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Latino Population Growth and Hospital Uncompensated Care in California

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Uncompensated hospital care for the uninsured and underinsured imposes a significant financial burden on the US health care system. The American Hospital Association reported that uncompensated care rose to \$45.9 billion in 2012, which accounted for 6.1% of total hospital expenses that year.¹ This problem affects hospitals' financial stability and ability to recoup losses from reduced payments, which in turn can hurt their ability to care for the local population, operate emergency department and specialty services to meet patient needs, and maintain optimal nurse staffing ratios.²⁻⁴

Hospitals have typically responded to increased uncompensated care by increasing prices for paying patients⁵; however, Medicaid and Medicare payments have been reduced, and it has become more difficult to shift costs to private payers. Uncompensated care also affects all levels of government, which provide subsidies to offset these losses through other programs.⁶ The largest source of federal funding for uncompensated care—Medicaid Disproportionate Share Hospital (DSH) payments—totaled \$11.4 billion in 2012.⁷ Despite these mechanisms that indirectly subsidize hospitals' provision of uncompensated care, hospital closures have been linked to uncompensated care.⁸

Hospital administrators, policymakers, and advocates for the uninsured hoped that the Patient Protection and Affordable Care Act (ACA) would provide health insurance to many of the almost 50 million previously uninsured Americans and thereby significantly reduce uncompensated care. The Supreme Court's decision on the ACA allows states to opt out of the mostly federally funded Medicaid expansion, which will likely lower the projected numbers of Americans who obtain coverage and potentially undermine the predicted decreases in future uncompensated care by hospitals.⁹ Existing policy efforts focus on decreasing hospital payments to reduce health

Objectives. We examined the association between the size and growth of Latino populations and hospitals' uncompensated care in California.

Methods. Our sample consisted of general acute care hospitals in California operating during 2000 and 2010 (n = 251). We merged California hospital data with US Census data for each hospital service area. We used spatial analysis, multivariate regression, and fixed-effect models.

Results. We found a significant association between the growth of California's Latino population and hospitals' uncompensated care in the unadjusted regression. This association was still significant after we controlled for hospital and community population characteristics. After we added market characteristics into the final model, this relationship became nonsignificant.

Conclusions. Our findings suggest that systematic support is needed in areas with rapid Latino population growth to control hospitals' uncompensated care, especially if Latinos are excluded from or do not respond to the insurance options made available through the Affordable Care Act. Improving availability of resources for hospitals and providers in areas with high Latino population growth could help alleviate financial pressures. (*Am J Public Health.* 2015;105:1710-1717. doi:10.2105/AJPH.2015.302583)

care spending,¹⁰ and DSH payments are being reduced in anticipation of increases in insurance coverage in all states.¹¹ These recent health policy developments have brought the problem of uncompensated hospital care into a new focus, generating increasing interest in understanding what factors affect hospitals' financial stress.

Some have suggested that immigrants use large amounts of uncompensated care,¹² potentially implicating the Latino population—the nation's largest immigrant group¹³—in rising uncompensated care. However, hospital uncompensated care may also decrease because of Latinos' low health care utilization¹⁴⁻²¹ and expenditures,²²⁻²⁵ which have been described in the context of the healthy immigrant effect (i.e., Latino immigrants are usually younger and healthier than Latinos born in the United States)²⁶ and other factors (e.g., fewer available health care resources, lack of linguistically appropriate care, discrimination in health care settings, and fear of deportation among undocumented Latinos).^{27,28} Empirical evidence for the potential impact of changing Latino

demographics on hospitals' uncompensated care is limited at best. A study of Oregon state data found weak evidence of an association between the size of the Latino population and hospital uncompensated care.²⁷ A nonsignificant relationship might have reflected Latinos' immigrant status, limited health care access, and unwillingness or inability to seek health care.

California's hospitals account for more than 10% of uncompensated care nationally.²⁹ California has the largest Latino population of any state, as well as the largest growth rate in its Latino population.²⁹ In 2012, 44.5% of California's uninsured population was Latino.³⁰ Among the uninsured Latino population in the state, more than 1 million will remain uninsured, even after the ACA's coverage expansions.^{31,32} Although some are able to temporarily access emergency Medicaid services for significant, emergent health issues, the majority are uninsured and require help from local indigent care programs, hospital charity care, federally qualified health centers, or other safety net providers. Hence, California, because

of its high number (7 million) and percentage (20%) of uninsured residents prior to the ACA,³³ offers an excellent setting to study the impact of the Latino population on the uninsured rate, uncompensated care need, and local safety net providers.

We examined the association between Latino population growth rates and hospitals' uncompensated care in California between 2000 and 2010. These growth rates not only reflected the marginal increases in uncompensated care and Latino population estimates, but also took into account baseline levels of these variables. Because growth rates are considered to be better than the level measures for predicting future population growth trends,³⁴ our findings could have important policy implications regarding the allocation of health care resources.

METHODS

We conducted an analysis of the state Latino population and uncompensated care in California's general acute care hospitals between 2000 and 2010. We obtained hospital data from California's Office of Statewide Health Planning and Development, which mandates financial and utilization reporting by hospitals. These data included detailed financial data, service numbers, and measures of capacity. The data set contained information on 312 and 297 general acute care hospitals in 2000 and 2010, respectively. We excluded long-term care rehabilitation hospitals and hospitals that were not in existence throughout the entire study period because we could not determine their change in uncompensated care costs ($n=61$ in 2000; $n=46$ in 2010). The final analytic sample consisted of 251 hospitals.

