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Fqhcs, Health Center Controlled Network Affiliation And Performance

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FQHCS, HEALTH CENTER CONTROLLED NETWORK AFFILIATION AND PERFORMANCE

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ABSTRACT

Since the mid-1960s, Federally Qualified Health Centers (FQHCs) have been funded by the U.S. federal government to provide access to preventative and primary care for medically underserved communities. The federal government's involvement in the funding of FQHCs was a response to extreme poverty, economic instability, and civil unrest related to the Civil Rights movement. Adoption of value-based care delivery practices to improve clinical and financial performances among FQHCs has been slow. This slow adoption has been attributable to cost, lack of expertise, and support. Since August 1994, the Department of Health Resources and Services Administration (HRSA), the funding source for FQHCs, has provided grants to support Health Center Controlled Networks (HCCNs) to address this issue. HCCNs assist FQHCs through health center collaboration, shared resources, and the adoption of practice management and Heath Information Technology (HIT) tools to increase participation in value-based care. Although many FQHCs have voluntarily affiliated with HCCNs, there is little known regarding the effectiveness of this strategic collaboration specifically for improving operational (i.e., financial) and clinical performance of FQHCs. The purpose of this study was to determine if there was an association between FQHCs with HCCN network affiliation and their reported clinical and financial performance as compared to FQHCs without an HCCN affiliation. We found that FQHCs with a HCCN affiliation report higher clinical and financial performances when compared to FQHCs with no HCCN

affiliation. More specifically, six out of the seven adjusted clinical quartile rankings (AQRs) evaluated for free-standing HCCNs were more likely to be in the top / best 25% rankings however, only four were statically significant at p= .05. Also, four out of the seven AQRs evaluated for primary care association (PCA) HCCNs were more likely to be in the top / best 25% rankings however, only two were statically significant at p= .05. FQHCs affiliated with both free standing and PCA / HCCNs reported higher financial performance as compared to FQHC without an affiliation. The outcomes of this research are intended to inform healthcare leaders and policymakers regarding the effectiveness of this interorganizational collaboration.

Keywords: FQHCs, HCCNs, interorganizational collaboration

DEDICATION

For Raphael, Katera, Kobe, and our family. We have learned a lot together. This has been a long journey. I used to wonder what I, might accomplish and now we, will tackle changing the world together!

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This dissertation would not have been possible without GOD and the love, support, and encouragement I received from my family and friends. I do not have the words to adequately describe my deep gratitude for all they have provided me, though I hope to show them in the years to come. I have benefited greatly from the prayer and mentoring of strong women of color and I will forever be grateful. I studied population health because of the continuous, disproportionate negative impact on minority communities and a tremendous desire to learn and understand how I might influence change for my family, friends and generations to come. I am truly indebted to the lessons learned from my community in Memphis TN, mentors, colleagues, classmates and family members. My career, and life journey will flourish because of the lessons and encouragement poured into me by others.

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CHAPTER 1

INTRODUCTION

Current trends in healthcare costs and practices are reminiscent of the early 1990s when accelerated change and growing costs threatened access for the poor (The U.S. health care system: a look to the 1990s). These trends are now coupled with the focus of delivering valued-based care. As such, the U.S. federal government through the Health Resources and Services Administration (HRSA), has provided funding to Federally Qualified Health Centers (FQHCs) to ensure access to quality and efficient health care services for medically and financially vulnerable populations.

With more than 30 million people living in poverty (CDC, 2020), one in 12 individuals relies upon FQHCs and Look-Alike community health centers for comprehensive primary care (HRSA, 2018a). Federally Qualified Health Center Look-Alikes are community-based health care providers that meet the requirements of the HRSA Health Center Program, but do not receive Health Center Program funding. Look-Alikes provide primary care services in underserved areas, provide care on a sliding fee scale based on ability to pay and operate under a governing board that includes patients (HRSA, 2021). Throughout this paper, we will interchangeably refer to FQHCs as health centers. These health centers offer a range of services from dental services to primary care. Comprehensive primary care includes three categories: preventative, acute and chronic care. Primary care can span many different clinicians, physicians and social support workers, that could include health center staff and other organizations (Knox &

Parchman, 2015). The goal of FQHCs is to provide comprehensive primary care for low-income and uninsured individuals. To accomplish this goal, a FQHC often partners with another FQHC as well as other health services organizations (Davlyatov et al., 2019). The aim of these partnerships is to provide healthcare and other patient services that are not within the health center's ability thereby improving its capacity for providing efficient and effective healthcare for the population it serves. Partnering with organizations coupled with leveraging technology to coordinate patient-related activities and services can improve health outcomes for FQHC patient populations (Deckard et al., 2010; Steichen & Gregg, 2015). One example of health center partnerships is Health Center Controlled Networks (HCCNs). Dating back to 1994, HCCNs are organized networks of FQHCs leveraging collaboration and shared resources including Health Information Technology (HIT) to improve health center efficacy (HRSA, 2020). Although, strategic collaboration and technology solutions have proven to improve performance; HCCN affiliation and performance has not been studied.

Background

Overview of the creation of Federally Qualified Health Centers. President Johnson's administration is notably remembered by public health advocates for advancements in social justice and poverty. Specifically, his legislative achievements recognized environmental factors that influenced decisions to financially support community health centers. For example, Johnson's War on Poverty resulted in policies to provide economic relief to populations impacted by poverty (Milkis et al., 2013).

In 1964, President Johnson signed into law legislation that initiated the Medicare and Medicaid programs (Stevens, 1996) in addition to the Economic Opportunity Act to fund neighborhood health centers for under-resourced communities targeting uninsured and underprivileged populations (Taylor, 2004). In 1975, the federal government passed the Community Health Center Program, which was authorized under Section 330 of the Public Health Service Act to enable grant funding (Milkis et al., 2013). In 1989, Congress created the Federally Qualified Health Center Program to serve as safety net public health providers. According to The Institute of Medicine (IOM), safety net providers are organizations that establish and deliver a significant level of health care and other needed services to uninsured, Medicaid and other vulnerable populations (Lewin & Altman, 2000).

FQHCs have evolved and established themselves as an integral part of the U.S. health delivery system for ensuring access to preventative care and primary care service for uninsured and low-income populations. Currently, there are more than 20 million people who access care through more than 1,400 health centers in the United States, District of Columbia, Puerto Rico, the Virgin Islands, and the Pacific Basin (HRSA, 2018a).

A goal of FQHCs, as a safety-net healthcare organization, is to increase access to primary care for individuals who due to factors like lack of insurance or financial resources, could not otherwise access health care (Jacobs et al., 2013). Limited access to care over many years can increase the probability of developing chronic diseases. Medically underserved populations have disproportionately poorer health outcomes and less access to quality, affordable healthcare (Jacobs et al., 2013).

Organizational characteristics of FQHCs. FQHCs are not-for-profit ambulatory healthcare centers providing comprehensive primary care services, referrals, and other needed services to vulnerable populations. FQHCs are in medically underserved areas or serve federally designated medically underserved populations of individuals between 100% and 400% of the federal poverty limit at a sliding scale rate (HRSA, 2017a). According to the National Association of Community Health Centers (NACHC), the term "medically underserved population" represents the population of an urban or rural area designated as an area with a shortage of personal health services or a population group, established by the Secretary of State, as having a lack of such services.

FQHCs include community health centers, migrant health centers, health care for the homeless centers, public housing primary care centers, outpatient health programs or facilities operated by a tribe, as well as health center program “Look-Alikes” (Department of Health and Human Services, 2017). FQHCs collaborate with other safety net organizations, community organizations, social services organizations, and specialty care providers to enable access to high-quality primary care (HRSA, 2020). Many health centers also offer dental, pharmacy, substance abuse, and other specialty care services for communities with inadequate access to these services (HRSA, 2017a).

FQHCs are financed primarily through grant funding from the federal government under Section 330 of the Public Service Act (HRSA, 2018a) as well as patient fees, Medicaid and Medicare reimbursement, and other funding sources such as state grants and subsidizes (HRSA, 2017a). FQHCs generally operate with a low-profit margin limiting the availability of financial resources to obtain technology and other practice management improvement tools.

FQHC quality reporting. HRSA requires healthcare quality performance reporting for FQHCs that are identified by the Institute of Medicine (IOM) as needing national action for advancing improved health outcomes (HRSA, 2019). These quality indicators are a set of Core Clinical Measures (CCMs) that target complex health conditions found among vulnerable populations and communities (HRSA, 2019). CCMs include but are not limited to, cancer screenings, prenatal care, HIV screening, age-appropriate immunizations, and specific chronic disease parameters (HRSA, 2019).

In 2015, HRSA began ranking FQHCs' CCM performance in comparison to other FQHCs. HRSA uses adjusted quartiles to evaluate FQHCs' improvement in clinical performance measures after adjusting for differences in selected organizational characteristic factors such as percent of uninsured patients, minorities, and special populations (HRSA, 2020). Improved clinical performance is ranked from quartile 1 (highest 25% of reporting health centers) to quartile 4 (lowest 25% of reporting health centers) (HRSA, 2019). Using the National Uniform Data System (UDS) clinical measures, the objective of CCM performance rankings is to provide FQHCs with clinical performance information as compared to their peers (HRSA, 2020).

