

The influence of Federal Regulations and community health indicators on community benefit spending by private nonprofit hospital in some States of the US: A retrospective longitudinal correlational study

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Abstract

Introduction: In the United States, private nonprofit hospitals are exempt from federal, state, and local taxes in exchange for providing community benefits. Federal legislation in 2007 and 2010 established a standard reporting format that allowed researchers to examine community benefit spending patterns by private nonprofit hospitals, though this continues to be an understudied subject. The aim of this study was to assess whether the recent federal regulations and community health indicators influenced community benefit spending by private nonprofit hospitals in seven US states.

Methods: A retrospective longitudinal study was used to estimate the relationship between county-level community health indicators in one year and levels of spending on community health improvement initiatives in the consecutive year for 223 urban and rural counties in seven US states. A generalized linear mixed model with lagged community health indicators and included multiple covariates was used.

Results: Only two of the fourteen community health indicators included in the analytical model were significantly associated with spending on community health improvement initiatives. The ratio of population to primary care physicians was positively associated with spending ($P < 0.0001$), while adult smoking was negatively associated with spending on these activities ($P = 0.003$).

Discussion: Major variations exist in spending on community health improvement initiatives between counties in the same state and across different states. States with the highest health needs spent the least, while those with lowest health needs spent the most. The remarkable fluctuation in spending over the three years of the study could not be explained by a matching variability in the community health needs. Additional research should examine what factors influence the spending decisions by private nonprofit hospitals on community health improvement activities.

KEY WORDS: Affordable Care Act; health expenditures; healthcare policy; patient protection; public health; USA.

Riassunto

Introduzione: Negli Stati Uniti, le strutture sanitarie private senza scopo di lucro sono esentate dal pagamento di tasse federali, statali e locali se forniscono dei benefit alla comunità. La legislazione federale nel 2007 e nel 2010 ha stabilito uno standard con il format che consente ai ricercatori di esaminare i pattern di spesa per la comunità da parte degli ospedali privati no profit, sebbene questo continui ad essere un soggetto poco studiato. L'obiettivo di questo studio è stato quello di valutare la recente normativa federale e gli indicatori sanitari della comunità influenzati dai benefit spesi dagli ospedali private no profit in sette stati degli USA.

Metodi: Uno studio retrospettivo longitudinale è stato usato per stimare la relazione tra gli indicatori di salute comunitari a livello di contea in un anno ed i livelli di spesa per iniziative finalizzate al miglioramento della salute comunitaria nell'anno successivo, per 223 contee urbane e rurali in sette stati degli USA. È stato utilizzato un modello misto lineare generalizzato con indicatori sanitari della comunità ritardati e sono state incluse covariate multiple.

Risultati: Solo due dei 14 indicatori di salute comunitari inclusi nel modello analitico sono stati associati in modo significativo con la spesa per iniziative di miglioramento della salute della comunità. Il rapporto tra popolazione e medici di base è stato positivamente associato con la spesa ($P < 0.0001$), mentre il fumo negli adulti è stato negativamente associato con la spesa per queste attività ($P = 0.003$).

Discussione: Importanti variazioni esistono nella spesa in iniziative di miglioramento della salute comunitaria tra contee dello stesso stato e tra differenti stati. Gli Stati con le esigenze maggiori di salute hanno speso meno, mentre quelli con minori esigenze di salute hanno speso di più. La fluttuazione sorprendente nella spesa nei tre anni di studio non poteva essere spiegata abbinando la variabilità nelle necessità di salute della comunità. Ulteriore ricerca dovrebbe esaminare quali fattori influenzano le decisioni sulla spesa da parte degli ospedali private no profit sulle attività di miglioramento della salute della comunità.

TAKE-HOME MESSAGE

In some states of the US, community benefits spending by private nonprofit hospitals does not appear to be responsive to the health needs of their communities. Counties and states with more profound health needs see less investment than those with fewer needs. Additional government oversight and intervention might be needed to achieve the goals of hospital tax-exempt laws.

Competing interests - none declared.

