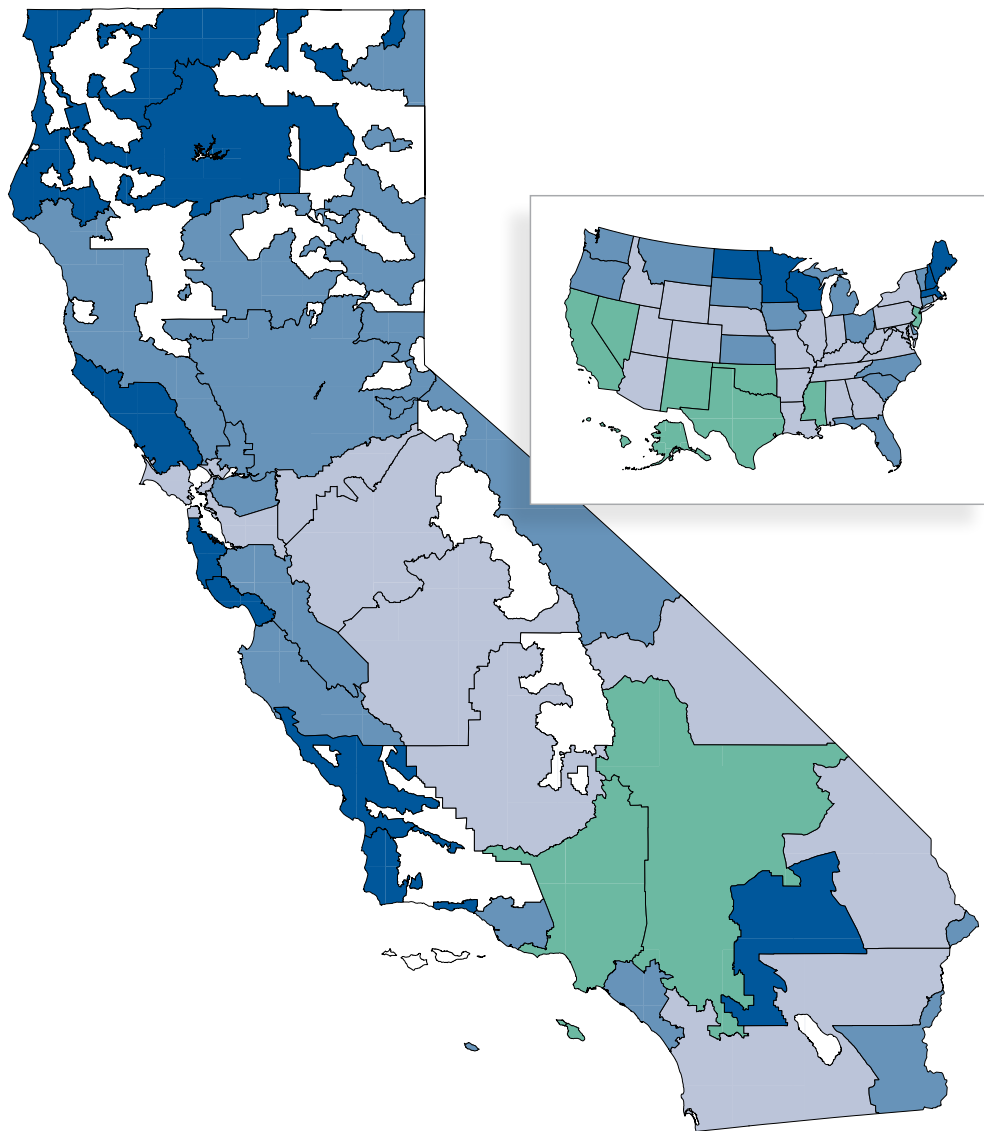




CALIFORNIA
HEALTHCARE
FOUNDATION



Geography Is Destiny:

Differences in Health Care Among
Medicare Beneficiaries in the
United States and California

November 2008

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Medicare Beneficiaries in the
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Prepared for

CALIFORNIA HEALTHCARE FOUNDATION

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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, 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. More information is available at www.dartmouthatlas.org.

About the Foundation

The **California HealthCare Foundation** is an independent philanthropy committed to improving the way health care is delivered and financed in California. By promoting innovations in care and broader access to information, our goal is to ensure that all Californians can get the care they need, when they need it, at a price they can afford. For more information, visit www.chcf.org.

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I. Introduction

Regardless of race or wealth, the safety and reliability of care in hospitals, surgical centers, nursing homes, and physician offices is far from certain.

THE U.S. HEALTH CARE SYSTEM IS BROKEN, AND NOWHERE is this more apparent than in California. Medicare and other payers spend significantly more per capita in the southern half of the state. At the same time, many Californians—indeed many Americans—fail to receive treatments of proven benefit, especially if their income is low and if they are African American or Latino. Regardless of race or wealth, the safety and reliability of care in hospitals, surgical centers, nursing homes, and physician offices is far from certain, and all too often physicians fail to ensure that their recommendations are clear, consistent, and understood by patients and their families. Most patients receive care from multiple physicians, who often fail to check if the drugs, tests, and treatments they prescribe are in sync with those prescribed by the rest of a patient’s doctors. As a result of these and other factors, U.S. health care costs—already the highest in the world—are growing at a rate that poses a serious financial threat to patients, employers, and the nation.

But it’s not just who you are that matters in health care, it’s also where you live. While income and race have an impact on both the health of patients and the care they receive, there are also striking differences in the amount and quality of care patients receive in different parts of California, and indeed in the rest of the country. Previous Dartmouth Atlas reports have documented remarkable variations in the quality and quantity of care delivered to patients living in different regions of the state. In southern California, for example, patients are more likely to be hospitalized and more likely to spend time in an intensive care unit than in the rest of the state. But contrary to what most patients—and most doctors—think, more care does not necessarily mean better care, or better health.

Key Findings

This Dartmouth Atlas Project report offers a window into underlying causes for the poor state of our health care system, as well as opportunities for reform. It looks at variation in health care delivery at both the national and California state level. This report is part of the California HealthCare Foundation’s ongoing commitment to improve the way health care is delivered and financed in California. To accomplish these goals, CHCF focuses on three main areas: improving the quality of care for Californians with chronic disease; reducing barriers to efficient, affordable health care for the underserved; and promoting greater transparency and accountability in the state’s health care system. To that end, CHCF commissioned the Dartmouth Atlas Project to perform the research and analysis for this report on variation in health care delivery, at both the national and California state levels. The major findings include:

- Across the country, the rate of leg amputation—a devastating treatment that is needed in severe cases of diabetes and peripheral vascular disease—is four times greater in African Americans than in whites. Rates of amputation also differ by a factor of three among U.S. states and more than five-fold among local regions. Within California, rates in different regions vary by a factor of two. Because poverty is an important risk factor for amputations, addressing these extraordinary differences in health outcomes will require attention to the full spectrum of health determinants, ranging from lower levels of schooling and limited health literacy, to inadequate housing and lack of transportation, as well as inadequate access to high quality, well-coordinated primary and specialty care.
- For evidence-based services such as screening mammography and appropriate testing for diabetes, differences across states and regions are substantially greater than the differences by race. In other words, while race matters when it comes to whether or not you receive appropriate, evidence-based services, where you live can matter even more. Furthermore, there are some regions where African Americans 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 (non-hospital) care for all races.
- Regions differ dramatically in their use of hospitals. Although African Americans 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 conditions include such chronic illnesses as heart disease, lung disease, diabetes, and high blood pressure.) These findings (and other recent Dartmouth Atlas reports) underscore the importance of the local delivery system. Some systems have been built in such a way that it is easier to put patients with chronic illnesses in the hospital, which is not necessarily the best—or safest—place for them to receive treatment. Other local delivery systems offer more opportunities to care for chronically ill patients in ambulatory settings—like doctors’ offices, or at home.

These findings and others reported here highlight the importance of understanding health and health care where it is delivered. Like politics, all health care is local, and addressing health care differences within and across regions requires understanding the forces that drive those differences in health care delivery.

A note on the data used in this report. These findings cover the fee-for-service Medicare population age 65 and older. They are based on claims data from the Centers for Medicare and Medicaid Services, which makes available a uniform national claims database for research purposes. There is no counterpart to this database for the commercially insured population. However, studies that the Dartmouth Atlas Project and others have done using other data sources (such as private insurer data and state all-payer data) have shown similar variations among the under-65 population.

This report does not attempt to sort out differences in health and health care among all races. There are several practical reasons for this. Separate analyses of the Latino population are challenging because fewer than half of self-designated Latinos are coded as such in the Medicare data; Latinos constitute less than 6 percent of the elderly population; and they are highly clustered in a few communities. Racial designations for Asians and American Indians are more accurate, but their small numbers (they represent less than 3 percent of the U.S. population) 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 undesirable. The Dartmouth Atlas Project therefore restricted the analyses in the current report to African Americans and non-African Americans, and, for ease of exposition, the authors refer to the non-African American population as white.

II. Screening for Breast Cancer

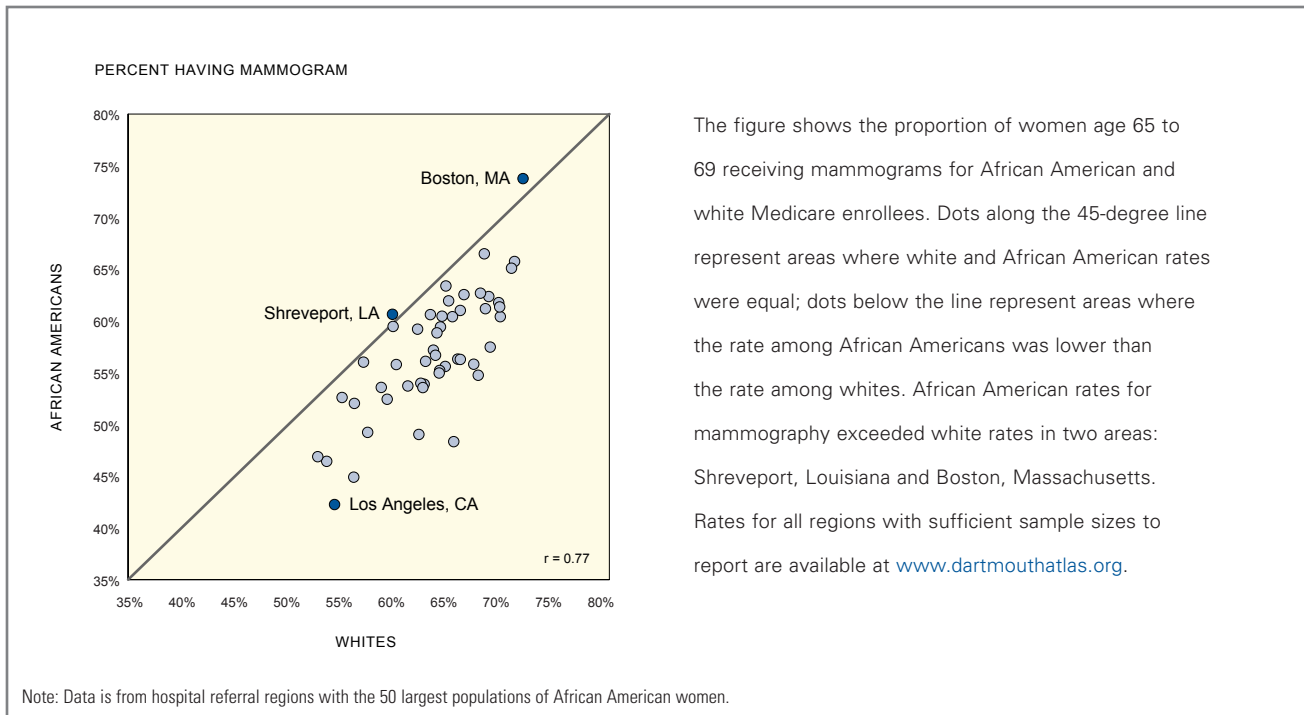
It seems reasonable to expect that a high quality health care system would work to ensure that all women in the right age groups receive their recommended mammogram.

WHEN LOOKING AT THE QUALITY OF CARE DELIVERED TO patients, it's useful to measure the rate at which providers make sure that patients receive care that has been shown to offer clear benefit. Mammographic screening for breast cancer is widely considered to be one example of this sort of evidence-based care. The United States Preventive Services Task Force, considered the gold standard for health care guidelines, recommends mammographic screening every one to three years for women age 40 and older. Evidence of benefit is strongest for women age 50 to 69, the age group that was generally included in the clinical trials. The evidence for women age 40 to 49 is weaker and the absolute benefit is smaller than in women age 50 to 69, making it harder to determine whether there is a substantial benefit from screening before age 50. The Task Force concluded that the evidence for benefit also applies to women over 70, provided their life expectancy is not compromised by other medical conditions.