FQHC organizational challenges. Health centers operate with a low profit margin which can limit the organization's ability to obtain technology, practice management tools, and internal expertise needed to support value- based care practices (Ko et al., 2015). According to the American Medical Association, the goal of practice management systems is to leverage healthcare software that manages the day-to-day operations of a clinic, such as appointments, scheduling and billing to enhance efficacy. Acquiring and implementing technology-based practice management tools to increase

reimbursement, improve operating efficiencies, and support care coordination in health centers is challenging (Lin et al., 2018). Trends that illuminate barriers to technology adoption in health centers have remained consistent over the years. For example, in a recent study, Lin et al. (2018) identified technology cost, Medicaid reimbursement policies, and technical issues such as the lack of community connectivity as significant barriers to HIT adoption in health centers. This is concerning considering that leveraging technology-related collaborations for care coordination has shown promising results in improving health outcomes among vulnerable and complex populations (Frimpong et al., 2013).

In the absence of technology solutions, coordinating care across many providers and services can be challenging and may contribute to decreases in care quality, patient experience, and health outcomes. As such, in 1994, HRSA announced funding for Health Center Controlled Networks (HCCNs) to support FQHCs' collaboration and technology-based practice management support services (HRSA, 2020). HCCNs were and continue to be part of a larger HRSA goal to help health centers overcome organizational gaps through learning health system networks (HRSA, 2019). The attributes of these learning networks and partnerships include access to shared expertise, training, aligned interest and improved value and care outcomes (HRSA, 2019). HCCNs are one example of strategic collaboration for health centers with a goal of supporting technology enabled improvements in performance (HRSA, 2020).

Health Center Controlled Networks (HCCN)

The original aim of HRSA funded HCCNs (formerly referred to as Integrated Service Networks [ISN]) was to facilitate the collaboration among FQHCs to negotiate contracts with Medicaid managed care organizations (MCOs), centralize certain practice management services, such as billing, and pool data for improving clinical and financial performance. ISNs, now referred to as HCCNs, were built on three overarching principals: (1) locally controlled by health centers, (2) partnership with more than one health center, and (3) agreement for partnering health centers to collaborate for improving performance in at least one area of operations. As time passed, the goal of the networks evolved to meet the needs of the changing healthcare environment. For example, in the 2000's, the aim of most networks was to support FQHCs' acquisition, adoption and implementation of electronic health records to improve the quality and efficiencies of the health centers' operations. Although the Commonwealth Fund reported a 133% increase in electronic health record (EHR) adoption by FQHCs from 2009-2013, little is known about the efficacy of FQHCs that voluntarily participated in HCCNs and their reported overall performance as compared to FQHCs that choose not to participate with HCCNs.

In 1994, HRSA's Bureau of Primary Health Care (BPHC) awarded initial funding for the Integrated Services Network Development Initiative (ISNDI), now known as HCCNs. In this first year, $4.5 million was granted to 29 ISNs. Twenty-five years later, in 2019, HRSA awarded $36 million to 50 networks, a 788% increase in network funding and a 72% increase in HCCN growth (HRSA, 2020). Although each FQHC operates autonomously for the most part, to achieve their organizational goal, networks facilitate among the participating health centers; the coordination of similar business operations,

shared staff expertise, collaboration regarding best practices, and may in some situations leverage strategic partnerships with state and regional primary care associations (PCAs).

Although health centers may have been members of an ISN for many years, it was not until the Health Care Safety Net Amendments of 2002 which created Section 330e(1)(C) of the Public Health Act, that the name "Health Center Controlled Networks" was coined. Today the aim of the HCCN program is to assist health centers leverage health IT to increase participation in value-based care by: (1) enhancing the patient and provider experience, (2) advancing interoperability, and (3) using data to enhance value (HRSA, 2020). According to HRSA, one purpose of HCCNs is to support the operational quality of care delivery at health centers. This can be accomplished through various means such as the adoption and implementation of HIT, including meaningful use of EHRs, patient centered medical home (PCMH) recognition, and quality improvement initiatives (HRSA, 2020).

Technology use for clinical and operational outcomes. HRSA's early and continued focus on supporting FQHCs and HCCN collaboration in the area of technology is grounded in the believe that practice management and HIT solutions support enhanced care coordination efforts, improved low-cost preventative care utilization, and improved efficiency and productivity by strengthening operational workflows and interoperability. However, limited financial resources have and continue to be a significant factor in health centers' decisions to adopt and/or fully implement technology solutions, even though over the past decade, various legislation has enabled the growth of HIT at the center level (Lin et al., 2018). For example, Medicaid expansion states, compared to those in non-expansion states, were more likely to report improvements in their financial stability

(69% vs. 41%) and in their ability to provide affordable care to patients (76% vs. 52%) since the ACA took effect. (Lewis et al., 2019). In addition, the Health Information Technology for Economic and Clinical Health (HITECH) Act and the American Recovery and Reinvestment Act of 2009 (Recovery Act) increased HIT funding opportunities directly to health centers and indirectly through HCCNs (Frimpong et al., 2013).

Technology adoption in health centers can improve care coordination through the standardization of clinical documentation and collaboration among healthcare organizations (Steichen & Gregg, 2015). Although the adoption of technology has been associated with improvements in the provision of preventative care, patient outcomes, and overall quality improvement, health centers have varying degrees of access to, adoption and implementation of HIT. Although growing, the literature is limited about the use and adoption of HIT in FQHCs and its relationship to quality improvement. There appears to be more focus on the financial impact of HIT regarding decreasing waste, improving productivity, and reducing high-cost medical service utilization in health centers (Garg et al., 2005). In addition, little is known about FQHCs' participation in HCCNs, where the goal is to leverage HIT to improve the health center's clinical outcomes and operational (i.e., financial) performance. In other words, there remains a gap in our knowledge regarding the impact of collaborations, specifically HCCN affiliation, on clinical and financial performance in FQHCs.

Defining Collaboration in Healthcare Service Delivery

Interorganizational Relations Theory was first described in the 1960s as organizational transactions. Over the past 50 years, Interorganizational Relationships (IORs) has evolved to include a broad mix of collaborative organizational exchanges, like strategic partnership, mergers and cross sector partnerships and organizational interactions. Currently, IORs describe relational exchanges within and across organizations that are defined by the need for organizations to strategically collaborate through interorganizational interactions thereby sharing resources to improve performance (Parmigiani & Rivera-Santos, 2011).

Collaborations are used to describe groups and organizations working together from different contexts with different experiences, perspectives, and agendas to achieve a common goal (Nyström et al., 2018). Means for collaboration are described in the literature as a form of connection mechanisms (Nyström et al., 2018). Collaboration is a way of knowledge brokering for many organizations and groups. Nyström et al. (2018) defined knowledge brokering as the linking activity for decision-makers and facilitators to better understand each other's goal, professional cultures, influence shared work, forge a new partnership and promote the use of research-based evidence in decision-making processes. For many years, organizations have recognized the value of strategic partnerships that can improve their overall competitive position and product value. Organizations like Nokia, Proctor and Gamble, Toyota, and Zara have applied collaboration strategies to gain competitive advantages (Kim & Lee, 2010).

An offshoot of IOR exchanges is Interorganizational Collaboration Theory (IOC) (Parmigiani & Rivera-Santos, 2011). Collaboration across organizations are frequently

modeled in the literature and referred to as interorganizational collaboration (IOC). The IOC theoretical framework is described as a network of organizations participating in a mutually beneficial partnership to confront similar problems, share resources, and reduce problem-solving costs (Sharma & Kearins, 2011). Collaborations among organizations can facilitate mutual learning and value creation, augment collective problem-solving skills, and elicit greater support from stakeholders for organizational decisions (Sharma & Kearins, 2011).

In healthcare, the goal of many IOC networks is to increase the quality of health and human services by supplementing community problem-solving capacity to address persistent health problems (Sharma & Kearins, 2011). Hasnain-Wynia (2003) points out that improving access and quality care for medically complex populations is best addressed from a broader community-wide perspective. For example, public health, private healthcare, and community agencies, like FQHCs, have benefited from IOC networks by creating public-private IOC partnerships to develop community infrastructures for the assessment, planning, and evaluation of community health needs (Hasnain-Wynia, 2003). These types of IOC partnerships have focused on patients and community needs, to determine priorities for targeting public health system reform (Sharma & Kearins, 2011). In addition, other types of IOC exchanges can be reflected in integrated care models, including comprehensive care for patients' medical, emotional, and behavioral health needs (Cohen et al., 2015). These types of community care networks (CCNs) may include community organizations, human and social services organizations, public health departments, hospitals, and health systems (Sharma & Kearins, 2011).

Interorganizational Collaboration (IOC) is a partnership between organizations that can influence processes to increase organizational resource availability, improve service effectiveness, and improve healthcare access (Gulzar & Henry, 2005). Through its voluntary affiliation with a designated HCCN, a FQHC chooses to strategically partner with other member health centers as well obtain the expertise and coordination of share services of the HCCN in an IOC relationship. Using Interorganizational Collaboration Theory to guide our research, this study intends to examine if there is an association between FQHCs with HCCN affiliation and their reported clinical and financial performance compared to FQHCs without an HCCN affiliation.