We linked the California hospital data with demographic data from the US Census,³⁵ which we aggregated by the hospital service area (HSA), according to *The Dartmouth Atlas of Health Care in the United States*.³⁶ HSAs are defined as "a collection of zip codes whose residents receive most of their hospitalizations from the hospitals in that area."³⁶ HSAs are constructed from Medicare utilization data and are reported for each region of the country.³⁷ Each hospital was located in 1 HSA, and some HSAs in densely populated areas contained more than 1 hospital. We selected the HSA as

the unit of analysis because it most accurately captures demographic changes that may affect hospital services.³⁸

Uncompensated Care

We defined uncompensated care as the uncompensated care charges adjusted by the cost-to-charge ratio, according to the guideline of the American Hospital Association.^{2,29} We calculated uncompensated care charges by adding the following individual measures: (1) charity care charges, for patients without the ability to pay who qualified under the hospitals' charity guidelines; (2) bad debt charges, for patients without the ability to pay who did not qualify under the hospitals' charity guidelines; and (3) county indigent contractual adjustments, the difference between hospitals' full charges and the actual payments received. California's Welfare and Institutions Code requires counties to provide or pay for basic health care services for their indigent residents,³⁹ which typically include uninsured populations earning up to approximately 200% of the federal poverty level.⁴⁰ The Office of Statewide Health Planning and Development data excluded county and other indigent care program spending from the charity care and bad debt variables.

We calculated the uncompensated care of each hospital in 2000 and 2010 by deflating the sum of these 3 variables by the hospital's cost-to-charge ratio.²⁹ Under the guideline of the American Hospital Association, the cost-to-charge ratio is defined as the ratio of total expenses exclusive of bad debt to the sum of gross patient revenue and other operating revenue. To account for inflation, we expressed all dollar amounts in 2010 dollars. We defined the growth rate of uncompensated care between 2000 and 2010 by the following formula: (uncompensated care of 2010 – uncompensated care of 2000)/uncompensated care of 2000.

Covariates

We derived California Latino population estimates from US Census data, which we aggregated from the census tract level into HSAs. As with our outcome variable, we used growth rates as the measure of our primary independent variable.

We examined various factors taken from the literature that might be related to hospitals'

uncompensated care.^{2,4,41–44} The characteristics of hospitals, the markets in which they resided, and the populations they served might confound the primary relationship under study; thus we treated them as covariates in our analyses. We controlled for hospital ownership type, system membership, urban location, and DSH payments received by each hospital. We obtained the teaching status of hospitals from American Hospital Association data and considered this a rough proxy for case mix of hospitalized patients.⁴⁵

Local market competition has been identified as a factor associated with financial pressure on hospitals.⁴⁴ We were therefore interested in including market competition in our analysis, which we estimated in several ways. We used geographic information system software to calculate the distance between all hospitals in the study and determine the number of hospitals within a 15-mile radius of each hospital. We included the number of not-for-profit and government hospitals within a 15-mile radius of each hospital, which is a common geographic definition of a local market.⁴⁶ In addition, we included a widely accepted measure of hospital competition, the Herfindahl–Hirschman Index.^{47,48} This index is defined as the sum of the squared market share of all hospitals in the same market, which is measured by discharges. The score ranges from 0 to 10 000, with the upper bound representing a monopoly (i.e., the only hospital in a 15-mile radius) and the lower bound representing the hypothetical case of an infinite number of hospitals competing in that market. We used a cutoff of 2500 or below to define a competitive market.⁴¹ We included both the Herfindahl–Hirschman Index and the presence of other safety net hospitals as covariates because they capture different aspects of market competition.

We also included in our analyses the following population characteristics at the HSA level: unemployment (percentage of population that was unemployed), educational attainment (percentage of the population that completed high school), elderly (percentage of the population aged 65 years or older), and percentage of White, African American, Asian, and other racial and ethnic groups.^{2,4,41–44} We obtained these data at the census tract level and aggregated them into HSAs.

Statistical Analyses

To examine variation in California Latino population growth rates from 2000 to 2010, we used geographic information system software to generate a choropleth map, which shows higher growth rates as a darker color. We then presented the summary statistics of the 251 California hospitals in our study. To further delineate the relationship between Latino population growth and hospital uncompensated care, we categorized the hospitals into 3 levels of Latino population growth rate: (1) low (the first one third of the hospitals), (2) medium (the middle third), and (3) high (the top third). We then compared hospital uncompensated care, growth rates, and the covariates among the hospital tertiles of Latino growth rates.

Because the distribution of uncompensated care was highly skewed, we used the natural log of hospital uncompensated care as the outcome variable. Five hospitals reported providing no uncompensated care during 2010. To include these 5 hospitals in our analyses, we used uncompensated care costs plus \$1. We first used the multivariate ordinary least square estimation to examine the association between Latino population size (per million residents) and hospital uncompensated care (per million dollars). We also estimated this relationship in fixed-effect models and the 2000 to 2010 panel data. The fixed-effect estimation helped to adjust unobserved time-invariant variables that might be related to hospital uncompensated care.

We then modeled the relationship between growth rates of the California Latino population and hospital uncompensated care. We categorized these covariates into 3 groups: hospital, market, and community population characteristics. In model 1, we estimated the unadjusted association between Latino growth rates and hospital uncompensated care. We used hierarchical regressions to examine the impact of each of these groupings of variables on the primary relationship under study. Model 4, the full model, controlled for all of the covariates. We also conducted sensitivity analyses with various model specifications and measurements.

