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The Impact of the Hospital Value-Based Purchasing Program on Healthy Days, Health Inequity, and Hospital Community Benefit Spending

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by

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Abstract

The Hospital Value-Based Purchasing Program (HVBP) is a Centers for Medicare and Medicaid Services (CMS) program implemented in 2012 to reward acute-care hospitals with incentive payments for the quality of care provided to Medicare patients in inpatient settings. Under this policy, payment adjustments are made based on a variety of factors including clinical quality, patient experience, and cost reductions. This paper uses state-level variation in the implementation of HVBP to ascertain whether the policy led to improvements in Healthy Days (a CDC-designed composite measure of individuals' self-reported number of physically and mentally "healthy" days per month), health disparities, and community benefit spending patterns using a difference-in-differences model. Notably, this paper adds to economic literature on health equity by utilizing and comparing three measures of health disparity, including a novel measure of health inequity that includes a social justice component in the U.S. context. Results show that the HVBP led to meaningful improvements in Healthy Days, with differential effects based on income and race. It also significantly reduced health disparities and significantly increased certain types of community benefit spending, showing that hospitals can and should be invested in addressing community health. Policymakers should continue to use value-based policies to implement incentives to achieve health equity, but must be more thoughtful and intentional with these efforts by grappling with racial, political, sociological, and economic structures that contribute to inequity.

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United States medical system. While this paper does not "solve" health inequity, I certainly hope it is a step in the right direction.

Introduction

In response to high and rising healthcare costs in the United States (Levit et al., 2004), healthcare reforms over the past two decades have attempted to reduce healthcare costs while maintaining, if not improving, quality of care. Compared to other high-income countries, the United States has the highest uninsured rate and also spends more per capita on healthcare (Papanicolas et al., 2018). This spending does not translate to better outcomes; compared to other OECD nations, the U.S. spends nearly twice as much on healthcare as a share of the economy as the average OECD country but has the lowest life expectancy, the highest suicide rate, the highest chronic disease burden, and one of the highest rates of hospitalizations from preventable causes (Tikkanen & Abrams, 2020). Income-based health disparities are much more pronounced in the United States than in other high-income countries (Choi et al., 2020). A large body of literature suggests that health disparities, including disparities by race, gender, and socioeconomic status, to name a few, are not only morally unjust but have a significant financial cost (Waidmann, 2009; LaVeist et al., 2011; Turner, 2016; Thorpe et al., 2013). By some estimates, eliminating health disparities for racial/ethnic minorities would have reduced direct medical care expenditures by about $230 billion and indirect costs associated with illness and premature deaths by more than $1 trillion for the years 2003 – 2006 (in 2008 inflation-adjusted dollars) (LaVeist et al., 2011). Others estimate that disparities in health in the U.S. today represent $93 billion in excess medical care costs and $42 billion in untapped productivity, for a total potential economic gain of $135 billion per year (Turner, 2016). Therefore, a clear monetary incentive to reduce inequity in health outcomes across socioeconomic and demographic lines exists from both social justice and economic perspectives.

While structural causes of health inequity such as disparities in food access, health insurance coverage, and racial disparities in wealth are well-documented, relatively little is known about the impact that hospitals can have in furthering equity. Value-based payment includes models that attach financial incentives/disincentives with provider performance in a variety of domains including clinical quality, readmission rates, patient experience, and cost-effectiveness of care. One such value-based program currently in place in the United States is the Centers for Medicaid and Medicare Services (CMS) Hospital Value-Based Purchasing Program (HVBP), which reduces all Medicare payments to acute-care hospital by 2% and redistributes the saved funds to hospitals based on their performance and year-to-year improvement in four domains: safety, clinical care, efficiency and cost reduction, and patient and caregiver-centered experience (*NEJM Catalyst*, 2018). How hospital-level incentives introduced by HVBP in 2012 affect health outcomes, health inequity, and community health-related spending by hospitals (formally known as community benefit spending), is explored further in this paper.

Theoretically, hospitals that seek to improve their patient engagement scores and reduce costs may choose to invest in community health spending to reach underserved populations who typically have limited access to low-cost care such as primary care and are over-utilizers of high-cost care such as emergency departments, both due to greater accessibility and poorer health (Kangovi et al., 2013). Examples of community benefit spending include community building activities (e.g. establishing a hospital-based food bank or housing voucher program), providing more free care or accepting more Medicaid patients even though Medicaid typically has lower reimbursement rates than private insurers, or conducting research on the health needs of the local community. Unfortunately, the literature regarding community benefit spending is comparatively sparse. One longitudinal study found that in spite of the ACA's requirement for hospitals to

conduct and report Community Health Needs Assessments to guide their benefit spending, community benefit spending increased only marginally after the passage of the ACA (Young et al., 2018). Others found that hospitals located in states where Medicaid expansion took effect decreased spending in uncompensated care but that these savings did not translate into additional direct community benefit spending (Kanter et al., 2020). The nature of the relationship between the average amount spent on providing direct community benefits by hospitals and health equity rates in the hospital's service area is unknown; whether hospitals with historically high community benefit spending have indeed improved health equity in the areas surrounding them leading to a positive correlation between the two, or whether hospitals in areas of low equity are spending more on community benefits to ameliorate the disparities, leading to a negative correlation, is unclear but necessary to avoid unintentional penalties. Thus, while promoting health equity is not an explicitly stated goal of the HVBP program, the value-based incentive structure which prioritizes the patient care experience, clinical quality, and cost-reduction may reduce the health gap between the most and least privileged patients. The central research question then, is to understand whether healthcare payment reforms that reward quality of care rather than quantity of care (as the shift away from fee-for-service and toward value-based payment continues to do) effectively lead to changes in hospital behaviors that ultimately improve average health and reduce gaps in health outcomes for local residents.

Using state-level variation in the implementation of HVBP, this paper analyzes the role of value-based policies and their potential to improve aggregate health outcomes, reduce health disparities, and promote community health initiatives at hospitals nationwide. A difference-in-differences (DID) analysis is used to assess hospitals' potential to improve equity through two channels: improved patient communication and community investments. Data sources include

the CDC's BRFSS from the 2010 to 2016 periods to quantify health outcomes using Healthy Days and health disparities using three different measures, as well as data from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) to evaluate patient experience ratings, and data compiled by RTI International to quantify hospitals' community benefit spending. Supplementary multiple linear regression models are utilized to identify the associations between hospital quality (using HCAHPS data on patient communication) and benefit spending, and health outcomes and equity. In other words, this paper evaluates whether value-based policies that do not explicitly aim to reduce inequity maintain the status-quo, exacerbate inequities, or reduce them by motivating hospital spending patterns toward community-oriented efforts.

Much of the existing health economics research has studied the effects of various policies on access to care, primarily through changes in insurance coverage and healthcare utilization, but little attention has been given to how healthcare policies have impacted health equity. The concept of "health equity" is not new, but it has been difficult for researchers to standardize for evaluation purposes, contributing to the issue. In a widely cited paper, Whitehead (1992) defined health inequities as "differences in health that are unnecessary, avoidable, unfair and unjust." Braveman and Gruskin (2003) built on this definition, supporting "operationalization of the right to the highest attainable standard of health as indicated by the health status of the most socially advantaged group" and specifically noted the importance of comparing both health outcomes *and* the social drivers of health between more and less advantaged social groups. In doing so, Braveman and Gruskin contextualize inequitable patterns in health outcomes between various demographic groups by grounding the study of health in the study of the socioeconomic and political factors that lead to these disparities. Previous literature has used various indicators and

composite measures to quantify structural and community drivers of health outcomes, including community trauma, Gini Index, and academic achievement (Davis, 2015). More recently, UCLA's Center for Health Advancement developed a "Health Equity Metric" (HEM) that is distinct from other traditionally used measures, and builds on Braveman and Gruskin's sociologically-grounded framework. While other measures of inequity usually compare an individual's health to the population average, HEM compares an individual's health with the average health of the most socially privileged group. Using data regarding respondents' average number of healthy days per month, researchers have calculated "the distastefulness associated with one's health falling short of optimal achievable health, instrumentalized as the median health of the most socially privileged category, that of upper-income white men." Because of its novelty, few studies have been able to study health equity through this lens, but existing literature has shown that the Health Equity Metric has actually declined over time, underscoring a lack of progress in this domain in spite of major changes in health policy at the federal level (Zimmerman and Anderson, 2019). Thus, the literature in this space is graduating from the identification of health disparities toward the measurement of health inequities, and should continue to prioritize the evaluation of various policies and programs that promote health equity. This thesis evaluates how HVBP led to changes in health inequities using the HEM along with two other measures to see whether different measures of disparities tell different stories about health inequity in America.

The HVBP's novel addition of patient experience-based financial rewards for hospitals poses an interesting question as to whether positive patient experience actually translate to better health outcomes. The policy uses the nationally administered Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey to determine payment rates, providing

better reimbursement rates to hospitals that score better for patient communication and overall patient care ratings. Beginning in FY 2018, this "Person and Community Engagement" portion accounted for 25% of the overall score, and was used to determine payments.[1] The theoretical model developed by Street et al. (2009) links clear and culturally aware doctor-patient communication to better patient health outcomes due to better information exchange, and through fostering trust and feelings of patients' self-determination.

Previous research has confirmed communication biases towards patients of color, so policies that encourage better patient communication may actually benefit patients of color more than white patients, thus contributing to lessened health disparities. For example, Johnson et al. (2004) found that physicians were more verbally dominant and less engaged in patient-centered communication with Black patients when compared to white patients, contributing to racial disparities in health care quality. This difference is consistent with other findings that Black Americans tend to receive care at hospitals with lower quality scores compared to white Americans (Figueroa et al., 2016). Studies have also found that lower hospital quality scores tend to cluster in densely population and demographically heterogeneous areas (McFarland et al., 2015). While some argue that tying hospital quality to Medicare reimbursement through HVBP would incentivize hospitals to proactively and intentionally improve the patient experience through various efforts, others fear that doing so would unintentionally penalize hospitals serving more diverse and at-risk patient populations. While it is not the focus of this paper to characterize the distribution of patient experience scores across hospitals, some analyses will explore the associations between hospital quality scores for communication and patient

[1] https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/Hospital_VBPurchasing_Fact_Sheet_ICN907664.pdf

experience, hospital-level community benefit spending, and patient outcomes in terms of healthy days and health inequities.