Purpose of the Study

Problem Statement

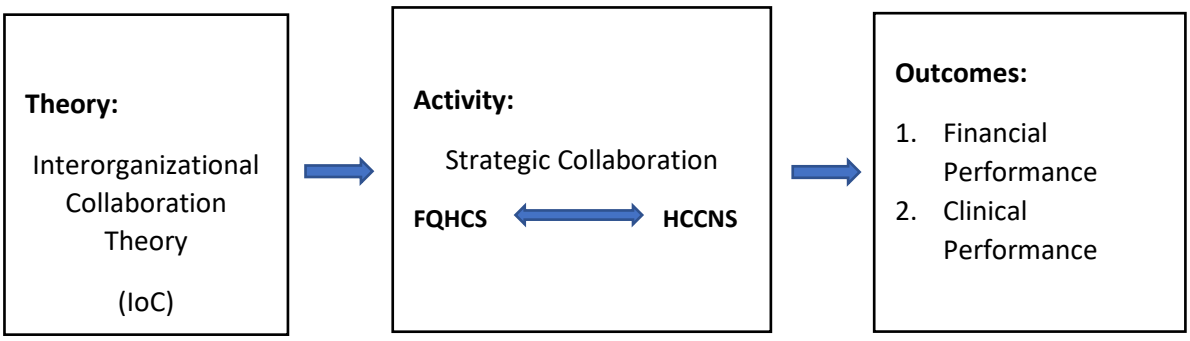
One of the most pressing issues for FQHCs is leveraging knowledge and resources to support value-based care delivery. To address this issue, FQHCs have strategically chosen to either affiliate with a designated HCCNs or not. HCCNs are intended to help FQHCs leverage shared expertise, collaboration, HIT and other practice management services. As previously noted, the objective is to leverage HIT to increase participation in value-based care. However, little is known about the effectiveness of this affiliation. The unanswered question is, “do FQHCs with HCCN affiliation report better clinical and financial performance, as compared to FQHCs with no HCCN affiliation?”

The IOC framework influenced the conceptual model for this analysis. Figure 1 illustrates the IOC relationship between FQHCs and HCCNs and intended outcome performances. Many healthcare organizations engage in strategic partnerships. Public

health and safety-net provider organizations are motivated by access to resources and services to support care provision for underserved communities. One of the aims for HCCNs is to work with FQHCs to leverage HIT to decrease inefficiencies and cost and improve health outcomes. The purpose of this study is to determine if there is an association between FQHCs with HCCN network affiliation and reported clinical and financial performance as compared to FQHCs that are not HCCN affiliated. Specifically, this analysis addressed the following research question, "Is there an association between FQHCs with HCCN affiliation and reported clinical and financial performance as compared to FQHCs without an HCCN affiliation?"

Figure 1

Conceptual Model



Research Question: Is there an association between FQHCs with a HCCN affiliation and reported clinical and financial performance as compared to FQHCs without a HCCN affiliation?

CHAPTER 2

LITERATURE REVIEW

Overview of Federally Qualified Health Centers

Background. In 1964, the Office of Economic Opportunity was established in response to our nation's poverty rates. This Office enabled the establishment and funding of the neighborhood health center program. Since 1965, these neighborhood health centers have provided primary care services to underserved communities (Taylor, 2004). These health centers have evolved and are now referred to as Federally Qualified Health Centers (FQHC), whose designation is defined by Medicare and Medicaid statutes (Taylor, 2004) and regulated by HRSA's Bureau of Primary Health Care (BPHC) under the Health Center Program (Sefton et al., 2011).

Organizational characteristics of FQHCs. The FQHC designation includes organizations receiving grant funding under Section 330 of the federal Public Health Service (PHS) Act (42 United States Code Section 254a). FQHCs are considered healthcare "safety net" providers (Sefton et al., 2011). Safety Net providers include nonprofit entities such as community health centers, public housing centers, outpatient Indian Health Service (IHS) programs, and homeless programs. The goal of health centers is to enable access to preventative health care services in medically underserved communities for vulnerable populations. Medically underserved communities are defined

as those areas that have demonstrated a scarcity of preventative healthcare services or a population with limited access to health services due to economic, cultural, or language

barriers (Sefton et al., 2011). One in 12 people across the United States relies on health centers for care (HRSA, 2020). Health centers are seen as essential points of access to healthcare. Although health centers are viewed as an integral part of the U.S. health delivery system, they face many challenges related to care delivery and costs associated with personnel shortages and the underuse of technology (HRSA, 2020).

FQHC quality reporting. Health centers aim to provide high-quality, low-cost healthcare services to underserved populations. Health centers have HRSA program requirements that must be met, such as providing community-based, comprehensive primary health care and support services irrespective of patients' ability to pay with a quality assurance program, and a patient-majority governance board (Nair & Chen, 2018). FQHCs must report pre-determined measures of patient outcomes through the Uniformed Data System (UDS) (HRSA, 2020). The UDS includes health center data on patient demographics, staffing, clinical indicators, costs, and revenues (HRSA, 2020). This information is used by HRSA to support health centers' performance improvement, ensure health center compliance, and identify trends in health centers' impact on expanding access, addressing health disparities, improving quality, and reducing health care cost (HRSA, 2020). Leveraging UDS data, HRSA also assesses each center for clinical performance measures for quality of care and health outcomes through adjusted quartile ranking. Health center clinical performance is ranked from quartile 1 (highest 25% of reporting health center) to quartile 4 (lowest 25% of reporting health centers) as compared to other health centers (HRSA, 2020). According to HRSA, the factors included for adjustment were factors that vary among health centers. These factors are significantly associated with differences in clinical performance and include percent

uninsured patients, percent minority patients, percent special populations patients (i.e., homeless, farmworker), and Electronic Health Record (EHR) status (HRSA, 2021). The adjusted quartile rankings include: 14 clinical indicators: Childhood Immunization, Diabetes Control, Hypertension Control, Pap Test, Children (Ages 3-17) Receiving Weight Assessment & Counseling, Adults (Age 18+) Receiving Weight Screening & Follow-up, Adults (Age 18+) Receiving Tobacco Use Assessment and Cessation Intervention, Asthma Patients (Age 5-40) Receiving Pharmacologic Therapy, Coronary Artery Disease Receiving Lipid Therapy (18+) Ischemic Vascular Disease (IVD) Receiving Aspirin Therapy (18+), Colorectal Cancer Screening (Ages 51-74), HIV Linkage to Care, Depression Screening and Follow-up (Age 12+) Children (Age 6-9) Receiving Dental Sealant to First Molars (HRSA, 2021). Over the decades, many health centers have been able to meet the minimum quality requirements by using HIT tools for practice management and meaningful use of electronic health records (EHRs) supported by voluntary participation in collaborations to share expertise and best practices.

FQHC organizational challenges. Health centers operate with a low-profit margin hence limiting their resources to secure expertise to support more advanced practice management systems and HIT adoption and usage. One of the most pressing issues for health centers is broad adoption and usage of technology tools to support practice management systems for the improvement of clinical and financial performance. As such, this study focuses on the health centers' strategic decision to collaborate with others to gain the expertise needed in technology adoption and usage as well as the sharing of best practices with the aims of improving care coordination and health outcomes for patients, and operating efficiencies.

Health Center Controlled Network (HCCN)

Background. According to HRSA, Health Center Controlled Network (HCCN) are groups of health centers that collaborate to improve clinical and financial performance. There are two categories of HCCNs that are eligible for federal funding: (1) Free Standing HCCNs, and (2) HCCNs Programs within Primary Care Associations (PCAs). The evolution of HCCNs (formerly referred to as Integrated Services Delivery Networks) and HRSA's goals for funding HCCN's operations date back to the early 1970s.

HCCN program: 1970s. During the mid-1960s, the health center program was initiated to provide access to primary care in medically underserved communities (Taylor, 2004). The health center model of care was based on three criteria: (1) mission driven, (2) access regardless of ability to pay, and (3) majority patient governed. According to the National Association of Community Health Centers (NACHC), in the 1970s the inaugural FQHCs demonstrated that locally governed healthcare can improve health outcomes while lowering costs. However, due to limited resources, during the late 1970s, health centers soon realized that they could do more and be more effective if they collaborated with each other regarding operational efficacy and political lobbying than if each center attempted to do it on they own. The health centers began creating informal local networks to achieve their stated goals of sharing best practices and increasing their political strength by sharing one voice to establish their value and for sustainable funding. Hence, the early version of FQHC collaborating networks was born.

HCCN program: 1980s. By the 1980s, the health center model of care proved to improve patient outcomes for the vulnerable populations that they served. However, by

the late 1980s, the need for continued health center funding and support to challenge the competition from Medicaid managed care programs was evident (NACHC, 2020). In the early 1970s the Health Maintenance Organization Act of 1973 was passed and interest in managed care and practice management tools cemented healthcare related political priorities (National Council on Disability.org, 2020). The goal of managed care is to manage care cost, healthcare utilization, and quality, through coordinated healthcare systems (CMS, 2020). The FQHC collaboration and network discussions that began between health centers in the 1980s evolved to focus on leveraging shared services and resources to align with these political priorities.

HCCN program: 1990s. HRSA became interested in formally leveraging health center collaborations in the 1990s. HRSA began funding demonstration grants for network collaboration in 1994, referred to as integrated services networks (ISNs), now known as HCCNs (HRSA, 2020). The original network principles included: (1) majority ownership must be with the health centers, (2) agreement among health center members to collaborate, and (3) consensus on shared goals and priorities. In addition, HRSA established a taskforce of health center network leaders to open communication channels regarding challenges. The foci for health center networks in the 1990s was increasing the adoption of technology-based practice management systems and supporting the ability of FQHCs to either join or compete with Medicaid managed care programs in their communities.

HCCN program: 2000s. As the managed care movement grew within the healthcare industry, so did HRSA's interest in health information technology. HRSA understood that EHRs were a way to increase access to clinical quality data from health

centers. The focus of networks evolved to align with HRSA priorities, one being the increase adoption and use of technology in health centers through HCCN support. Because of the positive outcomes of the previous ISN collaborations, in 2002, Congress passed Section 330(e)(1)(C) of the Public Health Service Act formally establishing what is now referred to as Health Care Controlled Networks (HCCNs) with a mission to improve operational effectiveness and clinical quality outcomes in health centers through the provision of management, financial, technology and clinical support services. The legislation requires that networks be majority controlled or majority owned by FQHCs to receive operational funding under Section 330. During the mid-2000s, the primary goal of HCCN/FQHC partnerships was to support effective and efficient access to health care for the medically underserved populations through the enhancement of health center operations supported by health information technology (HRSA, 2020).

