Healthcare Access and Academic Achievement: Investigating Connections between Hospitals and Student Success

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Abstract

This study explores associations between the number of Medicare-certified hospitals and emergency rooms and student performance on the Ohio State Tests in English Language Arts and Mathematics for third graders enrolled in Northeast Ohio schools in 2019 and 2023. This secondary-research study uses archival data to investigate correlations between topographical and location features (rurality, Appalachian status, ESC) and individual variables (gender, race or ethnicity, economic status, English language learner, homeless, disability) and student achievement. The use of Pearson Zero-Order Correlation analysis determined that no association is present between number of Medicare-certified hospitals and emergency rooms and student achievement in Northeast Ohio. The analysis supported significant, negative correlations between student achievement in ELA and mathematics and the individual variables of Black, Non-Hispanic, Hispanic, Multiracial, economic disadvantage, ELL, homeless and disability. There were no interaction effects between independent and dependent variables. This research supports the need for future research into associations between alternative forms of healthcare, such as pop-up clinics, and student achievement, given the prevalence of alternative healthcare services in areas of Northeast Ohio that do not have adequate hospital or emergency room access.

Keywords: Medicare-certified hospitals, Medicare-certified emergency rooms, student achievement, underrepresented minorities, economic disadvantage, hospital access, healthcare access

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Dedication

This research study is dedicated to my husband, Mike.

You have taken this journey right alongside me and I could not be more blessed to have you by my side. You can now look forward to being able to access our home computer, because I do not ever want to see it again. I promise to move the printer out of the living room. Thank you for all of the chili's that covered supper for days, the long walks with the dogs that helped them get settled and calm while I worked, the encouragement to keep going, and the "escapes" you made for me so that I could work on my dissertation. I cannot forget all the mini-lessons on Excel, and your patience when I immediately forgot them. You supported me when I started this program and helped clear the obstacles so that I could finish. You are my rock and I love you.

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Chapter I

Introduction

"Of all the forms of inequality, injustice in health is the most shocking and inhumane."

Martin Luther King, Jr. (1966)

In schools across the United States, daily conversations center around meeting the needs of struggling learners. When academic goals are unmet or when behavioral needs interfere with learning, interventions are put into place to measure the effectiveness of different teaching techniques in the face of barriers. Intwined in these conversations about student needs and interventions are shared observations of students who squint to see information posted at the front of the classroom, data showing multiple visits to the school nurse for stomachaches, concern for unmet mental health needs in children and adolescents, and waitlists for students who require evaluations by clinical providers. Teachers and educational leaders witness the practical implications of student health on academic performance every day. However, there is limited research to help educational leaders address how the changing landscape of healthcare in a community can impact student achievement.

Statement of the Problem

Health is an important factor in overall happiness (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019). Healthcare needs develop over a lifetime, but the need for quality healthcare is consistently felt by all members of a household. Healthcare is a broad umbrella that covers many services to aid in functioning, wellness, and performing daily life functions (Tzenios, 2019). A person's overall quality of life is impacted as much as 20% by clinical care, including care provided by doctors, access to needed treatments,

and routines that support preventative health (MacKinney, 2019). When access to quality healthcare is limited, people suffer negative impacts on overall life satisfaction and well-being (Choi, 2022; MacKinney, 2019).

Families that reside in rural locations have more difficulty accessing quality healthcare than urban peers, which impacts the overall health of all members (American Hospital Association, 2022; Douthit et al., 2015; Harvey, 2019). For example, women ages 18 or older experience higher rates of health problems than non-rural peers (American College of Obstetricians and Gynecologists, 2014). Infant mortality rates for babies in rural counties exceed those of nonrural babies (Ehrenthal et al., 2020), and children in rural locations are more likely to be obese (Health Resources and Services Administration [HRSA] Maternal & Child Health Bureau [MCHB], 2022) and are less likely to have adequate health insurance coverage (Bettenhausen et al., 2021). Adolescents in rural locations have higher rates of death by suicide (Bettenhausen et al., 2021), and elderly rural residents are more likely to be admitted to a nursing home compared to peers in non-rural settings (Miller et al., 2023).

There are numerous obstacles to accessing quality healthcare in rural locations. One of those obstacles is the lack of a definition for rurality (Bennett et al., 2019; Childs et al., 2022; HRSA, n.d.; Hirsch, 2019; Ratcliffe et al., 2016). Variations in rural definitions has proven an obstacle to people trying to receive healthcare services and supports (Bennett et al., 2019; Childs et al., 2022). The U.S. Census Bureau categorizes rurality as a location that does not meet urban criteria of having a population of 50,000 people or more (Childs et al., 2022; Hirsch, 2019; Ratcliffe et al., 2016). Furthermore, the U.S. Office of Management and Budget classifies rural based on the size of the largest

city within a county, with counties classified as rural if the county does not have a city of 10,000 or more people (Childs et al., 2022; Hirsch, 2019). This investigation used both classification systems to identify counties that are categorized as rural, partial rural, and urban. In addition to rurality, this study explored the impact of Appalachia to health and student achievement.

Appalachia is a geographical location connected to the Appalachian Mountain Chain. This area of the United States is divided into four sections: Western Region, Central Region, Eastern Region, and the Northeastern Region (Appalachian Ohio, 2024). The Appalachian counties in Northeast Ohio are Ashtabula, Columbiana, Tuscarawas, Mahoning and Trumbull counties (Appalachian Ohio, 2024). Appalachian residents are more likely to die from health conditions such as cancer, stroke, diabetes, and heart disease; furthermore, incidents of drug overdoses and suicide are higher in Appalachian counties compared to non-Appalachian counties (Marshall & Alcalde, 2017). This study includes considerations for Appalachian status in the investigation of possible relationships between healthcare access and student achievement.

Regardless of how a location is coded or classified, quality healthcare is not available to residents if healthcare hubs close down. The World Health Organization (WHO) (2024) emphasized the importance of hospital systems as a healthcare hub where resources are concentrated and where the complex network of care providers is coordinated. Although hospitals are recognized as vital to the coordination of complex care networks, many are at risk for closure due to financial constraints (Center for Healthcare Quality and Payment Reform, 2023). These closures have the most impact on vulnerable populations such as rural populations who face longer travel times to access

healthcare services (United States Government Accountability Office, 2020); when faced with additional travel burden to access healthcare providers, people in areas with limited healthcare services rely on family instead of clinical providers (Miller et al., 2023). These factors lead to inequality in healthcare access between rural and urban settings. Wainer (2024) asserted that hospital location is important in a healthcare landscape where three out of four doctors are employed by hospitals or corporate entities, versus private ownership. Doctors are more likely to go where hospitals are located.

Hospital closures impact how far people living in rural settings have to travel to access healthcare (Homeland Security and Governmental Affairs, 2020). Additionally, rural Americans make less money than urban counterparts (National Rural Health Association, n.d.), and rural individuals experience lower health literacy that interferes with full understanding of health forms (Skierkowski et al., 2019). People living in rural locations are more likely to have housing that does not meet their physical needs as they age (Henning-Smith et al., 2023), and rural residents have limited broadband access to connect with telehealth services when seeing a doctor in person is not a possibility (Lee et al., 2022). Healthcare access is an important determinant to well-being. However, there is a gap in the research regarding the potential impact of limited healthcare access on student achievement. This research gap is important to the field of educational leadership because educational leaders need to advocate for the needs of the community to promote healthy families and learning environments.

Because of rural hospital closures, the burden on rural families to access quality healthcare has increased (Homeland Security and Governmental Affairs, 2020). Children in rural communities face more health maladies than nonrural peers (Bettenhausen et al.,

2021; MCHB, 2022). As a result, the poor health of rural children has a strong, negative impact on student academic success (Bortes et al., 2018; Rattermann et al., 2021). Research supports the existence of health inequality between rural and non-rural populations (Bettenhausen et al., 2021; Douthit et al., 2015; Quigley et al., 2022, Rural Health Research Gateway, 2019). Despite the research that supports the relationship between health and student achievement, little research has been completed to investigate the potential relationship between hospital closures and student achievement. Investigating the relationship between access to quality healthcare and student achievement will better equip educational leaders to advocate for the needs of their community when hospital closures impact access to quality healthcare.

Purpose of the Study

Access to quality healthcare supports the health and vitality of individuals (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019). Healthcare is complex and can look different for each member of a family depending on age, disability status, and need. Hospitals provide a centralized hub for healthcare (World Health Organization [WHO], 2024); however, hospitals are at great risk for closure in the near future (Center for Healthcare Quality and Payment Reform, 2023). Hospital closures are leading to significant increases in travel times for rural families to see a physician or to receive medical care (United States Government Accountability Office, 2020).

Additionally, research supports the inequalities in healthcare between rural and nonrural communities (American Hospital Association, 2022; Bettenhausen et al., 2021; Douthit et al., 2015; MCHB, 2022; Harvey, 2019; Miller et al., 2023). Rural families experience higher burdens when accessing healthcare than nonrural families (American

Hospital Association, 2022; Douthit et al., 2015; Harvey, 2019). Furthermore, rural families also experience higher health problems related to obesity, illness, accidents and substance abuse than non-rural peers (Douthit et al., 2015; Rural Health Research Gateway, 2019). Health risks, medical conditions and illness have been found to negatively impact student achievement (Hattie, 2023).

In addition to student achievement, student health impacts learning (Youth Risk Behavior Surveillance System, 2023a, 2023b, 2023c, 2023d). Rural students start to demonstrate academic gaps starting in the third grade when compared to nonrural peers (Johnson et al., 2022). Even though it is recognized that health is an important factor in learning, there is a gap in the research exploring the relationship between the number of hospitals in a county and student achievement and how this possible relationship may impact rural students. The purpose of this study was to investigate possible relationships between number of hospitals in a county and student achievement for third grade students in Northeast Ohio who participated in the Ohio State Tests (OSTs) in English Language Arts (ELA) and mathematics during the 2022-2023 school year. Furthermore, the study explored the impact of other variables on student achievement such as gender, race and ethnicity, designation of English language learner, Appalachian status, economic disadvantage status, homeless status, and disability status. Access to healthcare is defined by the number of hospitals in a county. Therefore, this study investigated the potential for a predictive relationship between lower access to healthcare and lower student achievement.

Theoretical Framework

The systems thinking model guides current initiatives in public education by emphasizing the importance of shared ownership and cross-functional collaboration to support academic progress while recognizing the complexity of factors that contribute to student performance (Benham & Murakami, 2010; Senge, 1990). Educational leaders recognize the importance of engaging community stakeholders as members of the larger systems that supports student learning (Ndaruhutse et al., 2019). The systems thinking approach that binds together the processes within a school with the strengths and needs of the community aligns with the social model. The social model promotes the idea that obstacles for full participation in society stem from a mismatch between individuals and the features of the environment that allow for full participation of every individual (Bunbury, 2019; Goering, 2015). The systems thinking model and the social model support the need for a global, multi-faceted approach to supporting student success. This has historically been limited to cross-functional work within a school system and the inclusion of resources within the immediate community. The work done by educational leaders to support community members is limited by the focus on individual families, and not focused on other systems that are operating within the community, such as the healthcare system.

Educational leaders are called on to support families within their school community. The Educational Leadership Policy Standards set the standard that educational leaders will show responsiveness to community needs in a context that stretches well beyond the education of students (Council of Chief State School Officers, 2008). This study reimagined that expectation to challenge educational leaders to

consider that the increasing phenomenon of hospital closures in rural locations requires innovative solutions in order to support the healthcare needs of students and families.

Primary Research Questions

The research questions in this study addressed the potential relationships between the number of hospitals and third grade student achievement. This research study explored the following research questions:

Question 1

Is there an association between healthcare access, as measured by number of Medicare-certified hospitals in counties in Northeast Ohio, and student achievement, as measured by the 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics for public school districts in Northeast Ohio.