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INTRODUCTION

In the United States, private nonprofit hospitals are exempt from federal, state, and local taxes in exchange for providing community benefits. Historically, this has been an ambiguous concept because private nonprofit hospitals can decide if and how they will respond to community health needs and their level of investment in community health improvement activities. However, in 2007, federal legislation began requiring all private nonprofit hospitals to report community benefit expenditures on the Internal Revenue Service (IRS) Schedule H, Form 990 [1]. In 2010, the Patient Protection and Affordable Care Act (ACA) amended the IRS regulations to encourage private nonprofit hospitals to invest in community programs and activities that improve population health outcomes. For the first time, a standard reporting format allowed researchers to examine community benefit spending patterns by private nonprofit hospitals.

Before these changes in reporting requirements, researchers tended to focus on individual socioeconomic indicators and spending on charity and uncompensated care. One study in California found no significant associations between socioeconomic factors and levels of uncompensated care by these hospitals [2]. Bazzoli et al. found no relationship between the provision of community benefits spending by private nonprofit hospitals in California and Florida and reported community needs [3]. While Song and her colleagues did not find a significant relationship between a community's unemployment rate or per capita income and the level of uncompensated care by private nonprofit hospitals, they did note that levels of unemployment are significantly associated with the provision of community health services [4]. Young et al. found that spending on different community benefit activities is not dependent on population characteristics and needs [5]. Singh et al. conducted a cross-sectional study that used 16 community health indicators and found that hospitals spent more on direct patient care activities in communities with higher he-

alth needs [6]. However, they observed no relationship between community health needs and hospital spending on community health improvement activities. They attributed this finding to the absence of federal definitions and minimum requirements for spending on community health improvement initiatives.

After reporting requirements were enacted, several studies assessed community benefits spending and concluded that private nonprofit hospitals allocate most of their expenditures to charity care and other direct patient services [7–9]. Begun et al. found that spending toward community health improvement activities was positively associated with hospital size, profitability, membership in a system, urban setting, and, perhaps surprisingly, states that do not have community benefit requirements [10]. However, McCullough et al. determined that private nonprofit hospital investments in community health services was positively associated with improved health outcomes over several years [11].

Therefore, the aim of this study was to analyze the influence of community health indicators, either independently or within specific health categories, in predicting spending on community health improvement activities over successive years by private nonprofit hospitals in seven US states.

We use community spending data for private nonprofit hospitals in seven states from 2010–2013 and explore their association with county-level community health indicators identified the year before. Our assumption is that the availability of financial data for multiple years after the implementation of the new reporting requirements provides a better opportunity to evaluate this relationship and to establish a baseline from which future studies can evaluate more recent spending by private nonprofit hospitals.

METHODS

Study design and procedure

A retrospective longitudinal design was used to estimate the relationship between county-level community health indicators in one

year and the levels of spending on community health improvement initiatives by private nonprofit hospitals in the following year. The final dataset included a unique profile for each county that combined fourteen community health indicators, aggregate spending on community health improvement initiatives, and a population profile.

The primary source of data for the community health indicators was the County Health Rankings & Roadmaps files at the University of Wisconsin Population Health Institute and funded by the Robert Wood Johnson Foundation [12]. The County Health Rankings measures fundamental health factors and outcomes in almost every county in the U.S. and provides a portrait of how the physical, educational, occupational, and social environments influence health. For this analysis, we used 2010, 2011, and 2012 data. We supplemented these data with demographic, poverty, and degree of rurality information from the U.S. Census Bureau and the U.S. Department of Agriculture [13, 14].

We used the American Hospital Association (AHA) Annual Survey to identify private nonprofit hospitals in each of the seven states. The Henry J. Kaiser Family Foundation, the Virginia Health Information, and the Kentucky Hospital Association website were used to update and verify the status of hospitals [15–18]. Financial information reported on hospitals' revised IRS income tax Form 990 was the primary source for the spending on different community health improvement initiatives. Spending by individual hospitals was aggregated at the county level. Once the hospital panel was verified, we used 2011, 2012, and 2013 financial data from GuideStar, Economic Research Institute, and Foundation Center websites to complete the income tax Form 990 for private nonprofit hospitals [19–21].

Study sample and variables

We included 223 urban and rural counties in the states of Kentucky, Minnesota, Mississippi, Nebraska, New Hampshire, New Mexico, and Virginia. These states were selected be-

cause they had the highest and lowest rates of poverty from all four Census regions. The study sample included all counties that had at least one private nonprofit hospital in the selected seven states.