We used the ArcGIS 10.1 geographic information system software package (ESRI Inc,

Redlands, CA) for spatial data processing. We conducted all statistical and econometric analyses with Stata SE version 12.0 (StataCorp LP, College Station, TX).⁴⁹

RESULTS

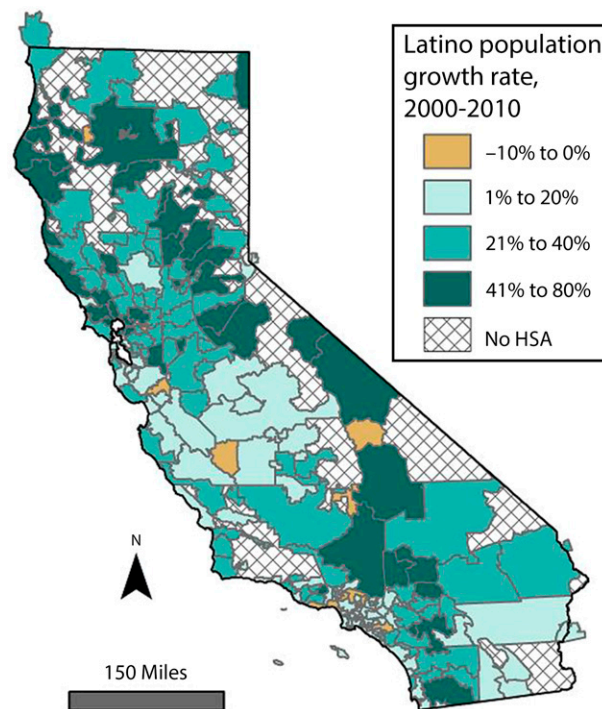
Between 2000 and 2010, California experienced a significant increase in the size of its Latino population. Figure 1 shows that Latino population growth in California during this period was geographically dispersed throughout the state.

Table 1 shows the summary of hospital uncompensated care and covariates by tertiles of Latino population growth rates. In this bivariate analysis, hospital uncompensated care was significantly associated with Latino population growth rates. Hospitals with medium and high Latino population growth rates were more likely to be government owned, were less likely to be teaching or urban hospitals, and faced less market competition. Communities with medium and high Latino population growth rates

had higher educational attainment and higher percentages of White residents. Communities with high Latino population growth rates had higher unemployment rates than communities with low Latino growth rates.

Table 2 shows the association between the size of the Latino population in HSAs and hospital uncompensated care, after adjustment for all the covariates. The relationship between the Latino population and uncompensated care was not statistically significant in either ordinary least square or fixed-effect model specifications.

Table 3 presents the relationship between the growth rates of the Latino population and hospital uncompensated care. High Latino population growth rates were significantly associated with the growth rates of hospital uncompensated care in models 1 to 3, adjusted for hospital and community population characteristics. Medium Latino population growth rates were significantly associated with the growth rates of hospital uncompensated care only in model 1. These associations were no



Source. Data from US Census.³⁵

FIGURE 1—Latino population growth rates by hospital service area (HSA): California, 2000–2010.

TABLE 1—Hospital, Market, and Population Characteristics by Tertiles of Change in Latino Population Growth Rate: California, 2000–2010

Characteristic	Latino Population Growth Rate		
	Low (n = 84), Mean (95% CI)	Medium (n = 83), Mean (95% CI)	High (n = 84), Mean (95% CI)
Hospital uncompensated care cost, \$1 000 000s			
2010	18.74 (7.80, 29.67)	17.64 (8.79, 26.50)	14.24 (9.57, 18.91)
2000	15.53 (3.18, 27.88)	10.86 (5.27, 16.44)	7.54 (4.35, 10.72)
Growth rate of hospital uncompensated care cost	0.53 (0.17, 0.89)	1.13** (0.84, 1.41)	1.55*** (1.16, 1.95)
Hospital			
Received DSH payment	0.43 (0.32, 0.54)	0.36 (0.26, 0.47)	0.33 (0.23, 0.44)
Member of a system	0.43 (0.32, 0.54)	0.46 (0.35, 0.57)	0.55 (0.44, 0.66)
For-profit ownership	0.36 (0.25, 0.46)	0.14 (0.07, 0.22)	0.08 (0.02, 0.14)
Government ownership	0.11 (0.04, 0.17)	0.30** (0.20, 0.40)	0.25* (0.16, 0.34)
Not-for-profit ownership	0.54 (0.43, 0.64)	0.55 (0.45, 0.66)	0.67 (0.56, 0.77)
Teaching hospital	0.17 (0.09, 0.25)	0.05* (0.00, 0.10)	0.06* (0.01, 0.11)
Urban location	0.93 (0.87, 0.98)	0.72*** (0.62, 0.82)	0.75** (0.66, 0.84)
Community population ^a			
Unemployment rate	0.09 (0.08, 0.09)	0.09 (0.09, 0.10)	0.10*** (0.09, 0.11)
High school completion rate	0.76 (0.74, 0.79)	0.82*** (0.73, 0.90)	0.84*** (0.82, 0.86)
Elderly	0.12 (0.11, 0.13)	0.12 (0.12, 0.13)	0.13 (0.12, 0.14)
White	0.33 (0.29, 0.38)	0.46*** (0.42, 0.50)	0.54*** (0.49, 0.58)
African American	0.06 (0.05, 0.08)	0.04*** (0.03, 0.04)	0.05* (0.04, 0.06)
Asian	0.16 (0.13, 0.19)	0.10*** (0.08, 0.12)	0.06*** (0.05, 0.08)
Other race/ethnicity	0.03 (0.03, 0.03)	0.04*** (0.03, 0.04)	0.04*** (0.04, 0.05)
Market			
≥ 1 government hospital within 15-mile radius	0.74 (0.64, 0.83)	0.65 (0.55, 0.76)	0.52** (0.41, 0.63)
≥ 1 not-for-profit hospital within 15-mile radius	0.98 (0.94, 1.01)	0.82*** (0.73, 0.90)	0.85** (0.77, 0.92)
Competitive market HHI score ^b	0.89 (0.83, 0.96)	0.45*** (0.34, 0.55)	0.33*** (0.23, 0.44)