Question 2

To what extent do topographical and location features (rurality, Appalachian status, Educational Service Center alignment), individual variables (gender, race or ethnicity, economic status, English language learner status, homeless status, disability status), and healthcare access in 2019 and 2023 predict variability in student achievement, as measured by the 2019 and 2023 third grade Proficiency Level Percentage Trends in ELA and mathematics for public school districts in Northeast Ohio?

Objectives of the Study

The main objectives of this study were:

1. Define healthcare as an important factor in the quality of life of all family members.
2. Explain the obstacles facing rural families in accessing healthcare.

3. Explore possible interaction effects on student achievement such as gender, race or ethnicity, Appalachian status, English language learner status, economic disadvantage status, homeless status, and disability status.
4. Determine the relationship between number of hospitals and student achievement (third grade OST in ELA and mathematics).
5. Investigate a predictive relationship between topographical, location and individual factors, number of hospitals and student achievement.

Research Methodology

This study followed a correlational design using archival data in a quantitative, non-experimental analysis to investigate possible relationships between healthcare access and student achievement. Additionally, this study focused on third grade students who participated in the OSTs for ELA and mathematics for the 2022-2023 school year in public schools in Northeast Ohio. Data snapshots from the United States Centers for Medicare and Medicaid Services (CMS) were examined, and two lists of Medicare-certified hospitals in Northeast Ohio were compiled from data snapshots taken on April 4, 2019 (CMS, n.d.-b) and April 6, 2023 (CMS, n.d.-c).

Significance of the Study

In 2010, the Hunger-Free Kids Act was approved by the U.S. Congress to support student access to healthy, nutritious food in public schools (United States Department of Agriculture [USDA], 2022). The National Association of School Nurses implemented a data reporting system called Every Student Counts! in 2018 to assist in the development of school-based health programs (Maughan et al., 2020). These efforts highlight the growing recognition that student health is an important factor in improving learning

outcomes. Efforts to improve student health have focused on the student within the school context. Health is complex and impacts all members of a family; therefore, when family members at all life stages struggle to get needed healthcare, well-being suffers (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019).

Leithwood et al. (2010) emphasizes the need for educational leaders to engage with their community to increase school performance by meeting the needs of families in the community, especially in situations where there are barriers to families getting access to needed services. Additionally, hospital closures are disproportionally impacting rural communities (American Hospital Association, 2022; United States Government Accountability Office, 2020). This study addressed a gap in research by investigating the relationship between the number of hospitals in a county and student achievement; thus, seeking to make the connection that hospital closures impact student achievement by limiting access to healthcare. The study further explored changes over time with an analysis of 2019 (CMS, n.d.-b) and 2023 (CMS, n.d.-c) hospital data and 2019 and 2023 achievement (ODE, n.d.-b).

Assumptions, Limitations, and Delimitations

Healthcare is a complex concept consisting of a variety of resources, strategies, and techniques with the goal of improved quality of life. The following two assumptions were made for the purpose of this study.

1. It is assumed that a hospital is a healthcare resource.
2. It is assumed that increased access to a hospital would lead to more use of a hospital and surrounding physician networks for the purpose of increasing one's health.

There are many reasons to explain underperformance on the OSTs. Student performance could be impacted by distractibility, not eating breakfast on the day of the test, or other forms of distraction. It was not reasonable to investigate possible underperformance reasons through a historical review of each students' educational needs.

Additionally, this study focused on a specific region within Ohio and used data from third grade test results. It would have been unmanageable to expand the study to include all Ohio students or to expand the study to include students in other grade levels. This study focused on public schools in Northeast Ohio. Due to the large areas covered, it is possible that not all public schools were captured in this analysis. Further, this study focused on the number of hospitals in a county based on a list of Medicare-certified hospitals found in data sets from the CMS (n.d.-a). This number may not represent the total number of all hospitals and does not represent the number of total health care providers in a county. It would have been unmanageable to expand the definition of healthcare access to include all hospitals, clinics, and healthcare providers in the region selected for the study.

Definition of Terms

Achievement - Performance on the OSTs for ELA and mathematics. This study focused on the percent of students scoring in the proficient range at the school district level and at the county level (Ohio Department of Education and Workforce [DEW], n.d.-b).

Appalachia - A geographical area associated with the Appalachian Mountain Chain which is statistically associated with high education, economic, and health

needs compared to areas not identified as Appalachian (Marshal & Alcalde, 2017).

District Dashboard - An electronic portal that provides public access to information about the performance of Ohio school districts including performance on OSTs and aggregate demographic information such as gender, race and ethnicity, English language learner status, homeless status, and disability status (DEW, n.d.-b).

Economic disadvantage - Students who have met one or more of the following criteria: eligibility for free or reduced lunch, live in a household where another family member is eligible for free or reduced lunch, receive public assistance or have a guardian receiving public assistance, or who meet income thresholds on a Title I application (Ohio Department of Education [ODE], 2021).

English language learner - Students identified as having English as a second language through the use of a language usage survey and based on the results of the Ohio English Language Proficiency Screener. These students require support in one of the following areas: Listening, speaking, reading, or writing in the English language (DEW, 2024b).

Homeless - Students who experience instability in housing and do not have a nighttime location that is reliable. These students often change residences frequently, leading to instability that can impact educational progress (DEW, 2024a).

Hospital - This study focused on Medicare-certified hospitals located in archival data sets from the CMS (n.d.-a) website.

Northeast Ohio - A region of Ohio consisting of 18 counties: Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Loraine, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, and Wayne (Team NEO, 2024).

Ohio State Tests (OSTs) - Assessments taken annually by students in Ohio to measure grade level curricular skills and to measure growth year over year (DEW, 2024c).

Rural - This study combined the criteria for rural from the U.S. Census Bureau and the OMB. The U.S. Census Bureau defines rural as an area that does not meet urban criteria, with less than 50,000 people in a location (Childs et al., 2022; Hirsch, 2019; Ratcliffe et al., 2016). The OMB defines rural as a county in which the largest city has less than 10,000 people (Childs et al., 2022; Hirsch, 2019).

Partial rural - This recognizes counties in which the layout of the population might result in an urban designation if classification was based on the population of a city within the county. This designation might not be fitting for the majority of the county (Ohio Department of Health [ODH], 2020).

Proficiency level percentage trends (PLPT) - Students taking the OSTs in ELA and mathematics can score on different levels: Limited, basic, proficient, or accelerated. Those who score on the proficient level demonstrate appropriate mastery of grade level skills (DEW, 2021).

Urban - A location with a population of 50,000 or more people (Childs et al., 2022).

Summary

Students in rural settings face more obstacles to quality healthcare than nonrural peers (American Hospital Association, 2022; Anarde, 2019; Rural Health Research Gateway, 2019; MCHB, 2022). Hospitals serve as a coordination point for various healthcare providers (WHO, 2024). However, many hospitals in rural areas are facing eminent closure, placing higher burdens on families to gain access to needed healthcare (Center for Healthcare Quality and Payment Reform, 2023; Miller et al., 2023). Rural populations face more health obstacles than nonrural peers in the form of higher rates of childhood obesity, inadequate access to preventative care, insufficient reproductive health services, and limited mental health services (Rural Health Research Gateway, 2019). In addition, poor health negatively impacts student success (Bortes et al., 2018; Rattermann et al., 2021). There is a gap in research investigating the relationship between hospital closures and student achievement. Therefore, this study aimed to provide correlational information between the number of hospitals in a county and student achievement to support the efforts of educational leaders who are charged with advocating for the needs of families within their communities and supporting equitable access to healthcare regardless of where a student resides.

Chapter II

Literature Review

Healthcare is a vital component of health and happiness, and inadequate access to healthcare jeopardizes overall well-being (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019). Healthy living and aging depend on access to quality healthcare, ensuring appropriate preventative care is in place and providing clinical care when an individual experiences an illness or disability (Choi, 2022; MacKinney, 2019). Limited access to healthcare by trained and skilled professionals can have deleterious effects on the health and wellness of individuals with disabilities in rural areas (Douthit et al., 2015). In a systemic review of peer-reviewed studies examining healthcare differences between rural and urban settings, Quigley et al. (2022) reported, "compared with those in urban areas, rural patients had 6% fewer home health rehabilitation visits after ICU stays, 11% lower physical therapy utilization after total knee arthroplasty, and 5.7% fewer visits from rehabilitation specialists" (p. 1653.e6). Research evidence supports the presence of continued inequalities between rural and urban healthcare with a need for skilled care in rural settings that is responsive to rural culture (Douthit et al., 2015).

Healthcare impacts all members of a family, regardless of age and family ranking. Infants in rural settings have higher infant mortality rates than non-rural peers (Ehrenthal et al., 2020). Children ages 10 to 17 are more likely to experience obesity than urban children (36% of rural children compared to 31.6% of urban children) (MCHB, 2022). Furthermore, children in rural settings experienced higher health adversity than urban children, with 6.1% of rural children having no health insurance compared to 4.9% of urban children (Bettenhausen et al., 2021). In addition, rural children were less likely to

receive preventative medical and dental care than urban children (59.6% of rural children compared to 66.7% of urban children). Young adults face higher challenges to health and mental health in rural setting. Young adults 17 years old and younger experienced higher rates of suicide in rural areas (3.4 per 100,000 for rural children compared to 2.3 per 100,000 for urban children) (Bettenhausen et al., 2021). Grandmothers, mothers, and sisters in rural settings are facing higher health adversity in addition to children and young adults.

A survey published by the American College of Obstetricians and Gynecologists (2014) demonstrated that approximately 22.8% of women ages 18 or older resided in rural communities, and they experienced a higher prevalence of accidents, injuries, disease, disability, and health problems compared to women living in non-rural communities. According to the Rural Health Research Gateway (2019), 41% of women living in rural communities lived with obesity (compared to 32% of women in urban communities), 21% of rural women were reported smokers (compared to 13% of urban women), and fewer rural women reported being in excellent or very good health (51% rural, 61% urban). Women living in rural counties were less likely than women living in urban counties to have their cholesterol checked on a regular schedule (67.8% rural women, 71.7% urban women), less likely to receive a mammogram for preventative cancer care, and less likely to be fully vaccinated against human papillomavirus (Rural Health Research Gateway, 2019). Additionally, women living in rural communities faced unique hardships with obtaining needed care from doctors specializing in reproductive health with limited access to specialists. Rural women experienced obstacles to receiving quality care; 54% of rural areas had no access to local obstetric (OB) services and wider

scale limitations to healthcare services (considering only 30.2% of rural counties had OB care within the same county as the women requiring support) (Rural Health Research Gateway, 2019). Children, young adults, and women are not the only demographics having difficulty maintaining health in the rural settings. Senior members of households face challenges to maintaining healthy aging in the home setting in rural locations.

In the home setting, aging family members may require support with daily self-care such as bathing and dressing, as well as potential assistance with home tasks such as laundry and cooking (Anarde, 2019; CMS, n.d.-e, CMS, n.d.-f). According to the U.S. Census Bureau (2022c), census data demonstrated that 12.6% of people ages 35 to 64 years reported having a disability, 24.3% of people ages 65 to 74 reported having a disability, and 45.9% of people ages 75 and older reported having a disability. Therefore, half of people ages 65 and older will require long-term healthcare services and support (Colello, 2023). Healthcare needs for aging adults span multiple areas of hearing, vision, cognition, mobility, and self-care, with mobility being the most prevalent concern, impacting 26.9% of aging individuals (Okoro et al., 2018). According to a 2018 Home and Community Preferences Survey conducted by the American Association of Retired Persons (AARP), 68% of Americans ages 18-49 desired to stay in their community as they aged, and 63% of Americans desired to stay in their current home as they aged (Binette & Vasold, 2018). Although most people desired to age in their homes, only 5.4% of seniors ages 65 and older died with the support of hospice care in their homes, while 54.5% of beneficiaries spent their end of life in either a hospital setting or a nursing home (Rosendaal et al., 2023). By 2060, it is projected that 24% of the population will be 65 or older, emphasizing that access to quality healthcare and disability support benefits all

Americans (Colby & Ortman, 2015). Grandparents are also facing an increasing epidemic of raising their grandchildren. Approximately 100,000 senior Ohio residents are raising grandchildren, and 39% of homes with grandparents raising grandchildren do not have a parent in the home to assist (The Ohio State University, 2021).