Dependent Variable

There are three categories of benefits on Schedule H Form 990 that the IRS defines as initiatives taken by hospitals to improve the overall health of their communities. These activities include community health improvement services (activities aimed to improve community health), cash and in-kind contributions for community benefit (contributions to any community benefit activity), and community building activities. Hospitals report spending on these activities in total dollar amounts and as a percentage of total hospital expenses. We aggregated total expenditure on those three community benefit spending categories into one dependent variable identified as community health improvement initiatives. Total spending was aggregated at the county level. The aggregated total spending was a highly skewed distribution, so we used log spending as our dependent variable.

Independent Variables

Community health indicators were obtained from the County Health Rankings and Roadmaps database. This database includes estimates of health factors, defined as "factors that influence the health of a county" [12]. They include indicators across four domains: health behaviors, clinical care, social and economic environment, and physical environment. Most are comparable between counties and across states; however, state-level effects incorporated in estimating a few of these factors prevent their comparison across states [12]. We used indicators that were consistently estimated and reported from 2010 to 2012 and followed the methodology used by Singh et al [6].

Other Covariates

We included several covariates that could bias

our analysis based on previous research. We also included a year variable to assess change over time, a location variable to examine the difference between rural and urban Counties, and a state variable to examine differences between states. Our covariates included year of spending on community health improvement initiatives; rural/urban classification; state; poverty rates; proportion of total population that is female; proportion of population over age 65; and proportion of population under age 18. We did not test for differences between Census and poverty regions due to their high collinearity with other covariates.

Data analysis

In addition to descriptive statistics for all county characteristics, community health indicators, and spending on community health improvement initiatives, categorical variables include frequencies and percentages, and continuous variables include analysis of normality, collinearity, and outliers, as well as maximums, minimums, and means. To standardize the amounts of spending over the three years of the study, we used the Consumer Price Index inflation calculator (CPI) for the U.S. to adjust nominal spending for each of the three years to 2016 [12]. To identify community health indicators predictive of spending on community health improvement activity, we used a generalized linear mixed model with lagged community health indicators and included multiple covariates. We tested for skewness and kurtosis, and log transformation was the best fit for the model. For any county that had zero spending, we added 1 then log transformed.

SAS/STAT software (V 9.4) was used for all analyses. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Table 1 provides an overview of counties included in the analysis. Total spending on community health improvement activities varied considerably across counties in the seven states and between counties within the same state. On Schedule H, private nonprofit hospitals

have the option of providing the types of programs/activities and number of persons served by each CB category. However, because of extremely low reporting, it was difficult to determine how hospitals direct their CB spending and who benefits from the CB spending. As an alternative, we calculated spending per capita and per individuals in poverty. Community health indicators varied considerably between and among states, and in Table 3 the descriptive statistics of county health indicators used in the analysis are reported.

Only two of the fourteen community health indicators included in the analytical model were significantly associated with spending on community health improvement initiatives (Table 4). Adult smoking was significant but negatively associated with spending on these activities ($P = 0.003$). A 1% increase in adult smoking rates was associated with a decrease of 0.06 log units spending on community health improvement activities. The ratio of population to primary care physicians was significant and positively associated with spending ($P < 0.0001$). Two other health indicators showed borderline significant association with this spending. There was a marginally positive association ($P = 0.08$) with the teen birth rate, and the preventable hospital stays were negatively associated although its effect was minimal ($P = 0.08$). No significant statistical relationship was found between the remaining health indicators and spending on these activities. We found a significant difference in spending on these activities between rural and urban counties ($P = 0.003$), with rural counties spending less. We also found significant differences ($P = 0.01$) in spending between the seven states. Mississippi, the state with second worst average scores on indicators, spent the least on these activities, compared to other states. We also found that the proportion of elderly population is significant and negatively associated with spending on these activities ($P = 0.0009$), while poverty rate indicator was a borderline negative predictor of spending ($P = 0.09$). We could not find any statistically significant change in spending on commu-

Table 1. Number of counties and numbers and percentage of population where private nonprofit hospitals are located in the counties included in the study.

