ELECTRONIC HEALTH RECORDS AND HEALTH INFORMATION TECHNOLOGY ADOPTION IN RURAL GEORGIA: A QUANTITATIVE CORRELATIONAL STUDY

by

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ABSTRACT

Electronic health records (EHR) and health information technology (HIT) adoption is favored by clinicians and physicians to reduce excessive paperwork, and inefficient, burdensome practices of electronic transmission of physicians' orders. Thus, healthcare providers can efficiently provide quality care through effectuating better outcomes for patients while contributing to improvements in standardized practices. In rural hospitals, EHR fosters interoperability among clinicians and physicians, offers beneficial information to the healthcare industry, and supports the quality, delivery, and safety of healthcare through best practices and collaborative, evidence-based systems. Although findings show increased adoption rates, there are insufficient statistics on EHR/HIT adoption in underserved communities. Health disparities still exist in the delivery of healthcare, and access to care are prevalent in minority populations; this often results in high rates of poverty, comorbidities, and mortality rates. As EHR adoption varies globally, the pathways through which they reduce health disparities in rural populations are unknown. These were factors considered by conducting this quantitative correlational research study that explored the relationship between EHR/HIT adoption and the quality of healthcare delivery in rural Georgia. A total of 60 clinicians and physicians participated in the study. The theoretical frameworks DOI, TAM, and UTAUT, guided the study. Findings revealed that higher EHR/HIT adoption was associated with the quality of healthcare delivery based on clinician and physician perceptions of burden and interoperability. These results suggest to policymakers that improvements in healthcare as experienced within rural communities are shaped by the adoption of EHR/HIT to meet local needs.

DEDICATION

I dedicate this body of work to my late maternal grandfather, Samuel William Joseph Haffner, Sr.; my maternal grandmother, Nasu Kumba Josephine Haffner; my paternal grandmother Kumba Iye Bockaire Jarvoe; my paternal grandfather, Kakuneh "Tailor" Pessima; and my dear uncles Samuel Tamba William Haffner, and Dr. Jonathan Ngagba Alfred Lengar. Without their divine Sierra Leonean ancestral presence and support as a child and young adult, this project would not have been possible, and I will forever be grateful for each of them. May their legacy be long-lived, and their souls rest in heaven.

Additionally, I would like to dedicate this research project to all persons who are underinsured, uninsured, or medically disadvantaged in the United States and globally in addition to those who sacrificed their lives because of complex healthcare policies and systems, and standardization. Also, I dedicate this to all novel coronavirus (COVID-19) pandemic first responders, leaders, medical pioneers, scientists, and trailblazers. Lastly, to those who shattered stereotypes and invented medical treatments through advancement toward universal healthcare for millions of people such as Rebecca Lee Crumpler, MD, James McCune Smith, MD, Leonidas Harris Berry, MD, Charles Richard Drew, MD, Louis Wade Sullivan, MD, Marilyn Hughes Gaston, MD, Patricia Era Bath, MD, Herbert W. Nickens, MD, Alexa Irene Canady, MD, and Regina Marcia Benjamin, MD, MBA.

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Chapter 1

Introduction

Health information technology (HIT) for medical settings require proper and comprehensive planning of office operations and functionality, where there is no impact on workflow, and medical professionals are knowledgeable of technology capabilities and its use (Carter, 2008; Casey, Schwartz, Stewart & Adler, 2016; Wang, Kung, Wang, & Cegielski, 2018). The lack of availability of HIT may also interfere with physician or clinician appointment times or workflow in underserved regions such as rural areas, which may inhibit healthcare accessibility (Edelman & Menz, 1996, Gibbons, 2011; Amer, 2019). Access to healthcare is disproportionate for many medically underserved individuals in sparsely populated areas (Gibbons, 2011; Russell, Humphreys, McGrail, Cameron & Williams, 2013; Amer, 2019; Hardeman & Kahn, 2020). HIT systems can be the most vulnerable, and the integrity of data is subject to privacy rules and scrutiny due to extensive use. HIT adoption, resources, quality, equity and cost-efficacy are significant health-related issues that many countries face globally (Zhanpeng & Chen, 2015).

One innovation in the area of HIT is electronic health records (EHR), a central component of integrated HIT for the management of chronic health conditions and medical records (Gaylin, Moidaddin, Mohamoud, Lundeen & Kelly, 2011; Chiauzzi, Rodarte & DasMahapatra, 2015). Emerging models of HIT are "e-prescriptions, EHR, computerized provider order entry (CPOE), picture archiving and communication systems (PACS), clinical decision support systems (CDSS), and telemedicine" (Lluch, 2011, p. 850). These HIT models may involve video conferencing for routine medical

appointments, examinations, or feedback through patient-generated data to medical clinicians for improved care, and the influence of better patient health choices (Lluch, 2011; Duggal, Brindle & Bagenal, 2018). Chapter 1 suggests the following areas: a) background of problem, b) problem and purpose statements, c) population and sample size, d) significance of study, e) nature of study, f) research question and hypothesis, g) theoretical frameworks, h) definition of terms, i) assumptions, and j) limitations and delimitations.

Background of the Problem

Evidence exists to suggest that electronic health record (EHR) adoption and HIT may improve healthcare delivery and efficiency. The quality, delivery and safety of healthcare are supported through best practices, and collaborative evidence-based systems (Keeler, Morton & Shekelle, 2006; Yu-Kai, Minfeng, & HsinChun, 2019). This basis of evidence represents a minimal number of clinician facilities, organizational changes, community practice and expense (Keeler, Morton & Shekelle, 2006; Birkhead, Klompas & Shah, 2015; Yu-Kai, Minfeng, & HsinChun, 2019). Through the collective use of HIT, there may be an increase in the quality of healthcare and a reduction in medical or surgical errors while using EHR as a comprehensive reporting tool that displays current medical data and improves communications with clinicians and patients. This practice suggests a direct correlation to improved quality of care, despite the cultural lag in EHR adoption rates. Many physicians favor EHR; however, there are also many who must weigh the up-front financial responsibility and burden in supporting the systems (Ajami & Bagheri-Tadi, 2013; Birkhead, Klompas & Shah, 2015).

Research is necessary to analyze the gradual adoption of EHR/HIT, its high costs, technological modernization leading toward standardization, interoperability concerns, and identifying healthcare facilities organizational needs in rural areas (Gaylin et al., 2011; Erlangga, Suhrcke, Ali & Bloor, 2019; Yu-Kai, Minfeng, & HsinChun, 2019). Clinicians in facilities who serve people that are classified as underrepresented minorities (URM) in rural communities may have affordability concerns with HIT or EHR system standardization, which can be a vehicle for quality improvement (QI), and access to care (Gaylin et al., 2011; Klaiman, Pracilio, Kimberly, Cecil & Legnini, 2014; Oest, Hightower & Krasowski, 2018). Many clinicians favor moving toward integrated systems, although there are concerns relating to the cost of maintenance, replacement of existing systems, interface difficulties in legacy systems, and security or safeguard of patient records (Blackwell, 2008; Kooienga, 2018). The U.S. health system is at risk to regarding demands related to the escalation of costs, inconsistencies in the quality of care, and inefficient EHR/HIT and decision support systems (Keeler, Morton & Shekelle, 2006; Yu-Kai, Minfeng, & HsinChun, 2019).

Medicare requires health clinicians to submit claims electronically and convert paper patient health records (PHR) to EHR to decrease expenditures. This requirement also offers improved quality of care, fosters evidence-based medicine, and maintains proper recordkeeping and accessibility (Menachemi, Powers & Brooks, 2011; Yu-Kai, Minfeng, & HsinChun, 2019). Some physicians use third-party service vendors to provide their HIT setups, and costs include only the actual purchase, and not maintenance, monitoring, troubleshooting, or upgrades (Ajami & Bagheri-Tadi, 2013; Birkhead, Klompas & Shah, 2015). EHR costs can be conflicting to its benefits with a

disconnect to vendors who develop HIT and its end-users (Rudin, Bates & MacRae, 2016). For medium or small clinician practices, budgeting for these tools can be the largest barrier to EHR adoption. Although HIT is a significant investment for the future, security and privacy, technical support, operational complexity, and EHR interoperability may affect business practices (Angst & Agarwal, 2009; Mandl & Kohane, 2012; Meltzer & Chung, 2014).

The intent of EHR use is to improve access to health documentation, quality of care for improved health outcomes, and lower healthcare expenditures for patients, including the chronically ill patients (Randell, Cornet, & McCowan, 2017). EHR and HIT adoption have the potential to enable effective, protected and prompt healthcare exchange between clinicians, patients, and health care organizations. Electronic data exchanges facilitate better-quality care for patient comorbidities (Drawz, Archdeacon, McDonald, Powe, Smith, Norton, Williams, Patel & Narva, 2015). Chronic conditions such as Type 2 diabetes, heart failure, cognitive impairments, and other comorbidities that may be comparable determinants or social and economic status (World Health Organization, 2017). Poor and underinsured populations are unlikely to have access to healthcare and less likely to have access to technology (Choi & Dinitto, 2013). Wildendons, Peute and Jasper (as cited in Randell, Cornet & McCowan 2017) suggested, budget, performance, use and expertise in EHR play a critical role in the literacy of patient health, technology operability, and effectiveness.

Problem Statement

The general problem, in the face of rapid growth of technology over the past decade, and documented health disparities, is that many rural populations in the United

States remain underserved in health care access and quality prevention and maintenance of comorbidities such as asthma, cancer, and diabetes (Crilly, Keefe & Volpe, 2011; Birkhead, Klompas & Shah, 2015; Amer, 2019). Leaders have failed to institute more programs that encourage the institution and meaningful use (MU) and adoption of HIT, and health care coverage for many low-income communities in Georgia, which may complicate healthcare delivery (Galloway, 2012; Hogan, Stevens, Hosseinpoor & Boerma, 2017).

The specific problem is although clinicians and physicians are adopting HIT and EHR, and utilizing incentive programs, healthcare delivery is still distressed because of the burden EHR/HIT places on clinical practice and the reduction of patient-clinician and physician appointment times (Payne, et al., 2015). Additionally, interoperability which remains challenging with the transition from paper to electronic records (Payne, et al., 2015). Technology adoption sometimes leads to unintended risks, burdens, and disparities in some clinician and physician practices, such as rural, solo or small group practices (Payne, et al., 2015). Kohn, Corrigan and Donaldson (as cited in Lin, Guirguis-Blake, Keppel, Dobie, Osborn, Cole & Baldwin, 2016) stated that errors in medical records are the eighth leading cause of, and most common for, mortality in the United States. Death rates may result from medical dosage and diagnosis errors if not accurately documented in patient EHR, these errors may result in adverse care leading to patient mortality, increased medical costs and an excess of healthcare operations (Kohn, Corrigan & Donaldson, 2000; Lin, Guirguis-Blake, Keppel, Dobie, Osborn, Cole & Baldwin, 2016; Makary & Daniel, 2016).

There are several rural communities in Georgia where there may be a significant

disconnect in EHR/HIT adoption (Singh, Lichter, Danzo, Taylor & Rosenthal, 2012; Braunstein, 2015). Primary care providers in rural communities seem to have the lowest EHR adoption rate of 5.7 %, compared to those in urban health care settings with an adoption rate of 38.3 %; EHR adoption rates are lower among providers who serve uninsured patients (Gibbons, 2011). According to Hsiao and Hing (2014), in Georgia, 42.8% of physician-based offices had a basic EHR system, which was not significantly different from the national average (48.1%). "Physician-based" signifies all physician types except radiologists, anesthesiologists, and pathologists (Hsiao & Hing, 2014). National EHR adoption rates are at 60% from 5 previous years (Hing & Burt, 2009). In a 2017 American Community Survey the number of uninsured people increased from 27.3 million to 28.0 million (Berchick (2018). The uninsured population totals were from working adults between the ages of 19 – 64 and the uninsured population totals that were disproportionately focused in southern states and were more likely to live in poverty (Berchick, 2018).

According to CMS (2018), roughly 60 million Americans- almost one in five-- reside in rural areas. These rural entities appear at increased poverty rates, with chronic illnesses and are known to be underinsured or uninsured, where health care delivery may be broken, and clinicians are overstrained with limited or reduced staffing (CMS, 2018a). Within the last 4 years, the healthcare environment has changed, and HIT adoption is implemented widely by offering incentive programs such as the Health Information Technology for Economic and Clinical Health (HITECH) Act and MU Electronic Health Record (EHR) programs (Payne, Corley, Cullen, Gandhi, Harrington, Kuperman, Mattison, McCallie, McDonald, Tang, Tierney, Weaver, Weir & Zaroukian, 2015).

One of the key activities supporting the Centers for Medicare & Medicaid Services (CMS) Rural Health Strategy is to expand opportunities with organizations such as the Office of the National Coordinator (ONC) for Health Information Technology (HIT) along with Federally Qualified Health Centers (FQHC) and other partner federal agencies to encourage utilization, and interoperability of EHR in rural health areas for quality improvement. (CMS, 2018a). In addition to the current Omnibus Burden Reduction (Conditions of Participation) Final Rule CMS-3346-F, which removes excessive paperwork and burdensome Medicare regulations that are obsolete and inefficient regarding electronic transmission of written physician orders (CMS, 2019). For example, medical tests and exams that aid healthcare providers and hospitals to achieve quality care and better outcomes for patients while contributing to ongoing lower cost solutions like Quality Assessment and Performance Improvement (QAPI) infection control programs (CMS, 2019). This modern technology transformation provides simpler best practices amid facilities for improvements in quality of care, benefiting small and rural hospitals that utilize resources and clinical expertise of other larger hospital organizations (CMS, 2019).

Although outcomes of EHR/HIT adoption in underserved and uninsured communities may show increased adoption rates, health disparities continue to exist in healthcare delivery and access to care, with a high prevalence in minority populations, resulting in high poverty or comorbidities resulting in high mortality rates, and other disparities (Hing & Burt, 2009; CMS, 2018a; Hardeman & Kahn, 2020). Consequently, EHR adoption rates vary across the nation and the pathways by which EHRs reduce health disparities for minorities in rural populations are unknown (Beach, Gary, Price,

Robinson, Gozu, Palacio, Smarth, Jenckes, Feuerstein, Bass, Powe & Cooper, 2006). Through purposive sampling of 60 licensed clinicians and physicians serving the underserved and uninsured in rural Georgia, this quantitative correlational research study was conducted to explore the relationship between EHR/HIT adoption and the quality of healthcare delivery.

Purpose of the Study

The purpose of this quantitative study was to explore the relationship between EHR and HIT adoption and the quality of clinician and physician healthcare delivery based on burden and interoperability in rural Georgia. Despite evidence confirming the ability of HIT adoption to facilitate the decrease of comorbidities, the need to improve the quality of healthcare delivery still exists because of the lack of medical professionals, standardization of HIT that contributes to its ineffectiveness in preventing excess morbidity and mortality in rural communities (Ryan, Bishop, Shih & Casalino, 2013; Birkhead, Klompas & Shah, 2015; Sampson, et al., 2016).

In this study, the degree of services in healthcare for individuals within a population and the probability of constant increased outcomes in healthcare based on clinician knowledge is characterized as quality (Lohr, 1991; Mosadeghrad , 2013; Mosadeghrad, 2014). Quality is referred to as the degree of improvement of a condition, status or classification (Mosadeghrad , 2013; Mosadeghrad, 2014). As Kem, Edwards Pichardo and Kaushal (2014) stated, EHR adoption rates across the country are lower in underserved rural communities; however, the government is aiding the adoption of EHR by enlisting resources such as Federally Qualified Health Centers (FQHC) that provide community-based care to rural and medically underserved populations.

Utilization forecasts predict that rural adoption rates may decrease significantly in the next few years because of soaring costs associated with implementation in rural health care facilities (Weinfeld, Davidson & Mohan, 2012; Haun, Patel, French, Campbell, Bradham & Lapcevic, 2015). Medical providers that lack access to technology are tasked with absorbing costs associated with implementing EHR systems in vulnerable populations and may cause an adverse impact on rural patient healthcare (Hing & Burt, 2009; Singh, et al., 2012; Humble, Tolley, Krukowski, Womack, Motley & Bailey, 2016, Centers for Medicare & Medicaid Services (CMS), 2018a). Therefore, individuals in rural communities might be presented with unique challenges in healthcare delivery and physicians, and clinicians in these rural community's face obstacles sustaining QI efforts (Siebenaller, 2012; Klaiman, Pracilio, Kimberly, Cecil & Legnini, 2014).

According to Day (2019), the Small Area Health Insurance Estimates (SAHIE) indicated there was an increase in people who had insurance between 2013-2017. However, residents in rural counties still lack health insurance coverage as compared to urban areas (CMS, 2018b; Day, 2019). Lack of technology adoption and the understanding of health disparities in rural communities continue to be the focus nationally and regionally (Derose, Gresenz & Ringel, 2011).

The study explored the relationship between EHR/HIT adoption and the quality healthcare technology based on burden and interoperability in rural Georgia communities despite improvements in healthcare technology. This study adds to the body of knowledge to stakeholders and medical technology, which can lead to greater population healthcare assistance in rural communities. The next section provides population and

sample criteria and the units of analysis, including the defined geographical location for the quantitative correlational study.

Population and Sample

The quantitative correlational study explored a target sample size of approximately 60 female and male licensed physicians and clinicians located in the most medically underserved, underinsured or uninsured, and health professional shortage areas (HPSA) in rural Georgia, as determined by the 2010 U.S. Census (Health Resources & Services Administration, 2017; U.S. Census Bureau, 2017; Georgia Department of Community Health, 2017). In these rural areas, medical professionals deliver direct medical care to patients and serve in populations of 35,000 or less of various genders, ages, ethnicities and socioeconomic backgrounds. The clinicians and physicians must be certified or licensed medical or pharmaceutical professionals. These include medical doctors and practitioners, physician's assistants (PA), advanced practice nurses, registered nurses (RN), pharmacists, psychologists and psychiatrists. The sample population will be taken from approved State Office of Rural Health (SORH), Health Research Services Agency (HRSA) and U. S. Census decennial Census Public Use Microdata Areas (PUMA) public distribution lists for providers (clinicians and physicians) in 16 counties in rural Georgia.

Unit of Analysis and Geographic Location

Primary care clinicians and physicians in state approved rural healthcare settings, such as hospitals, medical offices, group practices, pharmacies, community health centers, and those in private medical practices in the state of Georgia, were the individuals who participated in the study; they comprise the units of analysis. The area of focus centers on populations in in 16 rural or partially rural counties in Georgia wherein high percentages of uninsured and underinsured people that are cared for by clinicians

and physicians. Residents in these populations consist of minorities of several racial and ethnic groups (i.e., American Indian or Alaskan Native, Asian or Pacific Islander, African American or Black, and Hispanic) (U. S. Census Bureau, 2010a; Equal Employment Opportunity Commission (EEOC), 2015). For this research purpose, the use of the EEOC definition of a minority is appropriate. Table 1 exhibits geographical units studied, which are PUMA states (locations) within Georgia.

Table 1.

Georgia: Top Counties within the PUMA States (locations) Based on Uninsured Totals

Category	(PUMA 100) Walker County, Catoosa County, Dade County	(PUMA 200) Whitfield County, Gordon County, Murray County	(PUMA 2200) Elbert County, Morgan County, Greene County, Oglethorpe County, Wilkes County, Hancock County, Lincoln County, Warren County, Taliaferro County	(PUMA 2500) Burke County, Emanuel County, Washington County, Jefferson County, Screven County, Jenkins County, Glascock County	(PUMA 2900) Meriwether County (Warm Springs), Harris County, Heard County, Talbot County, Troup County	(PUMA 3200) Toombs County, Dodge County, Telfair County, Bleckley County, Pulaski County, Wilcox County, Montgomery County, Treutlen County, Wheeler County	(PUMA 3300) Appling County, Candler County, Evans County, Jeff Davis County, Tattnall County, Wayne County	(PUMA 3800) Coffee County, Ware County, Pierce County, Brantley County, Charlton County, Bacon County, Atkinson County, Clinch County	(PUMA 3900) Tift County, Ben Hill County, Berrien County, Cook County, Irwin County, Turner County, Lanier County
Uninsured Total	21,483	37,418	20, 069	22,785	25,576	22,785	42, 810	42,487	27,910
Uninsured Percentage	16.8%	22.4%	23%	23.9%	21.8%	32.3%	27.1%	31.8%	26.7%
Ethnicity									
- Latino	995	8,010	118	552	747	1,806	3,431	3,132	1,709
- Black-Non-Latino	797	1,756	9,633	9,634	16,192	15,544	11,915	28,288	8,973
- White-Non-Latino	18,495	27,242	9,856	12,520	8,030	15,912	26,320	10,060	15,412
- Asian – Non-Latino	864	76	177	0	182	138	188	892	459
- Hawaiian Pacific Islander	0	0	67	0	0	0	0	0	0
- American Indian/Alaska a Native	332	93	51	0	0	0	266	115	0
- Multiracial or Other	0	242	167	79	426	162	691	0	1,356

Note. Adapted from "The Number of Estimated Eligible Uninsured People for Outreach Targeting." by U. S. Census Bureau, 2010b; CMS 2017.

Significance of the Study

Several models are significant to many of the components of the study and the leadership in the modernization of HIT. These include communication, collaboration, participatory, and strategic abilities among leaders, specifically in healthcare organizations while in an era of exponential change. Models such as transactional, transformational and situational leadership support the studies foundation where these concepts are highly interrelated to distinct components of leadership behavior in organizations; thus, applicable to HIT. The leadership models suggest in this relationship and the process toward transparency, understanding, and readiness, along with having available resources for the adoption of HIT.

Transactional leadership is related to transformational leadership because it considers strategic influence as a framework. (Resick, et al., 2009, p. 1365). This influence allows leaders to have more involvement and better exchange of controversial issues such as HIT in underserved populations (Rutledge, Haney, Bordelon, Renaud & Fowler, 2014). Situational leadership assigns behavior, such as commitment in relation to performance, openness, commitment, and competence (Ghazzawi, Radwan & Osta, 2017). The models explained above do not address to a role for public health, but they do create a foundation for monitoring and addressing the process to decrease health disparities and increase adoption of the technology when identified.

The failure of leaders to expand the Medicaid program and the Affordable Care Act (ACA) "Obamacare" in Georgia serves as evidence that there is no encouragement for quality healthcare delivery and the institution of systems of greater meaningful use and healthcare coverage for over 650,000 low-income individuals in Georgia (Galloway,

2012; Payne, et al., 2015; Bowers & Gann, 2019). Without transformational leaders in the rural communities in Georgia, innovation and quality care delivery using HIT may be hindered (Galloway, 2112). According to Galloway (2012), patients find this to be an opportunity neglected by leaders; this could address legislative gaps and inflexible healthcare access and resolve health outcomes concerning healthcare coverage for the uninsured.

Nature of the Study

The importance of the selection of quantitative research is to demonstrate statistically how physicians and clinicians are equipped in underserved rural populations to address the concerns presented by deficiencies in the quality of healthcare delivery. The quantitative research design in this study examines, predicts or confirms theories of clinician and physician experiences of EHR adoption through empirical analysis in relation to quality healthcare delivery. The presence of the entity (EHR adoption) and the degree or number of occurrences or relations between variables (quality of clinician and physician healthcare delivery) was examined. The significance between predictor and criterion variables is displayed statistically during this process of examination.

Qualitative methods were eschewed due to the interruption of clinician and physician care in medical settings in rural populations, which are limited in size or personnel bandwidth. Qualitative data does not use numerical techniques as the purpose of this data type is descriptive with entity related properties (Patton, 2015). In addition, mixed methods were not chosen because of the ambiguity of results from the use of open-ended questions, which can be subjective. A quantitative correlational design may be the most appropriate for testing the null hypothesis suggested and the use of correlation

design and linear regression analysis statistical *t* tests. The applied methodology is a critical component in scientific research to ensure generalizable, conclusive outcomes. Methodology assumptions provide accountability, credibility, and legitimacy of answers in the research question. The following specific research question and hypotheses used in data collection for EHR/HIT adoption that may influence quality healthcare delivery for underserved, underinsured, and uninsured rural populations in Georgia are as follows:

Research Question/Hypothesis

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

The following hypothesis is tested and provides the context for the investigation or relationship between clinician or physician EHR/HIT adoption (criterion variable) and the quality of healthcare delivery (predictor variable). Hypothesis zero (0) represents a null hypothesis and hypothesis (a) represent the alternative hypothesis, which is referenced below.

Hypothesis 1:

$H1_0$: There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

$H1_a$: There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

The research question presented intends to use several theoretical frameworks which are applicable to the current state of EHR/HIT adoption and the disparities among remote rural communities and provide constructs of technology adoption and quality healthcare delivery in Georgia.

Theoretical Frameworks

Technology adoption links numerous theories as well as scholarly frameworks which are applicable to the current state of research. For the context of this study, the focus will be on three theoretical frameworks and models: diffusion of innovation (DOI) theory, the unified theory of acceptance and use of technology (UTAUT), and the technology acceptance model (TAM). Although other theories considered for this study were relevant, the focus is on the relationship of HIT adoption and health disparities in rural communities regarding health management and care. The models and theories explained in the next section are DOI, TAM and UTAUT.

Diffusion of Innovation (DOI) Theory

The core constructs of the DOI theory are as follows:

1) Relative advantage – the degree to which innovation is better than its preceptor
2) Ease of Use – the degree to which innovation is difficult to use
3) Image – the degree to which use of innovation enhances one's image or status in one's social system

4) Visibility – the degree to which one can see others using the system in the organization
5) Compatibility – the degree to which innovation is consistent with the existing values, needs, and experience of potential adopters
6) Results Demonstrability – the tangibility of the results of using the innovation, including their observability and communicability
7) Voluntariness of Use – the degree to which use of innovation is voluntary, or of free will (Moore & Benbasat, 1991, p. 195; Sharma & Mishra, 2014; Greenhalgh, et.al., 2017).

Moore and Benbasat (1991) adopt the features of innovation offered by Rogers, which refined the set of constructs stated above for use in this study regarding individual acceptance of the technology. For example, with EHR regulations, compliance and information sharing for better understanding are the purposes rather than innovation in general. Compliance requires technology adoption in healthcare facilities, which is unique to most practitioners in the medical field. Rogers explains four elements in the diffusion of new ideas, (a) communication outlets, (b) innovation, (c) time, and (d) social systems. These elements relate to the characteristics such as advantage, complexity, compatibility, observability, and observation.

Advantage relates to the degree of innovation and the perception that the adoption of technology (EHR) improves with social, moral, and economic implications (Rogers, 1995; Braunstein, 2015; Kooienga, 2018). The assumptions of diffusion are central to the situation, which expands or reduces the probability that a new product or, in this case, the adoption of new technology or practice by members of a certain culture. DOI theory

foresees the means or influence on individual opinions and judgments (Rogers, 1995; Feistel, 2014; Sharma & Mishra, 2014; Cohen, 2016). Leadership opinions influence behavior through diverse intercessors such as medical practitioners, which includes the process of diffusion (Rogers, 1995; Feistel, 2014; Sharma & Mishra, 2014; Cohen, 2016). Rogers (1995) stated that there are five acceptance types - (a) early adopters, (b) innovators, (c) early majority, (d) late majority, and (e) laggards. Figure 1 explains the DOI model.

