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ORIGINAL RESEARCH

Examining the Impact of Availability and Accessibility of Community Benefit Provisions on County Health Outcomes

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Background: The recent rise of accountability in healthcare providers has spurred a keen interest in improving community benefit provisions and how these are associated with community health development. However, prior studies predominantly focus on the adequate amount of community benefit provisions (availability), disregarding the potential influence of distributional provisions (accessibility). To fill this gap, this study explores how the total amount (availability) and Blau's Index (accessibility) of community benefits are positively associated with county health outcomes.

Methods: This study adopts a cross-sectional time series two-way fixed effect analysis from 2014 to 2019 for the county level. Independent variables are calculated as the total amount and Blau's Index of community benefit provisions in hospital referral regions (HRRs). Dependent variables are county health outcomes, measured by physical and mental unhealthy days and distress days.

Results: The results demonstrated that both the availability and accessibility of community benefit provisions are correlated with lower physical and mental healthy days and distress. Remarkably, the accessibility of community benefit provisions by hospitals became pivotal to improving county health outcomes.

Conclusion: From the theoretical aspects, it provides empirical evidence between community benefit provisions and community health outcomes and extends the theory of access into community benefit provisions. From the practical aspects, it offers invaluable insights for hospital managers and policymakers for their strategic decision-making to contribute to community health outcomes.

Keywords: community benefit provisions, theory of access, county health outcomes

Introduction

The accountability of hospitals to the community has become pivotal in delivering cost-effective care with a community-oriented approach, thereby improving quality and access.[1,2] Since the enactment of the Affordable Care Act in 2010, some states have taken more affirmative action by adopting mandatory regulations on hospital community benefit provisions, such as Community Health Needs Assessment, Community benefit reporting, and minimum standard laws. Moreover, for-profit hospitals also pay attention to community benefit provisions to maintain their reputation for community engagement with the Corporate Social Responsibility (CSR) aspect.[3] Thus, significant pressures from the government and societal demands have been imposed on hospitals, encompassing public, non-profit, and for-profit hospitals.

In parallel with this accountability, there has been significant interest in the extent of hospital community benefit provisions and how they can improve population health. Community benefit provisions, primarily in the form of financial assistance for medical services and community-directed programs, can enhance the affordability of healthcare for low-income or uninsured populations, thereby improving access to care within the community. Prior studies have focused on increasing hospital community benefit provisions by identifying their determinant factors. They focus on two main areas: the impact of organizational characteristics, such as ownership type, finance, mission, board membership, competition,

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size, and urbanicity,[4–10] and the effects of policy interventions, including charity care regulations, the ACA, Medicaid expansions, and state reporting requirements.[11–16]

However, one critical gap that has not been paid attention to is how community benefit dollars are a funding resource for improving community health[17] (Singh et al, 2016). Although uncompensated and unreimbursed care dominates community benefit provisions, most studies tend to approach the Social Determinants of Health by examining links between community-related programs, health expenditures, and local health outcomes.[1,18–21] While a limited number of studies have explored the relationship between community benefit provisions and population health outcomes,[22–24] empirical evidence remains mixed and vague.

To fill this gap, this study aims to analyze how community benefit provisions – uncompensated and unreimbursed care costs – are associated with county health outcomes, applied to the theory of access: availability and accessibility. Availability refers to adequate resources and capacity to meet the needs of the community it serves, and accessibility indicates a service being within reasonable proximity to the community in terms of time and distance.[25] Using the total amount and the Blau index of community benefits within hospital referral regions (HRRs), it analyzes how the overall availability and heterogeneous distribution of benefits from multiple providers – which enhance physical accessibility to these resources – are associated with county health outcomes. Compiling various datasets including the Medicare Cost Report by the Centers for Medicare and Medicaid Services (CMS), County Health Rankings, and the American Hospital Association (AHA) Annual Hospital Survey, it conducts a cross-sectional time series two-way fixed effect analysis from 2014 to 2019. The principal contributions of this study are twofold: theoretically, it enhances understanding of the interconnected dimensions of access theory – availability and accessibility – in community benefit provisions and provides empirical evidence on their relationship with local health outcomes.