Little quantitative literature currently exists to understand how measures taken at the hospital level can broadly affect health equity. Existing literature has largely focused on intervention evaluations, and has extensively documented how particular programs have affected disparities in hospital utilization and specific clinical outcomes. For example, deployment of community health workers was shown to significantly decrease hospitalization due to asthma amongst Black and Hispanic children who make up a disproportionate fraction of asthma hospitalizations (Woods et al., 2016), and a number of studies provide evidence-based programming to empower glycemic control amongst traditionally marginalized diabetic patients (Golden et al., 2017). However, few studies have looked at how hospitals can introduce broadly applicable initiatives to promote health equity. This paper addressing this gap in the literature to determine whether payment structures incentivizing care quality not only lead to better health for the overall population, but whether they also can be used as policy tools to ameliorate health disparities.

Literature Review

I. Background

One of the most notable equity-related healthcare reforms was The Patient Protection and Affordable Care Act (ACA) of 2010, often referred to as "Obamacare". A central component of the ACA was the expansion of Medicaid, the federal health insurance program primarily for low-income individuals that is jointly funded by state and federal governments and administered through state Medicaid programs. The ACA allowed states to expand their Medicaid program to cover all adults with incomes up to 138% of the federal poverty line ($26,500 for a family of 4 in 2021[2]) beginning in 2014. In spite of substantial federal subsidies to pay for expansion, not all states in the U.S. adopted the expansion, causing significant variation in coverage across states. As of August 2020, 38 states and the District of Columbia have adopted the Medicaid expansion, while 12 have not. Of the 38 states that have adopted the Medicaid expansion, three of them (Nebraska, Missouri, and Oklahoma) have not yet implemented it. Still, due to the ACA, the number of uninsured nonelderly Americans decreased from over 46.5 million in 2010, to 27.5 million in 2018, making the ACA a key piece of legislation affecting health access and equity (Tolbert et al., 2019).

Following the Affordable Care Act, a number of other healthcare reforms were implemented, marking a shift away from fee-for-service (FFS) payments and towards "value-based" payment (VBP) models. Whereas FFS models reimburse hospitals and healthcare practitioners for each test ordered and each service provide, VBP models reimburse hospitals and providers for quality and lowered costs of care ("CMS' Value-Based Programs"). In essence,

[2] See 2021 Poverty Guidelines from the U.S. Department of Health and Human Services: https://aspe.hhs.gov/2021-poverty-guidelines

newer payment models continue to incentivize improved quality of care rather than greater quantity of care. Current value-based programs target improved quality and cost reduction across various domains, some are broadly focused on hospital quality while others aimed to reduce specific events such as readmissions or hospital-acquired infections, and still others incentivize an increase in usage of skilled nursing facilities and home health models.

One example of a broad value-based program is Medicare's Hospital Value Based Purchasing (HVBP) program, which adjusts Medicare payments to hospitals based on their performance on various domains that reflect hospital quality, including patient safety, patient experience, efficiency, cost-reduction, complication, and hospital-associated infections. When hospitals fail to meet certain quality point thresholds, a certain percentage of the total payment that the hospital should receive from Medicare is deducted. Hospitals are rewarded for meeting certain absolute thresholds and for improvements from year to year. While adjustments to the quality scoring criteria are made annually, one major component of the score is "Patient and Community Engagement," which uses CMS' Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey to assess improvements in areas such as doctor-patient communication, cultural competency, community reputation, and overall patient satisfaction. While HCAHPS was not intentionally developed to assess health equity, it does address some key barriers to health equity as cited in literature, particularly communication.

In addition to Medicaid and Medicare-related health equity reform, various tax-related policies have also sought to improve health equity by requiring certain hospitals to invest in the communities they serve. Under Internal Revenue Service regulations, all 501(c)(3) nonprofit hospitals, which account for approximately 56% of all hospitals in the U.S. ("Hospitals by Ownership Type") are also required to document their "community benefit" activities in

exchange for their tax-exempt status. These include absorbing the cost of care for patients who are uninsured or whose insurance plan pays less than the cost of care (common amongst patients with Medicaid), creation of programs to support social determinants of health, workforce development efforts, and advocacy funding, amongst many others. The ACA added to this, requiring all 501(c)(3) tax-exempt hospitals to also conduct a Community Health Needs Assessment (CHNA) every three years to better understand the needs of the communities they serve. They are also required to create and adopt an Implementation Strategy that discusses how the hospital plans to address concerns raised through the CHNA.

The landscape of healthcare policy is changing rapidly to create programs and policies that incentivize better quality of care while also reducing healthcare costs. Through payment reform and tax policy, hospitals are having to change their processes of care to avoid financial penalties. Still, while the majority of policy is focused on improving aggregate health outcomes and reducing aggregate healthcare costs, little attention is paid to reducing health inequities specifically.

II. Factors contributing to unequal health outcomes

Public health researchers have studied the "social determinants of health" for decades, underscoring the role that structural factors – including access to healthy food, safe housing, a clean environment, and transportation access, to name a few – have on healthcare utilization and health outcomes (Kushel et al., 2006; Krieger and Higgins, 2002; Arcury et al., 2005, Nardone et al., 2020). In essence, differential access to "upstream" or structural, non-medical commodities such as food and clean air, causes "downstream" disparities in mental and physical health outcomes. This paper will not go into further detail about these upstream factors because their

effect is already well-known; rather, this paper will focus of hospital-level efforts that may ameliorate the negative impacts of social risk factors contributing to inequity.

At the interpersonal level, a significant body of literature elucidates the role of unequal doctor-patient interactions that perpetuate health inequity. Sun et al.'s (2000) study found that Black patients had significantly lower patient satisfaction scores, and that a large reason for this dissatisfaction stemmed from poor communication. Notably, they cite poor explanation of key causes of the ailment, setting inaccurate expectations regarding wait times, not being told when to resume normal activities or return for a follow-up appointment, as being highly correlated with low overall patient satisfaction scores. Observing doctor-patient interactions to build on these findings Johnson et al. (2004) found that physicians were 23% more verbally dominant and 33% less engaged in patient-centered communication with African American patients than with White patients. Similarly, Carrasquillo et al. (1999) conducted surveys 10 days after patients had an emergency room visit and found that non-English speakers were significantly more likely to report overall problems with care, communication, and testing, significantly less likely to be satisfied, and significantly less willing to return to the same emergency room. Given these barriers to communication, the quality of doctor-patient communication may suffer resulting in poorer treatment and worse health outcomes generally. One exception to this may be that Black individuals had lower deaths due to prescription opioids during the opioid crisis in the United States, but this was once again due to evidence of providers being less likely to recognize and address pain amongst Black patients, a marker of poor patient care (Alexander et al., 2018). Balsa and McGuire (2003) outline three potential mechanisms through which doctor-patient relationships may produce racially discriminatory patterns of health: 1. bias (or prejudice) against minorities, 2. greater clinical uncertainty when interacting with minority patients (e.g. not

knowing how to interpret their presentation of symptoms), and 3. beliefs (or stereotypes) held by the provider about the behavior or health of minorities.

Studies document that physicians do indeed exhibit different treatment patterns based on the patient's gender and race. In a landmark paper, Schulman et al. (1999) found that female patients and Black patients were 40% less likely than male patients and White patients, respectively, to be recommended for cardiac catherization when they presented with the same symptoms of chest pain. Conversely, the physician's gender has also been shown to cause problematic differential treatment patterns based in race and gender stereotypes rather than clinical necessity; male physicians have been shown to prescribe significantly higher doses of narcotics to White and male patients, while female physicians have been shown to prescribe significantly higher doses of narcotics to Black and female patients (Weisse et al., 2001). While the exact reasons why these gendered and racialized differences exist is difficult to pinpoint, studies have shown that patient's race and socioeconomic status are associated with the physicians' assessment of patient's intelligence, feelings of affiliation toward the patient, and beliefs about the patient's likelihood of risky behavior and adherence with medical advice (van Ryn and Burke, 2000).

A few studies have tried to better understand the associations between patient satisfaction and health outcomes, but they all use varying definitions of patient satisfaction and have mixed results. Using HCAHPS data, some find that larger hospital size, high surgical volume, and low mortality are positively associated with patient satisfaction (Kennedy et al., 2014), others find that higher patient satisfaction is associated with less emergency department use but with greater inpatient use, and higher overall health care and prescription drug expenditures (Fenton et al., 2012). However, Kennedy and Fenton's papers do not disaggregate by race and gender, and do

not look at health inequity. More recently, researchers using MEPS (Medical Expenditures Panel Survey) data found that patients who were younger, male, Black, on Medicaid, and patients with lower socioeconomic status were more likely to report poor satisfaction, and while physical health was not associated with patient satisfaction, patients with poor mental health and those who had at least two emergency department visits per year were significantly more likely to have poor overall satisfaction (Chen et al., 2019). This paper was able to show that some demographic groups do indeed report lower satisfaction on standardized surveys, corroborating earlier aforementioned research on racial disparities in doctor-patient communication, but does not link patient satisfaction with health equity measures; rather it looks at individual-level health. Research is therefore needed to understand whether better patient satisfaction on average is also associated with greater health equity. This paper quantifies associations between metro area-level hospital quality averages and health inequity, broadening the literature from person-level associations to population-level associations.

