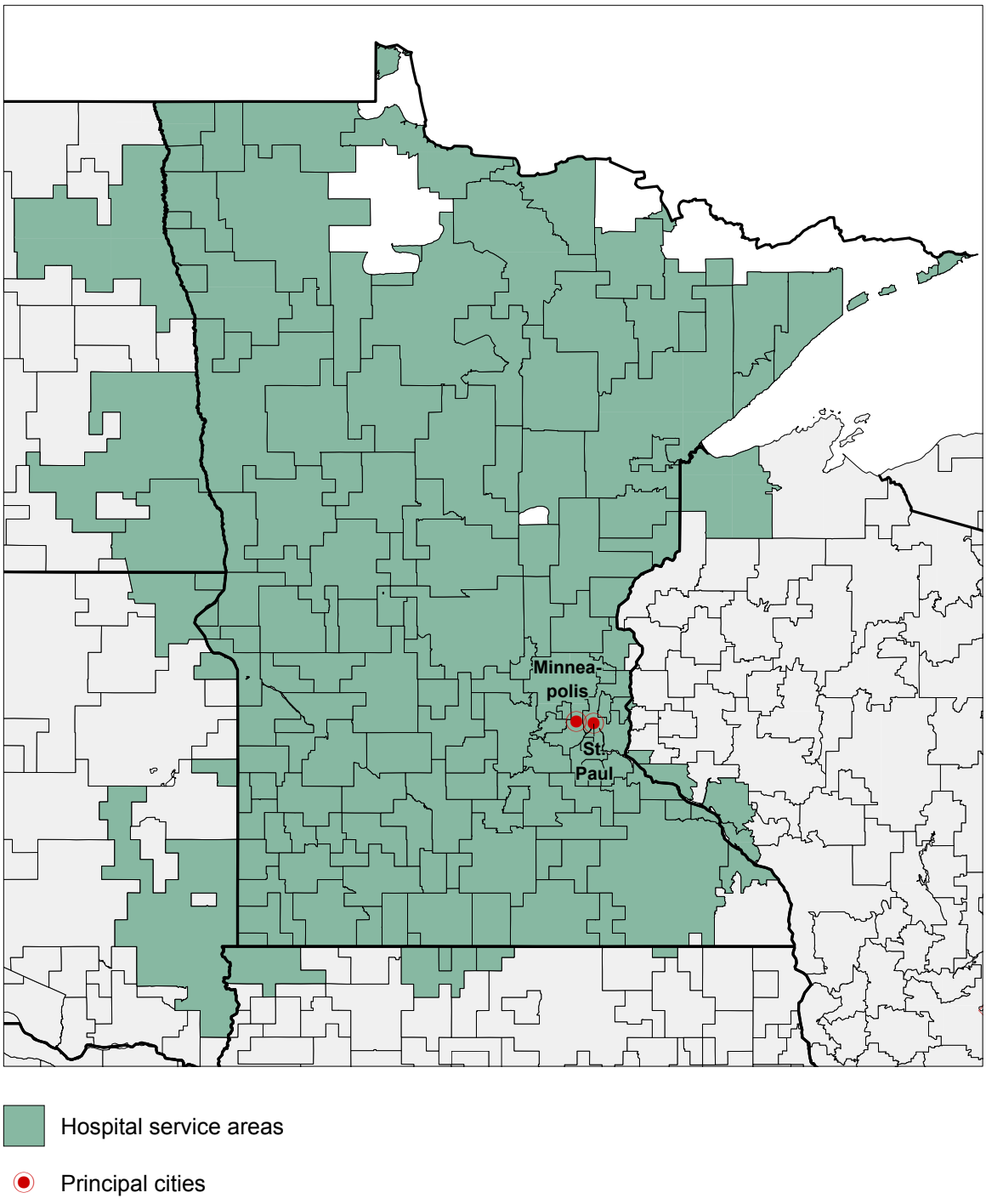
Hospital Service Areas in the Maine AF4Q Region