Community Benefit Provisions and Health Outcomes

Increasing the accountability of hospitals as primary healthcare providers, it became more critical for each hospital to fulfill social demands and establish themselves as responsible and valued partners in the community. In this respect, the current argument in community benefit provision is that not only tax-exempted non-profit hospitals should promote community health, but also for-profit hospitals with the Corporate Social Responsibility (CSR) approach should contribute to population health improvement.[3]

Community benefit provisions have been defined broadly. The traditional approach to community benefit provisions lies in providing medical-related financial assistance rather than facilitating community-building activities, focusing on charity care, uncompensated care, shortfalls from Medicare and Medicaid, and unreimbursed services.[6,26] Since the enactment of the Affordable Care Act (ACA), emerging perspectives on Social Determinants of Health (SDoH) have shifted the discussion to community-related activities, responding to a complex web of social, economic, political, behavioral, cultural, environmental, and genetic determinants of population health.[27]

However, the role of hospitals in community health improvement has predominantly focused on medical assistance. Still, even in non-profit hospitals, net spending in 17 community benefit categories by IRS Schedule H, the medical aid – financial assistance at cost and unreimbursed Medicaid expense – has taken up the most considerable portion of community benefits.[15] In this regard, uncompensated care and unreimbursed care costs are conventional concepts that reflect the overall community benefit provisions. This study defines overall community benefit provisions as uncompensated care and unreimbursed care costs, indicating hospitals' voluntary and involuntary financial assistance toward community health.

A primary goal of community benefit provisions originates from the belief that hospitals should be essential in enhancing community health development. The discussions over the relationship between hospitals and community health are not novel. There has been an increasing recognition that hospitals can deliver cost-effective care through community-focused approaches, enhancing quality and access.[1,28] Prior studies have normatively justified the hospitals' community benefit provisions – uncompensated and unreimbursed care – to progress population health by helping low-income and uninsured populations access care. As a portion of their mission and to meet societal and legislative expectations, healthcare organizations are expected to provide some extent level of uncompensated care.[22,29]

According to the 2024 American Hospital Association (AHA) statistics, 84% of the US hospitals are community hospitals. Of these, 58% are non-profit, 24% are for-profit, and 18% are state and local government hospitals. The fact that community and non-profit hospitals constitute the majority has reinforced expectations for the role of hospitals within a community. Upon this expectation, the medical services through uncompensated and unreimbursed care have been considered a public good. The public-good concept provides a verifiable explanation for community benefit provisions: a service consumed by an individual that others beyond the direct consumer attach positive value to and is subsidized.[30] Similarly, hospitals have become the safety net within the community by providing uncompensated and unreimbursed health services to patients. According to the Institute of Medicine, a safety-net hospital is defined as one that serves vulnerable populations or treats a disproportionately high number of patients who are covered by Medicaid or uninsured.[31] Charity care and bad debt levels in safety-net hospitals were twice as high as for non-safety-net hospitals, and unreimbursed care costs were 38% greater.[32] Thus, community benefit provisions play a remarkable role within a community, improving the affordability of low-income and uninsured populations and enhancing their access to care, thereby contributing to overall community health improvement.

Remarkably, in the relationship between community benefit provisions and health outcomes, two key facets are availability and accessibility: whether these benefits are adequately provided and easily accessible. This implies that hospitals should provide adequate benefits, and multiple hospitals within the community must offer benefits rather than relying on a single hospital to improve residents' access to benefits. However, research is lacking specifying these distinct effects on health outcomes. Moreover, few studies that highlight uncompensated and unreimbursed medical costs for the community have revealed mixed results between community benefit provisions and health outcomes. For instance, a study demonstrates that the association between readmission rates and total community benefit provisions and healthcare-related spending was not statistically significant.[23] Another study indicates a small size of the impact and partial influences of community benefit spending on local health outcomes, such as the number of health professionals and medication adherence.[24]

Theoretical Framework

Availability and Accessibility of Community Benefits

This study applied Penchansky and Thomas' theory of access to the relationship between community benefit provisions and health outcomes.[25] They explained that integration and interconnectedness of multi-dimensional access determine citizens' overall access to care and health outcomes. This study sheds light on affordability, availability, and accessibility of access to care. Affordability is the relationship between provider costs and the consumer's ability to pay[25] (Penchansky & Thomas, 1980). Availability involves having sufficient resources to meet client and community needs, while accessibility means services are within reasonable time and distance.[33]

The traditional approach of community benefit provisions – uncompensated and unreimbursed care – has been considered a pivotal tool for enhancing the affordability of health services within a community, subsidizing low-income and uninsured populations. However, this effect is more likely to be significant when accessibility and availability of community benefit provisions are guaranteed. This indicates that even if healthcare providers offer community benefit provisions to enhance the overall affordability of their community, the appropriate amount of community benefit provisions should be offered within a community. In addition, these supplies should be easily accessible within a reasonable time and distance. Thus, the availability and accessibility of community benefit spending by hospitals are also essential for improving the general affordability of healthcare services within a community and developing health outcomes by providing appropriate financial assistance to populations in need.