Note. CI = confidence interval; DSH = Disproportionate Share Hospital; HHI = Herfindahl-Hirschman Index. Low Latino population growth rate was the reference. Latino population growth rate between 2000 and 2010 was defined by the following formula: (2010 Latino population - 2000 Latino population)/2000 Latino population. This variable was divided into tertiles according to its distribution.

^aAll population characteristics reported at the level of the hospital service area, defined by the 1996 *Dartmouth Atlas of Health Care in the United States*.³⁵

^bHHI defined as the sum of the squared market shares of all hospitals within the same market, where market share is measured by hospital discharges. The HHI ranges from 0 (representing the hypothetical case of an infinite number of hospitals competing in a market) to 10 000 (representing a monopoly). An HHI value of 2500 or below defines a competitive market.

* $P < .05$; ** $P < .01$; *** $P < .001$.

longer significant ($P = .13$ and $P = .1$) after adjustment for measures of hospital market competition (model 4).

We conducted a sensitivity analysis for which results are not shown. We excluded poverty rates and uninsurance rates in our main estimation results because they likely sit on the causal pathway between Latino demographic growth and hospital uncompensated care. Nevertheless, we controlled for poverty and uninsurance rates in the sensitivity analysis and found that all multivariate results were substantively unchanged.

To examine longitudinal changes in uncompensated care, we included in our analysis only hospitals that were in existence during the

entire study period. We excluded 61 hospitals in 2000 and 46 hospitals in 2010 that were not operating during both years. Compared with the 251 hospitals we studied, the excluded hospitals did not differ significantly with respect to uncompensated care or growth in the Latino communities they serve. Five hospitals encountered zero uncompensated care cost in 2010. We ran a sensitivity analysis without these 5 hospitals, which yielded similar results.

DISCUSSION

The summary statistics of our study revealed overall increases in both California's Latino population and uncompensated care in

California hospitals from 2000 to 2010. We observed a significant relationship between growth rates in California's Latino population and hospitals' uncompensated care in unadjusted models and models that incorporated only hospital and community population characteristics. After we added hospital market characteristics, such as market competition, into the final model, this relationship became nonsignificant.

This finding suggests that increasing competition among hospitals and improving hospital resources could protect against uncompensated care burden. Communities with large Latino populations may have existing safety net resources that lower hospitals' uncompensated

TABLE 2—Multivariate Association Between Hospitals' Uncompensated Care and Size of Latino Populations Within Hospital Service Areas: California, 2000–2010

Characteristic	OLS		Fixed Effects	
	b (95% CI)	P	b (95% CI)	P
Latinos/million population	0.21 (-1.11, 1.54)	.75	-1.46 (-9.33, 6.42)	.72
Hospital				
Received DSH payment	0.88 (0.48, 1.29)	< .001	0.26 (-0.37, 0.89)	.41
Member of a system	0.73 (0.45, 1.01)	< .001	0.44 (-0.43, 1.32)	.32
For-profit ownership (Ref)	1.00		1.00	
Government ownership	2.57 (1.80, 3.34)	< .001	0.46 (-1.88, 2.79)	.7
Not-for-profit ownership	1.83 (1.18, 2.47)	< .001	0.09 (-1.17, 1.34)	.89
Teaching hospital	1.69 (1.30, 2.09)	< .001	–	–
Urban location	1.40 (1.09, 1.72)	< .001	–	–
Community population				
Unemployment rate	3.71 (-2.09, 9.50)	.21	3.01 (-8.95, 14.98)	.62
High school completion rate	1.64 (-0.81, 4.09)	.19	1.00 (-4.53, 6.54)	.72
Elderly	-5.02 (-10.63, 0.58)	.08	6.41 (-9.81, 22.63)	.44
White	0.07 (-1.95, 2.09)	.94	-4.98 (-9.40, -0.56)	.03
African American	-3.98 (-9.11, 1.16)	.13	3.27 (-13.46, 20.00)	.7
Asian	-1.50 (-4.19, 1.19)	.27	-14.05 (-26.54, -1.57)	.03
Other race/ethnicity	6.93 (-1.97, 15.84)	.13	21.60 (-10.41, 53.61)	.19
Market				
≥ 1 government hospital within 15-mile radius	-0.41 (-0.77, -0.06)	.02	-0.38 (-1.99, 1.22)	.64
≥ 1 not-for-profit hospital within 15-mile radius	0.05 (-0.50, 0.60)	.85	0.75 (-1.66, 3.15)	.54
Competitive market HHI score ^a	0.22 (-0.27, 0.70)	.38	1.06 (-0.07, 2.19)	.07
Constant	10.79 (9.38, 12.19)	< .001	14.94 (10.32, 19.55)	< .001

Note. CI = confidence interval; DSH = Disproportionate Share Hospital; HHI = Herfindahl-Hirschman Index; OLS = ordinary least squares.