HCCN program: 2010s. Based on FQHCs case studies success stories, in the early 2010s HRSA's goal was to have a high majority of health centers join HCCNs to benefit from shared services and expertise. To accomplish this goal, HRSA made two changes to its funding eligibility requirements. First, Primary Care Associations (PCA) were able to participate, and second each HCCN grantee was required to have a minimum of 10, versus the previous requirement of three collaborating health center partners. The requirement change for 10 participating health centers caused some free-standing HCCNs to reverted to non-federal funded status (and some continue to operate as such) or to partner with other HCCNs or PCAs to meet the minimum collaborating partner requirement.

PCAs are nonprofit organizations that provide training, support and technical assistance to health centers and other safety-net providers (HRSA, 2020). The technical assistance and support is based on statewide and regional needs to help health centers improve clinical and financial performance through strategy and alignment with political priorities (HRSA, 2020). To qualify for network federal funding, PCAs established HCCN programs within their existing organization. HRSA achieved its goal. By 2015, approximately 70% of FQHCs participated in a network and by 2020 approximately 83% of FQHCs participate in a network.

Networks are afforded a great deal of autonomy in determining the activities to meet their goals. According to HRSA (2020), networks have flexibility in determining their activities. Each network is unique, depending on market factors, collaborators, needs, and interests. In different marketplaces, issues such as demand and levels of managed care, composition of collaborators, and/or unique health care delivery characteristics impact function and composition.

HCCNs Case Studies

Although there has been limited empirical research evaluating the effectiveness of HCCNs in achieving the stated goals at the patient level, there are case studies and performance improvement demonstrations published highlighting operational outcomes. HCCN projects generally target functional areas of health center operations requiring high-cost and/or highly specialized trained personnel, procurement of large infrastructure. For example, in Tuscan Arizona, CHC Collaborative Ventures, Inc. The CHC network encompasses 12 health centers. CHC network activities include: software development;

group purchasing; human resources management; development of new clinical services and deployment of business intelligence software for improved day to day management, budgeting (HRSA, 2020) FY 2010 Reported accomplishments included: deployment of Medicaid insurance eligibility software, improved billing and collection processes, network support to individual CHCs adding pharmacy services and ongoing human resources management (HRSA, 2020).

Technology use for clinical and operational outcomes. Over the past two decades, HRSA has focused its attention on supporting FQHCs efforts either directly or indirectly through HCCNs to adopt and implement both technology-based practice management systems and HIT for the purpose of improving the heath centers' clinical and operational performances. HIT is the processing, storage, and exchange of health information in an electronic environment (HRSA, 2020). Healthcare Practice Management systems have many capabilities: scheduling, billing and care coordination. The vast majority of research examining the role of technology in improving healthcare outcomes is limited to HIT. Technology solutions like practice management systems or HIT are recognized by HRSA and the American Medical Association as essential in improving health center efficacy and improving performance. Research has shown that healthcare providers face many challenges which include the increasing dependence on technology solutions to improve quality and performance (Alzoubi et al., 2019). Davlyatov et al. (2019) published a study that examined the relationship between the age and extent of HIT adoption/use and clinical performance in FQHCs. This study used a longitudinal national data set of 982 FQHCs for the period 2011 to 2016. The clinical performance areas examined included: (1) quality of care (cervical cancer screening and

colorectal cancer testing); and (2) health outcomes (controlled hypertension and diabetes). Specifically, the quality-of-care measure included (1) the percentage of women 21-64 years of age who received one or more Pap tests, and (2) the percentage of adults 50-80 years of age who had appropriate screening for colorectal cancer. The health outcome measures included (1) the percentage of adult patients (> 18 years) patients with diagnosed diabetes who had hemoglobin A1c lower than 8%, and (2) the percentage of adult (> 18 years) patients with diagnosed hypertension whose blood pressure was less than 140/90 during the study period year (Davlyatov et al., 2019). For the 982 FQHCs, the average age of HIT adoption was 3.08 years, and 82% of the FQHCs fully adopted/used HIT. The researchers found that the age of HIT adoption was significantly associated with the FQHCs' clinical measures. Specifically, each additional year of HIT adoption was associated with a 2% increase in diabetic control, 5% increase in hypertension control, 3% increase in colorectal tests, and 4% increase in Pap tests (Davlyatov et al., 2019).

The results of the extent of technology adoption/use were equivocal. FQHCs that fully adopted HIT had 7% higher hypertension control that those that did not adopt HIT. However, partial adoption/use of HIT was negatively associated with colorectal tests and Pap tests compared to FQHCs that had no HIT at all. The study's authors concluded that although the results were mixed in terms of the association between the extent of HIT adoption/use and clinical performance, their findings demonstrated that early adopters of HIT had improved clinical performance outcomes. The authors suggested that the study's findings could help stakeholders make informed decisions regarding how FQHCs can improve care for their patients and potentially sustain a competitive advantage. This study

did not mention whether FQHCs were associated with an HCCN, so there is no way to related it to any of the improved clinical performance outcomes with this relationship.

Frimpong et al. (2013) examined the association between HIT capacity at FQHCs and quality care. HIT capacity referred to the availability and use of multiple and advanced HIT functionalities. The researchers utilized data from the 2009 National Survey of Federally Qualified Health Centers with 776 FQHCs participating. Frimpong et al. (2013) found that of the 776 FQHCs included in the study, 43% utilized electronic medical records. Additionally, only 32% of FQHCs were classified as having high HIT capacity compared to 50% of FQHCs with low HIT capacity. The study reported a positive association between HIT capacity and quality of care. FQHCs with higher HIT capacity were significantly more likely to have improved quality of care outcome measures. High HIT capacity FQHCs had 1.43 times the odds of usually/often receiving discharge summaries. FQHCs which had high HIT capacity had nearly two times the unadjusted odds of sending patients notifications for preventive or follow-up care, and FQHCs with high HIT capacity were more likely to get timely appointments for specialty care. The study's findings showcased HIT's influence in improving quality care, particularly for vulnerable populations at FQHCs. This study also did not mention whether the FQHCs engaged in a strategic collaboration with a HCCN, so there is no way to associate any of the improved quality of care outcomes with that relationship.

There are also studies about the adoption of HIT, such as the adoption of electronic health records (EHR), and the association of quality improvements with clinical outcomes within FQHCs. Kern et al. (2015) assessed the longitudinal effects of EHRs on health care quality in six FQHCs in New York. The study period was for three

years and included 25,290 unique patient visits. The study examined 12 quality measures: (1) appropriate asthma medication; (2) breast cancer screening; (3) cervical cancer screening; (4) colorectal cancer screening; (5-8) for patients with diabetes: hemoglobin A1c test done, hemoglobin A1c test <7%, hemoglobin A1c test >9% or no test, low-density lipoprotein cholesterol <100 mg/dl; (9 and 10) for patients with ischemic vascular disease: appropriate antithrombotic medication, low-density lipoprotein cholesterol <100 mg/dl; (11) influenza vaccine; and (12) pneumococcal pneumonia vaccine (Kern et al., 2015). The study's findings revealed that patients were twice as likely to receive recommended care on a set of 12 quality measures three years post-EHR implementation, compared to one-year post-implementation. The proportion of patients receiving recommended care significantly increased for eight of the 12 measures from the first to the second-year post-implementation of the EHR, and five of the 12 measures from the second to the third-year post-implementation (Kern et al., 2015). The researchers concluded that EHRs were associated with continuous improvement in healthcare quality for at least three years' post-implementation in the safety net setting of an FQHC. The authors discussed that EHRs could improve clinical outcomes through decision support, such as alerts, reminders, evidence-based recommendations, and smart tools for ordering and documenting preventive services and managing chronic disease. As in the previous studies, Kern et al. (2015) did not indicate whether the FQHCs were associated with an HCCN, so there is no way to assess if any of the improved clinical performance outcomes were the outcome of a collaborative relationship.

In 2005, Garg et al. (2005) conducted a study to assess the effects of computerized clinical decision support systems (CDSS) and practice management tools,

on practitioner performance and patient outcomes. CDSS are systems intended to improve clinical decisions through software algorithms that generate patient-specific recommendations. The questions used to assess the studies were (1) Do CDSSs improve practitioner performance or patient outcomes? (2) Which CDSS and study-level factors are associated with effective CDSSs? In 47% of the studies, CDSS was part of an electronic medical record or HIT system. Garg et al. (2005) found that 90% of trials described the effect of CDSS on performance and 50% assessed patient outcomes. Findings also included the improvement HIT had on patient orders, and physician ordering practices. More than 50% of CDSSs were diagnostic systems for cardiac ischemia in the emergency department, and the rate of unnecessary hospital or coronary care admissions reduced by 15% ($P<.05$) (Garg et al., 2005). However, this study did not mention whether the FQHCs were members of an HCCN, so there is no way to associate any improved quality measures with that relationship.