Rural Americans face more obstacles in accessing quality healthcare compared to their urban peers (American Hospital Association, 2022; Anarde, 2019; Douthit et al., 2015; Harvey, 2019; MacKinney, 2019; National Rural Health Association, n.d.). When high levels of unmet needs exist, individuals are less likely to age in place within their home and community and more likely to seek admission to a supportive living facility (Miller et al., 2023). Future nursing home admission was reported as a more prevalent concern amongst rural residents (+6.3%) versus urban residents (-18.5%). Medicare and Medicaid data between 2007 and 2011 for beneficiaries over the age of 65 showed that rural beneficiaries had a 52% higher likelihood of nursing home placement than urban beneficiaries (Coburn et al., 2019). Aforementioned data demonstrates that obstacles to healthcare access in rural America are complex (Bipartisan Policy Center, 2018; Coburn et al., 2019; Douthit et al., 2015). These obstacles begin with inconsistencies in rural definitions that factor into eligibility for supports (Bennett et al., 2019; Childs et al., 2022; HRSA, n.d.; Hirsch, 2019). Additionally, systemic barriers exist that interfere with rural Americans having adequate transportation, broadband access, and care providers (MacKinney, 2019; Miller et al., 2023; Siconolfi et al., 2019). In addition to obstacles to health that are present in rural areas, residents in Appalachian counties show statistically higher incidents of health problems compared to residents in non-Appalachian counties.

Appalachian counties run along the eastern part of the United States, following the Appalachian Mountain Chain across parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia (Marshall & Alcalde, 2017). Improvements in health outcomes and economic viability have occurred in Appalachian counties; however, these counties continue to demonstrate a disproportionate level of health need that leads to increased mortality, morbidity, and mental health needs than non-Appalachian counties (Marshall & Alcalde, 2017). In Northeast Ohio, Appalachian counties exist in rural, partial rural, and urban locations.

Rural Definition

There is a lack of clear criteria for what is considered rural in the United States (Bennett et al., 2019; Childs et al., 2022; HRSA, n.d.; Hirsch, 2019; Ratcliffe et al., 2016). This lack of consistency interferes with obtaining an accurate picture of rural needs and a lack of consistency with providing a consistent approach to supporting the healthcare needs of people in rural America (Bennett et al., 2019; Childs et al., 2022). In a scoping review of literature, Childs et al. (2022) identified 33 separate definitions of rural across several federal agencies, most of which centered on the number of people living in an area and the density of the population within an area; thus, making the number and concentration of people a primary indicator of governmental definitions of rurality. The issue of poor consistency in defining rural America has plagued the healthcare industry, posing challenges to those living in rural locations and preventing them from receiving adequate healthcare (Bennett et al., 2019; Childs et al., 2022). Congress created the Federal Office of Rural Health Policy in 1987 to provide public

health information and guidance to the Department of Health and Human Services to positively impact access and outcomes of rural healthcare and to decrease rates of disease in rural America (Bennett et al., 2019). Defining rurality continues to be at the core of addressing disparities in healthcare because it defines who qualifies for benefits and additional services (Bennett et al., 2019; HRSA, n.d.; Hirsch, 2019). Research has focused on defining rurality by population count and geographic location and has overlooked the consideration of shared demographic characteristics as a key indicator of rurality instead of focusing on geographic location (Bennett et al., 2019).

The U.S. Census Bureau developed criteria for rurality based on the number of people in a clustered area. At the beginning of the 20th century, the criterion for a location to be considered urban was that there were, at a minimum, 2,500 people residing in that area. Rural populations are classified by the distinction that the population does not fit urban criteria (Childs et al., 2022; Hirsch, 2019; Ratcliffe et al., 2016). Due to the census being analyzed on blocks of people, there is a lack of differentiation within the blocks to accurately capture rural versus urban. Census blocks, defined by number of people, are classified as urban areas with a population of 50,000 people or more, urban clusters with a population between 2,500 and 49,999 people; and rural areas with a population of 2,499 or less (Childs et al., 2022; Hirsch, 2019; Ratcliffe et al., 2016). According to 2020 Census data, 19.88% of the total population lived in rural areas (HRSA, n.d.).

The OMB defines areas into counties based on the patterns of commuting by residents. This provides more consistency than census blocks, given that county boundaries rarely change (Childs et al., 2022). OMB breaks areas into classifications

based on the largest city within a county. An urban designation is given if a county has a city with 10,000 or more people, and a rural designation is given to counties that do not have a city with 10,000 or more people (Childs et al., 2022; Hirsch, 2019). Bennett et al. (2019) reported that OMB metropolitan and non-metropolitan data contributed to the development of Urban Influence Codes, which divide areas into counties and classify these counties based on size, and Rural-Urban Continuum Codes, which are based on population and proximity to metropolitan areas. The above systems for distinguishing rural from urban have flaws due to their reliance on county-based parameters. This variable can lump rural and urban populations into one classification category due to their proximity within a county (Childs et al., 2022). Since OMB data uses counties as parameters, small rural populations can be overlooked in data analysis. Bennett et al. (2019), cautions researchers about the use of OMB classifications as a rural-urban indicator to make decisions about the distribution of resources. OMB classifications were not intended for use in studying rural populations and rural needs, and the prevalence of this classification system in the research "leads to a large body of literature that depends upon an arguably poor measure of rurality" (Bennett et al., 2019, p. 1986). The OMB reports that 14.99% of the total population lives in rural areas (HRSA, n.d.).

The U.S. Department of Agriculture (USDA) Economic Research Service (ERS) approaches classification differently than county-based systems. The ERS created the Frontier and Remote Area Codes (FAR) that classify rural areas based on zip code and the population size of the largest town within that zip code. This classification system allows for flexibility to allow for different classifications to support a variety of reasons for analyzing data (Bennett et al., 2019). The FAR have four different levels. The lower

threshold for rurality defines an area as being at least 15 minutes away from a city with between 2,500 and 9,999 people and at least an hour away from a city with 50,000 people or more. The higher threshold defines rural as an area with less than 50,000 people that is more than an hour away from a city of 50,000 people or more (HRSA, n.d.). In addition to FAR, the ERS also provides Rural-Urban Commuting Area Codes (RUCA) to isolate areas within census data of counties with either rural or urban indicators. RUCA codes four to 10 highlight a rural area. Additionally, the ERS reported that 16.55% of the total population qualifies as living in a rural area (HRSA, n.d.).

Waldorf (2006) presented a new approach to defining rurality called the Index of Relative Rurality, which provides a continuous classification system of rurality based on percentage concentrations, density, and number of people, and gives consideration to the largest city or town within a county (Waldorf, 2006). The Index of Relative Rurality places areas on a scale of 1 to 100 based on the level of remoteness, the size and density of the population, and other evidence of the development of that area. By classifying rurality along a continuum, the Index of Relative Rurality pushed the notion for the first time that the location of an individual's home and the number of people within a county or census block does not adequately encompass the unique needs of the population within that area. While not in widespread use, this index is used by the Kaiser Family Foundation as an indicator of rurality and supports a changing view of rural definitions towards consideration of more complex factors than just geography and population density (Bennett et al., 2019).

Factors Impacting Healthcare in Rural America

Rural Americans face higher health insecurity than their urban peers, and rural adults with disabilities face the reality of unmet healthcare needs (American Hospital Association, 2022; Douthit et al., 2015; Harvey, 2019).

Limited Access to Hospitals and Physicians

Rural hospital closures have increased the healthcare burden on rural residents. From 2012 to 2018, rural residents have increased travel time to a physician by 20 miles, to an emergency room by 20.9 miles, and to alcohol or drug treatment supports by 39.1 miles; therefore, complicating the ability of rural residents to obtain needed medical care in cases of emergency, ongoing treatment and monitoring, and access to preventative care (United States Government Accountability Office, 2020). There is an insufficient supply of skilled medical partners in rural areas. For every 100,000 people, rural residents have 39.8 physicians, while urban residents have 53.3 physicians. This discrepancy is more pronounced when considering access to specialists. For every 100,000 people, rural residents have access to 30 specialists, while their urban counterparts have access to 263 specialists, requiring rural residents to either forego specialty care or to make complicated travel arrangements to receive needed care (National Rural Health Association, n.d.). In rural areas in which hospital closures occurred between 2012 and 2017, there was a 41.3% decline in general surgeons, a 39.7% decline in emergency care physicians, a 34.9% decline in outpatient surgeons, a 25.4% decline in pediatric surgeons, a 22.2% decline in outpatient care centers, a 17.5% decline in obstetric care, a 12.7% decline in primary care providers, and a 9.5% decline in available healthcare transportation options (United States Government Accountability Office, 2020).

According to Tzenios (2019), accessible healthcare means having physicians, therapists, and specialists on hand to meet the needs identified across the population. Accessible healthcare should be distributed nationwide to serve all populations, from rural to urban. Accessible healthcare operates during times that allow individuals to utilize the service, and it is centered on the needs of the consumer, providing high-quality services that improve the quality of life for the consumer (Tzenios, 2019). Clinical care represents only 20% of a person's health and includes care received by a doctor, treatments, vaccinations, and access to clinicians. Although this social determinant of health represents a small portion of a person's overall well-being, critical care, such as access to hospitals and specialists, is vitally important when needed (MacKinney, 2019). During the COVID-19 pandemic, as many doctor offices were closed and people across the world were encouraged to stay in their homes, individuals with disabilities were directed toward telehealth services as a way to continue check-ins and appointments with doctors and clinical providers from a distance. In a study of healthcare stakeholders across 14 states, Siconolfi et al. (2019) found that individuals with disabilities residing in areas with limited internet, or those who did not own a device to connect to telehealth appointments, were left without vital care and the connection to meet their clinical needs.

Reliance on Family Caregivers

This discrepancy in access to care in rural settings explains the practice of relying on family caregivers in those settings for family members in need of support in the home (Miller et al., 2023). In an analysis of past retirement study cohorts, Miller et al. (2023) reported a significant increase in rural areas in the use of family caregivers without the support of home healthcare by people outside of the family (+5.7%), while there was a

decrease in the use of family caregivers without the support of home healthcare by people outside of the family in urban areas (-2.3%). The COVID-19 pandemic of 2020 put a spotlight on the need for home healthcare services. Due to the spread of a novel virus, workers were sent home, healthcare offices were closed, appointments were canceled, and citizens around the globe were mandated to shelter in place for lengthy periods. Sama et al. (2021) conducted an online survey of agency managers of home health and home care agencies operating in Massachusetts between March and June of 2020. The results of this study showed that 80.9% of home health and home care agencies experienced a decline in home visits to support patients due to the risk of infection as a concern for both clients, families, and agency workers. Sama et al. (2021) further discussed that 64.5% of agency managers reported that family members assumed caretaking tasks for individuals with disabilities during this time period. According to the National Academy of Social Insurance (n.d.), the need for long-term services and supports will become especially problematic by the year 2050 as the gap in available family caregivers to support an aging population will increase to 11 million, and the gap in available paid care workers will grow to 355,000 unfilled positions. Further complicating these worker deficits is the reality that family sizes are decreasing, and individuals with disabilities are faced with the reality that family caregivers may not be in a position to provide support where there are gaps in service (Edwards & Sen, 2019).