Given the Task Force's strong recommendation, it seems reasonable to expect that a high quality health care system would work to ensure that all women in the right age groups receive their recommended mammogram. The table and map below suggest that there is considerable variation in this measure of quality. The data presented show the average proportion of women ages 65 to 69 who underwent screening during the two-year period 2004–05. Data are presented for this age group overall, and for white and African American women. Overall, the proportion of women who had mammograms during the two-year period in the United States was 64 percent, but the rate varied by a factor of about 1.3 across states, from less than 57 percent to 74 percent.

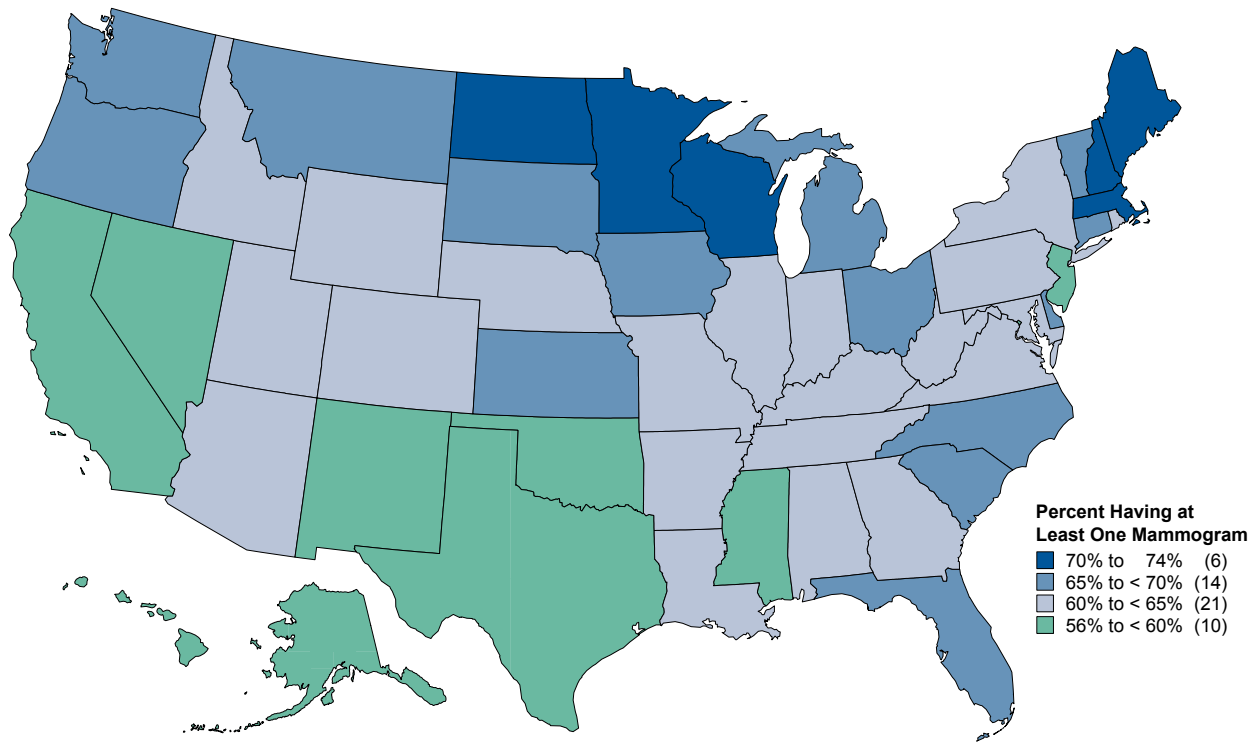
African Americans were less likely to receive mammographic screening than whites, but different states showed larger and smaller gaps between the races. The greatest gaps in screening rates were in Illinois (white, 63 percent; African American, 51 percent) and California (white, 60 percent; African American, 48 percent). The smallest gaps were in Delaware and Massachusetts. However, regions of the country that tended to do a better job of ensuring that white patients were screened also did a better job of ensuring that African American patients got their mammograms, and vice versa—those that weren't very good at screening white patients were also poor at screening African American patients (see Figure 1). The difference across regions (ranging from 42 percent of African Americans screened in Los Angeles to 74 percent in Boston) was greater than the differences in screening rates between races within every region.

Figure 1. Relationship Between Mammographic Screening for Breast Cancer Among African American and White Female Medicare Enrollees Ages 65 to 69, 2004 to 2005



In California, rates of mammography for female Medicare enrollees age 65 to 69 varied considerably. Among the state’s hospital referral regions, rates for all races ranged from a low of only 53 percent in Los Angeles and 55 percent in San Bernardino to 70 percent in San Mateo County and 69 percent in San Luis Obispo.¹ The state average was 59 percent. Only one region, Los Angeles, had a sufficiently large African American female population to allow reporting of race-specific mammography rates. In Los Angeles, the mammography rate was about 30 percent higher for white women (54 percent) than African American women (42 percent).

Map 1. Mammography Among Female Medicare Enrollees Ages 65 to 69, by State, 2004 to 2005

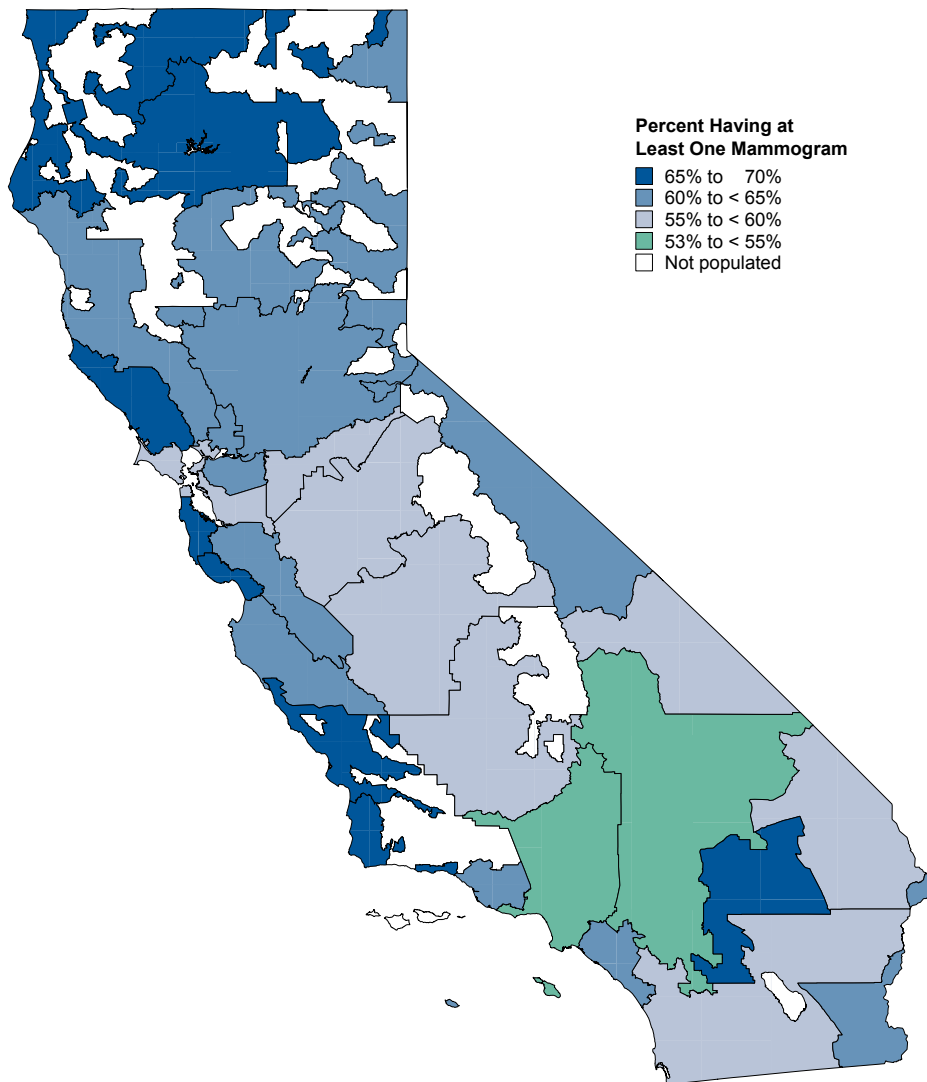


Percent Having at Least One Mammogram

- 70% to 74% (6)
- 65% to < 70% (14)
- 60% to < 65% (21)
- 56% to < 60% (10)

	56% to < 60%			60% to < 65%			65% to < 70%			70% to 74%					
	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE			
CA	59.3	47.8	60.0	AZ	64.6	n/a	n/a	MT	70.0	n/a	n/a	ME	74.0	n/a	n/a
NJ	59.1	54.2	59.7	WV	64.4	n/a	n/a	MI	69.8	62.6	70.7	ND	73.5	n/a	n/a
DC	58.9	55.6	65.5	MD	64.1	60.4	65.1	VT	69.6	n/a	n/a	MA	71.9	71.5	71.9
NM	58.8	n/a	n/a	PA	64.0	53.7	64.6	DE	69.4	66.5	69.8	MN	70.7	n/a	n/a
TX	58.7	54.0	59.1	RI	63.7	n/a	n/a	CT	68.8	63.8	69.3	NH	70.6	n/a	n/a
AK	58.3	n/a	n/a	VA	63.6	59.2	64.5	FL	67.6	58.6	68.3	WI	70.2	61.3	70.5
NV	57.9	n/a	n/a	AL	63.5	58.8	64.4	IA	67.3	n/a	n/a				
HI	57.3	n/a	n/a	GA	63.3	57.3	64.9	NC	67.1	60.1	68.5				
OK	57.1	53.9	57.2	NE	63.3	n/a	n/a	OR	66.1	n/a	n/a				
MS	56.9	49.3	59.5	CO	62.7	n/a	n/a	KS	66.0	n/a	n/a				
				TN	62.7	57.8	63.2	WA	65.5	n/a	n/a				
				MO	62.0	59.0	62.3	OH	65.4	62.0	65.7				
				IN	61.9	56.3	62.3	SD	65.3	n/a	n/a				
				KY	61.9	65.2	61.7	SC	65.3	60.3	66.6				
				IL	61.6	51.0	63.0								
				ID	61.1	n/a	n/a								
				UT	61.1	n/a	n/a								
				WY	60.9	n/a	n/a								
				LA	60.9	56.7	62.1								
				NY	60.7	51.6	61.8								
				AR	60.0	52.1	60.8								

Map 2. Mammography Among Female Medicare Enrollees Ages 65 to 69 in California,
by Hospital Referral Region, 2004 to 2005



53% to < 55%		55% to < 60%		60% to < 65%		65% to 70%	
San Bernardino	54.7	San Francisco	59.9	Ventura	64.2	San Mateo County	69.7
Los Angeles	53.1	Modesto	59.5	Sacramento	64.0	San Luis Obispo	69.4
		Fresno	58.9	Napa	63.8	Palm Springs/ Rancho Mirage	67.9
		Bakersfield	58.8	Chico	63.1	Santa Rosa	66.3
		Stockton	58.5	Salinas	62.9	Santa Barbara	66.1
		Alameda County	57.5	Orange County	62.7	Redding	65.8
		San Diego	56.2	San Jose	61.5	Santa Cruz	65.7
				Contra Costa County	60.5		