Patterns of community benefit spending by hospitals is an area of research that is relatively understudied in spite of its potentially large impact on population health and health equity. Community benefit spending is typically aimed at providing healthcare for medically underserved community members, whether through pro-bono care or through innovative programming that addresses social determinants of health. The Affordable Care Act gained the support of many hospitals because the expansion of Medicaid coverage would save hospitals considerable money that would otherwise go uncompensated care. Retrospective studies found uncompensated care costs decreased from 4.1 percentage points to 3.1 percentage points of total operating costs in states that did expand Medicaid, and that the cost of uncompensated care could have decreased by nearly 2% of total operating costs in non-expansion states, had they chosen to

expand Medicaid (Dranove et al., 2016). While one would expect that these savings from uncompensated care would be redirected toward more community health improvement programs, studies showed that in the years immediately after the ACA went into effect, community benefit spending increased only marginally (Young et al., 2018). Furthermore, not only did total community benefit spending barely increase, but direct community investments, a subsection of total community benefit spending, also barely changed in spite of the ACA's requirement of conducting a Community Health Needs Assessment (CHNA) to guide direct community health spending (Chaiyachati et al., 2018; Kanter et al., 2020). This shows that hospitals' direct community spending is not yet aligned with the social needs of the communities they serve, and hospitals investments in their communities are lagging in spite of their potential to improve population health and reduce healthcare costs. Little literature exists to elucidate the connection between the average amount spent by hospitals in any given region on providing direct community benefits and health equity in those hospitals' service areas. For one, the directionality of the relationship is also unknown; it is unclear whether communities where hospitals that have spent more on direct community benefits have higher health equity scores, or whether high direct community benefit spending is indicative of and in response to low health equity in surrounding communities. This paper uses multiple linear regressions to establish associations between metropolitan area-level per capita community benefit spending and average health outcomes and health equity.

In summary, while literature has shown race and gender-based disparities exist in doctor-patient communication, patient satisfaction scores, and treatment and prescription patterns, there is a lack of research that connects whether incentivizing patient communication improves health outcomes or health equity in particular. Furthermore, little research has been done to understand

the role of community benefit spending as a potential lever to foster community-level health equity. Given that Medicare's Hospital Value Based Purchasing program incentivizes patient satisfaction, clinical quality, and cost reduction, the policy could have spurred hospitals to improve their outreach to medically underserved populations and groups that have disproportionately poor health outcomes, although the extent of the policy's impact on health equity is largely unknown. Connecting these ideas, this paper will use multiple linear regressions to understand whether greater hospital patient communication scores and/or community benefit spending are associated with better average health outcomes and reduced disparities. It also utilizes a difference-in-differences model to evaluate the Hospital Value Based Purchasing program's impact on health outcomes, health equity, and benefit spending patterns, to inform whether value-based policies in health care are effective in guiding hospitals' financial decision-making and performance regarding health inequity.

Data and Model

The health of an individual is contingent on social, political, and economic drivers that exist from the interpersonal level to the national level. The persistence of health inequity is, in many cases, not only a result of interpersonal discrimination, but structural racism, sexism, and classism that perpetuate inequity. This thesis investigates whether using policy levers incentivizing better communication with patients, as implemented with Medicare's Hospital Value-Based Purchasing Program improves aggregate health outcomes, promotes health equity, and increases hospital-level community benefit spending. In theory, financial incentives to promote patient communication might not only improve health outcomes for the whole population, but may have a differential, more positive effect on health outcomes for marginalized

groups who have experienced disproportionately poor communication, thus improving health equity in addition to average population health outcomes. Furthermore, hospitals that seek to improve their scores for patient communication may attempt a wide range of initiatives to improve patient satisfaction, including increasing their community benefits spending in ways that their patient population would directly experience.

This study takes advantage of state-level variation in the application of HVBP policy to conduct a quasi-experimental policy analysis. The state of Maryland is the only state that was exempt from the HVBP program, providing an opportunity to compare various outcomes of interest between Maryland and other states in the pre-HVBP and post-HVBP periods. Maryland operates the nation's only all-payer hospital rate regulation system which has been in place since 1977. Under this system, all insurers in Maryland reimburse hospitals at the same rate, differing from other states in which commercial insurers typically reimburse hospitals at a much higher rate than Medicaid and Medicare. In July 2009, Maryland implemented a Quality-Based Reimbursement (QBR) program that uses very similar rate-setting measures to the federal Medicare HVBP program that was established a few years later in October 2012. Because of Maryland's long-standing Medicare waiver for its all-payer rate-setting system and the implementation of the QBR program, CMS has granted Maryland an exemption from participation in HVBP.

The crux of this paper relies on this state-level variation to conduct three key difference-in-differences models to understand whether the HVBP policy led to meaningful changes in health outcomes, health equity, and community benefit spending. For the purposes of this paper, the pre-treatment, or baseline period is 2010 – 2011 and the treatment period is 2013 – 2016. The year 2012 is eliminated from all analyses because HVBP was implemented in the latter half of

the year, contaminating results. Because Maryland implemented a similar statewide policy a couple of years prior to HVBP, it is hypothesized that during the baseline period individuals living in Maryland will have experienced better average health outcomes and less health inequity, and also that hospitals in Maryland will have spent more on community benefit spending per capita than those in other states. Therefore, over the course of the treatment period, the difference in key variables of interest between Maryland, used as the control group, and the states in the treatment group is estimated to shrink.

The states selected as treatment states for the purposes of these difference-in-differences regressions are Louisiana, Georgia, Virginia, Delaware, North Carolina and New Jersey. These states were chosen as a match for Maryland based on state-level demographic data. The treatment states were the closest matches to Maryland based on per capita income, per capita GDP, percent white, percent Hispanic, and percent Black. Percent female and average life expectancy were comparable for all of the states. Table 1.1 shows key summary statistics for individuals in the treatment and control groups during the first year of the pre-treatment period (2010).[3] It is important to note that Maryland had implemented a Medicaid eligibility expansion under the Affordable Care Act in January 2014, but this was not the case for all of the states chosen for the treatment group. Table 1.2 shows the timeline of Medicaid expansion for all of the states in the treatment and control groups.

Table 1.1 State-level descriptive statistics (2010)

	Control (n= 9,185)	Treatment (n= 47,035)
Average Population [a]	5785982	6924063.83
Average Per Capita GDP [a]	56531.23	54140.50
Average Annual Income [a]	50007	40932
Percent White [b]	61.12	68.96

[3] In this table, the number of individuals (n) shown for control and treatment refers to the number of individuals in the CDC BRFSS dataset which is used in regression analysis. The data from the Bureau of Economic Analysis is largely used for state-by-state comparisons to determine treatment and control groups.

Percent Black [b]	30.89	24.20
Percent Hispanic [b]	8.19	9.22
Median Age [b]	38	37.32
Percent Female [b]	51.6	51.19
Percent Non-HS Graduates [b]	6.89	10.2

Sources: [a] Bureau of Economic Analysis, Quarterly GDP and Personal Income by State (2010); [b] CDC Behavioral Risk Factor Surveillance Survey (2010)

Table 1.2 Status of Medicaid Expansion, Treatment vs. Control States

Cohort	State	Date Medicaid Expansion Implemented
Control	MD	Jan. 2014
Treatment	NJ	Jan. 2014
	DE	Jan. 2014
	LA	Jul. 2016
	VA	Jan. 2019
	GA	Not Yet Expanded
	NC	Not Yet Expanded

Source: Kaiser Family Foundation (KFF) Status of State Medicaid Expansion Decisions Interactive Map. https://www.kff.org/medicaid/issue-brief/status-of-state-medicaid-expansion-decisions-interactive-map/

Equation 1 shows the difference-in-differences regression that was conducted to understand whether there was a significantly different change in individuals' average healthy days in states exposed to HVBP when compared to individuals in Maryland, which was exempt from HVBP.[4] The *HVBP* term is an indicator variable for individuals living in the aforementioned treatment states. X_{ist} is a vector of individual characteristics including age, gender, race, educational attainment, income, and insurance coverage. The term λ_t captures year fixed effects and μ_s indicates state fixed effects.

(1) $$healthy\ days_i = B_o + B_1 HVBP + B_2 Post + B_3 Post * HVBP + X_{ist} + \lambda_t + \mu_s$$

[4] All data analysis for this paper was conducted using STATA SE, Version 16.1.

This paper adds to the existing literature on health disparities and health equity by comparing three measures of "health disadvantage". The term "health disadvantage" is used here as an umbrella term encompassing measures of both disparity and inequity.

1. Weighted Absolute Disparity (WAD): $\left(y_{i,j} - \overline{y_J}\right)^2$, in which larger deviations from the mean of the state's average number of healthy days (both positive and negative) for a given year are weighted more heavily. (Derived from Gakidou et al.'s (2000) Individual/Mean Differences formula).
2. Weighted Relative Disparity (WRD): $\left(\frac{y_{i,j} - \overline{y_J}}{\overline{y_J}}\right)^2$, in which an individual's weighted difference from the average number of healthy days for the state in which they live is relative to the state's average number of healthy days for that year. In other words, a larger absolute difference is more pertinent if the state's healthy days average was low to begin with. (Derived from Gakidou et al.'s (2000) Individual/Mean Differences formula).
3. Weighted Relative Inequity (WRI): $\left(\frac{\overline{y_J^*} - y_{i,j}}{\overline{y_J^*}}, 0\right)^2$, which is similar to measure 3, but the comparison is made to the average number of healthy days of the most socially privileged group in each state for that year. An a priori assumption is made that the most socially advantaged group in every state is non-Hispanic White men in the highest income category. (Derived from Zimmerman's (2019) Health Equity Metric). Furthermore, this is solely a measure of health poorer than that of the average of the most socially privileged group; all individuals with healthy days higher than the average of non-Hispanic White men in the top income category receive a "0" for this score.

Regression 2 parallels regressions 1, but instead of healthy days as the dependent variable, health disadvantage is the dependent variable.

(2) $health\ disadvantage_i = B_o + B_1 HVBP + B_2 Post + B_3 Post * HVBP + X_{ist} + \lambda_t + \mu_s$

Table 3.1 shows descriptive statistics for the longitudinal data with disparity and inequity measures calculated using state-level averages for each year. Notable differences are that the control state has a higher percentage of college graduates, individuals in the highest income group, and individuals who are employed. Maryland residents had significantly more healthy days per month and significantly less WAD and WRI in both the pre-treatment and post-treatment periods.

