
[All ETDs from UAB](#)

[UAB Theses & Dissertations](#)

2023

The Association of Availability and Accessibility of Federally Qualified Health Centers on Hospitals' Reported Charity Care

Philip Cendoma
University Of Alabama At Birmingham

Follow this and additional works at: <https://digitalcommons.library.uab.edu/etd-collection>



Part of the [Medical Humanities Commons](#)

Recommended Citation

Cendoma, Philip, "The Association of Availability and Accessibility of Federally Qualified Health Centers on Hospitals' Reported Charity Care" (2023). *All ETDs from UAB*. 44.
<https://digitalcommons.library.uab.edu/etd-collection/44>

This content has been accepted for inclusion by an authorized administrator of the UAB Digital Commons, and is provided as a free open access item. All inquiries regarding this item or the UAB Digital Commons should be directed to the [UAB Libraries Office of Scholarly Communication](#).

**THE ASSOCIATION OF AVAILABILITY AND ACCESSIBILITY OF FEDERALLY
QUALIFIED HEALTH CENTERS ON HOSPITALS' REPORTED CHARITY CARE**

by

PHILIP CENDOMA

NANCY BORKOWSKI, COMMITTEE CHAIR

NATHAN CARROLL

GANISHER DAVLYATOV

STEPHEN O'CONNOR

ROBERT WEECH-MALDONADO

A DISSERTATION

Submitted to the graduate faculty of The University of Alabama at Birmingham,
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

BIRMINGHAM, ALABAMA

2023

Copyright by
Philip Cendoma
2023

THE ASSOCIATION OF AVAILABILITY AND ACCESSIBILITY OF FEDERALLY QUALIFIED HEALTH CENTERS ON HOSPITALS' REPORTED CHARITY CARE

PHILIP CENDOMA

ADMINISTRATION-HEALTH SERVICES

ABSTRACT

Hospitals are facing financially challenging times. Each year, billions of dollars are spent by hospitals to provide care to patients that, ultimately, will go unreimbursed. How to effectively provide accessible and affordable health care to the uninsured population continues to be a topic of discussion for policymakers, healthcare administrators, as well as healthcare-based consortiums, and consultant. The cost of charity care consists largely of the care provided to the uninsured population. Federally Qualified Health Centers (FQHCs) play an important role in providing primary care to the uninsured population, regardless of the patient's ability to pay. Based on the 5 A's of Access, our study examines the association of availability and accessibility of FQHC delivery sites on hospital's reported cost of charity care as a percent of operating expenses. Our results indicate a positive association between hospital's cost of charity care and the number of FQHC delivery sites in the hospital's zip code and a negative association between the hospital's cost of charity care and the distance in miles between the hospital's zip code and the nearest FQHC delivery site's zip code.

Keywords: Hospital Charity Care, Federally Qualified Health Centers (FQHCs), Access to health care, Availability, Accessibility

DEDICATION

I dedicate this dissertation to my wonderful, loving family, Raime Ann, Vaughn, and Theodore. You are my everything, I could not have completed this without your love, support, and sacrifice. Raime, I am lucky to have you by my side. Boys, I am blessed to be your father.

ACKNOWLEDGMENTS

I cannot speak highly enough of the support I have received throughout my journey of pursuing my PhD. My dissertation is a product of a collection of contributions made by many wonderful, selfless individuals.

I am deeply grateful for my dissertation chair, Dr. Nancy Borkowski. From the first course I took from Dr. Borkowski, it was apparent that she truly enjoys the mentoring aspects of her role as a Professor. During her time serving as my dissertation chair, she was my solid foundation, provided me with all the support I needed and applied the right amount of pressure at the right times to keep me focused and on track. I never felt alone in the process, I don't know how she did it, but Dr. Borkowski always seemed to be there when I needed encouragement and/or advice to get me through the many challenges that come with dissertation writing. Even beyond her role as committee chair, Dr. Borkowski happily took me under her wing, included me in other research collaborations, advised me throughout the job-searching process, and actively provides suggestions on how I can best succeed in the field of academia. I will always remember her contribution; I look to emulate her and provide similar dedication to the next generation of students and scholars.

I would like to thank my committee members, Drs. Robert Weech-Maldonado, Stephen O'Connor, Nathan Carroll, and Ganisher Davlyatov. They each dedicated, not only their time, but also, they exemplified kindness and understanding while providing

me with their expertise. I thoroughly enjoyed working with each one of them, they enhanced my development through sharing of knowledge and providing valuable feedback. The added benefit was that I was able to work with each of them on a one-on-one basis thus leading to a deeper relationship that I cherish.

I wish to give special thanks to former and current doctoral students who were instrumental to my success in the PhD program, especially Dr. Akbar Ghiasi, Dr. Seongwon Choi, Dr. Neeraj Puro, Dr. Reena Kelly, Dr. Hani Almaliki, Jonathan Patterson, Ali Riza Demirbas, Aizhan Karabukayeva, Jillur Rahim, Aurora Tafili, Devdutt Upadhye, Tanjila Nawshin, and Dalton Peña.

Lastly, I express my gratitude for the never-ending support from my family who sacrificed so much to be by my side every step of the way. My dear wife, Raime, who showed an immense amount of love and support as we moved our family across the country to Birmingham, AL for my pursuit of a doctorate degree. She stood by me and kept our family centered on the things that matter most. My wonderful boys, Vaughn and Theodore, who are my best friends and were my biggest fans throughout the last four years. They were my driving force; I am excited to spend my weekends playing with them again. My mom and dad who have always supported me to further my education even though they were not afforded the same opportunities. My siblings, Mike and Lisa, for the social support when I needed to talk things through. My father-in-law, Rayme, and my late mother-in-law, Cheryl, who gave my wife and kids much needed comfort and love.

TABLE OF CONTENTS

	Page
ABSTRACT.....	iii
DEDICATION.....	iv
ACKNOWLEDGMENTS	v
LIST OF TABLES.....	ix
LIST OF FIGURES	x
CHAPTER	
I. Introduction	1
Background.....	4
Uncompensated Care	4
Hospital Emergency Dept Utilization for Non-Emergency Care	5
Federally Qualified Health Centers	6
Problem Statement.....	7
Theoretical Framework.....	8
2. Literature Review.....	9
Conceptual Framework.....	12
Hypothesis Developments	15
Availability	15
Accessibility.....	16
3. Methods.....	18
Data Source.....	18
Variables	19

Dependent Variables	19
Independent Variables	20
Control Variables	21
Analysis.....	24
4. Results.....	25
5. Discussion	36
Limitations	38
Conclusion	39
LIST OF REFERENCES.....	40
APPENDICES	
A IRB APPROVAL.....	46
B NUMBER OF FQHC DELIVERY SITES IN HOSPITAL ZIP CODE	48
C SUB ANALYSIS: COUNTY DEMOGRAPHICS BY # OF SITES	50
D SUB ANALYSIS: COUNTY DEMOGRAPHICS BY DISTANCE	52

LIST OF TABLES

<i>Tables</i>		<i>Page</i>
1	List of Variables.....	23
2	Descriptive Statistics of the Sample	27
3	Bivariate Regression of the Sample.....	30
4	Regression Analysis using # of FQHC delivery sites variable.....	33
5	Regression Analysis using Distance variable	34

LIST OF FIGURES

<i>Figure</i>		<i>Page</i>
1	Penchansky and Thomas' 5 A's of Access	14
2	Conceptual Framework – Hypothesis Development	15
3	Hypothesis #1 – Graph of Relationship	16
4	Hypothesis #2 – Graph of Relationship	17

CHAPTER 1

Introduction

Healthcare delivery systems' involvement in providing services as a social safety net has played a vital role in enhancing the health of communities across the United States. Hospitals are often looked upon as a supplier of social goods, particularly social goods in the form of free care to the medical indigent population (R. G. Frank & Salkever, 1991). The American Hospital Association's (AHA) Annual Survey of Hospitals tracks the amount hospitals spend on uncompensated care. The AHA's estimates that \$660 billion of uncompensated care was provided by hospitals between the years 2000 and 2018, \$41.3 billion alone in 2018 (American Hospital Association, 2019). As a result, hospitals are financially burdened by the growing amount of unreimbursed care provided for their patient population.

The steady growth of uncompensated care over the last few decades is attributed to one over-arching theme, access and affordability (Bitterman, 2002; McKenna et al., 2018). How to effectively provide accessible and affordable health care to all populations of society in the United States continues to be a topic of discussion for policymakers, healthcare administrators, as well as healthcare-based consortiums, and consultants.

One significant policy change that greatly increased access to hospital care was the passing of the Emergency Medical Treatment and Labor Act of 1986 (EMTALA).

EMTALA requires federally reimbursed (e.g. Medicare) hospitals to treat all patients who present to an emergency room regardless of their ability to pay. As a contributing proponent of increasing access to all for much needed care, EMTALA shifted the financial burden from the individual who could not pay for care to the health care delivery organization. As the financial responsibility transferred from patient to hospital, the debt left unpaid is accounted for as charity care.

A general lack of health care providers, i.e., primary care, in poverty-stricken communities adds to the financial burden on hospitals, studies have found that the Medicaid and uninsured population are more likely to use emergency department (ED) services than those with private insurance (Cheung, Wiler, Lowe, & Ginde, 2012). As the Medicaid and uninsured population seek access to health much discussion has been had regarding the effective use of emergency department (ED) services and if it is the appropriate level of care for those with non-emergency medical needs. Unfortunately, the current state of health care in the United States provides few options for the uninsured to seek health care other than through EMTALA-mandated emergency services.