^aHHI defined as the sum of the squared market shares of all hospitals within the same market, where market share is measured by hospital discharges. The HHI ranges from 0 (representing the hypothetical case of an infinite number of hospitals competing in a market) to 10 000 (representing a monopoly). An HHI value of 2500 or below defines a competitive market.

care costs below those in smaller Latino communities without such resources.⁵⁰ Hospitals located in areas with high Latino population growth rates were more likely to be located in rural areas, with limited complementary health care resources. Such hospitals may face financial or administrative challenges to dealing with rapid changes in population demographics. Not-for-profit hospitals are more likely to face such challenges because they provide the majority of the health care services to Latinos in California. Our results suggest that increasing the number of not-for-profit hospitals in areas with rapid Latino population growth might help control uncompensated care for

each individual hospital. For example, hospital collaborations working on a large economic scale might help to relieve the burden of uncompensated care.

These findings suggest that systematic support is needed in areas with rapid Latino population growth to ensure financial viability of hospitals, especially if Latinos are excluded from the insurance options made available via the ACA.¹⁷ Even in California, where indigent care programs at the county level have long subsidized public and private hospital services, hospitals face financial pressures. These pressures may grow with cuts of DSH funds, eligibility restrictions, and unpredictable

uptake of ACA coverage among the Latino population.⁵¹ Investments in low-cost, community-based primary care accessible to the uninsured will be needed to mitigate the demand for acute hospital care. At the same time, hospitals should focus attention on coordinating care with these community primary care providers.

Limitations

Although we examined relevant potential confounders in our analyses, we could not include granular local data that may affect hospitals' uncompensated care. For example, uncompensated hospital care may reflect a limited capacity of local safety net clinics to manage chronic diseases among the uninsured and underinsured in the outpatient setting.

We lacked data on Latinos' immigration and documentation status, which determines access to public insurance programs and many of the existing county indigent programs.^{52,53} We used teaching hospital status as a proxy variable to control for case mix of hospital patients. Precise measures of case-mix disease severity codes can better reflect patients' clinical needs.

Finally, several policies were implemented during 2000 to 2010 that might affect hospital uncompensated care. For example, Senate Bill 350 (Runner, Chapter 347, Statutes of 2007), implemented in 2008, aimed to reduce aggressive billing tactics for overdue bills.⁵⁴ Under this legislation, hospitals had more incentives to shift from bad debt to charity care. In addition, California Assembly Bill 774 (2006) required hospitals to clearly state charity care policies and limit charges for emergency services for individuals earning 300% of the federal poverty level or less.⁵⁵ Other market-aggregated impacts, such as the economic recession in 2007 to 2009, may also have affected trends in hospital uncompensated care. In our 2-period study spanning 10 years, we were not able to control for all the specific policy and market changes. Nevertheless, our study provides a benchmark of the association of Latino population growth rates with hospital uncompensated care. Future studies should explore the causality of these 2 variables.

Policy Implications

Over the past 3 decades, uncompensated care has exerted increasing financial pressure

TABLE 3—Multivariate Association Between Growth Rates of Hospitals' Uncompensated Care and Latino Populations Within Hospital Service Areas: California, 2000–2010

Characteristic	Model 1 ^a		Model 2 ^b		Model 3 ^c		Model 4 ^d	
	b (95% CI)	P	b (95% CI)	P	b (95% CI)	P	b (95% CI)	P
Latino population growth								
Low (Ref)	1.00		1.00		1.00		1.00	
Medium	0.60 (0.14, 1.06)	.01	0.42 (-0.11, 0.94)	.12	0.47 (-0.04, 0.97)	.07	0.43 (-0.12, 0.97)	.13
High	1.02 (0.49, 1.56)	<.001	0.75 (0.15, 1.35)	.02	0.66 (0.03, 1.30)	.04	0.61 (-0.11, 1.33)	.1
Hospital								
Received DSH payment			-0.25 (-0.64, 0.14)	.22	-0.29 (-0.65, 0.08)	.13	-0.28 (-0.69, 0.14)	.19
Member of a system			0.34 (-0.22, 0.91)	.23	0.32 (-0.25, 0.88)	.27	0.34 (-0.25, 0.93)	.26
For-profit ownership (Ref)			1.00		1.00		1.00	
Government ownership			0.43 (-0.21, 1.07)	.19	0.40 (-0.29, 1.08)	.26	0.45 (-0.47, 1.38)	.33
Not-for-profit ownership			0.72 (0.02, 1.42)	.05	0.71 (-0.08, 1.49)	.08	0.70 (-0.10, 1.50)	.09
Teaching hospital			-0.29 (-0.71, 0.13)	.17	-0.24 (-0.65, 0.17)	.24	-0.25 (-0.68, 0.17)	.23
Urban location			-0.13 (-0.59, 0.34)	.59	0.03 (-0.62, 0.68)	.92	0.10 (-0.58, 0.77)	.78
Community population								
Unemployment rate					8.72 (-0.83, 18.26)	.07	7.72 (-1.87, 17.31)	.11
High school completion rate					-2.14 (-6.09, 1.80)	.29	-1.98 (-6.25, 2.29)	.36
Elderly					-2.46 (-10.64, 5.72)	.55	-2.14 (-10.11, 5.83)	.6
White					2.65 (0.03, 5.28)	.05	2.45 (-0.30, 5.19)	.08
African American					1.43 (-3.10, 5.96)	.54	2.05 (-2.60, 6.70)	.39
Asian					2.22 (-1.12, 5.56)	.19	2.49 (-1.24, 6.21)	.19
Other race/ethnicity					-8.74 (-22.74, 5.26)	.22	-8.97 (-22.96, 5.02)	.21
Market								
≥ 1 government hospital within 15-mile radius							-0.14 (-0.81, 0.54)	.69
≥ 1 not-for-profit hospital within 15-mile radius							-0.02 (-0.60, 0.56)	.95
Competitive market HHI score ^e							-0.18 (-0.94, 0.58)	.64
Constant	0.53 (0.17, 0.89)	<.01	0.22 (-0.48, 0.93)	.53	0.21 (-2.24, 2.67)	.86	0.34 (-2.53, 3.20)	.82