III. Management of Diabetes: Hemoglobin A1c Measurement

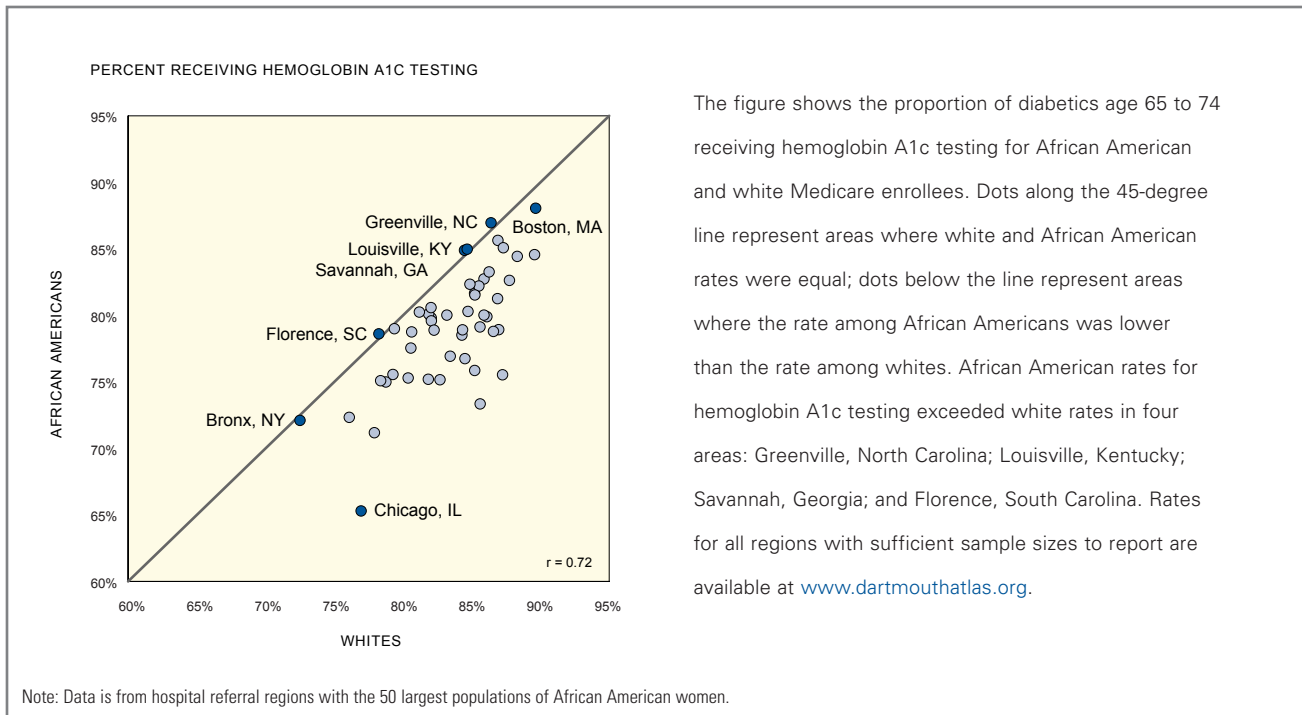
Clinical trials have shown that proper management of diabetes, including blood sugar and blood pressure control, and attention to such risk factors for heart disease as smoking and elevated cholesterol levels, can reduce the risk of complications.

ANOTHER WAY TO GAUGE THE QUALITY OF HEALTH CARE is the rate at which diabetics receive an annual test for hemoglobin A1c, a measurement that reflects how well the patient's blood sugar is being controlled by medication, diet, and exercise. Diabetes is a chronic illness that affects almost 21 million Americans. Between 5 and 10 percent of patients have Type 1 diabetes, which is caused by the destruction of the insulin-producing cells in the pancreas. Type 2 diabetes is by far the most common form of the disease, especially in the Medicare population, and is associated with older age, physical inactivity, and excess weight. 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, including blindness, stroke, heart attack, kidney failure, and nerve damage. Diabetes is the sixth leading cause of death in the United States. Clinical trials have shown that proper management of diabetes, including blood sugar and blood pressure control, and attention to such risk factors for heart disease 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 the care of patients with diabetes. Three of these measures are the rate at which patients are given specific diagnostic tests: testing of their hemoglobin A1c, a retinal exam, and testing of their cholesterol levels. The Dartmouth Atlas Project looked at the rate at which all three tests were delivered. In general, states and regions that did well on one test also did well on the others. For this reason, only one measure is presented in this report, the average proportion of diabetics receiving a hemoglobin A1c test during a given year (the others are available online at www.dartmouthatlas.org). The data presented here represent the average annual rate for the three-year period 2003 to 2005.

African Americans were less likely to receive annual hemoglobin A1c testing than whites, but the gap between African Americans and whites varied across states. The greatest gaps in testing rates were in Colorado (white, 84 percent; African American, 66 percent) and Illinois (white, 84 percent; African American, 70 percent). The smallest gaps were in Massachusetts and Oklahoma. The gap in California was 8 percent (white, 80 percent; African American, 74 percent). Once again, states and regions that were diligent about testing whites tended to be better at testing African Americans, and those that did a poor job at testing whites also did a worse job for African Americans (see

Figure 2. Relationship Between Rates of Hemoglobin A1c Testing Among African American and White Diabetic Medicare Enrollees Ages 65 to 74, 2003 to 2005



The figure shows the proportion of diabetics age 65 to 74 receiving hemoglobin A1c testing for African American and white Medicare enrollees. Dots along the 45-degree line represent areas where white and African American rates were equal; dots below the line represent areas where the rate among African Americans was lower than the rate among whites. African American rates for hemoglobin A1c testing exceeded white rates in four areas: Greenville, North Carolina; Louisville, Kentucky; Savannah, Georgia; and Florence, South Carolina. Rates for all regions with sufficient sample sizes to report are available at www.dartmouthatlas.org.

Figure 2). In four regions of the country, Greenville, North Carolina; Louisville, Kentucky; Savannah, Georgia; and Florence, South Carolina, rates of testing for African Americans were higher than for white Americans. The difference across regions was greater than the racial differences within every region.

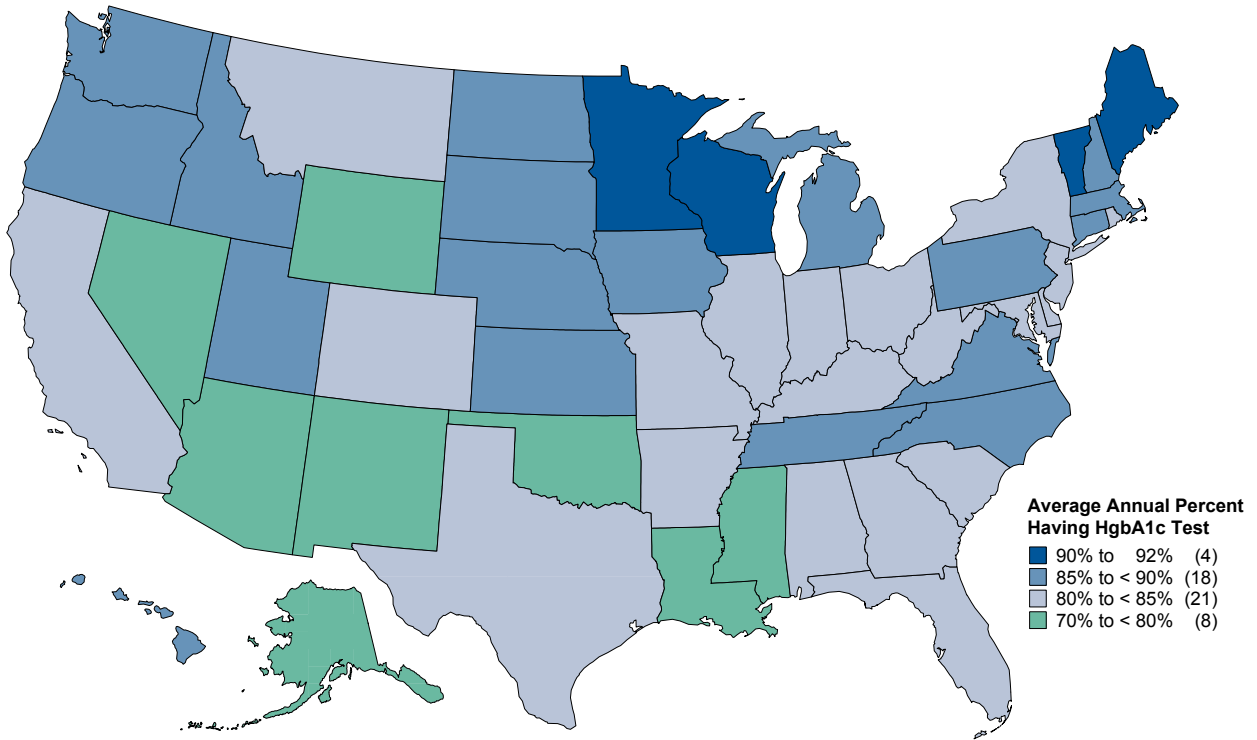
In California, rates of hemoglobin A1c testing among diabetic Medicare enrollees averaged 80 percent, which was below the national average of 84 percent, but it varied considerably in different regions of the state. Los Angeles (76 percent), San Bernardino (78 percent), Alameda County (78 percent) and San Jose (79 percent) all fell below the state average. By contrast, San Luis Obispo (89 percent) and Santa Barbara (88 percent) did better than the rest of the state.

Seven California regions had a sufficient number of African American diabetic enrollees to report race-specific rates. The most striking disparity between African American and white screening rates was found in Alameda County, where the hemoglobin A1c testing rate for white diabetics (82 percent) was dramatically higher than the rate for African Americans (66 percent).

In the other six regions, African American and white screening rates were within 7 percent of each other; in no region was the screening rate for African Americans higher than the rate for whites. Sacramento had the highest rate for both races (African American, 81 percent; white, 84 percent), as well as the smallest gap between African American and white rates (4 percent). The screening rate for African Americans in Sacramento was higher than the rate for whites in two other regions: Los Angeles (white, 76 percent) and San Bernardino (white, 79 percent).

It is worth noting that Sacramento and several other regions in California that provide relatively high quality care, at least as far as the delivery of such evidence-based tests as the hemoglobin A1c, also cost Medicare less per beneficiary. There is some evidence to suggest that these regions do better on both delivery of evidence-based care and controlling costs at least in part because many of their providers, including the hospitals and physicians, are working within such organized group practices as the Sutter System, which is located in Sacramento. For more information on this topic, see the 2008 Chronic Care Atlas at www.dartmouthatlas.org.

Map 3. Hemoglobin A1c Testing Among Diabetic Medicare Enrollees Ages 65 to 74, by State, 2003 to 2005

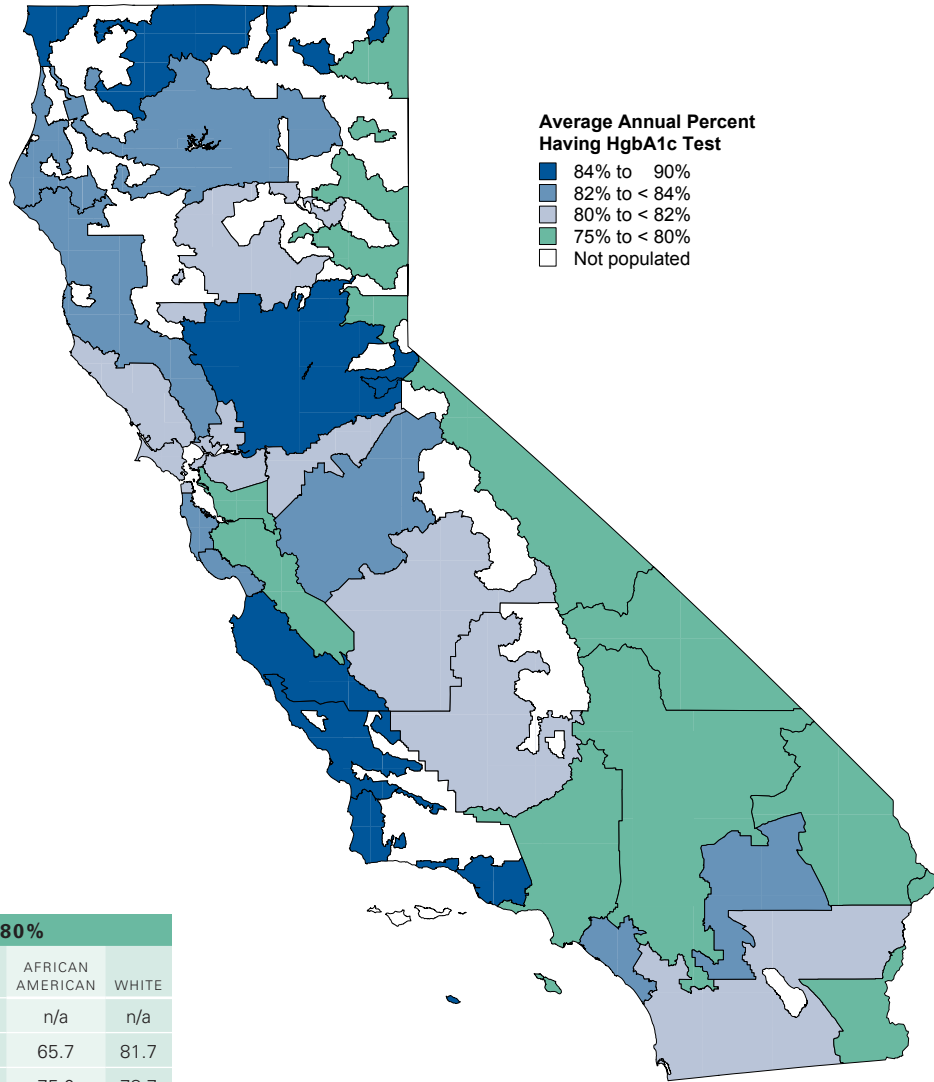


Average Annual Percent Having HgbA1c Test

- 90% to 92% (4)
- 85% to < 90% (18)
- 80% to < 85% (21)
- 70% to < 80% (8)