The availability of community benefit provisions can be defined as the total amount offered by hospitals within a community. The accessibility of community benefit provisions refers to the ease with which patients can access the hospital that offers community benefits within a community.

Regarding the availability of community benefit provisions, hospitals are expected to provide them more to fulfill their mission and societal and legislative expectations[22,28] Non-profit hospitals are expected to put more effort into community benefits to justify their tax exemption. At the same time, for-profit hospitals also focus on community benefits

as part of their corporate social responsibility within the community. In this respect, community benefit provisions have been considered an important tool to progress population health by helping low-income and uninsured populations access care. Despite the substantial influence of hospitals' financial contribution to the more extensive public health system, little is known about the importance of hospitals' community benefit dollars as a funding source for improving population health.[17,24] However, prior studies have emphasized how sufficient funding resources within a community can contribute to community health improvement.[17,23,33–35] For instance, in areas with higher CHC grant revenues, the uninsured were more likely to use lower-price providers, and it was positively associated with a greater tendency to explore medical care, thereby improving access to care.[33] Therefore, this study hypothesizes that hospitals' greater availability of community benefit provisions leads to greater access to care, thereby improving community health outcomes. If more community benefits are provided within the community, it is more likely that uninsured and low-income populations will receive appropriate care in increasing affordability. Moreover, this increased affordability will result in better overall community health outcomes.

H1: Greater total amounts of hospital community benefit provisions within an HRR are more likely to improve county health outcomes.

Regarding the accessibility of community benefit provisions, the number of hospitals providing community benefit provisions within a community is critical to ensuring that patients can easily access the benefits. This is because various communities with equivalent availability of health services and providers may still have different levels of accessibility.[25] Similarly, prior studies have also emphasized the relationship between geographical accessibility to hospitals, medical access, and health outcomes[33,36] For instance, Shorter distances to the nearest safety net providers increase access to care for uninsured persons.[37] In addition, a study by Cunningham et al (2007) found that in areas with more safety-net hospitals, the uninsured were more likely to use lower-priced providers, and a higher probability of having lower-priced providers was strongly associated with a greater tendency to use medical services. This affordability, coupled with accessibility, enhances community health outcomes by improving access to care.[33] Thus, the greater accessibility of community benefit provisions by hospitals within a community results in greater access to care, thereby enhancing community health outcomes. If higher numbers of hospitals distributionally provide community benefits within a community, it is more likely that uninsured and low-income populations will easily receive appropriate care in increasing affordability. This increased affordability will lead to better overall community health outcomes.

H2: More hospitals that distribute community benefits within an HRR are more likely to improve county health outcomes.

In short, Figure 1 shows the overall research model that is used in this study by combining the association between independent and dependent variables.

Data and Method

Analytic Strategies

This study pinpoints how total community benefit provisions and distributionally provided community benefits by each hospital within a community are positively associated with health outcomes. This study analyzes a cross-sectional time series two-way fixed effect regressions at the county level to capture the unobserved heterogeneity across entities and periods. First, we aggregate each hospital's community benefit provisions within the hospital referral regions and calculate the total amount of benefits and the Blau index across the region. A hospital referral region is a geographic area that can reflect actual healthcare utilization and patient flow. It consists of multiple counties and is often used in healthcare studies to analyze regional healthcare outcomes. Second, to conduct the analysis, we merged this data with county health outcomes, socioeconomic factors, health behaviors, and health resource variables. This study compiles the CMS Medicare Provider Cost Report, American Hospital Association Annual Survey (AHA), and County Health Ranking & Roadmaps from 2014 to 2019. The CMS Medicare Provider Cost Report provides open-source data about