Table 3.1 Individual Descriptive Statistics, Before and After HVBP

	Pre-treatment (2010-2011)		Post-Treatment (2013 - 2016)			
	Treatment	Control	Treatment	Control	Theoretical Min	Theoretical Max
White (%)	72.66	71.85	67.74	69.62		
College Graduate (%)	34.93	41.63	37.36	44.74		
Income <$15,000 (%)	9.78	5.38	8.50	5.35		
Income > $49,999 (%)	37.60	48.48	39.86	48.97		
Has Health Insurance (%)	87.89	92.33	89.34	94.87		
Employed [a] (%)	42.48	49.98	43.03	42.42		
Healthy Days	23.09	23.99***	23.26	23.88***	0.00	30.00
	(10.84)	(10.10)	(10.62)	(10.05)		
Weighted Absolute Disparity	117.29	102.029***	112.61	100.9157***	0.00	900
	(177.29)	(180.06)	(176.20)	(176.60)		
Weighted Relative Disparity	0.22	0.18	0.21	0.18	0.00	1.00
	(0.33)	(0.31)	(0.33)	(0.31)		
Weighted Relative Inequity	0.17	0.143***	0.16	0.143***	0.00	1.00
	(0.36)	(0.33)	(0.35)	(0.33)		
N (# of individuals)	106,236	19,302	253,772	87,785		

Note: [a] Refers to the percent of individuals earning wages and self-employed individuals. Universe includes students, retirees, homemakers, those unable to work, and those out of work.

The final difference-in-differences equation examines whether community benefit spending changed significantly more in treatment states relative to Maryland. Community benefit encompasses programs or activities that provide health-related services in response to identified community needs. Community benefit programs have a special focus on the disadvantaged populations and must be available to the broad community. According to the IRS, to count as a community benefit, a program or activity must respond to a demonstrated health-related community need and seek to achieve at least one community benefit objective: increase access to health services, enhance public health, advance knowledgeable through education or research, or relieve or reduce a burden of government to improve health. This paper analyzes four subtypes of community benefit spending, namely community health improvement services, community building activities, unreimbursed Medicaid and bad debt. Community health improvement services are conducted with the explicit purpose of improving health and do not generate revenue for the hospital. Community building activities are those which take measures to improve health and safety and typically refers to efforts tackling "upstream" social determinants of health such as education, environment, housing, and food.[5] Unreimbursed Medicaid refers to the difference between the total cost that the hospital bears to provide care for Medicaid patient and the Medicaid payments received by the hospital. Bad debt is the total cost of services for which a hospital anticipated payment but did not receive it. Whereas unreimbursed Medicaid can be considered financial assistance/charity care, bad debt is money that the hospital involuntarily loses due to unrecovered costs. While bad debt is financially unfavorable for hospitals, it is possible that

[5] Examples of community building activities include physical improvements like housing rehabilitation, economic development through the creation of job training programs, educational investments such as mentoring programs, environmental efforts to reduce air or water pollution, and more. See http://www.communitybenefitinsight.org/?page=info.glossary#glossary_3 for more details.

greater bad debt may actually translate to better health or fewer health disparities on average because it would be indicative of individuals seeking medical care even when they cannot afford to pay for it. Still, whether hospitals taking on more bad debt translates to better patient outcomes is unknown, and the relationship may determine whether bad debt should be incentivized at the policy level or whether internal management efforts at the hospital level may be necessary to reduce bad debt.

To evaluate community benefit spending patterns, this paper uses hospital level data and keeps the same pre- and post- period timeframes as above to see whether states in the treatment group had significantly greater changes in community benefit spending. It was hypothesized that states that experienced HVBP would invest more in their communities through various forms of community benefit spending in order to increase their HCAHPS patient ratings and to have better clinical outcomes. Table 3.2 shows hospital community benefit spending trends of hospitals located in treatment and control states at 3-year intervals from 2010 to 2016. In 2010, hospitals in treatment states spent an average of $36.2 million on community benefits, and hospitals in Maryland (control) spent an average of $25.5 million. In both treatment and control states, total community benefit spending increased on average. Also interestingly, healthcare access increased markedly in treatment states; the percent of hospitals that were the sole community provider in a certain radius dropped from 8.011% to 0% in treatment states from 2010 to 2016. Table 3.3 in the Appendix contains the same summary statistics but only compares the pre-period and the post-period, rather than point-in-time figures for three years.

(3) $CB\ Spending_h = B_0 + B_1 HVBP + B_2 Post + B_3 Post * HVBP + X_{ist} + \lambda_t + \mu_s$

Regression 3 parallels the prior two regressions, but instead of analyzing person-level data, it uses hospital-level data. X_{ist} is a vector of hospital characteristics including whether or not the hospital is a sole community provider, in an urban setting, a teaching hospital, in a state that expanded Medicaid, or in a state that requires community benefit spending. The regression also includes time (λ_t) and state (μ_s) fixed effects.

Table 3.2 Hospital Benefit Spending Characteristics (Thousands of $), 2010 – 2016

	2010		2013		2016	
	Treatment	Control	Treatment	Control	Treatment	Control
Total Community Benefits	36204.794	25547.955	44024.205	33659.556	57540.630	32443.737*
	(79914.44)	(79914.44)	(79914.44)	(79914.44)	(79914.44)	(79914.44)
Unreimbursed Medicaid	8304.158	222.470***	8157.438	621.082***	16613.751	746.104***
	(12599.86)	(776.19)	(19495.43)	(2791.01)	(27824.56)	(1549.93)
Community Health Improvement	1322.310	2720.598***	2374.530	3113.184	2020.695	3996.174***
	(2569.56)	(4406.43)	(6576.24)	(4663.45)	(4386.60)	(6997.87)
Community Building Activities	146.559	735.526***	220.938	379.345*	271.102	582.331*
	(478.34)	(1544.75)	(530.21)	(558.53)	(1078.58)	(846.99)
Bad Debt	10898.85	11657.83*	25463.42	15190.21**	33779.75	11169.44***
	(13188.64)	(11860.89)	(32873.85)	(16667.74)	(47408.52)	(10034.33)
Sole Community Provider (%)	8.01186944	0	7.58017493	0	0	0
Urban Hospital (%)	74.7774481	93.4782609	74.9271137	93.75	76.2048193	93.75
Teaching Hospital (%)	34.7181009	39.1304348	35.8600583	37.5	36.1445783	37.5
ACA Expansion State (%)	33.2344214	100	33.5276968	100	33.7349398	100
State Requires Community Benefits (%)	85.1632047	100	84.2565598	100	83.7349398	100
N	337	46	343	48	332	48

Results

Prior to running difference-in-difference regressions to evaluate the effect of HVBP, a few preliminary regressions using Micropolitan/Metropolitan Statistical Area[6] (MMSA)-level data were conducted to characterize relationships between hospital performance for patient experience, hospital community benefits, and health outcomes and inequities. All of these regressions were multiple linear regressions conducted using 2016 numbers from HCAHPS, BRFSS (specifically the MMSA-level SMART dataset), and community benefit datasets. These regressions provided insight into the directionality of associations between these variables; it enabled an understanding of whether better patient communication scores (measured using the aforementioned HCAHPS survey) and more community benefit spending were indeed positively associated with health outcomes (Healthy Days) and negatively associated with health disparities (using the 3 aforementioned measures). Greater detail on these multiple linear regressions can be found in the Appendix. To summarize, individuals living in MMSA's where hospitals scored better on HCAHPS had clinically negligible differences in healthy days compared to those that scored worse. Additionally, there were mixed results as to whether greater MMSA HCAHPS averages were correlated with less disparities as measured by WAD and WRD, and there was no significant association between MMSA-level HCAHPS scores and WRI, suggesting that more targeted efforts may be needed to reduce inequity, which is more rooted in social justice frameworks than disparity is. Interestingly, greater community benefit spending was significantly associated with more healthy days and less health disadvantage across all three measures suggest

[6] The acronym "MMSA" refers to metropolitan statistical areas, micropolitan statistical areas, and metropolitan divisions. These geographic subdivisions are designated by the U. S. Office of Management and Budget and used by the U. S. Census Bureau as of June 2003. The general concept of a metropolitan or micropolitan statistical area is that of a core area containing a substantial population nucleus, together with adjacent communities and all having a high degree of economic and social integration. For addition information, see https://www.cdc.gov/brfss/smart/smart_faq.htm

that community benefit spending may potentially be a channel through which hospitals can address health disparities and inequities.

These regressions illuminated the associations between various hospital patterns and outcomes of interest but did not prove causality. The following sections discuss the results of the difference-in-differences regressions which evaluate HVBP for its impact on healthy days, health disadvantages, and community benefit spending.

I. Effect on Healthy Days

Table 6.1 shows the results of the difference-in-differences regression with healthy days as the outcome variable. Regression (1), without any demographic controls or state-level fixed effects, shows a significant increase in healthy days by 0.115 days per month ($p<0.01$) as a result of the policy. Adding demographic and socioeconomic controls in regression 2 shows an even more pronounced intervention effect of 0.173 more healthy days per month ($p<0.01$) on average. Adding state and year fixed effects in regression 3 slightly reduces the treatment effect, but it is still significant (0.140; $p<0.01$). Further stratifying the regression by low-income and higher-income groups shows that the improvement in healthy days as a result of the policy was more than twice as large for individuals in the lowest income groups (those earning less than $25,000 per year) as it was for individuals in the highest income group (those earning more than $50,000 per year) (Regressions 4 and 5, respectively). For low-income patients, those in treatment states had 0.297 more healthy days on average than those in control states ($p<0.01$). In contrast, patients in the highest income group saw an intervention effect Limiting the regression to only White respondents and only non-White respondents showed that the treatment effect was significant and positive, but only for White individuals. In fact, there was no significant change in healthy days for non-White respondents at all. Limiting the regression even more to only

Black individuals showed a decrease in Healthy Days by 0.195 Healthy Days per month ($p<0.1$). Thus, while the HVBP may have been effective at reducing income-related disparities, it did not seem to improve race-related disparities independent of income and may even have increased race-based disparities given that the increase was driven largely by White individuals.

II. Effect on Health Disadvantages

Next, the paper evaluated whether HVBP led to significant decreases in health disadvantages using three different measures. In each case, adding demographic controls increased the treatment effect but adding state and year fixed effects reduced the treatment effect (Table 6.2). Across the board, the policy seemed to significantly decrease this disadvantage, whether it was measures as weighted absolute disparity, weighted relative disparity, or weighted relative inequity. In 2010, individual weighted absolute disparity ranged from 0 to 638.21, and the treatment reduced weighted absolute disparity by an average of 3.58 points ($p<0.01$) after adding controls and fixed effects. Similarly, weighted relative disparity (range 0,1) decreased by 0.007 points ($p<0.01$) and weighted relative inequity (range 0,1) decreased by 0.006 ($p<0.01$) as a result of the treatment, after adding controls and state fixed effects.