Diffusion of Innovation Model

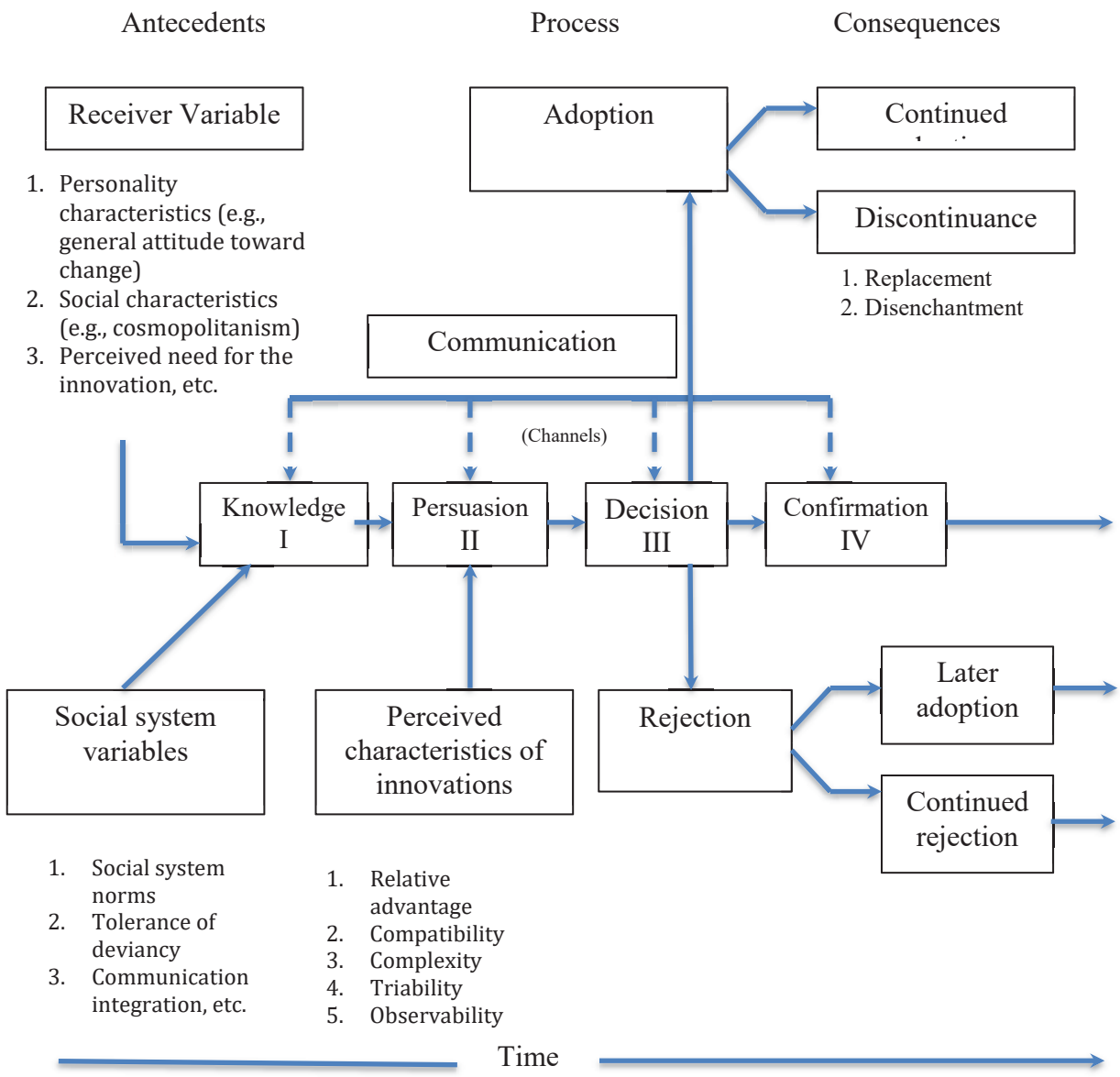

Figure 1. Conceptual Model. Adapted from "*Diffusion of innovations"* (4th ed.). by E. M. Rogers, New York, NY: The Free Press, 1995, p. 207.

Various theories and models support explanations of health disparities and technology adoption. According to Rogers (1995), the diffusion of the innovation process considers explicit conduits periodically between groups of a social system. The DOI theory attempts to explore the degree to which the technology is dispersed in various cultures and populations (Greenhalgh, Wherton, Papoutsi, Lynch, Hughes, A'Court,

Hinder, Fahy, Procter & Shaw, 2017). The theory, DOI includes several phases in the decision of innovation adoption. These phases include refusal, persuasion, awareness pursued through implementation, validation regarding the use, and advantage and compatibility of the innovation, which may explain HIT adoption rates (Rogers, 1995; Rogers, et al., 2017). According to Greenhalgh, Wherton, Papoutsi, Lynch, Hughes, A'Court, Hinder, Fahy, Procter and Shaw (2017), individual factors that disrupt technology implementation efforts are based on DOI. Technology modernization in settings such as rural areas can be complex when introduced and not likely successfully sustained or adopted.

Technology Acceptance Model (TAM)

The ease of use of a specific system (EHR/HIT) aids in an individual's control and efficacy with the intention of influencing positive outcomes and behaviors (Davis, 1989; Feistel, 2014; Sharma & Mishra, 2014). Figure 2 exhibits the explanation of computer use. In research, the TAM model suggests an expansion in the forecast of behaviors in innovative technology such as EHR/HIT and telemedicine adoption (Davis, 1989; Sharma & Mishra, 2014). Likewise, in the case of healthcare physicians and clinicians use of technology may aid in the decision-making process although social impacts may affect the decision to adopt EHRs. TAM is applied widely to a diverse set of technology users (Davis, 1989; Sharma & Mishra, 2014; De Grood, Raissi, Kwon & Santana, 2016).

Technology Acceptance Model (TAM)

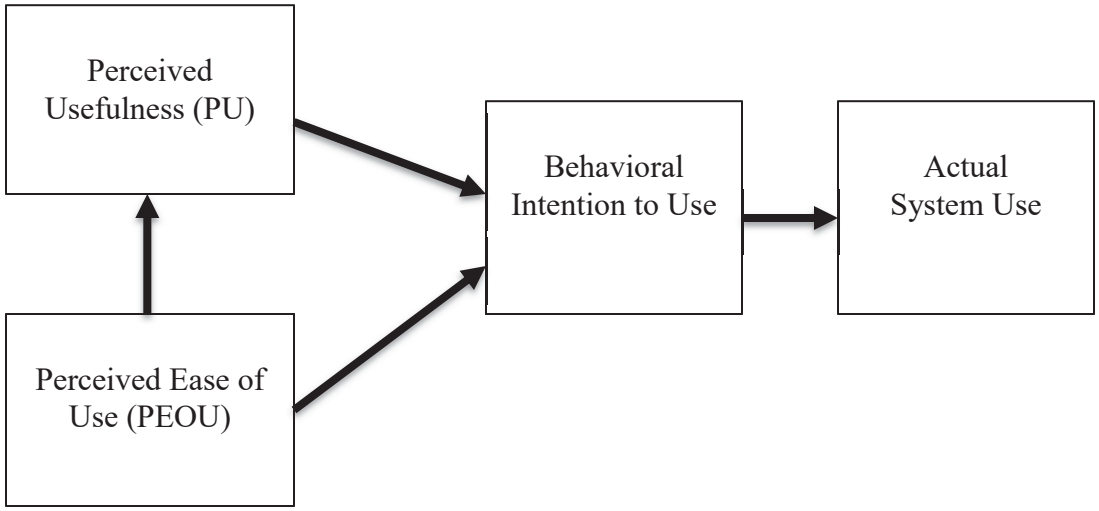

Figure 2. Basic TAM Assumptions. Note. Adapted from "Perceived usefulness, perceived ease of use, and user acceptance of information technology," by F. D. Davis, 1989, *MIS Quarterly, 13*(3) p. 319-339. Copyright 1989 by the Management Information Systems Research Center.

The TAM model adapts the theory of reasoned action, which explains the use of technology. The assumption is that the intention of an action completed without limits. Although, any external constraints such as time, ability, environmental, and organizational limitations may modify habits or behavior, and actions. The TAM model included perceived usefulness (PU) and perceived ease of use (PEOU), which primarily pertains to the adoption of technology behaviors (Davis, 1989; Feistel, 2014). PU corresponds to positive enhancements to one's work performance, and PEOU corresponds to the degree of effort to maintain one's work (Davis, 1989). PU relates to "the degree to which a person believes that using a particular system would enhance one's job performance" (Davis, 1989, p. 320). PEOU relates to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320).

Unified Theory of Acceptance and Use of Technology (UTAUT)

Figure 3 represents the UTAUT model that explains technology adoption.

Unified Theory of Acceptance and Use of Technology (UTAUT)

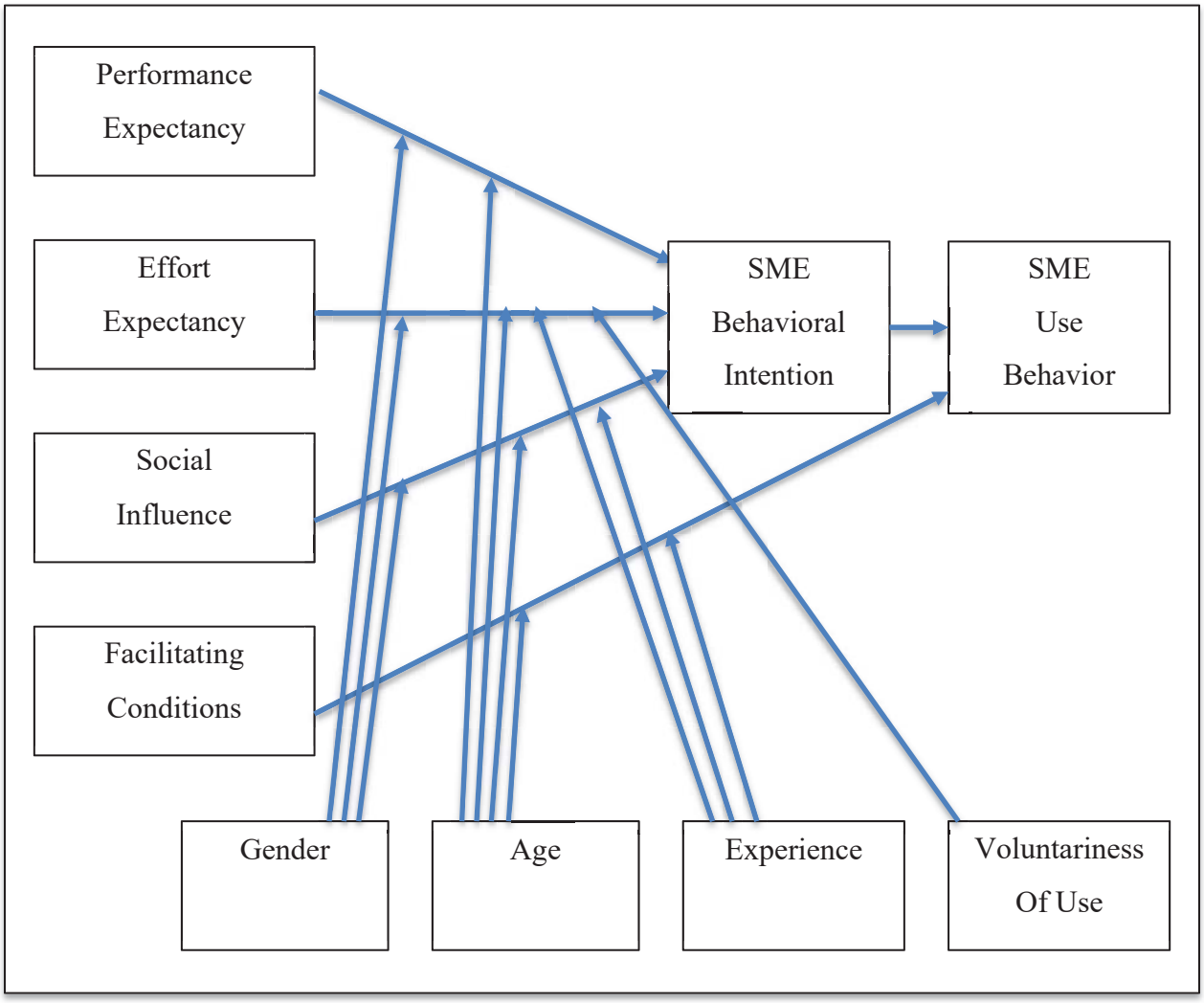

Figure 3. Research Model. Note. Adapted from "User acceptance of information technology: Toward a unified view," by V. Venkatesh, M. Morris and G. Davis, 2003, *MIS Quarterly*, *27*(3), p. 447. Copyright 2003 by the Management Information Systems Research Center.

The review of UTAUT and other models as it relates to HIT adoption and compares empirically by validating the model's core elements of intended use and intermediaries of key relationships. The UTAUT model may aid in the understanding of

the drivers of acceptance proactively to propose interventions for targeted rural populations in Georgia PUMA states (locations) where clinicians may be less inclined to adapt and use innovative systems such as HIT.

UTAUT embraces four concepts:

- Performance expectancy - utility derived from use and advantage, enabling end users to attain information
- Effort expectancy - degree of effort linked with the use of the system.
- Social influence, and - specific standards
- Facilitating conditions - daily behavior control (Zhou, 2012; Sharma & Mishra, 2014).

Venkatesh, Morris and Davis (2003) describe these concepts as direct factors of intended use that ease with age, experience, gender, and voluntary use. With EHRs, it is likely that physicians and clinicians will acquire technology in efforts to deliver patient health information effectively for applicable decision-making in healthcare diagnosis. UTAUT are explored relationships between conditions, process transformations and communication modification (Sharma & Mishra, 2014). Process transformations may lead to quality improvements that may have a direct or indirect correlation to the reduction of health outcomes such as comorbidities and health care delivery. The UTAUT will aid in explaining the constructs that establish EHR resistance or adoption among physicians and clinicians. The level of effort in EHR adoption by health care physicians and clinicians may affect certification and frequency of patient screening.

The objective of this research is to leverage the use of the UTAUT model to evaluate and analyze factors influencing clinician adoption and use of EHRs. The

UTAUT theory synthesizes more than eight existing models including DOI theory and TAM (Venkatesh, Morris & Davis, 2003; Venkatesh, Thong & Xu, 2012; Tavares & Oliveira, 2016). Yet, these models yield different sets of technology acceptance elements. Thus, UTAUT provides a useful instrument for a healthcare administrator's assessment of the attainment of new technology.

According to AHRQ (2010), race, ethnicity, and socioeconomic (SES) status may be insignificant in the prevention of individuals in rural communities from receiving quality health care. African Americans and Native Americans received poorer care as compared to White counterparts on 40% of the five core measures (AHRQ, 2010). The Affordable Care Act provided access to healthcare for many uninsured individuals. Medical professionals and policymaker's recognition of patients' SES status prompted the development of health initiatives to cover social determinants of health care improvements that may aid in reducing health disparities (Ansell & McDonald, 2015; Chen, Weider, Konopka & Danis, 2014).

These health disparities are unacceptable and warrant immediate attention by health policymakers, independent healthcare clinicians, and local, state, and federal healthcare agencies. HIT and EHR systems guarantee an electronic level of effort to establish population health and records management for delivering quality patient healthcare efficiently (CMS, 2018b). Thus, improving the value of HIT yields results that policymakers and healthcare clinicians desire for rural population healthcare quality (Hodach, 2010).

In an Agency for Healthcare Research Quarterly (AHRQ) report of health disparities, the five core measures of the probable influence of HIT are: effectiveness,

patient safety, timeliness, patient-centeredness, access to care, the evaluation of prevention, quality of care, chronic disease management, health outcomes, and areas of health disparity (Smedley, Stith & Nelson, 2003; AHRQ, 2010; American Diabetes Association, 2017). Findings indicated no improvement in minimizing health disparities (AHRQ, 2010; Edwards, 2011). Penchansky and Thomas introduced an approach to understanding health disparities, which acknowledges parallel organizational and individual factors (Derose, Gresenz, & Ringel, 2011). For example, economics, health insurance, and the development of healthcare can facilitate or impede the use of health services (Derose, Gresenz, & Ringel, 2011). This approach measured the availability, accessibility, and affordability of healthcare services to potential clients as well as the degree to which the healthcare system operates.

The barrier-focused framework lacks frequent use as compared to the behavioral model to assess healthcare access, although the earlier framework has been influential (Derose, Gresenz, & Ringel, 2011). Other researchers have expanded the barrier-focused model through collaborative partnerships between healthcare clinicians and community agencies. However, wider determinants of health, such as ethnicity, social environments, and quality of care are necessary to analyze the expanded conceptions articulated in the role of public health, and the reduction of health disparities (Derose, Gresenz, & Ringel, 2011).

Definition of Terms

The following operational definitions are central to this study, and theoretical frameworks. Several of these key terms are commonly used to explain EHR and HIT systems. Each system may differ in functionality and use. The current literature is comprised of a variety of meanings of key terms as follows:

Access. According to Timmreck (1987), the Dictionary of Health Services Management defines accessibility as "the degree to which the system inhibits or facilitates the ability of an individual to gain entry and to receive services" (p. 4). "Thus, accessibility includes geographic, architectural, social, temporal and financial considerations. Access is also a function of the availability of health services and their acceptability" (Gulzar, 1999, p. 4).

Adoption. This refers to the phases and processes of acceptance of technology measures from an organizational level and those where HIT is applied or invested through policy or at clinical levels. The adoption process involves end users such as physicians, health administration professionals or nursing professionals who, use information technology to make decisions that incorporate the HIT in daily practice (Fonkych, Taylor, & Rand Corporation, 2005). Adoption stages may include decision-making as it relates to available options, acquiring a contract for the purchase of a HIT system such as an EHR system, the installation of the system, training, and development of the system (Fonkych, Taylor, & Rand Corporation, 2005).

Electronic Health Records (EHR). This term refers to automated records containing health information of patients which are retrieved and certified as interoperable, nationally and accessed by approved clinical staff throughout organizations

that administer healthcare (Cimasi, 2014). EHR is a longitudinal automated record of patient health information produced by one or more incidents in every healthcare and delivery environment. The electronic file may include a patient's full medical history of immunizations, allergies, demographics, billing, medication, lab work, and results or radiology imaging data maintained by any healthcare or clinical provider over time for rendered care (American Optometric Association, 2011; CMS, 2012; National Assembly on School-Based Health Care, 2012). EHRs are also referred to electronic medical records (EMR) and are interchangeable (Menachemi, Powers & Brooks, 2011; National Assembly on School-Based Health Care, 2012).

According to the Office of the National Coordinator for Health IT, EHR is an instantaneous patient health record, which contains evidence-based decision support tools used to aid in a practitioner's decision-making (U. S. Department of Health and Human Services, 2013). EHR is an automated system that can modernize the daily workflow of practitioners' by certifying health and clinical information communicated to other clinicians and physicians, pharmacies and health facilities for patient care (U. S. Department of Health and Human Services, 2013). Data housed in EHR may include prescriptions history, billing, lab results, clinical outcomes, and disease surveillance.

Health Disparities. "Health disparities refer to differences in access to or availability of facilities and services" (Medical Subject Headings (MeSH), 2013, para 1). "Health status disparities could refer to the variation in rates of disease occurrence and disabilities between SES and geographically defined population groups" (Medical Subject Headings (MeSH), 2009, para 1). Disparities refer to population-specific differences in the incidence of disease, health effects, quality of healthcare and access to

healthcare services that exist across ethnic groups (Carter-Pokras & Baquet, 2002). Health disparities represent a lack of efficiency within the healthcare system and account for unnecessary costs (Carter-Pokras & Baquet, 2002; Braveman, 2014).

The significant differences between one population and another describe these disparities as the differences in the rate of disease prevalence, morbidity, mortality or survival rates. Several factors may contribute to health disparities, including minorities, residents of rural areas, women, children, the elderly, and persons with disabilities (Carter-Pokras & Baquet, 2002). Disparities refer to health inequalities and health equality (Braveman, 2014). In this study for the purpose of this research, the use of health disparities will be the absolute term used (LaVeist, Gaskin & Richard, 2011; Ansell & McDonald, 2015).

Health Information Technology (HIT). HIT is described as a computer application or technology used in healthcare settings (Hersh, 2009). For example, HITECH, EHR, EMR, Personal Health Record (PHR) Systems and Medical Systems and Technology (NORC at the University of Chicago, 2013). According to the President's Council of Advisors on Science and Technology (2010), HIT is technology managed by physicians and clinicians to transmit health information to appropriate medical facilities.

Healthcare delivery. Healthcare delivery serves as a role and resource for primary care physicians and practitioners to provide and apply corrective care to local communities in various settings to assure accessible, affordable, appropriate, and high-quality health care. Healthcare delivery requires a transformation of HIT and specifically EHR, which may regionally engage patients in disease solutions and prevention (Nilakanta, Miller, Peer & Bojja, 2009). Healthcare delivery is also a physician and

clinician's knowledge management-driven process that provides opportunities for quality improvements and performance for patient-centered care (Nilakanta, Miller, Peer & Bojja, 2009; American Diabetes Association, 2017). Healthcare delivery, as defined by Shih, Davis, Schoenbaum, Gauthier, Nuzman and McCarthy (2008) is the overall coordination that elicits effective allocation of resources and provides proper treatment to patients.

Healthcare quality. Healthcare quality is the degree of growth of health services for populations and individuals and likeliness that preferred health outcomes are reliable with current professional expertise. Achieving QI in health care is determined by the need, result type, best practices and evidence-based methods (Carter, 2008; Wang, Kung, Wang, & Cegielski, 2018). According to Donabedian (2014), healthcare quality is defined as "the application of medical science and technology in a manner that maximizes its benefit to health without correspondingly increasing the risk" (p. 5).

Meaningful use. Meaningful use refers to the use of documentation and interrelated practices; for example, EHR, which represents a sustainable technology improvement that has potential to lower costs, provides ease for sharing patient information, and lowering instances of medical inaccuracy (DesRoches, & Rosenbaum, 2010; McCullough, Casey, Moscovice & Burlew, 2011; Siebenaller, 2012; McCullough, Zimmerman, Bell & Rodriguez, 2014). Meaningful use of EHR essentially improves both the efficiency and delivery of service and quality health care (Resnick & Alwan, 2010).

Minority. According to the U.S. Census Bureau (2010b) minority is described as non-White race or Hispanic origin of any race. Equal Employment Opportunity

Commission (EEOC) (2015) suggests the meaning of minority is an underrepresented or small group that shares race, origin or color other than individuals in a dominant group. The four groups included are (a) Native American or Alaskan Native, (b) Asian or Pacific Islander, (c) African American or Black, and (d) Hispanic (EEOC, 2015).

Public Use Microdata Areas (PUMA). According to the U. S. Census Bureau (2010b) "PUMA is a statistical geographic area defined for the tabulation and dissemination of decennial Census Public Use Microdata Sample (PUMS) data" (para, 1). The American Community Survey (ACS) is the omnipresent geographical instrument under state levels, which meet minimum population thresholds of 65,000 that required circulation of the annually, originally adopted PUMA (U.S. Census Bureau, 2010b, para, 1). PUMA is (a) contained within comparable entities and 50 states including Puerto Rico and Island regions, and (b) composed of census areas, which are subject to population levels and are geographically connected (U.S. Census Bureau, 2010b).

Rural. According to Rourke (1997) "Rural is a perspective, dependent on the person, place and context" (p. 113). Rural practice signifies non-urban areas wherein a small number of general practitioners, office-based physicians, and family doctors have limited or remote access to resources, e.g., modern healthcare technology (Patsdaughter, 2005). Rural suggests various meanings, such as landscapes, segregation, small cities, and small population concentrations. Rural as defined by the state of Georgia are counties with a population of 35,000 persons or less (U. S. Census, 2010b). Factors may include geographic scale and region and in the context of this research intends to improve the health of rural Americans. (Couper, 2003; Hart, Larson & Lishner, 2005; Ratcliffe, Burd, Holder & Fields, 2016).

Telehealth. World Health Organization (as cited in MCI, 2020 and Maheu, Whitten & Allen, 2002) stated the delivery and facilitation of health and health-related services such as medical care, patient and provider education, information health services, and healthcare through digital platforms and telecommunication technology.

Telemedicine. New England Journal of Medicine (as cited in MCI, 2020 and Maheu, Whitten & Allen, 2002) suggests telemedicine is the delivery of healthcare industry services, anywhere remoteness is a factor for acute care from healthcare provider use and exchange of data through telecommunication technology. Also, to validate or diagnose patients and offer treatment plans and preventative remedies for illnesses, diseases, injuries through evaluation, research and ongoing education for health improvements.

Underrepresented. Underrepresented individuals are those whose race or ethnicities are underrepresented within the total number in the general population. These individuals are occasionally referred to as underrepresented minorities (URM). Underrepresentation means those racial and ethnic populations underrepresented in the medical profession about their numbers in the general population (Association of American Medical Colleges (AAMC), 2004). The definition consists of historically underrepresented racial or ethnic groups: (a) Blacks, (b) Mexican Americans, (c) Native Americans (e.g. Native Americans, Alaska Natives, and Native Hawaiians), and (d) mainland Puerto Ricans. This representation of the change in demographics and stimulates reporting and data collection in a range of a fixed aggregation of racial and ethnic self-depictions (AAMC, 2004; Johns Hopkins Medicine, 2015).

Underserved. Mundt (1998) stated that the criteria regarding healthcare for underserved populations are unclear because it is implied that there is a clear standard of full and comprehensive services. However, it signifies the limited ability to determine an individual's exposure to inadequate services. Underserved commonly refers to those individuals who have not received adequate care or services (Mundt, 1998). These individuals are socioeconomically, culturally, or geographically isolated from a system and tend to experience either a total lack of services or severe barriers to accessing services (Mundt, 1998; Sampson, et al., 2016; Amer, 2019). In this instance, the term refers to populations who experience a lack of preventive and comprehensive services, which may contribute to the isolation from care and contribute to negative health outcomes (Mundt, 1998; Ansell & McDonald, 2015).

Assumptions, Limitations, and Delimitations

Assumptions are anticipations of a study that are out of the control of the researcher; they involve justification of confirmation of data collected in the study (Simon & Goes, 2012). For example, in this study, the survey responses are not tied to a participant's name, which ensures anonymity and allows a participant to drop out at any time without consequences. The underlying assumption in this study is relevant to accurate and honest responses from participants and choosing a representative population sample. Ensuring the study will provide insight and new information regarding the nature of the research problem and questions. Additionally, the minimum assumptions are as follows:

- The physicians and clinicians used in the study are competent in the use and implementation of EHR/HIT in question.
- The physicians and clinicians taking part in the research can influence the implementation of EHR/HIT in their organizational structure.

According to Simon and Goes (2012), limitations are weaknesses found in a study that are also out of a researcher's control, which requires an explanation to address the limitations. The limitations refer to potential deficiencies of the study, which cannot control the study. Limitations exist with each research design. This research design will focus on small to medium healthcare facilities located in 16 rural counties or other rural counties (35,000 or less population) in Georgia. The limitations of this study include the population's options, such as the county selections and clinician types.

Additionally, there may be limitations to the study regarding survey instrument response rate, recruitment, and yield that may lead to unrepresentative populations.

Although there may be a problem with random sampling, there may be an increase in recruitment from similar professionals within clinician and physician offices. This population target use and sample size must appear to provide adequate saturation, because there may not be an ample quantity of providers available in the 16 counties within the PUMA states (locations) selected. Ensuring appropriate recruitment is the target goal, but the status quo may be insufficient. Though the focus is to gain greater depth in the study and a better understanding of healthcare technology adoption, access factors such as SES challenges remain.

Delimitations are within the researchers' control; these are characteristics that may limit the scope and define the boundaries of a study (Simon, 2011; Simon & Goes, 2012). The delimitations suggest the restrictions set by the investigator, which constrain generalizable findings. However, the study design aids in understanding health care delivery by use of EHR/HIT adoption among underserved rural communities and rural physicians and clinicians. The selection of the most underserved populations is more significant in this research. Additionally, the quantity of 60 clinicians and practitioners used may be delimitations to the study because of population characteristics, and the limited rural clinician or provider facilities. Although this choice does not limit the study's reliability or validity, the survey will focus on the effects of the delivery of healthcare and EHR/HIT adoption in rural populations.

The research scope will focus on five areas - 1) the characteristics of innovative tools, which may influence EHR/HIT adoption, 2) the decision-making process, which occurs when medical physicians and clinicians consider adopting an EHR/HIT product or practice, 3) the characteristics of medical physicians and clinicians, which lead to the

adoption of an EHR/HIT system, 4) the consequences for physicians and clinicians in adopting EHR/HIT, and 5) the communication networks used in the EHR/HIT adoption process.

Chapter Summary

Though many providers (clinicians and physicians) and rural populations in Georgia may have access to health care, technology adoption of EHR/HIT exists. This dissertation proposes to explore health disparities in EHR/HIT adoption and their relationship, if any to health care delivery in underserved and underinsured populations among rural physicians and clinicians in Georgia. As clinicians acquire EHR/HIT technology to sustain quality health care for individuals in underserved communities, the adoption of EHR/HIT relative to federal government requirements, and policies is imperative. EHR/HIT is unquestionably a necessity but may not be enough for producing physician practice-based population health management.

The improvement of population health and the well-being and equity within rural communities is important and can guide stakeholders to action in shaping the healthcare system in meeting local needs and decreasing disparities. The consideration of demographics in the role of equitable health assists in fostering cross-collaboration for improvements in technology and health quality. Executives and leaders should commit to the care and coordination, which involves health care administration, and important success factors (Institute for Health Technology Transformation, 2010). Cutting-edge technology such as EHRs requires patient engagement, multi-level reporting and training, and continuous QI to be more effective (Institute for Health Technology Transformation, 2010; Wang, Kung, Wang, & Cegielski, 2018). Chapter 2 will provide a review of existing literature on health disparities, the effect of quality of care among individuals and patients in underserved populations, and the impact of clinician HIT use on healthcare delivery in rural populations.

Chapter 2

Literature Review

The literature review originated with the examination of various seminal and scholarly (peer-reviewed) articles, sources, and evidence-based authors who made significant contributions to healthcare, EHR, implementation, quality improvements in underserved rural populations, and HIT adoption. The literature review provides a historical account of the gaps in the literature, health disparities in care, healthcare delivery and technology such as EHR regulation and HITECH for underserved populations, and providers. The resources included in the literature search strategy and review were from the University of Phoenix electronic library, EBSCOhost, GALE virtual reference library, OVID, ProQuest, Science Direct, Dissertations and Theses databases in addition to broad Internet searches, and evidence-based reports will aid in connecting concepts to sources, and research findings. The literature review ranged between the years 1978 through 2019, concentrating on the last five years of electronic health records and health information technology modernization. Additionally, the literature will provide convergence between rural and underrepresented populations, and concepts included in literature.