Interorganizational Theory (IOC) and Collaboration

The underlying philosophy of collaboration literally is to ‘‘co-labor,’’ or work with others to achieve a shared goal and it seems to have reached all spheres of the economy and society. In the business world, collaboration has progressed far beyond its original focus on a competitive and individualistic mindset (Le Pennec & Raufflet, 2016, p. 817). In 2001, Chaskin et al. recognized leadership development and community organizing as strategies used by businesses to leverage shared resources and build capacity (Chaskin et al., 2001). Many organizations participate in partnerships due to shared goals and aligned culture. Collaboration, partnerships, alliance building,

cooperation or corporative agreements, and consortium are terms often used to describe the process of organizations working together. By definition, interorganizational theory (IOC) refers to strategic decision-making that involves coordinating and organizing innovation activities. IOC describes managing and initiating the relationships within the external party and internal organizational relationships (Jones & Furukawa, 2014). Collaborative organizations share their resources, exchange information and increase the ability to benefit mutually, and thereby discover a joint purpose by sharing risks and uncertainties, rewards, and responsibilities. An agreement for cooperation among two or more independent bodies to work together towards a common goal can be a strategic collaboration. Strategic collaboration ultimately creates value for audiences while organizations continue to remain independent.

History of organizational collaboration. There are various definitions of collaboration, most of which highlight participation of more than one organization or firm. Alliances, specifically collaboration, is not a new strategic phenomenon used by companies. Its usage has been documented as early as the 17th century (Kodama, 2018). Fast forward, around the 1970s, the focus of strategic collaboration changed from simple product quality like technology innovations, to more of an economic stimulus. Therefore, success is defined by an organization's capacity to build quality relationship assets for value creation (Le Pennec, 2016). During this time, large profitable strategic collaborations evolved, for instance, collaborations between Toshiba and Motorola, or IBM and Microsoft to leverage shared resources to gain strategic advantage. Notably, after the 1990s, with international markets skyrocketing, strategic collaboration began to turn towards the need for the better, newer, and more shocking products (Kodama, 2018).

As digital transformation played an integral part in successful organizations, most firms turned towards strategic collaboration to stay abreast with the advancing market. Over time, strategic collaboration has become centered on continuous collaboration and innovation in the current marketplace (Kodama, 2018), and strategic collaborations are increasingly growing as business organizations become even more deeply entrenched and intertwined with the digital transformation. In most cases, a business success depends widely on its utilization of technological resources from in-house financial, management, and inventory programs, to user-friendly websites and computer-driven registers.

The most current interorganizational collaboration theory (IOC) deals with digital transformation and innovation, such as social media platforms (Jones & Furukawa, 2014). For instance, with the ease of communicating with numerous mediums, the structures and levels of coordinating interorganizational theory can take diverse forms. These from range from a loose decentralized strategy that uses low levels of coordination that is below the threshold, such as the online societal organization, to a categorized organizational structure that uses massive coordination such as forming an interorganizational movement (Devece et al., 2019). Today, many organizations compete in a global context, and this trend is not expected to subside (Devece et al., 2019). With high levels of competition, organizations tend to join forces, share information, and share the risks and uncertainties that may occur while exploiting the scarce resources and enjoying the mutual benefit of their forces. There is a growing acknowledgment among organizations that collaboration rather than competition may be a better approach to survival.

Interorganizational Collaboration Theory (IOC) research. One of the most promising areas of IOC theory research is based on the results of collaborations that have been studied at the organization, individual, and group levels (Kodama, 2018). These contributions may lead to outlines for the foundation of other institutions such as technologies and regulations that can be galvanized by organizational associates or be used by cooperating groups in the future (Kodama, 2018). Many scholars suggest that most successful large-scale interorganizational frameworks were developed from the fertile environment of previously successful collaborating groups.

Collaboration among organizations has a relatively high rate of participation suggesting a positive perception of purpose associated with establishing goals and priorities and other leadership acts concerning collaboration. Research on IOC theory suggests that there are crucial benefits of collaboration among organizations (Kożuch & Sienkiewicz-Małyjurek, 2016). Various organizations implement learning to exchange essential information and activities, share resources, improve ability to benefit mutually, and establish a common purpose by sharing risks and uncertainties, rewards, and responsibilities (Kożuch & Sienkiewicz-Małyjurek, 2016). This will, in turn, lead to minimizing the cost of inputs while maximizing operational performance. Research outcomes in strategic collaboration identify categories of success, the establishment of relationships that bring value to the surrounding communities, and collective identity. Despite limitations and diversities, building something together is, in the end, mutually beneficial. Many organizations recognize the importance of working with other agencies to improve outcomes.

Collaboration, IOC, and organizational performance. Financial performance indicates the level of performance of an organization over a given time, articulated in terms of available profits and losses during that period. With interorganizational collaboration, evaluation of financial performance allows decision-makers from every organization to judge business stratagems' results, and activities in objective financial terms (Kożuch & Sienkiewicz-Małyjurek, 2016). Financial performance has been of significant concern to strategic management practitioners. It has implications for organizational health and well-being. High performance indicates management effectiveness and efficiency in using organizational resources and hence contributing to the economy at-large.

An organization’s financial situation determines the operating performance of the firm and shapes its financial structure. Operational performance objectives tend to focus on performance areas that an organization tries to improve to meet a corporate strategy (Kodama, 2018). Understanding operational performance objectives is crucial within an organization and vital to improve overall production efficiency. The IOC theory trend in improving operational performance has taken center stage for transformational initiatives, approaches, and technology and enabled organizations to perform better with greater agility, precision, and flexibility (Kodama, 2018). Operational performance as measured in collaboration is widely accepted as a significant success aspect for organizations that unite to achieve a common goal. Whether an organization starts a journey or attains higher performance levels, information technologies are responsible for providing the necessary means for improvement. Accordingly, improving operational performance

leads to organizational success. The result is an organization with efficiency, agility, and accuracy to consistently outpace the competition (Kodama, 2018).

Collaboration, IOC theory, and healthcare. IOC theory has beneficial applications in health care and other fields. For instance, IOC enables; better decision making shared among health care providers and patients, enhanced cooperation among dispersed units, as well as sharing of significant ideas and recombining scarce resources to save on cost (Kożuch & Sienkiewicz-Małyjurek, 2016). In 2013, a study was conducted to assess IOC and shared learning to support better care for geriatric populations (Ryan et al., 2013). This study aimed to establish a multi-organizational integrated primary care training model to better support frail seniors. In the study, physicians were part of a blended model with family health teams (FHT) and community health centers. The physicians were employed members of inter-professional teams targeting vulnerable communities, specifically geriatric populations. One hundred and forty-two FHTs and 46 Community Health Centers were invited to join the collaboration. Ninety-nine FHTs and 82 CHCs voluntarily participated in the IOC. Various staff types were included in the training, e.g., nurses and administrators. Staff representing different organizations were sent a survey to assess the effectiveness of the interorganizational training. Fifty-eight percent indicated some team planning for changes in senior care, and 40% indicated that the team had made “moderate” (32%) or “a lot” (8%) of change in their team’s care of frail seniors as a result of the training (Ryan et al., 2013).

Although interorganizational research can be carefully prepared, it still faces several limitations such as time and insufficient knowledge concerning underlying dysfunctions and their results. One limitation of IOC theory, is the limited research of the

efficacy of use in healthcare, more specifically FQHC relationships. Although Davlyatov et al. (2020) examined FQHC participation in organizational networks and resulting outcomes, this author was unable to find any published studies that specifically examined the association of FQHCs participating in strategic collaborations with HCCNs related to improvements in clinical and financial performance. This study aimed to leverage the IOC theory, to measure the association between FQHCs with HCCN network affiliation and their reported financial and clinical performance as compared to FQHCs without an HCCN affiliation.

Collaboration and IOC theory within health centers. Interorganizational collaboration is promoted as a rational and effective process through which the public expectation for accountability, results, and outcomes from human service organizations can be met (Alaszewski & Harrision, 1988; Austin, 2000; Chrislip & Larson, 1994; Gray, 1989; Page, 2003). Interorganizational collaboration in human services reflects a history of reform through legislation and federal funding to achieve "service integration" (Hassett & Austin (1997) and Neugeboren (1990). An FQHC is a community-based healthcare provider that serves uninsured, migrants, the homeless, and other public health care patients with a nonprofit motive (Heisey-Grove et al., 2014). However, this has not been the driver for interorganizational collaboration in other industries, where profit-making is the main objective to be achieved by the organizations involved. The collaboration between hospitals and FQHCs to improve the access to care is similar to interorganizational cooperative, where various organizations collaborate by enhancing ability to benefit mutually or identifying a common purpose.

Collaboration and Health Center Controlled Networks. Health Care Controlled Networks (HCCN) are uniquely positioned to assist health care centers in improving patient quality of care and safety through collaboration and leveraging technology solutions (Heisey-Grove et al., 2014). HCCNs provide specialized technical assistance and support to provide and maximize economies of scale, for instance, shared training, group purchasing power, and data analysis to support quality improvement. HCCNs aim to ensure effective use of health care technology for improved health outcomes through firm partnerships. This is the case of interorganizational theory, where collaborative organizations engage in work and share, hence enhancing the mutual benefit capacity. Moreover, HCCNs support FQHCs to improve quality care and achieve cost efficiencies by redesigning practices. In a study by Davlyatov et al., (2020), the researchers found that a significant positive relationship between health centers that participated in interrogational collaboration and clinical performance. However, this study did not find statistical significance with health centers and financial performance, additionally this study did not evaluate HCCN affiliation (Davlyatov et al., 2020).