	Number of counties	Percentage of total state counties	Rural counties	Population	Percentage of total Population	Rural population
Kentucky	56	47%	75%	3,009,739	70%	35.9%
Minnesota	50	57%	68%	4,527,929	85%	19.3%
Mississippi	19	23%	84%	1,000,055	33%	56.6%
Nebraska	34	36%	85%	1,488,148	81%	32.9%
New Hampshire	10	100%	70%	1,316,470	100%	37.8%
New Mexico	14	42%	71%	1,404,353	68%	23.9%
Virginia	40	30%	40%	3,859,463	48%	10%

Table 2. Inflation-Adjusted spending on Community Health Improvement Initiatives 2011-2013* in the Counties included in the study in each State.

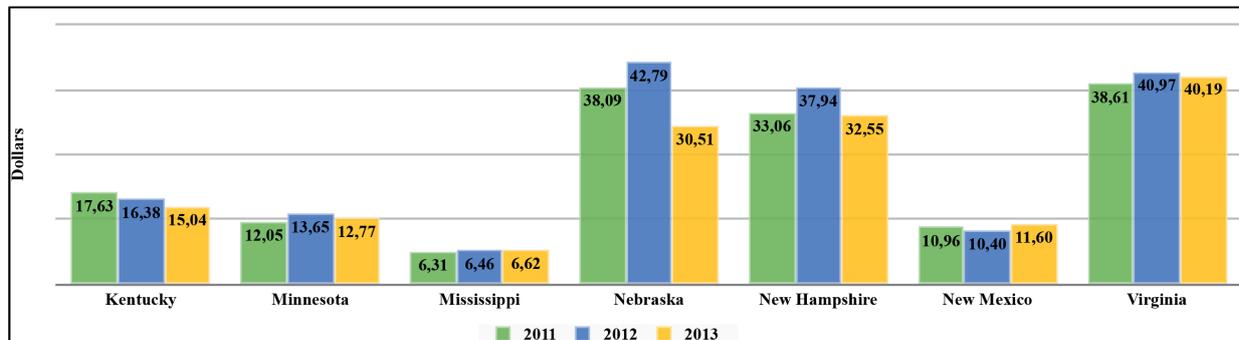
	County spending				
	Year	Total	Maximum	Minimum	Mean
Kentucky	2011	73,131,973	34,284,446	642	1,492,490
	2012	75,685,709	37,308,167	1,260	1,513,715
	2013	58,679,307	22,538,814	242	1,197,544
Minnesota	2011	73,673,886	22,465,148	4,997	1,503,549
	2012	73,283,069	21,280,988	2,752	1,465,661
	2013	73,777,329	26,091,691	663	1,475,546
Mississippi	2011	9,977,187	5,918,347	8,663	712,656
	2012	8,419,964	4,117,926	1,698	600,636
	2013	9,447,815	5,626,402	9,875	726,755
Nebraska	2011	51,519,708	15,180,033	3,925	1,661,926
	2012	54,637,935	19,197,474	1,374	1,762,514
	2013	37,477,859	9,882,982	2,408	1,292,340
New Hampshire	2011	33,829,329	10,690,758	188,553	3,382,933
	2012	31,231,933	10,788,018	305,150	3,470,214
	2013	30,395,516	9,288,184	241,941	3,039,552
New Mexico	2011	12,252,041	3,802,466	30,119	942,465
	2012	11,698,912	3,954,300	43,419	899,916
	2013	11,321,205	3,883,504	2,684	808,657
Virginia	2011	73,844,355	20,168,838	2,122	1,893,445
	2012	79,617,591	22,187,034	819	2,041,477
	2013	77,816,970	21,764,424	14,936	2,002,592

*Excluding all zero and negative values.

+Poverty is defined as all people under the federal poverty line.