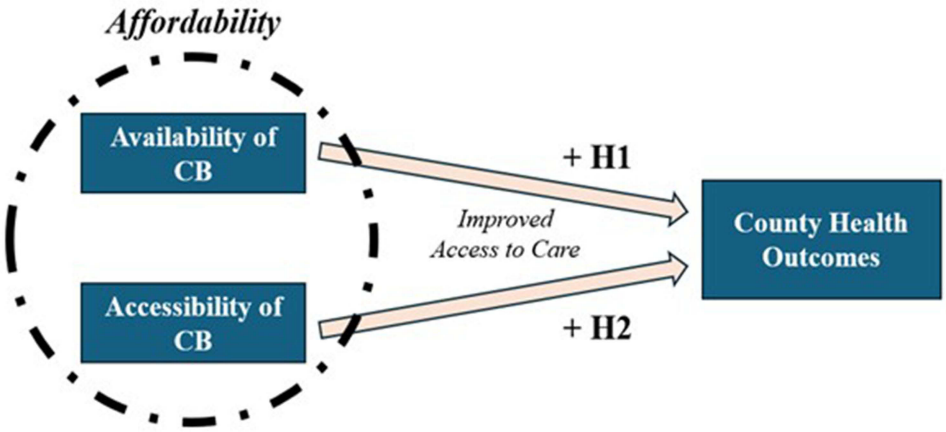

Figure 1 Research Model.

general cost information of healthcare providers, offering specific amounts of community benefit provisions. In addition, County Health Ranking data is compiled with various sets of healthcare-related information at the county level, such as Behavioral Risk Factor Surveillance System, Census Population Estimates, Area Health Resource File, American Medical Association, etc. In particular, since 2010, the Population Health Institute, collaborating with the University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation, collected publicly available data sources for county health and incorporated them with an overall ranking.[35] It is a widely used data source to analyze population health outcomes.[34,38] Finally, AHA survey data was employed to compile hospital-level and county-level information using the FIPS county code for each hospital.

Variables and Measurement

A set of metrics for a population's health compared to an individual's outcome may contain mortality, function, experiential state, and subjective sense of health and well-being (Parrish, 2010). Various objective measures, such as life expectancy or mortality, have been identified in analyzing local health outcomes. However, suggested as a complement to objective metrics, self-reported health status can offer a means to monitor population health trends over time.[39] Taking into account individual's assessment of and satisfaction with their health and functioning, this study employed self-reported measures of health outcomes. Using widely accepted population health information in the County Health Ranking database,[34,38] this study uses four measures of the overall county health outcomes: poor physical health days, poor mental health days, frequent physical distress, and frequent mental distress. These self-reported days of feeling physically and mentally unwell or distressed are reliable estimates of recent health status in a county. Poor physical and mental health days were measured by the average number of physically and mentally unhealthy days reported in the past 30 days. Frequent physical and mental distress was measured by the percentage of adults reporting 14 or more days of poor physical and mental health per month.

We define the community benefit provisions by hospitals' total cost of uncompensated and unreimbursed care, generally referring to the overall community benefit provision. The uncompensated and unreimbursed care consists of charity care, non-Medicare bad debt, and non-reimbursable Medicare bad debt, excluding discounts, courtesy allowances, and reimbursed bad debt. Overall, uncompensated and unreimbursed care costs can usually be defined as the sum of losses on charity care and bad debt.[40]

Following this community benefit, this study identifies two independent variables: availability and accessibility of community benefit provisions. The total number of community benefit provisions in each hospital referral region measures the availability of community benefit provisions. Filling the gap within the total amounts by each hospital, derived from hospitals' characteristics and sociodemographic factors, it applied a log transformation for the total community benefits to adjust its distribution. The accessibility of community benefit provisions is measured by calculating the Blau's Index of hospitals' community benefit provisions. The Blau's Index of community benefit

provisions within the hospital referral region can reflect how hospitals in a region have distributed community benefits. The Blau's Index originates from the measure to evaluate heterogeneity and representation within a group or population.[41] However, its robust plausibility allows researchers to apply it to any field. It calculated the variance ratio of a set of proportions to the average of those proportions. That is, the Blau's Index is calculated as $1 - \Sigma Pi\ 2$, where P is the proportion of individuals (directors) in a category and i is the number of categories (Blau,1979). Thus, a higher Blau's Index does mean more significant heterogeneity. Table 1 lists all variables, their measures, and data sources.