Given the prevalence of family caregivers in rural settings, the quality of care provided varies without regular oversight, training, and supervision. Family members who take on care tasks often lack the necessary training and skills to meet the needs of an individual with a disability. The act of caring for another person can have a negative

impact on the person providing the care and on the person receiving the care if supports are not in place to support a caregiving experience that is reflective and that benefits from ongoing training (Kayaalp et al., 2021; Kumurenzi et al., 2023). Based on an analysis of the Outcome and Assessment Information Set (OASIS), the National Health and Aging Trends Study, and Medicare claims data from 2011 to 2016, family caregivers with inadequate training were associated with an increase in emergency room visits for individuals with disabilities that was two to three times the number of visits for those who had caregivers receiving ongoing training (Burgdorf et al., 2021). It is vital to the health and safety of individuals with disabilities in rural areas that caregivers fall under the care team's umbrella so that caregivers' training can be shaped to the needs of the home and individual (Burgdorf et al., 2022).

Economic Challenges

According to the National Rural Health Association (n.d.), rural Americans face higher economic challenges than urban Americans. Rural adults earn $9,242 less than urban adults annually; 14.6% of rural families are enrolled in the Supplemental Nutrition Assistance Program, also known as SNAP; and approximately a quarter of rural children are designated as living in poverty. Closures of rural hospitals have had a negative impact on employment in rural America. These closures have also had an impact on local economies around rural hospitals. In a 2022 report, the American Hospital Association (2022) noted that one in 12 rural residents are employed through rural hospitals or connected healthcare systems to that hospital, and that rural hospitals feed $220 billion into the economies of rural towns. The use of family members as caregivers can have a negative economic impact on family members. Family caregivers find that their

responsibilities at home interfere with their work, leading to absenteeism and presenteeism, which is limited productivity while at work due to exhaustion from caretaking. Absenteeism and presenteeism result in a work productivity loss of $5,600 per year (Fakeye et al., 2023). Social economic status also has an impact on student achievement ($d = 0.56$) with income, education, and employment status having an effect on shaping student learning outcomes (Hattie, 2023).

Economic obstacles in rural settings, with lower income levels and more people living in poverty, impact life satisfaction. In a longitudinal study investigating factors related to life satisfaction among Norwegian people reporting having a physical disability, financial status was noted as the most important factor affecting life satisfaction among individuals aged 40 to 59 years (Nicolaisen et al., 2020). Financial stability plays a strong role in accessing care (MacKinney, 2019). In 2022, 37% of adults ages 65 and older reported concern about their ability to afford healthcare soon, and 25% of seniors reported taking less medication than their doctor prescribed to save money (National Council on Aging, 2023). Across the nation, people over 65 rely on Social Security to provide for 50% of their income needs, with over 17 million adults 65 and older well below the federal poverty level (National Council on Aging, 2023). In addition to daily needs, people ages 65 and older pay for long-term supports and services using out-of-pocket resources (Colello & Sorenson, 2023). The costs associated with healthcare to support aging in place are prohibitive for many individuals who have limited financial means. In 2021, it cost $108,405 annually to reside in a private nursing home, $61,766 annually for a home health aide, and $54,000 for a bed in an assisted living facility (Colello, 2023). Economic factors, along with other social factors, contribute to

approximately 40% of a person's overall health and wellness (MacKinney, 2019). Economic factors impact healthcare access, but even with the economic means to afford healthcare, too many individuals struggle to comprehend healthcare information available to explain available services.

Health Literacy

The Rural Health Information Hub (RHIH) (2022) stressed the importance of health information being accessible to rural residents beyond the initial act of obtaining the information. Health information should be at a reading level that supports a full understanding of the material (RHIH, 2022). The National Action Plan to Improve Health Literacy (2010) outlines the need for public health providers to deliver information in an accessible manner, with emphasis placed on the need for public health providers to tailor information to the knowledge and skills of their constituents (U.S. Department of Health and Human Services, 2010). Educational attainment in 2021 highlights a disparity between the educational level required to navigate healthcare documents and manage healthcare needs in a complicated system. For adults ages 55 and older, 33% of those surveyed reported holding a bachelor's degree or higher, 10% reported holding an associate degree, 44% reported holding a high school diploma, 3% reported holding a GED (General Education Development Test), and 10% reported completing some level of elementary or high school education with no diploma or GED (U.S. Census Bureau, 2022b).

Skierkowski et al. (2019) conducted an analysis of information available on the internet regarding specific disabilities. The reviewed information represented common sources that individuals would access to learn about disability symptoms and services.

The resulting analysis found that reading material was well above the sixth grade reading level, and many of the resources were above the eighth grade reading level, requiring a specific level of literacy to access the information analyzed. Healthcare documents are often at a higher reading level, making it difficult for individuals with learning disabilities or limited educational exposure to get the needed help (Skierkowski et al., 2019). Designing signs, labels, reading material, and technology to be accessible in various modalities recognizes that society services should be available to all people, not just those who meet a narrow description of abilities (Guffey, 2021). The ability to comprehend health information is not the only access barrier to healthcare. Sometimes the barrier is a physical barrier, interfering with basic mobility needs.

Mobility Barriers

Providing adequate care within a community or home setting rests not only on the medical care that is available, but also on the ability of a person to be mobile in their environment and within their home, to have people available to help with tasks, and to benefit from resources that maximize independence and allow for a feeling of purpose (Bigonnesse & Chaudhury, 2022; Henning-Smith et al., 2023). People require resources such as accessible housing options and buildings and community resources to support mobility within the community and healthy aging (Choi, 2022). The physical environment includes the ability to access stores, offices, parks, and government facilities, and achieve reasonable independence and autonomy to navigate their home and community. This determinant represents approximately 10% of a person's overall health and wellness (MacKinney, 2019). MacKinney emphasized the importance of living in the home and community to well-being: "Living independently in one's own home is a

common desire of older Americans, as loss of independence – perhaps the greatest personal loss – is often a consequence of transitioning to a nursing home or other institutional setting" (p. 48). Obstacles to navigating one's physical environment can interfere with the successful completion of daily self-care related tasks and can result in a higher likelihood of nursing home admission (Coburn et al., 2019). Because homes are designed with the expectation that individuals without disabilities will inhabit them, they require individuals with disabilities (expected to be more than 50% of the population after age 65) to complete modification projects (Maisel & Ranahan, 2022).

Rural residents experience a higher frequency of unmet needs than urban residents, which can interfere with full involvement and inclusion in day-to-day life (Henning-Smith et al., 2023; MacKinney, 2019). Additionally, rural Americans face a higher likelihood of housing obstacles that limit mobility and independence. They are 10% more likely to have a home with an entrance with stairs, with three-quarters of rural Americans lacking a ramp to assist entrance into their homes (Henning-Smith et al., 2023). According to a 2018 Home and Community Preferences Survey conducted by the AARP, 30% of the U.S. population required structural adaptations to their home to have adequate mobility and access (Binette & Vasold, 2018). Maisel and Ranahan (2022) discuss common modifications that may be required to support aging in place in the home. These might include

- thresholds that do not exceed one half of an inch,
- door handles positioned three feet from the floor,
- hallways widened to 42 inches,
- a full bathroom on the first floor,

- cabinetry at a seated level, and
- washing machines and dryers with front-loading capability.

The costs of making modifications to a home to support aging in place make those modifications prohibitive at times, and this need can put a strain on individuals with disabilities to understand and successfully navigate complicated processes for contractors and insurance programs that might provide assistance. Kim (2021) conducted a study using survey data collected in 2011 as part of the American Housing Survey and found that higher levels of education and higher levels of financial resources correlated with a higher likelihood of older adults having access to home modifications that supported aging in place and having access to more modifications within the home to support home accessibility and mobility. Renting was negatively correlated with unmet accessibility needs due to renters not having the right to make modifications to the rented living space.

In addition to the limitations to building access experienced in rural settings, transportation barriers exist. For example, “Sometimes the critical issue for rural elders is not so much whether they can navigate within their homes, but whether they can still navigate the miles that separate their homes from shopping, social activities, and medical appointments” (Anarde, 2019, p. 20). As local resources close due to a lack of funding, rural residents find that they must drive long distances to access basic and critical care (MacKinney, 2019). Rural residents often do not have access to public transportation resources. Even though there have been advancements in disability transportation during the 21st century, such as accessible vans, buses, and trains, these supports do not benefit rural people when no public transportation system is available to use (Dize, 2019).

Szanton et al. (2016) reported that adults with disabilities often require support in the home setting to navigate daily living skills and to function in their daily lives. Daily living skills are tasks such as taking showers, transferring from a wheelchair to a toilet, and dressing that contribute to an individual engaging in their own self-care. In addition to daily living skills, there are also instrumental living skills, which include tasks such as shopping and keeping a schedule with medication regimens. In a study of older adults with disabilities aging in their homes and supported by the CAPABLE program, a government-funded program to assist aging in place with a disability, program participants reported a 74.8% improvement in their ability to complete daily living skills related to self-care, a 65% improvement in their ability to complete instrumental daily living tasks such as grocery shopping, a 52.9% improvement in symptoms of depression, and a 77.6% decrease in reported home hazard concerns (Szanton et al., 2016). For those individuals who experience limitations to mobility, virtual healthcare options might appear to provide an access alternative to care. Many individuals living in remote locations lack the broadband access to make this a reality.

Digital Divide

Access to programs and services is increasingly digitized in modern society (Siconolfi et al., 2019). In an ever-growing digitized society, older Americans living in rural locations with limited income are most likely to go without internet service. The majority of affordable housing options in rural locations do not fall under the umbrella of the Department of Housing and Urban Development or the Department of Agriculture, an umbrella that would require access to the internet (Read & Wert, 2022). Methods of reporting broadband access have been called into question since the majority of available

data comes from internet providers who have been found to report that an area is serviced when, in actuality, there might only be one person receiving broadband access in that reported area (Lee et al., 2022). Lee et al. conducted a study of broadband access in rural areas of the country and found that 30.8% of respondents reported a lack of access to high-speed broadband and 53.6% reported relying on cell phones to view internet-based information. In an increasingly digitized world, rural residents encounter obstacles to full inclusion and participation with limited resources available.

Individuals living in rural settings face obstacles to participation in an increasingly digitized world and digitized communication and information delivery methods. Internet access and cell phone connectivity are concerns in rural areas that can interfere with residents obtaining information about home healthcare services, applying for benefits, and finding care providers in their areas (Siconolfi et al., 2019). Increased utilization of technology can in many ways bridge the gap in connecting individuals with disabilities, but it can also prove to be a barrier to engagement and access to services (Stoecker & Witkovsky, 2022). In a survey of rural residents, Lee et al. (2022) reported that 58.3% of people responding to survey questions believe that internet service providers shoulder the responsibility of making broadband access available in rural areas, 33.7% believe that the federal government should be responsible for making broadband accessible in rural areas, and 30.7% believe that this responsibility should fall on state government. Regardless of who was believed to be responsible, rural residents voiced that broadband access should be in place to allow for full participation in services and activities by rural residents.

The digital divide impacting rural areas does not just affect access to adequate healthcare but also interferes with student achievement. According to the National School Boards Association (2023), a limited number of parents had expectations for their child to receive instruction during the COVID-19 pandemic (27%). The digital divide caused such significant limitations to the provision of instruction in rural areas that only 40% of rural schools awarded grades to students (compared to 57% of urban schools) and only 43% of rural schools engaged in some system for taking attendance in the virtual classroom (compared to 65% of urban schools), creating inequity in access to education based on limited broadband service (National School Boards Association, 2023). Individuals who live in isolation and lack the needed broadband access to connect to others virtually may begin to experience social isolation.