Another key component of gaining access to health care in the United States is the correlation it has with an individuals' health insurance status. As health care costs continue to increase year-after-year, health insurance premiums have reached all-time highs and have become financially difficult to obtain if premiums are not greatly subsidized through employer-sponsored health plans. Insomuch, those without stable, full-time employment stand to suffer the full financial burden of, not only, a lack of consistent income but also an unbearable financial outlay required to obtain health insurance. Adding to the burden of rising premiums, high deductible health plans have

become more prevalent shifting greater “first-dollar” responsibility on the individual insured before coinsurance subsidizes the remaining amount.

In 2010, the Patient Protection and Affordable Care Act’s, also known as ACA, was passed in an attempt to expand Medicaid to a greater portion of the population. Through the ACA, all states, unless otherwise intentionally opted out, under law expand Medicaid eligibility to include all individuals and families with incomes up to 138% of the federal poverty level ("Patient protection and Affordable Care Act," 2010). The passing of the ACA legislation allowed millions of people access to health care by way of expanded Medicaid eligibility. Unlike EMTALA, the Medicaid expansion part of the ACA is not as universal considering there are 12 states that have not adopted the Medicaid expansion law as of 2020, leaving an estimated 4.3 million people uninsured who would otherwise be covered under the expansion (Garfield, Damico, & Orgera, 2020).

Across all 50 states, including those that have expanded Medicaid, there are many individuals and families that still do not have health insurance or are underinsured. Even with health insurance, such as Medicaid, individuals often are left with a costly hospital bill in order to cover the excess between contractual allowances and hospital charges. The remaining balances are passed on to the healthcare consumer as a financial liability. This debt often times goes unpaid, resulting in a loss of revenue for the hospital, i.e., charity care.

To address the inappropriate use of high-cost hospital-based services and to decrease the financial burden of charity care costs on hospitals, Federally Qualified Health Centers (FQHCs) can be used as alternative sources of health care providers in the

community. FQHCs are public, not-for-profit community health centers that receive federal grants known as Section 330 grants. Their role is to locate in medically underserved areas and provide primary health care services to all, regardless of ability to pay. Serving more than 20 million patients a year, 17% of which are uninsured or Medicaid recipients (Nath, Costigan, & Hsia, 2016), FQHCs are positioned to alleviate the health care needs of the community by providing health services to those who are otherwise without available options and have traditionally sought care via hospital emergency rooms.

Background

Uncompensated Care

The American Hospital Association (AHA) defines uncompensated care as “an overall measure of hospital care provided for which no payment was received from the patient or insurer.” (American Hospital Association, 2019) Uncompensated care is provided at both not-for-profit hospitals as well as for-profit hospitals. It is calculated by adding together the hospital’s charity care and the hospital’s bad debt. Although the two measurements, charity care and bad debt, come together to represent the hospital’s total costs of unreimbursed care provided, only charity care represents the amount spent on care to patients who are determined financially unable to pay. Gaskin, et al. described the difference of charity care and bad debt as “charity care represents the fulfillment of hospitals’ safety-net mission, whereas bad debt represents the failure of hospital financial management system (i.e. poor controls on patient billings and collections)” (Gaskin, Herring, Zare, & Anderson, 2019).

One of the general requirements for not-for-profit hospitals to receive tax-exemption under section 501(c)(3) of Internal Revenue Code (IRC), is that the hospital must provide free or subsidized care to the indigent population (Rosenbaum, 2015). In 2017, US nonprofit hospitals alone provided \$14.2 billion in charity care, about 30% of their overall net income (Bai, Yehia, & Anderson, 2020). The rising cost of charity care burdens both not-for-profit as well as for-profit hospitals. Although for-profit hospitals are not eligible for tax exemptions, they are able to take tax deductions for the cost of providing charity care (Bai, Zare, Eisenberg, Polsky, & Anderson, 2021; Nicholson, Pauly, Burns, Baumritter, & Asch, 2000). Recent research has shown there is no clear difference between ownership types when it comes to providing charity care, even suggesting that some for-profit hospitals provide more in charity care than nonprofit hospitals (Bruch & Bellamy, 2020; Cram et al., 2010; Kim, McCue, & Thompson, 2009; Valdovinos, Le, & Hsia, 2015). Understandably, both for-profit and nonprofit hospitals stand to benefit from better charity care cost management (Dixon, 2021).

Hospital Emergency Department Utilization for Non-Emergency Care

With the passing of EMTALA, hospitals must provide care to all who present to the emergency department regardless of ability to pay. Studies have shown the uninsured and Medicaid-insured disproportionately utilize emergency department (ED) services for nonemergency care due to the limited availability to access other health care services (DeNavas-Walt, 2010; Klein et al., 2017; Schuur & Venkatesh, 2012; Tang, Stein, Hsia, Maselli, & Gonzales, 2010). This has caused great concern about the use of emergency room services for nonemergency-related health needs. Due to the lack of affordable

primary care services for those that are uninsured, the higher cost emergency room has become their entry to accessing all health care related needs. In its report to Congress, the Office of the Assistant Secretary for Planning and Evaluation (ASPE) stated that approximately 12.5% of the overall national health expenditures in 2010 came from ED visits; and that the average cost of comparable conditions is estimated at 10-12 times higher in the ED compared to care provided in an urgent care or physician office (Evaluation, 2021; Galarraga & Pines, 2016; Karaca & Moore, 2006; Zhou, Baicker, Taubman, & Finkelstein, 2017). In addition to increasing overall healthcare costs, the over utilization of ED services for nonemergency care creates a public health crisis, which includes ED overcrowding resulting in long wait times, as well as, decreased quality of care. (Chen, Hibbert, Cheng, & Bennett, 2015) To enhance access to medical care for the uninsured and Medicaid population, researchers have suggested the use of community based health care centers, also known as Federally Qualified Health Centers (Bennett, Moore, & Probst, 2007; Chen et al., 2015).

Federally Qualified Health Centers

Federally Qualified Health Centers (FQHC) are entities that receive grant funding from the Health Resources and Services Administration (HRSA) to provide primary care services in underserved areas. As a community-based health care provider, FQHCs help to increase access to much needed medical and other health-related services to the nation's most vulnerable population, regardless of the patient's ability to pay. With approximately 1,400 Federally Qualified Health Centers, FQHCs provide care to over 20 million low-income patients each year (Gray, 2019).

As part of the required HRSA criteria, FQHCs must be located in underserved areas and offer a sliding fee schedule based on household income levels. (Gray, 2019) As beneficiaries of federal grant money under Section 330 of the Public Health Service Act, as well as receiving higher reimbursements from Medicaid (Rosenbaum, Sharac, Shin, & Tolbert, 2019), FQHCs are positioned to serve the uninsured and underinsured members of the community by providing a setting for accessing the appropriate level of care, precluding nonemergency visits to higher cost emergency room services.

Problem Statement

Recent studies have suggested the use of FQHCs to offset ED utilization (Bennett et al., 2007). However, in order to fulfill its role in providing health care to underserved communities, the availability of FQHCs in both urban and rural locations must be considered.

Looking to advance the research of hospital outcomes associated with the availability of FQHCs in a geographical area, no study has considered the hospital's level of charity care. Among the existent literature, there are studies that focus on state-specific ED utilization as it relates to the presence of an FQHC. One study, using national estimates derived by South Carolina billing data, shows the demand for ED use among self-pay patients and the financial stress it puts on the hospital. The same study suggests the presence of FQHCs as a means to reduce such demand (Bennett et al., 2007).

Another study looked at the impact of improving access to FQHCs on ED use among Medicaid-insured and uninsured adults in 58 counties in California (Nath, Costigan, Lin, Vittinghoff, & Hsia, 2019). There exists an unexplored area within the topic of hospital

and FQHC relationships, particularly regarding charity care and therefore this paper seeks to use access to FQHCs as a measure to answer the following question:

Is there a relationship with the level of charity care reported by a hospital and the accessibility and the availability of FQHC delivery sites?

Theoretical Framework

To study if there is an association between hospital charity care and FQHCs, Penchansky and Thomas' 5 A's of Access is best suited for the study. The 5 A's of Access framework categorizes access into five dimensions; Availability, Accessibility, Accommodation, Affordability, and Acceptability. Each dimension is uniquely defined, allowing for a more comprehensive and appropriate measurement of access to healthcare.

CHAPTER 2

As hospitals face the challenges of declining revenues, increasing operational expenses, and low margins, the focus on uncompensated care has become a key issue within hospital finance. Distinguishing costs between charity care and bad debt, the two components of uncompensated care, has historically been a difficult task for hospital accounting. This paper focuses on charity care which has been determined as the patient's inability to pay the hospital for services rendered.

Literature Review

There is much in the existent literature surrounding hospitals' charity care. It is generally understood that hospitals provide charity care as a social good. The level of charity care provision varies by hospital ownership type (nonprofit vs for-profit). Some studies have shown that not-for-profit hospitals provide more charity care than for-profit hospitals (Clement, White, & Valdmanis, 2002; Needleman, 1995; Norton & Staiger, 1994; Weissman, 1996). Clement et. al. (2002) goes on to suggest three explanations as to why for-profit hospitals behave differently with respect to providing charity care:

1. For-profits act as free riders and allow not-for-profits into the market to bear the greater burden of providing charity care to the uninsured population.

2. As part of a not-for-profit hospital's mission, the hospital is to offer charity care.

There may exist a crowding out by NFP hospitals to provide the most pressing needs of the community to fulfill their mission, therefore reducing charity care provided by for-profit hospitals

3. FP hospitals may find value in offering charity care by way of enhancing their image in the community as a "good neighbor" or an organization that gives back to the community.

In 2018, the average total charity care for not-for-profit hospitals was \$7.1 million and \$4.3 million for for-profit hospitals (Bruch & Bellamy, 2020). Another study reports the total amount of charity care provided by not-for-profit hospitals in a single year, 2017, was \$14.2 billion (Bai et al., 2020). These amounts represent a significant financial burden on all hospitals regardless of its ownership status.