Title Searches and Documentation

The topics examined included fundamental concepts of EHR historical development and adoption, health disparities, leadership, quality improvement, contemporary best practices and emerging trends, views of healthcare and opportunities for medical systems development, and policy, privacy and security concerns, diffusion of innovation theory, technology acceptance model, and unified theory of acceptance and

use of technology. Table 2 provides a brief summary of literature review inventory of keyword searches, documents, phrases, journals, and theories.

Table 2

Inventory of Keyword Searches, Documents, Phrases, Journals and Theories

Boolean Keyword Searches, Documents, Phrases, Journals & Theories	Publications < 5 Years	Publications > 5 Years	Total
Keyword Searches & Phrases			
Centers for Disease Control and Prevention (CDC)	2	3	5
Charismatic leadership	2	2	4
Clinician practice	48	137	145
Data security	4	13	17
Disparities	11	74	85
Electronic health record	6	36	42
Electronic medical record	3	12	15
Equal Employment Opportunity Commission (EEOC)	1	1	2
Coronavirus COVID-19	0	4	4
Health disparities	15	39	54
Health information technology	22	27	49
Health information technology for economic and clinical health (HITECH) Act	3	3	6
Health Insurance Portability and Accountability Act (HIPAA)	1	1	2
Health policy	9	10	19
Health privacy	3	6	9
Health Provider	19	22	41
Health technology	14	42	56
Healthcare quality	19	23	42

Healthcare technology adoption	13	234	247
Information systems	17	121	137
Leadership	2	22	24
Medical records	40	105	145
Medical systems	20	115	135
Office Management and Budget (OMB)	1	1	2
Office of National Coordinator (ONC)	2	3	5
Physician Practice	85	60	145
Quality improvement	2	4	6
Quantitative method	2	2	4
Rural health	6	20	26
Telemedicine	10	14	24
Transformational leadership	2	2	4
U. S. Census Bureau	4	0	4
Underinsured	2	8	10
Underserved populations	7	34	41
Uninsured	10	19	29
Documents			
American Community Survey	2	4	6
National Center for Health Statistics (NCHS)	2	3	5
National Electronic Health Records Survey (NEHRS)	2	4	6
National Health Interview Survey	1	0	1
Journals			
Academic Medicine	2	10	12
Academic Medicine	2	1	3
Academy of Health Care Management Journal	2	41	43
Academy of Health Care Management Journal	0	1	1

Acta Informatica Medica	0	1	1
Agency for Healthcare Research and Quality	13	156	169
American Journal of Preventive Medicine	9	2	11
American Journal of Public Health	1	31	33
Annals of Family Medicine	2	0	2
Annals of Internal Medicine	9	1	10
Association of Black Nursing Faculty Journal	0	1	1
Biomedical Instrumentation & Technology	1	0	1
BMC Family Practice	0	1	1
BMC Medical Informatics and Decision Making	1	0	1
BMC Medical Informatics and Decision Making	1	0	1
BMC Public Health	1	0	1
Canadian Journal of Rural Medicine	1	0	1
Diabetes Spectrum	1	0	1
Health Affairs	1	31	31
Health Disparities	12	322	334
Health Information and Libraries Journal	0	1	1
Health Services Research	0	1	1
Healthcare Design	0	1	1
Healthcare Financing Review	11	22	33
Healthcare Reform Magazine	3	1	4
Hospital Topics	1	0	1
IEEE Pervasive Computing	0	1	1
Institute of Medicine of the National Academies	1	0	1
International Journal of Health Services	1	1	2
International Journal of Healthcare	13	41	54

Information Systems and Informatics			
International Journal of Medical Informatics	1	1	2
Journal of AHIMA	0	1	1
Journal of Ambulatory Care Management	1	0	1
Journal of Cultural Diversity	1	0	1
Journal of Electronic Commerce Research	0	1	1
Journal of Health Care for the Poor and Underserved	11	230	241
Journal of Leadership Studies	1	0	1
Journal of Management Information Systems	100	14	114
Journal of Nursing Scholarship	1	0	1
Journal of Oncology Practice/American Society of Clinical Oncology	0	1	1
Journal of Rural Health	3	111	114
Journal of Rural Health	3	29	32
Journal of the American Medical Informatics Association	2	10	12
Journal of the American Medical Information Association	2	40	42
Journal of the American Optometric Association	0	1	1
Medical Care	0	1	1
Medical Care Research and Review	1	0	1
MIS Quarterly	2	0	2
Mt. Sinai Journal of Medicine	0	1	1
National Center for Health Statistics	1	9	10
New England Journal of Medicine	90	15	105
NORC Final Report	0	1	1
Perspectives in Health Information	3	21	24

Management			
Public Health Reports	2	0	2
Rural and Remote Health	1	20	21
System Sciences	1	0	1
Yes Magazine	0	1	1
Theories			
Diffusion of Innovation (DOI) Model	2	0	2
Technology Acceptance Model (TAM)	2	0	2
Unified Theory of Acceptance and Use of Technology (UTAUT)	3	0	3

The result of the literature review supports the investigation of perceptions and experiences of study participants, which influence technology adoption in rural populations. Although some literature searches resulted in locating articles from past years, the literature presents historical and germinal data on the implementation and introduction of EHR, and its key constructs, which may lead to quality healthcare delivery and adoption rates of HIT use in rural communities. This quantitative study will provide new and valuable knowledge for rural populations in the adoption of EHR/HIT and the delivery of care from clinicians in the field to reduce disparities in technology adoption and present healthcare diagnosis.

Historical and Current Content

Electronic Medical Record and HIT

The development of the first electronic medical record system in 1972, entitled the Regenstrief Medical Records System (RMRS) stored greater than 350 million patient observations, which were in code (Murray et al., 2003). The system was a central data source and repository for future use by health professionals. Six data analysts worked

collaboratively with the review board, which accessed the systems and protected the patients', clinicians' and physicians' confidentiality (Murray et al., 2003). The requirement for physicians and clinicians is to document patient encounters to ensure and determine an accurate and timely action for decision-making. The records maintained in the electronic medical systems are archival records and allows physicians to eliminate the duplication of effort when caring for patients. Each patient record may include medication, lab tests, x-rays and medical charts.

Tools such as EHR aim to prevent divided, large, and unnecessary information when collected from patients. Since the 1960s Larry Weed introduced the idea of documenting patient information electronically instead of the use of paper, which was the Problem Oriented Medical Record (POMR) into medical practice. Weed's modernization of the electronic record was to create a record for third-party and independent physicians and clinicians to substantiate a diagnosis (Murray et al., 2003; National Assembly on School-Based Health Care, 2012). According to National Assembly on School-Based Health Care (2012) an estimated use of EMR is 20% in the hospital sector in the United States and 5% in clinics. However, most physicians work in one to three practices, where costs associated with the implementation of HIT or EHR technology are excessive (National Assembly on School-Based Health Care, 2012).

Although improvements and modernization of healthcare information systems determine the evolution of technology in the medical industry, the technology remains inaccessible to many physicians, clinicians, and consumers. The theoretical literature on medical systems served as the foundation for the analysis. Beginning with this chapter, past development of medical systems is an area of interest in healthcare, influenced by

the demand for integrated healthcare systems in the medical and business industry. This research could offer insight to be more cost-effective to the government, provide long-term benefits to eliminate fraud and enhance the quality of care for consumers, insurers, physicians and clinicians. Medical systems security, access to technology, modernization, and management of technology are only a few limitations of integrated health care or medical systems, and the challenge is valuable.

The existence of EHRs began in 1960, and current developments in technology have made physicians' and clinicians' collaborations easier to share and expand through application and delivery of healthcare (Walker, 2012; Kooienga, 2018). The use of EHR technology is to access patient records that may contain critical health data for diagnosis and additional documentation such as lab work, x-rays, pharmacy, and radiology (Walker, 2012; Kooienga, 2018). The EHR are secure transfer systems used by most providers (Walker, 2012; Kooienga, 2018).

There exists a need for the increased adoption of information technology (IT) in healthcare. Currently, physician and clinician progress are contingent upon manual, paper-based medical record systems, which may be economically inefficient and produces significant variances in medical outcomes (Blackwell, 2008; Kooienga, 2018). On average IT expenditures currently represent approximately 1.3% of total healthcare spending (Blackwell, 2008). The value of IT in healthcare forecasts growth by an average of 9.4% per year and over $74.5 billion (Blackwell, 2008).

In the healthcare industry, there exist concerns with the development of hospital-based information systems for operational and clinical data accessibility. The aim is to give full range to healthcare professionals for access to information to increase the cost-

effectiveness of the delivery and improve the efficacy of care. HIT developments in the 1960s had a financial focus that would only capture charges, generate patient bills, and update the general ledger accounting systems (Blackwell, 2008). As the increased need to access patient records globally, modern technology presented more useful ways to generate clinical parameters and trends. As IT developed, systems focused on specialist and medical departments, for example, pharmacies, diagnostics, imaging, and intensive care. Although many health care physicians and clinicians like the attractions associated with a move toward integrated systems, there were concerns relating to the cost of replacement of existing systems, interface difficulties with legacy systems, security and the safeguard of patient records and data. Thus, the need for this study is applicable as HIT adoption and developments are on the rise, particularly with the privacy and security of systems such as HIT.

Adoption of Electronic Health Records (EHRs)

The sustaining goal of EHR and the federal incentive program is to advance quality and safety of healthcare (Blumenthal & Tavenner, 2010; Braunstein , 2015; Kooienga, 2018). Currently, CMS is in stage three of meaningful use of EHR incentive program for Medicare and Medicaid programs. Meaningful use includes three stages (a) 2011 - 2012 - Stage 1: Data sharing and capturing, (b) 2014 - Stage 2: Advanced clinical practices, and (c) 2016 - Stage 3: Improved outcomes (CMS, 2015b, para. 1). CMS facilitates the Medicare incentive program, and state Medicaid agencies run the Medicaid incentive program. An eHealth eligibility assessment tool determines entitlement for the physician, non-physician, practitioners and therapists (CMS, 2015a).

In March 2013 President Obama published a sequestration executive order, which reduced EHR incentive payments to health care professionals by 2% for Medicare only that excludes the Medicaid program by April 1, 2013 (CMS, 2015a). Additionally, the American Recovery and Reinvestment Act (ARRA) offered $155.1 billion in government incentives for the healthcare industry, which included $25.8 billion for IT and EHR where the overall goal would drive EHR adoption for 70 - 90% of providers by 2019 (Blumenthal, 2010; Kooienga, 2018). The federal rule states, by 2015 clinicians and physicians, and healthcare organizations who do not implement EHRs that meet the meaningful use classification may see a reduction of 1% annually in Medicare fees that cap at 3% by 2017 (Blumenthal, 2009; Kooienga, 2018). The representation of historical trends of EHR in Table 3 below provides insight toward periods of program development, their impact over the years, and the failed implementation attempts.

Table 3.

Notable Precursors of EHR Technology

Year	Program	Developer	Impact
1960s –1970s	Technician Data System (TDS)	Lockheed and El Camino Hospital 36	Processing speed and flexibility let multiple users into the system at one time.
1960s	Health Evaluation through Logical Processing (HELP)	University of Utah and Latter-Day Saints Hospital (brought to market by the 3M Corporation)	One of the first clinical decision-support programs.
1968– 1975	Computer-Stored Ambulatory Record (COSTAR)	Harvard University and Massachusetts General Hospital	Compartmentalized design increased efficiency, flexible vocabulary accounted for terminology variations, and was first to be made available in public domain.
1970s	Decentralized Hospital Computer Program (DHCP)	U.S. Department of Veterans' Affairs	First time the federal government began using EHR.
1983	THERESA	Emory University and Grady Memorial Hospital	First system to encourage direct physician data entry.
1986	The Medical Record (TMR)	Duke University Medical Center	Made data easy to manipulate and sort for ease of reference, giving way to Duke's Health Information System.
1988	Composite Health Care System (CHCS)	U.S. Departments of Defense	Renowned for lowering medical errors integrating various health record components.

Note. Adapted from "Healthcare valuation, the financial appraisal of enterprises, assets, and services." by R. J. Cimasi, Somerset, NJ: John Wiley & Sons, Incorporated, 2014, p. 545.

The challenges experienced in the past are no different than those that occur with modern-day developments of EHR. With substantial implementation costs to maintain

EHR systems, adoption may be hindered (Zhanpeng & Chen, 2015; Braunstein, 2015). A current study revealed the cost of implementing EHR systems is $32,409 per physician throughout the first 60 days after the launch of the system, with an additional $85,500 in maintenance expenditures for the initial year alone (Zhanpeng & Chen, 2015). Also, according to a survey 17 % of US doctors routinely use a minimal level of functionality and comprehensive electronic record systems (Zhanpeng & Chen, 2015).

According to Shortliffe (1999) the need for greater awareness among leaders, specifically in healthcare is imminent. Because of the complexities of organizational structures and the successful implementation of EHR software and technology, there is never a smooth process without training or cooperative efforts and adequate funding sources from healthcare leaders (Shortliffe, 1999; Braunstein, 2015; Kooienga, 2018). Additionally, the insufficient investment of HIT may cause a change in care and also issues in the leadership realm with planning efforts for effectively providing healthcare services to patients, including professional medical productivity (Shortliffe, 1999; Kooienga, 2018).

Despite various federal government initiatives in HIT, there appears to be a minimal progression in rural communities in the use and adoption of EHR (Bahensky, Jaana & Ward, 2008; Kooienga, 2018). Financial barriers present significant risks to healthcare physicians and clinicians in rural communities. Currently, the national agenda is to transform health care to make improvements to patient quality and safety, and value is greatly dependent on the use of technology (Bahensky, Jaana & Ward, 2008; Kooienga, 2018). The national healthcare goal is to focus on technology-enabled healthcare facilities, clinicians, hospitals, emergency departments, and physician

practices that invest in EHR systems (Bahensky, Jaana & Ward, 2008; Kooienga, 2018). Additionally, the state of implementation of EHR systems is stagnant and raises major concerns about future efforts toward better health care within the next decade (Bahensky, Jaana & Ward, 2008; Kooienga, 2018). Though, the progress of EHR implementation in rural communities is lagging (Bahensky, Jaana & Ward, 2008; Kooienga, 2018). The current "states with the greatest percentage of office-based physicians using EHR systems include (a) North Dakota, 84 %; (b) Utah, 80.8 %; and (c) Minnesota, 77.6 %; (Cimasi, 2014, p. 544). According to Hsiao and Hing (2014) office-based-physicians who use various types of EHR systems has increased from 2001 through 2013 by approximately 60%. Though, office-based physicians who used a basic EHR system increased by 37% from 2006, which is the year when basic systems became available (Hsiao & Hing, 2014).

Health professionals believe EHRs and HIT frameworks can provide real alternatives to foster equitable care and treatment, and promote patient self-management and self-empowerment through enhanced communication. Haung and Chen's (2010) research concurs with these assumptions in which their correlational study globally evaluated a gap (digital divide) between the advantaged and disadvantaged that have access to information communication technology (ICT) in several countries. The results of their experimental study revealed three types of gaps in information technology adoption; cultural, financial, and educational, which were factors of the global digital divide at various stages (Haung & Chen, 2010; Birkhead, Klompas & Shah, 2015).

Consequently, new sustainable approaches such as EHR adoption are relevant to extend and improve the nation's healthcare environments (Siebenaller, 2012;

Birkhead, Klompas & Shah, 2015). EHRs often function as cost-saving technology; though, the rate of adoption of EHRs nationally is diverse by region and healthcare system size (VanWormer, 2010; Birkhead, Klompas & Shah, 2015). Healthcare provider systems reported 20% use of EHRs, which is a lower rate than smaller facilities and rural communities (VanWormer, 2010; Braunstein, 2015).

EHR implementation offers enhanced technology improvements, quality patient healthcare, increased use and evidenced-based health information (Whittaker, Aufdenkamp & Tinley, 2009; Kooienga, 2018). Although research has shown in urban hospitals and medical establishments, EHR use is widespread as compared to rural healthcare facilities (Whittaker, Aufdenkamp & Tinley, 2009; Kooienga, 2018). Healthcare costs are increasing at unjustifiable rates, and financial and legislative pressures have increased to manage and regulate the economy of healthcare delivery (Siebenaller, 2012; Kooienga, 2018).

Healthcare delivery focuses on therapeutic services that may be in private doctor's offices, hospitals and clinics (Muennig & Su, 2013; Fortney, Pyne, Turner, Farris, Normoyle, Avery, Hilty & Unützer, 2015). CMS and the Institute of Medicine (IOM) are progressively establishing emphasis on care, and the need to occur not only through face-to-face appointments but also in various technology mediums (Kuck, 2012; Weinfeld, Davidson & Mohan, 2012; Kooienga, 2018). For example, the use of an array of emerging and current HIT tools and techniques to increase patient access, enhance and engage in quality care while fostering positive, and continued relationships to manage comorbidities (Weinfeld, Davidson & Mohan, 2012; American Diabetes Association, 2017; Fortney, Pyne, Turner, Farris, Normoyle, Avery, Hilty & Unützer, 2015).

Although, PHR and EHR systems are Internet-based linked to existing EHRs, which allows clinician and patient access, input, change, coordination of benefits, and control of health information (Weinfeld, Davidson & Mohan, 2012; Kooienga, 2018). Individuals, physicians, and clinicians specifically use the Internet and technology as a conduit to access, share, and transfer health information as a primary means to maintain connectivity, which aids in quality care (Crilly, Keefe & Volpe, 2011; Birkhead, Klompas & Shah, 2015). From an EHR perspective, clinicians use the Internet and alternative technology to transport EHRs from a single physician or clinician type to another, which may improve the quality HIT use and assessment of healthcare. Additionally, health care access to date has provided minimal insight regarding public health, and the effects technology may have on quality healthcare in rural and underserved populations (Derose, Gresenz & Ringel, 2011; Braunstein, 2015; Hardeman & Kahn, 2020).

Health Disparities

Although disparities may be multifactorial, implicit and biased decision-making may play a role in health care in URM groups and unequal treatment by favoring one group over another (Ansell & McDonald, 2015). Several viewpoints state the healthcare industry has developed a dependence on HIT for maintaining and improving health disparities, clinical and business operations, and decisions (Coulam & Gaumer, 1991; Kooienga, 2018). Burkhardt, Abir and Durning (2019), suggest U.S. universal health disparities are improbably and effectively adopted without much evidence or policy interests focusing on bettering health disparities and provider bias versus incentivizing.

According to Custodio, Gard and Graham (2009), racial and ethnic disparities exist in healthcare and the use of EHR for QI, education, outreach, workforce development, policy, advocacy, and financing aid in decreasing these disparities. Research that targets underrepresented populations and the advancement of HIT and best practices align with the goals of healthcare reform. A national survey presented minimal EHRs in community health centers that serve the uninsured and poor, and as a result, health IT initiatives ensure the quality of care, optimization of healthcare services, and collaborative effort to manage the health needs of vulnerable populations (Custodio, Gard & Graham, 2009; Kooienga, 2018). Unfortunately, the fragmentation and power struggles of the American healthcare system have created barriers to developing health policies that explicate a general standard of care (Mundt, 1998; Lynch, Kendall, Shanks, Haque, Jones, Wanis, Furukawa & Mostashari, 2014). As a result, inordinate resources are spent to support a system that only partially serves the health needs of citizens and systematically excludes whole segments from even the most basic care.

According to Cohen and Martinez (2014), the state of Georgia ranked 2.7% below the national level of individuals who were uninsured, 1.1% below the national level for individuals with public health plan coverage, and 6.7% below the national level of individuals who have private health insurance as shown in Table 4. Although percentages in Georgia show a major gap among uninsured individuals than those insured in comparison to the national levels, disparities may still exist among health care quality in several populations in Georgia. Also, health insurance programs are limited to individuals who are unemployed or have inadequate means to acquire health insurance because of soaring insurance premiums and other costs of living necessities in several rural areas.

Berchick (2018) stated "the number of people without health insurance increased to 28.0 million, up from 27.3 million in 2017, according to the latest American Community Survey (ACS) data released in 2018.

Table 4.

Percentages of persons in states who lacked health insurance coverage, had public health plan coverage, or had private health insurance coverage at the time of the interview, by age group: The United States, 2014.

GEORGIA

	(Percent Standard Error)		
	Uninsured at the time of the Interview	Public health plan coverage	Private health insurance coverage
All States (U.S)	11.5 (0.20)	34.6 (0.33)	61.8 (0.38)
All Ages	14.2 (1.44)	33.5 (1.32)	58.1 (1.80)
Under 65 Years	16.1 (1.65)	24.7 (1.41)	59.8 (2.05)
18-64 years	20.2 (2.21)	16.5 (1.28)	64.3 (1.96)
0 – 17 Years	5.5 (0.94)	45.9 (2.99)	48.3 (2.95)

Note: Adapted from "Health insurance coverage: Early release of estimates from the National Health Interview Survey, 2014". by R. A. Cohen & M. E. Martinez, 2014. *National Center for Health Statistics*, pp. 24-27.

Health professionals believe EHRs and the HIT frameworks can provide real alternatives to foster equitable care and treatment and promote patient self-management and self-empowerment through enhanced communication for the uninsured and insured. Research analysis revealed a relationship between the past and current literature and demonstrates important opportunities to promote quality healthcare through HIT and

systems accessibility. Research experts have identified several key health issues facing rural communities. These issues are access to care, the supply of primary care physicians and other healthcare providers, health promotion, disease prevention, healthcare technology, the organization of services for vulnerable rural populations, consumer choice, and rural hospitals. For healthcare providers to progress and provide integrated, automated, community-wide systems, modern information technology developments are necessary. "Without universal primary health care, it is difficult to make sure that all citizens, urban or rural, rich or poor and sick or healthy have the same accessibility to quality care" (Muening & Su, 2013, p. 112).

Disparities in health care are one of a multitude of problems in the United States, such as growing health costs, quality of care, and uninsured persons, despite the differences in SES status (Fiscella & Williams, 2004; Douthit, Kiv, Dwolatzky & Biswas, 2015; Hardeman & Kahn, 2020). The effects appear to represent individuals in rural populations living in poverty and across the SES spectrum (Fiscella & Williams, 2004). EHR adoption seems to be lower among clinicians serving larger proportions of uninsured patients (Hing & Burt, 2009; Douthit, Kiv, Dwolatzky & Biswas, 2015).

According to Hing and Burt (2009) African American, Hispanic or Latino patients who remained uninsured as Medicaid beneficiaries coexist as less likely to acquire Primary Care Physicians (PCP) with HIT or EHRs in comparison to patients with private insurance. Minority patients who have physicians and clinicians in rural communities are less likely to contribute to quality health improvements than those with patient portals and EHR/HIT tools to better manage their health than Whites (Hing & Burt, 2009; Douthit, Kiv, Dwolatzky & Biswas, 2015).

Income, race, SES status, access to healthcare, and technology are a few potential factors in rural populations that may originate from disadvantages in the quality of healthcare (Fiscella & Williams, 2004; U.S. Department of Health and Human Services, 2010a; Douthit, Kiv, Dwolatzky & Biswas, 2015). Nationally, policymakers, researchers and stakeholders have acknowledged the extent and value of healthcare resources received by Medicare beneficiaries, which vary significantly in the United States and in various regions (CMS, 2018).

The disparity in HIT access suggests disadvantages along with the implementation of modern IT program initiatives that may decrease the digital divide (Huang & Chen, 2010; Douthit, Kiv, Dwolatzky & Biswas, 2015). In contrast, the significant barriers in the healthcare industry primarily center on control, access, and management processes in technology. A degree of fragmentation may exist without standardization of electronically stored and transported data accessed through HIT systems. Thus, for practical purposes, HIT systems are synonymous with healthcare to meet the needs of the patient and the physicians and clinicians for general, and specialized services, maintenance, and access to EHR. IT in healthcare could provide the basis for a seamless and fully integrated system, which contains adequate availability of data instantaneously to ensure optimal care and delivery of services. Such systems would reduce errors, increase speed, streamline treatment, and ensure efficient protocols, thereby making the care optimally more cost-effective.

Chipp, Johnson, Brems, Warner and Roberts (2008) suggest that rural populations and clinicians in these areas endure several barriers that may link efficient healthcare services to geographic restrictions and limitations. These barriers represent and can lead

to health disparities, which perpetuate low quality of care to minority groups, inadequate disease prevention, illness, misdiagnoses, delayed diagnoses, ineffective treatment, and insufficient referrals from providers (Chipp et al., 2008; Douthit, Kiv, Dwolatzky & Biswas, 2015). American healthcare access is variable, depending on resources, geographic location, and the environment (Chin, Walters, Cook & Huang, 2007). Thus, there may be a range of health disparities nationally; these disparities will need intervention and management for the development and quality improvements in the delivery of care to patients in rural areas. The interaction with populations and cultural competency of physicians and clinicians empower and encourage patients to become active participants in their healthcare (Betancourt, Green, Carrillo & Ananeh-Firempong, 2003; Chin, Walters, Cook & Huang, 2007; Kooienga, 2018).

According to Zach, Dalrymple, Rogers and Williver-Farr (2012), health information access is fundamental to patient well-being. Inequities remain existent among communities where greater segments of the community live in poverty and lack access to physicians and clinicians (Zach et al., 2012; Sampson, et al., 2016). These communities are medically underserved areas (rural areas), and mortality rates may exist among these individuals because of the barriers related to limited resources of technology for primary care providers (Zach et al., 2012; Kooienga, 2018). Access to technology such as EHR can be costly, and many providers in rural communities contribute to the digital divide because of limited access to resources and funding to update systems (Zach et al., 2012; Braunstein, 2015).

Madison, Rudman, Hart-Hester, Caputo, French and Jones (2012) suggest that the use of HIT and information management may provide timely access to patient

information and records to optimize the quality of care, lower costs, and reduce the possibility of medical errors. According to Koppel (2016), HIT remains to be an immeasurable undertaking for medical providers. HIT has the ability to reduce medical errors, increase efficacy, and improve patient and clinician satisfaction, guidance, up-to-date data, and facilitation across professional networks, but technology can be frustrating when there are reduced benefits (Koppel, 2016). The investment in EHR by physicians and clinicians in rural communities is increasing at a slower pace and may be contributing to substandard care and delivery to individuals in the community because of the lack of resources. Consequently, chronic conditions may be difficult to manage (Madison et al., 2012; Braunstein, 2015). Telehealth, telemedicine and telepsychiatry are options to consider for rural physicians and clinicians that may improve timeliness and quality improvements in monitoring patients in rural settings and identifying illnesses (Madison et al., 2012; Fortney, Pyne, Turner, Farris, Normoyle, Avery, Hilty & Unützer, 2015; Amer, 2019). Conversely, Katzenstein, Kyrle, Crispin, Hartman and Lundberg (2012) suggests telemedicine: (a) can increase health care access to individuals who lack access to care, (b) increase effectiveness, efficiency and the capacity of the healthcare system, (c) increase access to care in rural healthcare settings, and (d) also improve the level of skill of medical professionals who collaboratively share information with other inner-city physicians and clinicians. The use of telemedicine allows physicians and clinicians to network with others and share best practices by connecting using technology such as e-mail to provide healthcare services to deliver medical information or suggest a diagnosis of patients (Katzenstein et al., 2012; Amer 2019).

This alternative medical technology may provide prompt or modern services to the patients in rural populations, but some technology is inaccessible to clinicians as well as patients because of lack of available resources. Some rural physicians and clinicians may incur less cost with the use of technological resources such as video conferencing, FaceTime, Skype or cellular phones with the use of telemedicine (Katzenstein et al., 2012; Amer, 2019). A lack of modern and reliable physical infrastructure and technology in rural communities may make the delivery of healthcare challenging (Serrano & Karahanna, 2009; Katzenstein et al., 2012; Amer, 2019). Additionally, the healthcare system in the United States can be burdened, inept and underserved with modern technology and telemedicine advancements and concerns for the quality of healthcare is rapidly rising (Amer, 2019).

Baird, Furukawa and Raghu (2012) suggest that healthcare providers share medical records and information on patient content in digital form rather than printed form. Thus, clinicians whether in rural or urban health care settings consider adopting HIT such as EHR and are valuable resources to improve best practices (Baird, Furukawa & Raghu, 2012; Payne, et al., 2015). Existing contingencies related to quality patient care rely on funding resources, depending on the geographic location and bandwidth (Baird, Furukawa & Raghu, 2012; Payne, et al., 2015). Helm, Slawson, Damitz and Olsen (2005) suggest that health care physicians and clinicians move toward the electronic world from the standard paper world some clinicians find that there is a tangible benefit in EHR/HIT adoption to improve patient care.

Further research is necessary for developing IT in the healthcare industry, which is critical in the use and management of medical systems, particularly in the current status

of the economy. This research can serve as a valuable source for newly established healthcare reform initiatives, such as the Affordable Care Act (ACA), HITECH Act, Medicare Access and CHIP Reauthorization Act (MACRA) of 2015 and the Quality Payment Program (QPP). These initiatives streamline and modernize the process for superseding EHR/HIT, which is also known as meaningful use, and posit incentive pay for adopting EHR. Conducting research on current medical systems and access to statistical data, and resources that maintain data related to the field are necessary.