	70% to < 80%			80% to < 85%			85% to < 90%			90% to 92%					
	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE	OVERALL	AFRICAN AMERICAN	WHITE			
LA	79.3	77.1	80.3	MD	84.8	80.7	86.6	IA	89.4	87.1	89.5	VT	91.5	n/a	n/a
NV	78.3	77.1	78.4	OH	84.7	80.1	85.3	NH	89.3	n/a	n/a	WI	90.9	85.4	91.2
WY	78.1	n/a	n/a	FL	84.4	81.5	84.9	WA	89.1	81.6	89.3	ME	90.8	n/a	n/a
MS	77.8	76.4	78.6	RI	84.4	n/a	n/a	MA	89.0	87.8	89.1	MN	90.2	83.2	90.3
OK	77.6	77.2	77.6	MO	84.3	78.1	85.1	ND	88.7	n/a	n/a				
AZ	77.4	80.9	77.3	DE	84.1	79.8	85.2	OR	87.7	n/a	n/a				
NM	73.6	n/a	n/a	WV	83.8	78.3	84.0	NC	87.4	86.1	87.9				
AK	70.9	n/a	n/a	NY	83.6	76.8	84.8	HI	87.3	n/a	n/a				
				GA	83.5	81.4	84.3	NE	87.2	82.7	87.3				
				KY	83.4	84.8	83.3	TN	86.8	81.4	87.8				
				IN	83.1	74.3	84.0	CT	86.5	83.0	87.0				
				CO	83.0	66.1	84.0	UT	86.5	n/a	n/a				
				TX	82.9	80.7	83.2	KS	86.5	76.4	87.2				
				MT	82.7	n/a	n/a	MI	86.1	80.6	87.1				
				AL	82.1	79.3	83.1	VA	85.8	81.9	87.3				
				SC	82.0	79.9	83.1	ID	85.6	n/a	n/a				
				IL	81.7	70.1	84.0	PA	85.5	79.1	86.0				
				DC	81.3	80.8	84.6	SD	85.4	n/a	n/a				
				AR	81.1	76.9	81.8								
				NJ	80.9	74.6	82.1								
				CA	80.0	74.3	80.5								

Map 4. Hemoglobin A1c Testing Among Diabetic Medicare Enrollees Ages 65 to 74 in California,
by Hospital Referral Region, 2003 to 2005



75% to < 80%			
	OVERALL	AFRICAN AMERICAN	WHITE
San Jose	79.3	n/a	n/a
Alameda County	78.3	65.7	81.7
San Bernardino	78.3	75.0	78.7
Los Angeles	75.7	72.3	76.1

80% to < 82%				82% to < 84%			84% to 90%				
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
Stockton	81.9	n/a	n/a	Napa	83.6	n/a	n/a	San Luis Obispo	89.1	n/a	n/a
Santa Rosa	81.7	n/a	n/a	San Mateo County	83.2	n/a	n/a	Santa Barbara	87.8	n/a	n/a
Fresno	81.6	78.2	81.8	Modesto	82.8	n/a	n/a	Salinas	85.8	n/a	n/a
Chico	81.2	n/a	n/a	Palm Springs/ Rancho Mirage	82.7	n/a	n/a	Ventura	84.4	n/a	n/a
San Diego	81.0	76.4	81.3	Redding	82.2	n/a	n/a	Sacramento	84.2	81.2	84.3
Bakersfield	81.0	n/a	n/a	Orange County	82.1	n/a	n/a				
Contra Costa County	80.3	n/a	n/a	Santa Cruz	82.0	n/a	n/a				
San Francisco	80.1	75.8	80.7								

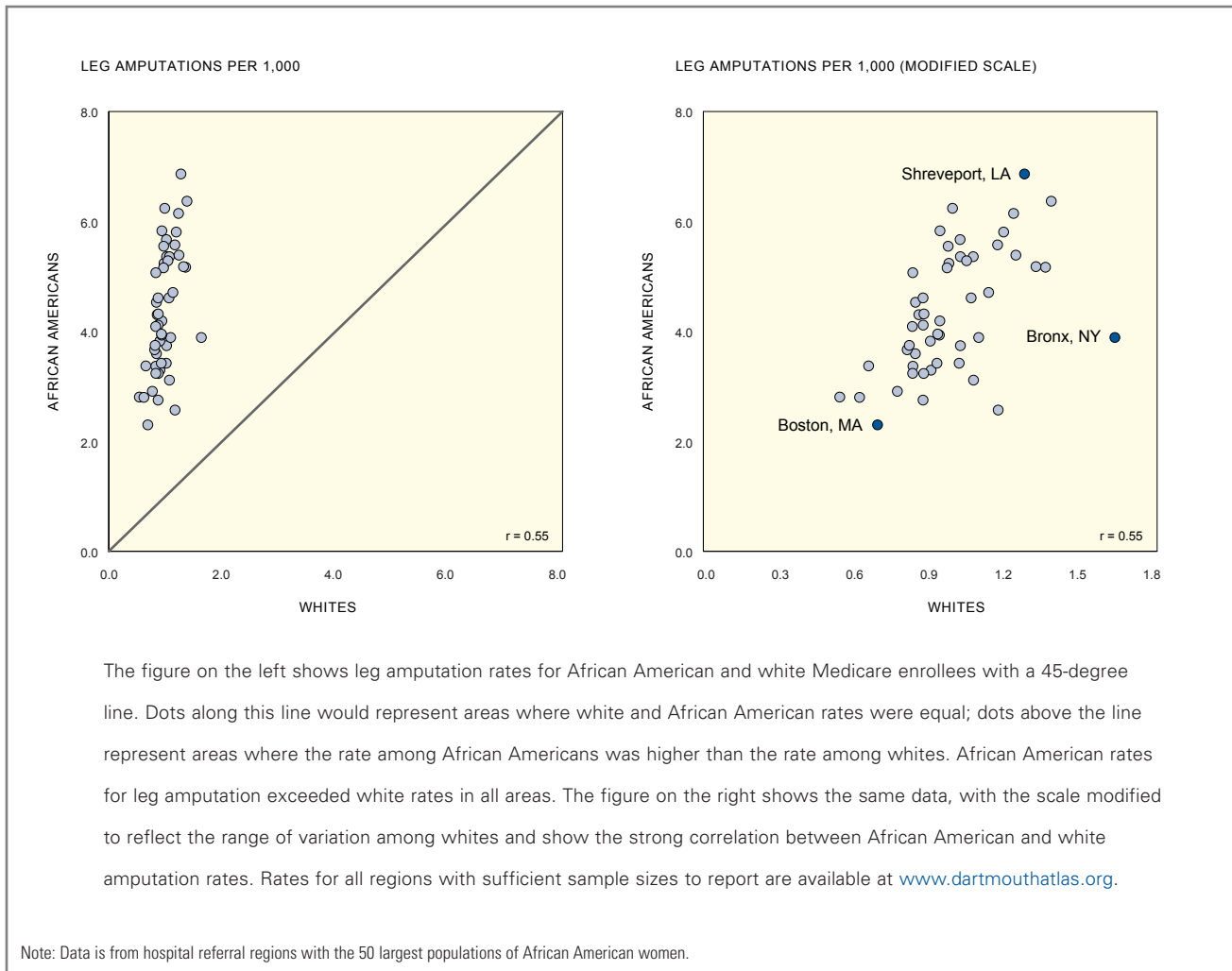
IV. Leg Amputations

Rates of leg amputation vary dramatically depending upon who a person is and where that person lives.

AMPUTATION IS ONE OF THE MORE DEVASTATING RESULTS OF failing to prevent diabetes and peripheral vascular disease, and improperly caring for patients who develop them. Both diseases can cause poor blood circulation and nerve damage, which predispose patients to injury and to infections that fail to heal. In some cases, amputation is the only option. A broad array of environmental, social, and behavioral factors place patients at risk for developing the underlying diseases in the first place. These include smoking, obesity, a sedentary lifestyle, poor blood pressure control, and lack of access to high quality primary and specialty medical care. Once patients are ill, rigorous attention to proper foot care is essential; such care includes 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. Not surprisingly, poverty and race represent major risk factors for amputation. Among Medicare beneficiaries who have undergone an amputation, more than 25 percent have a second amputation within a year and over 30 percent die within the same period.²

Rates of leg amputation vary dramatically depending upon who a person is and where that person lives. Among the states during 2003 to 2005, African Americans in the fee-for-service Medicare population were on average more than four times more likely to undergo amputation than whites in the same population. The amputation rate for African Americans was about 6 per 1,000 in Louisiana, Mississippi, and South Carolina, but was less than 2 per 1,000 in Colorado and Nevada. Amputation rates also varied substantially for whites across states, and rates for both races were correlated at both the state and regional level. Although the rates for whites were much lower, the differences for whites among different states were similar: the amputation rates for whites in Mississippi and Louisiana were around 1.3 per 1,000, but were about half that in Colorado and Nevada. In California, the amputation rate was 3.3 per 1,000 among African Americans and 0.8 per 1,000 among whites. This suggests that the underlying environmental, social, and behavioral factors that predispose patients to diabetes and peripheral vascular disease vary among regions and states, but within states and regions they are more likely to affect African Americans than whites.

Figure 3. Relationship Between Leg Amputation Rates Among African American and White Medicare Enrollees, 2003 to 2005

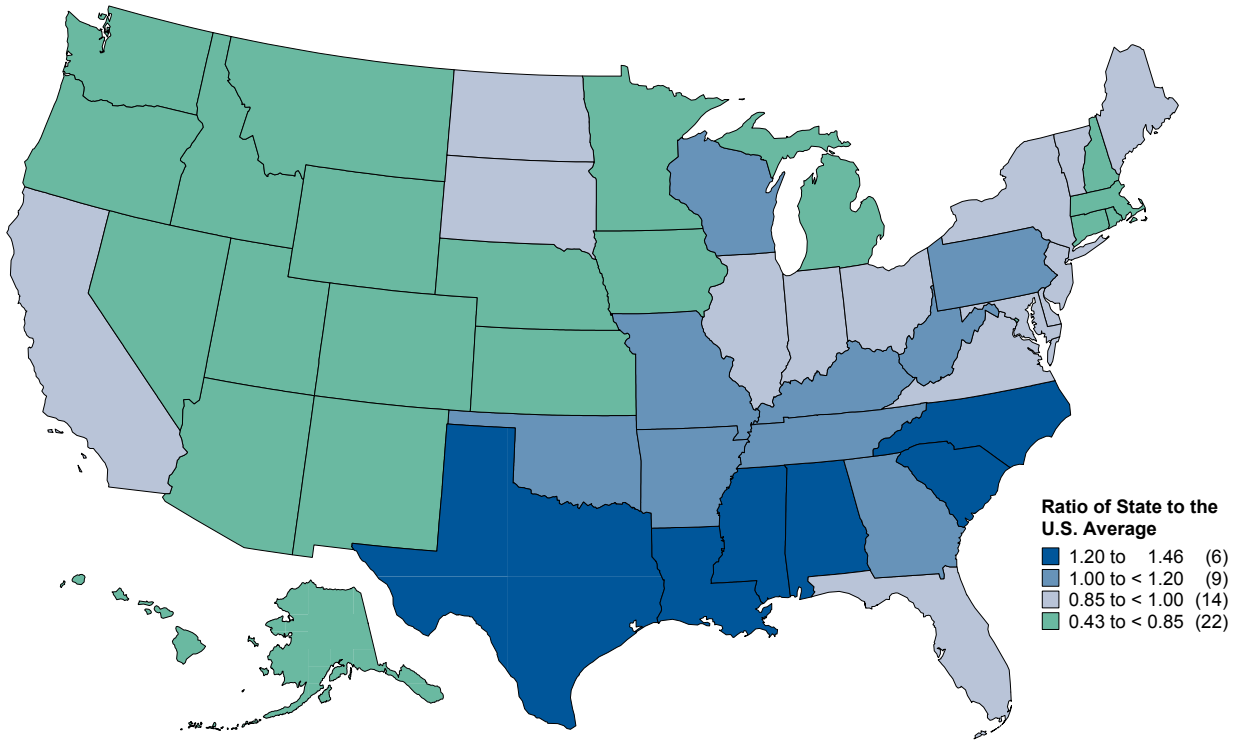


Among the 24 hospital referral regions in California, overall leg amputation rates varied by a factor of 2.7, from 0.60 to 1.62 per 1,000 Medicare enrollees. Rates were at least 40 percent higher than the state average of 0.99 per 1,000 in Modesto (1.62 per 1,000), Fresno (1.49 per 1,000) and Bakersfield (1.38 per 1,000). By contrast, rates were about 40 percent below the state average in San Luis Obispo, Palm Springs/Rancho Mirage, and Santa Rosa.