There have been numerous studies that have examined the factors that affect hospitals' provision of charity care. Buczko's (1994) study amongst hospitals in Washington state found that occupancy rates, the presence of a burn care unit, and the presence of a hospice were all associated with increased charity care (Buczko, 1994). Clement et al.'s (2002) study showed for-profit hospitals provided less charity care as a percentage of operating expenses than not-for-profit hospitals, larger hospitals allocated a smaller proportion of expenses to charity care, hospitals provide less charity care when there is a public hospital in the Health Facilities Planning Area, and charity care does not vary in response to HMO penetration (Clement et al., 2002). A state's legislation enactment has also shown to have influence on charity care provided by nonprofit hospitals. An analysis performed in the state of Texas showed that charity care provided

by nonprofit hospitals grew by 96.3% from 1994 to 1997 after the passing of statewide legislation requiring “nonprofit hospitals to provide a specific percentage of patient revenues for charity care, indigent health care, and community benefits” (Wood, 2000).

Considering charity care is to provide hospital services to those who are financially unable to pay for the service, it is important to examine the uninsured population. In Wang et. al.’s (2015) study of a homeless population in Texas, they found that 76% of the emergency visits between July 1, 2013 and June 30, 2014 were not only deemed to be inappropriate, but additionally 77% of the patients received charity care (Wang et al., 2015). The uninsured population stand to suffer the most from lack of access to health care, leading to a higher use of unnecessary emergency room visits resulting in higher costs of charity care. The use of FQHCs as a means to accessing healthcare has been discussed as a possible solution for alleviating emergency rooms from provided nonemergency care to the uninsured population.

In 2019, a California-based study by Nath, J. et. al., employed three measures of FQHC access: delivery sites per 100 square miles, delivery sites per 100,000 county residents, and the proportion of Medicaid-insured or uninsured residents ages 19 to 64 years that utilized FQHCs (Nath et al., 2019). The study results showed an increase in FQHC delivery sites was associated with a decrease in ED use by uninsured but not Medicaid-insured patients. However, the other two measures (FQHCs per county resident and proportion of Medicaid-insured or uninsured residents ages 19-65 that utilized FQHCs) were not associated with reduced rates of ED use among the insurance-status population.

Like Nath, et. al (2019), the use of geographic information systems (GIS) has made a momentous contribution to research within the healthcare industry. In his review of the seminal book titled, *GIS and Public Health*, Dr. Lawrence Frank speaks of the advances in technology and computing power to now have the ability to “collect, distribute, and convey spatial data in ways never before thought possible” (L. D. Frank, 2012). He continues by describing Geographic Information Science as “an analytical bridge between health and a myriad of other disciplines including urban planning, geography, transportation, political science, landscape architecture, ecology, and more.”

The literature connected to GIS and health care present a wide range of the use of spatial patterns, for example, in planning the location of new health facilities based on the travel time and distances, location of patients in relation to the area, and the availability of public transport (Gatrell & Senior, 1999; Higgs, 2004). In a study by Haynes et al (2000), the GIS-based analysis showed that residents in rural settings are more likely to use health services (surgery) closest to their home compared to those living in urban areas (Haynes, Lovett, & Sünnerberg, 2003).

Conceptual Framework

Access to healthcare is an essential part of any society’s ability to progress and thrive. Although that may sound like a simple statement, historically there has been difficulty in defining what ‘access to healthcare’ means. The Institute of Medicine defined access as “the timely use of personal health services to achieve the best possible health outcomes” (Fortney, Burgess, Bosworth, Booth, & Kaboli, 2011; Millman, 1993). Others have added to the definition of access as “the use of health care, conditional on the

need for care” (Waters, 2000) and by specifying access as “enabling a patient in need to receive the right care, from the right provider, at the right time, in the right place” (Saurman, 2016). One study stresses the importance of access to care as a social determinant of health, adding, “...health and illness are not distributed randomly throughout human society, and neither are resources to prevent illness and its effects. Instead, they cluster at the intersection of social, economic, environmental, and interpersonal forces.” (Havranek et al., 2015)

The concept of access to health care was defined by Penchansky and Thomas (1991) as the “degree of ‘fit’ between clients and the system.” In their study, Penchansky and Thomas laid out five dimensions of access which have become widely known as “The 5 A’s of Access”. The 5 A’s of Access categorizes the concept of access into five dimensions that provide specific definitions, allowing for each to be appropriately measured.

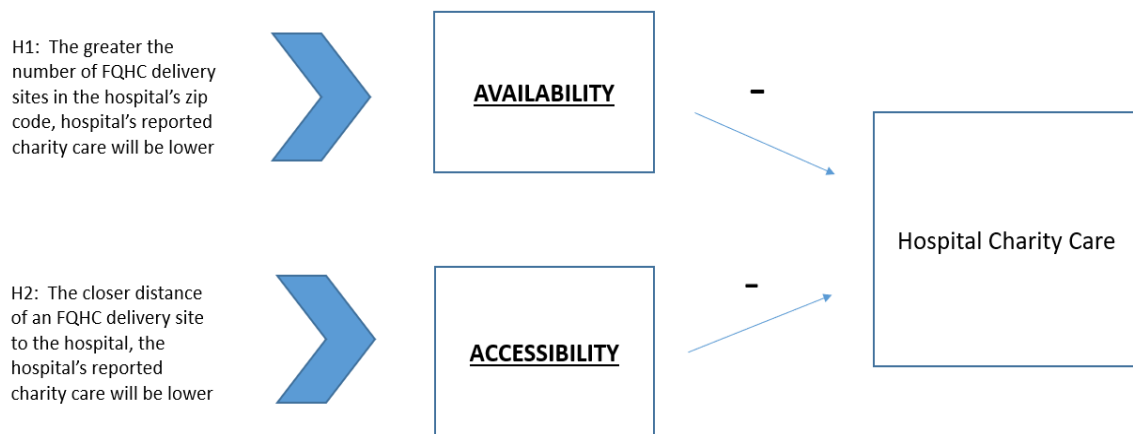
Figure 1. Penchansky and Thomas' 5 A's of Access

Dimension of Access	Definition
Availability	The relationship of the volume and type of existing services (and resources) to the clients' volume and types of needs. It refers to the adequacy of the supply of physicians, dentist, and other providers; of facilities such as clinics and hospitals; and of specialized programs and services such as mental health and emergency care.
Accessibility	The relationship between the location of supply and the location of clients, taking into account client transportation resources and travel time, distance and cost.
Accommodation	The relationship between the manner in which the supply resources are organized to accept clients (including appointment systems, hours of operation, walk-in facilities, telephone services) and the clients' ability to accommodate to these factors and the clients' perception of their appropriateness.
Affordability	The relationship of prices of services and providers' insurance or deposit requirements to the clients' income, ability to pay, and existing health insurance. Client perception of worth relative to total cost is a concern here, as is clients' knowledge of prices, total cost and possible credit arrangements.
Acceptability	The relationship of clients' attitudes about personal and practice characteristics of providers to the actual characteristics of existing providers, as well as to provider attitudes about acceptable personal characteristics of clients. In the literature, the term appears to be used most often to refer to specific consumer reaction to such provider attributes as age, sex, ethnicity, type of facility, neighborhood of facility, or religious affiliation of facility or provider. In turn, providers have attitudes about the preferred attributes of clients or their financing mechanisms. Providers either may be unwilling to serve certain types of clients (e.g., welfare patients) or, through accommodation, make themselves more or less available.

Hypothesis Development

To establish an understanding of a hospital's reported charity care relative to the presence of a Federally Qualified Health Center, the study uses two dimensions of access from Penchasky and Thomas, availability and accessibility.

Figure 2. Conceptual Framework – Hypothesis Development

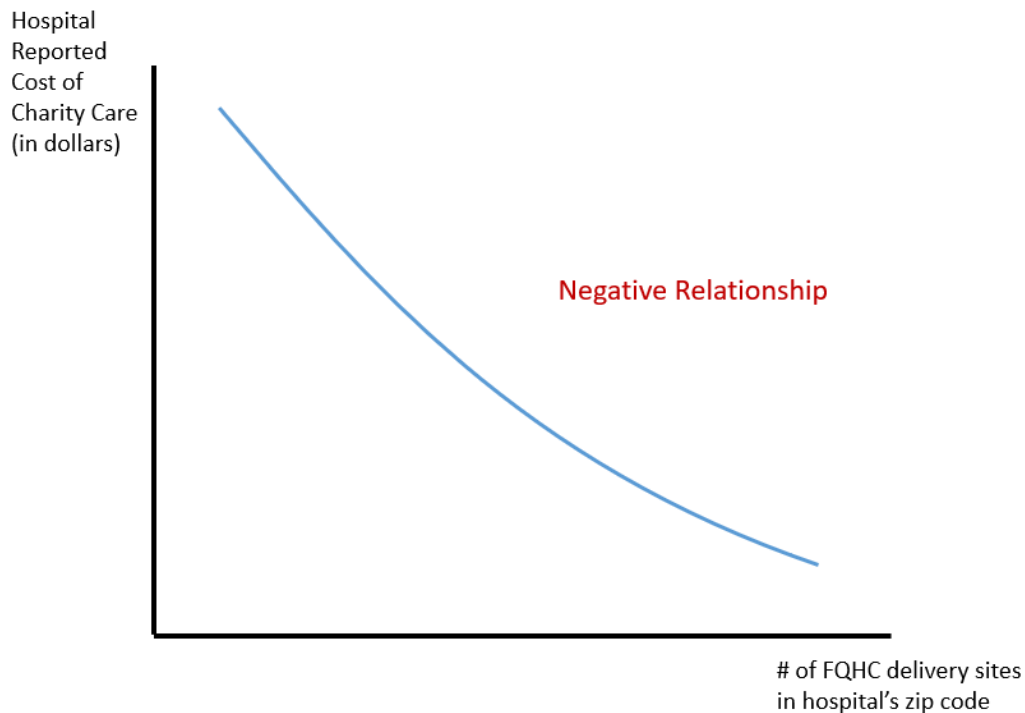


Availability. According to Penchasky and Thomas, availability refers to the adequacy of the supply of health care services. Health care services supplied are to include physicians, dentists, health care clinics, and/or specialized programs such as mental health or maternity care. FQHCs serve as community health clinics to provide more available health care services to the underserved populations, more often serving Medicaid or uninsured patients. The use of FQHCs to provide care to the Medicaid and uninsured population would avert the use of higher-cost hospital services for care that could be facilitated at a more appropriate setting. As a result, we would expect to see a

reduction in use of hospital charity care in zip codes where there are more FQHC delivery sites available.