According to Bowers and Gann (2019), annual changes in county uninsured rates vary but more specifically, Georgia populations uninsured rates range between 15% – 40%, depending on age, race, ethnicity and socioeconomic status in 2017. The ACA is part of a national quality strategy toward better care, healthy communities, healthy people, and affordable care (Gaylin et al., 2011; Payne, et al., 2015). The HITECH Act promotes the effective adoption of HIT, including EHRs, and electronic health information exchange among primary health care physicians and clinicians (Gaylin et al., 2011; Payne, et al., 2015). These acts aid both in support of empirical studies and the potential effects of public healthcare programs on health disparities and access to care. This information shall also offer room for improved literature pursuits and use of resources, such as the U.S. Department of Health and Human Services, National Healthcare Quality and Disparities Reports Agency for Healthcare Research and Quality (AHRQ) (2010).

Research opportunities in HIT systems could offer guidance to various federal and state government entities, and to outside health organizations (AHRQ, 2014). These research opportunities can also provide concrete data evidenced in questionnaires and

quantitative analysis, which may bridge the gap in research, reduce consumer health expenses, and provide best practices for health prevention and quality of care, as well as understanding the attitudes of clinicians concerning the potential of EHR/HIT to improve healthcare and the disparities that may exist based on demographics, SES status, health, income, and technological access.

Improvement in access to rural healthcare and modernization of HIT systems determines the growth of the medical industry (Custodio, Gard & Graham, 2004; Amer, 2019). Integration of technology in organizations and EHR or operational technology such as HIT access remain driving factors for growth in the healthcare industry (Custodio, Gard & Graham, 2004; Amer, 2019). Without the information, incentives, and infrastructure, the healthcare industry could not function. Healthcare access and technology remains inaccessible to many rural physicians, clinicians and underserved populations (Custodio, Gard & Graham, 2004; Amer, 2019). The theoretical literature on existing health disparities in care and HIT in underserved populations and rural physicians and clinicians serve as the foundation for the research. Health disparities and modern development of HIT systems are an area influenced by the demand for integrated healthcare systems in the medical and business industry. The role of health disparities goes beyond improvement of access to care, interoperability standards, and clinician information access. Quality improvements are crucial to eliminating or decreasing disparities of any system in healthcare reform.

Quality Improvement

The history of quality improvements in health care has evolved over the past decade, and the consumer and political interests have prompted shifts in HIT, as well as

payment systems and healthcare costs, which are governing the healthcare field (Carter, 2008, Amer, 2019). Healthcare physicians and clinicians' services are diverse and sometimes incompatible; this may lead to gaps in healthcare and gaps (Carter, 2008; Harper, S. Y., 2018; Amer, 2019). Figure 4 depicts a view that state-level policymakers can use to influence health care quality improvement at the macro level (McNeill & Kelley, 2005). The theoretical framework depicted in Figure 4 involves data collection and analysis to effect change in health care professionals for a proposed result.

The Quality Improvement Process: Links, Stages of Change and Information Supports

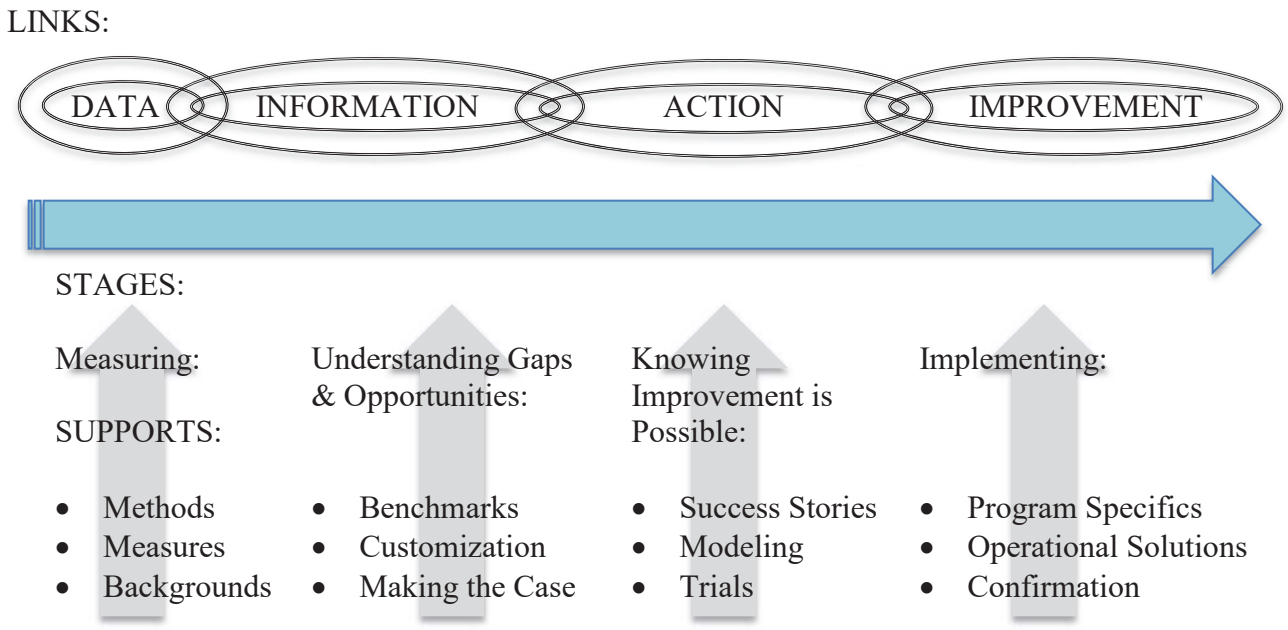

Figure 4. The quality Improvement Process: Links, Stages of Change, and Information Support. Adapted from D. McNeill & E. Kelley. *How the National healthcare quality and disparities reports can catalyze quality improvement. Medical Care. 43*(3 Suppl), 2005, p. I-83

The process for guiding effective action or enhancements of policymakers and particularly in this study applies to healthcare professionals and suggests the *Quality Improvement Cycle* as shown in Figure 5 (Langley, Nolan, Nolan, Norman & Provost, 1996). This cycle represents the Walter Shewart model, which was interpreted by W.

Edward Deming's Plan-Do-Check-Act conceptual model for decision-making. Walter Shewart and W. Edward Deming were notable for quality improvements in health care.

Quality Improvement Cycle

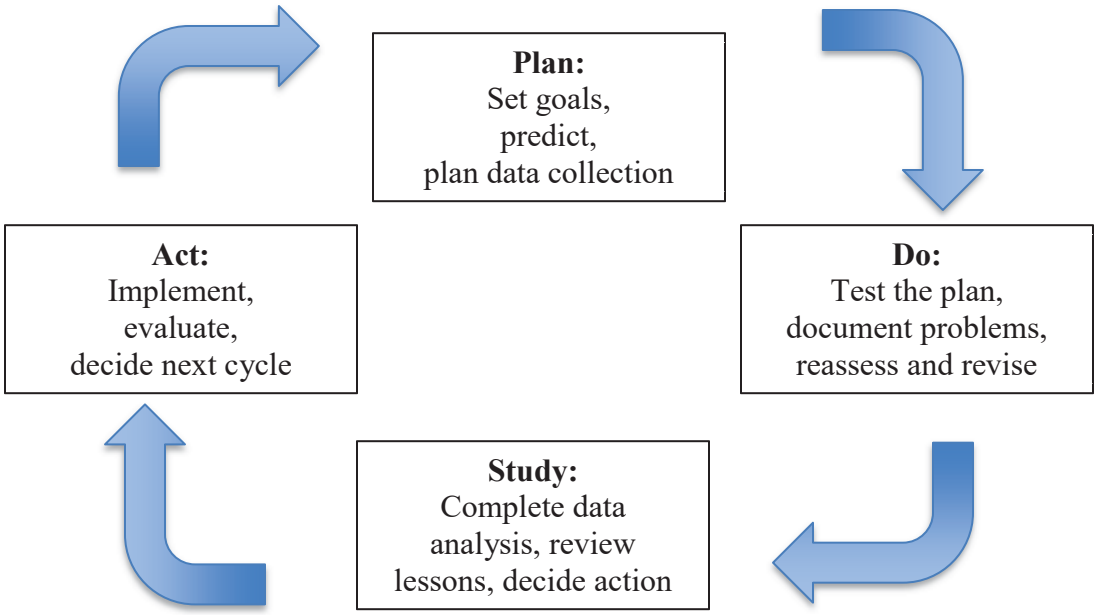

Figure 5. Quality Improvement Cycle. Adapted from by G. J. Langley, K. M. Nolan, T. W. Nolan, et al. *The improvement guide: A practical approach to enhancing organizational performance.* San Francisco: Jossey-Bass Publishers, 1996, p. 97

Likewise, Dr. Donald Berwick created the Institute of QI, later renamed the Institute for Healthcare Improvement, which focused on healthcare restructuring and quality. According to Alexander, Weiner, Shortell, Baker and Becker (2006), QI planning and implementation demonstrates constant improvement and performance through the implementation and use of information systems. Four elements of hospital support and infrastructure include integrated data systems, financial support for QI, clinical integration, and information system capability to ensure efforts of direct patient care via clinical team engagement. Healthcare facilities such as hospitals maintain infrastructure and support HIT adoption and QI, which include four elements: financial

support for QI, clinical data systems integration, and system information capabilities (Alexander, et al., 2006; Kooienga, 2018). It is critical to providing quality medical systems and technology in healthcare organizations.

Stage 2 of meaningful use of HIT was intended to "encourage the use of health IT for continuous quality improvement at the point of care and the exchange of information in the most structured format possible" (Yu, 2011, p. 207). Research has shown that patient-centered outcomes may not improve instinctively; however, direct attempts to adopt HIT may improve patient-provider interaction and necessitate greater use of technology for physicians in smaller, rural communities, which may develop better patient health outcomes (Selic, Svab, Repolusk, & Gucek, 2011; Kooienga, 2018). Legislators and physicians and clinicians may underestimate change or the effects of patient-provider interaction when incorporating HIT (Baron, 2007; Braunstein, 2015). Many patients would rather interact in person rather than through technology in rural communities and physicians, and clinicians are less equipped to absorb technology adoption costs (Selic, Svab, Repolusk, & Gucek, 2011; Braunstein, 2015; Kooienga, 2018). Although the presence of EHR/HIT may reduce the period physicians and clinicians spend with patients, entering information may be tedious for patients if submitted on their own (Shield, Goldman, Anthony, Wang, Doyle & Borkan, 2010; Braunstein, 2015; Kooienga, 2018).

In the healthcare industry, implementation, maintenance, usability, and developmental concerns exist with EHR, HIT, and hospital-based information systems for interoperability and clinician availability. The aim of HIT is to give a full range of resources to healthcare professionals and provide a vehicle toward QI and improve the

efficacy of care. HIT developments in the 1960s had a financial focus that would only capture charges, generate patient bills, and update the general ledger accounting systems (Blackwell, 2008). As the need increases globally for access to patient records globally, modern technology presents meaningful use in rural healthcare facilities and hospitals. "The implementation of EHRs and adopting different stages of meaningful use by health management professionals create a completely digitized healthcare system and present challenges" (Dowgiert, 2014, p. 28). Meaningful use of EHR is a priority, which gained national policy consideration centered on the Health Information Technology for Economic and Clinical Health (HITECH) Act for the efficiency and improvement of health care infrastructure and delivery (Blumenthal & Tavenner, 2010; Ajami & Bagheri-Tadi, 2013; Payne, et al., 2015). Meaningful use requires (a) consistency in clinical content and standards for health care, (b) computerized alerts, (c) measurement and data mining capabilities, (d) reporting features, and (e) interoperability (Tripathi, 2014; Payne, et al., 2015). Meaningful use focuses on clinicians having systems such as EHR to document and reference patient diagnoses, e-prescribing, treatments, assessments or observations captured by physicians (Tripathi, 2014). The future of e-prescribing proposed to improve patient care by reducing the interval among physicians, clinicians, and pharmacies, reducing instanced of prescription illegibility, monitoring opioid prescribing, and raising the quality of care and patient gratification (Kannry, 2011).

Additionally, meaningful use introduces interoperability among physician-to-physician HIT such as EHR systems in healthcare, which offer certifiable and complete records (Tripathi, 2014; Payne, et al., 2015). This research may inform rural physicians and clinicians of standardized measures and methods, drive rural physicians and

clinicians and state level legislators to action, help determine local benchmarks, and aid states in finding solutions for healthcare delivery and disparities in technology among rural communities, specifically in Georgia. Therefore, offering meaningful use of EHR, the use of medical documentation and interdependent practices represents viable technology improvements and the potential to lower costs, share patient information, and reduce medical errors (DesRoches, & Rosenbaum, 2010; McCullough, Casey, Moscovice & Burlew, 2011; Siebenaller, 2012; Payne, et al., 2015; Koppel, 2016).

Most healthcare programs aim to improve outcomes and promote healthy environments far beyond the health care system. Effective strategies for reducing health disparities entail a collaborative effort between physicians and clinicians, public health practitioners, healthcare systems, and other community stakeholders (CMS, 2018a). Strengthening partnerships and offering provider incentives may facilitate a community-based approach to reducing health disparities and access to care, and eventually, in public health (Derose, Gresenz, & Ringel, 2011; Birkhead, Klompas & Shah, 2015). Thus, this research could provide insight toward cost-effective and long-term benefits and enhance the quality of care for the underserved and physicians and clinicians, which can aid in reducing health disparities in rural communities. The physicians and clinicians include those in office-based multi-site practices or groups, mixed primary care practice, health system affiliated or hospital-owned health care.

Underserved Populations

According to Custodio, Gard and Graham (2009), there exist racial and ethnic disparities in health about HIT and use of EHR for QI, education, outreach, workforce development, policy, advocacy, and financing. This research targets underserved

populations and the advancement of HIT best practices to align with the goals of healthcare reform. A national survey presented minimal EHRs in community health centers that serve the uninsured and poor. As a result, HIT initiatives ensure the quality of care; maximize healthcare services, offer opportunities for collaborative effort to manage the health needs of vulnerable populations (Custodio, Gard & Graham, 2009; Hardeman & Kahn, 2020). The Georgia Department of Community Health (2015) stated there exists 141 medically underserved areas in Georgia and seven underserved populations. These statistics are startling, especially since many authors have stated how far the nation has come in modernizing technology and offering medical accessibility through EHR/HIT. Several resources such as the State Office of Rural Health (SORH) assist rural and underserved populations to reduce disparities in the health of Georgians who live in these areas. Individuals who live in rural areas are (a) likely to be uninsured, (b) are underinsured, and (c) suffer from cancer, diabetes, heart-related issues, and obesity (SORH, 2016). Thus, rural communities need long-term resolutions for delivery of care and disparities in clinician adoption of EHR/HIT.

Contemporary Best Practices and Emerging Trends

The next section examines the ongoing documentation of best practices in medical systems and technology and the impact of the emerging trends of healthcare in rural communities and healthcare facilities. Currently, networks of contractors and executives are in search of decision support, medical, financial, and accounting systems technology to safeguard government information, Medicare beneficiaries, physicians, and clinicians, and third-party payer claims payment data (Bahensky, Jaana & Ward, 2008; Braunstein, 2015; Kooienga, 2018). It is crucial for health organizations to provide

medical systems that safeguard the use of personally identifiable information (PII) and patient health records interchangeably in digital form and may be shared throughout healthcare organizations via wide area network (WAN) information systems.

Healthcare is one of many industries without standard automated information management systems; it must rely on the point-of-action on paper-based information or presentation. "A clinician provides many of these decisions after logical interpretation of available facts and assuming there were medical systems and resources available to manage the process; there would not be many deficiencies to overcome in the future" (Blackwell, 2008, p. 222). The significant barriers that exist in the healthcare industry are related to control, access, and management processes in medical HIT. Therefore, the degree of fragmentation may exist without standardization of transported and electronically stored data and accessed through medical systems. Thus, for practical purposes, medical systems are synonymous with healthcare to meet the needs of the patient as well as physicians and clinicians for general, and specialist services, maintenance, and access to health records.

Bates' (2002) study revealed computerization of error-prone processes and CDSS that may substantially improve both efficiency and quality as well as facilitate quality measurement. Comparable to Blackwell's (2008) study, medical information systems should allow data to be accessible to users of hospital-wide systems. Computing and medical systems should defy limitations and specialties and cater to patients for better quality care. EHR is one of the popular trends which allow information retrieval relating to patient history, efficient filing of records and providing accurate treatment plans. The development of computer-aided diagnosis or decision support systems (DSS), offer

automated resources, health management pathways and IT-based dynamics for many physicians and clinicians (Blackwell, 2008; Braunstein, 2015; Kooienga, 2018). The benefits of EHR systems may provide increased cost-effectiveness and enhanced evidence-based treatment that can lead to improved and consistent outcomes with fewer errors (Blackwell, 2008; Braunstein, 2015). Medical information systems can include applications for physicians and clinicians and transcription services and systems for physicians' offices or telemedicine.

According to Bernstein, McCreless, and Côté (2007), medical systems often include administrative data relating to costs, resources, scheduling, and staff as well as clinical data that contains patient information related to medical conditions diagnosis, laboratory tests, images, and plan of care. These systems present the physician with a full realm of the patients' prior and current diagnosis and allow minimal processing. The physician can consider each piece of information and can reach a diagnosis or treatment decisions immediately.

Health facilities often use automated tools such as HIT to reduce potential medical errors. Five constants that influence the successful integration of IT in healthcare are (1) proper use and maintenance of the IT budget, (2) supportive leadership, (3) the use of project management, (4) the process of implementation, and (5) significance of end user training and involvement (Bernstein, McCreless & Côté, 2007, p. 17; Braunstein, 2015; Kooienga, 2018). These constants are challenges which healthcare organizations face, and use in financial, and human resources when adopting new IT to achieve organizational goals and developing solid technological infrastructure to enhance the delivery of quality healthcare.

Today data integration limits many health physicians and clinicians because of the initial cost of these systems in smaller rural facilities. Therefore, incentives provided by the federal government may aid in the implementation of electronic health records and modern medical information technology systems. The long-term development of information systems in the healthcare industry is to create a complete medical record over a patient's lifetime by integrating the individual incidents with prior EHR data.

Transactional, Situational, Transformational Leadership and Healthcare

Transactional leadership is known to relate to the change process and to transformational leadership. The concept focuses on relationships and transactions, which aid in facilitating change and improving relationships to implement collaboration and decrease resistance (Florea, 2016). For example, clinicians are mandated to implement and adhere to EHR/HIT for the purpose of improving healthcare quality and increased productivity.

Situational leaders provide support to attain the desired goal. For example, clinicians are required to comply with EHR/HIT policies to provide better care and increase productivity, but many are faced with challenges such as uninsured patient populations and very little resources for technology commensurate to urban hospitals and facilities. Therefore, the clinician may practice without technology tools to provide thorough healthcare examinations.

Bernard Bass contended that organizational willingness to change is the barometer for transformational leadership (Bass, 2000). Bass argued that the application of leadership centers on performance beyond expectations (Bass, 2000). Research demonstrates the power of transformational leadership by increasing commitment,

effectiveness, understanding, and the dynamics of organizational change (Bass, 2000). Transformational leaders promote awareness in their communities on what is significant while increasing the concern for achievement and self-actualization of standards. For example, EHRs are a standard among healthcare clinicians, and policy from regulatory agencies such as CMS has the potential for healthcare improvement through HIT (Gaylin et al., 2011; Birkhead, Klompas & Shah, 2015). This topic has reached the highest level of the Executive Branch, which seeks to promote the use of EHR among clinicians for consistent health records and better-quality standards (Gaylin et al., 2011; Birkhead, Klompas & Shah, 2015).

Likewise, Burns (1978) theorized that transformational leadership remains independent of the three factors, which are as follows:

1) *Inspirational and charismatic leadership* - The leader envisions a valued future and articulates how to reach specific standards and goals, which individuals need to emulate
2) *Intellectual stimulation* - The leader encourages followers to query expectations and identify problems to enable new and innovative approaches
3) I*ndividualized consideration* - The leader treats individuals with various needs and supports the development (Bass, 2000).

These concepts are highly interrelated to distinct components of leadership behavior in organizations; thus, they are applicable to HIT.

Peter Senge introduced the art of practice in learning organizations and the need to adapt to changing environments (Bass, 2000). Senge (as cited in Bass, 2000)

suggested, "…adaptability characterizes the learning organization" (p. 19). The pace of change is fast; what may have served us differently in the past may no longer serve us in the future, and organizations are seeking competitive advantages such as cutting-edge technology (Senge, 2006). The changes in the local or global economy require new viewpoints (Senge, 2006). Modern developments closely involve information technology organizations with acquiring and processing information from external and internal environments (Bass, 2000). With EHRs, it is a necessity for clinicians to adopt changes to diversify the workforce and its customers as well as the changing demands of society (Custodio, Gard & Graham, 2009). To transition to EHR, healthcare executives may partner with healthcare clinicians and community organizations to address the immediate goal of developing HIT exchanges to ensure data availability to healthcare clinicians at the point of care. (Institute for Health Technology Transformation, 2010).

Views of Healthcare and Opportunities for Medical Systems Development

Many views state the healthcare industry has developed a dependence on IT for maintaining and improving clinical and business operations (Coulam & Gaumer, 1991; Kooienga, 2018). For example, the implementation of medical systems, such as payment system (PPS) and EHR, has produced key changes in the hospital industry and the way physicians and clinicians offer hospital services. Healthcare policy changes, however, may contribute to the ineffectiveness of hospital services, programs administered, pricing, and controlled spending, and maintenance of equity across the hospital industry (Custodio, Gard, Graham, 2009; Purnell, Calhoun, Golden, Halladay, Krok-Schoen, Appelhans & Cooper, 2016).

The disparity in digital information technology adoption suggests long-term investments for IT and education for the disadvantaged along with modern IT program initiatives that may decrease the digital divide. On the other hand, Suri (2002) examined information technology use and its positive outcomes in healthcare to achieve mandates for the delivery of quality care, which is more cost-effective. The scope of information technology and medical systems has publicly intensified, and clinical decision-making regarding health outcomes is becoming more vital nationally (Suri, 2002; Braunstein, 2015; Kooienga, 2018). The public interest substantiates the increased role of HIT, which may resolve many concerns with the use of EHR, HIT, and modern technology. HIT developments and computer-based medical records aid cooperative employer groups, physicians and clinicians, regulators and the healthcare industry increased attention toward quality care.

Policy, Privacy and Security Concerns

A wide-range field of HIT functions in healthcare systems such as the use and adoption of EHR has greater attention in current policy dialogs (Ludwick, 2009; Braunstein, 2015; Kooienga, 2018). President Obama and Congress set early goals for achieving EHRs for Americans within five years (2009 – 2014) for direct and indirect support for HIT adoption as part of the American Recovery and Reconstruction Act of 2009 (U.S. Congress 2009; Gaylin et al., 2011; Braunstein, 2015; Kooienga, 2018). Presently, HITECH Act offers provider gains in the form of incentive payments through Medicare and Medicaid to hospitals and physicians who adopt meaningful use of EHR technology (Ahern, Woods, Lightowler, Finley & Houston, 2011; McCullough, Casey, Moscovice & Burlew, 2011; Menachemi, Powers & Brooks, 2011; McCullough,

Zimmerman, Bell & Rodriguez, 2014).

Although government incentive programs exist, the development of security and confidentiality standards is daunting among EHR implementation and development (Bahensky, Jaana & Ward, 2008; Birkhead, Klompas & Shah, 2015). The federal government supports the certification commission of HIT to develop standardized patient records, which are computer-based (Bahensky, Jaana & Ward, 2008). HIT standards and criteria development are comprehensive and include functionality, interoperability, privacy and security (Bahensky, Jaana & Ward, 2008; Greenhalgh, et al., 2017). There is a differentiation between privacy and security as cited in Table 5.

Table 5

Privacy	Security
Privacy is the appropriate use of user's information	Security is the "confidentiality, integrity and availability" of data
The organization cannot sell its patient/user's information to a third party without prior consent of the user	Various techniques like Encryption, Firewall, etc. are used in order to prevent data compromise from technology or vulnerabilities in the network of an organization
It concerns with patient's right to safeguard their information from any other parties Privacy is the ability to decide what information of an individual goes and where to	It may provide for confidentiality or protect an enterprise or agency Security offers the ability to be confident that decisions are respected

Note. Adapted from "Big healthcare data: preserving security and privacy, 2018" by K. Abouelmehdi, A. Beni-Hessane & H. Khaloufi, *Journal of Big Data*, p. 5.

The central goal is to link healthcare information and EHR throughout the healthcare system; however, knowing the differences between privacy and security is relevant to preventing big data breaches and protecting patient health data. Consistent issues plague the efforts of EHR to reach interoperability among physicians and

clinicians while meeting Health Insurance Portability and Accountability Act (HIPAA) and security standards (Bahensky, Jaana & Ward, 2008; Braunstein, 2015). Additionally, identity theft and data loss due to security breaches are increasingly prevalent and employing EHR offers no sign of resolve for the dissolution of security concerns (Butler, 2015; Braunstein, 2015). Security incidents such as breaches in healthcare data confidentiality, PHI, unauthorized access to patient health records or sensitive data (big healthcare data) leads to preventive and proactive approaches for clinicians and are also focus of policymakers (Abouelmehdi, Beni-Hessane & Khaloufi, 2018). In healthcare mistaken identity is a factor with the absence of EHR when presented with resolving the reduction of medical or surgical errors (Butler, 2015; Braunstein, 2015; Abouelmehdi, Beni-Hessane & Khaloufi, 2018). Medical errors are challenges for rural as well as urban physicians and clinicians; there exist limits to the scope and number of medical facilities with less human resources and fewer employees with technical backgrounds (Bahensky, Jaana & Ward, 2008; Braunstein, 2015). Nonetheless, the ability to exchange health information electronically is beneficial to healthcare physicians and clinicians with the goal of delivering quality patient care (Bahensky, Jaana & Ward, 2008; Braunstein, 2015).

In 1991 the IOM in the United States developed policies and recommended by the year 2000 that each physician would use computers and technology in their practice to achieve progressive, high-quality patient care (National Assembly on School-Based Health Care, 2012). Despite the growing use of EMR since the 1970's, mostly government healthcare institutions and hospitals are part of a limited number of employers of this technology (National Assembly on School-Based Health Care, 2012).

Methodological Literature

Various studies have been conducted on the topic of EHR and HIT. These studies have used quantitative correlational methods versus qualitative or mixed method designs as the methodologies in research. Based on the literature review, the intent of this study was best conducted using quantitative methods. The key objectives accomplished in previous research were to evaluate factors such as the role of health informatics, technology adoption and healthcare delivery. The objectives contributed in EHR/HIT adoption and quality healthcare delivery are representative of sustainable healthcare, and the role of communication and technology. Since the aim was not to present a narration of data but rather specific analysis quantifiably the use of quantitative correlational methods was chosen to present varied levels of technology adoption, if any. The collection of data based on the methodology applied is critical to ensure generalizable outcomes and conclusive results through scientific research.

Research Design Literature

The quantitative correlational design for this study was determined by the review of several design methods. The germinal methodologist that contributed to EHR adoption was Bascetta, which explored meaningful use of HIT and quality healthcare delivery. Meaningful use of HIT is a quality assurance measure that Centers for Medicare & Medicaid Services (CMS) evaluates and monitors, which is how hospitals obtain their performance ratings (Bascetta, 2007; McCullough, Zimmerman, Bell & Rodriguez, 2014). Bascetta's (2007) study showed that existing IT systems could aid hospitals, provider groups, Accountable Care Organizations (ACO) and FQHC in gathering healthcare delivery data.

For this study, quantitative methodology was employed to gain understanding of how clinicians adopt technology and factors that may hinder use and contribute to quality healthcare delivery. This quantitative study increases our knowledge about the phenomena, specifically the evaluation of relationships that may exist among research theory, inquiry and hypothesis. The data in this study were best presented numerically and quantitatively to provide the relationships of variables, which qualitative research does not attain.

Conclusions

The volume of literature and availability regarding technology adoption in healthcare settings are relevant in the principles and general healthcare practice. The vulnerable populations who experience an absence of comprehensive and preventive services may provide the isolation from care and contribute to adverse health outcomes referred to as underserved (Mundt, 1998; Sampson, Kaplan, Cooper, Diez Roux, Marks, Engelgau, Peprah, Mishoe, Boulware, Felix, Califf, Flack, Cooper, Gracia, Henderson, Davidson, Krishnan, Lewis, Sanchez, Luban, Vaccarino, Wong, Wright, Meyers, Ogedegbe, Presley-Cantrell, Chambers, Belis, Bennett, Boyington, Creazzo, de Jesus, Krishnamurti, Lowden, Punturieri, Shero, Young, Zou & Mensah, 2016). This research would be of interest to policymakers and most importantly medical practitioners, as there exists a gap in health care delivery in rural populations, including Georgia (NORC at the University of Chicago, 2013). EHR exploration can provide informed recommendations for technology developers as well as stakeholders and health care professionals. The anticipation of health outcomes of the study will guide these entities in decision-making for further EHR adoption, in addition to other opportunities such as maintenance of this

technology in rural areas (Syzdykova, Malta, Zolfo, Diro & Oliveira, 2017).