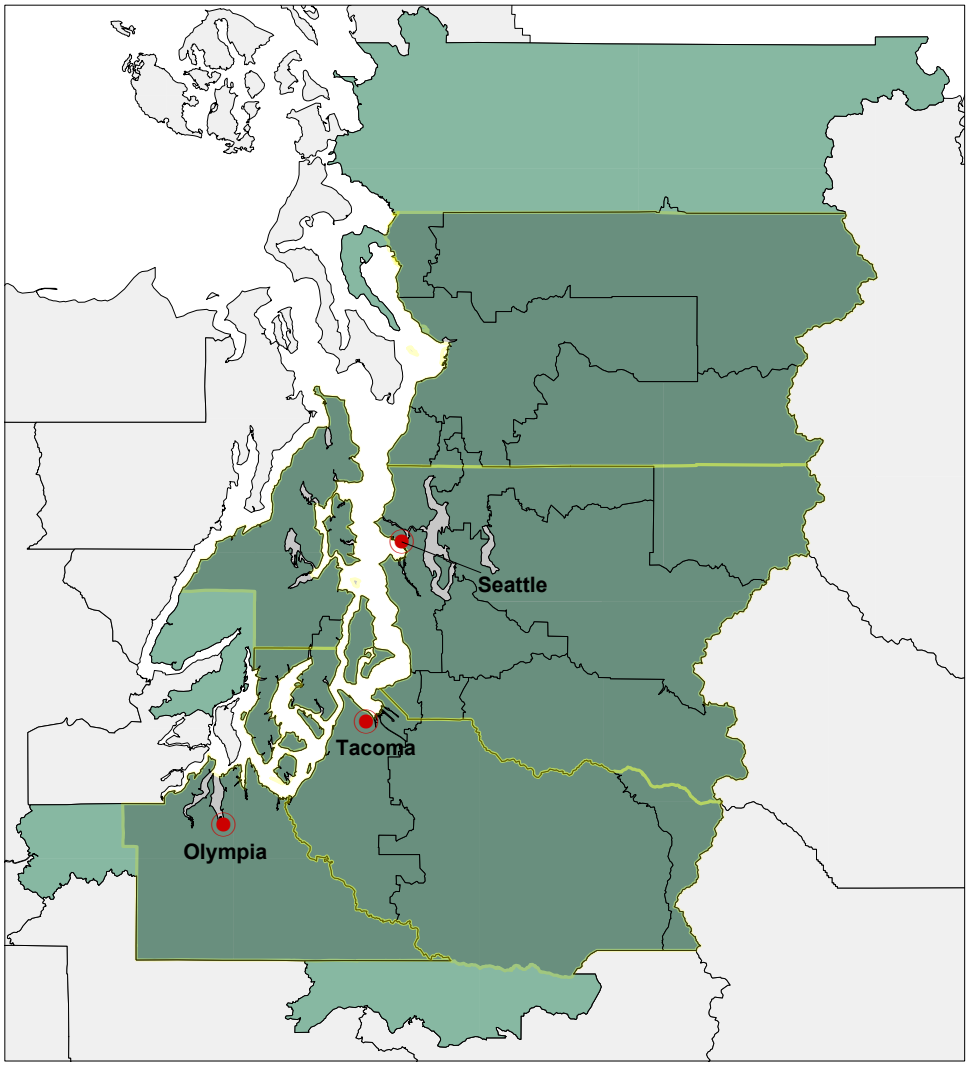
Hospital Service Areas in the Memphis, Tennessee AF4Q Region