Table 1 Variable and Measurement

Type	Variable	Measure	Data
IV	The total CB provisions	Total amounts of hospital's community benefit spending in a county (logged)	CMS Medicare Provider Cost Report
	Distributional provisions of CB	Blau's index of hospital's community benefit spending within the Hospital Referral Region	
DV	Physical Unhealthy Days	The average number of physically unhealthy days reported in the past 30 days	Behavioral Risk Factor Surveillance System
	Mental Unhealthy Days	The average number of mentally unhealthy days reported in the past 30 days	
	% Frequent Physical Distress	Percentage of adults reporting 14 or more days of poor physical health per month (age-adjusted)	
	% Frequent Mental Distress	Percentage of adults reporting 14 or more days of poor mental health per month (age-adjusted)	
CV	% Population under 18	Percentage of the population under 18 in a county	Census Population Estimates
	% Population over 65	Percentage of the population over 65 in a county	
	Racial Dispositions	Percentage of African American, Asian, Hispanic, Non-Hispanic White in a county	
	% Uninsured	Percentage of people under age 65 without insurance	Small Area Health Insurance Estimates
	% Unemployment	Percentage of the population age 16+ unemployed and looking for work	Bureau of Labor Statistics
	Preventable Hospitalization Rate	The rate of hospital stays for ambulatory-care sensitive conditions is per 100,000 Medicare enrollees.	Mapping Medicare Disparities Tool
	% Obese	Percentage of the adult population that reports a body mass index (BMI) greater than or equal to 30 kg/m2	Behavioral Risk Factor Surveillance System
	% Excessive Drinkers	Percentage of adults reporting binge or heavy drinking	Behavioral Risk Factor Surveillance System
	% Smokers	Percentage of adults who are current smokers	Behavioral Risk Factor Surveillance System
	% Food Insecurity	Percentage of the population who lack adequate access to food	Map the Meal Gap
	Number of PCPs	Log transformation of the number of primary physicians in a county	Area Health Resource File/ American Medical Association

Findings

Given data availability, the study included 13,700 county-year observations out of 18,840, representing 3,140 counties from 2014 to 2019. As the dependent variables, the average number of physically and mentally unhealthy days ranged from 2 to 7 days. The percentage of physical distress frequency was from 6.62% to 24.4%. The percentage of mental distress frequency ranged from 6.6% to 26.3%. The Blau's Index, the heterogeneity in community benefit provisions in each hospital referral region, falls between 0 and 0.96. General sociodemographic factors varied, such as unemployment rates between 1% and 24% and uninsured rates from 2% to 35% within counties. Moreover, overall health behaviors and environment, such as obesity, excessive drinking, smoking, and food insecurity, are heterogeneous within each county. Table 2 presents the overall descriptive statistics used in the models.

This study conducted a cross-sectional time series two-way fixed analysis to explore the statistical association between the availability and accessibility of community benefit provisions and county health outcomes. Table 3 presents two-way fixed effect regression results, and Figure 2 visualizes key coefficient values. In Table 3, all models are statistically significant and achieve at least 38% relationship explanations. County-level socioeconomic factors, health behaviors, and healthcare resources are controlled for and remain significant across the models. Overall, the results have shown empirical evidence of the positive role of the availability and accessibility of community benefit provisions on county health outcomes, reducing the perceptions of physically and mentally unhealthy days and distressed days.

First, the availability of community benefit provisions, measured by the total spending within hospital referral regions, was positively associated with county health outcomes. In all models analyzing physically and mentally unhealthy days and distress frequencies, the variable has significantly mitigated adverse health outcomes at a significance level of at least 5%. Since the total community benefit provisions are measured by total spending and log-transformed, a 1% increase in X corresponds to an approximate change of β/100 units in Y. In this regard, in the models for physically and mentally unhealthy days, the 1% increase in the community benefit provisions is associated with a 0.000226 decrease in the average number of physically unhealthy days and a 0.000293 decrease in the average number of mentally unhealthy days. In addition, in the physical and mental distress frequency models, the 1% increase in the community benefit provisions is