The five determinants of health that impact rural communities and racial or ethnic minority populations are (1) access to care, (2) availability and competency of health physicians and clinicians, (3) health promotion and disease prevention initiatives, (4) HIT adoption, and (5) services for underserved populations (U.S. Department of Health and Human Services, 2010b). These factors may drive changes in rural communities, which may have a critical effect on healthcare quality and HIT adoption (U.S. Department of Health and Human Services, 2010b, para. 3). The study will extend and increase the understanding of several limitations or failures of HIT such as EHR implementation and meaningful use. HIT are tools to aid in the comprehension of health disparities across geographic, ethnic, racial or gender groups in rural populations. Additionally, recent attention has been given to lower and middle-income areas such as isolated rural populations and may require information on how to deliver effective and efficient healthcare services using HIT (Muening & Su, 2013; Casey, Moscovice & McCullough, 2014). According to Agency for Healthcare Research and Quality (AHRQ) (2014), health disparities in quality of care remain prevalent in Southern states, which tend to have poor quality than Mid-Atlantic, Western, and North Central states but greater disparities exist in these states. The overall quality of care and racial/ethnic disparities vary countrywide (AHRQ, 2014, p. 3).

These health system practices ensure efforts of clinical teams engaging in direct patient care and creating a more patient-driven health experience to prevent suboptimal drug interactions or addiction (Mandl & Kohane, 2016). The healthcare industry is not far from enabling hospitals to automate the abstraction process, promote the use of HIT

for the collection, and submission of data for CMS' hospital quality measures and mandates (Bascetta, 2007; McCullough, Zimmerman, Bell & Rodriguez, 2014). It is critical, though, to acquire and maintain quality medical systems and technology in healthcare organizations. The study will examine the ongoing effectiveness and use of HIT in rural communities that may reduce health disparities and impact healthcare quality in rural communities and among healthcare physicians and clinicians.

Healthcare information technology adoption trends for rural Georgia populations are the topics considered. The use of Georgia in the study rather than other states provides diversity in demographics such as racial or ethnic groups. Although Georgia may not be similar in makeup as other rural Appalachian populations, and south area varies geographically, has a high concentration of minorities and low-income populations, and is lagging in EHR/HIT adoption and implies underserved populations.

Chapter Summary

The literature analysis revealed relationships and gaps in historical and current research and demonstrates important opportunities to promote quality healthcare with the use of medical systems, and technology adaptability. Research experts have identified several key health issues facing rural communities. The issues are (1) access to care, (2) healthcare delivery, (3) the quantity of primary care physicians and other healthcare clinicians, (4) health promotion, (5) disease prevention, (6) healthcare technology, (7) the organization of services for vulnerable populations, and (8) consumer choice in rural communities. For healthcare physicians and clinicians to progress and provide integrated, automated, community-wide systems, various information technology improvements are necessary. The constructs of this study facilitate clinician practice and attitudes around EHR adoption and use in relationship to quality healthcare delivery in rural populations. Chapter 3 will explain the methods outlined in this prospective study.

Chapter 3:

Research Methodology

The proposed quantitative correlational study is to explore the relationship between EHR adoption among clinicians and the quality of clinician healthcare delivery. Quality signifies the value and effectiveness of proper clinician care, preparation and availability of resources such as EHR technology, and clinician collaboration (Donabedian, 2014). This chapter introduces the basis of the research design and the appropriateness for the study. A contextual research method is applied to respond to the research question set forth and how it can best contribute to the research literature on rural health care physician and clinician populations in the quality of the delivery of care, and adoption of EHR/HIT. In this study, the degree of services in healthcare for individuals within a population and the probability of constant increased outcomes in healthcare based on clinician knowledge is characterized as quality (Lohr, 1991; Mosadeghrad , 2013; Mosadeghrad, 2014).

The purpose of this quantitative correlational study is to explore the relationship between technology EHR/HIT adoption and the quality of healthcare delivery in rural populations in Georgia. In this section use of a quantitative correlational study is applied to answer the research question. The following sections will address the research method and design appropriateness, population and sample, informed consent and confidentiality, instrumentation, validity and reliability, data collection and data analysis of the study.

Research Method and Design Appropriateness

The research design encompassed a quantitative correlational study, which the data collection consists of the analysis of survey data that may generate confirmation or causation of the potential theoretical base of trustworthy and credible data. The study provided in-depth analysis, interpretation, opportunities, and behaviors of physicians and clinicians in the field. The research methodologies included random sampling for the population target for data collection. The use of a questionnaire sought to explore technology adoption of EHR among healthcare professionals to identify barriers and opportunities for change. The rural populations in the United States have changed, and populations with underrepresented minorities have increased (U. S. Census, 2010b; CMS, 2017). The analysis attempted to identify locations with populations that encompass a high vulnerability, which include greater proportions of medically underserved minorities and low-income individuals who have reduced or limited resources in healthcare. The analysis was conducted by use of a survey instrument based on county levels with the use of population data from the 2010 Census, 2013-2017 American Community Survey (ACS), 2018 Health Research Services Agency (HRSA) data warehouse, coupled with survey responses from several physicians, clinician, and medical practitioner locations. First, the identification of the most vulnerable counties in Georgia that have uninsured, underinsured, and underrepresented minority populations based on the 2010 U. S. Census report occurred. Selections made are by demographic characteristics. Evaluation of the size of each county and HIT adoption in facilities such as hospitals, medical centers, nursing facilities, solo or private practices and clinicians within rural populations also occurred. Identifying the areas of Georgia that may merit major attention within the next

decade or sooner was appropriate for the study, as implementation of stage 3 meaningful use of EHR, and the Affordable Care Act are in effect (U. S. Census, 2010b; CMS, 2017).

Using homogeneous selection, which is a type of purposive sampling in several isolated rural counties, the data will represent racially or ethnically balanced populations for confirmability. The survey questions are derived and identified from underserved or underinsured populations and physician and clinician communities relevant to EHR/HIT adoption and healthcare delivery, and revealed health disparities that may exist from an organizational, structural, and technical perspective. The use of a survey was preferred because the instrument provides a self-administered process among participants and canvassing Georgia Rural Health Associations, Rural Health Clinics, Research Data Assistance Centers, National Primary Care Networks, and PUMA exchanges and data reports will offer analysis. E-mail distribution was used for convenience to allow the reach of reasonable health care populations because was highly difficult to travel to multiple rural healthcare organizations and rural populations to distribute the surveys to participants in person. Additionally, clinician availability and unintended disruption of patient appointments or health care delivery may be restricted during business hours to eliminate HIPAA violations. Electronic surveys allow respondents to answer the questionnaire conveniently at their leisure, which was less intrusive. A pilot study was not necessary because of the pre-approved use of an original 2017 National Electronic Health Records Survey (NEHRS), which was a pre-established and validated instrument.

Quantitative research. The quantitative study comprises of null hypothesis testing using statistical values (Creswell, 2014; Hoy & Adams, 2016; Creswell &

Creswell, 2019). The hypothesis denote predicted relationships among variables. The Pearson correlation coefficient test will be used to compute the relationship between two variables. The predictor variable is quality of clinician healthcare delivery and the criterion variable is EHR/HIT adoption. Later, linear regression analysis tests were used to strengthen the results and to understand the relationship between various criterion and predictor variables. The data collected in the quantitative study aided the investigator in the degree of measurement to confirm or reject the hypothesis (Creswell, 2014; Hoy & Adams, 2016; Creswell & Creswell, 2019).

Correlational design. The correlational design aided in the description of relationships that exist between variables without manipulation or modification and comprehension. Establishing cause and effect was not the focus of the design. Statistical analysis was used to determine a negative or positive correlation between the variables and the degree of correlation (Creswell, 2014; Hoy & Adams, 2016; Hoy & Adams, 2016; Creswell & Creswell, 2019). This included the ability to make inferences based on the knowledge and patterns between the variables. Linear regression analysis and correlational design with Pearson product-moment correlation and binomial logistic regression for nominal or ordinal data and computed findings was used to determine the relationship or significance of the criterion and predictor variables with the Pearson's *r* calculation (Hauke & Kossowski, 2011).

The data gathered in this study came from 60 healthcare physician and clinician primary care providers (PCP) in rural locations. For example, the physicians and clinicians originated from private or solo medical practices, Rural Health Clinics (RHC), Rural Referral Centers (RRC), Sole Community Hospitals (SCH) or Rural Medicare or

Medicaid-Dependent Hospitals, Critical Access Hospitals (CAH), and FQHCs with small to medium locations using a questionnaire instrument.

The use of a questionnaire facilitated the wide-range analysis and organization of data collection for the close-ended questions. The hypothesis was tested with the use of regression analysis in IBM SPSS for interpreting the questionnaire responses effectively. The use of this software enabled the analysis of input and output and offered a novice or expert statistical explanation of research (Armitage, Berry & Matthews, 2002; Hinton, McMurray & Brownlow, 2014). The IBM SPSS software use allowed analysis using tables, descriptive statistics, and visual explanations of results.

The quantitative correlational study will assess the criterion and predictor variables within rural populations concerning clinician healthcare delivery and disparities if any of EHR/HIT adoption. The predictor variables are the quality of healthcare delivery, burden and interoperability based on available resources (domestic resources), e.g. government incentive programs such as Regional Extension Center (REC). The mediating variables are burden and interoperability, which are also considered predictor variables. The criterion variable is EHR/HIT adoption. Additionally, a quantitative correlational study was the most appropriate for testing the null hypothesis suggested with the use of correlation and regression statistics. This quantitative method provided a numerical analysis of the data centered on the frequency, mean, and standard deviation. The standardized measurements aided in the presentation of data and findings with the unbiased opinion, trends and perceptions while producing practical, and generalized inferences (Creswell, 2014; Hoy & Adams, 2016; Creswell & Creswell, 2019). The data collected from the survey included but are not limited to gender, race, clinician type and

specialty, rural counties for the targeted population, and insurance type for patients served, as demographic data that was analyzed using descriptive statistics as shown in Appendix G.

The use of several public statistical websites and databases was employed to achieve the targeted population. For example, HRSA, ACS, Health System Measures data, Healthcare Information and Management Systems Society (HIMSS) and National Center for Health Statistics (NCHS), National Health Statistics (NHS) Reports, and the most current U. S. Census Bureau statistics were employed to provide target populations of uninsured, underinsured and underserved rural areas in Georgia, specifically. The survey information gathered included several key healthcare delivery systems-related measures across topical areas, including EHR/HIT costs, coverage, vulnerable populations, quality, prevention, HIT adoption and use. The data considered was population characteristics, clinician type, size, coverage area, insurance coverage type, and geography. The projected correlational quantitative research study explored insights of EHR/HIT adoption and health disparities in rural populations and clinicians within PUMA states (locations) in Georgia. The use of quantitative data provided analysis using descriptive measurements and an enhanced understanding of the role of public health, and healthcare delivery. The study also explored some advantages and disadvantages of EHR/HIT adoption and use. The data collected in this study provided federal and state-level legislators, physicians, practitioners, and consumers with significant information for improved decision-making, and opportunities for further development. In addition to quality improvement initiatives in the delivery of quality health care, improved health outcomes, disease management, bridging of disparity gaps, and greater access to

technology in rural populations. The next section restates the research question and hypothesis for the study.

Research Question/Hypothesis

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

The following hypothesis is tested and provide the context for the investigation or relationship between clinician or physician EHR/HIT adoption (criterion variable) and the quality of healthcare delivery (predictor variable). Hypothesis zero (0) represents a null hypothesis and hypothesis (a) represents the alternative hypothesis, which are referenced below.

Hypothesis 1:

$H1_0$: There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden and interoperability in underinsured or uninsured rural populations in Georgia.

$H1_a$: There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden and interoperability in underinsured or uninsured rural populations in Georgia.

Population and Sample

The quantitative correlational study strategy explored a target population in Georgia and relationships. Quantitative studies offer the ability to test target populations and generalize study findings (Creswell, 2014; Hoy & Adams, 2016; Creswell & Creswell, 2019). The use of a survey provided the data for the participant population. In this study, the population included female and male physicians and clinicians located in the most medically underserved, underinsured or uninsured rural or semirural areas in Georgia determined by the 2010 U.S. Census. The study used an estimated 60 male or female subjects identified as licensed primary care providers (PCP), physicians and clinicians in rural communities in Georgia, which include populations of 35,000 or less in PUMA states (locations) where clinicians currently deliver direct patient care. The subject characteristics and locations of rural health providers included private practices, community access health (CAH) centers, pharmacies, sole rural hospitals and other rural medical facilities. The clinician or physician types were certified and licensed medical or pharmaceutical professionals, medical doctors, practitioners, physician's assistants (PA), advanced practice nurses (registered nurses (RN), nurse practitioners, clinical nurse specialists, certified nurse anesthetists, certified nurse midwives), pharmacists or psychiatrists. The subjects operated in one or more offices of the 16 counties in rural populations within 5 PUMA states (locations): 100 (Walker); 200 (Gordon); 2200 (Wilkes); 2500 (Burke, Emanuel, and Washington); 2900 (Meriwether/Warm Springs); 3200 (Bleckley) 3300 (Appling, Candler, Evans, Jeff Davis, Tattnall, and Wayne); 3800 (Clinch) and 3900 (Tift) or those in other rural counties (35,000 or less population). The sample population was taken from approved State Office of Rural Health (SORH),

Health Research Services Agency (HRSA) and U. S. Census decennial Census Public Use Microdata Areas (PUMA) public distribution lists in 16 rural counties or other rural counties (35,000 or less population) in Georgia based on clinician or physician referrals.

The quantitative study provided an understanding of data and measures in relation to the medical populations. The criteria and characteristics essential for non-eligibility of human subjects and exclusion are (1) counties outside of the 16 counties proposed or other rural counties (35,000 or less population), (2) physician or clinician facilities and practices who do not speak, read, write or understand English and (3) medical facilities that do not have any patient or client contact. The population identified includes healthcare physicians and clinicians who provide services to a significant amount of underinsured and uninsured rural areas based on the most recent U.S. Census data (Health Resources & Services Administration, 2017; U.S. Census Bureau, 2017; Georgia Department of Community Health, 2017). The justification of population use was from HRSA, Department of Community Health, State Office of Rural Health (SORH) public statistical reports that exhibit the ratio of population to the number of clinicians and physicians, as well as the U. S. Census statistics in 16 PUMA states (locations), for recruitment of rural participants for the study. The sample population will be recruited from approved State Office of Rural Health (SORH), Health Research Services Agency (HRSA) and U. S. Census decennial Census Public Use Microdata Areas (PUMA) public distribution lists in 16 rural counties or other (35,000 or less population) in Georgia.

The use of random sampling is comprised of the research design and sample size, and based on the research problem and environment. A researcher must utilize personal knowledge about the population to establish the importance of the preselection of experts

and the predetermined criteria for samples (Polit & Hungler, 1997). Selecting purposive sampling require researchers to choose from two methods, (a) selecting from diverse perspectives, or (b) selections from people identified in a typical group (Leedy and Ormrod, 2010). However, other studies suggest that using Delphi method with iterative group consensus techniques with a diverse sample of participants can aid in reducing strong opinions and emotions and affecting geographically limiting opinions (Aldo & Ziglio, 1996; Critcher & Gladstone, 1998; Linstone & Turoff, 2002; Powell, 2003). However, upon identification of predetermined clinician or physician types, the implementation of random sampling allowed use of recruitment of professional acquaintances or colleagues in similar geographical rural populations in rural Georgia. This process increased the sample size of subjects meeting similar criteria and characteristics. The greater sample size ensured subject availability throughout the limited study schedule and the limited number of clinicians and physicians in the rural Georgia counties identified through the U. S. Census and other state health statistics.

According to Creswell (2014), sampling involves specific characteristic to define the targeted population. The female and male professional subjects used in this study offered strong input and aided in informed decision-making in Georgia healthcare and EHR/HIT adoption policies and programs. The measurements focused on parallels of rural certified healthcare professionals and disparities in technology adoption, if any through computation efforts in IBM SPSS. The target population and sample size for this study was derived from using the G*Power calculation. The G*Power is a statistical calculation of the sample population size (Dupont & Plummer, 1998). A G*Power calculation was used to determine the sample size needed using a 95 percent confidence

level and a .05 percent margin of error as shown in Appendix E. Appendix E was used to reach the *a priori* sample size of at least 60 from the target population needed and a secondary e-mail and distribution occurred to gain the desired sample size.

Unit of Analysis and Geographic Location

The units of analysis are primary care physicians and clinicians in rural healthcare settings, such as hospitals, medical offices, group practices, pharmacies, community health centers, and those in private medical practices in the state of Georgia, are the individuals who will participate in the study. The geographic area of focus is the rural populations in Georgia where there are high percentages of uninsured and underinsured people that are cared for by physicians and clinicians in 16 rural or semirural counties. Residents in these populations consist of minorities of several racial and ethnic groups (i.e., American Indian or Alaskan Native, Asian or Pacific Islander, African American or Black, and Hispanic) (U. S. Census Bureau, 2010a; Equal Employment Opportunity Commission (EEOC), 2015). For this research purpose, the use of the EEOC definition of a minority is appropriate. Table 1 exhibits geographical units studied, which are PUMA states (locations) within Georgia.

Informed Consent and Confidentiality

According to Creswell (2014), informed consent is reliant on disclosure, which shall reveal to participants and others involved, how to conduct the study, and the risks and benefits associated or expected to accomplish. Informed consent is an essential ethical process that include (a) the right to withdraw during any phase of the study, (b) the participant understands risks and benefits, and (c) non-coerced participation (Creswell, 2009; Creswell, 2014; Hoy & Adams, 2016; Koyfman, Reddy, Hizlan, Leek,

Kodish & Phase I Informed Consent (POIC) Research Team, 2016; Creswell & Creswell, 2019).

In this study, each participant will require written material about the rights per the institutional review board (IRB) requirements, and reiteration of these rights throughout the research process as well as additional explanations essential to the study. The participants in this study range from age 18 or older and are asked to provide consent to participate. Participation is strictly voluntary and once the participant provides consent, moving forward with the research is imminent, and the survey instrument will be accessed instantaneously. The participant may elect to initiate a withdrawal process through exiting the electronic survey at any time during data collection. Incomplete surveys from any participant will disqualify a participant immediately and any data collected will not be used. Additionally, use of password protection and encryption will ensure confidentially of data reports downloaded from Survey Monkey for anonymous surveys, security and safety of data accompanied by cyclic password changes for increased security of files on a stored flash drive and in Survey Monkey will occur quarterly. Group level analysis will protect the identities of the participant as well as the healthcare facility types and counties within the state of Georgia. There will be no personally identifiable information collected or presented in the results or the analyses.

The risks and benefits will be described to the participants in the informed consent. There is always the risk of bias and distortion from survey questionnaires; this will minimize the use of guides, probes, and prompt questions, by reflecting and acknowledging potential bias and grouping them, as this is normal with research. The quantitative correlational study survey distribution will not be accessed without

acceptance of informed consent and understanding of anonymity. Additionally, the participant must use a secure Internet connection. IP addresses will not be collected. The research must follow University of Phoenix code of ethics and accept the possible risks limited to loss of data that may be out of control of the researcher, and understand the use of data protection and securing participant information, which may be sensitive and private. Any participant risks are explained and provided in Appendix A and Appendix B. Particularly, the focus is on informed consent, participant data confidentiality, and online survey anonymity.

According to Creswell (2014), risk denotes the likelihood of any serious loss or consequence of the study. It is mandatory to determine whether participants are part of a vulnerable population and the freedom to make a choice, which may limit age (the very young and the very old), health (mental and physical incapacities), social constraints (inmates in prisons, hospitals or similar institutions) or other conditions including the victim of violent crime or engaging regularly in activities criminally or socially unacceptable, and demonstrates embarrassment (Creswell, 2014). In this study the risk is very limited because of the use of adults ages 18 or older that are professional and can make sound decisions. Also, there is no direct contact with the potential candidates who chose to voluntarily participate in the survey.

Instrumentation

The research participants will include healthcare clinicians and physicians from Georgia PUMA states (locations) located in 16 counties or other rural counties (35,000 or less population) that are considered small or medium rural communities, healthcare facilities, rural hospitals, community health centers, and office-based private practices.

The research will consider provider type, size, and coverage areas (counties). This approach would allow the opportunity for participants in private healthcare environments that provide valuable insights to share regarding the adoption of EHR and HIT systems and healthcare delivery.

Participant recruitment may span anywhere from four to eight weeks through e-mail announcement, social media posts (via Facebook, LinkedIn, Twitter), Survey Monkey kiosks as shown in Appendix G, and referrals from other rural clinicians located in 16 rural counties or other rural counties (35,000 or less population) in Georgia. Approved HRSA, SORH, Rural Health Association and Network comprehensive distribution lists will be used for distributing the survey instrument in rural medical practices as shown in Appendix D. Potential participant medical locations and offices are sent an e-mail with a letter of introduction, recruitment, and intent, introducing the research and study; inquiring of interest in participating in the study along with instructions on accessing the survey instrument. Once the survey link is accessed the initial screen will include a multiple-choice range for participant acceptance for consent and anonymity before continuing to survey questions. Participants who do not provide consent are not allowed access to the survey questions. Participants will receive neither compensation nor incentives for their participation.

The design of the survey instrument is intended to provide high-level state and county estimates of EHR/HIT adoption and healthcare deliver in rural Georgia. The request for the use of the National Electronic Health Records Survey (NEHRS) began by contacting the Division of Healthcare Statistics at the CDC, Research Scientist Ninee Yang, who redirected me to the survey statistician, Kelly L. Myrick, PhD, CPH for

confirmation of the use of the content of the public domain survey. The public domain survey approval expires on 07/31/2020 from Office of Management and Budget (OMB) (#0920-1015). The use of the 2017 NEHRS sponsored by the Office of National Coordinator (ONC), conducted by Centers for Disease Control and Prevention (CDC)/National Center for Health Statistics (NCHS) aimed to evaluate the EHR progress and adoption in the U. S. The approval of survey use was provided by the CDC liaison and Project Officer as shown in Appendix C. The survey instrument has also partially undergone cognitive testing. The use of the survey and type of questions examined were predetermined by the population area.

The questionnaire required several demographic questions related to the clinician characteristics of the 16 counties or other rural counties (35,000 or less population) in Georgia. Examples include gender, race/ethnicity, clinician type, city, zip code, and EHR/HIT adoption/use. The 55-question, multiple choice survey is not being completed in conjunction with any other entity or agency. However, the use of the public U.S. Census PUMA data for areas of recruitment originated from the total rural population of Georgia for areas medically underserved, underinsured, and uninsured. Assistance was employed to circulate the survey from the Rural Hospital Association and Networks, Department of Community Health, State Office of Rural Health (SORH) and HRSA distribution lists for medical locations, and practices that may be affiliated with rural networks who may be interested in the results. Additionally, the survey link was shared via social media posts on Facebook, LinkedIn, Twitter and referrals to other clinicians or physicians in similar rural areas. This survey is best suited for the study because the questions are toward clinician or physician EHR and HIT adoption while caring for

ambulatory patients in various healthcare settings. The characteristics of the survey instrument for this study highlighted rural physician and clinician experiences and behaviors through the use or nonuse of EHR/HIT.

Validity and Reliability

Strategies were developed to ensure both validity and reliability of the quantitative correlational study. Reliability refers to the consistency of the results of the research over time, including the replication of the study (Creswell, 2009; Heale & Twycross, 2015; Creswell & Creswell, 2019). In this study, the reliability of findings in the study could yield similar results in other rural areas in other states. The validity of the research refers to its credibility to the extent, which the instruments used will truly measure the concept under investigation (Creswell, 2009; Heale & Twycross, 2015; Creswell & Creswell, 2019). The reliability and validity are useful to address the credibility of the study. Consequently, the structured survey instrument is controlled and may exhibit high versus a low internal validity.

The methods employed addressed the validity and academic reflexivity, which permits the awareness of the role as the primary data collection instrument, and the impact it may have on participants, and the data collected. First, not having worked with this population previously, it is anticipated that the use of random sampling methods will yield the scientific sample size of physicians and clinicians needed to collect the data. Snowball sampling methods may create the potential for skewed data and minimal limitations but may yield convincing data collection of physicians and clinicians who have established relationships with other colleagues in the field and same area, as they may refer additional participants. There are questions included in the survey, which

identify the PUMA areas of the physicians and clinicians along with identification of the city and zip codes for location(s), which may resolve limitations of any skewed data and cross reference the responses from counties for validity. Second, close collaboration with rural health associations or networks and participants may present one means to check the validity of population use, as the rural health networks and associations have developed relationships with clinicians and physicians and have extensive listings of clinicians in the counties in the population surveyed. Third, use of data collection with survey tools and sharing an online self-distributed survey prevented limitations.

The questionnaire includes a series of very brief 55-item Likert scale multiple-choice questions including rank from 1 (never) to 4 (always), strongly disagree (1) to strongly agree (5) and Yes (2) or No (1) choices that represent performance evaluation metrics, and clinician or physician characteristics. The survey also includes questions regarding personal experiences to provide possibly another facet of clinician and physician EHR/HIT adoption for data collection. The characteristic questions in the beginning of the survey were questions related to the location/office and specialty, which were (1) rural county, (2) specialty, (3) gender, (4) race/ethnicity, (5) how they heard about the survey, and (6) language(s) spoken. In addition, the pre-requisite question of acceptance of informed consent terms including anonymity of survey responses. The Pearson Product correlation coefficient and binomial logistic regression is used to analyze the data and measure responses gathered from participants and variable relationships, if any.

Data Collection

Data collection and analysis will begin after the University of Phoenix Institutional Review Board (IRB) approval of the study. Data collection will occur over a period of eight weeks or less. The employment of a cross-sectional survey instrument consisting of a series of questions is used for the study, which may be completed in approximately 10 - 15 minutes per respondent. A survey through the open source collection tool Survey Monkey is used to gain participant responses and feedback. The data collection methods provide data for the analysis of responses from healthcare clinicians and physicians with major influences of HIT access such as EHR and healthcare access. The encryption of responses in data reports is encrypted through heightened secured socket layer (SSL) to ensure data entries are maintained confidentially and password protected by the researcher for accessibility. The online survey is offered to participants that volunteer to complete the survey for the generation of a higher yield of responses, and ensures reliability and validity after receipt of the appropriate informed consent through multiple-choice question for entry into the survey. The recruitment documentation and procedures for survey access include: (a) letter of introduction e-mail and recruitment with the Survey Instrument (Appendix G) link through Survey Monkey (Appendix A) and (b) informed consent (Appendix B).

Immediately following the survey data collection, response import from Survey Monkey into IBM SPSS occurs. The process guaranteed reproducibility in the graphical presentation of results while employing pseudonyms/ or unique grouped numerical identifiers to protect participant confidentiality. Data inputted in IBM SPSS was use organized group level analysis and are de-identified. Organization of data will consist of

clinician and physician responses that are confidentiality stored in an electronic file for analysis. The electronic information was secured by data encryption and password protection via saved electronic copies encrypted on an external drive that was stored in a locked safe.

Permission was necessary from SORH, HRSA & U.S. Census for any physical or electronic delivery through distribution lists of facilities as shown in Appendix D for researcher distribution at clinician/physician local listings. If these permissions are not granted, the researcher could not collect data from these locations or listings and any surveys received would be discarded. The study forward and announcement was also sent to a direct contact from each approved listing and then forwarded to any clinician, physician, rural association, and network in the 16 counties selected or other rural counties (35,000 or less population), which details how to participate in the survey. The study announcement will include a letter of introduction and recruitment (Appendix A), which includes all information necessary for those clinicians who choose to participate voluntarily. In addition, any confidential information and notes was secured on a USB flash drive in a locked file safe along with data files, and statistical data password protected, and stored on a personal computer from IBM SPSS database. Disposal of any documentation will be destroyed within three years from the date of completion of the study. The method used to destroy the documentation will be to securely delete any electronic files as well as securely shred documentation within three years of the completed study.

Data Analysis

Data analysis consisted of correlation analysis, testing of the hypothesis and exploration of the relationship between the criterion and predictor variables, if any. Use of regression analysis, Pearson product-moment correlation and statistical reporting comparisons of means from the evaluation of the survey responses were performed. IBM SPSS software use supported the graphical data presentation of diagrams and survey results. Data analysis in this quantitative correlational study began with gathering of responses of participants. Once data was collected, the data was analyzed for statistical test assumptions to ensure the data met the study assumptions for parametric testing and those that did not meet the assumptions were tested by non-parametric testing.