III. Effect on Community Benefit Spending

Previous MLR regressions established significant positive correlations with all forms of per capita community benefit spending and Healthy Days within an MMSA, as well as significant negative correlations between per capita benefit spending and health disparities and inequities (Appendix). Given the evidence that community benefit spending improves health outcomes and reduces disparities, it followed that HVBP, which would reward hospitals for improving

patient outcomes, should theoretically also spur hospitals to spend more in community benefits. Table 6.3 shows the impact of HVBP on hospital community benefit spending patterns using a difference-in-differences model. However, the model showed no significant changes in total community benefit spending, unreimbursed Medicaid spending, or community health improvement services and community benefit operations spending. Interestingly, only community building activities and bad debt spending changed (both increased) significantly as a result of HVBP. Community building activities spending was $202,256 higher on average for hospitals located in treatment states in the post-period after adding hospital and state-level controls ($p<0.05$). This increased to $207,776 after adding both state and year fixed effects ($p<0.05$). Average hospital bad debt was also significantly higher in treatment states than control states in the post-intervention period. Hospitals in treatment states had an average of $14.1 million more in bad debt ($p<0.01$) than those in control states after adding state and year fixed effects. However, looking at the bad debt-to-revenue ratio shows no significant difference between treatment and control states after program implementation. Thus, while hospitals in treatment states had significantly greater average bad debt than those in control states in the post-period, they also had proportionally greater revenue.

Discussion

This paper utilized difference-in-differences models to understand whether Medicare's Hospital Value Based Purchasing Program was effective in terms improving health outcomes, reducing health inequities, or shifting hospital spending to prioritize community. The HVBP program, which imposed payment incentives by withholding a certain percentage of Medicare reimbursement to hospitals failing to improve in areas including clinical quality and patient

experience, was particularly of interest because these incentives were specifically designed improve health outcomes. However, whether these incentives also led to decreases in health disparities and health inequity, and whether they encouraged hospitals to reallocate money towards community health efforts to address "upstream" social determinants of health is largely unknown. Using Maryland as the control state due to its exclusion from the HVBP program, the model ascertained whether there was any significant divergence in these three areas between treatment and control states in the post-intervention period (2012 – 2016), compared to the pre-intervention period (2010 – 2011).

The findings suggest that the program successfully increased average healthy days, showing that financial incentives that align with value-based purchasing are indeed successful at improving health at a high level. The Healthy Days measure is not as specific as a clinical marker of health status, but it is also more specific than a long-term measure such as life expectancy. The fact that it is derived from surveys through which individuals quantify their own health status enables individuals to have agency over their representation in healthcare datasets. It also allows for a more holistic view of health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity," as defined by the World Health Organization. The fact that HVBP not only led to aggregate improvements in Healthy Days, but also had more beneficial effects for individuals in the lowest income groups is encouraging for policymakers who are hoping to eliminate income-based disparities in health. Still, the lack of significant improvements in Healthy Days for non-White individuals while White individuals experienced significant improvements suggests that HVBP was not effective at mitigating race-based disparities. In fact, further disaggregating "Non-White" showed that Black individuals actually experienced a decrease in Healthy Days. Thus, while HVBP may have

successfully improved aggregate Healthy Days and closed income-based inequities, it has been ineffective at closing racial inequities, particularly the health gap between white and Black individuals. This study supports previous findings by Zimmerman et al. (2019) showing a clear lack of progress on health equity in the United States in the past two decades. Consequently, there is an urgent need for value-based purchasing policies that explicitly incentivize hospitals, payers, and health systems to decrease health inequities broadly, and specifically inequitable outcomes driven by racial inequities.

The Economics literature remains relatively sparse in terms of offering standardized quantitative measures of inequity that are rooted in Sociology and social justice-related disciplines. Thus, this paper attempted to compare various statistical measures to see whether the measure being used paints a different picture of how HVBP affected health disparities or health inequities. Weighted Absolute Disparity and Weighted Relative Disparity are more "objective" measures; in essence, they compare an individual's health status to that of the average for the individual's state of residence for any given year. Using these measures, both absolute and relative disparity showed significant decreases as a result of HVBP implementation, further supporting previous results looking at changes in Healthy Days. Weighted Relative Inequity, which calculates the difference between an individual's Healthy Days and the average of the most socially privileged group (White men in the highest income group) in any state and year, also saw a decrease after the policy was implemented. While these statistically significant results are encouraging, they lack economic significance in that the regression coefficients on *Post*Treat* rounded to approximately 0.01 for both relative measures and only 3.58 for the absolute measure (ranged from 0 to 638.21). This suggests that more targeted efforts to

proactively and intentionally reduce health inequities are necessary to see economically meaningful reductions in health disparities at the state-level.

To supplement this analysis, this paper sought to understand whether MMSA average HCAHPS scores are correlated with Healthy Days, health disparities, and healthy inequity for individuals living within those MMSA's. In theory, if HCAHPS scores as they are currently used are indeed correlated with these outcome variables, they may be a potential channel through which Medicare could incentivize better HCAHPS performance, and thus improve health outcomes and close health gaps. Unfortunately, the results were mixed; while some HCAHPS measures showed positive correlations with Healthy Days, some showed negative correlations. Furthermore, while HCAHPS scores were significantly negatively correlated with some measures of health disparity (specifically Weighted, Absolute Disparity), other measures showed no significant associations or some significant associations, but with varying directionality. This is not to say that HCAHPS is a poor measure for Medicare to use to incentivize hospitals to reduce health disparities. Rather, aggregating HCAHPS at the MMSA-level is likely too large of an area to be able to draw any meaningful conclusions. Further research should be done to see if hospitals' HCAHPS scores are correlated with improved Healthy Days, health disparities, and health inequities among the hospitals' patient populations specifically, rather than the MMSA at-large.

Along similar lines, a couple of MLR models were run to see if MMSA-level community benefit spending patterns were associated with Healthy Days, health disparities, or health inequity. By looking at whether MMSA's average benefit spending was correlated health outcomes or disparities, this analysis sought to elucidate whether policies incentivizing community benefit spending could be beneficial to improving health outcomes and closing

health gaps. Greater per capita benefit spending, both total and all sub-categories) were significantly correlated with more Healthy Days and less disparity and inequity. This suggests that policies incentivizing more community benefit spending may indeed be critical to improving not only aggregate health outcomes, but to eliminating health gaps. Community building activities were associated with the greatest "return" per dollar invested, with dramatic improvements in Healthy Days and reductions in all three measures of health disadvantage. This suggests that community benefit spending may indeed be a channel through which hospitals can contribute to population health efforts seeking to improve aggregate health and reduce health disparities. Given this, it is certainly encouraging that there was a significant increase in community benefit spending dollars after HVBP was implemented, but an even greater investment in community building activities may be even more beneficial. Specifically, investing more in community building activities may be prudent for hospitals, especially as the shift toward value-based care becomes more of a priority and hospitals experience a greater financial incentive to improve population health.

Limitations

While this paper shows promising results, it also has significant limitations that must be acknowledged in order to view these results in as objective a light as possible. As most natural experiments in the healthcare space go, there are numerous confounding factors and co-occurring policy changes that may have skewed results. First, Maryland is not a perfect control because it is the only state with an all-payer hospital rate regulation system, which has been in place for nearly 40 years. Under this system, both public and private insurers reimburse at the same rates, and thus have the same degree of incentives to reduce unnecessary healthcare spending.

Furthermore, this paper assumes parallel trends in the years before the documented pre-period years (2010-2011) which may not necessarily be true. The implementation of Maryland's own Quality-Based Reimbursement (QBR) program in 2009 may have led to the state's divergence from the rest of the nation in the years that followed immediately, thus potentially violating this trend. Figures 2a to 2d do indeed show slight divergences in trends for Healthy Days and the three measures of health disparities starting in 2010. Thus, the difference-in-differences estimate is imperfect and difficult to interpret on its own, but does still offer a glimpse of the extent to which the outcomes of interest converge in the post-intervention years. Additionally, the Affordable Care Act went into effect in 2010, and introduced a number of sweeping reforms across the country. This included prohibiting denial of coverage of individuals based on pre-existing conditions, allowing some states to expand Medicaid eligibility, and mandating non-profit hospitals to conduct Community Health Needs Assessments (CHNA's) and use the information gathered to formulate a 3-year plan to address the identified community needs. For the purposes of this study, it is assumed that the ACA affected both control and treatment states in similar ways and to similar extents. Still, it is possible that the ACA actually had differential effects on treatment and control states, so it would be prudent to interpret the treatment effect estimates as the result of multiple policy changes, including the ACA and HVBP, and not entirely the HVBP alone.

Future research in this area should use hospital data for more geographic precision to evaluate the impact of community benefit spending on nearby areas. As healthcare providers and communities prioritize health equity, a deeper understanding of community benefit spending and its ability to serve as a tool to achieve equity will be necessary. Additional studies on public-private partnerships between health systems and local departments of public health and the ways

in which both sectors can capitalize on their strengths to bolster community health are needed to set best practices and evidence-based incentives. It will also be interesting to see the types of clinical and equity impacts resulting from state community benefit spending and reporting requirements.

Conclusion

Overall, better patient communication and more community benefit spending are shown to be positively correlated with Healthy Days and negatively correlated with multiple measures of health disparities. This suggests that lawmakers should consider incentivizing patient communication and community benefit spending in order to improve population health, especially amongst medically underserved communities and communities that have disproportionately poor health outcomes. The paper also showed that value-based policies such as the Hospital Value Based Purchasing Program led to greater benefit spending, more Healthy Days, and smaller health gaps. Interestingly, the policy was successful in reducing income-based health gaps far more than race-based health gaps, calling for more targeted policy solutions to specifically mitigate racial health disparities in addition to broader programming to reduce inequities generally. Additionally, while the three measures of health disparities did show similar trends, the inequity measure that was based more in a social justice framework (WRI) generally had weaker associations with patient communication scores and community benefit spending. Thus, while shrinking disparities generally may be more attainable through improving patient communication and increasing community benefit, adding nuance to the conversation by addressing inequity, which requires grappling with racial, political, sociological, and economic structures, will be a much larger challenge for healthcare policymakers.