Social Isolation

Healthy aging requires comprehensive conditions working together, such as attachment, social ties, a support structure, and positive personal traits that correlate with resilience (MacKinney, 2019; Pani-Harreman et al., 2020). Happiness and a high quality of life are associated with the home setting due to the presence of quality social connections and companionship (MacKinney, 2019; Nicolaisen et al., 2020). Proximity to family, friends, and community support networks bolsters one's ability to solve problems and seek solutions to those problems (Bigonnesse & Chaudhury, 2022). Human connection and quality relationships are important to aging to prevent loneliness and isolation. The Bipartisan Policy Center (2018) reported that social isolation is a concern for rural residents and that social isolation is correlated with a 29% increase in the risk of death. Three in 10 rural adults experience feelings of isolation, loneliness, and a lack of

social companionship (Binette & Vasold, 2018). The location where a person grows older will impact their access to social connections and their ability to lean on social networks for help and assistance. Bigonnesse and Chaudhury (2022) discussed that "social connections with family, friends and neighbours foster older adults' capacity to cope with age-related changes. These types of relationships could help prevent social isolation, allow contact between generations, provide emotional and instrumental support, and encourage their participation in the life of the community" (p. 67). Loneliness and social isolation are common in rural America, with a recent study finding that almost half of rural citizens ages 65 and older living in Maine live alone (Bipartisan Policy Center, 2018). In a study involving interviews with retirees with high civic engagement in Wisconsin, Stoecker and Witkovsky (2022) found that successfully engaged elder adults found that the later years of a person's life are a time of redirected energy, passion, and productivity that can benefit the community as a whole. The promotion of healthcare in rural America is inclusive of actions that bolster community-based supports and networks, such as local organizations focused on encouraging interaction and activities that engage rural community members, to foster the social connectedness that supports well-being (Bipartisan Policy Center, 2018; MacKinney, 2019).

Systemic Factors Supporting Increased Healthcare Access

The ability to access care is impacted by healthcare affordability, and accessibility, making government funding streams for healthcare vital to the provision of healthcare to all people (Tzenios, 2019).

Legislation

In 1965, President Harry Truman signed Title XVIII and Title XIX of the Social Security Act, known now as Medicare and Medicaid, respectively, to provide long-term care, hospital coverage, and home healthcare to qualifying individuals over the age of 65, and this coverage was expanded in 1972 to qualifying individuals under the age of 65 with long-term disabilities dually eligible for Supplemental Security Income (CMS, 2015). Medicare was established to cover hospital-related services (Part A) and services provided by a physician (Part B) for beneficiaries ages 65 and older. The establishment of Medicaid extended long-term care coverage for hospital and physician services to individuals of all ages (CMS, n.d.-d). In 2021, Medicare provided services to 55.9 million adults. Within this population of 55.9 million adults, 8 million reported having a disability (Office of Enterprise Data and Analytics, 2023). Medicare services are primarily focused on support needed for a limited time frame, while Medicaid services are a state-structured but federally guided stream of funding towards long-term services and supports. In 2021, Medicaid provided 44.3% of the funding towards long-term services and support, amounting to $207 billion in expenditures (Colello & Sorenson, 2023). Medicare and Medicaid are essential programs for funding long-term services and are involved in the discussion of aging in any setting.

Section 504 of the Rehabilitation Act. Section 504 of the Rehabilitation Act was signed into law in 1973 and provided federal enforcement to the rights of individuals with disabilities to access and participate in programs and organizations and to benefit from services and supports offered by federally funded entities (Centers for Disease Control and Prevention, n.d.). Medicare and Medicaid fall under the umbrella of Section 504 of

the Rehabilitation Act, as programs receiving federal funding are prohibited from discriminating against individuals with disabilities (Iezzoni et al., 2022). Section 504 opened the door for individuals with disabilities to assert their right to be included in society, but there was more work to be done to understand the full scope of societal responsibility for this inclusion.

The Americans with Disabilities Act. The Americans with Disabilities Act (ADA), signed into law in 1990, outlined legal expectations for the inclusion of individuals with disabilities by reducing barriers that might be experienced in accessing government supports, participating in employment opportunities, utilizing public transportation, and obtaining needed and preferred services at establishments such as stores, parks, restaurants, and doctor's offices (Centers for Disease Control and Prevention, n.d.). The Americans with Disabilities Act resulted in greater attention to the requirement for state and local governments to ensure that services are accessible to all potential beneficiaries and that reasonable modifications be put into place when a disability interferes with full participation in government programs (Americans with Disabilities Act National Network, 2020). While the Americans with Disabilities Act laid the groundwork for government entities to ensure accessibility, many obstacles continue to exist within private programs and services that do not fall under these provisions because they do not collect public funding (Kim, 2021).

Olmstead v. L.C. The Americans with Disabilities Act was the backdrop of a historical court ruling that changed practices surrounding the location of disability care. In 1990, a lawsuit was brought to the Supreme Court when two individuals with mental health conditions were kept in a psychiatric hospital for care despite medical

recommendations stating that they could benefit from home- and community-based support (Lombardo et al., 2020). The Supreme Court ruling in *Olmstead v. L.C.* 1999 changed the landscape of how decisions were made pertaining to the location of services and legally recognized the right of all persons, including those with disabilities, to live a life of inclusion within their own community and home while receiving needed supports and services (Ferleger, 2020).

Olmstead v. L.C. launched a new approach to decision-making in the care of people with disabilities that embraced the importance of location in the delivery of services. *Olmstead v. L.C.* called into question the practices of institutionalized placement over home- and community-based supports. Prior to *Olmstead*, individuals with significant disabilities were often provided care within a medical facility, such as an institution or hospital. The *Olmstead* ruling prevented practices such as maintaining individuals in hospital settings for the purpose of maintaining a certain level of residents (Missouri Department of Mental Health, n.d.).

Affordable Care Act. On March 23, 2010, President Obama signed the Patient Protection and Affordable Care Act, more commonly called the Affordable Care Act. This law expanded the ability for individuals with pre-existing conditions to access health insurance and authorized Medicare and Medicaid to begin exploring different approaches to delivering services (Rosenbaum, 2011). One change that happened with this expansion towards different delivery service models was the differentiation between professional agency and consumer-directed care models. In the consumer-directed model of care, individuals with disabilities who require assistance with daily living skills and who have other healthcare needs in the home setting can hire their own home health aide or hire a

family member to serve in that capacity, providing the individual with more control over who provides their care. In a study of agency-provided health aides versus consumer-directed care in Pennsylvania, Veet et al. (2020) found that consumer-directed care had a lower cost than agency-provided care.

Shift from Liability to Person-Centered Care

Disability legislation and support structures have experienced considerable evolution across the 20th and 21st centuries. This evolution that has brought disability rights to a person-centered perspective has highlighted the turmoil within the healthcare system to operate between two conflicting worlds of clinical management of disabilities and social aspects of inclusion:

At their core, the web of laws that together comprise the legality of exclusion and risk avoidance. In contrast, civil rights law enacted to protect persons with disabilities are fundamentally intended to advance the societal embrace of individuals whose health status can carry the potential for a greater consumption of resources (Rosenbaum, 2007). The shift to disability care at home reflects a larger societal acknowledgement that life satisfaction is aided when surrounded by familiarity, connection, and support and that life satisfaction should be included within the goals of healthcare (Cicek et al., 2020).

Student Health, Achievement, and the Role of Educational Leaders

Health and health behaviors impact student achievement (Bortes et al., 2018; Rattermann et al., 2021; Youth Risk Behavior Surveillance System, 2023a, 2023b, 2023c, 2023d). Rural schools account for 30% of public schools in America, yet only 45% of rural high school graduates enrolled in college in 2011 compared to 52% of suburban high school graduates (Education Commission of the States, 2017). Only 23% of rural

high school students participated in advanced placement courses in 2015, compared to 36% of high school students in urban schools and 37% of high school students in suburban schools. Rural schools face obstacles in educating youth across large expanses of territory, limited access to highly qualified teachers, and limitations to diverse resources, materials, and teaching tools rich in technology (Johnson et al., 2022). The disadvantages experienced by rural schools in educating youth include teacher shortages, limited funding for initiatives, a lack of broadband access, and school system cultures that inhibit change in curriculum and instruction (National School Boards Association, 2023).

Although foundation reading and mathematics skills are on par with those of non-rural peers, rural students begin to experience gaps in academic growth between the third and eighth grade spans, and academic regression over the summer months is highly linked with this growing academic gap (Johnson et al., 2022). Hattie (2023) reported on the results of a meta-analysis of educational research and the effect sizes of student variables on achievement. Childhood health factors such as preterm birth weight (-0.56), illness (-0.51), physical syndromes (-0.42), and exposure to maltreatment (-0.63) demonstrate a strong negative impact on student achievement. Student achievement is negatively impacted by poor health, illness, and hospitalization (Bortes et al., 2018; Rattermann et al., 2021). Health behaviors are linked to academic achievement. For example, among students who earned high grades in school, 42% ate breakfast seven days a week, and 41% did not drink soda or pop. Among poor-performing students who earned low or failing grades, 80% did not eat breakfast seven days a week, and 79% drank soda or pop (Youth Risk Behavior Surveillance System, 2023b). Higher amounts of

physical activity have been associated with higher academic achievement. As reported in the Youth Risk Behavior Surveillance Report (2023d), sedentary behavior, such as watching television for three or more hours per day, was reported by 28% of students earning failing grades (D's and F's), compared to 15% of students earning A's in school.

The role of the school environment in promoting student health has been promoted by the WHO since the 1990s with an emphasis on healthy school cultures, practices, environments, and linkages made by school personnel to connect families to community groups and health resources (Lowry et al., 2022). Schools have the resources to serve as a community center, located close to families and with ties to families through the education of children (Davis & Weisz, 2019; Lowry et al., 2022). Schools are often the only place to access preventative health screenings for rural children. Mader (2018) reported that 68% of children living in rural towns rely on Head Start for a variety of preventative services, such as education on avoiding substance abuse and positive parenting strategies. Students living in the rural town of Nome, Alaska, rely on Head Start for preventative dental, hearing, and vision screenings (Mader, 2018). Additionally, students with high grades in school are often tied to better health access and health behaviors; only 1% of high-performing students (earning A's) had never been to a dentist compared to 5% of students earning D's and F's, and 25% of high-performing students received eight or more hours of sleep at night compared to 14% of low-performing students (Youth Risk Behavior Surveillance Report, 2023c).

Adolescent healthcare is inclusive of substance abuse prevention and treatment. The Youth Risk Behavior Surveillance Report (2023a, 2023b, 2023c, 2023d) provided information about adolescents' mental and physical health needs as surveyed in 2021.

Survey efforts spanned all states and the District of Columbia, included any schools supporting grades 9-12 and consisted of more than 40 students enrolled in 9-12. The resulting research yielded 17,232 questionnaires usable for data analysis. Among the adolescents participating in surveys for this report, 29% reported using alcohol, marijuana, or prescription opioids to a degree considered misuse, and 34% reported using multiple substances to a degree of misuse (Michael et al., 2023). Alcohol use prior to age 13 was linked with 26% of students earning D's and F's in school and 12% of students earning A's in school (Youth Risk Behavior Surveillance Report, 2023a). Health and healthy behaviors are connected to student achievement, making calls for increased community involvement to advocate for increased access to healthcare, which supports the vital role of educational leaders (Bortes et al., 2018; Lowry et al., 2022; Rattermann et al., 2021).

Theoretical Framework

Schools are part of a larger community, and the school mission of educating students occurs not within a vacuum but in recognition of larger systems and variables that influence student achievement (Senge, 1990). Benham and Murakami (2010) noted the importance of schools and communities as strong partners supporting the education of youth in Indigenous communities.