Hypothesis 1: *The total number of FQHC delivery sites in the zip code is negatively associated with hospital's reported cost of charity care.*

Figure 3. Hypothesis #1 – Graph of Relationship

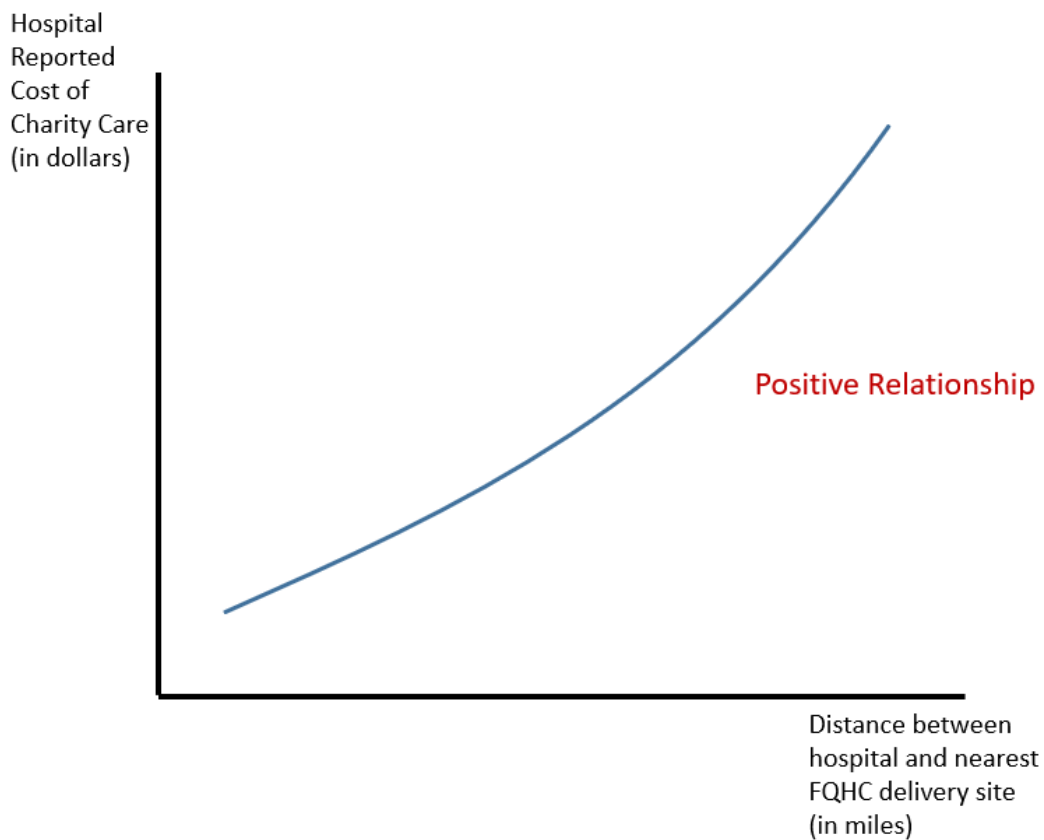


Accessibility. Penchansky and Thomas use geographical location to explain the accessibility dimension of health care access. They use the relationship of location of “supply” with the location of “clients” while taking into consideration the client’s travel time and distance. Guagliardo, 2004, explains that distance to healthcare providers has been historically acknowledged as a significant barrier to healthcare access in the United States (Guagliardo, 2004). With the introduction and use of FQHCs, the medically underserved population would have greater accessibility of health care services by

establishing community health centers in areas with a higher population of uninsured individuals. As a result, we would expect to see less reported charity care among hospitals that are located within closer proximity to FQHC delivery sites.

Hypothesis 2: *The closer distance between hospital and nearest FQHC delivery site is positively associated with hospital's reported cost of charity care.*

Figure 4. Hypothesis #2 – Graph of Relationship



CHAPTER 3

Methods

The method section describes the data sources and variables that will be used to conduct the proposed analysis. A list of variables with definitions and data sources are summarized in Table 1. The variables are subcategorized by dependent, independent, and control variables.

Data Sources

The study requires data for both hospital and FQHC organizations as well as county demographics. Hospital data is published annually and is publicly available. The American Hospital Association (AHA) Annual Survey Database and the CMS Cost Reports (cost reports) will be used to gather the required hospital-level information needed for the study. The AHA annual report is a voluntary survey conducted annually by nearly 6,300 hospitals across the US. It has been widely used in health services administration research for years as it contains the most comprehensive data about hospital facilities. The CMS cost reports are also submitted on an annual basis, however, unlike the AHA annual survey, the cost reports are required by CMS for all Medicare-certified institutional providers. The cost reports provide specifics on each hospital organization's financial performance, i.e., charity care.

For FQHC-level data, we will use information from The Health Resources and Services Administration (HRSA). HRSA provides a system called Uniform Data System (UDS) to gather information from all health centers that receive Section 330 grants. Every year, FQHC data is therefore collected and is publicly available via UDS. In addition to AHA, cost reports, and UDS databases, we will utilize county-level data from Area Health Resource Files (AHRF) to provide the needed county demographics for the study.

The study's unit of analysis is at the hospital level. AHA data was used to gather organizational information for each hospital in the United States for years 2018 and 2019. The sample used included general acute care hospitals in the 50 states. Hospitals located in US territories, specialty hospitals, pediatric hospitals, as well as federal government-owned hospitals were excluded from the study. After implementing the exclusion criteria, the AHA data was merged with CMS cost report data by Medicare number, UDS data by zip code, and with AHRF by FIPS code. The final sample set included 7,941 hospital year observations (3,994 for 2018 and 3,947 for 2019).

Variables

Dependent variable:

The dependent variable in the study is the hospital's cost of charity care as a percent of operating expenses for 2018 and 2019, this standardization of cost of charity care is consistent with other studies (Bai et al., 2021; Bruch & Bellamy, 2020; Clement et al., 2002; Young, Flaherty, Zepeda, Singh, & Rosen Cramer, 2018). CMS defines charity care as "health services for which a hospital demonstrates that the patient is unable to

pay.” (CMS, 2015) Charity care is reported in U.S. dollars annually on the CMS Cost Reports, Worksheet S-10. Recent literature has discussed the use of charity care versus uncompensated care as a measurement of the hospital’s unreimbursed care (Bai et al., 2021; Gaskin et al., 2019). Given the nature of this study, we find it appropriate to use charity care to capture the true amount of care provided by hospitals to the uninsured and indigent populations.

Independent variable:

The independent variables of interest are two variables created from aggregating FQHC data from UDS along with data from AHRF and AHA. The variables are used to measure 1.) availability and 2.) accessibility. Recent research has shown similar use of calculations to measure access to FQHCs (Nath et al., 2019). The UDS data provide an annual list of all FQHCs in the United States. For the purpose of this study, we used UDS data to gather to identify FQHC delivery sites for years 2018 and 2019. We used all FQHC service delivery sites that have the following operational characteristics:

- Permanent location
- Location setting at “Hospital” or “All Other Clinic Types” (exclude: “Correctional Facility”, “Domestic Violence”, “Nursing Home, and “School”
- 30+ hours of total weekly operations
- Non-seasonal schedule
- Operating within the 50 United States (FQHC delivery sites operating in US territories were excluded)

The first variable will be used to measure “availability” in accordance with Penchansky and Thomas’ (1981) definition of availability, “adequacy of the supply”. The availability variable is a count variable representing the number of FQHC delivery sites in each hospital’s zip code.

The second independent variable was created to represent “accessibility”. The 5 A’s of Access define accessibility as “the relationship between location of supply and the location of clients, taking account of client transportation resources, travel time, distance and cost (Penchansky & Thomas, 1981). The accessibility variable was represented by calculating the distance between the hospital’s zip code centroid and the centroid of the nearest FQHC delivery site’s zip code. This variable is a continuous variable measured in miles, therefore the greater the result of the accessibility variable represents a greater distance between hospital’s zip code centroid and nearest FQHC’s zip code centroid.

Control variables

To test the relationship between hospitals’ reported cost of charity care and the availability and accessibility of FQHC delivery sites, there are certain variables that must be taken into consideration. The control variables for the study are separated into two categories, Organizational Characteristics and Environmental and Market Factors. Considering the hospital as the unit of analysis, the organizational characteristics represent hospital-level measurements. Ownership type, critical access hospital status, location (metro, micro, or rural), teaching status, size of hospital, the hospital’s adjusted average daily census, occupancy rate, and hospital’s state Medicaid expansion status are

controlled for under the organizational characteristics. For each of the previously mentioned variables, recent literature has shown some indication of significance in relation to hospital's cost of charity care (Bai, Zare, Eisenberg, Polsky, & Anderson, 2022; Branson, Buxton, Chen, & Smith, 2014; Davlyatov et al., 2019; Gale, Croom, Croll, & Coburn, 2015; Thorpe & Phelps, 1991). Additionally, recent studies have demonstrated convincing need to include environmental and market factors such as percentage of county population representing racial minority, poverty, those without health insurance, and those with less than a high school diploma are used as well as county-level median household income, population and hospital's market competition measured by the Herfindahl-Hirshman Index (Branson et al., 2014; Ghiasi, Zengul, Ozaydin, Oner, & Breland, 2018; Ginter & Duncan, 1990; J'Aime et al., 2019; Valdovinos et al., 2015).