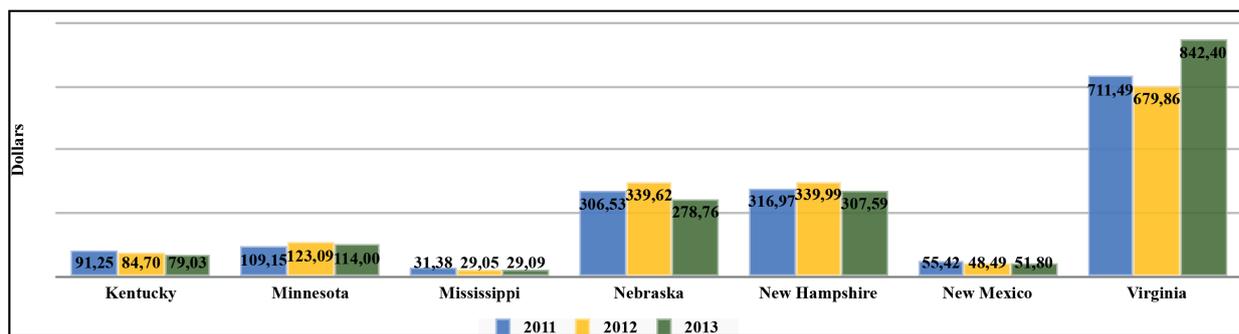
Table 3. Descriptive Statistics of Community Health Indicators (n = 223 counties) in the Counties included in the study.

Variable	Minimum	Maximum	Mean
Adult smoking	2%	40.2%	22.29%
Adult obesity	12.7%	40.1%	29.25%
Motor vehicle crash death rate	4.66/100,000	58.16/100,000	24.03/100,000
Teen birth rate	7.3/1000	93.8/1000	43.22/1000
Primary care physicians	0	604	77.53
Preventable hospital stays	33.76/1000	265.76/1000	89.28/1000
Diabetic screening	26.7%	96.15%	81.74%
Children in poverty	2.7%	50%	20.45%
Inadequate social support	5.55%	37.4%	18.65%
Air pollution-particulate matter days	0	17	0.83
Air pollution-ozone days	0	27	1.26
Access to healthy foods	0%	100%	49.88%
Uninsured Adults	7.4%	37.1%	17.54%
Unemployment	2.4%	19.4%	7.39%



*Excluding all zero values.

Figure 1. Inflation-Adjusted Average Per Capita Spending on Community Health Improvement Initiatives 2011-2013* in the Counties included in the study.



*Excluding all zero values.

†Poverty is defined as all people under the federal poverty line.

Figure 2. Inflation- Adjusted Average Per Individuals in Poverty Spending on Community Health Improvement Initiatives 2011-2013* in the Counties included in the study.

Table 4. Regression of spending on Community Health Improvement Activities on Community Health Indicators.

<i>Log Spending on Community Health Improvement Initiatives</i>					
Predictor variables	Estimate	Confidence Interval		P-value	
Health behaviors indicators:					
Adult smoking	-0.06	-0.10	-0.02	0.003	
Adult obesity	-0.02	-0.06	0.03	0.53	
Motor vehicle crash death rate	-0.01	-0.04	0.01	0.32	
Teen birth rate	0.02	-0.001	0.03	0.08	
Clinical care indicators:					
Uninsured Adults	-0.01	-0.03	0.01	0.23	
Primary care physicians	0.01	0.01	0.02	<0.0001	
Preventable hospital stays	-0.005	-0.01	0.001	0.08	
Diabetic screening	0.001	-0.01	0.01	0.87	
Social and economic factors:					
Unemployment	0.05	-0.02	0.11	0.14	
Children in poverty	0.01	-0.02	0.04	0.48	
Inadequate social support	0.03	-0.01	0.08	0.15	
Physical environment indicators:					
Air pollution-particulate matter days	0.03	-0.02	0.07	0.30	
Air pollution-ozone days	0.01	-0.02	0.04	0.44	
Access to healthy foods	-0.0007	-0.01	0.01	0.81	
Covariates					
Year	2011	Ref.	.		
	2012	0.03	-0.20	0.26	0.73
	2013	-0.03	-0.29	0.23	
Location	Urban	Ref.	.		
	Rural	-0.94	-1.55	-0.32	0.003
State	New Hampshire	Ref.	.		
	Kentucky	-1.28	-2.53	-0.02	
	Minnesota	-1.50	-2.61	-0.39	
	Mississippi	-2.33	-3.82	-0.83	0.01
	Nebraska	-1.03	-2.16	0.10	
	New Mexico	-1.58	-3.12	-0.03	
	Virginia	-1.90	-3.03	-0.77	
Poverty rates	-0.03	-0.06	0.004	0.09	
Population under 18	-0.03	-0.12	0.05	0.43	
People 65 and older	-0.12	-0.19	-0.05	0.0009	
Female population	0.068	-0.07	0.21	0.33	

nity health improvement initiatives over the three-year study period ($P = 0.73$), nor between proportion of population under 18 or female.