Table 2 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Physically Unhealthy Days	13,700	4.046346	0.743531	2.164197	7.211441
Mentally Unhealthy Days	13,700	4.18568	0.759965	2.1	7.460286
Frequent Physical Distress %	13,700	12.42263	2.505856	6.627829	24.4
Frequent Mental Distress %	13,700	13.17503	2.709386	6.6	26.3
FIPS	13,700	30,245.5	15,028.13	1001	56045
YEAR	13,700	2016.488	1.706963	2014	2019
The total amount of CB	13,700	18.95461	1.033491	15.85148	23.9635
Blau's Index of CB	13,700	0.808003	0.129972	0	0.964172
Unemployed population %	13,700	4.92144	1.923068	1.18856	24.00836
Uninsured population %	13,700	11.86858	5.069662	2.068201	35.75324
Under 18%	13,700	22.47897	3.243741	7.068776	41.99164
Over 65%	13,700	18.21383	4.466131	4.769278	58.17399
African American %	13,700	9.10706	14.23638	0.042355	85.87005
Asian %	13,700	1.588274	2.781077	0	43.00673
Hispanic %	13,700	9.485262	13.38568	0.42605	96.35955
Non-Hispanic White %	13,700	76.20293	19.54461	2.685535	98.14984
Preventable Hospital Rate per 1,000	13,700	50.79947	21.41859	0	230.93
Obesity %	13,700	27.81901	4.860928	10.5	44.3
Excessive Drink %	13,700	17.76785	3.467857	6.453001	31.0137
Smoking %	13,700	18.80134	3.893959	5.908719	41.49131
Food Insecurity %	13,700	13.71776	3.936307	3.4	37.9
Primary Physician Number (log)	13,700	2.976999	1.583421	0	8.910991

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Table 3 Two-Way Fixed Effect Results

Variables	Physical Unhealthy Days	Mental Unhealthy Days	Physical Distress %	Mental Distress %
The total amount of CB	−0.0226**	−0.0293***	−0.0830***	−0.133***
	(0.0096)	(0.0088)	(0.0274)	(0.0300)
The Blau's Index of CB	−0.0540	−0.147***	−0.272**	−0.658***
	(0.0420)	(0.0424)	(0.120)	(0.140)
Population under 15%	0.0059*	0.0189***	−0.0288***	0.0066
	(0.0031)	(0.0032)	(0.0097)	(0.0118)
Uninsured %	−0.0038**	−0.00200	0.00304	0.0130**
	(0.0018)	(0.0019)	(0.0054)	(0.0063)
Under 18%	0.0107**	0.00722	0.00854	0.0252
	(0.0054)	(0.0059)	(0.0171)	(0.0233)
Over 65%	0.0089*	−0.0069	0.0050	−0.0512***
	(0.0047)	(0.0052)	(0.0151)	(0.0193)
African American %	−0.0145	0.0010	−0.0283	−0.0471
	(0.0131)	(0.0151)	(0.0410)	(0.0441)
Asian %	−0.0380**	−0.0652***	−0.158***	−0.416***
	(0.0159)	(0.0185)	(0.0506)	(0.0601)
Hispanic %	0.0083	−0.0020	0.0329	−0.128***
	(0.0120)	(0.0146)	(0.0381)	(0.0440)
Non-Hispanic White %	−0.0119	0.0189	−0.0137	0.0144
	(0.0117)	(0.0139)	(0.0366)	(0.0382)
Preventable	−0.0004**	−0.0014***	−0.00242***	−0.0056***
Hospital Rate_per 1,000	(0.0002)	(0.0002)	(0.0005)	(0.0006)
Obesity %	0.0022***	0.0014**	0.0058***	0.0005
	(0.0006)	(0.0007)	(0.0019)	(0.0022)
Excessive Drink %	−0.0198***	−0.00570***	−0.0676***	−0.0493***
	(0.0016)	(0.0017)	(0.0050)	(0.0055)
Smoking %	0.0763***	0.0636***	0.269***	0.262***
	(0.0017)	(0.0017)	(0.0059)	(0.0067)
Food Insecurity %	0.0132***	0.0119***	0.0709***	0.0802***
	(0.0019)	(0.0020)	(0.0070)	(0.0086)
Primary Physician Number	0.0027	−0.0135	−0.0063	−0.0686
(log)	(0.0135)	(0.0131)	(0.0415)	(0.0452)
2015	0.139***	0.163***	0.419***	0.713***
	(0.0070)	(0.0067)	(0.0200)	(0.0211)
2016	0.157***	0.325***	0.636***	1.330***
	(0.0093)	(0.0099)	(0.0296)	(0.0327)
2017	0.271***	0.615***	0.920***	2.345***
	(0.0114)	(0.0122)	(0.0357)	(0.0403)
2018	0.393***	0.899***	1.440***	3.579***
	(0.0147)	(0.0162)	(0.0489)	(0.0586)
2019	0.410***	1.179***	1.779***	4.712***
	(0.0161)	(0.0176)	(0.0535)	(0.0651)
Constant	3.615***	1.713	9.581***	10.84***
	(1.164)	(1.363)	(3.632)	(3.776)
Observations	13,700	13,700	13,700	13,700
R-squared (Overall)	0.6202	0.3902	0.7237	0.3879
Number of FIPS (County)	2,354	2,354	2,354	2,354