Still, this paper shows promising results; not only did HVBP lead to improvements in health and health disparities, but it shows that hospitals can and should be invested in addressing community health. Whether that involves racial bias in healthcare communication training for providers or partnering with local non-profits to provide food and housing assistance for patients, hospitals play a key part in solving the crisis of health inequity in the United States.

Tables and Figures

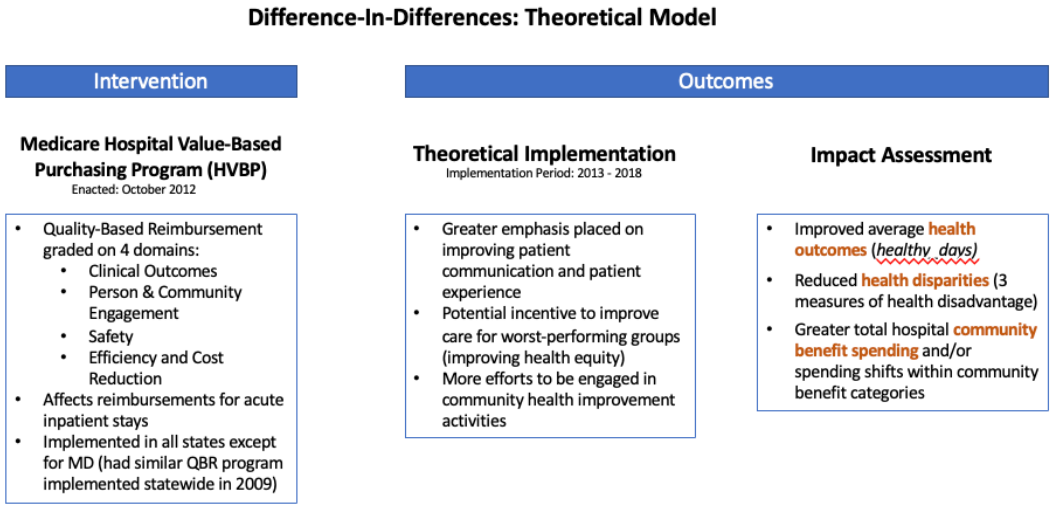

Figure 1. Policy and Theoretical Model

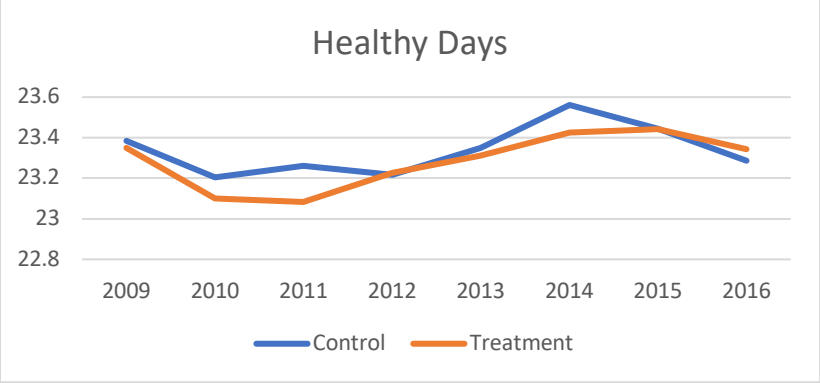

Figure 2a.

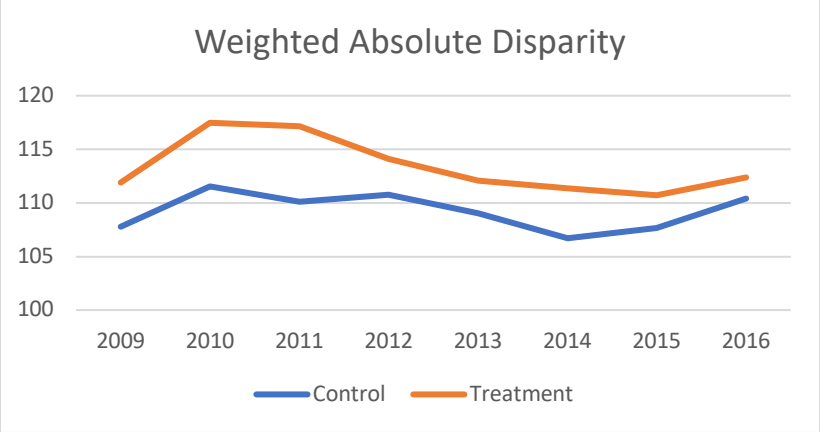

Figure 2b.

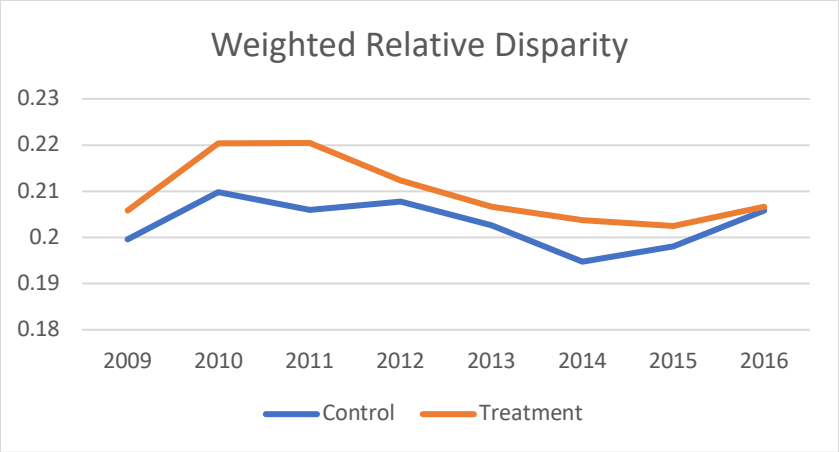

Figure 2c.

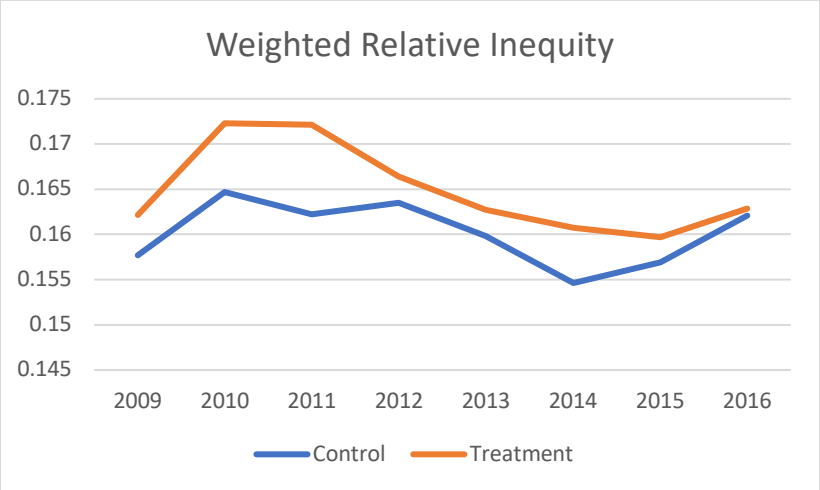

Figure 2d.

Table 3.3 Hospital Community Benefit Spending (Pre vs. Post-Treatment)

	Pre-Treatment (2010-2011)		Post-Treatment (2013 - 2016)	
	Treatment	Control	Treatment	Control
Benefit Spending (millions $)				
Total Community Benefits	37.50	27.40	55.80	33.90***
	(81.10)	(32.70)	(90.60)	(42.50)
Unreimbursed Medicaid	8.15	0.18***	14.30	.52***
	(11.70)	(19.50)	(26.70)	(2.05)
Comm. Health Improv.	1.46	2.93***	2.06	3.67***
	(2.87)	(4.67)	(5.84)	(5.84)
Community Building Activities	0.17	.65***	0.21	0.53***
	(0.49)	(1.30)	(0.67)	(0.79)
Bad Debt	14.70	12.20	31.80	11.90***
	(20.40)	(11.20)	(45.10)	(11.10)
Other Hospital Characteristics				
State ACA Expansion 138% FPL (%)	33%	100%	35%	100%
State Requires CB Reporting (%)	85%	100%	84%	100%
Urban (%)	75%	93%	77%	93%
Sole Community Provider (%)	6%	0%	3%	0%
Teaching Hospital (%)	35%	39%	37%	36%
N	674	92	1,823	255

Source: Community Benefit Insight Hospital Data API.
http://www.communitybenefitinsight.org/?page=info.data_api

Note: Columns with state and year fixed effects (the complete model) are highlighted in grey for ease.