The research used group levels and de-identified participant data to maintain confidentiality. Participants that did not provide a full set of responses, were removed as those surveys were incomplete. The responses and entries were compiled from Survey Monkey in Microsoft Excel csv format that was then imported in IBM SPSS. The collected responses provided the basis for initial testing of the hypothesis and explanation of findings descriptively, and in the discussion. The tests and analysis were then sufficiently interpreted.

Summary

While this study is designed to understand health technology adoption and healthcare delivery, disparities may exist among underserved and vulnerable populations in Georgia. Recruitment of participants primarily occurred in remote rural counties in Georgia where healthcare among the rural populations is questionable. Based on these factors, this study is significantly important in identifying technological best practices that advance the delivery of the quality of healthcare to underserved and vulnerable populations in Georgia. This research attempted to generate knowledge and a better understanding of diverse technological barriers that exist or are insufficient in rural areas where EHR/HIT adoption remain low or unaddressed, and may lead to strategies to overcome disparities for rural physician and clinician practices in underserved populations in Georgia. The next section provides statistical analysis of the study statistically, including findings while examining the research question.

Chapter 4:

Analysis and Results

The purpose of this quantitative study was to explore the relationship between EHR and HIT adoption and the quality of clinician and physician healthcare delivery in rural Georgia. The study involved examining the relationship between clinician and physician adoption of EHR/HIT and the quality of healthcare delivery in underinsured or uninsured rural populations in Georgia based on burden and interoperability. A correlational study was appropriate based on the association of variables while using and adopting EHR/HIT.

The online survey method saved researcher expense and time and allowed for a greater reach with diversified populations as the online survey was referred to potential participants (clinicians or physicians) in Georgia rural populations. Also, this led to responses from other rural areas with 35,000 or less in population in addition to the 16 specific counties listed through random sampling to broaden recruitment as shown in Figure 7. Participants who answered "No" to the informed consent were disqualified from the survey, as were participants who no longer practice in fields of medicine or those who directly care for any ambulatory patients. The data analysis did not include or disclose participants names or email addresses nor the city and zip code of the respondents; rural counties will be the only geographic locations for data collection. The data inspection sought out any missing, identical and unacceptable participant responses and subsequently the data was entered into IBM SPSS® version 24 for analyses. Descriptive statistics were exhibited, and data analysis was performed in early February 2020.

The three theoretical frameworks and models used were diffusion of innovation (DOI) theory, the unified theory of acceptance and use of technology (UTAUT), and the technology acceptance model (TAM). These models were explained and were provided as an extension, and framework for the study of EHR/HIT adoption and experiences of clinicians and physicians, in addition to their perceptions or patterns that may exist with EHR/HIT optimization and implementation in healthcare facilities. Graphical representation with charts and diagrams will offer trends and relationships followed by statistical exhibits of frequencies and percentages. Chapter 4 exhibits the analysis and results of the study, including the summary of results and findings, with descriptive and correlational analysis. The research question and hypothesis are restated in the next section.

Research Question/Hypothesis

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

The following hypothesis is tested and provide the context for the investigation or relationship between clinician or physician EHR/HIT adoption (criterion variable) and the quality of healthcare delivery (predictor variable). Hypothesis zero (0) represents a null hypothesis; and hypothesis (a) represents the alternative hypothesis, which are referenced below.

Hypothesis 1:

$H1_0$: There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

$H1_a$: There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

Data Collection

The study participants included licensed clinicians and physicians workong in any of the 16 predetermined counties and in Georgia rural populations that use electronic heath records (EHR)/health information technology (HIT). The informed consent was a prerequisite question that each participant completed prior to moving forward with the online survey questions hosted on Survey Monkey. A total of 60 participants were required to meet the sample size. The G*Power test was used to compute the necessary sample size at a 95% confidence level with a 5% margin of error. A 55-question Likert-scale, multiple-choice survey was distributed to approximately 75 rural healthcare facilities with licensed clinicians and physicians in Georgia rural populations of 35,000 or less *via* e-mail. A total of 95 participants contributed to the study and agreed to the informed consent prior to completing the survey. The final analysis consisted of a total 60 participants as 35 surveys were disqualified or were incomplete.

Demographics

The demographics for several questions will be explained in this section. The clinician or physician types were advanced practice nurses 21.67% (n = 13), pharmacists 1.67% (n =1), physicians 58.33 % (n = 35), physician assistants 13.33% (n = 8), psychiatrists 1.67% (n = 1) and psychologists 3.33% (n = 3) as shown in Figure 6. This revealed the limitations of the study as explained in the next section.

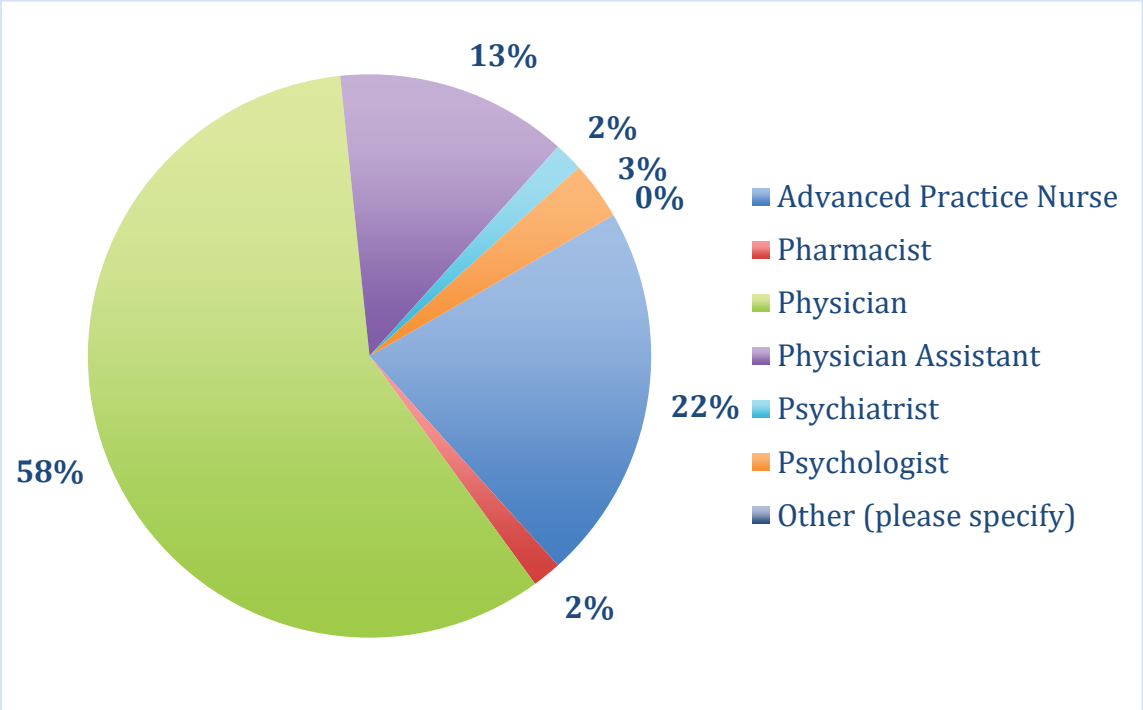

Figure 6. Types of clinicians and physicians who responded to the survey

Descriptive Statistics

The clinicians and physicians were from 24 Georgia rural counties. Most participants were surveyed from the county of Meriwether/Warm Springs 15% (n = 9), county as shown in Figure 7.

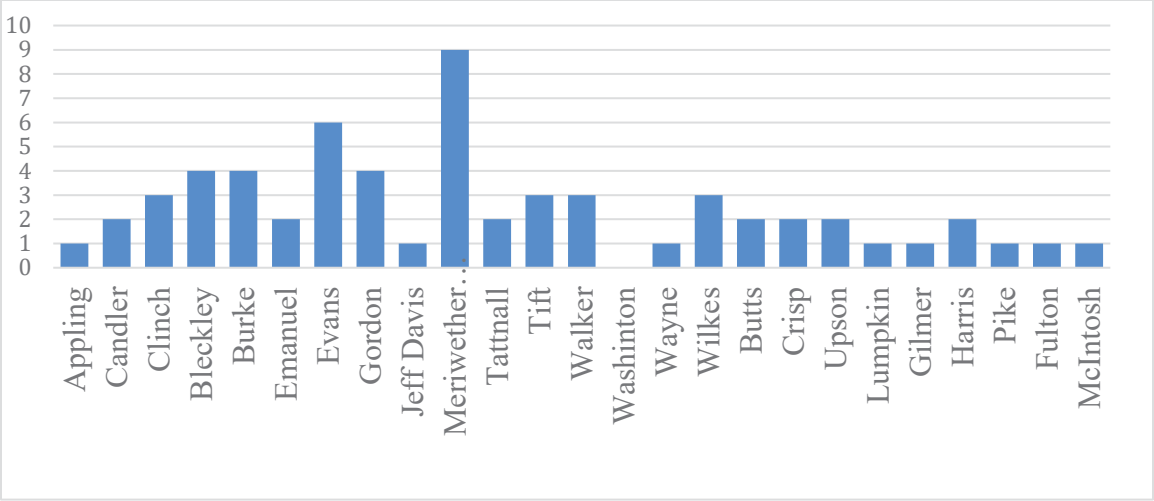

Figure 7. Number of respondents from various Georgia rural counties

More participants originated from investigator e-mail messages to clinicians and physicians or other referrals, followed by advanced practice nurses from approved facility distribution lists in several rural populations in Georgia. The survey participants were largely from private or solo practices, community health centers, and free-standing clinics or urgent care centers. The ethnicity with the most participation was White Non-Hispanic followed by Black/African American and then other ethnicities. The ethnic distribution of clinicians and physicians was as follows:

Latino or Hispanic 3.3% (n = 2) , Non-Hispanic 5.00% (n = 3)White Non-Hispanic 48.33% (n = 29), Black/African American, 23.33% (n = 14), White Non-Latino 5.00% (n = 3), Asian -American/Pacific Islander 1.97% (n = 1), Native American/Alaskan Native 0.00% (n = 0), Multiracial or Other Races 3.3% (n = 3), and Prefer not to Answer 10.00% (n = 10) as shown in Table 6.

Table 6.

Participant Racial distribution.

	n	%
Latino or Hispanic	**2**	3.33%
Non-Hispanic	**3**	5.00%
Black/African American	**14**	23.33%
White Non-Hispanic	**29**	48.33%
White Non-Latino	**3**	5.00%
Asian-American/Pacific Islander	**1**	1.67%
Native American/Alaskan Native	**0**	0.00%
Multiracial or Other Race	**2**	3.33%
Prefer not to Answer	**6**	10.00%

There were 95% (*n*=57) of respondents that indicated they use and adopt EHR/HIT in their medical organizations and 5% (*n*=3) that do not adopt technology. The statistics related to adoption of EHR/HIT (dependent variable) is mean = 1.05 and standard deviation (STD) = 0.21978. The independent variable, which is quality of healthcare delivery is mean = 11.40 and STD = 1.7582; for burden the mean = 5.983 and STD = 1.18596, and interoperability is mean = 8.40 and STD = 1.67939.

Figure 8 represents the level of clinician and physician EHR/HIT adoption and their perceptions of the quality of healthcare delivery in underinsured or uninsured rural populations in Georgia and the burden it may place on patient-clinician or physician appointment times and interoperability. The data collected for this question was ordinal (Likert Scale) and ranked data.

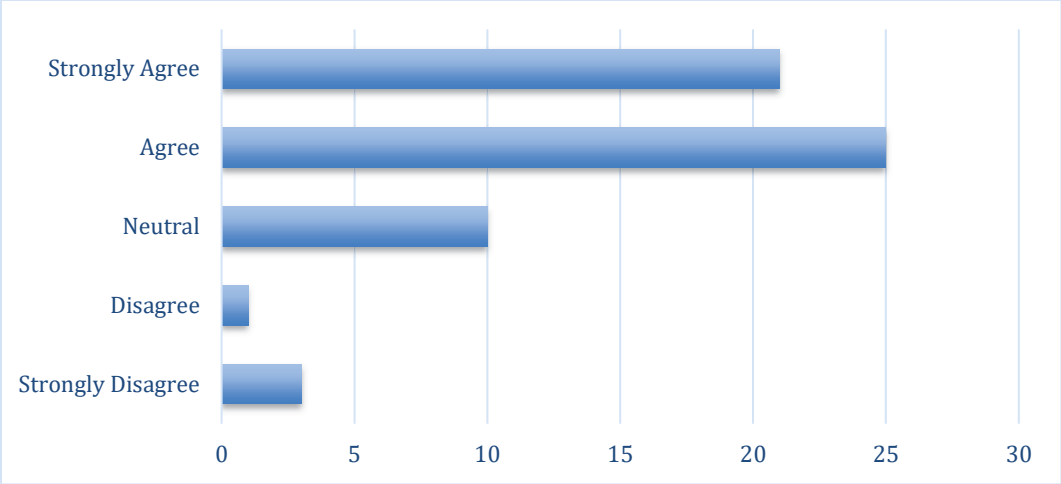

Figure 8. Bar Chart for Quality of Healthcare Delivery.

In Figure 9 the statistical results show 51.67% of clinicians and physicians generally agree that EHR/HIT assist and aid in the diagnosis or plan of care. aid in answering the research question also in relation to quality of healthcare and delivery in rural Georgia. The Pearson *r* (Pearson's Correlation Coefficient) calculation results in EHR/HIT adoption and the quality of healthcare delivery were found to be moderately positively correlated. The value of *r2*, the coefficient of determination, is 0.3454. The *p-value* is < .00001. The result is significant at $p < .05$.

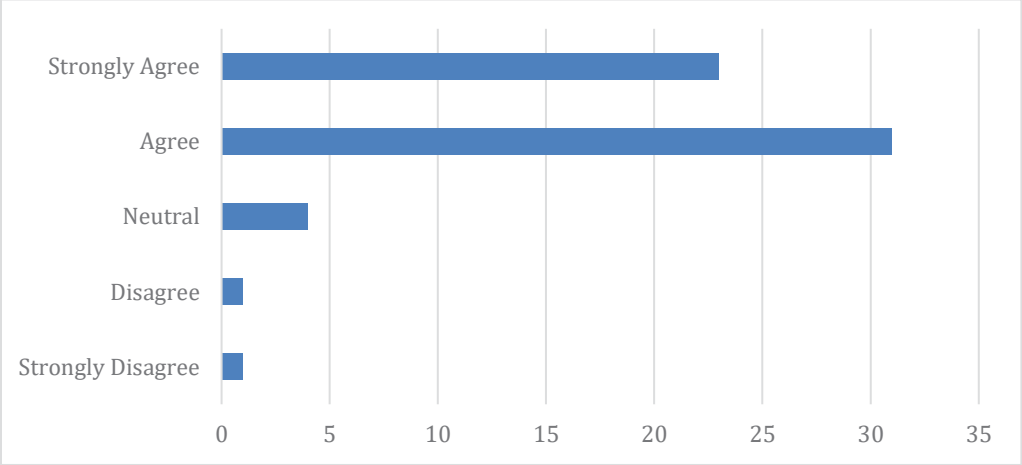

Figure 9, Clinician and physician opinions on whether EHR/HIT assist in quality of healthcare.

Data Analysis

The survey was scheduled to be open for approximately 4 weeks. However, the survey remained open for an additional 4 weeks to accommodate holiday observances and facilities with limited staff during the data collection period. The Survey Monkey link was placed in single posts on Facebook, LinkedIn and Twitter, as shown in Appendix F. Also, a Survey Monkey kiosk station with an Apple iPad, and 2 additional e-mail reminders were distributed during the data collection period after 2 weeks passed, where there were no significant replies. The survey was also referred to clinicians and physicians in rural Georgia populations in e-mail and via social media connections as shown in Table 7.

Table 7.

Population Distribution

	n	%
Disqualified Surveys from All Survey Types	35	58.34%
Social Media Post (Facebook, LinkedIn or Twitter)	35	58.34%
Kiosk Survey	21	34.99%
Clinician or Physician Referral & E-mail Distribution	4	6.67%

The Survey Monkey kiosk mode (iPad) was placed in the medical facilities and rural hospital break room/lounge areas. The facility break room/lounge areas were open to the public; therefore, no permission was required per the facility administrators. These rural medical facilities and hospitals were on the approved distribution listings as part of the 16 Georgia rural counties that were fewer than 2.5 hours away to gain survey participants. The kiosk was placed in 5 of 16 rural medical facilities and hospitals on the approved distribution lists in Bleckley, Evans, Gordon, Meriwether and Tift counties for

2 hours per facility from Friday through Sunday during the second week of January, 2020.

A sign was placed next to the kiosk that stated "Please Tap Screen to participate in a voluntary student research survey". The researcher was nearby only to safeguard the iPad. The researcher had no communication with the medical clinicians and physicians that voluntarily participated in the survey via Survey Monkey. The Survey Monkey Kiosk Mode iPad opened directly to the informed consent and then continued to the additional survey questions via Survey Monkey. Additionally, the researcher also reposted the Survey Monkey link on LinkedIn and the link was shared by several connections who were in rural populations in Georgia. These approaches served as valuable means to gain more survey responses to meet the expected sample size.

This method allowed for more responses and closed out of the survey with 60 participants. Although, 95 was the actual total, where 35 surveys were disqualified based on non-completion or rejecting the informed consent prior to entering the survey. These 35 participant surveys were removed from the final data analyses as the Survey Monkey was marked disqualified or incomplete. A total of 60 participants completed the survey: social media post (n=35) 58.34%, kiosk surveys (n=21) 38.34% and clinician or physician referral & e-mail distribution (n-4) 6.67%. The results of the survey are detailed in the next section.

Results

The study confirmed based on the statistical calculations that there is a relationship between clinician and physician EHR/HIT and the quality of healthcare delivery in underinsured and uninsured rural populations in Georgia. There were several questions asked in the survey instrument that measured the research question that are restated below and show slight relationships between EHR/HIT adoption and the quality of healthcare delivery with clinician and physician perceptions of burden and interoperability:

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

The Criterion (Dependent Variable) – EHR/HIT adoption is represented by Q17 Do you use electronic health records (EHR)/health information technology (HIT)? (Do not include billing record systems.) The Predictor variable (independent variable) - quality of healthcare delivery, ***w***ere represented by the survey questions: Q39 Do you believe the use of EHR/HIT aids in better healthcare quality & delivery of care?, Q38 Do you believe your EHR/HIT is a valuable tool to assist you in your diagnoses or plan of care?, and Q40 Would you say the use of EHR/HIT_____ aid(s) in improving patient health outcomes?

The questions also show whether to reject or accept the null and alternative hypothesis below.

Hypothesis 1:

$H1_0$: There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

$H1_a$: There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

The following questions represent the questions related to EHR/HIT interoperability in rural Georgia:

Q53a. Has your EHR/HIT provided you with a complete patient history?,

Q53c. Has your EHR/HIT helped reduced medical error?,

Q53d. Has your EHR/HIT alerted you of medical errors? and

Q53e. Has your EHR/HIT been accurate based on provider network exchanges?

The following questions are related to burden:

Q32. To what extent does the use of your EHR/HIT impact work productivity?

Q54. Would you say the use of EHR/HIT in your medical reporting location/office_____?

The Cox & Snell R Square and Nagelkerke R^2 values and methods were used for calculating the explanation of variations used. Therefore, explaining the variation in the dependent variable that was based on data ranges from 5.0% to 15.4%, depending on whether you reference the Cox & Snell R^2 or Nagelkerke R^2 methods, individually. The data was also analyzed by using a binomial logistic regression in SPSS Statistics. The

binomial logistic regression estimated the probability of EHR/HIT adoption occurred at 95%.

The Wald test was used to determine the statistical significance for each of the independent variables. From these results the quality of healthcare delivery (p= 1.00), burden, (p = .993) and interoperability (p = .915) added significantly to the prediction of EHR/HIT adoption. The probability of EHR/HIT adoption occurring based on one or more difference in an independent variable while other independent variables are held constant is significant. The table shows that the odds of EHR/HIT adoption ("yes" category) are .996 times greater, as opposed to not adopting EHR/HIT.

Based on the results above, a logistic regression was performed to determine the result of quality of healthcare delivery, burden and interoperability on the likelihood that participants adopt EHR/HIT. The logistic regression analysis result was statistically significant, $\chi 2(4) = 24.709$, $p < .0005$. The model explained 15.4% (Nagelkerke R^2) of the variance in EHR/HIT adoption and acceptably classified 95.0% of cases. Clinicians and physicians perceived burden are .996 times more likely when EHR/HIT adoption occurs. Increased quality of healthcare associated with an increased likelihood of burden, followed by increased interoperability associated with likelihood of EHR/HIT adoption. Therefore, the analysis demonstrated that one may reject the null hypothesis and accept the alternate hypothesis. The following tables represent the frequency for the uninsured and underinsured in rural Georgia populations. There were n = 22 (36.7%) of clinicians and physicians who reported the percentage of 21-30% of uninsured (self-pay) patients as shown in Table 8.

Table 8.

Frequency of approximate uninsured (self-pay) patients.

What is your approximate percentage of uninsured (self-pay) patients? (uninsured charity cases are included in the next question)			
	Frequency	Percent	Cumulative Percent
None [1]	2	3.3	3.3
< 5 % [2]	1	1.7	5.0
5 - 10 % [3]	2	3.3	8.3
11 – 15 % [4]	6	10.0	18.3
16 – 20 % [5]	15	25.0	43.3
21 – 30 % [6]	22	36.7	80.0
31 – 40 % [7]	10	16.7	96.7
41 – 50 % [8]	2	3.3	100.0
Total	60	100.0	

Despite technology adoption, approximately 16-20% of clinicians and physicians reported uninsured (charity cases/special cases) patients at $n = 21$ (35%) as shown in Table 9.

Frequency of approximate uninsured (charity cases/special situations) patients.

What is your approximate number of uninsured (charity cases/special situations) patients accepted?			
	Frequency	Percent	Cumulative Percent
None [1]	3	5.0	5.0
5 - 10 % [3]	6	10.0	15.0
11 – 15 % [4]	9	15.0	30.0
16 – 20 % [5]	21	35.0	65.0
21 – 30 % [6]	18	30.0	95.0
31 – 40 % [7]	2	3.3	98.3
41 – 50 % [8]	1	1.7	100.0
Total	60	100	

Chapter Summary

In summary the study included survey data from 60 clinicians and physicians in rural populations in Georgia to determine the relationship between EHR/HIT adoption and quality healthcare delivery. In the research question and hypothesis, the null hypothesis was not supported, and the alternative was supported in relation to clinician and physician EHR/HIT adoption based on burden and interoperability, and the quality of healthcare delivery in underinsured or uninsured rural populations in Georgia. Chapter 5 includes a discussion of the study findings and synthesis with the extent of literature, including new contributions to the literature and a discussion of study findings. Also, the chapter includes limitations, recommendations of leaders and practitioners and recommendations for future research.

Chapter 5:

Conclusions and Recommendations

The quantitative correlational study explored the relationship between EHR and HIT adoption and the quality of clinician and physician healthcare delivery in rural Georgia. The study involved examining the relationship between clinician and physician adoption of EHR/HIT and the quality of healthcare delivery based on burden, and interoperability in rural Georgia. A correlational study was appropriate based on the association of variables while using and adopting EHR/HIT. The study utilized the following theoretical frameworks and models: diffusion of innovation (DOI) theory, the unified theory of acceptance and use of technology (UTAUT), and the technology acceptance model (TAM). Through examination of the relationship between EHR/HIT adoption and quality of healthcare delivery based on burden and interoperability, the quantitative correlational study attempted to reveal gaps in the literature review and provide knowledge and supporting factors that are fundamental to policy makers and stakeholders.

The objective for conducting the quantitative correlational study was the problem of EHR/HIT adoption and whether there is a relationship between quality healthcare delivery based on use, burden and interoperability. The study anticipated through clinician and physician best practices and the adoption of collaborative evidence-based systems such as EHR/HIT. Despite evidence confirming EHR adoption and the facilitation to decrease comorbidities relative to quality of healthcare delivery, there still exists a lack of standardization and interoperability of EHR, which ultimately contributes to morbidity and mortality rates in rural communities (Keeler, Morton & Shekelle, 2006;

Ryan, Bishop, Shih & Casalino, 2013; Birkhead, Klompas & Shah, 2015; Sampson, et al., 2016; Yu-Kai, Minfeng, & HsinChun, 2019). Chapter 5 expounds on the conclusions of the study, including findings and limitations. The research question and hypothesis are restated in the next section.

Research Question/Hypothesis

The singular research question below was used to examine the relationship of adoption and quality of healthcare delivery based on burden and interoperability.

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

The following hypothesis zero (0) represented the null hypothesis and hypothesis (a) represented the alternative hypothesis referenced below. The hypotheses were examined and provided context for the investigation of the relationship between clinician or physician EHR/HIT adoption (criterion variable) and the quality of healthcare delivery (predictor variable). There were mediating variables examined in relation to EHR/HIT adoption, which are burden and interoperability (independent variables).

Hypothesis 1:

$H1_0$: There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.

$H1_a$: There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden and interoperability in underinsured or uninsured rural populations in Georgia. The discussion of findings provides associations of theoretical frameworks in the research.

Discussion of Findings

The three theoretical frameworks and models, (1) diffusion of innovation (DOI) theory, (2) the unified theory of acceptance and use of technology (UTAUT), and (3) the technology acceptance model (TAM) (Moore & Benbasat, 1991; Sharma & Mishra, 2014; Greenhalgh, et al., 2017). These models provided an extension of the frameworks with the study of EHR/HIT adoption and experiences of clinicians and physicians in addition to their perceptions or patterns that may exist with EHR/HIT optimization and implementation in healthcare facilities. The findings resulted in a significant relationship between EHR/HIT adoption and quality of healthcare delivery in underinsured or uninsured rural populations in Georgia based on burden and interoperability. The findings for EHR adoption were supported in the literature as claimed by Hsiao and Hing (2014), which stated that the number of office-based-physicians who use various types of EHR systems has increased by approximately 60%.

According to Blumenthal, 2010 and Kooienga, 2019, the research findings in this study support the findings that approximately 90% of providers would adopt EHR. In this study $n = 57$ (95%) of the population surveyed have adopted EHR. However, in this research study the perceptions of whether EHR/HIT adoption were a burden on clinicians

and physicians, in addition to the perceptions on interoperability, revealed issues that exist regardless of adopting EHR, and were consistent with the author Braunstein.

Braunstein (2015), claimed that issues still exist; although clinicians adopt EHR and physicians and clinicians find it difficult to support positive outcomes in healthcare and achieve the delivery of quality care based on the interoperability and additional concerns of privacy and data breaches, which emerge in protecting patient health data. Thus, the results confirmed in this study resulted in $n = 42$ (70%) clinicians and physicians who perceived that the adoption of EHR/HIT sometimes improves patient outcomes, although there were $n = 41$ (68.33%) clinicians and physicians in this study who strongly agreed that EHR/HIT adoption increases patient privacy and risk.

Although the significance in the relationship of EHR/HIT and quality of healthcare delivery in rural Georgia population were significant based on burden and interoperability, the theory of DOI was used to provide the theoretical framework for EHR/HIT adoption based on the clinician and physician perception of burden and interoperability in this study (Moore & Benbasat, 1991; Sharma & Mishra, 2014; Greenhalgh, et.al., 2017). In contrast, Kooienga (2018), claims EHR regulations serve as the difficulty in some cases and in the consistency and probability of adoption. According to Cohen (2016), diffusion and the adoption of new technology were based on influence. In contrast, the research conducted in the rural populations of Georgia from clinicians and physicians provided a bases for this claim as influence supported the reasons for adoption and the relationship with quality care and the interoperability. The five acceptance types of the DOI theory were in no comparison to the quality of healthcare in relation to use of EHR (Moore & Benbasat, 1991; Sharma & Mishra, 2014; Greenhalgh, et al., 2017). The

core constructs of the DOI theory is based on a) the degree of relative advantage, b) ease of use, c) the image of enhancing the status of community coordination of system use, d) visibility of using, and e) needs and compatibility (Moore & Benbasat, 1991; Sharma & Mishra, 2014; Greenhalgh, et.al., 2017). This corresponds with EHR/HIT adoption and interoperability and the tangible benefits based on observations of clinician and physician perceptions.

Also, the UTAUT model relates to HIT adoption based on the drivers of acceptance in the current population studied, rural populations in Georgia where clinicians may be less inclined to adopt technology (Zhou, 2012; Sharma & Mishra, 2014). The study revealed EHR adoption among Georgia rural populations were embraced by clinicians and physicians. However, the perception differed regarding interoperability and availability of incentive programs.

UTAUT concepts are based on what was expected or attain in the use, the degree of this expectancy and influence, which related to the policies and standardization of the system (Zhou, 2012; Sharma & Mishra, 2014). There were also perceptions of behavior and daily use among clinicians and physicians that can be based on personal factors related to number of patients, comorbidities treated and anticipated use toward healthcare improvements and communication through interoperability. This research study revealed the most common comorbidities clinicians and physicians treated in Georgia rural populations were 1) asthma (95%), 2) heart disease (95%), 3) urinary tract infections (95%) 4) diabetes (93.33%) and 5) arthritis (93.33%).

