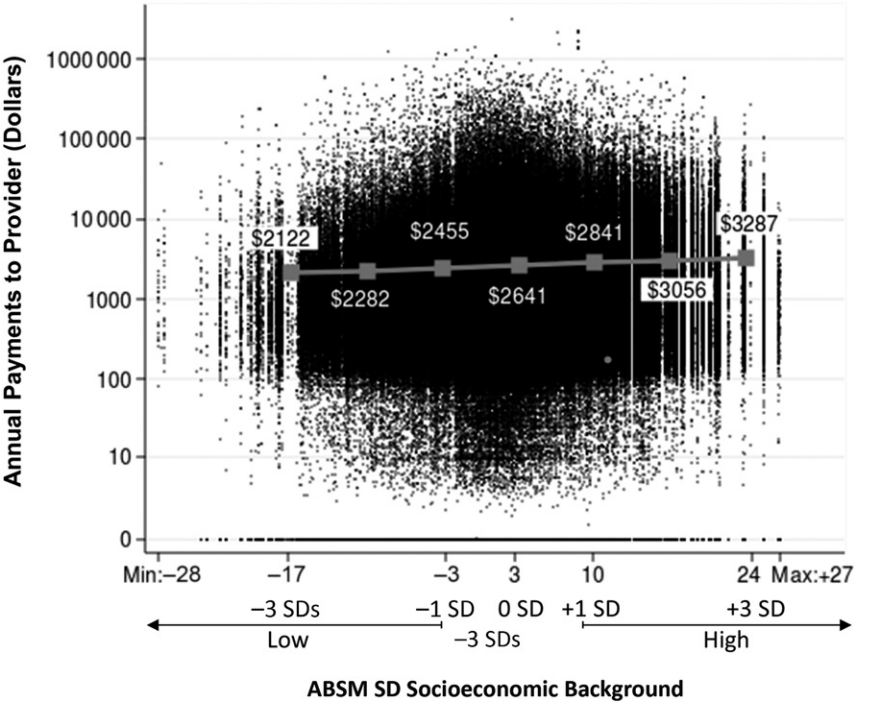
Supplemental Information

CALCULATION OF ABSM

The ABSM is a validated and established composite of geocoded information that we used to characterize enrollees' socioeconomic backgrounds.

The ABSM is comprised of the 10 census-based SE variables (Supplemental Table 4) shown to be reflective of neighborhood health risks, and it has been shown to be representative of numerous area-based health risks (eg, lead exposure[16,17,56] and communicable diseases[18–22]) and may be more predictive of health outcomes such as mortality than individual-level predictors are.[13,23,57]

This process entails mapping enrollees' addresses to their respective census tracts and then linking census tracts to the 10 census tract variables that comprise the validated ABSM.[34] To determine ABSM, we geocoded enrollees to corresponding census tracts and linked tracts to Krieger's 10 census-defined variables. Then, we calculated a *z* score for each of these 10 variables, standardizing values against those for Massachusetts as a whole (ie, if a census tract's value for a variable was equivalent to the state's average, then the census tract's *z* score for that variable was 0). We weighted each census variable equally per previously described methodologies.[34,58–61] For the analysis on component spending, we calculated a *z* score for each component variable so that each variable is standardized against each enrollees' state of residence (ie, if an enrollee resides in Massachusetts and his or her census tract's value for a variable equals the Massachusetts mean, then the corresponding *z* score will be 0). We standardized enrollee tract information against state means because health-related programs (eg, Medicaid eligibility) varies at the state level.[62,63]



SUPPLEMENTAL FIGURE 2
Geocoded socioeconomic background and annual payments to provider: observed and adjusted. ● = observed; ■ = adjusted.

SUPPLEMENTAL TABLE 4 Socioeconomic Variables Available From the American Community Survey

Median household income
Percent of persons within a tract
<12 y of education
≥4 y of college education
Unemployed
Employed in working-class occupations
Living below the federal poverty line
Percent of households within a tract
Income <50% of median income
Income >400% of median income
>1 person per room
Percent of homes within a tract
Worth >400% of median home value

These variables can be used to create the composite ABSM.

SUPPLEMENTAL TABLE 5 Enrollee Characteristics: BCBSMA 2008–2012

	N				%	
Person years	1 182 847				100	
Unique enrollees	459 180				39	
Age, y						
0–1	110 973				9	
2–6	261 104				22	
7–12	355 119				30	
13–17	323 591				27	
18–19	132 060				11	
Male	604 204				51	
No. of chronic conditions[a]						
0	636 687				54	
1	340 363				29	
2	135 700				11	
≥3	70 097				6	
Health plan type[b]						
Employer insured	807 966				68	
Self-insured	374 881				32	
Basic benefit design[c]						
Health maintenance organization	868 809				73	
Preferred provider organization	253 040				21	
Point of service	60 998				5	
Geocoded socioeconomic background[d,e]						
High	181 350				15	
Medium	850 804				72	
Low	150 693				13	
Proportion with any spending in category	1 146 277				97	
Outpatient	1 138 499				96	
Prescription medications	800 434				68	
ED	176 895				15	
Inpatient	72 326				6	
Per person annual spending, $	*N*	Median	Mean	SD	Min	Max
Annual payments to provider	1 182 847	969	2864	13 944	0	3 225 990
Outpatient	1 182 847	763	1807	7066	0	2 192 564
Prescription medications	1 182 847	27	328	1820	0	468 908
ED	1 182 847	0	41	157	0	14 836
Inpatient	1 182 847	0	689	10 515	0	3 211 813

[a] Agency for Healthcare Research and Quality. Chronic Condition Indicator (CCI) for ICD-9-CM. Available at: http://www.hcup-us.ahrq.gov/toolssoftware/chronic/chronic.jsp. Accessed September 23, 2014.[50]

[b] Employer sponsored means an employer purchases health insurance from a health plan on behalf of employees, and the insurer takes the financial risk. Self-insured means that the employer designs and funds his or her own health plan for employees; the employer takes the financial risk and may pay health plan fees to administer the health plan (eg, process claims).