Hospital Service Areas in the Minnesota AF4Q Region



Hospital Service Areas in the Puget Sound, Washington AF4Q Region

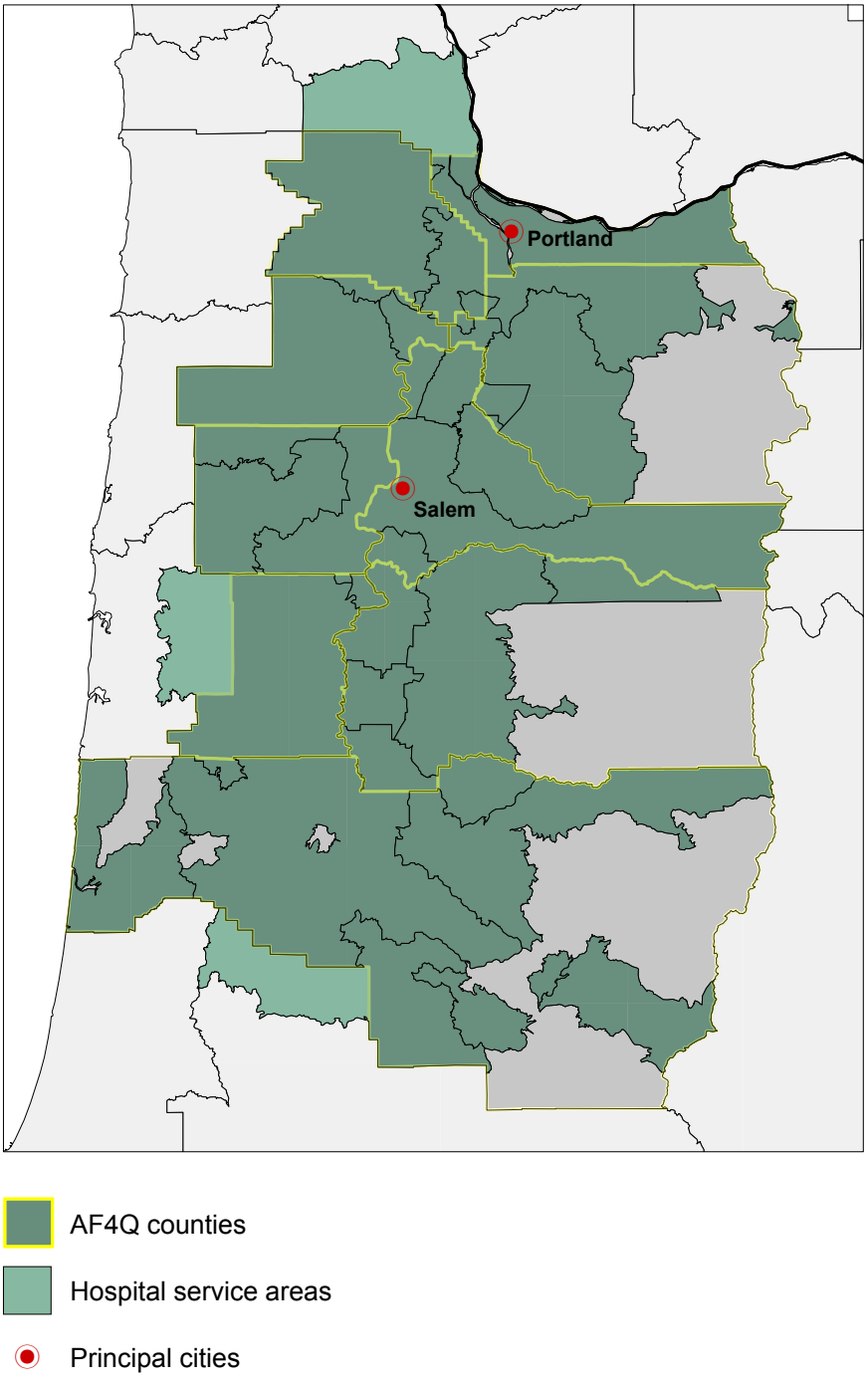


AF4Q counties