Table 1: List of Variables

Variables	Variable Type	Definition	Data Source
Dependent Variable			
Cost of hospital charity care as a percent of operating expenses	Continuous	Cost of charity care of the uninsured patients as reported on CMS Cost Report (in U.S. dollars) / Hospital's total operating expenses * 100	CMS Cost Report
Independent Variables			
Availability: Number of FQHC delivery sites in hospital's zip code	Continuous	Number of FQHC delivery-sites in hospital's zip code	UDS and AHA
Accessibility: Distance	Continuous	Distance (in miles) between the hospital's zip code centroid and the nearest FQHC delivery site's zip code centroid	UDS and AHA
Control Variables			
Organizational Characteristics			
Ownership type	Categorical	1 = For-profit 2 = Not-For-profit 3 = Government (non-federal)	AHA
Critical Access Hospital	Categorical	1 = Critical access hospital 0 = Not critical access hospital	AHA
Location of Hospital (core-based statistical area)	Categorical	1 = Metropolitan 2 = Micropolitan 3 = Rural	AHA
Teaching Status	Categorical	1 = Teaching hospital 0 = Not teaching hospital	AHA
Hospital Bed Size	Categorical	Number of beds: 1 = 6 – 99 2 = 100 – 399 3 = 400+	AHA
Adjusted Average Daily Census (in 100s)	Continuous	Hospital's adjusted average daily census / 100	AHA
Occupancy Rate	Continuous	Hospital's occupancy rate	AHA
Medicaid Expansion Status	Categorical	1 = Hospital in Medicaid expansion state 0 = Hospital not in Medicaid expansion state	KFF
Environmental and Market Factors			
Minority	Continuous	Percent of county population that is minority = 100 – Percent of population that is White	AHRF
Median household income (in 1,000s)	Continuous	Median household income / 1000	AHRF
Poverty	Continuous	Percent of county population in poverty (based on federal poverty thresholds)	AHRF
Uninsured	Continuous	Percent of county population that is < 65 years old without health insurance	AHRF
Education	Continuous	Percent of county population that has less than a high school diploma	AHRF
Population	Continuous	County population estimate (in 10,000s)	AHRF
Market Competition	Continuous	Herfindahl-Hirshman Index (HHI), range from 0 (very competitive) to 1 (monopolistic market) Sum of squares of market share based on inpatient days.	AHA

Analysis

The study examined a longitudinal association between our variables using 2018 and 2019 data. The analysis was conducted at the hospital level, data was examined by using descriptive statistics. Based on the type of variable (continuous or categorical), the univariate analysis calculated the mean and standard deviation, or the frequency of each variable used in the study. A correlation matrix was performed to test for multicollinearity amongst independent and control variables, none of the correlations were above 0.8. Bivariate analyses were conducted, bivariate regressions between the dependent variable and each of the independent variables were performed. Two random effects models of multiple regression were conducted to analyze the relationships between the single dependent variable, uninsured charity care as a percent of operating expenses, and each independent variable, number of FQHC delivery sites in hospital's zip code and the distance between the hospital's zip code and the nearest FQHC's zip code, along with additional control variables. Due to the skewness nature (rightly skewed) of the data, a log transformation was performed on the dependent variable. Additionally, we controlled for inter-state differences in regulations and policies by including state fixed effects as well as controlling for year fixed effect. Lastly, a sensitivity analysis was conducted by an additional multiple regression using the independent variable, number of FQHC delivery sites in hospital zip code, as a 3-tiered categorical variable (0 delivery sites, 1 delivery site, 2+ delivery sites in hospital zip code). All analyses were conducted using STATA version 17.0. This study was approved as nonhuman subjects by the University of Alabama at Birmingham's IRB committee.

CHAPTER 4

Results

The descriptive characteristics of the sample that were included for testing the association between hospital's reported charity care and the availability and accessibility of FQHC delivery sites are shown in Table 1. The number of hospitals used in the study are 3,994 in 2018 and 3,947 in 2019. The dependent variable, the hospital's reported cost of uninsured charity care as a percent of operating expenses, has a mean of 1.98% with standard deviation of 2.87 in 2018 and 2.15% with standard deviation of 3.12 in 2019. The first of the independent variables of interest, number of FQHC delivery sites in hospital's zip code, is reported to show a mean just shy of 1.0 FQHC delivery sites per hospital zip code for both 2018 and 2019. The distance between hospital's zip code and nearest FQHC delivery site's zip code, the second independent variable of interest, shows that the average distance between the centroid of the hospital's zip code and the centroid of the nearest FQHC delivery site's zip code is 9.66 and 9.63 miles for 2018 and 2019, respectively, with standard deviations near 15.00 miles.

The organizational characteristics of the hospitals in the 2018 sample show that the majority of the hospitals were of not-for-profit status (63.6%), had bed size between 6 to 99 beds (48.67%), located in metropolitan areas (59.79%), 5.63% with teaching-hospital status, 30% were critical access hospitals and, 56.6% of the hospitals were in

Medicaid-expansion states. Regarding the environmental factors of the hospitals in the study, hospitals resided in counties where 21.68% of the county population was minority (non-white), 14.13% of population was living in poverty, 10.74% of population was uninsured, 12.25% of persons did not have a high school diploma, and the county's median annual household income was \$58,228. Additionally, the mean competition level of hospitals, as calculated by the Herfindahl-Hirschman Index (HHI), was 0.78 with a standard deviation of 0.31.

Table 2. Descriptive Statistics of the Sample

Variables	Mean (SD) / Frequency (%)	
	2018 (N=3,994)	2019 (N=3,947)
Dependent Variable		
Uninsured Charity Care as a Percent of Operating Expenses	1.98 (2.87)	2.15 (3.12)
Independent Variable		
Number of FQHC delivery sites in Hospital's zip code	0.79 (1.30)	0.83 (1.37)
Distance between Hospital's Zip and nearest FQHC's Zip (in miles)	9.66 (14.94)	9.63 (15.01)
Organizational Factors		
Ownership Type		
Government	871 (21.8)	854 (21.6)
Not-For-Profit	2,539 (63.6)	2,541 (64.4)
For-Profit	584 (14.6)	552 (14.0)
Average Daily Census	247 (296)	251 (307)
Occupancy Rate	0.47 (0.22)	0.47 (0.22)
Bed Size		
6 to 99 beds	1,944 (48.67)	1,943 (49.23)
100 to 399 beds	1,613 (40.39)	1,571 (39.80)
400+ beds	437 (10.94)	433 (10.97)
Teaching Hospital	225 (5.63)	229 (5.80)
Critical Access Hospital	1,190 (30.0)	1,206 (30.55)
Location of Hospital		
Metropolitan area	2,388 (59.79)	2,342 (59.34)
Micropolitan area	679 (17.00)	682 (17.28)
Rural area	927 (23.21)	923 (23.38)
Hospitals in MCD Expansion State	2,263 (56.66)	2,332 (59.08)
Environmental Factors		
% Minority	21.68 (16.96)	21.27 (16.71)
Median Household Income (\$)	58,228 (16,073)	61,370 (16,569)
% In Poverty	14.13 (5.18)	13.37 (4.86)
% Uninsured	10.74 (4.91)	11.19 (5.04)
% Of persons with less than HS diploma	12.25 (5.51)	12.20 (5.53)
Herfindahl-Hirschman Index (HHI)	0.78 (0.31)	0.78 (0.31)
Population Estimate (in 10,000s)	65.30 (156.20)	61.67 (148.53)

Note: SD – standard deviation; FQHC – Federally qualified health center; MCD – Medicaid

The bivariate analysis of the data is shown in Table 2. A bivariate regression was conducted to show the relationship between the dependent variables with each independent variable. The number of FQHC delivery sites in the hospital's zip code has a positive correlation with the hospital's reported cost of charity care as a percent of operating expenses, 0.088 with p-value < 0.001, which is interpreted as a 1 unit increase in FQHC delivery site to a hospital's zip code is associated with a 9% increase in the hospital's cost of charity care as a percent of operating expense. The second independent variable, distance between hospital's zip code and nearest FQHC delivery site's zip code, was negatively correlated with the dependent variable, -0.021, p-value = <0.001, interpreted as a 1-mile increase distance between hospital's zip code centroid and the zip code centroid of the nearest FQHC deliver site is associated with a 2% drop of hospital's reported charity care costs as a percent of operating expenses. Other variables showing positive correlation with the dependent variable with an incremental change include adjusted average daily census (7%), occupancy rate (296%), minority percentage in the county (2%), percent of county in poverty (3%), percent of county that is uninsured (15%), percent of county population with less than a high school diploma (5%), and the population estimate of the county (0.1%). The variable showing a negative correlation with the dependent variable for an incremental change is the HHI (-65%). Additionally, the results for the statistically significant categorical control variables are the following; ownership type (nonfederal government as reference group) showed not-for-profit with a -46% and for-profit at -60% compared to the reference group, hospital bed size (6-99 beds as reference group) showed hospitals with 100-399 beds as 67% and hospitals with

400+ beds as 143% compared to reference group, location of hospital (metropolitan as reference group) showed micro as -34% and rural at -53% compared to reference group, critical access hospital (non-CAH as reference) was -58% compared to non-CAH, and hospitals in Medicaid expansion states compared to the non-Medicaid expansion state as the reference group was -71%.