Eight California regions had sufficiently large African American populations to report race-specific leg amputation rates. Among African American Medicare enrollees, amputation rates varied 1.5 times, from 2.53

per 1,000 in Alameda County to 3.90 per 1,000 in Fresno. Fresno also had the highest leg amputation rate among white enrollees (1.22 per 1,000), but the African American rate in Fresno was more than three times the white rate. Fresno had the smallest gap between African American and white rates; the largest gap was in Contra Costa County, where the African American rate (3.69 per 1,000) was more than 5.6 times the white rate (0.66 per 1,000).

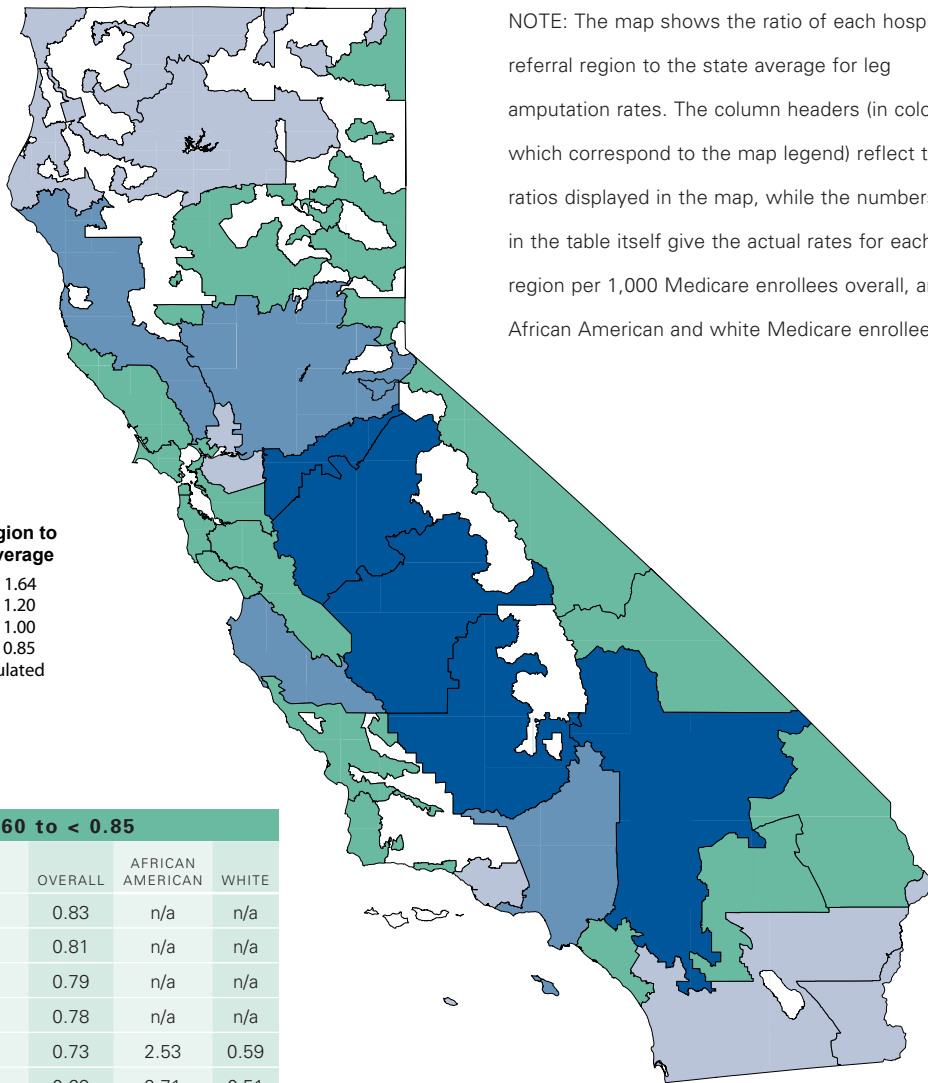
Map 5. Leg Amputation Rates Per Thousand Among Medicare Enrollees, by State, 2003 to 2005



0.43 to < 0.85				0.85 to < 1.00				1.00 to < 1.20			1.20 to 1.46				
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
CT	0.96	2.88	0.78	IN	1.13	3.49	0.91	GA	1.37	5.21	1.00	LA	1.66	6.14	1.26
NH	0.96	n/a	n/a	VA	1.12	4.11	0.86	WV	1.36	3.88	1.08	MS	1.60	5.61	1.31
NM	0.96	n/a	n/a	NY	1.08	3.47	0.88	TN	1.36	4.57	1.09	SC	1.56	6.04	1.12
RI	0.94	n/a	n/a	OH	1.08	3.31	0.89	AR	1.35	5.38	1.00	TX	1.50	4.20	1.27
MA	0.93	2.30	0.76	SD	1.06	n/a	n/a	PA	1.29	3.35	1.07	AL	1.49	5.37	1.16
HI	0.92	n/a	n/a	NJ	1.06	3.73	0.83	KY	1.27	3.75	1.03	NC	1.40	5.31	1.04
WA	0.92	2.54	0.72	IL	1.05	3.32	0.86	WI	1.20	4.09	0.93				
WY	0.91	n/a	n/a	DE	1.05	3.80	0.81	OK	1.20	3.64	0.96				
MI	0.91	2.99	0.74	ND	1.03	n/a	n/a	MO	1.14	4.19	0.88				
AK	0.90	n/a	n/a	VT	1.02	n/a	n/a								
DC	0.90	3.39	0.47	MD	1.00	3.55	0.79								
KS	0.89	2.42	0.72	CA	0.99	3.30	0.78								
MN	0.88	2.19	0.69	ME	0.98	n/a	n/a								
IA	0.86	3.03	0.67	FL	0.98	4.10	0.73								
AZ	0.85	2.63	0.67												
NE	0.85	2.24	0.67												
OR	0.85	n/a	n/a												
MT	0.82	n/a	n/a												
ID	0.71	n/a	n/a												
NV	0.71	1.50	0.60												
CO	0.67	1.76	0.53												
UT	0.50	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 African American and white Medicare enrollees.

Map 6. Leg Amputation Rates Per Thousand Among Medicare Enrollees in California,
by Hospital Referral Region, 2003 to 2005



NOTE: The map shows the ratio of each hospital referral region to the state 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 region per 1,000 Medicare enrollees overall, and for African American and white Medicare enrollees.

Ratio of Region to the State Average

- 1.20 to 1.64
- 1.00 to < 1.20
- 0.85 to < 1.00
- 0.60 to < 0.85
- Not populated

0.60 to < 0.85			
	OVERALL	AFRICAN AMERICAN	WHITE
Orange County	0.83	n/a	n/a
Santa Barbara	0.81	n/a	n/a
San Jose	0.79	n/a	n/a
Chico	0.78	n/a	n/a
Alameda County	0.73	2.53	0.59
San Francisco	0.69	2.71	0.51
San Mateo County	0.66	n/a	n/a
Santa Cruz	0.65	n/a	n/a
Santa Rosa	0.60	n/a	n/a
Palm Springs/Rancho Mirage	0.60	n/a	n/a
San Luis Obispo	0.60	n/a	n/a

0.85 to < 1.00				1.00 to < 1.20				1.20 to 1.64			
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
San Diego	0.99	2.83	0.79	Napa	1.11	n/a	n/a	Modesto	1.62	n/a	n/a
Ventura	0.95	n/a	n/a	Salinas	1.10	n/a	n/a	Fresno	1.49	3.90	1.22
Contra Costa County	0.88	3.69	0.66	Sacramento	1.08	3.32	0.85	Bakersfield	1.38	n/a	n/a
Redding	0.86	n/a	n/a	Los Angeles	1.03	3.67	0.81	Stockton	1.36	n/a	n/a
								San Bernardino	1.31	3.65	1.09

V. Primary Care Orientation: Predominant Provider a Primary Care Physician

One of the greatest failings of the U.S. health care delivery system is its inability to coordinate care safely and effectively over the course of a patient's illness.

OBVIOUSLY, THERE ARE MANY FACTORS THAT GO INTO THE rates at which patients develop chronic illnesses, including diabetes and peripheral vascular disease, and these factors must be taken into account when explaining both regional differences and racial differences in rates of leg amputation. Poverty is a factor in the rate of leg amputation, because being poor makes people more likely to suffer diabetes and peripheral vascular disease in the first place, and African American Californians are more likely to be poor than whites. It is unclear from these data how much lack of access to good medical care contributes to a patient's risk for amputation.

On the other hand, there is widespread agreement that one of the greatest failings of the U.S. health care delivery system is its inability to coordinate care safely and effectively over the course of a patient's illness, and among the various settings where a patient receives care. The care of both chronic illnesses like diabetes, and acute conditions like heart attack and hip fracture, has become so complex that any serious injury or illness requires care from multiple physicians in multiple settings. Diabetics may need to be seen not just by a primary care physician, but also a cardiologist, neurologist, and a nephrologist (kidney specialist), because diabetes can cause heart disease, nerve damage, and kidney failure. For many patients, inadequate coordination among various physicians, and poorly executed care transitions between different care givers—like from one nursing shift to another, or during transfer from hospital to nursing home—can lead to poor care, duplication of tests, erroneous diagnoses, unnecessary prescriptions, inadvertent drug interactions and avoidable hospitalizations, infections, and medical errors.

Primary care physicians play a key role in providing and coordinating high quality health care. For such conditions as diabetes and hypertension, primary care physicians have been shown to provide care that is similar to specialty care in quality, yet lower in cost. Adequate access to primary care can improve care coordination and reduce the frequency of avoidable hospitalizations.

The Dartmouth Atlas Project and other studies have found that regions with a greater proportion of care provided by primary care physicians have both lower costs and higher quality. In nearly all 50 states, 90 percent of Medicare beneficiaries were seen at least once in a two-year period by a primary care physician (tables available at www.dartmouthatlas.org). There was, however, substantial variation in the proportion of beneficiaries whose predominant ambulatory physician was a primary care doctor, ranging from over 85 percent in Nebraska, Maine, and South Dakota, to less than 70 percent in Connecticut and New Jersey. In California, 72 percent of beneficiaries had a primary care

physician as their predominant provider. Although the differences between African Americans and whites within regions were smaller than the variation across regions (see Figure 4), African Americans were slightly more likely to have a primary care physician as their predominant provider than were whites.