UTAUT is related to the process that led to quality improvements that have indirect or direct correlations to increase positive health outcomes in health care delivery

(Zhou, 2012; Sharma & Mishra, 2014). The level of effort in EHR adoption of health care physicians and clinicians may affect validation of patient screening and certification based on interoperability. Therefore, UTAUT provides a useful tool for healthcare administrator assessments in attaining new technology.

The quantitative correlational study findings determined perceived levels of burden or the adoption of technology such as EHR/HIT or lack thereof, confirm transformational and situational leadership among Georgia rural clinicians and physicians and a correlation in some intervening variable, such as burden and interoperability available to clinicians and physicians. Modern technology transformation and influence allow rural medical practices to make improvements in quality of care as these rural medical facilities accept and EHR/HIT use. In comparison, EHR adoption is a significant future investment that requires improvements as interoperability may affect business practices (Angst & Agarwal, 2009; Mandl & Kohane, 2012; Meltzer & Chung, 2014).

The TAM model was based on perceived and acceptance of use and behavior, and specifically EHR/HIT, which is based on clinician and physician control or influence, such as regulations of healthcare policies that require technology use for positive outcomes (Sharma & Mishra, 2014; De Grood, Raissi, Kwon & Santana, 2016). In this study, Georgia rural healthcare physicians and clinicians use of technology is based on the decision and requirement of use, which is dependent on social impacts in healthcare delivery. The TAM model varies by reason for action and behavior in the use and adoption of EHR/HIT technology (Sharma & Mishra, 2014). The study confirmed this theory as external constraints such as adoption of EHR/HIT, burden, appointment times and interoperability provide information to effectively diagnose patients, which confirms

perceived usefulness (PU), which determines the degree of effort to perceive quality healthcare delivery.

Research Question One Findings

Research Question 1

R1: What is the relationship (if any) between clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?

In the survey the question 17 was the direct question related to EHR/HIT use and adoption and 38, 39 and 40 were questions related to the quality of healthcare delivery. Questions 53a, c, d and e were related to interoperability. The correlations of the burden and interoperability provide a significant relationship to the EHR/HIT adoption among clinician and physician based on their opinions.

The relationship of clinician and physician adoption of EHR/HIT were based on the opinions of burden and interoperability regarding use of EHR/HIT in Georgia rural populations. These findings provided evidence to reject the null hypothesis and to accept the alternate hypothesis, and the research question findings were significant as 60 clinicians and physicians adopted EHR/HIT as shown in Table 10. However, the number of respondents in the correlational study were low in number and may have contributed to the findings but were supported by the literature. Additionally, the populations areas assessed were concentrated on populations where uninsured and underinsured patients exist. The next section will describe some of the limitations of the study.

Table 10.

Research Findings

	Research Question	Findings
RQ1	What is the relationship (if any) of clinician or physician adoption of EHR/health information technology (HIT) and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia?	Significant
	Hypothesis	**Findings**
$H1_0$	There is no significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia.	Reject
$H1_a$	There is a significant relationship between clinician or physician EHR/health information technology (HIT) adoption and the quality of healthcare delivery based on burden, and interoperability in underinsured or uninsured rural populations in Georgia. The discussion of findings provide associations of theoretical frameworks in the research.	Accept

Limitations

The limitations of the study were based on the survey method, which was through e-mail distribution. This saved the researcher expense and time, which allowed for a greater reach with diversified populations as the online survey was referred to potential participants (clinicians or physicians) in Georgia rural populations. Also, this led to responses from other rural areas with 35,000 or less in population in addition to the 16 specific counties listed through purposive sampling to broaden recruitment as shown in Figure 9. Participants who answered "No" to the informed consent were disqualified from the survey in addition to participants who no longer practice in fields of medicine and those who directly cared for any ambulatory patients. The data inspection sought out any missing, identical and unacceptable participant responses as the data collection was analyzed in IBM SPSS®.

Additionally, the sample size was reached after an eight-week period, which varied from the initial timeframe of 2-3 weeks after e-mail delivery. The survey was distributed prior to and during several U. S. holidays and these may have been times where clinician and physician offices worked with limited staffing. Although the sample size was met, more participants and research would be recommended to assess fully more populations in rural Georgia. The researcher would have conducted research by extending the period for data collection. However, the novel coronavirus (COVID-19) was imminent in the U. S., and this would have caused further delays in data collection. Additionally, expanding the population and sample size by attending local rural health forums, meetings and conferences, would have provided more participants as clinicians and physicians in one setting.

Recommendations for Leaders and Practitioners

Many households in vulnerable populations were presented with challenges that were either pre-determined by policies, guidelines or partisan laws, which may cause individuals to choose between immediate needs such as food, shelter and clothing over healthcare (Bhatt & Bathija, 2018). However, there are many individuals in vulnerable rural populations who use technology to self-assess or self-treat themselves using the Internet and websites such as Google, WebMD and online medical databases (Lee, Hoti, Hughes & Emerton, 2017). This leads to incomplete and inconsistent data in medical systems such as EHR/HIT as patient records are inconclusive, and records do not commonly provide a complete medical record. This also leads to vulnerable population access to unprescribed opioid use, unconventional methods such as cannabidiol (CBD), and recreational drugs, such as marijuana, use that can be sourced in the black market (Wiese & Wilson Poe, 2018). A total of 100 % of clinicians and physicians in this study prescribe controlled substances and send the prescriptions electronically to pharmacies for fulfillment.

In addition, there are many populations that correspond to those in the U. S. that are medically underserved and uninsured areas that do not have EHR and technology, such as Sierra Leone (Oza, et al, 2019). The U.S. focus is on universal healthcare for all and EHR/HIT are no exception to this progression. Particularly with the current global health issue, the novel coronavirus (COVID-19), which is affecting the U. S. and international countries, which provided several lessons learned in relation to innovation of technology for healthcare. According to Wang, Ng and Brook (2020), governmental decision-making can cause ambiguity but must take into consideration the

appropriateness based on the population and immediate crisis identification along with transparency during public health threats.

Furthermore, EHRs are routinely equipped to handle public health threats and the rapid spread of infectious diseases such as COVID-19, Ebola, acute respiratory syndrome (SARS-CoV-2), and Zika in certified EHRs, leads to interoperability among clinicians during a global epidemic (Adams & Walls, 2020; McBride, n.d.). The lack of well-defined standards have created significant uncertainty for medical providers with the use of telemedicine, which is determined by internet bandwidth and connection speeds for ideal information exchange (MCI, 2020). Therefore, in times like these where EHRs are the source of documentation, although burdensome to some healthcare professionals in clinical settings, the standardization of EHR/HIT is exigent and should be promoted and taken seriously. EHR design, notwithstanding its many weaknesses, is a great tool for contact tracing as pandemics such as COVID-19 affect public health emergencies. Major findings were related to the credibility of information based on a variety of formats, unstructured and structured regarding data storage and complete medical data, which in return can delay patient care. The results in this study revealed the differences in interoperability in EHR/HIT.

Although this research was conducted in the United States, several other countries can relate to the topic on EHR/HIT and interoperability or burden. Oza, Wing, Sesay, Boufkhed, Houlihan, Vandi, Sebba, McGowan, Cummings and Checchi (2019) provide the following commonalities for not sharing medical information: 1) the time limitations, 2) the burden of gaining pre approvals for release of information forms, 3) ease of use in varying platforms, and 4) standardized practice in various settings internationally. This

presents the opportunity of Universal Healthcare (UHC) and improvements in clinical workflow. The recommendations offered based on the results and findings of this study is to a) provide training for clinician or physician use of EHR/HIT, b) offer more incentives to encourage standardization, c) mandate use by audits and reviews of systems for technical issues, d) allow patients to complete forms electronically to incorporate or update EHR systems prior to doctors' visits.

Recommendations for Future Research

With the increase in pandemic illnesses, the use of EHR/HIT adoption and interoperability regardless of clinician and physician burden are becoming more prevalent to aid in the eradication these illnesses and also the prevention and spread of these diseases. Access to healthcare and quality medical facilities is improved by healthcare coverage and would provide statistics on vulnerable rural populations. Included in these vulnerable populations are African Americans, who are overrepresented and affected by the COVID-19 pandemic based on comorbidities, mortality rates and socioeconomic status. (Backer, 2020; Muniyappa & Gubbi, 2020; Laurencin & McClinton, 2020). According to Backer (2020), African American males have been more vulnerable to the diagnosis of COVID-19. Further studies are necessary to research the area of African American men's health and also African American populations in relation to healthcare, technology adoption and the fears or myths of technology use and electronic health records and portal usage, and also seeking medical care and services (Randolph, Coakley & Shears, 2018) Although findings are inconsistent, understanding the drivers that influence different outcomes in vulnerable populations contributed to achieving universal healthcare (UHC) and the increase of adoption of EHR/HIT. UHC is the global focus

through public and organized sharing of risks against healthcare spending that covers limited public healthcare resources for large populations collectively (Erlangga, Suhrcke, Ali & Bloor, 2019). The lack of access to healthcare and burden regarding financial hardships means that many individuals in vulnerable populations have sacrificed care (Erlangga, Suhrcke, Ali & Bloor, 2019).

The transformation of healthcare and EHR/HIT allows for the ability to share data among other healthcare professionals for rapid and informed decisions to improve health, and equal access (MCI, 2020; Evans, 2016). According to Evans (2016), clinician-accepted EHR in the next 25 years will be based on growth by education, training and availability. This offers leaders and clinicians and physicians with options for HIT such as artificial intelligence (AI), telemedicine, which provides an avenue for clinicians and face-to-face unconventional ways that are cost effective and possible in various medical settings to decrease barriers such as the potential to improve equity, efficiency and effectiveness in health care (Bullock, Pham, Nga Lam & Luengo-Oroz, 2020; Hashiguchi, 2020).

In the current times of COVID-19, EHR/HIT are becoming more favorable to enable providers with contact traceability, a history of a patient's medical records in order to treat patients remotely using telemedicine and other technology, and to seamlessly share and manage medical records through interoperability. Geographical distance can be challenging although telemedicine creates advantages for cost efficiency in rural populations and may reduce burden for clinicians and physicians during routine patient medical appointments (MCI, 2020). Additionally, patient and provider safety and management during disasters may provide protection that eliminates exposure of viruses,

and infections such as COVID-19 with the use of telemedicine. Thus, healthcare organizations who invest in telemedicine to ensure the needs of patients with outbreaks such as COVID-19 (MCI, 2020). Amer (2019) stated that the healthcare system in the U. S. can be burdened, inept and underserved with modern technology and telemedicine advancements, and that concerns for the quality of healthcare are rapidly rising.

Amid emerging changes to policies related to telemedicine and Emergency Medical Treatment and Labor Act (EMTALA), many stakeholders in the healthcare industry have discovered that information sharing and interoperability need improvements as EHR is an essential tool used in healthcare for immediate decision-making, including real-time data analytics (Eddy, 2020; Reeves, Hollandsworth, Torriani, Taplitz, Abeles & Tai-Seale, Millen, Clay & Longhurst, 2020; Turer, Jones, Rosenbloom, Slovis & Ward, 2020; Wang, Ng & Brook, 2020). Additionally, continuity of operations plans (COOP) and disaster preparedness programs are deemed necessary in healthcare in relation to interoperability as healthcare workflow is dependent on EHR availability (Eddy, 2020). According to Porter (2018), the HHS and Office of the National Coordinator for HIT have developed federal regulations that will take effect in several years toward EHR/HIT which will stipulate that patients have the ability to access health records electronically with the use of a smart phone or other device at no cost. In addition, the requirement will provide doctors with more interoperability, as they would be required to share data electronically through proper security standards such as application program interface (API) (HHS, 2020). These mandates may provide access to EHR, but further studies would be required for pre-pandemic healthcare and to assess the relationship of quality healthcare delivery based on interoperability among clinicians

and physicians in rural states and give more control over a patient's personal medical data. However, security and privacy concerns are unfavorable among the American Medical Association, EHR vendors and policymakers as these risks are extremely heightened because of the existing vulnerabilities of healthcare data and immigration concerns.

Researcher Reflection

This study was completed during the most vulnerable and appropriate time because of the current status of the U. S. healthcare system, and the international healthcare system. Technology is used more widely by clinicians and physicians who are required to use telemedicine as a tool to assist in diagnosing patients. Additionally, relying on the EHR may assist providers with diagnosis when sharing information and through interoperability, although some patient medical records may not exist or are invalid, as patients who may have never sought out medical care are being treated for the novel coronavirus (COVID-19).

This study is appropriate for the healthcare industry as the healthcare system is saturated with COVID-19 patients, in addition to emergency and severely ill patients. I plan to publish future research and contribute significantly to the healthcare systems as an IT leader. This study has provided insight and meaningful information to the body of knowledge and the information systems, and technology field, and specifically the healthcare industry. The knowledge attained will be used in future publications and in the modernization of IT. Technology use will no longer be looked at the same, as it has become the standard way of the world, especially in healthcare and in education, and during this pandemic. The next section will provide Chapter 5 summary.

Summary

The variables showed significant correlations in EHR/HIT adoption and quality of healthcare delivery based on burden or interoperability in underinsured or uninsured rural populations in Georgia in research question 1. These relationships can occur in various populations whether rural or urban, underinsured or uninsured. The results present further topics for extended research in other populations regarding health IT burden and interoperability. Findings from multiple studies have presented similarities and differences. The DOI, TAM and UTAUT models served as the theoretical framework for this quantitative correlational study. Furthermore, the increase in telemedicine can aid rural populations in general and place less burden on clinicians and physicians and the interoperability of technology to reduce medical errors or to gain full patient health records through the increased use of EHR/HIT and patient portals in emergent public health incidents.

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APPENDIX A: LETTER OF INTRODUCTION AND RECRUITMENT (E-MAIL)

LETTER OF INTRODUCTION AND RECRUITMENT (E-MAIL): PARTICIPANTS 18 YEARS OF AGE AND OLDER

Dear Prospective Participant,

I **Joedda Pessima** am currently a student with the University of Phoenix, School of Advanced Studies completing my dissertation in fulfillment of the degree of Doctor of Management in Organizational Leadership with a specialization in Information Systems and Technology. This study is not being conducted in conjunction with any other entity or healthcare organization. This study is solely for research purposes. I am conducting a study entitled, Healthcare Delivery and Technology Adoption in Rural Georgia: A Quantitative Correlational Study. The purpose of the study is to explore the relationship between electronic health records (EHR)/health information technology (HIT) adoption and the burden it may place on appointment times, interoperability and the quality of healthcare delivery in clinical practice, specifically in underinsured or uninsured rural populations in Georgia.

This study requires your voluntary, candid and expert response to a cross-sectional multiple-choice anonymous survey about EHR/HIT use in your office. **The suggested survey completion time is approximately 15 minutes and shall be returned within 7-14 days of receipt. Please complete by December 16, 2019.** The participant criteria are licensed clinicians and physicians who practice in one of 16 Georgia rural counties (Wilkes, Emanuel, Washington, Meriwether (Warm Springs), Appling, Candler, Bleckley, Burke, Evans, Gordon, Jeff Davis, Tattnall, Tift, Walker, Wayne & Clinch) or other rural counties (35,000 or less population), in private medical offices, healthcare centers, rural hospitals and pharmacies. Participant non-eligibility include (a) those outside of the 16 counties above or other rural counties in Georgia, (b) clinician or physician locations and practices who do not speak, read, write and understand English, and (c) medical office locations that do not have patient or client contact.

The anticipated benefits of this research are to gain an understanding of the efficacy of EHR/HIT adoption, use, maintenance costs, patient privacy and security, and an improved approach to facilitate health outcomes in rural populations in clinician or physician practices. Additionally, the research may assist in defining local benchmarks, solutions for EHR/HIT adoption in the delivery of healthcare and help decrease disparities in health technology in rural populations, specifically in Georgia.

If you meet the criteria and wish to participate, I would sincerely appreciate and value your expert opinion, as you commit time out of your busy schedule to assist in this significant research project. Your participation is strictly voluntary, and responses will be captured anonymously in a secure cross-sectional survey via SurveyMonkey. As the sole researcher, I will access the data securely and confidentially. **To participate, click here to be redirected to the survey.** All data and responses will be de-identified and participant responses are assigned numerical unique identifiers to ensure anonymity of the online survey. No personal data will be captured, and no IP addresses will be collected.

Should you have any questions or concerns, do not hesitate to contact me by phone at [redacted] or by e-mail at jpessima@email.phoenix.edu.

Very respectfully,
/s/Joedda F. Pessima, MSM

APPENDIX B: INFORMED CONSENT

INFORMED CONSENT: PARTICIPANTS 18 YEARS OF AGE AND OLDER

Dear Prospective Participant,

My name is **Joedda Pessima**, and I am currently a student with the University of Phoenix, School of Advanced Studies completing my dissertation in fulfillment of the degree of Doctor of Management in Organizational Leadership with a specialization in Information Systems and Technology. I am conducting a study entitled, Healthcare Delivery and Technology Adoption in Rural Georgia: A Quantitative Correlational Study. The purpose of the study is to explore the relationship between electronic health records (EHR)/health information technology (HIT) adoption and the burden it may place on appointment times, interoperability and the quality of healthcare delivery in clinical practice, specifically in underinsured or uninsured rural populations in Georgia.

The participant criteria are licensed clinicians and physicians who practice in one of 16 rural counties (Wilkes, Emanuel, Washington, Meriwether (Warm Springs), Appling, Candler, Bleckley, Burke, Evans, Gordon, Jeff Davis, Tattnall, Tift, Walker, Wayne & Clinch) or other rural counties (35,000 or less population) in Georgia, in private offices, healthcare centers, rural hospitals and pharmacies. The participant exclusion criteria for non-eligibility are (a) those outside of the 16 counties above or other rural counties in Georgia, (b) clinician or physician offices or practices who do not speak, read, write and understand English and (c) medical offices that do not have any patient or client contact.

Your participation is strictly voluntary and anonymous responses will be captured in a secure cross-sectional survey via Survey Monkey. As the sole researcher, I will be the only person accessing the survey data and reports confidentially.

The suggested survey completion time is approximately 15 minutes and shall be returned to the researcher within 7-14 days of receipt. Please complete by December 16, 2019. Data from the survey will be stored electronically, and participant responses will remain confidential. You can withdraw from the study at any time without any penalty by exiting the survey. No results pertaining to any response will be captured or used for the purpose of this study. If you submit a complete survey, your participation is conclusive and cannot be removed.

The results of the study may be published at a group level, and your identity will remain anonymous. This research has no foreseeable risks. Although there may not be a direct benefit to you, the potential benefit from taking part in this study may lead to a better understanding of the potential influence or impact of EHR/HIT adoption on rural clinician or physician practices in several rural counties in Georgia.

If you have any questions or concerns about this study, please call [redacted] or e-mail jpessima@email.phoenix.edu. For any concerns regarding your rights as a participant, or any complaints, please contact the University of Phoenix Institutional Review Board via email at IRB@phoenix.edu.

As a participant in this study, you should understand the following:

1. The researcher, Joedda Pessima reserves the right to terminate the survey at any time and up to the desired sample size is achieved.
2. You can withdraw from the study at any time during the survey by exiting the survey window without any penalty. No results pertaining to any response will be captured or used for the purpose of this study. If you submit a completed survey, your participation is conclusive and cannot be removed.
3. Your identity will remain anonymous and no IP addresses will be captured.
4. The researcher has outlined the nature of the study and has provided the consent and confidentiality terms, and the contact information for concerns, questions and withdrawal process.
5. Data reports from the survey is maintained on an encrypted flash drive and stored securely in a locked safe in my home where I have sole access, and will be retained for three years, and later destroyed.
6. The results of this study may be published; your identity, however, will remain anonymous.

By clicking the link to access the survey serves as acceptance of your agreement to take the survey and acknowledges your comprehension of the nature of the study, any risks, if any, and how the anonymity of your identity, and data reports will be maintained and captured as a participant. Also, by accepting these terms, you acknowledge that you are 18 years or older and that you give permission to volunteer as a participant in the study as described above.

APPENDIX C: PERMISSION TO USE PUBLIC DOMAIN SURVEY

Joedda Pessima **Sunday, March 3, 2019 at 4:00:09 PM Eastern Standard Time**

Subject: Re: Request for Permission for National Electronic Health Records (NEHR) Survey OMB No. 0920-1015
Date: Sunday, March 3, 2019 at 1:43:04 PM Eastern Standard Time
From: Joedda Pessima <jpessima@email.phoenix.edu>
To: Myrick, Kelly L. (CDC/DDPHSS/NCHS/DHCS) [redacted]
CC: Ogburn, Damon (CDC/DDPHSS/NCHS/DHCS) [redacted], Joedda Pessima <jpessima@email.phoenix.edu>, [redacted]

Greetings Kelly,

Thank you for your prompt response on my request and permission to use the survey. I appreciate the additional information you provided and look forward to discussing any questions or concerns that I may have in the interim.

Kindest regards,

Joedda Pessima
Email: jpessima@email.phoenix.edu
Alternate: [redacted]
Mobile: [redacted]

From: Myrick, Kelly L. (CDC/DDPHSS/NCHS/DHCS) [redacted]
Sent: Wednesday, February 27, 2019 6:01 AM
To: Joedda Pessima
Cc: Ogburn, Damon (CDC/DDPHSS/NCHS/DHCS)
Subject: FW: Request for Permission for National Electronic Health Records (NEHR) Survey OMB No. 0920-1015

Dear Joedda,

Hi! Ninee kindly forwarded your message to me. I am the current project officer for NEHRS; I have cc'd my colleague Damon Ogburn who also oversees the survey. We are happy to help and wish you all the best on your dissertation project!

The NEHRS data and instrument is open to the public and you may use the questions for your research and don't require permission. I read the thread below and saw that you were interested in cognitive testing so I have provided information about that below. The 2017 NEHRS is the most current data available and the questionnaire can be found on the website here: https://www.cdc.gov/nchs/ahcd/ahcd_survey_instruments.htm . The 2018 survey is in the field; the 2019 survey has not gone into the field yet.

The complete 2017 National Electronic Health Records Survey has not been cognitively tested, however, some questions have been cognitively tested in the past by the National Center for Health Statistics' Collaborating Center for Questionnaire Design and Evaluation Research (CCQDER) (https://www.cdc.gov/nchs/CCQDER/index.html) . The CCQDER has details on their methods (https://www.cdc.gov/nchs/CCQDER/evaluation/Home.htm) . The CCQDER has reports on surveys that they have tested; the reports can be found here: https://wwwn.cdc.gov/qbank/Reports.aspx#/Reports

The 2015 NEHRS survey was cognitively tested. Note that the 2015 NEHRS was the survey that precedes the 2017 NEHRS; there was no 2016 NEHRS survey. The CCQDER report on the 2015 NEHRS testing can be found here: https://wwwn.cdc.gov/qbank/Reports.aspx#/Reports/1152

All questions that the CCQDER has tested are listed in the Q-Bank, which is a publicly available resource located here: https://wwwn.cdc.gov/qbank/home.aspx

Best wishes,

Kelly L. Myrick, PhD, CPH
Survey Statistician
National Center for Health Statistics | Centers for Disease Control and Prevention
3311 Toledo Road, # 3616, MS P-08, Hyattsville, MD 20782

Email: [redacted] | Office: (301)458-4498 | Fax: (301)458-4032
Telework Mondays & Fridays

From: Yang, Ninee (CDC/DDPHSIS/CGH/DGHT) [redacted]
Sent: Friday, February 22, 2019 10:11 AM
To: Myrick, Kelly L. (CDC/DDPHSS/NCHS/DHCS) [redacted]
Subject: Fwd: Request for Permission for National Electronic Health Records (NEHR) Survey OMB No. 0920-1015

Hi Kelly,

Please respond to this request. Thanks!

Ninee

From: Joedda Pessima <jpessima@email.phoenix.edu>
Date: February 22, 2019 at 9:16:38 PM GMT+7
To: Jamoom, Eric (CDC/DDPHSS/NCHS/DRM) <[redacted]>, Yang, Ninee (CDC/DDPHSIS/CGH/DGHT) <[redacted]>
Cc: Joedda Pessima <jpessima@email.phoenix.edu>, [redacted]

Subject: Request for Permission for National Electronic Health Records (NEHR) Survey OMB No. 0920- 1015

Greetings Eric and Ninee,

I am a continuing my doctoral education as a full-time student at University of Phoenix (Tempe, AZ) and I am currently completing my dissertation after taking a 2-year break due to a serious illness. My dissertation title remains unchanged. The title is: HEALTHCARE INFORMATION TECHNOLOGY ADOPTION TRENDS FOR RURAL GEORGIA POPULATIONS: A QUANTITATIVE STUDY

I would like to request permission again to use the following survey and add additional questions related to my current research area and clinician population in Georgia.

I received the following information to request the Approval of the use of the *National Electronic Health Records Survey OMB No. 0920-1015: Approval expires 07/31/2020 (https://www.cdc.gov/nchs/data/ahcd/2017_NEHRS_Sample_Card.pdf)*. (Expiration: 07/31/2020)
Contact Information:
Eric Jamoom, Ph.D.
Health Scientist, Ambulatory Care Team
Ambulatory and Hospital Care Statistics Branch
Division of Health Care Statistics
National Center for Health Statistics
Centers for Disease Control and Prevention
3311 Toledo Road, Room 3304
Hyattsville, MD 20782
301-458-4798
301-458-4032 (fax)
[redacted]

Please advise.

Also, if you are not the appropriate contact for the approval of use of the survey please refer me to the appropriate person.

Thank you for your time and I look forward to your response.

Joedda Pessima
Email: jpessima@email.phoenix.edu
Alternate: [redacted]
Mobile: [redacted]

RE: Population Data Websites (Rural Health) (Public Information) - Data Use Permission

HRSA Press <Press@hrsa.gov>
Fri 8/16/2019 12:48 PM
To: Joedda Pessima <jpessima@email.phoenix.edu>; joedda@bellsouth.net <joedda@bellsouth.net>

Hi Joedda,

You have our permission to make use the data you've identified in your academic efforts. This data is within the public domain.

And thank you for citing all of the data you are using.

Best of luck in your educational efforts,

David Bowman
Public Affairs Specialist
Office of Communications
Health Resources and Services Administration
E-mail: [redacted]
Phone: 301-443-3376

HRSA
Health Resources & Services Administration

From: Joedda Pessima <jpessima@email.phoenix.edu>
Sent: Friday, August 16, 2019 12:33 PM
To: HRSA Press <Press@hrsa.gov>
Cc: [redacted] Joedda Pessima <jpessima@email.phoenix.edu>
Subject: Fw: Population Data Websites (Rural Health) (Public Information) - Data Use Permission

Greetings,

I was advised by the Deputy of the local HRSA office in Atlanta, GA to contact the HRSA Office of communications to receive authorization to use the data from the HRSA website.

Is there someone at HRSA that can complete the attached form for the University of Phoenix for me? (See attached form)

They will also accept formal e-mail authorizations also if applicable to HRSA.

I am only using public data from the websitehttps://data.hrsa.gov/data/about. I have cited all sources for the US Census Bureau and HRSA. I need to cover all bases for the Institutional Review Board approval process to distribute my survey.

It states on the HRSA Website https://data.hrsa.gov/data/about the following about the data I used:

American Community Survey (ACS) – Data published by: U.S. Census Bureau
Usage limitations: These data are free to use in a product or publication, however acknowledgement must be given to the U.S. Census Bureau as the source.

Census 2010 Summary File 1 – Data published by: U.S. Census Bureau
Usage limitations: The Topologically Integrated Geographic Encoding and Referencing (TIGER)/Line Shapefile products are not copyrighted however TIGER/Line and Census TIGER are registered trademarks of the U.S. Census Bureau. These products are free to use in a product or publication, however acknowledgement must be given to the U.S. Census Bureau as the source. The boundary information in the TIGER/Line Shapefiles are for statistical data collection and tabulation purposes only; their depiction and designation for statistical purposes does not constitute a determination of jurisdictional authority or rights of ownership or entitlement and they are not legal land descriptions. Coordinates in the TIGER/Line shapefiles have six implied decimal places, but the positional accuracy of these coordinates is not as great as the six decimal places suggest.

Counties – Data published by: U.S. Census Bureau
Usage limitations: The Topologically Integrated Geographic Encoding and Referencing (TIGER)/Line Shapefile products are not copyrighted however TIGER/Line and Census TIGER are registered trademarks of the U.S. Census Bureau. These products are free to use in a product or publication, however acknowledgement must be given to the U.S. Census Bureau as the source. The boundary information in the TIGER/Line Shapefiles are for statistical data collection and tabulation purposes only; their depiction and designation for statistical purposes does not constitute a determination of jurisdictional authority or rights of ownership or entitlement and they are not legal land descriptions. Coordinates in the TIGER/Line shapefiles have six implied decimal places, but the positional accuracy of these coordinates is not as great as the six decimal places suggest.