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

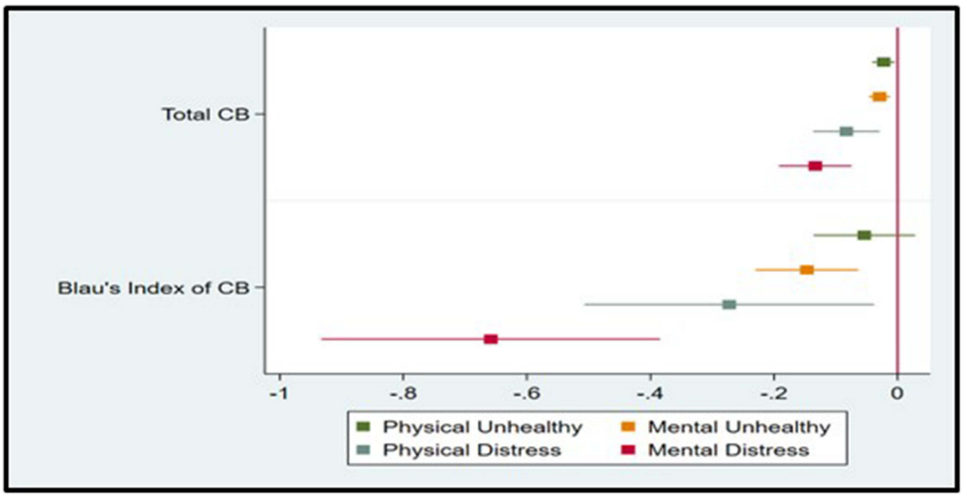

Figure 2 Coefficient Plot of Results.

associated with a 0.00083% decrease in the percentage of adults reporting 14 or more days of poor physical health per month and a 0.00133% decrease in the percentage of adults reporting 14 or more days of poor mental health per month. Despite considering that the dependent variable measures the average number of physically and mentally unhealthy days over the past 30 days, the associations and their coefficients remain negligible. For instance, even a 100% increase in community benefits corresponds to only 0.0226 days reduction in physically unhealthy days for the county population. However, the direction of the relationship suggests that community benefit provisions are consistently associated with better county health outcomes. Thus, more engagement of community benefits can lead to more tangible improvements in local health outcomes, depending on how effectively they are delivered to patients.

Second, the accessibility of community benefit provisions, measured by Blau's Index of community benefit provisions within the HRR region, was positively significant in county health outcomes. As the dependent variables were calculated as the percentage of frequency of physical and mental distress, the negative association between the degree of heterogeneity in community benefit provisions implies its positive impacts on the local population's health status. In the physically and mentally unhealthy days models, only the mentally unhealthy days model was statistically significant in improving county health outcomes. A unit increase in Blau's Index is associated with a 0.147 decrease in the average number of mentally unhealthy days. Furthermore, both the physical and mental distress frequency models alleviate adverse perceptions of their health status. A unit increase in Blau's Index is associated with a 0.272 decrease in the percentage of frequent physical distress and a 0.658 decrease in the percentage of frequent mental distress. Thus, the higher the distributional provisions in community benefits, the better overall county health outcomes.

Remarkably, Figure 2 visualizes the general tendency of the more significant influence of the accessibility of community benefit provisions on health outcomes compared to the total amounts. While there is a difference in interpretation due to the measure, it shows clear evidence that distributed community benefits by heterogeneous hospitals within the hospital referral region are likely to improve population health outcomes. Thus, the accessibility of community benefit provisions can be one of the significant factors in determining population health outcomes.

Discussion

This study explores how the availability and accessibility of community benefit provisions are positively associated with county health outcomes, improving the affordability of healthcare services for low-income populations. Analyzing the cross-sectional time series two-way fixed effect analyses from 2014 to 2019 demonstrates that the total community benefits and Blau's Index of community benefits significantly improve overall county health outcomes.