Table 3. Bivariate Regression of the Sample

Variables	Uninsured Charity Care as a Percent of Operating Expenses (log-transformed)	p-value
Number of FQHC delivery sites in Hospital's zip code	0.088	< 0.001
Distance between Hospital's Zip and nearest FQHC's Zip (in miles)	-0.021	< 0.001
Ownership Type		< 0.001
Government	reference	
Not-For-Profit	-0.618	< 0.001
For-Profit	-0.917	< 0.001
Adj Average Daily Census (per 100)	0.070	< 0.001
Occupancy Rate	1.377	< 0.001
Bed Size		
6 to 99 beds	reference	
100 to 399 beds	0.512	< 0.001
400+ beds	0.886	< 0.001
Location of Hospital		
Metro	reference	
Micro	-0.423	< 0.001
Rural	-0.763	< 0.001
Teaching Hospital		
No	reference	
Yes	0.323	< 0.001
Critical Access Hospital		
No	reference	< 0.001
Yes	-0.866	
Hospitals in MCD Expansion State		
No	reference	
Yes	-1.249	< 0.001
Minority %	0.021	< 0.001
Median Household Income (in 1000s)	0.001	0.318
% In Poverty	0.027	< 0.001
% Uninsured	0.137	< 0.001
% Of persons with less than HS diploma	0.052	< 0.001
HHI	-1.057	< 0.001
Population Estimate (in 10,000s)	0.001	< 0.001

The purpose of the study was to determine the association of availability and accessibility of FQHC delivery sites on hospital's reported cost of charity care. The results of the regression analysis are shown in Table 3 and Table 4.

Availability:

Hypothesis 1: *The total number of FQHC delivery sites in the zip code is negatively associated with hospital's reported charity care.*

The results of the regression analysis shows that the independent variable of interest to test hypothesis #1, the number of FQHC delivery sites in hospital's zip code, was calculated to have a positive coefficient (0.058, p-value <0.001). Considering the log-transformed dependent variable the interpretation of the independent variable result is understood to have a 6% associated increase of the hospital's cost of charity care as a percent of operating expenses with each one unit increase in FQHC delivery site to the hospital's zip code. This result, while controlling for the other variables listed in Table 3, is interpreted as a positive relationship between the independent variable and the dependent variable. This finding does not support hypothesis #1.

Other statistically significant variables in the regression model were ownership type (not-for-profit at 30% and nonfederal government at -15% when compared to the for-profit reference group), occupancy rate (71%), hospital bed size (hospitals with 400+ beds had a 24% change when compared to hospitals with 6 to 99 beds), critical access hospitals (-14% when compared to non-CAHs), hospital location (rural had a 15% change when compared to metro-located hospitals), hospitals in Medicaid expansion states (-39%) when compared to hospitals not in expansion states, racial minority (1%), percent of county population uninsured (3%), and HHI (-16%).

The sensitivity analysis using the independent variable as a categorical variable showed similar association to the dependent variable, hospitals with one FQHC delivery site in its zip code had a 8% positive effect on the cost of charity care and hospitals with 2 or more delivery sites in hospital's zip code had a 22% increase on cost of charity care when compared to hospitals with no FQHC delivery site in their zip code (both p-values < 0.05).

Table 4. Regression Analysis using # of FQHC delivery sites variable

Variables	Beta coefficient	95 % Confidence interval	
Number of FQHC delivery sites in Zip Code	0.058***	0.031	0.086
Ownership Type			
For-Profit	reference		
Not-For-Profit	0.263***	0.152	0.375
Government	-0.167*	-0.299	-0.035
Adj Average Daily Census (per 100)	-0.007	-0.028	0.015
Occupancy Rate	0.538***	0.331	0.746
Bed Size			
6 to 99 beds	reference		
100 to 399 beds	0.082	-0.028	0.192
400+ beds	0.218*	0.010	0.425
Teaching Hospital			
No	reference		
Yes	-0.083	-0.274	0.107
Critical Access Hospital			
No	reference		
Yes	-0.150*	-0.269	-0.032
Location of Hospital			
Metro	reference		
Micro	-0.055	-0.177	0.067
Rural	-0.164*	-0.300	-0.028
Hospitals in MCD Expansion State	-0.499***	-0.700	-0.329
Minority %	0.006**	0.002	0.010
Median Household Income (in 1000s)	.004	-0.0004	0.008
% In Poverty	-0.004	-0.017	0.008
% Uninsured	0.025**	0.006	0.044
% Of persons with less than HS diploma	-0.008	-0.020	0.003
HHI	-0.176*	-0.327	-0.025
Population Estimate (in 10,000s)	-0.0002	-0.0005	0.0001

* p<0.05, ** p<0.01, *** p<0.001

Accessibility:

Hypothesis 2: *The closer distance between hospital and nearest FQHC delivery site is positively associated with hospital's reported charity care.*

The results of the regression analysis shows that the independent variable of interest to test hypothesis #2, the distance (in miles) between the hospital's zip code centroid and the nearest FQHC delivery site's zip code centroid, was calculated to have a negative beta coefficient (-0.004, p-value <0.05), representing a 0.4% decrease in hospital's cost of charity care as a percent of its operating expenses with each incremental increase in distance from hospital's zip code to nearest FQHC delivery site's zip code. This result, while controlling for the other variables listed in Table 4, is interpreted as a negative relationship between the independent variable and the dependent variable, in other words. This finding does not support hypothesis #2.

The statistically significant variables in the model were ownership type (not-for-profit having a 30% increase on the dependent variable when compared to for-profit and nonfederal government a -15% compared to for-profit), occupancy rate (69%), hospital bed size (hospitals with 400+ beds had a 25% change when compared to hospitals with 6 to 99 beds), critical access hospitals (-14% when compared to non-CAHs), hospitals in Medicaid expansion states (-40%) when compared to hospitals not in expansion states, racial minority (1%), percent of county population uninsured (3%), and HHI (-17%).

Table 5. Regression Analysis using Distance variable

Variables	Beta coefficient	95 % Confidence interval	
Distance (in miles) – Hospital zip code to nearest FQHC delivery site zip code	-0.004*	-0.007	-0.0007
Ownership Type			
For-Profit	reference		
Not-For-Profit	0.265***	0.153	0.378
Government	-0.161*	-0.295	-0.028
Adj Average Daily Census (in 100s)	-0.005	-0.027	0.017
Occupancy Rate	0.527***	0.318	0.736
Bed Size			
6 to 99 beds	reference		
100 to 399 beds	0.083	-0.028	0.195
400+ beds	0.220*	0.008	0.432
Teaching Hospital			
No	reference		
Yes	-0.087	-0.284	0.109
Critical Access Hospital			
No	reference		
Yes	-0.148*	-0.268	-0.028
Location of Hospital			
Metro	reference		
Micro	-0.039	-0.163	0.084
Rural	-0.138	-0.277	0.0004
Hospitals in MCD Expansion State	-0.504***	-0.677	-0.331
Minority %	0.006**	0.003	0.010
Median Household Income (in 1,000s)	0.003	-0.0007	0.008
% In Poverty	-0.005	-0.018	0.008
% Uninsured	0.026**	0.007	0.046
% Of persons with less than HS diploma	-0.009	-0.021	0.003
HHI	-0.183*	-0.336	-0.031
Population Estimate (in 10,000s)	-0.0002	-0.001	0.0001

* p<0.05, ** p<0.01, *** p<0.001

CHAPTER 5

Discussion

With recent hospital financial performance trends heading toward uncomfortably slim margins, hospitals are at an ever-increasing threat of financial insolvency which could lead to closure. Poor financial performance from hospitals has been shown to limit the organization's ability to provide quality of care. (Dubas-Jakóbczyk et al., 2022) Additionally, financially underperforming hospitals often limit breadth of services or eliminate unprofitable service lines in effort to improve margins. Unfortunately, the lower income populations stand to suffer the most due to hospitals located in lower resource areas are at greater risk of becoming financially insolvent.

In this study, we examined the relationship between the availability and accessibility of FQHC delivery sites with the cost of hospital's reported charity care. Our results suggest that the two constructs of Penchensky and Thomas' 5 A's of Access do have a financial impact on hospitals' cost of charity care. More specifically, we found that an increase in FQHC delivery sites in the hospital's zip code is associated with a higher reported cost of hospital charity care (uninsured patients) as a percent of the hospital's operating expenses. This result did not support what was originally hypothesized. One explanation for this could be those hospitals with FQHC delivery sites in their zip codes are more likely to have lower resourced community demographics.

A sub-analysis of the data in the study shows that hospitals with 1 or more FQHC delivery site in their zip code, on average, have a higher percent of people living in poverty and a higher percent of unemployment as well as a lower median household income compared to hospitals with no FQHC delivery sites in zip code. When examining the county demographics using the distance variable (hospitals within 4 miles of nearest FQHC delivery site versus greater than or equal to 4 miles distance), similar results were found. (See Appendix C and Appendix D).

Like availability of FQHC delivery sites, the results regarding the accessibility variable were also shown to not support the hypothesis. Hospitals with closer distances to FQHC delivery site zip codes were associated with greater cost of charity care as a percent of operating expenses. One explanation could be that proximity between hospital and FQHC delivery site leads to a “feeder” effect in the sense that FQHCs do not offer inpatient care and therefore their primary care patients eventually utilize acute care services from nearby hospitals. Similarly, the hospital’s relationship with the community health centers in its immediate area led to an increase in uninsured patient care. It is in the FQHC’s best interest to create a partnership with general acute care hospitals so that their patient population has a more complete continuum of care beyond that of primary care services. Considering FQHCs are in underserved areas, patients utilizing primary health care services of FQHCs would be more likely to seek additional care from hospitals nearest to where they reside. Future research should address any relationship agreement that may exist between hospitals and FQHCs as this could lead to greater volume of patients from the uninsured population.