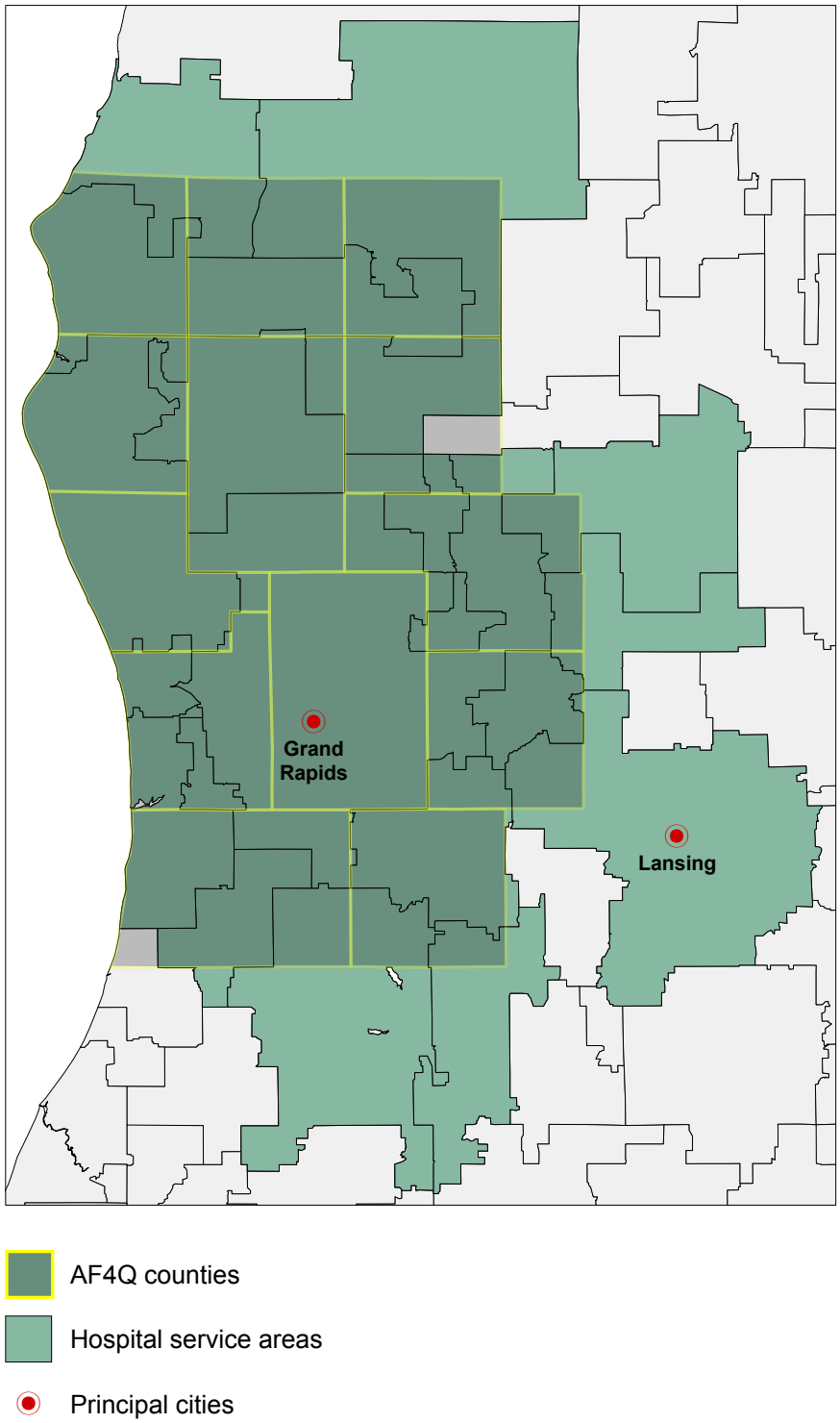
Hospital service areas

Principal cities

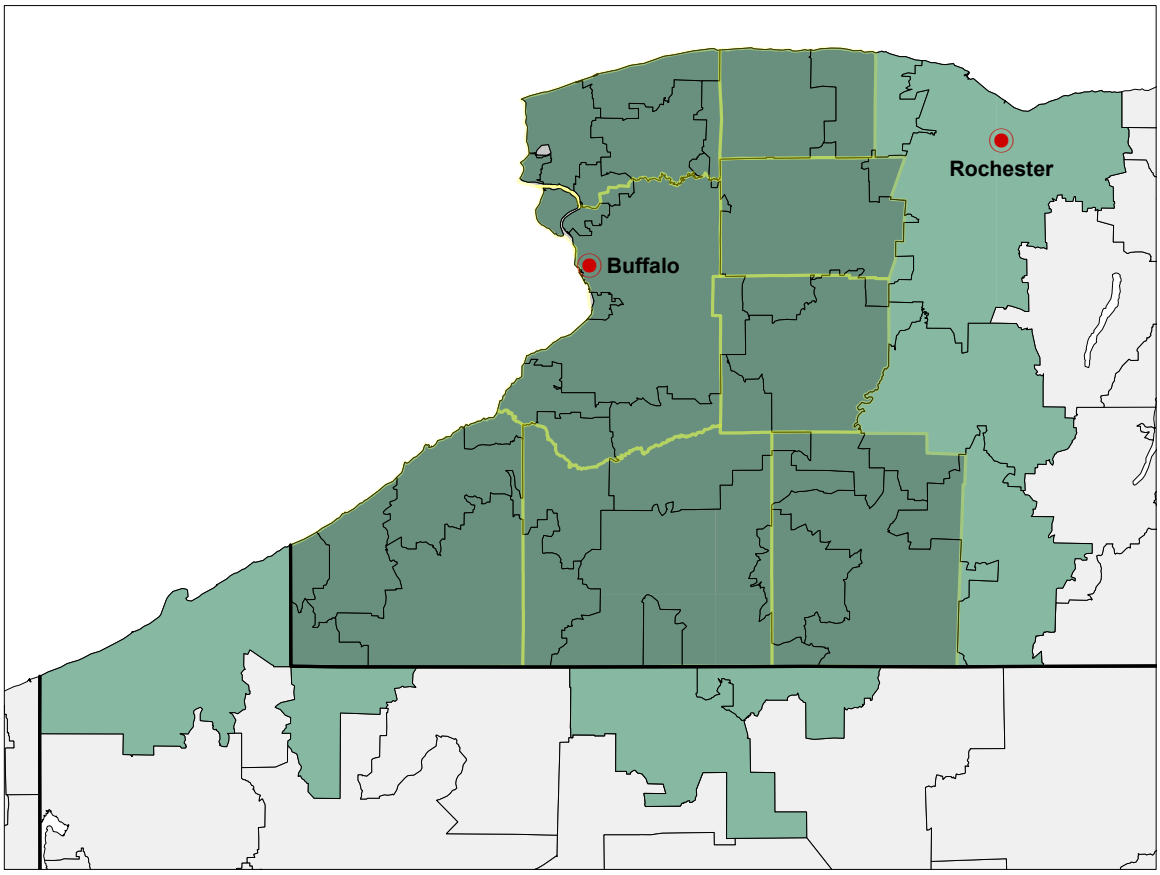
Hospital Service Areas in the Willamette Valley, Oregon AF4Q Region