Health Center Controlled Network organizational structure. There are two categories of HCCNs: (1) Freestanding HCCNs, and (2) HCCN Programs within Primary Care Associations (PCAs). An HCCN must have its own governing board, independent of the boards of its health center members. Freestanding HCCNs are organizations comprised of one or multistate network members. Freestanding HCCNs are networks established to, and focus primary on supporting HCCN priorities. Freestanding HCCNs are separate entities, majority owned and governed by FQHCs with member FQHCs within a one of more PCA’s state territories. PCAs are state specific organizations and

the PCA/HCCN programs are comprised of interstate network members. PCAs are private, non-profit organizations that receive Cooperative Agreement funding from HRSA to provide training and technical assistance to potential and existing health centers and other safety-net providers to support the development of health centers in their areas, enhance the operations and performance of health centers, and develop strategies to recruit and retain health center staff. In addition, to providing FQHC technical support, PCA/HCCN grantees receive additional funding to support HCCN goals leveraging previously established PCA and FQHC relationships.

Health centers are often members of multiple networks to accomplish organizational goals. A health center's decision to join a network is driven by many factors; shared interest in a specific EHR, shared culture or shared local political priorities. To meet the minimum HRSA qualifications to apply for HCCN funding, HCCNs must have a minimum membership of 10 participating health centers. Participating health centers submit a Memorandum of Understanding (MOU) to the HCCN, to accompany the HCCN grant application agreeing to be a participating member. FQHCs can belong to more than one HCCN, however network membership can only be counted once for formal HRSA HCCN grantee requirements. This study seeks to evaluate the relationship between FQHC affiliation with HCCNs and their reported clinical and financial performance. The goal of this study is to understand if this strategic collaboration, through HCCN affiliation influences health center performance.

CHAPTER 3

RESEARCH METHODS

This chapter describes the research design, data sources, variables, and statistical analyses used to test the study's hypotheses. The purpose of this study was to determine if there is an association between FQHCs with a HCCN network affiliation and their reported clinical and financial performance as compared to FQHCs without a HCCN affiliation.

Hypotheses

- **H1a** FQHCs with a freestanding HCCN affiliation are more likely to be in the top quartile ranking for clinical performance as compared to FQHCs without a HCCN program affiliation.
- **H1b** FQHCs with a PCA/HCCN affiliation are more likely to be in the top quartile ranking for clinical performance as compared to FQHCs without a HCCN program affiliation.
- **H2a** FQHCs with a Freestanding HCCN affiliation report higher total margin performance as compared to FQHCs without a HCCN program affiliation
- **H2b** FQHCs with a PCA/HCCN program affiliation report higher total margin performance as compared to FQHCs without a HCCN program affiliation

Population

This study was an exploratory, cross-sectional study for the HCCN grant year 2019. The study's population consists of all FQHCs that meet both federal requirements

and receive grants under Section 330. As such FQHC look alike organizations were excluded. Since the study's independent variable is federally funded HCCN affiliation, all HCCNs that meet both federal funding requirements and received funding under Grant 16-010 are included. These HCCNs within two categories: (1) Freestanding HCCNs, and (2) PCA/HCCN programs.

Data Sources

This study used data from various publicly available sources. HRSA's reported 2019 grantees with affiliated FQHCs funded under Grant 16-010 was used to identify HCCNs. HRSA's Uniformed Data System data (UDS) was used to obtain FQHCs' organizational characteristics. HRSA's Health Center Adjusted Quartile Rankings (AQRs) was utilized to obtain data on clinical performance and the 2018 HRSA Health Area Resource File (HARF) data base was used to obtain county-level FQHC market factors. Finally, Internal Revenue Service (IRS) form 990 data extracted from GuideStar was used to calculate FQHCs' total margin for reporting year 2018. The UDS data reports FQHCs' patient demographic information and health outcomes as well as organizational characteristics including HIT usage and adoption information, specifically the health center's implementation of an EHR, certification of systems, HIT capability and how widely adopted the system is throughout the health center and its providers (HRSA, 2020).

Variables

The unit of analysis is the Federally Qualified Health Center. As noted previously, the independent variable is if the FQHC is affiliated with a federally-funded HCCN. HCCN affiliation was coded as, (0) no affiliation, (1) freestanding HCCN affiliation and (2) PCA/HCCN affiliation. The dependent variables are clinical health center adjusted quartile rankings, (AQR) and financial (total margin) performance (see Table 1). Health Center Controlled Networks work together and leverage health information technology

Table 1

Variable Types, Definitions, and Sources

Variable	Variable Type	Source	Operationalizing Variables
Funded Health Center Controlled Network 1. Freestanding HCCN 2. PCA/HCCN Association	Independent Variable	(HRSA)	Categorical Variable used to identify category of HCCN affiliation • (0)- No Funded HCCN Affiliation • (1)- Freestanding HCCN Affiliation • (2)- PCA/HCCN Affiliation
FQHC Clinical Performance (CCM) 1. Performance Quartiles: 1-4	Dependent Variable	HRSA's Core Clinical Measures (CCM)	FQHC clinical performance compared to other FQHCs, while adjusting for specific differences in patient characteristics Categorical Variable • (1) Quartile 1 (highest 25% of reporting health center) • (2) Quartile 2 • (3) Quartile 3 • (4) Quartile 4 (lowest 25% of reporting health centers)
FQHC Financial Performance 1. Total Margin	Dependent Variables	Internal Revenue Service (IRS) Form 990	Continuous Variable Formula: Net income/total revenue
Federally Qualified Health Center (FQHC) Organizational Characteristics 1. Patient Demographics Age (65 and Older) Gender 2. Size of FQHC 3. % of minority patients 4. Payer Mix 5. % of patients in poverty 6. Location (Urban v. Rural)	Control Variables	(HRSA)-Uniform Data System (UDS) administrative database	Organizational Characteristics: Continuous Variables FQHC Size Proxy- number of patients seen annually Categorical Variables: Patient Demographics Location of FQHC ((1)-Urban v. (2)-Rural)

7. Health Center Health Information Technology (HIT) Capabilities			Categorical Variable: Tech Ranking: The extent of HIT Use 0 Not Beyond Patient Care 1 Low HIT Usage (1-2 Responses) 2 High HIT Usage (3 or More Responses)
Market Factors Providers: 1. Physician Rate (per 100,000 population) 2. Per capita income 3. Percentage of pop >65 yrs	Control Variables	(HRSA) Area Health Resources Files	Factors within a defined FQHC's market that affect FQHC performance Location: Providers: Continuous Variables: Per capita income Percentage of pop >65 yrs Physician Rate (per 100,000 population)

technology (health IT) to improve operational and clinical practices. Adjusted quartile rankings (AQRs) are calculated by HRSA reflecting each FQHCs clinical performance on 16 measures as compared to other FQHCs, after adjusting for differences that influence clinical performance, such as certain patient demographics and electronic health record status. Clinical performance for each measure is ranked from quartile 1 (highest 25% of reporting health centers) to quartile 4 (lowest 25% of reporting health centers) (HRSA, 2021).

As previously noted, FQHCs AQRs are adjusted for organizational characteristics that may influence clinical performance. These characteristics include percent of patients that are uninsured, minority, homeless and farmworker patients (HRSA, 2021). Additionally, electronic heath record (EHR) status is included in HRSA's AQR adjustment formula. For this study, the top reported seven AQR clinical performance measures were included. These measures were Diabetes Control, Depression Screening and Follow-up (Age 12+), Adults (Age 18+) Receiving Tobacco Use Assessment and Cessation Intervention, Adults (Age 18+) Receiving Weight Screening & Follow-up,

Colorectal Cancer Screening (Ages 51-74), Pap Test/Cervical Cancer Screening and Hypertension Control. These seven measures represent the programs and services that the majority of health centers provide for their patient populations. As such, each of the seven measures had less than 1% of missing variables. Clinical performance for each FQHC's seven variables were categorized by HRSA calculated AQR: (1) Quartile 1 (best/ highest 25% of reporting health centers), (2) Quartile 2, (3) Quartile 3 and (4) Quartile 4 (lowest 25% of reporting health centers). As previously noted, HRSA's AQR calculation adjusts for certain organizational characteristic related to patient demographics and EHR status. As such, for Hypothesis 1a and 1b, we controlled for organizational characteristics, excluding percentage of minority and uninsured patients, and county-level market factors. For this analysis, HIT usage is determined by FQHCs' responses to how they are using electronic health records (EHRs), whereas HRSA accounts for EHR status by the number of health centers using EHRs (HRSA, 2021).

Financial performance was measured using each FQHC's IRS Form 990 reported total margin (net income/total revenue) and treated as a continuous variable. The financial performance analysis (H2a and H2b) controlled for all FQHC organizational characteristics and county-level market factors.

The control variable related to technology was measured using HRSA's Health Center, Health Information Technology (HIT) Capabilities report data that included information related to the technology adoption, number of health center who have adopted HIT and usage of HIT in data sharing and population health management. We used the FQHCs' reported responses to question 10: "How does your health center utilize HIT and EHR data beyond direct patient care (HRSA, 2021)? Health centers can select

"all that apply" from six options: quality improvement, population health management, program evaluation, research, other and "we do not utilize HIT or EHR data beyond direct patient care" (HRSA, 2021). Health Information Technology HIT capabilities was coded as (0) No HIT Usage/ adoption, (not beyond patient care) (1) Low HIT Usage/adoption (any other 1-2 responses), and (2) High HIT Usage/ adoption (more than 2 responses).

The county-level market factors controlled for in this study included factors that most impact health centers physician supply (rate per 100,000 population), percent of population older than 65, and per capita income. These variables were included to account for health centers' environmental factors.