Additional future research could include the hospital's Emergency Severity Index (ESI). Similar to case mix index, ESI is a triage system that measures the patient's acuity level and resources required to treat the patient. ESI is measure on numerical scale from 1 to 5. Patients with ESI of 1 or 2 are considered to have immediate need of care or a high risk of deterioration in health status. Levels 3, 4, or 5 are not considered to have an immediate need and are in a stable condition. If a hospital experiences a high volume of uninsured patients with an ESI of 3, 4, or 5, then greater utilization of FQHC delivery sites should be encouraged by way of hospital—FQHC partnerships. Lastly, Penchansky and Thomas' conceptual framework was used as a guide to this study, future studies could examine the other "A's" of the framework, namely, Accommodation, Affordability, and Acceptability for relationships between hospital's reported cost of charity care and FQHC delivery sites.

Limitations

The use of secondary data comes with limitations due to the general representational role of the data as opposed to specific data collected for the precise research question and design. Although we controlled for many county-level demographics, it is understood that we were not able to fully control for the demand of charity care for the population. Another limitation we experienced was the approximation used to represent the distance in miles from the hospital to its nearest FQHC delivery site. Publicly available data estimated this distance by using the centroid-to-centroid location of each zip code. Considering the various geographical sizes of counties throughout the United States, these calculated distances do don't fully represent

the direct distance from hospital to its nearest FQHC delivery site. Future research should consider the actual (or drivable) distance from hospital to FQHC delivery site based on exact locations.

Conclusion

Hospitals are facing significant financial challenges as the cost of health care continues to rise in the United States. As hospitals search for ways to improve operational efficiencies and increase revenues, reducing the cost of charity care provided to the uninsured population would improve overall financial performance. Federally qualified health centers are a likely solution to alleviating hospital's cost of charity care as they exist to provide primary care services to underserved areas, regardless of the patient's ability to pay. However, the greater availability and accessibility of FQHC delivery sites to a hospital does not relate to a decrease in the hospital's cost of charity care. Considering FQHCs are partially funded by the federal government, further research should be conducted to examine how FQHCs and hospitals can best utilize their resources and service lines to provide care for the uninsured population while reducing their own financial burden.

References

- American Hospital Association. (2019). Uncompensated hospital care cost fact sheet. Retrieved October, 12, 2010.
- Bai, G., Yehia, F., & Anderson, G. F. (2020). Charity care provision by US Nonprofit Hospitals. *JAMA internal medicine, 180*(4), 606-607.
- Bai, G., Zare, H., Eisenberg, M. D., Polsky, D., & Anderson, G. F. (2021). Analysis Suggests Government And Nonprofit Hospitals' Charity Care Is Not Aligned With Their Favorable Tax Treatment: Study examines government and nonprofit hospital charity care expenses compared to charity care obligations arising from the organizations' favorable tax treatment. *Health Affairs, 40*(4), 629-636.
- Bai, G., Zare, H., Eisenberg, M. D., Polsky, D., & Anderson, G. F. (2022). Comparison of Trends in Nonprofit Hospitals' Charity Care Eligibility Policies Between Medicaid Expansion States and Medicaid Nonexpansion States. *Medical Care Research and Review, 79*(3), 458-468.
- Bennett, K. J., Moore, C. G., & Probst, J. C. (2007). Estimating uncompensated care charges at rural hospital emergency departments. *The Journal of Rural Health, 23*(3), 258-263.
- Bitterman, R. A. (2002). Explaining the EMTALA paradox. *Annals of emergency medicine, 40*(5), 470-475.
- Branson, L., Buxton, M., Chen, L., & Smith, J. (2014). COMMUNITY DEMOGRAPHICS, HOSPITAL SIZE AND HOSPITAL CHARITY CARE. *International Journal of Business & Public Administration, 11*(1).
- Bruch, J. D., & Bellamy, D. (2020). Charity Care: Do Nonprofit Hospitals Give More than For-Profit Hospitals? *Journal of general internal medicine, 1-2*.
- Buczko, W. (1994). Factors affecting charity care and bad debt charges in Washington hospitals. *Journal of Healthcare Management, 39*(2), 179.
- Chen, B. K., Hibbert, J., Cheng, X., & Bennett, K. (2015). Travel distance and sociodemographic correlates of potentially avoidable emergency department visits

- in California, 2006–2010: an observational study. *International journal for equity in health*, 14(1), 1-8.
- Cheung, P. T., Wiler, J. L., Lowe, R. A., & Ginde, A. A. (2012). National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries. *Annals of emergency medicine*, 60(1), 4-10. e12.
- Clement, J. P., White, K. R., & Valdmanis, V. (2002). Charity care: do not-for-profits influence for-profits? *Medical Care Research and Review*, 59(1), 59-78.
- CMS, C. f. M. M. S. (2015). Provider Reimbursement Manual Part 2. Retrieved from <https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/2015-Transmittals-Items/R8P240>
- Cram, P., Bayman, L., Popescu, I., Vaughan-Sarrazin, M. S., Cai, X., & Rosenthal, G. E. (2010). Uncompensated care provided by for-profit, not-for-profit, and government owned hospitals. *BMC Health Services Research*, 10(1), 1-13.
- Davlyatov, G., Borkowski, N., Qu, H., Burke, D., Bronstein, J., & Brickman, A. (2019). Is there an Association between Quality Care and Financial Performance in Community Health Centers? *Journal of health care finance*.
- DeNavas-Walt, C. (2010). *Income, poverty, and health insurance coverage in the United States (2005)*: Diane Publishing.
- Dixon, T. B. (2021). *The Effect of Medicaid Expansion on Hospitals Allowance for Bad Debt*. (Ds.C.). The University of Alabama at Birmingham, United States -- Alabama. Retrieved from <https://uab.idm.oclc.org/login?url=https://www.proquest.com/dissertations-theses/effect-medicaid-expansion-on-hospitals-allowance/docview/2623857578/se-2?accountid=8240>
- https://uab.primo.exlibrisgroup.com/openurl/01UALB/UAB_Libraries?genre=dissertations&atitle=&author=Dixon%2C+Tara+B.&volume=&issue=&spage=&date=2021&rft.btitle=&rft.jtitle=&issn=&isbn=9798762198233&sid=Dissertations+%26+Theses+%40+University+of+Alabama+at+Birmingham Dissertations & Theses @ University of Alabama at Birmingham database. (28776430)
- Dubas-Jakóbczyk, K., Kocot, E., Tambor, M., Szetela, P., Kostrzevska, O., Siegrist Jr, R. B., & Quentin, W. (2022). The association between hospital financial performance and the quality of care—a scoping literature review. *International journal of health policy and management*.
- Evaluation, O. o. t. A. S. f. P. a. (2021). *Trends in the Utilization of Emergency Department Services, 2009-2018*. Retrieved from <https://aspe.hhs.gov/pdf-report/utilization-emergency-department-services>

- Fortney, J. C., Burgess, J. F., Bosworth, H. B., Booth, B. M., & Kaboli, P. J. (2011). A re-conceptualization of access for 21st century healthcare. *Journal of general internal medicine*, 26(2), 639.
- Frank, L. D. (2012). GIS and Public Health. *American Journal of Preventive Medicine*, 42(5), e97. doi:<https://doi.org/10.1016/j.amepre.2012.03.007>
- Frank, R. G., & Salkever, D. S. (1991). The supply of charity services by nonprofit hospitals: Motives and market structure. *The Rand journal of economics*, 430-445.
- Galarraga, J. E., & Pines, J. M. (2016). Costs of ED episodes of care in the United States. *The American journal of emergency medicine*, 34(3), 357-365.
- Gale, J. A., Croom, J., Croll, Z., & Coburn, A. F. (2015). Charity Care and Bad Debt Activities of Tax-Exempt Critical Access Hospitals. *Flex Monitoring Team*.
- Garfield, R., Damico, A., & Orgera, K. (2020). The coverage gap: uninsured poor adults in states that do not expand Medicaid. *Peterson KFF-Health System Tracker*. Disponível em: Acesso em, 29.
- Gaskin, D. J., Herring, B., Zare, H., & Anderson, G. (2019). Measuring Nonprofit Hospitals' Provision of Charity Care Using IRS and CMS Data. *Journal of Healthcare Management*, 64(5), 293-314.
- Gatrell, A., & Senior, M. (1999). Health and health care applications. *Geographical Information systems: Principles, techniques, applications and management*.
- Ghiasi, A., Zengul, F. D., Ozaydin, B., Oner, N., & Breland, B. K. (2018). The impact of hospital competition on strategies and outcomes of hospitals: A systematic review of the US hospitals 1996-2016. *Journal of health care finance*, 44(2).
- Ginter, P. M., & Duncan, W. J. (1990). Macroenvironmental analysis for strategic management. *Long Range Planning*, 23(6), 91-100.
- Gray, C. (2019). The Impact of Community Health Centers on Households and Providers. In.
- Guagliardo, M. F. (2004). Spatial accessibility of primary care: concepts, methods and challenges. *International Journal of Health Geographics*, 3(1), 3. doi:10.1186/1476-072X-3-3
- Havranek, E. P., Mujahid, M. S., Barr, D. A., Blair, I. V., Cohen, M. S., Cruz-Flores, S., . . . Lockwood, D. W. (2015). Social determinants of risk and outcomes for cardiovascular disease: a scientific statement from the American Heart Association. *Circulation*, 132(9), 873-898.