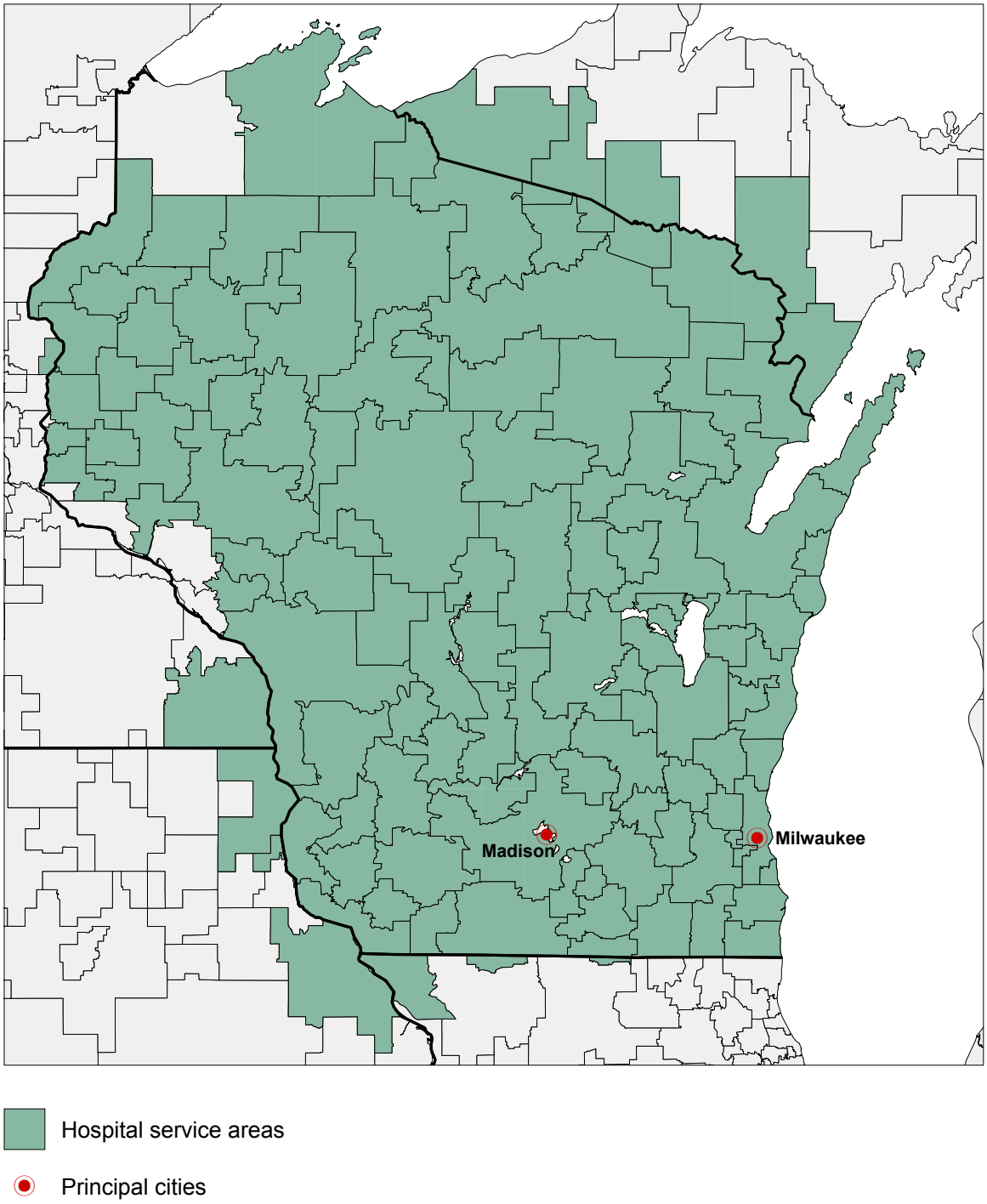
Hospital Service Areas in the Western Michigan AF4Q Region