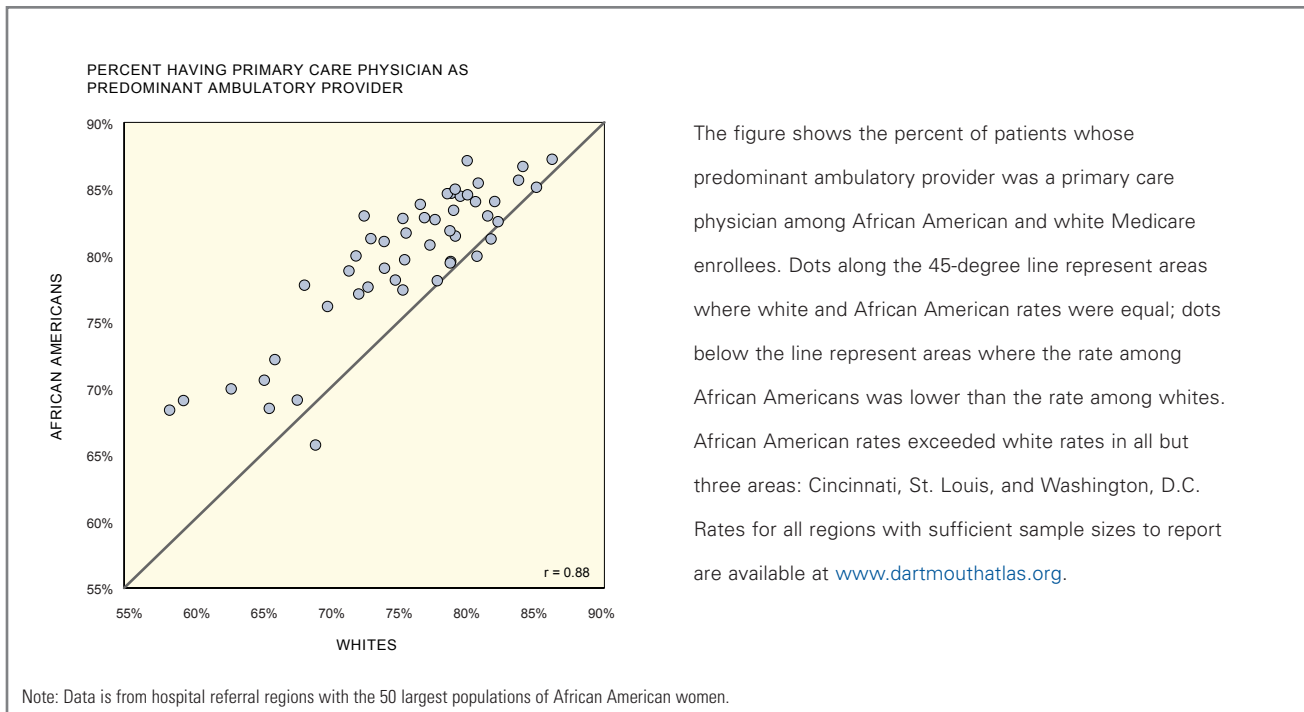
In states and regions where patients tended to have a specialist as their main provider—such as New Jersey and Connecticut—they were also much more likely to have multiple physicians. Across all U.S. hospital referral regions, having a predominant provider who was a primary care physician meant that a patient was far less likely to see ten or more different physicians in a year. While many Americans assume that having more care, and perhaps more doctors, leads to better care and better health, previous research shows that having more physicians is actually correlated with poorer quality care and worse outcomes.³

At first glance, these findings might seem contradictory. On the one hand, having a primary care physician as the main provider generally leads to better care. On the other hand, African Americans have worse health status,

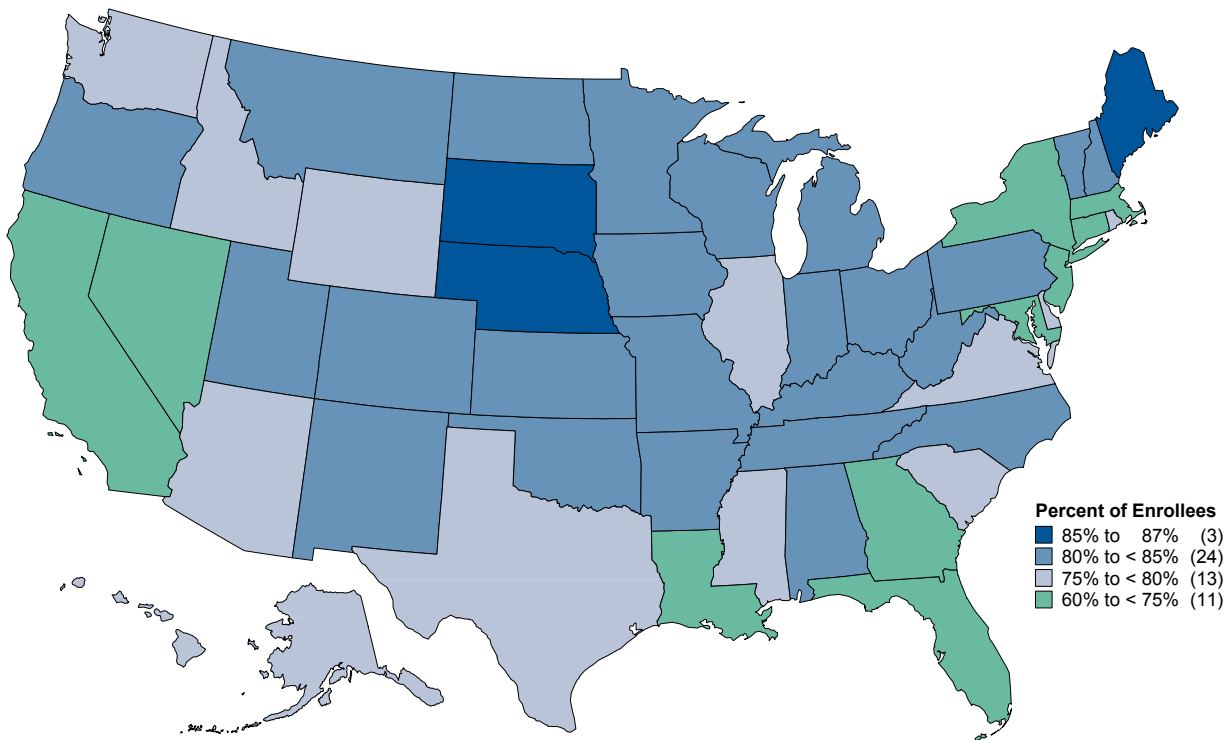
despite being somewhat more likely to have a primary care doctor as their predominant provider. The problem is that medicine cannot cure all ills, and poor health and poor care result from many different factors. While having a primary care physician can help improve the quality of care patients receive, it may not be enough to counter the negative effects that poverty and environment have on underlying rates of chronic illness, or on patients' ability to manage their own care.

The striking disparity, for example, between African Americans and whites in their rates of leg amputation, even in regions where the quality of care is better than average for both races, points out the need to focus attention on the full spectrum of health determinants. A number of factors are correlated with poor health, including poverty, lower levels of schooling, limited health literacy, inadequate housing, lack of transportation—as well as inadequate access to high-quality, well-coordinated primary and specialty care. Most importantly, the absence of a simple relationship between relatively higher use of primary care physicians and outcomes reveals the importance of health care systems that are well integrated across all

Figure 4. Relationship Between the Rate of Patients Having a Primary Care Physician as their Predominant Ambulatory Provider Among African American and White Medicare Enrollees, 2004



Map 7. Primary Care Physician as the Predominant Ambulatory Provider Among Medicare Enrollees, by State, 2004



Percent of Enrollees
 ■ 85% to 87% (3)
 ■ 80% to < 85% (24)
 ■ 75% to < 80% (13)
 ■ 60% to < 75% (11)

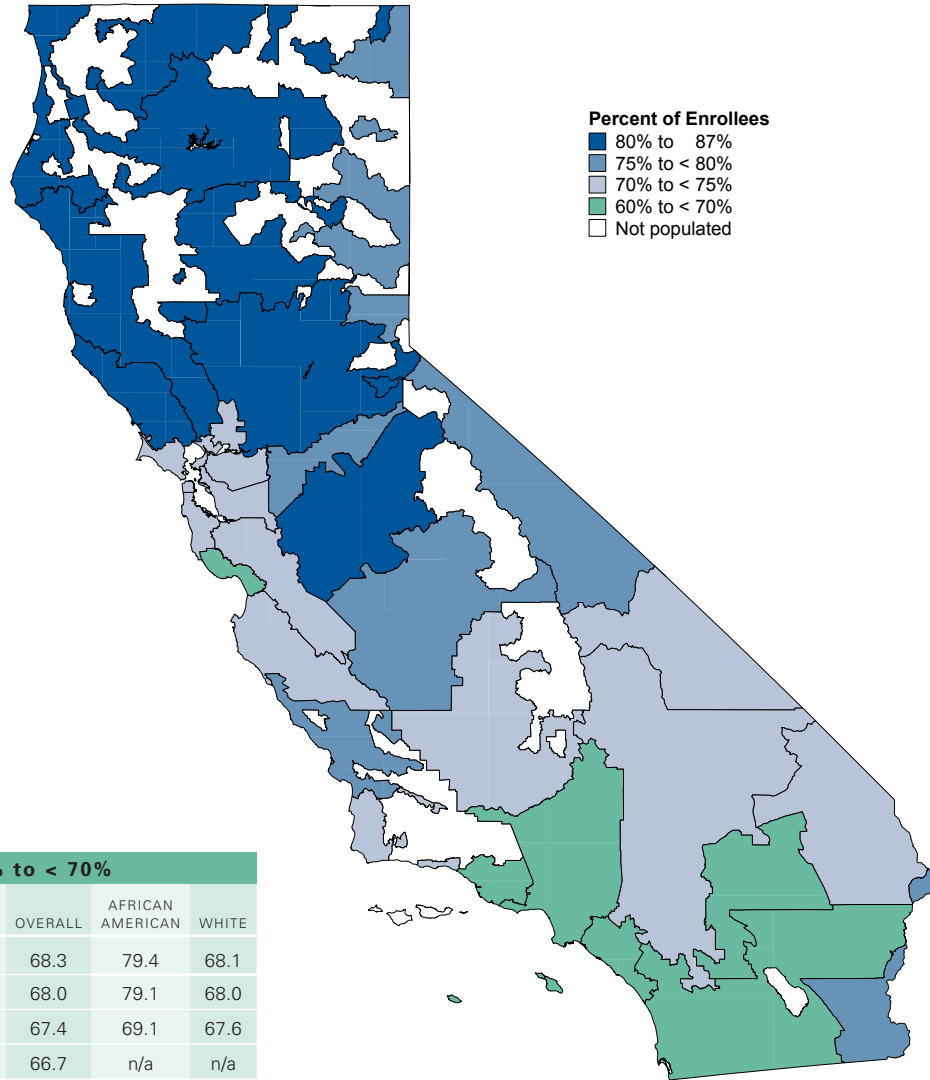
60% to < 75%				75% to < 80%			80% to < 85%			85% to 87%					
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
GA	74.8	79.0	74.2	SC	80.0	83.9	79.4	KS	84.6	85.5	84.4	NE	86.4	81.8	86.3
MD	74.5	76.6	74.3	WY	79.7	n/a	n/a	MN	83.9	82.0	83.6	SD	86.4	n/a	n/a
MA	74.3	82.2	74.0	WA	79.6	77.6	79.5	IA	83.3	85.0	83.0	ME	85.3	n/a	n/a
NV	72.6	73.2	72.5	HI	79.5	n/a	n/a	OR	83.3	85.1	83.0				
CA	72.4	74.9	72.5	VA	78.9	81.9	78.5	AR	83.2	85.0	83.0				
LA	72.0	78.3	70.7	RI	78.7	83.7	78.4	ND	82.6	n/a	n/a				
FL	71.3	79.2	70.8	TX	78.3	82.5	78.1	VT	82.5	n/a	n/a				
NY	70.5	71.6	70.4	IL	77.1	78.7	77.0	MO	82.3	81.1	82.3				
CT	69.8	72.4	69.6	AK	76.7	n/a	n/a	OH	82.1	83.2	82.0				
NJ	65.3	71.8	64.8	MS	76.6	83.0	75.1	PA	82.1	81.3	82.0				
DC	60.2	63.2	58.0	AZ	75.7	78.7	75.5	KY	82.0	85.1	81.7				
				ID	75.2	n/a	n/a	MI	81.8	82.8	81.7				
				DE	75.0	80.6	74.4	WI	81.6	80.0	81.4				
								AL	81.5	85.3	81.0				
								NC	81.5	84.8	81.1				
								OK	81.3	80.2	81.3				
								UT	81.1	n/a	n/a				
								TN	81.0	82.5	80.9				
								IN	81.0	81.2	80.8				
								NH	81.0	n/a	n/a				
								WV	80.9	79.9	80.7				
								MT	80.5	n/a	n/a				
								CO	80.2	79.2	80.0				
								NM	80.0	82.6	80.0				

physician specialties—primary care, subspecialty care, and all sites of care. Primary care is an essential element of high quality care, but not sufficient by itself.

Among California hospital referral regions, the percent of Medicare enrollees having a primary care physician as their predominant ambulatory provider ranged from 60 percent in the Palm Springs/Rancho Mirage region to 87 percent in Redding. Rates were also substantially higher than the state average of 72 percent in Modesto (83 percent), Santa Rosa (82 percent), and Chico (82 percent).

Thirteen regions had enough African American Medicare enrollees to allow reporting of race-specific rates. In three regions, the percent having a primary care doctor as their predominant provider was higher among whites than African Americans: Stockton (white, 78 percent; African American, 75 percent), Contra Costa County (white, 70 percent; African American, 69 percent), and Bakersfield (white, 74 percent; African American, 73 percent). The gap was smallest in Sacramento, where 81 percent of both African Americans and whites had a primary care physician as their predominant ambulatory doctor. The gap was largest in San Diego and Orange County, where African American rates (79 percent) exceeded white rates (68 percent) by about 16 percent.