- Haynes, R., Lovett, A., & Sünnerberg, G. (2003). Potential accessibility, travel time, and consumer choice: geographical variations in general medical practice registrations in Eastern England. *Environment and Planning A*, 35(10), 1733-1750.
- Higgs, G. (2004). A literature review of the use of GIS-based measures of access to health care services. *Health Services and Outcomes Research Methodology*, 5(2), 119-139.
- J'Aime, C. J., Landry, A. Y., Hearld, L. R., Weech-Maldonado, R., Snyder, S. W., & Patrician, P. A. (2019). Organizational and environmental factors influencing hospital community orientation. *Health Care Management Review*, 44(3), 274-284.
- Karaca, Z., & Moore, B. J. (2006). Costs of Emergency Department Visits for Mental and Substance Use Disorders in the United States, 2017: Statistical Brief# 257. *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs [Internet]*.
- Kim, T. H., McCue, M. I., & Thompson, J. M. (2009). The relationship of financial and mission factors to the level of uncompensated care provided in California hospitals. *Journal of Healthcare Management*, 54(6).
- Klein, E. Y., Levin, S., Toerper, M. F., Makowsky, M. D., Xu, T., Cole, G., & Kelen, G. D. (2017). The effect of Medicaid expansion on utilization in Maryland emergency departments. *Annals of emergency medicine*, 70(5), 607-614. e601.
- McKenna, R. M., Purtle, J., Nelson, K. L., Roby, D. H., Regenstein, M., & Ortega, A. N. (2018). Examining EMTALA in the era of the patient protection and Affordable Care Act. *AIMS public health*, 5(4), 366.
- Millman, M. (1993). Access to health care in America.
- Nath, J. B., Costigan, S., & Hsia, R. Y. (2016). Changes in demographics of patients seen at federally qualified health centers, 2005-2014. *JAMA internal medicine*, 176(5), 712-714.
- Nath, J. B., Costigan, S., Lin, F., Vittinghoff, E., & Hsia, R. Y. (2019). Access to federally qualified health centers and emergency department use among uninsured and Medicaid-insured adults: California, 2005 to 2013. *Academic Emergency Medicine*, 26(2), 129-139. Retrieved from <https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/acem.13494?download=true>
- Needleman, J. (1995). *The economic behavior of for-profit and nonprofit hospitals: the impact of ownership on responses to changing reimbursement and market environments*: Harvard University.

- Nicholson, S., Pauly, M. V., Burns, L. R., Baumritter, A., & Asch, D. A. (2000). Measuring Community Benefits Provided By For-Profit And Nonprofit Hospitals. *Health Affairs*, 19(6), 168-177. doi:10.1377/hlthaff.19.6.168
- Norton, E. C., & Staiger, D. O. (1994). How hospital ownership affects access to care for the uninsured. *The Rand journal of economics*, 171-185.
- Patient protection and Affordable Care Act. (2010). In *Public law* (Vol. 111, pp. 759-762).
- Penchansky, R., & Thomas, J. W. (1981). The concept of access: definition and relationship to consumer satisfaction. *Medical care*, 127-140.
- Rosenbaum, S. (2015). Additional requirements for charitable hospitals: Final rules on community health needs assessments and financial assistance. *Health Affairs Blog*, 23.
- Rosenbaum, S., Sharac, J., Shin, P., & Tolbert, J. (2019). Community Health Center Financing: The Role of Medicaid and Section 330 Grant Funding Explained. *The Kaiser Family Foundation*.
- Saurman, E. (2016). Improving access: modifying Penchansky and Thomas's theory of access. *Journal of health services research & policy*, 21(1), 36-39.
- Schuur, J. D., & Venkatesh, A. K. (2012). The growing role of emergency departments in hospital admissions. *N Engl J Med*.
- Tang, N., Stein, J., Hsia, R. Y., Maselli, J. H., & Gonzales, R. (2010). Trends and characteristics of US emergency department visits, 1997-2007. *Jama*, 304(6), 664-670.
- Thorpe, K. E., & Phelps, C. E. (1991). The social role of not-for-profit organizations: hospital provision of charity care. *Economic Inquiry*, 29(3), 472-484.
- Valdovinos, E., Le, S., & Hsia, R. Y. (2015). In California, not-for-profit hospitals spent more operating expenses on charity care than for-profit hospitals spent. *Health Affairs*, 34(8), 1296-1303.
- Wang, H., Nejtck, V. A., Zieger, D., Robinson, R. D., Schrader, C. D., Phariss, C., . . . Zenarosa, N. R. (2015). The role of charity care and primary care physician assignment on ED use in homeless patients. *The American journal of emergency medicine*, 33(8), 1006-1011.
- Waters, H. R. (2000). Measuring equity in access to health care. *Social Science & Medicine*, 51(4), 599-612.

- Weissman, J. (1996). Uncompensated hospital care: will it be there if we need it? *Jama*, 276(10), 823-828.
- Wood, K. M. (2000). Legislatively-mandated charity care for nonprofit hospitals: Does government intervention make any difference. *Rev. Litig.*, 20, 709.
- Young, G. J., Flaherty, S., Zepeda, E. D., Singh, S. R., & Rosen Cramer, G. (2018). Community benefit spending by tax-exempt hospitals changed little after ACA. *Health Affairs*, 37(1), 121-124.
- Zhou, R. A., Baicker, K., Taubman, S., & Finkelstein, A. N. (2017). The uninsured do not use the emergency department more—they use other care less. *Health Affairs*, 36(12), 2115-2122.

APPENDIX A
IRB APPROVAL

NHSR DETERMINATION

TO: Cendoma, Philip

FROM: University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)
IORG Registration # IRB00012550 (IRB 03)

DATE: 18-Nov-2021

RE: IRB-300008470
The Association of Availability and Accessibility of Federally Qualified Health
Centers on Hospitals' Reported Charity Care

The Office of the IRB has reviewed your Application for Not Human Subjects Research Designation for the above referenced project.

The reviewer has determined this project is not subject to FDA regulations and is not Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

if you have questions or concerns, please contact the Office of the IRB at 205-934-3789.

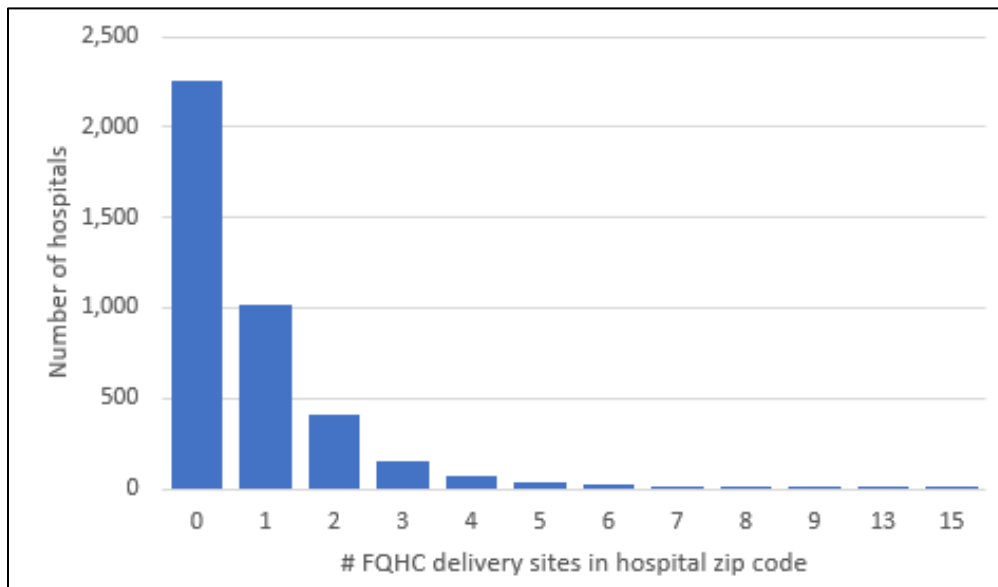
Additional Comments:

Publicly available Hospital data

APPENDIX B

NUMBER OF FQHC DELIVERY SITES IN HOSPITAL ZIP CODE

# FQHC sites in hospital zip code	Frequency	Percent
0	2,252	56.38
1	1,023	25.61
2	409	10.24
3	157	3.93
4	68	1.7
5	36	0.9
6	21	0.53
7	9	0.23
8	7	0.18
9	7	0.18
13	4	0.1
15	1	0.03
Total	3,994	100.00



APPENDIX C

SUB ANALYSIS: COUNTY DEMOGRAPHICS BY # OF SITES

Number of FQHC delivery sites in hospital zip code = 0

Variable	Obs	Mean	Std. dev.	Min	Max
Percent of Persons in Poverty	4,452	12.95633	4.659089	2.6	42.5
Number of Unemployed	4,452	10845.39	29400.47	15	239829
Percent with less than a HS degree	4,452	11.50108	5.397522	1.9	43.1

Number of FQHC delivery sites in hospital zip code = 1+

Variable	Obs	Mean	Std. dev.	Min	Max
Percent of Persons in Poverty	3,489	14.76635	5.311709	3.1	38.2
Number of Unemployed	3,489	15002.01	38357.02	28	239829
Percent with less than a HS degree	3,489	13.14374	5.54698	2.9	46.7

APPENDIX D

SUB ANALYSIS: COUNTY DEMOGRAPHICS BY DISTANCE

Distance < 4 miles

Variable	Obs	Mean	Std. dev.	Min	Max
Percent of Persons in Poverty	4,285	14.44	5.135	3.1	38.2
Number of Unemployed	4,285	18,555	41,478	28	239,829
Percent with less than a HS degree	4,285	12.90	5.37	2.9	43.1

Distance 4+ miles

Variable	Obs	Mean	Std. dev.	Min	Max
Percent of Persons in Poverty	3,656	12.94	4.80	2.6	42.5
Number of Unemployed	3,656	5,776	19,006	15	239,829
Percent with less than a HS degree	3,656	11.43	5.60	1.9	43.1