HRSA Data Warehouse Summary Statistics – Data published by: HRSA Data Warehouse
Usage limitations: None

Medically Underserved Areas/Populations (MUA/P) – Data published by: HRSA, Bureau of Health Workforce (BHW), Division of Policy and Shortage Designation (DPSD)
Usage limitations: None

National Health Service Corps (NHSC) Providers – Data published by: HRSA, Bureau of Health Workforce (BHW), National Health Service Corps (NHSC)
Usage limitations: None

Thank you.

University of Phoenix® Institutional Review Board

Data Access and Use Permission

The principal investigator must complete this form, and have it signed by the individual who owns the data, or a representative from the organization that owns the data.

Project Title: DISSERTATION TITLE: HEALTHCARE DELIVERY AND TECHNOLOGY ADOPTION IN RURAL GEORGIA: A QUANTITATIVE CORRELATIONAL STUDY.	
Principal Investigator: JOEDDA F. PESSIMA	
Name of Organization or Individual that Owns the Data: Department of Community Health/State Office of Rural Health (SORH)	
Name of Representative Providing Permissions: Patsy Whaley	**Title of Representative:** Executive Director
Address of Organization or Individual Providing Data: 502 S. 7th St. Cordele Ga 31015	**URL for Organization:** https://dch.georgia.gov/sorh-maps-georgia-0
Email Address of Representative: pwhaley@dch.ga.gov	**Phone Number of Representative:** 229-401-3081

Data Permissions

Data Description: Provide a description of the data that will be provided to the researcher. Public data (MUA/P, Rural Maps, RHCs, FQHC Listings) from Georgia Rural counties at website https://dch.georgia.gov/sorh-maps-georgia-0

Yes	No	Answer the following questions about the data and permissions.
☐	☒	**Will the data provided include individual identifiers** (i.e. names, email addresses, or any other item or a collection of demographic items that may make the data individually identifiable)?
☒	☐	**May the source of the data be identified in the reporting and/or publication of study results?**
☒	☐	**If the University of Phoenix researcher is a student, can relevant information associated with this data be available to the faculty or school administrators working with this student**, such as the dissertation chair and dissertation committee for educational purposes?
☐	☒	**Are there any other stipulations about how the data must be maintained?**
If yes:		*Describe additional stipulations.*

In granting this permission, I understand the data will be maintained in a secure and confidential manner and that all reporting will be done in the aggregate or in a manner to protect the privacy of any identifiable individual.
I am also aware that the researcher will obtain an IRB review and approval or exempt determination to conduct the study listed above before being given access to any data for research purposes.

Signature of Organizational Representative or Data Owner: Patsy Whaley-Executive Director-Ga SORH	*Select Date* 8/20/19

Re: Custom Data Request - Georgia Rural Health Populations

ACSO Users Support (CENSUS/ACSO) <acso.users.support@census.gov>
Fri 8/16/2019 11:18 AM
To: Joedda Pessima <jpessima@email.phoenix.edu>; Andrew W Hait (CENSUS/GTMD FED)
<[redacted]
C[redacted]

Joedda,

I believe the ACS data that you are going to be using is publicly available so you don't need any authorization from us. If you would like to source the survey and the Census Bureau in your work that would be great.

Thanks!
Chase

American Community Survey-Data User Support
U.S. Census Bureau
Toll-Free: 1-866-805-5993
acso.users.support@census.gov
census.gov | @uscensusbureau
Connect with other data users by joining the ACS Data User Group online community!

Subscribe to ACS email updates.

Share your ACS data story and see how others are using ACS data!

From: Joedda Pessima <jpessima@email.phoenix.edu>
Sent: Thursday, August 15, 2019 7:51:51 PM
To: ACSO Users Support (CENSUS/ACSO) <acso.users.support@census.gov>; Andrew W Hait (CENSUS/GTMD FED)
[redacted]
Cc: [redacted]; Joedda Pessima <jpessima@email.phoenix.edu>
Subject: Re: Custom Data Request - Georgia Rural Health Populations

Greetings,

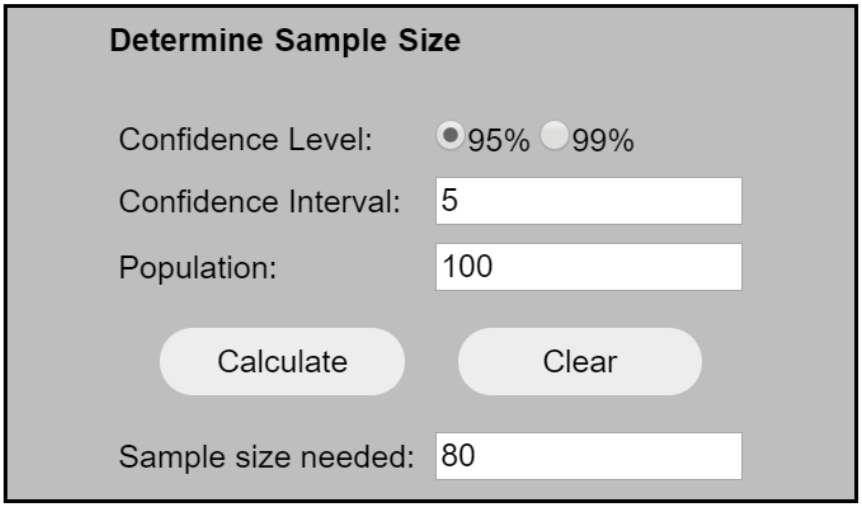
Is there someone who can complete this form for the University of Phoenix approving me to use the data for my research? (See attached)

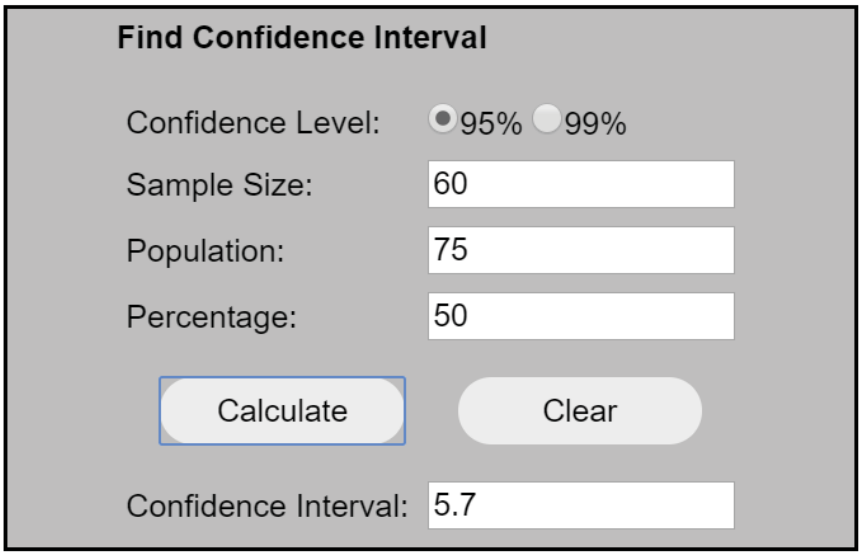
Please let me know.

Thank you.

Joedda Pessima
Email: [redacted]
Alternate: [redacted]
Mobile: [redacted]

APPENDIX E: G*POWER CALCULATION





APPENDIX F: SOCIAL MEDIA POSTS & KIOSK MODE

Facebook Post:

Are you interested in population health as a Georgia Rural Health Provider? Do you know a provider who serves in rural health populations in Georgia? Please tell us your experience with Electronic Health Records (EHR) and Health Information Technology (HIT) adoption.
Can you spare a few moments to take a survey?
https://www.surveymonkey.com/r/EHRITSM.

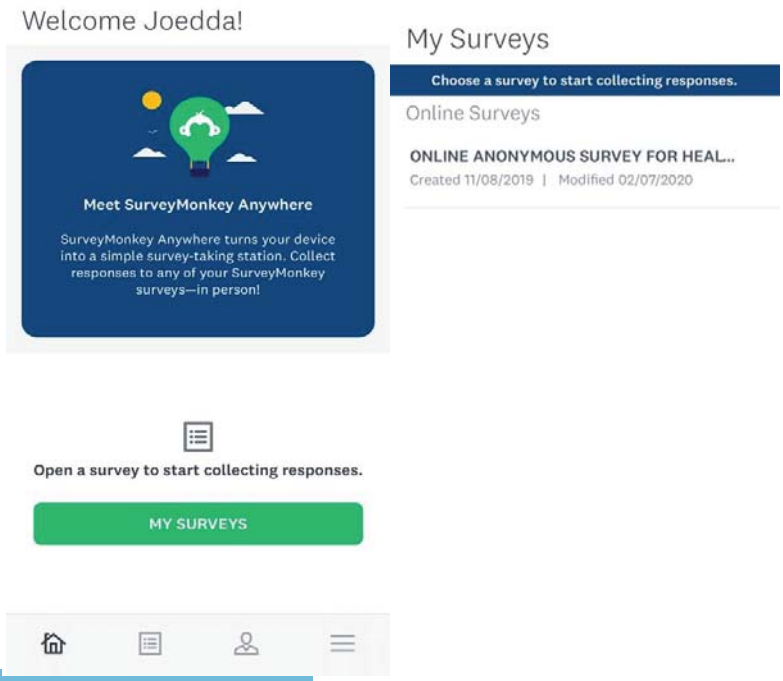
LinkedIn Post:

Are you a Georgia Rural Health Provider or do you know a provider who serves in rural health populations in Georgia? Please tell us your experience with Electronic Health Records (EHR) and Health Information Technology (HIT) adoption. Thank you for sharing.
https://www.surveymonkey.com/r/EHRITSM.

Twitter Post:

Are you a rural healthcare provider? Your experiences matter, as rural healthcare and technology adoption remains an interest, globally. Please share your experience. Complete the anonymous survey at https://www.surveymonkey.com/r/EHRITSM. Your assistance with the study is greatly appreciated.

Kiosk Mode (Tablet - iPad or Smartphone - iPhone):



APPENDIX G: SURVEY INSTRUMENT

ONLINE ANONYMOUS SURVEY FOR HEALTHCARE DELIVERY AND TECHNOLOGY ADOPTION IN RURAL GEORGIA: A QUANTITATIVE CORRELATIONAL STUDY

1. Do you agree to the terms of **informed consent**? By clicking Yes, you consent that you are willing to answer the questions in this survey.

☐ Yes
☐ No (Please stop here and exit the survey. Thank you for your time.)

2. How did you hear about this survey?

☐ Clinician or Physician Referral [1]
☐ College/University [2]
☐ Georgia State Office of Rural Health [3]
☐ HomeTown Health Network [4]
☐ Medical Association of Georgia [5]
☐ Georgia Rural Health Association [6]
☐ Other_____ [7]

3. What type of clinician or physician are you?

☐ Advanced Practice Nurse [1]
☐ Pharmacist [2]
☐ Physician [3]
☐ Physician Assistant [4]
☐ Psychiatrist [5]
☐ Psychologist [6]
☐ Other_____ [7]

4. What is your specialty or healthcare profession? (Check all that apply)

☐ Family Medicine [1]
☐ General Practice [2]
☐ Internal Medicine [3]
☐ Pharmacy [4]
☐ OB/GYN [5]
☐ Pediatrics [6]
☐ Psychiatry [7]
☐ Geriatrics [8]
☐ Multiple Specialties [9]
☐ Other_____ [10]

5. What is your gender?

☐ Female [1]
☐ Male [2]

.

6. What is your race/ethnicity?

- ☐ Hispanic [1]
- ☐ Latino [2]
- ☐ Non-Hispanic [3]
- ☐ Black/African American [4]
- ☐ White - Non-Hispanic [5]
- ☐ White – Non Latino [6]
- ☐ Asian-American/Pacific Islander [7]
- ☐ Native American/Alaska Native [8]
- ☐ Multiracial or Other Race [9]
- ☐ Prefer not to answer [10]

7. What language(s) do you speak? (Check all that apply)

- ☐ English [1]
- ☐ Spanish [2]
- ☐ Chinese [3]
- ☐ Korean [4]
- ☐ Japanese [5]
- ☐ Arabic [6]
- ☐ French [7]
- ☐ German [8]
- ☐ Haitian/Creole (Kreyol) [9]
- ☐ Hindi [10]
- ☐ Portuguese [11]
- ☐ Russian [12]
- ☐ Other_____ [13]

8. Do you directly care for any ambulatory patients in your work?

- ☐ Yes [1] (Continue to Question 8)
- ☐ No [2]
- ☐ I am no longer in practice [3]

Please stop here and exit the survey. Thank you for your time.

9. Overall how many office locations (excluding hospital emergency or hospital outpatient departments) do you see ambulatory patients in a normal work week?_____

(Normal work week - a week with a normal caseload, with no holidays, vacations, or conferences)

10. Do you see ambulatory patients in any of the following settings? (Check all that apply)
(Ambulatory - care for patients receiving health services without admission to a hospital or other facility.)

- ☐ Private solo or group practice [1]
- ☐ Freestanding clinic or Urgent Care Center [2]
- ☐ Community Health Center (e.g., Federally Qualified Health Center [FQHC], federally funded clinics or "look-alike" clinics) [3]
- ☐ Mental health center [4]
- ☐ Non-federal government clinic (e.g., state, county, city, maternal & child health, etc.) [5]
- ☐ Family planning clinic (including Planned Parenthood) [6]
- ☐ Health maintenance organization or other prepaid practice (e.g., Kaiser Permanente) [7]
- ☐ Faculty practice plan (an organized group of physicians that treats patients referred to an academic medical center) [8]

☐ Other _____ [9]

11. At which of the settings in the previous question do you see the most ambulatory patients? WRITE THE NUMBER LOCATED NEXT TO THE OPTION YOU CHECKED. _____
For the rest of the survey we will refer to this as the "reporting location".

12. Does your reporting location/office use any of the following health resources? (Check all that apply)

☐ Federally Qualified Health Center (FQHC) [1]
☐ Rural Health Centers (RHC) [2]
☐ Quality Payment Program (QPP) [3]
☐ Connected Care: The Chronic Care Management Resource [4]
☐ CMS Innovation Center [5]
☐ Federal Office of Rural Health Policy [6]
☐ Rural Health Information Hub [7]
☐ National Organizations of State Offices of Rural Health [8]
☐ Don't Know [9]
☐ Other _____ [10]

13. What is the city and zip code of the reporting location/office? (Write response below)

City _____ Zip Code _____

14. What county or counties do you directly care for patients? (Check all that apply)

☐ Appling [1]
☐ Candler [2]
☐ Clinch [3]
☐ Bleckley [4]
☐ Burke [5]
☐ Emanuel [6]
☐ Evans [7]
☐ Gordon [8]
☐ Jeff Davis [9]
☐ Meriwether (Warm Springs) [10]
☐ Tattnall [11]
☐ Tift [12]
☐ Walker [13]
☐ Washington [14]
☐ Wayne [15]
☐ Wilkes [16]
☐ Other_____ [17]

15. Who owns the reporting location/office?

☐ Physician or Physician Group [1]
☐ Insurance company, health plan or HMO [2]
☐ Community Health Center [3]
☐ Medical/Academic Health Center [4]
☐ Other Hospital [5]
☐ Other Healthcare Corporation [6]
☐ Other_____ [7]

16. How many physicians, including you, work in this reporting location/office including physicians at any other locations of the practice)?

☐ 1 Physician [1]
☐ 2-3 Physicians [2]
☐ 4-10 Physicians [3]
☐ 11-50 Physicians [4]
☐ 51-100 Physicians [5]
☐ More than 100 Physicians [6]
☐ None [7]
☐ Other_____ [8]

17. Do you use electronic health records (EHR)/health information technology (HIT)? (Do not include billing record systems.)

☐ Yes [1]
☐ No [2]

18. Estimate the number of years you have used any EHR system. ENTER NUMBER BELOW (Do not include billing record systems.)

☐ Check here if you have used an EHR system and list # Years below [1]
Please specify the estimated number of years you have used any EHR system_____ [2]

19. Does your EHR system meet EHR criteria based on 2015 Edition EHR Certification or as defined by the Department of Health and Human Services?

☐ Yes [1]
☐ No [2]
☐ Don't know [3]

20. Have you received incentive payments for meaningful use of EHR/HIT?

☐ Yes [1]
☐ No [2]
☐ Don't Know [3]

21. Have you been subject to penalties for non-meaningful use of EHR/HIT?

☐ Yes [1]
☐ No [2]
☐ Don't Know [3]

22. Indicate whether the reporting location/office uses each of the computerized capabilities listed below. CHECK NO MORE THAN ONE OPTION PER ROW. Does the reporting location use a computerized system to:		Yes	No	Don't Know
BASIC COMPUTER CAPABILITIES	Record patient history & demographic information?	☐ 1	☐ 2	☐ 3
	Record patient problem lists?	☐ 1	☐ 2	☐ 3
	Record patients' allergies and medications?	☐ 1	☐ 2	☐ 3
	Record clinical notes?	☐ 1	☐ 2	☐ 3
	View lab results?	☐ 1	☐ 2	☐ 3
	View imaging reports?	☐ 1	☐ 2	☐ 3
SAFETY	Order Prescriptions?	☐ 1	☐ 2	☐ 3
	Are prescriptions sent electronically to the pharmacy?	☐ 1	☐ 2	☐ 3
	Are warnings of drug interactions or contraindications provided?	☐ 1	☐ 2	☐ 3
	Order lab tests?	☐ 1	☐ 2	☐ 3
	Order radiology tests?	☐ 1	☐ 2	☐ 3
	Provide reminders for guide-based interventions or screening tests?	☐ 1	☐ 2	☐ 3
	Reconcile lists of patient medications to			

	identify the most accurate list?			
PATIENT ENGAGEMENT	Provide patients with clinical summaries for each visit? Exchange secure messages with patients?	☐ 1 ☐ 1	☐ 2 ☐ 2	☐ 3 ☐ 3
POPULATION MANAGEMENT	Identify patients due for preventive or follow-up care? Provide data to generate lists of patients with particular health conditions? Provide data to create reports on clinical care measures for patients with specific chronic conditions (e.g., HbA1c for people with diabetes)?	☐ 1 ☐ 1 ☐ 1	☐ 2 ☐ 2 ☐ 2	☐ 3 ☐ 3 ☐ 3

23. What are the most common type(s) of comorbidities (illnesses) do you treat? (Check all that apply)

- ☐ Alzheimer's
- ☐ Asthma
- ☐ Arthritis
- ☐ Bacterial Pneumonia
- ☐ Cancer
- ☐ Chronic Obstructive Pulmonary
- ☐ Congestive Heart Failure
- ☐ Diabetes
- ☐ End Stage Renal Disease (ESRD) [9]
- ☐ Fracture reductions
- ☐ Heart Disease
- ☐ Hypertension
- ☐ Laceration Repair
- ☐ Obstetric deliveries
- ☐ Parkinson's
- ☐ Sepsis
- ☐ Urinary Tract Infections
- ☐ Other_____

24. Are you currently accepting new patients at the reporting location?

☐ Yes [1]
☐ No [2]
☐ Other_____ [3]

25. What types of insurance do you accept? (Check all that apply)	Yes	No	Don't Know	Not Applicable
Private insurance capitated	☐ 1	☐ 2	☐ 3	☐ 4
Private insurance non-capitated	☐ 1	☐ 2	☐ 3	☐ 4
Medicare	☐ 1	☐ 2	☐ 3	☐ 4
Medicaid/CHIP	☐ 1	☐ 2	☐ 3	☐ 4
Workers' compensation	☐ 1	☐ 2	☐ 3	☐ 4
Self-pay	☐ 1	☐ 2	☐ 3	☐ 4
No charge (uninsured)	☐ 1	☐ 2	☐ 3	☐ 4

26. What is your approximate percentage of insured patients from all sources of insurance?

☐ None [1]
☐ < 5 % [2]
☐ 5 - 10 % [3]
☐ 11 – 15 % [4]
☐ 16 – 20 % [5]
☐ 21 – 30 % [6]
☐ 31 – 40 % [7]
☐ 41 – 50 % [8]
☐ > 50 % [9]

27. What is your approximate percentage of patients insured by Medicaid and/or Medicare? (Choose one option per column)

Medicaid	Medicare
☐ None [1]	☐ None [1]
☐ 1% - 5% [2]	☐ 1% - 5% [2]
☐ 6% - 10% [3]	☐ 6% - 10% [3]
☐ 11% - 20% [4]	☐ 11% - 20% [4]
☐ 21% - 40% [5]	☐ 21% - 40% [5]
☐ 41% - 50 % [6]	☐ 41% - 50 % [6]
☐ > 50% [7]	☐ > 50% [7]

28. What is your approximate percentage of patient races/ethnicities served? (Check all that apply for each option)

Hispanic or Latino	Black/African American Race (Non-Hispanic)	White (Non-Latino)
☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]	☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]	☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]
Asian-American/Pacific Islander Race	**American Indian/Alaska Native**	**Multiracial or Other Race**
☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]	☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]	☐ None [1] ☐ < 5 % [2] ☐ 5 % [3] ☐ 6 - 10 % [4] ☐ 11 - 15 % [5] ☐ 16 - 20 % [6] ☐ 21 – 30 % [7] ☐ 31 – 40 % [8] ☐ 41 – 50 % [9] ☐ 51 – 60 % [10] ☐ 61 – 70 % [11] ☐ 71 – 80 % [12] ☐ 81 – 90 % [13] ☐ 100 % [14]

29. What is your approximate percentage of uninsured (self-pay) patients? (uninsured charity cases are included in the next question)

☐ None [1]
☐ < 5 % [2]
☐ 5 - 10 % [3]
☐ 11 – 15 % [4]
☐ 16 – 20 % [5]
☐ 21 – 30 % [6]
☐ 31 – 40 % [7]
☐ 41 – 50 % [8]
☐ > 50 % [9]

30. What is your approximate number of uninsured (charity cases/special situations) patients accepted?

- ☐ None [1]
- ☐ < 5 % [2]
- ☐ 5 - 10 % [6]
- ☐ 11 – 15 % [7]
- ☐ 16 – 20 % [3]
- ☐ 21 – 30 % [4]
- ☐ 31 – 40 % [5]
- ☐ 41 – 50 % [8]
- ☐ > 50 % [9]

31. What is the approximate cost for maintaining your EHR/HIT monthly?

- ☐ $0 - $50
- ☐ $50 - $100
- ☐ $101 - $300
- ☐ $301 - $500
- ☐ $501 - $700
- ☐ $701 - $900
- ☐ $901 - $1100
- ☐ >$1101
- ☐ Not applicable

32. To what extent does the use of your EHR/HIT impact work productivity?

Never	Rarely	Sometimes	Always
☐ 1	☐ 2	☐ 3	☐ 4

33. In the past has your reporting location/office enrolled with a Regional Extension Center (REC)?

- ☐ Yes [1]
- ☐ No [2]
- ☐ Don't Know [3]

34. Is your medical organization affiliated with an Independent Practice Association (IPA) or Physician Hospital Organization (PHO)?

- ☐ Yes [1]
- ☐ No [2]
- ☐ Don't Know [3]

35. Does the reporting location/office participate in an Accountable Care Organization (ACO) arrangement with Medicare or private insurers?

- ☐ Yes [1]
- ☐ No [2]
- ☐ Don't Know [3]

36. Has your reporting location/office been recognized as a Patient Centered Medical Home (PCMH) by a state, a commercial health plan, or a national organization?

- ☐ Yes [1]
- ☐ No [2]
- ☐ Don't Know [3]

37. Does the reporting location/office participate in a Pay-for-Performance arrangement, where you receive financial bonuses based on your performance?

- ☐ Yes [1]
- ☐ No [2]
- ☐ Don't Know [3]

38. Do you believe your EHR/HIT is a valuable tool to assist you in your diagnoses or plan of care?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

39. Do you believe the use of EHR/HIT aids in better healthcare quality & delivery of care?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

40. Would you say the use of EHR/HIT _____ aid(s) in improving patient health outcomes?

Never	Rarely	Sometimes	Always
☐ 1	☐ 2	☐ 3	☐ 4

41. Do you believe the use of EHR/HIT increases patient privacy risk?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

42. Do you ONLY send and receive patient health information through paper-based methods including fax, e-Fax, or mail?

☐ Yes [1]
☐ No [2]

43. Do you electronically **send** patient health information to other providers outside your medical organization using an EHR (not eFax) or a Web Portal (separate from EHR)?

☐ Yes [1]
☐ No [2] [Skip to question 45]

44. Do you send patient health information to any of the following providers electronically? (Electronically does not include scanned or PDF documents from fax, eFax, or mail.)	Yes	No	Don't Know	Not Applicable
Ambulatory care providers outside your organization	☐ 1	☐ 2	☐ 3	☐ 4
Hospitals unaffiliated with your organization	☐ 1	☐ 2	☐ 3	☐ 4
Hospitals affiliated with your organization	☐ 1	☐ 2	☐ 3	☐ 4
Behavioral health providers	☐ 1	☐ 2	☐ 3	☐ 4
Long-term care providers	☐ 1	☐ 2	☐ 3	☐ 4

45. Do you electronically **receive** patient health information to other providers outside your medical organization using an EHR (not eFax) or a Web Portal (separate from EHR)?

☐ Yes [1]
☐ No [2] [Skip to question 47]

46. Do you receive patient health information to any of the following providers electronically? (Electronically does not include scanned or PDF documents from fax, eFax, or mail.)	Yes	No	Don't Know	Not Applicable
Ambulatory care providers outside your organization	☐ 1	☐ 2	☐ 3	☐ 4
Hospitals unaffiliated with your organization	☐ 1	☐ 2	☐ 3	☐ 4
Hospitals affiliated with your organization	☐ 1	☐ 2	☐ 3	☐ 4
Behavioral health providers	☐ 1	☐ 2	☐ 3	☐ 4
Long-term care providers	☐ 1	☐ 2	☐ 3	☐ 4

47. Do you electronically search for your patient's health information from sources outside of your medical organization (e.g., remote access to other facility, health information exchange organization)?

☐ Yes [1]
☐ No [2]

48. Do you electronically search for the following patient health information from sources outside your medical organization?...	Yes	No	Don't Know	Not Applicable
Lab results	☐ 1	☐ 2	☐ 3	☐ 4
Patient problem lists	☐ 1	☐ 2	☐ 3	☐ 4
Imaging reports	☐ 1	☐ 2	☐ 3	☐ 4
Medication lists	☐ 1	☐ 2	☐ 3	☐ 4

Medication allergy list	☐ 1	☐ 2	☐ 3	☐ 4
Discharge summaries	☐ 1	☐ 2	☐ 3	☐ 4
Vaccination history	☐ 1	☐ 2	☐ 3	☐ 4
Advance directives	☐ 1	☐ 2	☐ 3	☐ 4
Care plans	☐ 1	☐ 2	☐ 3	☐ 4

49. What is the approximate percentage of your patients that use the Patient Portal connected to your EHR/HIT?

- ☐ None [1]
- ☐ < 5 % [2]
- ☐ 5 - 10 % [3]
- ☐ 11 – 15 % [4]
- ☐ 16 – 20 % [5]
- ☐ 21 – 30 % [6]
- ☐ 31 – 40 % [7]
- ☐ 41 – 50 % [8]
- ☐ > 50 % [9]
- ☐ Unknown [10]

50. How do you use your EHR/HIT? (Check All that Apply)

- ☐ Offer preventive services [1]
- ☐ Webinars/Training [2]
- ☐ Community Outreach [3]
- ☐ Track Health Trends/Statistics [4]
- ☐ e-Prescribing component [5]
- ☐ Lab Results [6]
- ☐ Manage patient test results (alerts for abnormal readings) [7]
- ☐ Secure messaging to Patients or other Physicians or Clinicians [8]
- ☐ Electronic Referrals to other Physicians or Clinicians [9]
- ☐ Addiction/Treatment Referrals [10]
- ☐ Tele Health i.e., tele radiology [11]
- ☐ Video Calling [12]

51. Do you prescribe controlled substances (i.e., opioids)?

- ☐ Yes [1]
- ☐ No [2] [Skip to question 52]

52. Are the prescriptions for controlled substances sent electronically to the pharmacy?

☐ Yes [1]
☐ No [2]

53. Has your EHR/HIT ...	Never	Rarely	Sometimes	Always
… provided you with a complete patient history?	☐ 1	☐ 2	☐ 3	☐ 4
… increased patient rapport?	☐ 1	☐ 2	☐ 3	☐ 4
… helped reduce medical errors?	☐ 1	☐ 2	☐ 3	☐ 4
… alerted you of medical errors?	☐ 1	☐ 2	☐ 3	☐ 4
… been accurate based on provider network exchanges?	☐ 1	☐ 2	☐ 3	☐ 4

54. Would you say the use of EHR/HIT in your medical reporting location/office _____?

☐ Wastes time during appointments [1]
☐ Delays time during appointments [2]
☐ Has no impact on time during appointments [3]
☐ Standardizes time during appointments [4]
☐ Speeds up time during appointments [5]

55. Who completed this survey?

☐ Physician to whom the survey was addressed [1]
☐ Clinician to whom the survey was addressed [2]
☐ Administrative Staff on behalf of Physician or Clinician [3]
☐ Other _____ [4] (Please specify position/profession type)

Thank you for your participation.