Note. CI = confidence interval; DSH = Disproportionate Share Hospital; HHI = Herfindahl-Hirschman Index.

^aUnadjusted model, with control only for Latino population growth rates.

^bModel 1 plus adjustment for hospital characteristics.

^cModel 2 plus adjustment for community population characteristics.

^dModel 3 plus adjustment for market characteristics.

^eHHI defined as the sum of the squared market shares of all hospitals within the same market, where market share is measured by hospital discharges. The HHI ranges from 0 (representing the hypothetical case of an infinite number of hospitals competing in a market) to 10 000 (representing a monopoly). An HHI value of 2500 or below defines a competitive market.

on hospitals and payers. Although this financial burden was expected to decrease substantially with the ACA, the future of uncompensated hospital care is now uncertain after the Supreme Court's June 2012 ruling on Medicaid expansion and subsequent efforts to reduce hospital payments and revise the allocation of DSH funds.⁵⁶ Full implementation of the ACA started in January 2014, and future research should evaluate the impact of the ACA's insurance expansions on hospitals' uncompensated care.

In California, it is estimated that in 2015, more than 400 000 Latinos will be newly

enrolled in private insurance with subsidies through Covered California (the state health insurance marketplace) and more than 600 000 will be enrolled in the newly expanded Medicaid program.³² The US Department of Health and Human Services recently published analyses suggesting that hospitals nationwide will save \$5.7 billion in uncompensated care because of the coverage expansion, with a majority of the savings (\$4.2 billion) accruing to states such as California that opted to implement the Medicaid expansion.⁵⁷ The mandatory use of Medicaid managed care plans for most populations in California is likely

to still put pressure on hospitals providing care to newly insured Latinos because of relatively low reimbursement rates.

In areas with high numbers of undocumented Latinos and an existing burden of uncompensated care, less funding will be available from DSH and county indigent funds, despite the fact that the low-income, uninsured, undocumented residents who may drive at least a portion of uncompensated care are explicitly excluded from the Medicaid expansion and purchase of insurance through state health insurance marketplaces. Counties will be making key decisions relating to the level of

reimbursement, eligibility criteria (including whether to allow undocumented immigrants to enroll), and services covered that will have a large impact on uninsured Latinos and hospital uncompensated care spending.

Conclusions

Our results suggest that systematic support is needed in areas with rapid Latino population growth to control hospitals' uncompensated care. Improving hospital resources in communities with high Latino population growth can be an efficient way to reduce uncompensated care for individual hospitals. An integrated health care system is essential to promote efficient and coordinated health care by encouraging cost-effective primary care for ambulatory care-sensitive conditions, such as asthma, congestive heart failure, hypertension, and diabetes.^{17,58–59}

Multiple stakeholders, such as patients, health care providers, social workers, health insurance companies, and governmental organizations, should work together to improve health care efficiency, especially for patients with different cultural backgrounds and language barriers.⁵⁹ Critical provisions of the ACA, including accountable care organizations, patient-centered medical homes, and reform of the reimbursement system, have been designed to promote care coordination. Future study will be needed to explore Latino population health and hospital uncompensated care cost in an integrated health care system. ■

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Human Participant Protection

This study was exempt from review because it involved the collection and study of existing, publicly available, de-identified data.