[c] Health maintenance organization and point of service benefit designs typically require enrollees to designate a primary care provider who directs care within a designated network for which there are no or limited patient out-of-pocket costs; out-of-pocket costs rise if patients seek out-of-network care. In health maintenance organizations, patients must involve their primary care providers in directing care to a greater extent than in point of service plans. In preferred provider organization plans, primary care providers are not required to direct care, and enrollees typically pay some out-of-pocket amounts for the care they seek.

[d] Krieger N, Chen JT, Waterman PD, Rehkopf DH, Subramanian SV. Painting a truer picture of US socioeconomic and racial/ethnic health inequalities: the Public Health Disparities Geocoding Project. *Am J Public Health.* 2005;95(2):312–323.[32]

[e] High geocoded socioeconomic background means living in a census tract with an ABSM score >1 SD above the state mean. Low geocoded socioeconomic background is equivalent to living in a census tract with an ABSM score <—1 SD below the state mean. Medium corresponds to living in a census tract with an ABSM score between 1 and —1 SD of the mean.

SUPPLEMENTAL TABLE 6 Geocoded Socioeconomic Background and Annual Payments to Provider: Typical Risk-Adjustment Model for Health Plan Spending

	Percent Change	95% CI, %		*P*
Geocoded socioeconomic background[a,b]	+1.10	+1.03	+1.16	<.001
Age, y (0–1 as referent)				
2–6	−66	−66	−65	<.001
7–12	−72	−73	−72	<.001
13–17	−65	−66	−64	<.001
18–19	−62	−63	−61	<.001
Sex (male as referent)				
Female	−5	−6	−4	<.001
No. of chronic conditions[c] (0 as referent)				
1	+153	+151	+156	<.001
2	+354	+348	+360	<.001
3	+649	+634	+665	<.001
4	+1145	+1101	+1192	<.001
≥5	+3007	+2769	+3265	<.001
Health plan type[d], (employer insured as referent)				
Self-insured	+6	+5	+7	<.001
Basic benefit design[e] (HMO as referent)				
Preferred provider organization	+0	−1	+1	.67
Point of service	+6	+4	+8	<.001

HMO, health maintenance organization.

[a] Agency for Healthcare Research and Quality. Chronic Condition Indicator (CCI) for ICD-9-CM. Available at: http://www.hcup-us.ahrq.gov/toolssoftware/chronic/chronic.jsp. Accessed September 23, 2014.[50]

[b] ABSM is a continuous value between −28 and +27.

[c] Krieger N, Chen JT, Waterman PD, Rehkopf DH, Subramanian SV. Painting a truer picture of US socioeconomic and racial/ethnic health inequalities: the Public Health Disparities Geocoding Project. *Am J Public Health*. 2005;95(2):312–323.[32]

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[e] Health maintenance organization and point of service benefit designs typically require enrollees to designate a primary care provider who directs care within a designated network for which there are no or limited patient out-of-pocket costs; out-of-pocket costs rise if patients seek out-of-network care. In health maintenance organizations, patients must involve their primary care providers in directing care to a greater extent than in point of service plans. In preferred provider organizations plans, primary care providers are not required to direct care, and enrollees typically pay some out-of-pocket amounts for the care they seek.

SUPPLEMENTAL TABLE 7 High and Low Geocoded Socioeconomic Backgrounds: Use and Prices for Outpatient, Inpatient, Pharmacy, and ED Services

Type of Service, Annual	Use								Prices, $							
	High Socioeconomic Background			Low Socioeconomic Background				High Socioeconomic Background			Low Socioeconomic Background					
	(ABSM >1 SD Above Enrollee Mean)			(ABSM <1 SD Below Enrollee Mean)				(ABSM >1 SD Above Enrollee Mean)			(ABSM <1 SD Below Enrollee Mean)					
	Median Observed	Mean Adjusted	95% CI	Median Observed	Mean Adjusted	95% CI		*P*	Median Observed	Mean Adjusted	95% CI	Median Observed	Mean Adjusted	95% CI		*P*
Outpatient encounters	5.0	7.9	7.9	8.0	4.0	6.4	6.4	6.5	<.001	125	250	248	252	122	235	233	237	<.001
Prescription drug classes	1.0	1.7	1.7	1.8	1.0	1.5	1.5	1.6	<.001	32	174	167	182	25	132	127	136	<.001
Inpatient																		
Admissions	0.0	0.07	0.067	0.070	0.0	0.08	0.076	0.079	<.001	2711	9792	9295	10289	2657	10336	9706	10967	.10
Length of stay, d	2.0	4.3	4.2	4.4	2.0	4.3	4.2	4.5	.77	—	—	—	—	—	—	—	—	—
ED visits	0.0	0.18	0.18	0.19	0.0	0.23	0.22	0.23	<.001	159	221	218	223	146	190	288	192	<.001

—, not applicable.

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