Statistical Analysis

The data were analyzed using Stata Version 13 and employed both logistic and linear regression. Descriptive statistics were used to examine the sample characteristics of the three HCCN affiliation groups. We used chi-square, ANOVA, and t-test analyses to examine differences in the three HCCN affiliation groups and their organizational characteristics and market factors. We examined the relationship between FQHC HCCN affiliation and clinical performance as the dependent variables using a logistic modeling strategy to examine the probability of each of the clinical variables performing in the top quartile. The logistic regression models included organizational characteristics, excluding percentage of minority and uninsured patients, and county-level market factors as control variables. In the logistic regression model, a dichotomous variable was created to measure the likelihood for each of the seven clinical performance measures being in the

top 25% quartile ranking by HCCN affiliation group. Based on the models, results are reported as the probability of being in the top 25% clinical quartile ranking group based on HCCN affiliation.

Linear regression analysis was used to evaluate the relationship between HCCN affiliation and financial performance. Financial performance was measured using each FQHC's IRS Form 990 reported total margin (net income/total revenue) and treated as a continuous variable. The financial performance analysis controlled for all FQHC organizational characteristics and county-level market factors

CHAPTER 4

RESULTS

Descriptive statistics are reflected in Table 2. There were 1385 FQHCs included in our study's population with 1,383 included in our analysis. Tests of significance were conducted as appropriate (ANOVA for continuous variables and chi-square for categorical variables).

FQHCs associated with Freestanding HCCN affiliation were larger, more urban located, with a higher percentage of patients at or below the 100% federal poverty level with Medicaid and CHIPS as their major payer as compared to FQHCs with a PCA/HCCN affiliation or no HCCN affiliation. In addition, they were located in higher per capita income geographic locations with a larger physician supply as compared to those FQHCs with either a PCA/HCCN affiliation or no affiliation. When compared to FQHCs with either a Free-Standing HCCN affiliation or no affiliation, PCA/HCCN affiliated FQHCs had higher percentages of aged 65 or older and female patients, and higher HIT usage.

Table 2

Descriptive Statistics of HCCN Affiliated FQHCs

	HCCN Group (0 No Affiliation, 1 Freestanding, 2 PCA)					
Variable	**0**	**1**	**2**	**Total (Mean)**	***F*/X2**	
FQHC Size (Mean Patients Seen Annually) **	19404.47	27289.16	18147.91	21560.08	16.93	p<.01
Patients Age 65 and Older**	10.27%	10.53%	11.62%	10.88%	5.95	p<.01
Female Patients **	40.58%	43.55%	45.22%	43.39%	9.68	p<.01
HIT Usage **						
(Not Beyond Patient Care) 0	7	3	2	12		
(1-2 Other Responses) 1	124	108	137	369	X=16.92	p<.01
(3+ Reponses) 2	249	353	400	1002		
FQHC Location **						
(Urban) 1	220	295	285	800		
	57.89%	63.58%	52.88%	57.85%	X=11.71	p<.01
(Rural) 2	160	169	254	583		
	42.11%	36.42%	47.12%	42.15%		
Nonwhite (Minority) **	49.51%	48.64%	44.44%	47.24%	3.74	
Insurance/Payer						
Patients at or Below 100% FPL**	46.99%	48.67%	43.51%	46.19%	6.68	p<.01
Uninsured	25.78%	24.57%	24.34%	24.81%	0.79	
Medicare**	10.26%	10.52%	12.21%	11.11%	10.44	p<.01
Private**	18.88%	18.57%	23.64%	20.63%	25	p<.01
Medicaid/ Chip/Other **	45.08%	46.34%	39.81%	43.45%	17.74	p<.01
Total Margin*	0.03	0.05	0.05	0.04	3.03	p<.05
Market Factors						
Per Capita Income**	$55,625.30	$54,829.60	$50,247.60	$53,279.26	8.06	p<.01
Population 65 Years and Older*	0.16%	0.17%	0.17%	0.17%	4	p<.05
Physicians Per 100K Populations	285.16	302.8	296.73	295.66	0.46	

Note: *** p<.001, ** p<.01, *p<.05. N = 1383

FQHCs Affiliation and Clinical Performance

In models 1-7 (Table 4) we examined the relationship between HCCN affiliation and likelihood of achieving top 25% quartile clinical performance for seven clinical indicators as measured by the AQR, controlling for certain organizational characteristics and county-level market factors.

Diabetes Control: FQHCs with a Freestanding HCCN affiliation are 41% (OR=1.41, 95% CI=1.01-2.00, p=0.05) more likely to be in the top 25% quartile for diabetes control performance as compared to FQHCs without a HCCN affiliation.

Colorectal Cancer Screening (Ages 51-74): For colorectal screening Freestanding HCCN affiliation, are 56% more likely (OR=1.56, 95% CI=1.11-2.20, p=0.05) to achieve top 25% quartile clinical performance as compared to FQHCs without a HCCN affiliation. Also, relative to FQHCs in category (0) no affiliation, FQHCs with PCA/HCCN affiliation are 40% (OR=1.40, 95% CI=1.00-1.99, p=0.05) more likely to be in the top performance quartile.

Hypertension Control: FQHCs with a Freestanding HCCN affiliation are 54% (OR=1.54, 95% CI=1.12-2.13, p=0.05) more likely to be in the top 25% quartile for hypertension control performance as compared to FQHCs without a HCCN affiliation.

Adults (Age 18+) Receiving Weight Screening and Follow-up

For weight screening, FQHCs with Freestanding HCCN affiliation, are 43% more likely to be in top quartile performance (OR=1.43, 95% CI=1.02-2.01, p=0.05) as compared to FQHCs without a HCCN affiliation. Also, relative to no affiliation, FQHCs

with a PCA/HCCN affiliation are 44% more likely to be in the top performance quartile (OR=1.44, 95% CI=1.03-2.02, p=0.05).

Summary of Hypothesis 1a and 1b Support

When defining the level of support for Hypothesis 1a and 1b, it was important to account for the different number of variables for the hypothesis (see Table 3). As such we used the approach outlined by Pierce et al. (2019) to establish a range of support to moderate the effects of a large or small number of variables tested in the hypothesis. Following the Pierce et al. (2019) approach hypotheses were considered fully supported when all variables evaluated in the hypotheses had a statistically significant relationship in the direction predicted with the dependent variable. Hypotheses were considered to have strong support when greater than 66%, but less 100% of the variables had a statistically significant relationship in the direction predicted with the dependent variable. Hypotheses were considered partially supported when at least 33%-66% of the variables had a statistically significant relationship with the dependent variable. Hypotheses were defined as having weak support when greater than 0% but less than 33% of the variables had a statistically significant relationship with the dependent variable. Hypotheses were considered to have no support when no statistically significant relationships existed between the variables and the dependent variable.

Table 3

Summary of Hypothesis 1a and 1b Support

Clinical Performance Measure	Hypothesis 1a	Hypothesis 1b
Diabetes Control	Statistically significant findings	No statistically significant findings
Colorectal Screening	Statistically significant findings	Statistically significant findings
Depression Screening and Follow Up	No statistically significant findings	No statistically significant findings
Hypertension Control	Statistically significant findings	No statistically significant findings
Cervical Cancer Screening/Pap Test	No statistically significant findings	No statistically significant findings
Adult Weight Screening and Follow Up/BMI	Statistically significant findings	Statistically significant findings
Tobacco Assessment and Cessation Intervention	No statistically significant findings	No statistically significant findings
Support	Partially Supported 4/7 = 57%	Weak Support 2/7 = 29%

FQHCs affiliation and financial performance. We examined the association among HCCN affiliation and financial performance, using a regression model controlling for organizational characteristics and market factors (see Table 5). The mean reported health center total margin for the year 2018 was .04 percent. Relative to FQHCs with no affiliation, FQHCs with a Freestanding HCCN affiliation, were associated with .02 percent higher reported total margin ($p < .05$). Also, relative to FQHCs with no affiliation, FQHCs with a PCA/HCCN affiliation were associated with .02 percent higher reported total margin ($p < .05$). Based on the above findings, both Hypothesis 2a and 2b are supported.

Table 5

Total Margin Regression

Total Margin	Coef.	St. Err.	t-value	[95% Conf]	[Interval]
No HCCN Affiliation	(referent)	.	.	.	.
Freestanding HCCN Affiliation	**0.023***	0.009	2.5	0.005	0.041
PCA/HCCN Affiliation	**0.018***	0.009	2.05	0.001	0.036
FQHC Location					
Urban	(referent)	.	.	.	.
Rural	0.005	0.01	0.47	-0.014	0.023
HIT Usage		.	.	.	.
0- Not Beyond Patient Care	(referent)				
1-1-2 Responses	0.044	0.046	0.95	-0.047	0.134
2-3 or More Responses	0.047	0.046	1.02	-0.043	0.137
Minority (%)	.	.	-1.65	-0.001	.
Female Patients (%)	.	.	-1.31	-0.001	.
Male Patients (%)	.	.	1.28	.	0.001
Medicare (%)	-0.001	0.001	-1.67	-0.002	.
None/Uninsured (%)		.	-0.45	-0.001	.
Private (%)	.	.	-1.27	-0.001	.
CHIP/ Other (%)	.	.	.	.	.
FQHC Size (Patients Seen Annually)	.	.	-0.41	.	.
Market Factors					
Physician Per 100k Population	.	.	-0.62	.	.
Population over 65 Years (%)	0.087	0.097	0.9	-0.103	0.278
Per Capita Income	.	.	-1.78	.	.
Mean dependent var	*0.043*	*SD dependent var*		*0.119*	
R-squared	*0.022*	*Number of obs*		*1213*	
F-test	*1.779*	*Prob > F*		*0.033*	

*Note: *** p<.001, ** p<.01, *p<.05*

CHAPTER 5

DISCUSSION AND CONCLUSIONS

The purpose of this study was to examine the relationship between FQHCs and HCCN affiliation and reported clinical and financial performances. Over the life cycle of the HCCN program more than $160 million dollars has been awarded to HCCN grantees. However, there has been limited empirical research evaluating the efficacy of the HCCN FQHC relationship. This is the first study examining the impact of FQHC affiliations with HCCNs. FQHCs provide comprehensive and quality primary care to underserved populations throughout the United States and voluntarily participate in HCCNs. According to HRSA the intent of the HCCN grant is for FQHCs to collaborate and use health information technology (health IT) to improve operational and clinical practices (HRSA, 2021). HRSA has encouraged these strategic collaborations to advance EHR adoption and usage and the advancement of value based care activities in FQHCs. As previously mentioned HIT adoption more specifically electronic health record adoption has increased however we expected to see more support for H1a and H1b, clinical performance. Literature highlights that HIT can improve health outcomes in vulnerable populations (Davlyatov et al. (2019). In addition to HIT adoption, health centers have participated in quality improvement initiatives and cost reduction strategies for several years through their Health Center Controlled Network (HCCN) membership.