Map 8. Primary Care Physician as the Predominant Ambulatory Provider Among Medicare Enrollees in California,
by Hospital Referral Region, 2004



60% to < 70%			
	OVERALL	AFRICAN AMERICAN	WHITE
San Diego	68.3	79.4	68.1
Orange County	68.0	79.1	68.0
Los Angeles	67.4	69.1	67.6
Santa Cruz	66.7	n/a	n/a
Ventura	65.4	n/a	n/a
Palm Springs/ Rancho Mirage	60.3	n/a	n/a

70% to < 75%				75% to < 80%				80% to 87%			
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
Salinas	75.0	n/a	n/a	Fresno	78.7	84.5	78.6	Redding	86.8	n/a	n/a
Santa Barbara	74.3	n/a	n/a	Stockton	78.0	74.7	78.4	Modesto	83.1	84.6	83.1
Bakersfield	74.2	73.4	74.2	San Luis Obispo	77.1	n/a	n/a	Santa Rosa	82.4	n/a	n/a
San Francisco	73.7	79.6	73.7					Chico	81.9	n/a	n/a
Alameda County	73.0	76.2	73.2					Sacramento	81.0	81.4	81.0
San Bernardino	72.2	78.9	71.9					Napa	80.6	n/a	n/a
San Jose	71.8	n/a	n/a								
San Mateo County	70.8	78.6	70.6								
Contra Costa County	70.4	68.7	70.5								

VI. The Use of the Hospital as a Site of Care

While hospitalizing patients may seem safer and easier for the physician, many hospital admissions for certain medical conditions could have been prevented by better outpatient care.

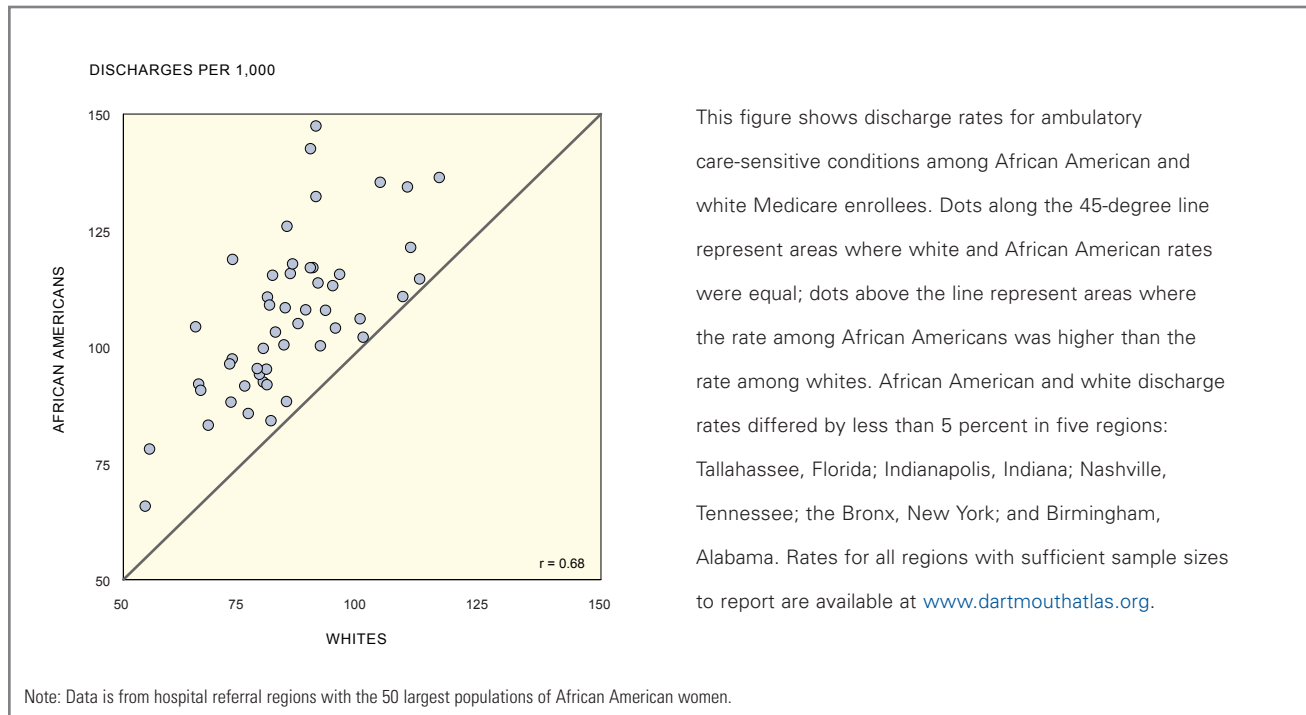
BEING HOSPITALIZED IS SOMETHING MOST PATIENTS WOULD choose to avoid if they could, and for good reason. Hospitalization poses two kinds of burdens: it is the most expensive place to treat patients, and it puts them at risk for suffering medical error, drug interactions, and hospital acquired infections. There are many medical (as opposed to surgical) conditions that can be cared for either in the inpatient or the outpatient setting: poorly controlled diabetes, for example, or worsening heart failure. While hospitalizing patients may seem safer and easier for the physician, or the only option for a patient with inadequate home or community-based support, many hospital admissions for certain medical conditions could have been prevented by better outpatient care. These conditions are sometimes referred to as ambulatory care-sensitive.⁴ In other words, where patients with these conditions are cared for depends in part upon the quality of ambulatory care they receive.

Discharge rates for these ambulatory care-sensitive conditions vary widely across the country. (Rates of hospitalization for such conditions are also highly correlated with the local supply of hospital beds. See the section on supply-sensitive care on page 27.) Two- to three-fold variations in ambulatory care-sensitive hospitalization rates were found across U.S. states (see Map 9) and across hospital referral regions. During 2003 to 2005, West Virginia, Kentucky, Louisiana, and Mississippi had particularly high rates of hospitalization for ambulatory care-sensitive conditions (all had rates over 100 discharges per 1,000 beneficiaries). States with particularly low rates included Washington (50 discharges per 1,000), Utah (47.6 per 1,000), and Hawaii (31.8 per 1,000). At 64.3 per 1,000, California's rate was well below the national average of 78.3.

The discharge rates for African Americans were higher than for whites in 44 states, including California. Yet simply saying that discharge rates are higher for African Americans than whites does not tell the whole story. While the general pattern of higher rates for African Americans than whites held true in nearly all regions, comparing rates in the 50 U.S. hospital referral regions with the largest African American populations shows that the rates for African Americans and whites went hand in hand in any individual region. Where African Americans had higher rates than average, so did whites. In only four regions were discharge rates for whites and African Americans about equal.

In California, discharge rates for ambulatory care-sensitive conditions varied nearly two-fold among the state's hospital referral regions. Rates were more than 25 percent above the state average of 64.3 per 1,000 Medicare enrollees

Figure 5. Relationship Between Discharges for Ambulatory Care-sensitive Conditions Among African American and White Medicare Enrollees, 2003 to 2005



in San Bernardino (83.6 per 1,000) and Bakersfield (81.8 per 1,000) They were more than 25 percent below the state average in San Luis Obispo (44.6 per 1,000), San Mateo County (45.4 per 1,000), Santa Barbara (45.6 per 1,000), and Santa Rosa (46.4 per 1,000).

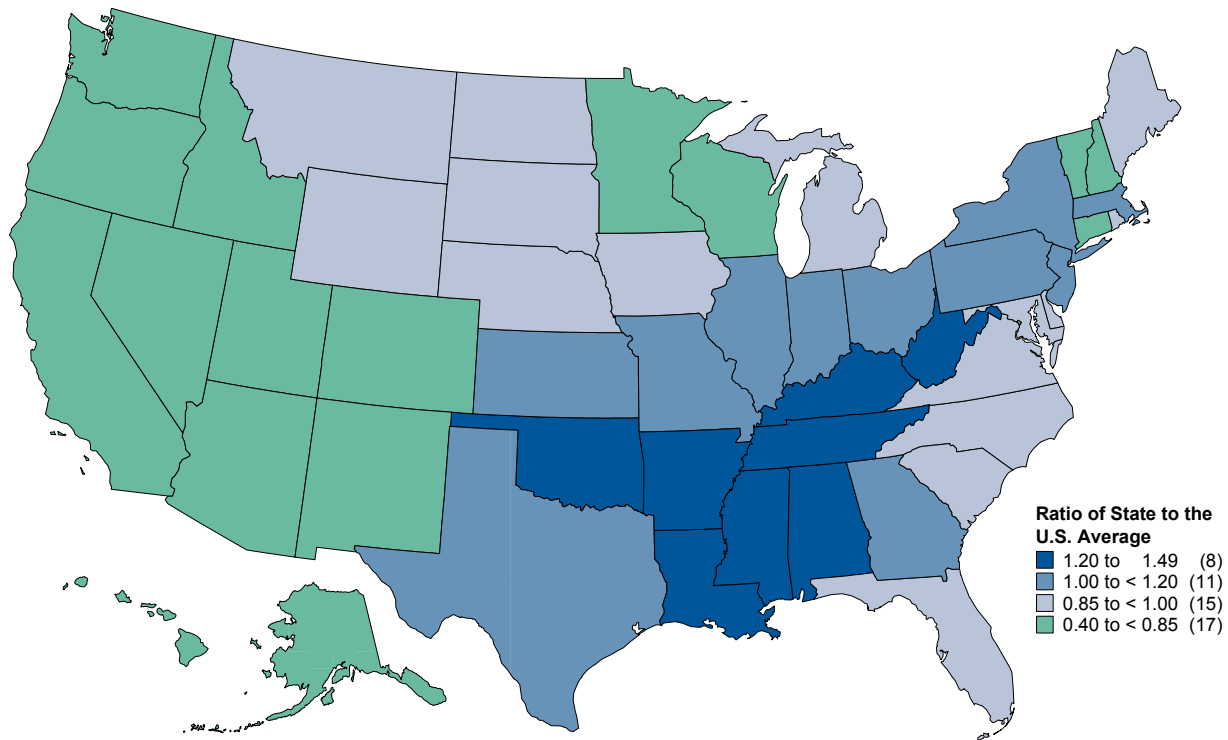
Twenty-three of the 24 regions had enough African American Medicare enrollees to allow reporting of race-specific ambulatory care-sensitive discharge rates. Among African American Medicare enrollees, discharge rates were over 100 per 1,000 enrollees in five regions: Los Angeles (118.8 per 1,000), Stockton (116.6 per 1,000), San Bernardino (116.1 per 1,000), Chico (111.9 per 1,000), and Bakersfield (106.6 per 1,000). Rates among African Americans were less than half of the Los Angeles rate in Redding (44.3 per 1,000), Napa (52.3 per 1,000), and Santa Barbara (58.3 per 1,000).

Discharge rates for African Americans were lower than those for whites in Redding (white, 56.2 per 1,000; African American, 44.3 per 1,000), and African American and white rates were virtually equal in Napa. In every other region, discharge rates among African

Americans exceeded those among whites, in some regions by more than 70 percent. The largest gap was in San Francisco, where the discharge rate among African Americans (85.8 per 1,000) exceeded the white rate (49.6 per 1,000) by 73 percent.

To some degree, these discharge rates for ambulatory care-sensitive conditions reflect differences in illness rates in different parts of the country and among different races within states and regions. But previous work by the Dartmouth Atlas Project suggests that only a portion of the variation can be attributed to different rates of illness. Some of the variation in ambulatory care-sensitive hospitalizations is correlated with the local supply of hospital beds. Where there are more beds, physicians are more likely to hospitalize patients with diabetes, for example, or heart failure, rather than caring for them in an ambulatory setting. In some cases, primary care physicians may be seeing too many patients per day to manage properly the care of very sick, chronically ill patients. In such cases, it may often be easier for the physician to hospitalize the patient, provided there are beds readily available.