Table 6.1 DND Effect of HVBP on Healthy Days

	All			<$25,000	>$50,000	White	Non-White	Black
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
post	0.17***	-0.14***		-0.02	-0.07***	-0.01	0.05	0.38***
	(0.01)	(0.01)		(0.03)	(0.02)	(0.02)	(0.03)	(0.05)
treat	-0.142***	-0.25***		-0.41***	-0.27***	-0.22***	0.32***	0.59***
	(0.03)	(0.0331)		(0.08)	(0.04)	(0.03)	(0.06)	(0.09)
Post x Treat	0.12***	0.17***	0.14***	0.29***	0.14***	0.14***	0.06	-0.19*
	(0.04)	(0.04)	(0.04)	(0.10)	(0.05)	(0.05)	(0.08)	(0.12)
All Controls	N	Y	Y	Y	Y	Y	Y	Y
State FE	N	N	Y	Y	Y	Y	Y	Y
Year FE	N	N	Y	Y	Y	Y	Y	Y
Constant	23.23***	18.99***	18.99***	22.31***	25.58***	24.91***	25.13***	25.22***
	(0.0114)	(0.0362)	(0.0380)	(0.0679)	(0.0498)	(0.0384)	(0.0606)	(0.110)
Observations	2,841,738	2,841,368	2,841,368	701,020	1,071,434	2,180,390	660,978	224,942
R-squared	0.000	0.070	0.068	0.043	0.007	0.009	0.022	0.013

Table 6.2 DND Effect of HVBP on Health Disparities

	WAD (1)	WAD (2)	WAD (3)	WRD (1)	WRD (2)	WRD (3)	WRI (1)	WRI (2)	WRI (3)
post	-2.27***	2.13***		-0.01***	0.00**		-0.004***	0.004***	
	(0.232)	(0.226)		(0.000428)	(0.000418)		(0.00)	(0.00)	
treat	6.50***	8.30***		0.01***	0.02***		0.01***	0.01***	
	(0.56)	(0.552)		(0.00105)	(0.00102)		(0.00)	(0.00)	
post_treat	-3.37***	-4.11***	-3.57***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0.71)	(0.69)	(0.70)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	110.8***	160.7***	161.2***	0.208***	0.302***	0.301***	0.163***	0.277***	0.278***
	(0.18)	(0.60)	(0.63)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
All Controls	N	Y	Y	N	Y	Y	N	Y	Y
State FE	N	N	Y	N	N	Y	N	N	Y
Year FE	N	N	Y	N	N	Y	N	N	Y

Table 6.3 DND Effect of HVBP on Hospital Community Benefit Spending (millions of $)

	Total Community Benefit Spending	Unreimbursed Medicaid	Comm. Health Improvement	Comm. Building Activities	Bad Debt	Bad Debt/Total Revenue
(Post x Treat), Fixed Effect Model	4.880	3.607	-0.147	0.207**	14.051***	0.050
	(10.05)	(2.394)	(0.561)	(0.091)	(4.136)	(0.063)
Observations	2,299	2,299	2,299	2,299	2,299	2,299
R-squared	0.090	0.055	0.037	0.014	0.088	0.008

Appendix

Additional Characterization Regressions

Data and Model

The first multiple linear regressions were conducted to illuminate associations between health outcomes, health equity, and the quality of patient communication and community benefit spending at various hospitals. Where noted, measures of hospital quality and hospital benefit spending were aggregated to the Metropolitan/Micropolitan Statistical Area (MMSA) level, as this is the most detailed geographic granularity offered by the CDC BRFSS SMART data used for health outcomes and health equity measures. All of these multiple linear regressions are all limited to the January – December 2016 timeframe.

The first key outcome of interest from HVBP is to assess the extent to which the policy improved average health outcomes. This paper measures health outcomes using Healthy Days, a CDC-approved composite measure of the number of days per month that an individual reported feeling physically and mentally health[7]. Regression 1 is a preliminary characterization of various factors that potentially affect individual's healthy days. In addition to analyzing demographic factors (race, sex), education level and socioeconomic factors (income, insurance status, employment status), the regression also attempts to understand whether hospitals' patient communication scores are positively associated with healthy days. To do this, patient communication scores from HCAHPS data are averaged at the MMSA-level. The four domains of patient communication are: doctor-patient communication, nurse-patient communication, communication at discharge, and overall patient satisfaction. Table 2.1 shows the average scores

[7] For details on calculations of the Healthy Days measure, see the CDC's guidelines here: https://www.cdc.gov/hrqol/methods.htm

for these various components of the Person and Community Engagement dimension of the HVBP reimbursement methodology, which is calculated using HCAHPS scores. The table displays data for the 3,278 that are located in the 136 MMSAs included in the BRFSS dataset with MMSA-level geographic specificity (the Selected Metropolitan/Micropolitan Area Risk Trends, or SMART dataset).

Table 2.1 HCAHPS Quality Scores
(FY 2018: Performance Period Jan. - Dec. 2016)

Doctor-Patient Communication	79.53988
	(4.17)
Nurse-Patient Communication	78.90652
	(4.32)
Discharge Communication	86.72552
	(3.28)
Overall Hospital Rating	70.73441
	(7.41)
N (# of Hospitals)	*3,278*

Source: Person and Community Engagement dimension scores (HCAHPS) from the Centers for Medicare and Medicaid Services. https://data.cms.gov/provider-data/dataset/avtz-f2ge

It is expected that individuals living in MMSA's with better average scores in each of these domains will experience better health, so the coefficient of this term is expected to be positive. However, it is unclear which of the four domains being tested will be most strongly predictive of individual health. Because MMSA's often cross state boundaries, no state-level fixed effects are included. X_i is a vector of individual characteristics including race, sex, educational attainment, income group and insurance status, and δ_m is a vector of MMSA-level characteristics including per capita income and population.

(1) $healthy\ days_i = B_o + B_1 MMSA\ HCAHPS\ score + X_i + \delta_m + \mathcal{E}$

Regression 2 is almost identical to Regression 1, except that the dependent variable is measure of health inequity. More correctly, the term "inequity" has a component of social justice, so the equation below shows a justice-neutral term, "disadvantage".

(2) $health\ disadvantage_i = B_o + B_1 MMSA\ HCAHPS\ score + X_i + \delta_m + \mathcal{E}$

In this second regression, it is hypothesized that individuals living in MMSA's with higher HCAHPS scores for communication and satisfaction will have better health outcomes and less health inequity on average. Although it is expected that respondents living in MMSA's where the median income is greater are likely healthier, it is unclear whether disparities will also be lower. When using an equity measure, however, respondents living in MMSA's where the median income is lower may experience greater inequity.

Table 2.2 Descriptive Statistics of BRFSS SMART Respondents (2016)

White (%)	74.6
College Graduate (%)	40.52
Income <$15,000 (%)	7.1
Income > $49,999 (%)	43.33
Has Health Insurance (%)	92.62
Healthy Days	23.50187
	(10.327)
Weighted Absolute Disparity	106.1125
	(174.209)
Weighted Relative Disparity	0.194
	(.317)
Weighted Relative Inequity	0.153
	(.336)
MMSA Population	2476947
	(2919973)
MMSA Per Capita Income	51600.74
	(9452.081)
N *(individuals)*	232,603
N (*MMSAs*)	136

This paper also analyzes hospital-level community benefit spending regressions were conducted to understand associations between per-capita benefit spending, health outcomes, and health equity.

Table 2.3 MMSA Average Per Capita Community Benefit Spending in 2016 (Thousands of $)

Per Capita Total Community Benefits	0.139
	(0.312)
Per Capita Unreimbursed Medicaid	0.061
	(0.181)
Per Capita Community Health Improvement	0.004
	(0.011)
Per Capita Community Building Activities	0.001
	(0.002)
Per Capita Bad Debt	0.06
	(0.126)
MMSA Population	2476947.3
	(2919973)
N (individuals)	177,829
N (MMSAs)	136

Mirroring regression 1, regression 3 elucidates associations between per capita hospital community benefit spending and healthy days. In other words, this regression seeks to unveil whether individuals living in MMSA's where hospitals have invested more per capita in community benefit spending have greater healthy days on average. For this regression, the timeframe is once again limited to the year 2016. X_i is a vector of individual characteristics including race, sex, educational attainment, income group and insurance status, and δ_m is a vector of MMSA-level characteristics including per capita income and population.

(3) $healthy\ days_i = B_o + B_1 MMSA\ Per\ Cap\ CB\ Spending + X_i + \delta_m + \mathcal{E}$

(4) $health\ disadvantage_i = B_o + B_1 MMSA\ Per\ Cap\ CB\ Spending + X_i + \delta_m + \mathcal{E}$

Similar to regression 2, regression 4 examine the effect of average MMSA per-capita community benefit spending on health disadvantage, rather than healthy days.

Results

Individuals living in MMSA's where hospitals performed better for nurse-patient communication and communication at discharge in 2016 have statistically significantly fewer healthy days per month, but the clinical significance is arguably negligible (Table 4.1). For example, a one-point increase in nurse-patient communication and communication upon discharge from the hospital correspond to a decrease of 0.02 healthy days per month ($p<0.05$; $p<0.1$, respectively). While causality cannot be determined, this may possibly be indicative of more challenging patient bases in certain areas that could have contributed to lower Healthy Days scores. Interestingly, MMSA's with better patient communication and overall hospital ratings were mostly negatively correlated with both the absolute and relative measures of disparity, suggesting that promoting patient communication may indeed be a channel through with health disparities could be reduced (Table 4.2, Table 4.3). After adding controls, a one-point increase in average communication with doctors was correlated with a 0.34 unit decrease in weighted absolute disparity ($p<0.05$). Additionally, a one-point score increase in average communication at discharge was correlated with a 0.38 unit decrease in weighted absolute disparity ($p<0.1$). While HCAHPS scores were statistically significantly correlated with weighted relative disparity, the directionality was inconsistent, and the regression coefficients rounded to 0. Better nurse communication was once again associated with greater weighted relative disparity ($p<0.01$), while better doctor communication, discharge communication, and overall score, were associated with lower weighted relative disparity ($p<0.05$, $p<0.1$, $p<0.01$

respectively). The one measure of inequity (weighted relative inequity) used in this study showed no significant associations with any of the HCAHPS scores. This lack of significant associations between MMSA-level HCAHPS scores and health inequity suggest that more targeted efforts may be needed to reduce inequity, which is more rooted in social justice frameworks than disparity is (Table 4.4).