This study was guided by Interorganizational Collaboration Theory (IOC) to evaluate the outcome of strategic HCCN affiliation by FQHCs in two areas: clinical performance as measured by the AQR and financial performance as measured by the organizations' total margin. IOC networks and other collaborations are innovative and can respond faster to the ever-changing healthcare delivery environment. The role of collaborative networks in the community and public health regarding financial and clinical performance is multipronged in successful organizations (Goodstein et al., 1994). This study found that relative to no HCCN affiliation, the Freestanding affiliated FQHCs were more likely to achieve top quartile clinical performance ranking as compared to FQHCs without a HCCN affiliation. Also, relative to no affiliation, health centers affiliated with both freestanding and PCA HCCNs reported higher reported total margin. However, this study had limitations.

Study Limitations

IOC theory limitations. Interorganizational collaboration can be considered a strategic collaboration in that organizations join together forces to share ideas, risks, and uncertainties, to reach predetermined goals for mutual benefits. Strategic collaboration is the willingness for organizations to consider each other's interest in planning goals and objectives. Insufficient time can be a study limitation. Due to time restrictions, collaborative research has only been conducted with smaller samples of participants; hence generalizing a survey for larger populations would require more consultations at diverse levels (Mor, 2015). This study leveraged a cross sectional study design, limited to

the 2016-2019 HCCN grant reporting period due changes in reporting throughout the HCCN program lifecycle.

HCCN program limitations. This study uncovered many changes in grant and grantee reporting requirements throughout the HCCN program lifecycle. Due to changes in the HCCN reporting requirements this study was limited to evaluating the 2016-2019 grant period. FQHCs can have dual membership, more specifically heath centers can belong to more than one HCCN but can only report affiliation to one HCCN program to meet the grant requirements. Also, HCCNs were initiated in the 1970s, and HRSA grant requirements changed in 2010 increasing the number of required participating health centers to meet the HCCN grant requirements for funding. It was this change in 2010 that invited PCAs to compete for HCCN grants. Although this study did find higher clinical and financial performance in the PCA group relative to no HCCN affiliation, free standing affiliation performed better. This performance difference could be associated with the fact that freestanding HCCNs have more experience and PCAs may perform better in the future. PCAs have several core functions and competencies that provide the framework for support and assistance to health centers to include but not limited to increasing access to comprehensive primary care, accelerating value-based care delivery and fostering a health center workforce to address current and emerging needs in addition to the HCCN program (HRSA, 2021). Whereas freestanding HCCNs' organizational focus is to meet the HCCN grant goals. The differences in PCA and freestanding HCCNs' organizational structure and the relationship to performance is also an area for future research. Moreover, health centers, throughout a grant period can move in and out of HCCNs nationally. Understanding the impact of continuity of health center HCCN

affiliation could prove to be beneficial for future research. Additionally, this study leveraged clinical adjusted quartile ranking (AQR) as the clinical performance indicator. The AQRs are a product of a formula developed by HRSA. This study was unable to replicate the AQR formula. HRSA's goal in HCCN affiliation includes increasing a health center's ability to leverage technology to increase performance by enhancing patient experience and value (HRSA, 2021). HRSAs initial goal was the adoption of technology and for many years that goal was the primary focus of HCCNs. Only recently has the focus of the HCCN included the advancement of value based care activities, and over more time FQHCs performance relative to HCCN affiliation may change. Also, although FQHCs voluntarily affiliate with HCCNs, health centers are afforded a great deal of organizational autonomy to determine and implement HCCN program objectives at the health center level. Examining the impact of organizational culture, HCCN affiliation and performance may provide further insight as to how affiliation might impact health center performance.

Conclusion and Future Research

Evidence from this and previous empirical studies suggest that it would be valuable to leverage HCCN collaborations to help FQHCs improve performance. As previously mentioned , prior to this study HCCN affiliation was not included in the literature as a form of strategic collaboration. Future research examining HCCNs as a form if strategic collaboration to help identify new collaborative forms could be beneficial.

This evaluation of the FQHCs and HCCN affiliation provides valuable insights for future funding for these programs and guidance for healthcare managers in decisions to collaborate. Future reviewers can focus on the topic of value-based care and the value transformation framework related to FQHCs and HCCNs to examine associations between the two related to improved clinical and financial outcomes. Relative to data limitations future research would benefit from evaluating the impact of the duration of the HCCN affiliation, technology usage beyond patient care and performance. Additionally, HRSA conducts health center patient surveys (HCPS). Data is collected from one-on-one patient interviews with patients served by a subset of up to 300 HRSA-funded health centers which is considered a nationally representative of the Health Center Program patient population (HRSA, 2021). Patient experience relative to HCCN affiliation would provide invaluable insights in understanding the HCCN networks and patient satisfaction. Never the less, this study was the first study that empirically evaluated HCCN affiliation. Even though we only found partial support at the statistically significant level, overall six out of the seven clinical measure were in the top 25% quartile rankings. Also, compared to no HCCN affiliation, health centers affiliated with both freestanding and PCA networks reported a higher total margin.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD LETTER OF APPROVAL

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Office of the Institutional Review Board for Human Use

470 Administration Building
701 20th Street South
Birmingham, AL 35294-0104
205.934.3789 | Fax 205.934.1301 |
irb@uab.edu

NHSR DETERMINATION

TO: Berkley, Armika Jessica

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: 15-Jan-2021

RE: IRB-300006717
FQHC, Health Centered Controlled Network Affiliation, and Performance

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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:

De-identified publicly available data

APPENDIX B

TABLE 4. LOGISTIC REGRESSION, HCCN AFFILIATION AND CLINICAL PERFORMANCE

	Dependent Variables						
	HCCN Affiliation and Clinical Performance						
	Model 1: Diabetes Control *N=1349*	***Model 2: Colorectal Screening*** *N=1349*	***Model 3: Depression Screening and Follow Up*** *N=1349*	***Model 4: Hypertension Control*** *N=1349*	***Model 5: Cervical Cancer Screening / Pap Test*** *N=1341*	***Model 6: Adult Weight Screening and Follow Up / BMI*** *N=1349*	***Model 7: Tobacco Assessment and Cessation Intervention*** *N=1341*
Independent Variables	***OR***	***OR***	***OR***	***OR***	***OR***	***OR***	***OR***
No HCCN Affiliation	(referent)	(referent)	(referent)	(referent)	(referent)	(referent)	(referent)
Free Standing HCCN Affiliation	**1.41***	**1.56****	1.08	***1.54****	*1.14*	***1.43****	*0.95*
PCA/HCCN Affiliation	1.36	**1.40***	0.87	0.90	1.16	**1.44***	0.87
Control Variables							
Organizational Characteristics							
Female Patients %	1.00	1.00	1.00*	.99	**1.01****	**1.01****	1.00
Patients 65 and Older %	**1.13****	**1.08*****	.56	**1.05****	1.03	.99	.99
Patients Below 100 % Poverty %	.99	.99	**1.00****	1.00	1.00	1.01*	1.00
HIT Adoption							
0- Not Beyond Patient Care	(referent)	(referent)	(referent)	(referent)		(referent)	
1--2 Responses	1.74	1.88	2.48	.52	.80	1.06	**.74***
2-3 or More Responses	2.53	2.10	2.80	.58		1.03	
FQHC Location	.72	1.06	.95	1.08	1.14	1.21	1.25
Urban	(referent)	(referent)	(referent)	(referent)	(referent)	(referent)	(referent)
Rural	.72	1.06	.95	1.08	1.05	1.21	1.25
Medicaid / CHIP %	.99	.99	.99	1.00	1.00	1.01	.99
Medicare %	**.93****	.97	1.00	**.95****	**.96***	1.02	1.00
Private %	.99	.98	1.01	1.00	1.00	.99	.99
FQHC Size	**.99*****	1.00	.99	1.00	1.00	1.00	**1.00***
Market Factors							

Per Capita Income	1.00	0.99	1.00	1.00	1	**.99***	1.00
Population 65 Years and Older %	.60	.30	.99	.43	1.57	2.23	1.73
Physicians Per 100K Populations	1.00	**1.00*** **	.99	.99	**1.00*** **	1.00	1.00
Pseudo R-squared	.05	.04	.02	.02	.03	.03	.01

Note: *** p<.001, ** p<.01, *p<.05