In particular, the availability of community benefit provisions (ie, the total amount of community benefit provisions) is positively associated with county health outcomes, although the corresponding coefficients are relatively small. There

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may be a possible clue for this weak association. Low-income patients eligible for community benefit provisions may constitute only a small portion of the total community population, resulting in a limited association with overall community health outcomes. Furthermore, hospitals' community benefit provisions are not an affirmative action to community health development but a passive response to the Medicaid shortfall. A previous study also identified that not only half of the community benefit spending per capita was associated with the Medicaid shortfall, but also that healthcare services funded by Medicaid shortfall may have little impact on overall community health.[24] However, over the long term, we found out a tendency for greater amounts of community benefit provisions to be associated with better average health outcomes among residents.

Furthermore, the accessibility of community benefit provisions (ie, the Blau's Index of community benefit provisions) can create better health outcomes within a community. Blau's Index of community benefit provisions represents the heterogeneity among hospitals in distributing these provisions. In this regard, a higher Blau's Index in this study indicates that a more diverse range of hospitals contribute to community benefit provisions rather than dependence on a limited number of wealthy or safety-net hospitals. Thus, it enhances patients' accessibility to financial assistance, giving them more choices to receive support from nearby hospitals more easily within their community. Given the strong effect size of accessibility to community benefit provisions, it is evident that ensuring accessibility of community benefits through multiple providers is essential for better community health outcomes, beyond merely providing financial aid. Even in the context of financial assistance aimed at improving healthcare services' affordability, accessibility to these resources is just as important as their availability. In addition, it also aligns with previous studies, both from a normative perspective on the role of community benefit provisions by hospitals in improving community health,[42–45] and from empirical efforts supporting the positive relationship between community benefit provisions and population health outcomes.[23,24,46]

Conclusion

This study can contribute to both theoretical and practical aspects. From the theoretical aspects, it expands the access theory by incorporating the availability and accessibility of community benefit provisions. In this regard, when offering community benefits for better affordability for low-income patients, it is primary to consider the adequate amount of these benefits and their distribution from multiple hospitals within the community to improve accessibility. Thus, this study can contribute to understanding the interconnectedness in dimensions of the access theory: affordability, availability, and accessibility in community benefit provisions. Second, it broadens the discussion on the relationship between community benefit provisions and local health outcomes by offering empirical evidence. It sheds lights on the critical role of hospitals in sustaining community health improvement, extending beyond the normative perspective.

From the practical aspect, it can contribute to hospital managers and policymakers. Hospitals can contemplate more effective strategies for operating uncompensated and unreimbursed care to achieve desired community health improvement, as they are also motivated to enhance community health to meet social responsibilities or comply with regulatory pressures. For instance, hospitals can not only offer more charity care to enhance the availability of community benefits, but also implement affirmative actions to address accessibility of community benefits, such as facilitating outreach programs and developing telehealth systems incorporated with community benefit provisions. Moreover, policymakers can recognize the importance of delivering community benefits accessible through multiple hospitals. In this regard, they should focus not only on increasing the total volume of community benefits but also on designing in-depth policy interventions that can enhance the accessibility of these provisions.

This study also included some limitations. First, this study does not specify the community benefit provisions but uses an integrated measure of uncompensated and unreimbursed care costs. The social determinants of health perspective may argue that community-directed programs are more likely to be associated with local health outcomes than financial assistance, even though medical aid constitutes most of these provisions. Future studies should simultaneously explore the distinct influence of medical financial aid and community-directed programs on local health outcomes. Second, this study does not capture the causal relationship between hospital's community benefit provisions and local health outcomes. The causal relationships may be weak, as hospital community benefits typically constitute a small portion of their operating expenses. Thus, future studies should adopt causal inference methods at the individual level to examine populations that have benefited from charity care. In addition, it needs to include more control variables, such as

healthcare system or personal health status. Third, this study employs self-reported health outcomes, which could inherently be subject to bias. Future studies should utilize various health outcome indicators to capture a more robust relationship between community benefits and actual health improvement within the community.

Data Sharing Statement

All data used in this study can be publicly accessed or purchased. Details of data information can be stated in the Data and Method section of this study.

Ethics Approval and Informed Consent

As the data in this study were compiled using the publicly available information at county-level. In this regard, the Florida State University (FSU) IRB process determined on July 15, 2024, that the proposed study is not research involving human subjects as defined by DHHS and/or FDA regulations.

Disclosure

The authors declare no conflicts of interest in this work.

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