Systems Thinking and Educational Leadership

The systems view of education within Indigenous cultures centers around the importance of strengthening community connections, learning in multiple locations, celebrating and honoring past generations, and actions that further the betterment of the greater community (Benham & Murakami, 2010). Systems thinking has gathered

increased attention in education in reaction to calls for school-wide initiatives with interconnected features, requirements and collective work towards a common goal (Ndaruhutse et al., 2019). Tschannen-Moran (2004) provided a framework for school leaders to build trusting relationships with school personnel and families within the community. In building trusting relationships with parents as stakeholders in student achievement, educational leaders should work to equip families within the community with resources to build partnerships between the community and schools and bolster the ability of parents to actively participate in the education of children (Tschannen-Moran, 2004). Systems thinking provides a framework for organizational change that centers on shared vision, collaboration across various stakeholders, effective leadership strategies, actions informed by evidence, and ongoing data-based reflection and change (Ndaruhutse et al., 2019). Aligned with the community-centered approach of Indigenous cultures, systems thinking highlights that "a system is greater than the sum of its constituent components because the relationship between the different components adds value to the system" (Ndaruhutse et al., 2019, p. 15).

The Social Model and Educational Leadership

The social model places responsibility on society to adjust and make accommodations for the needs of all individuals to promote full access and participation in society (Goering, 2015). The social model was envisioned in the 1970s by the Union of the Physically Impaired Against Segregation (UPIAS) in response to the medical model of disability, which focused more on "fixing" the clinical and medical aspects of disability instead of pushing inclusivity of individuals with various needs (Bunbury, 2019). The social model gained recognition through the work of Mike Oliver in the 1980s

(Berghs et al., 2019). Within the social model, impairment exists due to a mismatch between individual abilities and the environment, which arises from social injustice (Bunbury, 2019). Stigma can hinder an individual requesting help and support in times of need. In an analysis of perceived disability stigma among survey respondents completing the 2015 Special Supplemental Nutrition Program for Women, Infants and Children Child Development Survey and a survey of parents of children with autism, Abdul-Chani et al. (2021) reported higher perceived community stigma from respondents who reported knowing an individual with a disability or reported having knowledge of disabilities. This suggests that awareness of stigma increases with increased knowledge of disabilities. Jansen-Van Vuuren and Aldersey (2020) discussed the importance of addressing stigma in a multi-tiered approach that includes interventions for individuals, families, and society, further embracing the community aspect of disability inclusion. Riddle (2020) further emphasized that the social model framework is important towards the conceptualization that society plays a role in the disablement of at-risk individuals.

The systems thinking and social models provide the theoretical framework for considering the role of educational leaders and school communities in addressing the healthcare crisis in rural communities. Home and community conditions impact the direction of student learning:

> Challenges emerging from aspects of students' family background, especially poverty, are a key cause of poor student performance in many schools in need of being turned around. But through parental engagement and community involvement, schools can significantly reverse their performance and fortunes. (Leithwood et al., 2010, p. 266)

School organizational members serve as stewards towards the community, holding responsibility for systemic improvement efforts that uplift those who need it the most (Sergiovanni, 1992).

The Council of Chief State School Officers (2008) created a set of Educational Leadership Policy Standards (ISLLC 2008) for the purpose of guiding the practice of leadership in school settings. Standard 4 of the ISLLC 2008 highlights the importance of educational leaders serving as advocates for the needs of families within a community: "An education leader promotes the success of every student by collaborating with faculty and community members, responding to diverse community interests and needs, and mobilizing community resources" (Council of Chief State School Officers, 2008, p. 89). Standard 6 of the ISLLC 2008 asserts that "an educational leader promotes the success of every student by understanding, responding to, and influencing the political, social, economic, legal, and cultural context" (Council of Chief State School Officers, 2008, p. 90). Additionally, the importance of educational leaders to support students beyond the school environment is important because educational institutions should "grasp [the] relationship to larger realities – the larger organization of which they are a part, conditions external to the organization, global trends" (Gardner, 1990, p. 20).

Current Need for Healthcare

There is a relationship between health and high quality of living for all family members (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019). Healthy students are better positioned to learn in school compared to students with health problems or unhealthy behaviors (Bortes et al., 2018; Rattermann et al., 2021; Youth Risk Behavior Surveillance System, 2023a, 2023b, 2023c, 2023d). Rural families face higher

healthcare insecurity (United States Government Accountability Office, 2020). Rural infants, children, and adolescents face higher rates of illness and mortality than urban peers (Bettenhausen et al., 2021; MCHB, 2022). There is a lack of research exploring the potential relationship between healthcare access and student achievement in rural public schools. This gap in the research poses a threat to the advocacy efforts of educational leaders who are responsible for responding to community needs to bolster student achievement. The goal of this investigation will be to address this lacuna.

Summary

Healthcare insecurity in rural America is driven by limited access to hospitals and physicians (United States Government Accountability Office, 2020), and a mismatch between internet and technology availability and the increased demands for digitization of healthcare services (Stoecker & Witkovsky, 2022). Adequate access to healthcare is paramount to experiencing a high quality of life and living (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019). Rural families with limited access to healthcare services also experience higher incidents of illness, accidents and death compared to urban peers (Bettenhausen et al., 2021; MCHB, 2022). This study analyzed the relationships between healthcare access and student achievement in reading and math in grades 3-12 in Ohio and Pennsylvania public schools.

Chapter III

Methodology

The current investigation examined healthcare access and student achievement. This research gap represents an obstacle to the advocacy efforts of educational leaders who support families within their communities. This correlational study analyzed possible relationships between access to healthcare, as measured by number of hospitals counties located in Northeast Ohio, and student achievement, as measured by the 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics across public schools in this geographic area.

This study aimed to build on current research supporting student health as a factor in student achievement (Coburn et al., 2019; Czeisler et al., 2021; Edwards & Sen, 2019) to explore the possible impact on student achievement when there are limited hospitals in a county. Internal Review Board Approval is provided in Appendix A.

Research Questions

The study analyzed the potential for rurality and number of hospitals in a county to predict student achievement. The following research questions were explored:

Question 1

Is there an association between healthcare access, as measured by number of Medicare-certified hospitals, in counties in Northeast Ohio, and student achievement, as measured by the 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics for public school districts in Northeast Ohio?

Question 2

To what extent do topographical and location features (rurality, Appalachian status, Educational Service Center alignment), individual variables (gender, race or ethnicity, economic status, English language learner status, homeless status, disability status), and healthcare access in 2019 and 2023 predict variability in student achievement, as measured by the 2019 and 2023 third grade Proficiency Level Percentage Trends in ELA and mathematics for public school districts in Northeast Ohio?

Participants

This study focused on Northeast Ohio, a U.S. Census Bureau region of the United States. Northeast Ohio consists of 18 counties: Ashland, Ashtabula, Columbiana, Cuyahoga, Erie, Geauga, Huron, Lake, Loraine, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, and Wayne. Northeast Ohio is located in the Midwest Census Region of the United States. The 2022 American Community Survey reported the following population totals for counties in Northeastern Ohio: Ashtabula n = 97,014, Columbiana n = 100,511, Cuyahoga n = 1,236,041, Erie n = 74,501, Geauga n = 95,469, Lake n = 231,842, Loraine n = 316,268, Mahoning n = 225,636, Medina n = 183,512, Portage n = 161,745, Richland n = 125,319, Stark n = 372,657, Summit n = 535,882, Trumbull n = 200,643, Tuscarawas n = 91,937, Wayne n = 116,559 (U.S. Census Bureau, 2022a). According to the U.S. Census Bureau, the Ashland County population estimate in 2022 was 52,181 (U.S. Census Bureau, 2023a). The population estimate in 2022 for Huron County was 58,218 (U.S. Census Bureau, 2023b).

For the purpose of this study, OMB rural counties and ODH rural and partial rural counties were recognized as rural counties. Given the combination of rural and partial

rural, this study identified the following Northeast Ohio counties as rural: Ashland, Ashtabula, Columbiana, Erie, Geauga, Huron, Loraine, Mahoning, Richland, Stark, Tuscarawas, and Wayne. The following Northeast Ohio counties were identified as urban for the purpose of this study: Cuyahoga, Lake, Medina, Portage, Summit, and Trumbull.

The participants in this study were the third-grade students who participated in the 2022-2023 administration of the OSTs in ELA and mathematics and were enrolled in public schools in Northeast Ohio at the time data was pulled for the 2022-2023 District Dashboard analysis. The process of selecting school districts began by listing all school districts shown on a list for the 18 counties of Northeast Ohio (DEW, Typology of Ohio School Districts, 2013). This search resulted in a list of 175 school districts (see Appendix B). Given that some school districts visually appeared to cover multiple counties on the map, county information was verified on District Dashboard (DEW, n.d.-b).

Procedures

This study utilized the U.S. OMB (2021) classifications of rural counties as well as the ODH (2020) classifications of rural and partial rural counties. The rural and partial rural designations are provided in Table 1.

Table 1.

Rural and Partial Rural Counties

OMB Rural Counties	ODH Rural Counties	ODH Partial Rural Counties
Ashland	Ashland	Geauga
Ashtabula	Ashtabula	Loraine
Columbiana	Columbiana	Mahoning
Erie	Erie	Richland
Huron	Huron	Stark
Tuscarawas	Tuscarawas	
Wayne	Wayne	

This study incorporated analysis of Appalachian counties in Northeast Ohio. According to Appalachian Ohio (2024), the Northwestern Region of Appalachian counties that are also situated in Northeast Ohio are: Ashtabula, Columbiana, Tuscarawas, Mahoning and Trumbull.

Information was collected from the District Profile tab on the District Dashboard (DEW, n.d.-b) regarding third grade students enrolled in a Northeast Ohio public school in the third grade for the 2018-2019 and 2022-2023 school years. Each of the 175 school districts were selected in the Choose a District scroll bar. Next, the Enrollment tab was selected and then "3rd Grade" was selected to reveal information about total enrollment, enrollment for males, enrollment for females, race/ethnicity, English Learner status, and additional subgroups such as economic disadvantaged, homeless students, and students with disabilities.

The CMS (n.d.-a) maintains datasets of hospitals that meet one of the following criteria: Medicare-certified, Veterans Administration (VA) medical centers, and Department of Defense (DoD) hospitals. According to Medicare Interactive (2024), hospitals with the distinction of Medicare-certified provide services to patients that meet the level of care quality allowing these sites to seek Medicare reimbursement. Archived data snapshots from April 4, 2019 (CMS, n.d.-b) and April 6, 2023 (CMS, n.d.-c) were examined (Appendix C and Appendix D).

Proposed Data Analysis

This study utilized a quantitative, non-experimental, correlational methodology that investigated the potential relationship between third grade student achievement in ELA and mathematics, county designation and number of hospitals in a county to determine if student achievement is related to number of hospitals. The study also investigated the potential predictive abilities of topographical, location and individual variables on student achievement.

Dependent and Independent Variables

The dependent variables in this study are the third grade OST Proficiency Level Percentage Trends (PLPT) for ELA and mathematics. The PLPT represent reading achievement and mathematics achievement for the purpose of this study. These variables for ELA and mathematics achievement measure student performance along a continuous scale from zero to 100. They represent a ratio level of measurement. There is a true zero with the PLPT, with the possibility that 0% of students receive at least a proficient score on one of the assessments. PLPT information was pulled from District Dashboard (DEW, n.d.-b).

There were eight independent variables analyzed in this correlational study. The first independent variable was the number of hospitals in a county, representing healthcare access for the purpose of this study. Number of hospitals in a county serves as a continuous independent variable at the ratio level of measurement (with zero as a possibility). This information was taken from archival data sets for Medicare-certified hospitals in 2019 (CMS, n.d.-b) and 2023 (CMS, n.d.-c).