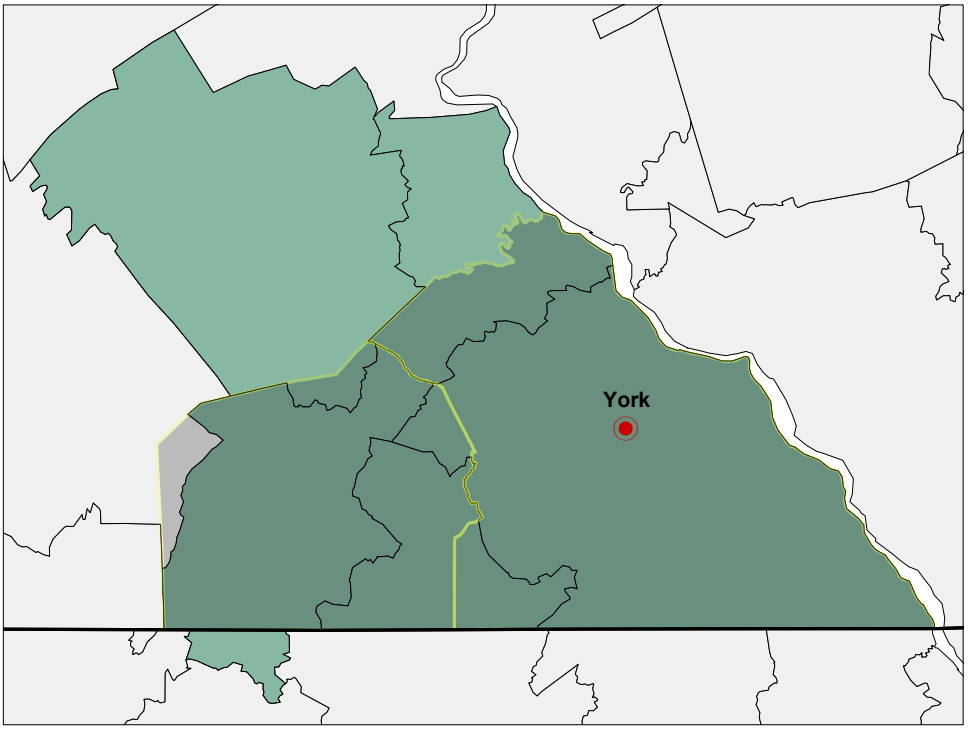
Hospital Service Areas in the Western New York AF4Q Region



Hospital Service Areas in the Wisconsin AF4Q Region



Hospital Service Areas in the South Central Pennsylvania AF4Q Region



Regional and Racial Variation in Health Care among Medicare Beneficiaries

A Brief Report of the Dartmouth Atlas Project

December 1, 2008

The Dartmouth Atlas Project works to accurately describe how medical resources are distributed and used in the United States. The project offers comprehensive information and analysis about national, regional, and local markets, as well as individual hospitals and their affiliated physicians, in order to provide a basis for improving health and health systems. Through this analysis, the project has demonstrated glaring variations in how health care is delivered across the United States.

The Robert Wood Johnson Foundation's **Aligning Forces for Quality** program commissioned this special report by the Dartmouth Atlas Project to highlight the uneven quality of health care being delivered across America and the need to improve the quality of care and reduce disparities in health in every community. Aligning Forces for Quality is working to lift the overall quality of health care in targeted communities across America, and provide models for national reform.

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