References

1. Bruce J. Hospital uncompensated care rises to \$46 billion without Obamacare. 2014. Available at: <http://www.forbes.com/sites/brucejapsen/2014/01/07/hospital-uncompensated-care-rises-to-46-billion-without-obamacare>. Accessed September 29, 2014.
2. Mann JM, Melnick GA, Bamezai A, Zwanziger J. A profile of uncompensated hospital care, 1983–1995. *Health Aff (Millwood)*. 1997;16(4):223–232.
3. Lindrooth RC, Bazzoli GJ, Needleman J, Hasnain-Wynia R. The effect of changes in hospital reimbursement on nurse staffing decisions at safety net and nonsafety net hospitals. *Health Serv Res*. 2006;41(3 pt 1):701–720.
4. Ly DP, Jha AK, Epstein AM. The association between hospital margins, quality of care, and closure or other change in operating status. *J Gen Intern Med*. 2011;26(11):1291–1296.
5. Atkinson G, Helms WD, Needleman J. State trends in hospital uncompensated care. *Health Aff (Millwood)*. 1997;16(4):233–241.
6. Blewett LA, Davidson G, Brown ME, Maude-Griffin R. Hospital provision of uncompensated care and public program enrollment. *Med Care Res Rev*. 2003;60(4):509–527.
7. Alison M. Congressional Research Service. Medicaid disproportionate share hospital payments. 2013. Available at: <http://fas.org/sgp/crs/misc/R42865.pdf>. Accessed September 19, 2014.
8. Weissman J. Uncompensated hospital care. Will it be there if we need it? *JAMA*. 1996;276(10):823–828.
9. ObamaCare Facts. Supreme Court ObamaCare: ruling on ObamaCare. Available at: <http://obamacarefacts.com/supreme-court-obamacare>. Accessed September 29, 2014.
10. Rau J. Behind the fiscal cliff deal, a prolonged hospital finance fight. 2013. *Kaiser Health News*. Available at: <http://www.kaiserhealthnews.org/stories/2013/january/04/fiscal-cliff-deal-hospital-finance-fight.aspx>. Accessed January 28, 2014.

11. Neuhausen K, Davis AC, Needleman J, Brook RH, Zingmond D, Roby DH. Disproportionate-share hospital payment reductions may threaten the financial stability of safety-net hospitals. *Health Aff (Millwood)*. 2014;33(6):988–996.

12. Noah T. The nativism tax: what it will cost you to deny illegal immigrants health insurance. 2009. *Slate*. Available at: http://www.slate.com/articles/news_and_politics/prescriptions/2009/11/the_nativism_tax.html. Accessed January 21, 2014.

13. Motel S, Patten E. *The 10 Largest Hispanic Origin Groups: Characteristics, Rankings, Top Counties*. Washington, DC: Pew Hispanic Center; 2012.

14. Chen J, Vargas-Bustamante A, Mortensen K, Thomas S. Using quantile regression to examine health care expenditures during the Great Recession. *Health Serv Res*. 2014;49(2):705–730.

15. Harvey H, Hearne J, Anders S. *Updated Estimates for the Insurance Coverage Provisions of the Affordable Care Act*. Washington, DC: Congressional Budget Office; 2012.

16. *National Healthcare Disparities Report*. Rockville, MD: Agency for Healthcare Research and Quality; 2012. AHQRQ Publication 12–0006.

17. Ortega AN, Rodriguez HP, Vargas Bustamante A. Policy dilemmas in Latino health care and implementation of the Affordable Care Act. *Annu Rev Public Health*. 2015;36:525–544.

18. Vargas Bustamante A, Fang H, Garza J, et al. Variations in healthcare access and utilization among Mexican immigrants: the role of documentation status. *J Immigr Minor Health*. 2012;14(1):146–155.

19. Ortega AN, Fang H, Perez VH, et al. Health care access, use of services, and experiences among undocumented Mexicans and other Latinos. *Arch Intern Med*. 2007;167(21):2354–2360.

20. James C, Thomas M, Lillie-Blanton M, Garfield R. *Key Facts: Race, Ethnicity and Medical Care*. Menlo Park, CA: Henry J. Kaiser Family Foundation; 2007.

21. Berk ML, Schur CL, Chavez LR, Frankel M. Health care use among undocumented Latino immigrants. *Health Aff (Millwood)*. 2000;19(4):51–64.

22. Lauderdale DS, Wen M, Jacobs EA, Kandula NR. Immigrant perceptions of discrimination in health care: the California Health Interview Survey 2003. *Med Care*. 2006;44(10):914–920.

23. McGuire TG, Alegria M, Cook BL, Wells KB, Zaslavsky AM. Implementing the Institute of Medicine definition of disparities: an application to mental health care. *Health Serv Res*. 2006;41(5):1979–2005.

24. Cook BL, Manning WG. Measuring racial/ethnic disparities across the distribution of health care expenditures. *Health Serv Res*. 2009;44(5 pt 1):1603–1621.

25. Stimpson JP, Wilson FA, Su D. Unauthorized immigrants spend less than other immigrants and US natives on health care. *Health Aff (Millwood)*. 2013;32(7):1313–1318.

26. McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Soc Sci Med*. 2004;59(8):1613–1627.

27. López-Cevallos D. Are Latino immigrants a burden to safety net services in nontraditional immigrant states? Lessons from Oregon. *Am J Pub Health*. 2014;104(5):781–786.