The next three independent variables represent a nominal level of measurement for the purpose of conducting correlational analysis and are categorical and discrete in nature. First, information about county designation was pulled from the OMB and the ODH. The gathered information categorized each county in Northeast Ohio as either rural, partial rural, or urban. When analyzing linear regression, county designation served as a continuous variable and represented an ordinal level of measurement to support analysis investigating if increased rurality resulted in changes in healthcare access. The second independent variable at the nominal level of measurement was race or ethnicity and represents a discrete variable. This information was taken from the District Dashboard (DEW, n.d.-b). The third variable was Educational Service Center (ESC) that services a school district. This information was pulled from ESC websites.

The remaining five independent variables represent discrete, nominal and binary measurement. This information included gender (male/female), English language learner (yes/no), economic disadvantage (yes/no), Appalachian Status (yes/no), homeless (yes/no) and student with a disability (yes/no). The data related to these independent variables were pulled from District Dashboard (DEW, n.d.-b).

Instrumentation

Demographic information was pulled from District Dashboard (DEW, n.d.-b) into an Excel spreadsheet. This information was tabulated using Excel formulas for sum and average. Ohio information was taken from District Dashboard by selecting all districts. Excel formulas were utilized to calculate sum totals and percentages for students across all counties in Northeast Ohio for gender, race/ethnicity, English learner status, economic disadvantage status, homeless status, and disability status.

Demographic information about the populations in the rural counties of Northeast Ohio was pulled from the U.S. Census Bureau QuickFacts for individual counties based on population estimates from July 1, 2023. This individual county data was then analyzed in an Excel spreadsheet, created specifically for this study. Excel formulas for sums and averages were utilized to provide demographic information for rural, partial rural, and urban counties.

ODE provided a statistical summary of test takers across the Nation in grades 3-8 who participated in the spring 2023 test administration. As shown in Table 2, student performance across both ELA and mathematics for grades 3-8 demonstrated appropriate reliability. Although third grade is the focus of this study, information in grades 3-8 are provided to support the presence of a continued trend of acceptable reliability and validity in OST data as a measure of achievement.

Table 2.

Reliability from Spring 2023 Administration

Test	*n*	Scale Score Mean	Scale Score Standard Deviation	Reliability
Grade 3 ELA	118,132	716.01	56.16	0.89
Grade 4 ELA	120,147	709.74	49.66	0.88
Grade 5 ELA	119,548	719.27	49.98	0.89
Grade 6 ELA	120,780	704.42	45.06	0.91
Grade 7 ELA	121,780	713.64	42.21	0.92
Grade 8 ELA	125,941	704.03	34.33	0.91
Grade 3 Mathematics	119,373	714.95	49.86	0.93
Grade 4 Mathematics	119,589	724.31	51.40	0.94
Grade 5 Mathematics	118,106	708.58	38.39	0.94
Grade 6 Mathematics	119,164	700.63	38.14	0.94
Grade 7 Mathematics	115,320	699.29	34.69	0.92
Grade 8 Mathematics	104,451	698.38	24.73	0.92

Note. Adapted from "Ohio's State Tests – Spring 2023 Administration, Statistical Summary," by ODE (n.d.-b).

The OSTs include test questions that undergo a development process to support validity. According to the DEW (n.d.-a), testing items go through a process of drafting, revision, review, field testing, rubric validation and review by college experts followed by additional field testing. The intent and purpose of the OSTs is to measure student

proficiency on academic learning standards for their respective grade level (Cambium Assessment, 2023).

Cambium Assessments (2023) completed confirmatory factor analysis to determine validity information for test items on OSTs. Goodness-of-fit indices were analyzed based on first-order structure, referring to the path from content strand to test item and second-order structure, referring to the path from subject area to content strand. The Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square of Approximation (RMSEA) were used in the calculation of goodness-of-fit for supporting internal validity of test items, as detailed in Table 3 (ELA) and Table 4 (Mathematics).

Table 3.

Goodness-of-Fit for the OST First-Order Model and Second-Order Model and Difference in Fit Between Two Competing Models – ELA

Grade/ Course	Goodness-of-Fit						Difference in Fit between First- and Second-Order Models		
	First-Order Models			Second-Order Models					
	CFI	TLI	RMSEA	CFI	TLI	RMSEA	X^2	*df*	*p* value
Grade 3	0.97	0.97	0.05	1.00	0.99	0.02	19361.7	3	$p < 0.001$
Grade 4	0.96	0.96	0.05	1.00	1.00	0.02	29193.4	3	$p < 0.001$
Grade 5	0.96	0.96	0.05	0.99	0.99	0.02	30571.9	3	$p < 0.001$
Grade 6	0.98	0.96	0.05	0.99	0.99	0.03	41182.6	3	$p < 0.001$
Grade 7	0.98	0.98	0.05	0.99	0.99	0.03	38064.2	3	$p < 0.001$
Grade 8	0.98	0.98	0.05	0.99	0.99	0.03	39174.5	3	$p < 0.001$

Note. Indication of good fit across all indices is $0 \geq 0.95$. Table reprinted from "Annual Technical Report: Ohio's State Tests in English Language Arts, Mathematics, Science, and Social Studies, 2022-2023 School Year" (Cambium Assessment, 2023).

Table 4.

Goodness-of-Fit for the OST First-Order Model and Second-Order Model and Difference in Fit Between Two Competing Models – Mathematics

Grade/ Course	Goodness-of-Fit						Difference in Fit between First- and Second-Order Models		
	First-Order Models			Second-Order Models					
	CFI	TLI	RMSEA	CFI	TLI	RMSEA	X^2	*df*	*p* value
Grade 3	0.98	0.98	0.03	0.98	0.98	0.03	8486.3	4	$p < 0.001$
Grade 4	0.98	0.98	0.03	0.98	0.98	0.03	9643.8	3	$p < 0.001$
Grade 5	0.98	0.98	0.03	0.98	0.98	0.03	9567.8	3	$p < 0.001$
Grade 6	0.98	0.98	0.03	0.98	0.98	0.03	4907.1	4	$p < 0.001$
Grade 7	0.99	0.99	0.02	0.99	0.99	0.02	1621.7	4	$p < 0.001$
Grade 8	0.97	0.98	0.03	0.98	0.98	0.02	8318.7	4	$p < 0.001$

Note. Indication of good fit across all indices is $0 \geq 0.95$. Table reprinted from "Annual Technical Report: Ohio's State Tests in English Language Arts, Mathematics, Science, and Social Studies, 2022-2023 School Year" (Cambium Assessment, 2023).

The information shown in the above tables indicate that the OSTs demonstrate adequate validity and reliability for the purpose of evaluating student achievement in grades 3-8 for ELA and mathematics. The results of the OSTs is used for the purpose of evaluating school district performance, teacher performance in public school settings, and the measure by which academic progress is measured in relation to grade level curriculum standards. The practice of using the OSTs as a publicly recognized and practical standard for evaluating student achievement further supports the use of these results in this study. The data used in this study to represent student achievement is

retrievable data in the public domain, allowing for replication of the study by other researchers.

Summary

This chapter outlined the research methodology utilized in this study. Information was provided regarding research questions, hypothesis, study participants, data collection, analytic strategy, and ethical considerations. A correlational research theory was applied to the investigation of relationships between access to healthcare, as defined by number of hospitals in a county, and student achievement, as defined by 2018-2019 and 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics for public school districts in Northeast Ohio. The research had no interaction with study participants, and the study was completed using a secondary research approach analyzing archival data from public data sets. The methodology outlined in this chapter supported the investigation of a potential relationship between healthcare access and student achievement in reading and math. Chapter Four outlines the study results linked to the methodology described in this chapter.

Chapter IV

Results

The current investigation examines whether there is an association between healthcare access, as measured by the number of Medicare-certified hospitals in counties in Northeast Ohio, and student achievement, as measured by the 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics for public school districts in Northeast Ohio. The investigation examines to what extent topographical and location features (rurality, Appalachian status, Educational Service Center alignment) or individual variables (gender, race or ethnicity, economic status, English language learner status, homeless status, disability status), and healthcare access in 2019 and 2023, predict variability in student achievement, as measured by the 2019 and 2023 third grade Proficiency Level Percentage Trends in ELA and mathematics for public school districts in Northeast Ohio based on n = 175 school districts utilizing a 2019 sample of n = 31,965 students and a 2023 sample of n = 30,796 students.

Descriptive Statistics

The initial analyses for 2019 reveal that the sample included n = 16,406 (51.32%) males and n = 15,526 (48.57%) females, with n = 4,762 (14.90%) identifying as “Black, Non-Hispanic”, n = 1,698 (05.31%) identifying as “Hispanic”, n = 1,361 (04.26%) identifying as “Multiracial”, and n = 21,911 (68.55%) identifying as “White, Non-Hispanic”. Across 175 school districts, less than n = 10 were reported in all districts, resulting in a total count of n = 0. For students reporting “American Indian or Alaskan Native”, 158 school districts reported less than 10 students under the demographic of “Asian or Pacific Islander”. The descriptive analysis did not include these demographic

categories due to low sample size. Table 5 provides a breakout of English language learner status (ELL), economic disadvantage status, homeless status and disability status.

Table 5.

2019 ELL, Economic Disadvantage, Homeless and Disability Status

Description	(*n*) Total (*n*) = 31,965	Percent
English Language Learner	519	1.62
Economic Disadvantaged	17,368	54.33
Homeless	427	1.34
Student with a Disability	5,111	15.99

As indicated above, the 2019 sample included *n* = 519 (1.62%) English language learners, *n* = 17,368 (54.33%) students reporting economic disadvantage, *n* = 427 (1.34%) homeless students, and *n* = 5,111 (15.99%) students with a disability.

The initial analyses for 2023 reveals that the sample included *n* = 15,877 (51.56%) males and *n* = 14,907 (48.41%) females, with *n* = 4,118 (13.37%) identifying as “Black, Non-Hispanic”, *n* = 1,875 (6.09%) identifying as “Hispanic”, *n* = 1,668 (5.42%) identifying as “Multiracial”, and *n* = 21,095 (68.50%) identifying as “White, Non-Hispanic”. No schools with more than 10 students reported “American Indian or Alaskan Native” and 156 school districts reported less than 10 students under the demographic of “Asian or Pacific Islander”. These demographic categories were not included in descriptive analysis due to low sample size. Table 6 provides a breakout of English language learner status (ELL), economic disadvantage, homeless, and disability status.

Table 6.

2023 ELL, Economic Disadvantage, Homeless and Disability Status

Description	(*n*) Total (*n*) = 30,796	Percent
English Language Learner	1,140	3.70
Economic Disadvantaged	15,979	51.89
Homeless	360	1.17
Student with a Disability	5,255	17.07

As indicated above, the 2023 sample included *n* = 1,140 (3.70%) English language learners, *n* = 15,979 (51.89%) students reporting economic disadvantage, *n* = 360 (1.17%) homeless students, and *n* = 5,255 (17.07%) students with a disability.

The initial analysis of school districts in this study reveals that in 2024, *n* = 52 (29.70%) of school districts are identified as rural, *n* = 51 (29.10%) are identified as partially rural, and *n* = 72 (41.10%) of school districts are identified as urban. The breakout of Appalachian school districts reveals that *n* = 60 (34.30%) of school districts are Appalachian, and *n* = 115 (65.70%) are not Appalachian.

Table 7 shows the descriptive statistics related to Educational Service Center affiliation.

Table 7.