Additionally, multiple linear regressions using 2016 data showed that individuals living in MMSA's with greater average per capita community benefit spending did indeed experience more Healthy Days and smaller health gaps by all measures, suggesting that incentivizing community benefit spending may be a policy level that can be used to both improve aggregate health outcomes and reduce health disparities (Table 5.1). Total community benefit spending encompasses a variety of expenditures, from unreimbursed Medicaid to community health improvement activity. After adding controls, a $1,000 increase in per capita total community benefit spending was associated with an average increase in 0.6 Healthy Days ($p<0.01$), an 11.7 point decrease in weighted absolute disparity ($p<0.01$), a 0.03 unit decrease in weighted relative disparity ($p<0.01$), and 0.02 unit decrease weighted relative inequity ($p<0.01$). Unreimbursed Medicaid, which is the amount that hospitals spend covering the cost of care that is not fully paid by Medicaid reimbursements, also saw similar but more pronounced trends. With controls, a $1,000 increase in per capita unreimbursed Medicaid spending in a particular MMSA was associated with an addition of 1.1 Healthy Days, an 18.6 unit decrease in weighted absolute disparity, a 0.05 unit decrease in weighted relative disparity, and a 0.04 unit decrease in weighted relative inequity (all $p<0.01$) (Table 5.2). Community building activities, a subcategory of total community benefit spending that refers specifically to activities that help address "upstream" factors and social determinants that impact health such as education, air quality, and access to

nutritious food had the greatest return on Healthy Days, and health disparity and inequity reduction. Every $100 increase in per capita community building activities spending was associated with a 4.3 day increase in Healthy Days, a 62.6 unit decrease in weighted absolute disparity, a 0.16 unit decrease in weighted relative disparity, and a 0.13 unit decrease in health inequity ($p<0.01$ for all four outcomes) (Table 5.3). Community Health Improvement spending followed similar trends. A $1000 increase in per capita CHI spending was associated with 16.19 more healthy days, a 264 unit decrease in WAD, 0.71 unit decrease in WRD, ad 0.51 unit decrease in WRI (all $p<0.01$) (Table 5.4). Finally, Bad Debt, which consists of services for which a tax-exempt hospital anticipated payment from either an individual or an insurer but did not receive, also saw similar trends. Every $1,000 increase in per capita bad debt was associated with a 0.9 day increase in Healthy Days, a 23.6 unit decrease in weighted absolute disparity, a 0.07 unit decrease in weighted relative disparity, and a 0.04 unit decrease in weighted relative inequity ($p<0.01$ for all) (Table 5.5). The significant positive associations healthy days and the significant negative associations with all measures of health disparity suggest that community benefit spending may potentially be a channel through which hospitals can address health disparities. Consequently, later difference-in-differences models sought to understand whether HVBP actually spurred hospitals to increase their community benefit spending or to change their benefit spending patterns in order to improve health outcomes and close health gaps.

Regression Tables

Table 4.1 MMSA-Average HCAHPS Achievement Scores and Healthy Days

Avg. Nurse Communication Score	-0.06***	-0.024**						
	(0.01)	(0.00)						
Avg. Doctor Communication Score			-0.00	0.01				
			(0.01)	(0.01)				
Avg. Discharge Comm.					-0.03***	-0.02*		
					(0.01)	(0.01)		
Avg. Overall Score							-0.01**	-0.00
							(0.01)	(0.01)
Constant	27.98***	19.55***	23.80***	17.11***	26.35***	19.57***	24.22***	17.67***
	(0.704)	(0.799)	(0.718)	(0.769)	(0.910)	(1.084)	(0.361)	(0.444)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	232,603	230,205	232,603	230,205	232,603	230,205	232,603	230,205
R-squared	0.000	0.065	0.000	0.065	0.000	0.065	0.000	0.065

Note: *** p<0.01, ** p<0.05, * p<0.1. Controls: race, sex, age group, income group, health insurance status, MMSA per capita income, MMSA population

Table 4.2 MMSA-Average HCAHPS Achievement Scores and Weighted Absolute Disparity (WAD)

Avg. Nurse Communication Score	0.94***	0.25						
	(0.15)	(0.17)						
Avg. Doctor Communication Score			-0.14	-0.34**				
			(0.15)	(0.16)				
Avg. Discharge Comm. Score					0.10	-0.38*		
					(0.18)	(0.21)		
Avg. Overall Score							0.20**	-0.07
							(0.09)	(0.09)
Constant	32.67***	169.4***	117.3***	216.4***	97.09***	222.9***	92.18***	195.3***
	(11.88)	(13.53)	(12.11)	(13.02)	(15.36)	(18.37)	(6.096)	(7.520)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	232,603	230,205	232,603	230,205	232,603	230,205	232,603	230,205
R-squared	0.000	0.057	0.000	0.057	0.000	0.057	0.000	0.057

Note: *** p<0.01, ** p<0.05, * p<0.1. Controls: race, sex, age group, income group, health insurance status, MMSA per capita income, MMSA population

Table 4.2 MMSA-Average HCAHPS Achievement Scores and Weighted Relative Disparity (WRD)

Avg. Nurse Communication Score	0.00265***	0.00103***						
	(0.000276)	(0.000300)						
Avg. Doctor Communication Score			4.86e-05	-0.000575**				
			(0.000279)	(0.000290)				
Avg. Discharge Comm. Score					0.000688**	-0.000666*		
					(0.000322)	(0.000378)		
Avg. Overall Score							0.000532***	-0.000429***
							(0.000157)	(0.000164)
Constant	-0.0142	0.300***	0.190***	0.428***	0.134***	0.441***	0.156***	0.415***
	(0.0217)	(0.0246)	(0.0221)	(0.0237)	(0.0280)	(0.0334)	(0.0111)	(0.0137)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	232,603	230,205	232,603	230,205	232,603	230,205	232,603	230,205
R-squared	0.000	0.061	0.000	0.061	0.000	0.061	0.000	0.061

Table 4.3 MMSA-Average HCAHPS Achievement Scores and Weighted Relative Inequity (WRI)

Avg. Nurse Communication Score	0.00201***				0.000590*			
	(0.000292)				(0.000318)			
Avg. Doctor Communication Score		0.000147				-0.000324		
		(0.000296)				(0.000307)		
Avg. Discharge Comm. Score			0.000607*				-0.000419	
			(0.000342)				(0.000401)	
Avg. Overall Score				0.000457***				-7.38e-05
				(0.000166)				(0.000174)
Constant	-0.00373	0.142***	0.101***	0.122***	0.282***	0.355***	0.365***	0.334***
	(0.0230)	(0.0234)	(0.0297)	(0.0118)	(0.0261)	(0.0251)	(0.0354)	(0.0145)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	232,603	232,603	232,603	232,603	230,205	230,205	230,205	230,205
R-squared	0.000	0.000	0.000	0.000	0.061	0.061	0.061	0.061

Table 5.1 MMSA Average Per Capita Total Community Benefit Spending (Thousands of $), health outcomes, and health disparities

	Healthy Days	Healthy Days	WAD	WAD	WRD	WRD	WRI	WRI
Per Capita Total Community Benefits (Thousands of $)	0.48***	0.62***	-9.15***	-11.7***	-0.02***	-0.03***	-0.02***	-0.02***
	(0.10)	(0.10)	(1.77)	(1.79)	(0.003)	(0.003)	(0.00)	(0.00)
Constant	23.37***	16.40***	108.8***	209.9***	0.201***	0.443***	0.159***	0.368***
	(0.03)	(0.24)	(0.48)	(4.05)	(0.00)	(0.00)	(0.01)	(0.01)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	177,307	177,307	177,307	177,307	177,307	177,307	177,307	177,307
R-squared	0.000	0.068	0.000	0.059	0.000	0.064	0.000	0.064

Table 5.2 MMSA Average Per Capita Unreimbursed Medicaid (Thousands of $), health outcomes, and health disparities

	Healthy Days	Healthy Days	WAD	WAD	WRD	WRD	WRI	WRI
Per Capita Unreimbursed Medicaid	0.93***	1.14***	-15.41***	-18.60***	-0.037***	-0.047***	-0.03***	-0.04***
	(0.20)	(0.201)	(3.39)	(3.38)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	23.38***	16.51***	108.5***	207.6***	0.200***	0.437***	0.158***	0.364***
	(0.03)	(0.23)	(0.46)	(4.02)	(0.00)	(0.01)	(0.00)	(0.01)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	177,307	177,307	177,307	177,307	177,307	177,307	177,307	177,307
R-squared	0.000	0.068	0.000	0.059	0.000	0.063	0.000	0.064

Table 5.3 MMSA Average Per Capita Community Building Activities Spending (Thousands of $), health outcomes, and health disparities

	Healthy Days	Healthy Days	WAD	WAD	WRD	WRD	WRI	WRI
Per Capita Community Building Activities	-0.456	43.94***	171.1	-626.5***	0.317	-1.62***	0.311	-1.27***
	(12.29)	(12.02)	(205.9)	(202.4)	(0.378)	(0.371)	(0.401)	(0.393)
Constant	23.44***	16.50***	107.4***	207.6***	0.198***	0.437***	0.157***	0.364***
	(0.0256)	(0.240)	(0.430)	(4.035)	(0.000788)	(0.00739)	(0.000837)	(0.00784)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	177,307	177,307	177,307	177,307	177,307	177,307	177,307	177,307

R-squared	0.000	0.068	0.000	0.059	0.000	0.063	0.000	0.064

Table 5.4 MMSA Average Per Capita Community Health Improvement Services (Thousands of $), health outcomes, and health disparities

	Healthy Days	Healthy Days	WAD	WAD	WRD	WRD	WRI	WRI
Per Capita CHI Activities	10.38***	16.19***	-173.1***	-264.0***	-0.42***	-0.71***	-0.31**	-0.51***
	(3.956)	(3.929)	(66.30)	(66.16)	(0.122)	(0.121)	(0.129)	(0.128)
Constant	23.40***	16.49***	108.2***	207.9***	0.200***	0.438***	0.158***	0.365***
	(0.0292)	(0.240)	(0.489)	(4.034)	(0.000898)	(0.00738)	(0.000953)	(0.00783)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	177,307	177,307	177,307	177,307	177,307	177,307	177,307	177,307
R-squared	0.000	0.068	0.000	0.059	0.000	0.063	0.000	0.064

Table 5.5 MMSA Average Per Capita Bad Debt (Thousands of $), health outcomes, and health disparities

	Healthy Days	Healthy Days	WAD	WAD	WRD	WRD	WRI	WRI
Per Capita Bad Debt	0.388*	0.990***	-11.37***	-23.59***	-0.02***	-0.07***	-0.02**	-0.04***
	(0.21)	(0.22)	(3.62)	(3.79)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	23.41***	16.28***	108.2***	213.8***	0.19***	0.45***	0.16***	0.37***
	(0.02)	(0.24)	(0.46)	(4.19)	(0.00)	(0.01)	(0.00)	(0.01)
All Controls	N	Y	N	Y	N	Y	N	Y
Observations	177,307	177,307	177,307	177,307	177,307	177,307	177,307	177,307
R-squared	0.000	0.068	0.000	0.059	0.000	0.064	0.000	0.064

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