28. Pourat N, Wallace SP, Hadler MW, Ponce N. Assessing health care services used by California's undocumented immigrant population in 2010. *Health Aff (Millwood)*. 2014;33(5):840–847.
29. American Hospital Association. *Uncompensated Hospital Care Cost Fact Sheet*. Chicago, IL: American Hospital Association; 2014.
30. California Health Interview Survey, 2001 and 2012. Available at: <http://www.askchis.com>. Accessed September 27, 2014.
31. Lucia L, Jacobs K, Dietz M, Graham-Squire D, Pourat N, Roby DH. *After Millions of Californians Gain Health Coverage Under the Affordable Care Act, Who Will Remain Uninsured?* Berkeley: University of California, Berkeley Center for Labor Research and Education; 2012. Available at: http://healthpolicy.ucla.edu/publications/Documents/PDF/aca_uninsured12.pdf. Accessed September 29, 2014.
32. University of California, Los Angeles Center for Health Policy Research. California simulation of insurance markets (CalSIM), version 1.91 statewide data book 2015–2019. Available at: <http://healthpolicy.ucla.edu/publications/Documents/PDF/2014/calSIMdatabook-may2014.pdf>. Accessed September 29, 2014.
33. California Healthcare Foundation. California's uninsured: by the numbers. Available at: <http://www.chcf.org/publications/2013/12/californias-uninsured>. Accessed September 29, 2014.
34. Fogel RW. Economic growth, population theory, and physiology: the bearing of long-term processes on the making of economic policy. *Am Econ Rev*. 1994;84(3):369–395.
35. US Census data. 2010 Census demographic profiles. Available at: http://www2.census.gov/census_2010/03-Demographic_Profile. Accessed September 29, 2014.
36. The Dartmouth atlas of health care research methods. Available at: <http://www.dartmouthatlas.org/tools/faq/researchmethods.aspx>. Accessed February 1, 2014.
37. Wennberg JE, Cooper MM. *The Dartmouth Atlas of Health Care in the United States*. Chicago, IL: American Hospital Association; 1996.
38. Wennberg J, Gittelsohn A. Small area variations in health care delivery. *Science*. 1973;182(4117):1102–1108.
39. Welfare and institutions code section 17000-17030.1. Available at: <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wic&group=16001-17000&file=17000-17030.1>. Accessed September 29, 2014.
40. California Healthcare Foundation. County programs for the medically indigent in California. Available at: <http://www.chcf.org/~media/MEDIA%20LIBRARY%20Files/PDF/C/PDF%20CountyIndigentPrograms.pdf>. Accessed September 29, 2014.
41. Hsia RY, Kellermann AL, Shen YC. Factors associated with closures of emergency departments in the United States. *JAMA*. 2011;305(19):1978–1985.
42. Dunn DL, Chen M. Uncompensated hospital care payment and access for the uninsured: evidence from New Jersey. *Health Serv Res*. 1994;29(1):113–130.
43. Cram P, Bayman L, Popescu I, Vaughan-Sarrazin MS, Cai X, Rosenthal GE. Uncompensated care provided by for-profit, not-for-profit, and government owned hospitals. *BMC Health Serv Res*. 2010;10:90.
44. Mann J, Melnick G, Bamezai A, Zwanziger J. Uncompensated care: hospitals' responses to fiscal pressures. *Health Aff (Millwood)*. 1995;14(1):263–270.
45. American Hospital Association. AHA Data and Directories. Available at: <http://www.ahadataviewer.com>. Accessed September 20, 2014.
46. Baker LC. Measuring competition in health care markets. *Health Serv Res*. 2001;36(1 pt 2):223–251.
47. Brown DM, Warren-Boulton FR. Testing the Structure-Competition Relationship on Cross-Sectional Firm Data. Discussion paper 88–6, 1988. Economic Analysis Group, U.S. Department of Justice.
48. Zwanziger J, Melnick GA, Mann JM. Measures of hospital market structure: a review of the alternatives and a proposed approach. *Socioecon Plann Sci*. 1990;24(2):81–95.
49. StataCorp. Stata Statistical Software Release 12.0. College Station, TX: Stata Corporation. 2011.
50. Cunningham PJ, May JH. A growing hole in the safety net: physician charity care declines again. Washington, DC: Center for Studying Health System Change; 2006. Tracking report 13.
51. Belshé K, McConville S. *Re-thinking the State-Local Relationship: Health Care*. Sacramento, CA: Public Policy Institute of California; 2013.
52. Zuckerman S, Waidmann TA, Lawton E. Undocumented immigrants, left out of health reform, likely to continue to grow as share of the uninsured. *Health Aff (Millwood)*. 2011;30(10):1997–2004.
53. Passel JS, Cohn DV. *Unauthorized Immigrant Population: National and State Trends, 2010*. Washington, DC: Pew Hispanic Center; 2011.
54. Senate Bill 350. Runner, Chapter 347, Statutes of 2007. Available at: http://leginfo.ca.gov/pub/07-08/bill/sen/sb_0301-0350/sb_350_cfa_20070417_101600_sen_comm.html. Accessed September 29, 2014.
55. State of California. Hospital fair pricing policies. Available at: <http://www.oshpd.ca.gov/HID/Products/Hospitals/FairPricing/FAQPublic.html>. Accessed September 29, 2014.
56. Clemans-Cope L, Kenney GM, Buettgens M, Carroll C, Blavin F. The Affordable Care Act's coverage expansions will reduce differences in uninsurance rates by race and ethnicity. *Health Aff (Millwood)*. 2012;31(5):920–930.
57. DeLeire T, Joynt K, McDonald R. Impact of insurance expansion on hospital uncompensated care costs in 2014. Available at: http://aspe.hhs.gov/health/reports/2014/UncompensatedCare/ib_UncompensatedCare.pdf. Accessed September 29, 2014.
58. Roby DH, Pourat N, Pirritano MJ, Vrungos SM, Dajee H, Castillo D, Kominski GF. Impact of patient-centered medical home assignment on emergency room visits among uninsured patients in a county health system. *Med Care Res Rev*. 2010; 67(4):412–430.
59. Chen J, Mullins D, Novak P, Thomas S. Personalized strategies to activate and empower patients in health care and reduce health disparities. *Health Educ Behav*. 2015; Epub ahead of print.