DISCUSSION

Private nonprofit hospitals have been given tax exempt status in return for ensuring they continue investing in activities and programs that address the health needs in their communities. Before the IRS regulations were established in 2007, no study was able to accurately estimate the amount private nonprofit hospitals spent on programs and activities directed to improve their communities' health. Previous research has examined the relationship between various socioeconomic and demographic factors and spending on community benefits or uncompensated care. Schedule H offered a standard tool that allows researchers to estimate the amounts of spending on three community benefits activities that specifically target the health needs in the community. However, it is left up to the hospital to define which needs are the most important and which programs and activities should be funded.

To our knowledge, this study is the first to determine whether community health indicators, either independently or within specific health factor categories, can predict the spending on community health improvement activities over successive years. Our results show substantial differences in community health indicators between different counties within the same state and across states. Based on the set of fourteen indicators used in this study, the health needs in Mississippi far exceed other states on many indicators. However, when weights were applied to the indicators that were used by Community Health Rankings & Roadmaps, Kentucky had the lowest average scores for health indicators [12].

When the spending on community health improvement activities was adjusted for inflation, substantial differences were found among counties in the same state and across states. States that had the highest total spend-

ing on community benefits ranked very low when these spending patterns were estimated on a per capita and per individuals in poverty basis. Although this is not an ideal method to estimate who benefitted from the spending, it provided an indication at whether people experiencing poverty benefit from this spending. More interestingly, when we plotted the aggregated weighted sums of the community health indicators against spending, no logical pattern was observed. We found only two community health indicators that are significant and two that are marginally associated with community benefit expenditures. Our results partially contradict those reported by Young et al. and Singh et al. about the lack of association between poverty and spending on these activities [5, 6].

Our findings suggest that many private nonprofit hospitals invest considerable financial resources in community programs and activities, but these investments do not appear to address the specific health needs in their communities. We also found that hospitals spent more in areas with better socioeconomic indicators such as higher incomes and a higher percentage of insured, but our results indicate that these hospitals represent only a small fraction of private nonprofit facilities. We hypothesize that in states with worse health indicators, more community benefit spending is directed to direct patient care activities, leaving fewer financial resources for spending on community health improvement initiatives. Our results support previously published studies showing lack of association between level of uninsured adults and spending on community health improvement activities [5].

However, community spending may become more targeted in the future as private nonprofit hospitals develop their community health needs assessments and implementation plans. Future research should evaluate whether these spending patterns become more responsive as community health needs become better understood.

Study strengths and limitations

This research is the first longitudinal study that examines the relationship between community health indicators and spending on community benefits by private nonprofit hospitals after the latest federal reporting requirements became mandatory. It is also the first study to compare the levels of community benefits spending between states with highest and lowest poverty levels. In addition, this study is not limited to states but includes all private nonprofit hospitals at the county level.

This research considers the years 2010 to 2013, which may not reflect current health needs or community benefits spending. All research into community benefits spending is vexed by a significant lag between when spending occurs and when financial data are reported and become available. While more recent data are available, using data from 2010 to 2013 period provides a baseline for analysis following the enactment of the IRS and ACA reporting regulations, which allows future researchers

to establish a causal relationship as they examine trends over time.

CONCLUSION

This study found major variations in spending by private nonprofit hospitals on community health improvement initiatives between counties in the same state and across different states. States with the highest health needs spent the least, while those with lowest health needs spent the most. Although not statistically significant, there was remarkable fluctuation in spending over the three years of the study, which could not be explained by a matching variability in the community health needs. Other environmental and organizational factors could explain the apparent dissociation between the health needs of a community and spending by hospitals to address these needs. Additional research should examine what factors influence the spending decisions by private nonprofit hospitals on community health improvement activities.

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