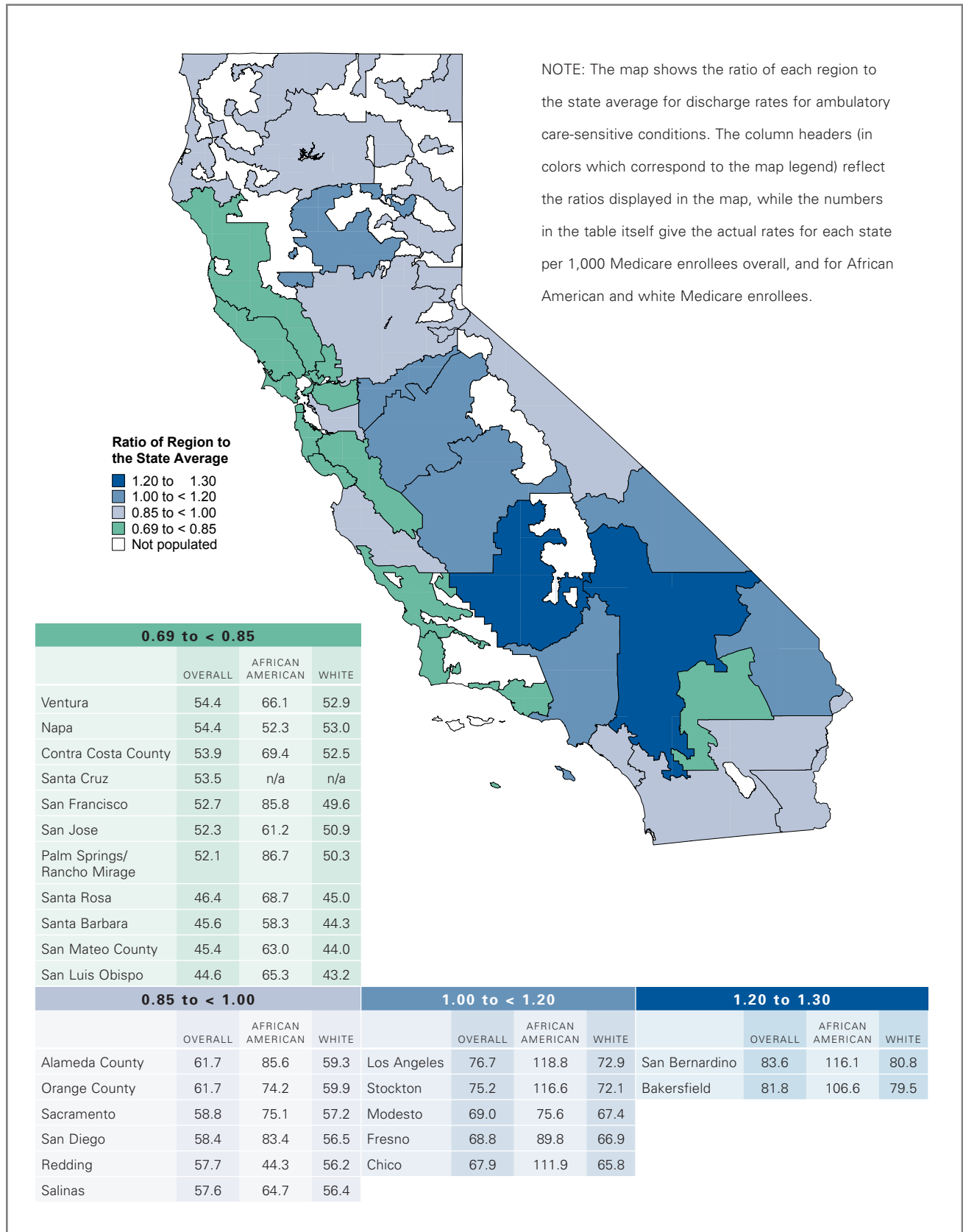
Map 9. Hospitalization for Ambulatory Care-Sensitive Conditions, by State, 2003 to 2005



0.40 to < 0.85				0.85 to < 1.00			1.00 to < 1.20			1.20 to 1.49					
	OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE		OVERALL	AFRICAN AMERICAN	WHITE
CT	65.3	80.6	63.7	RI	77.8	101.9	75.6	TX	88.6	105.8	87.2	WV	116.4	124.0	113.8
NM	64.9	66.5	63.3	SC	77.3	94.3	77.5	IL	87.7	129.9	83.9	KY	112.9	104.5	112.1
MN	64.5	81.2	62.7	MI	76.9	111.7	73.8	OH	87.3	109.0	85.4	LA	109.9	130.4	111.4
CA	64.3	100.1	61.7	NC	76.0	94.0	75.3	MO	87.1	112.8	84.8	MS	109.1	127.9	112.1
DC	64.1	93.4	46.6	SD	76.0	53.0	73.8	PA	84.6	121.7	81.7	TN	98.6	107.6	98.6
NV	63.5	76.3	62.1	MD	75.2	99.6	73.2	NJ	83.9	125.2	80.3	AL	96.5	106.6	98.3
AK	63.4	48.6	62.4	DE	73.3	99.8	70.9	GA	83.1	94.2	84.8	OK	95.4	100.3	93.8
WI	63.2	98.7	61.1	ND	71.5	n/a	n/a	IN	81.8	101.7	79.9	AR	94.7	108.0	94.0
NH	62.7	58.8	61.0	VA	71.2	84.2	71.2	MA	80.1	96.0	78.2				
AZ	59.3	76.0	57.6	NE	70.3	89.6	68.3	KS	79.6	89.2	77.8				
VT	58.7	65.7	57.0	FL	69.8	96.0	67.6	NY	78.7	105.6	76.3				
CO	56.1	65.8	54.7	MT	68.9	63.5	67.0								
ID	55.5	75.1	53.9	WY	68.1	54.1	66.3								
OR	52.3	62.0	50.8	IA	67.8	93.0	65.8								
WA	50.0	64.5	48.6	ME	67.3	67.6	65.4								
UT	47.6	59.4	46.3												
HI	31.8	40.2	30.9												

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 African American and white Medicare enrollees.

Map 10. Hospitalization for Ambulatory Care-Sensitive Conditions in California,
by Hospital Referral Region, 2003 to 2005



VII. Interpreting The Findings

These data can be used to determine how well health care providers in different states and regions deliver evidence-based care, or care of proven benefit.

THE SELECTED MEASURES INCLUDED IN THIS REPORT highlight several important issues related to the quality of health care and differences in health and health care delivery, and they underscore three opportunities for reform:

Delivering effective care. These data can be used to determine how well health care providers in different states and regions deliver evidence-based care, or care of proven benefit. Medicare and other payers are beginning to reward providers on the basis of how well they perform on such measures. The AQA Alliance (www.aqaalliance.org/performancewg.htm) and the National Committee for Quality Assurance (www.ncqa.org) have endorsed a set of these ambulatory care measures, but only a few of these measures can be reliably ascertained from claims data. Two of them, mammography rates for women age 65 to 69 and hemoglobin A1c (blood sugar) testing for diabetics, are included in this report, which shows that providers in different regions vary widely in their ability to deliver these two forms of care. Two other measures, eye exams and testing for blood lipids (cholesterol) in diabetics, are available at www.dartmouthatlas.org.

Improving care coordination. Primary care physicians play a key role in providing and coordinating high-quality health care. Having adequate access to primary care can improve the coordination of care and reduce the frequency of avoidable hospitalizations. The Dartmouth Atlas Project included one measure of primary care orientation in this report: the percentage of Medicare beneficiaries whose predominant (most frequently seen) provider is a primary care physician. An additional measure, the percentage of patients who have a primary care physician, is available on the Dartmouth Atlas Web site.

Avoiding adverse events. Considerable attention has been paid to the problems of adverse events and medical errors in hospitals and efforts are underway to reduce both. Yet many hospital admissions could have been avoided in the first place—and thus the errors and adverse events that have followed—if only patients had received proper care in an outpatient setting.

By pointing up the geographic variation in leg amputation, access to a primary care provider, and coordinated care, this report can be used by regulators and payers to encourage and reward more effective outpatient care of the chronically ill.

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 this report in context, some of the key findings of Dartmouth's earlier work are briefly summarized. A list of further readings and references is provided later in this report.

Unwarranted variations and the categories of care.

Some variations in the care that is delivered in different parts of the country are clearly justified. Higher rates of hospitalization, for example, are expected in areas where the population is sicker. The term unwarranted variation refers to regional differences in medical practice or spending on health care that cannot be explained on the basis of illness, strong scientific evidence, or the preferences of well-informed patients. The Dartmouth Atlas Project distinguishes three categories of care.⁵

Effective care consists of evidence-based services such as hemoglobin A1c testing for diabetics and pneumonia vaccination for elderly patients who are hospitalized. Variations in effective care reflect a 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. Women with early breast cancer can be treated with mastectomy, or with lumpectomy followed by radiation, and their chances for preventing premature death from breast cancer are the same. But the two options have very different risks and benefits, and different women will prefer one treatment over the other. The Dartmouth Atlas Project has long argued that patients should be fully informed about the trade-offs involved in elective care, such as cardiac bypass surgery, and then be allowed to decide on treatment based on their own preferences.

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 the clinical decisions of physicians, and thus 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 Quality of Care

Although there are differences in both illness rates and prices across U.S. states and regions, most of the differences in Medicare spending are due to differences in the quantity of supply-sensitive services provided to similar patients. In other words, spending turns out to be a good way to measure differences in the quantity of care delivered. Medicare beneficiaries in higher spending states and regions spend much more time in the hospital (e.g., they 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 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).^{3,5,6} Studies that followed patients with such serious conditions as heart attacks found that survival was slightly worse in the higher spending regions.³ In other words, more spending doesn't equal better care, it just means more care—and in some cases, more care is worse. Recent studies focused on the care of patients with serious chronic illness at the end of life revealed greater than two-fold differences in spending among major academic medical centers. This variation is explained almost entirely by differences in the use of supply-sensitive care.⁷ These studies have led many to conclude that we can improve the efficiency of care and outcomes and spend less.

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 for the effectiveness of medical

treatments that best 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 developing performance measures that can support improvement efforts; reforming the payment system to reduce current incentives for overuse; and paying careful attention to managing the growth of the physician workforce. Additional details and evidence are available online at www.dartmouthatlas.org/af4q.shtm.

VIII. Methodology

THE METHODOLOGY USED IN THIS REPORT HAS BEEN 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 www.dartmouthatlas.org/af4q.shtm.) The analysis entails four basic steps.

Defining geographic areas to compare. The first step requires defining the relevant geographic areas under study. This report presents data for two different geographic units: (1) States and the District of Columbia; and (2) Hospital Referral Regions (n = 306), which are natural markets for health care defined on the basis of travel for coronary bypass surgery and neurosurgery.

Defining the population under study. Each of the analyses presented in this report focused on either the entire fee-for-service Medicare population who were eligible for both Part A and B and were 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 analysis of testing for diabetes is restricted to Medicare beneficiaries between the ages of 65 and 74 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) 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 women receiving mammography within a two-year period) 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.

This specific report presents a subset of measures that are being made available online at www.dartmouthatlas.org.

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. This report focuses on the comparison of African Americans and non-African Americans for several practical reasons. Separate analyses of the Latino population are challenging because fewer than half of self-designated Latinos are coded as such in the Medicare data, they constitute less than 6 percent 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 percent) 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. Therefore the analyses were restricted in the current report to African Americans and non-African Americans, and, for ease of exposition, the non-African American population is referred to as white. These challenges, and the future growth of the Latino population, underscore the importance of improving the coding of race and ethnicity.

Endnotes

1. Hospital referral regions are areas about the size of a typical county that represent natural health care markets in which the majority of residents get the majority of their care at one or more hospitals within that region. There are 306 different HRRs in the U.S.
2. Dillingham T.R., Pezzin L.E., Shore A.D. “Reamputation, mortality and health care costs among persons with dysvascular lower-limb amputations.” *Archives of Physical Medicine and Rehabilitation*. 2005; 86:480–86.
3. Fisher E.S., Wennberg D.E., Stukel T.A., Gottlieb D.J., Lucas F.L., Pinder E.L. “The implications of regional variations in Medicare spending. Part 1: The content, quality, and accessibility of care.” *Annals of Internal Medicine*. 2003 February 18;138(4):273–87. Fisher E.S., Wennberg D.E., Stukel T.A., Gottlieb D.J., Lucas F.L., Pinder E.L. “The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care.” *Annals of Internal Medicine*. 2003 February 18;138(4):288–98.
4. Ambulatory care includes virtually any care a patient receives outside a hospital, nursing home, long term care facility, or skilled nursing facility.
5. Wennberg J.E., Fisher E.S., Skinner J.S. “Geography and the debate over Medicare reform.” *Health Affairs*. Web exclusive, February 13, 2002.
6. Baicker K., Chandra A., Skinner J., Wennberg J. “Who you are and where you live: how race and geography affect the treatment of Medicare beneficiaries.” *Health Affairs* Web exclusive, October 7, 2004.
7. Wennberg J.E., Fisher E.S., Goodman D.C., Skinner J.S., Bronner K.K., Sharp S.M. *Tracking the Care of Patients with Severe Chronic Illness: The Dartmouth Atlas of Health Care 2008*. The Trustees of Dartmouth College, 2008.



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