ESC Affiliation

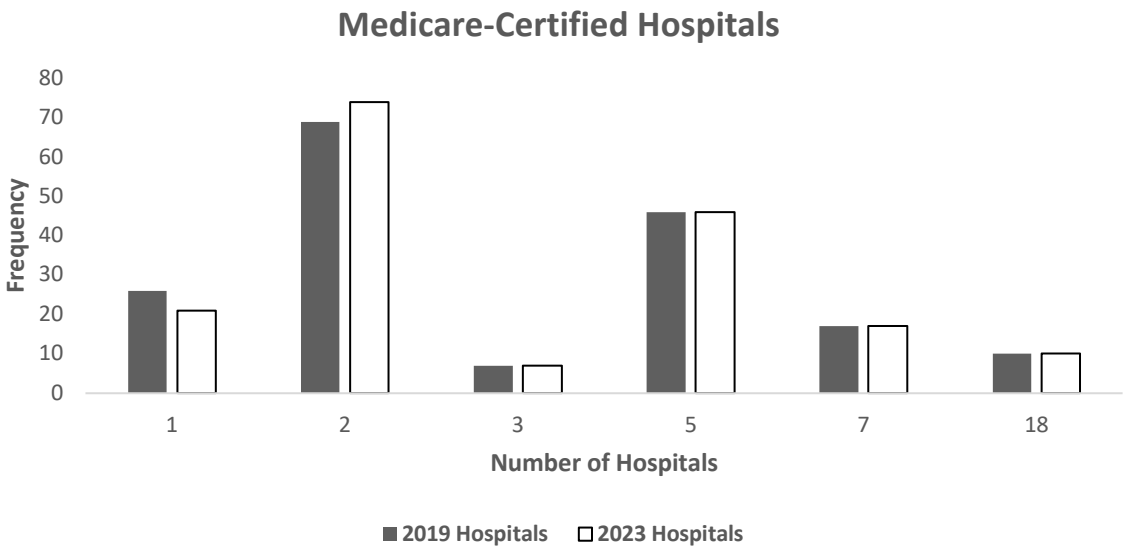
ESC Information	Frequency (Each)	Percent (Each)	Valid Percent (Each)
ESC of NE Ohio	25	14.3	14.3
Trumbull County ESC	20	11.4	11.4
Summit ESC and ESC of Eastern Ohio	17	9.7	9.7
Stark County ESC	14	8	8
Tri-County ESC and ESC of Lorain County	13	7.4	7.4
North Point ESC	12	6.9	6.9
ESC of the Western Reserve, ESC of Medina County, East Central Ohio ESC, Columbiana County ESC, and Ashtabula County ESC	7	4	4
Mid-Ohio ESC	5	2.9	2.9
North Central Ohio ESC	2	1.1	1.1
Muskingum Valley ESC and Jefferson County ESC	1	0.6	0.6

The information indicates that the ESC of Northeast Ohio had the highest number of school districts in the sample ($f = 25$), followed by the Trumbull County ESC ($f = 20$) and Summit ESC ($f = 17$) and the ESC of Eastern Ohio ($f = 17$). Jefferson County ESC and Muskingum Valley ESC had the lowest number of school districts in the sample ($f = 1$).

Frequency information for Medicare-certified hospitals in 2019 and 2023 is shown in Figure 1.

Figure 1

2019 and 2023 Frequencies for Medicare-Certified Hospitals

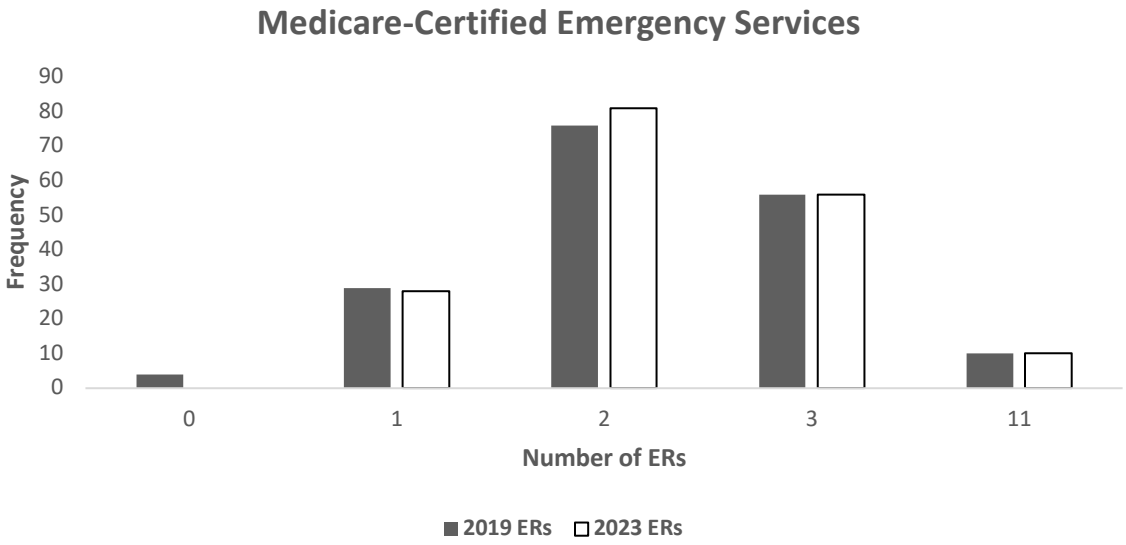


As indicated above, the most common number of hospitals in an area was two in both 2019 and 2023, followed by five in both years. There was minimal change in the number of Medicare-certified hospitals in Northeast Ohio counties between 2019 and 2023.

Frequency information for Medicare-certified emergency services in 2019 and 2023 is shown in Figure 2.

Figure 2

2019 and 2023 Frequencies for Medicare-Certified Emergency Services



As indicated above, the most common number of emergency rooms in an area was two, followed by three. This was the case in both 2019 and 2023. There was minimal change in the number of Medicare-certified emergency rooms between 2019 and 2023.

Statistical Assumption Tests

Initially, descriptive analyses of the variables are examined. Normality was assessed by examining the skewness and kurtosis levels of the continuous variables with normal distribution within acceptable levels |2.0| and |5.0|, respectively (personal communication, K. H. Larwin, Ph.D., May 2023). Assumption tests reveal that assumptions are tenable for 2019 and 2023 ELA total proficient or higher, and 2019 and 2023 math total proficient or higher.

The graphical histograms showing percent proficient or higher in ELA and math in 2019 and 2023 are displayed in Figures 3, 4, 5, and 6.

Figure 3

Histogram of 2019 ELA Proficient or Higher

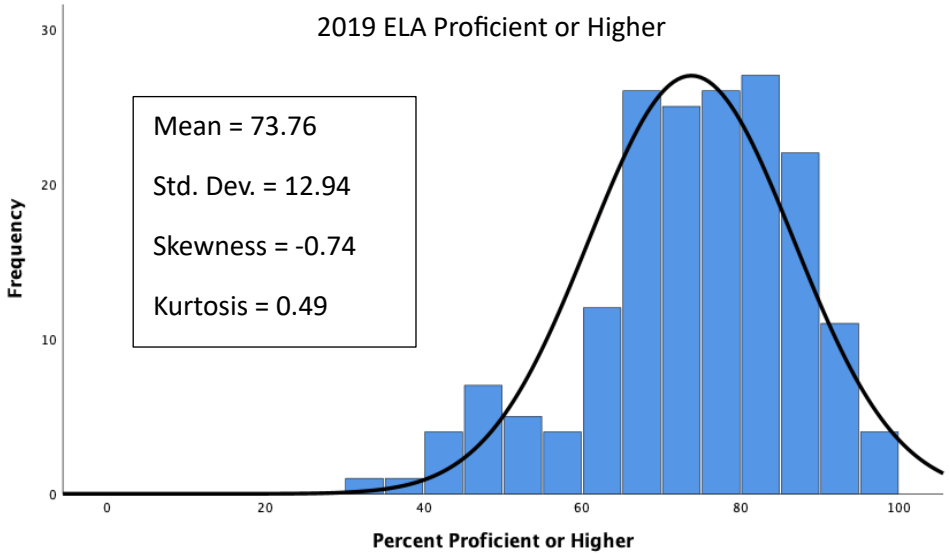


Figure 4

Histogram of 2023 ELA Proficient or Higher

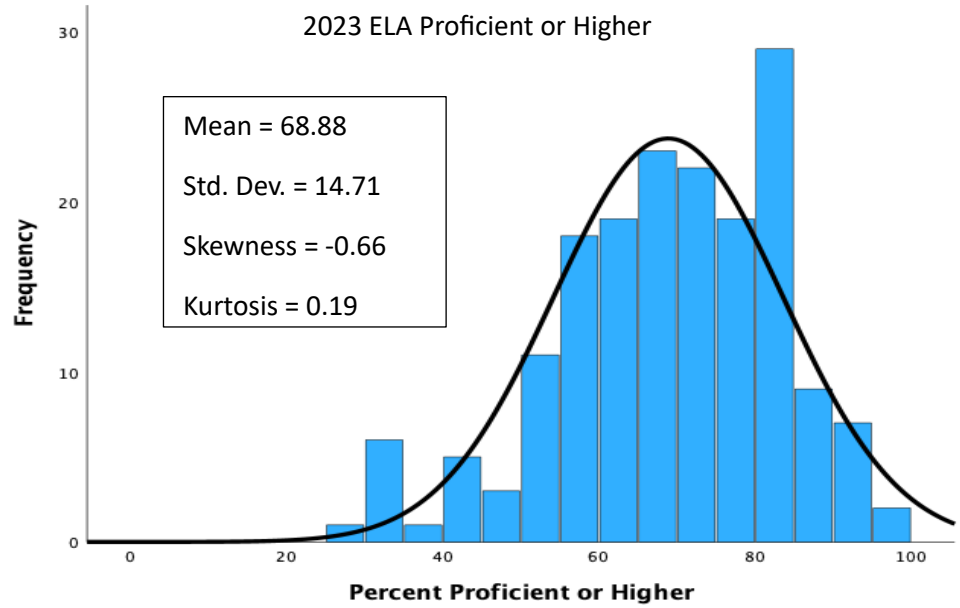


Figure 5

Histogram of 2019 Math Proficient or Higher

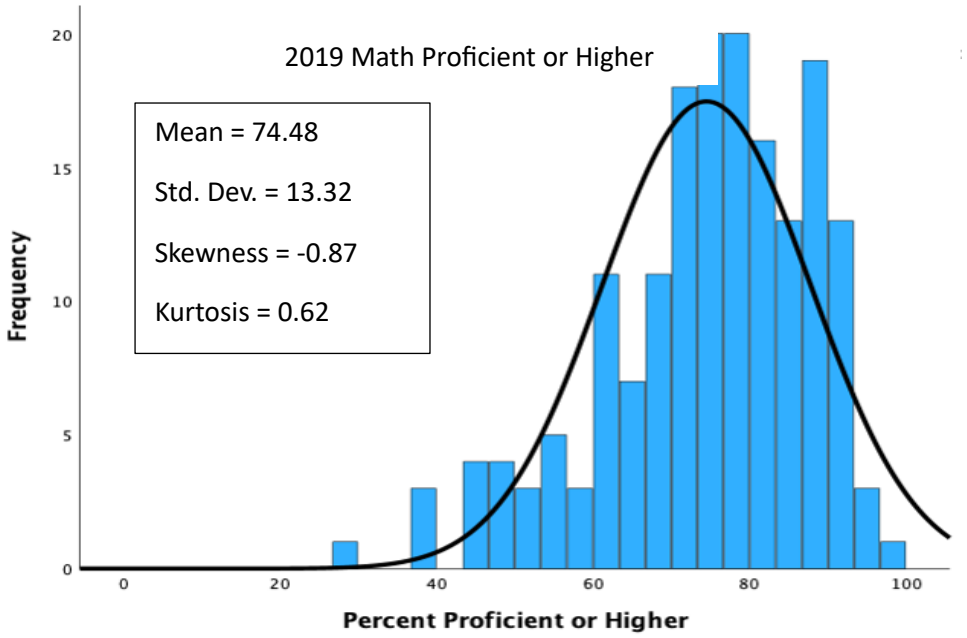
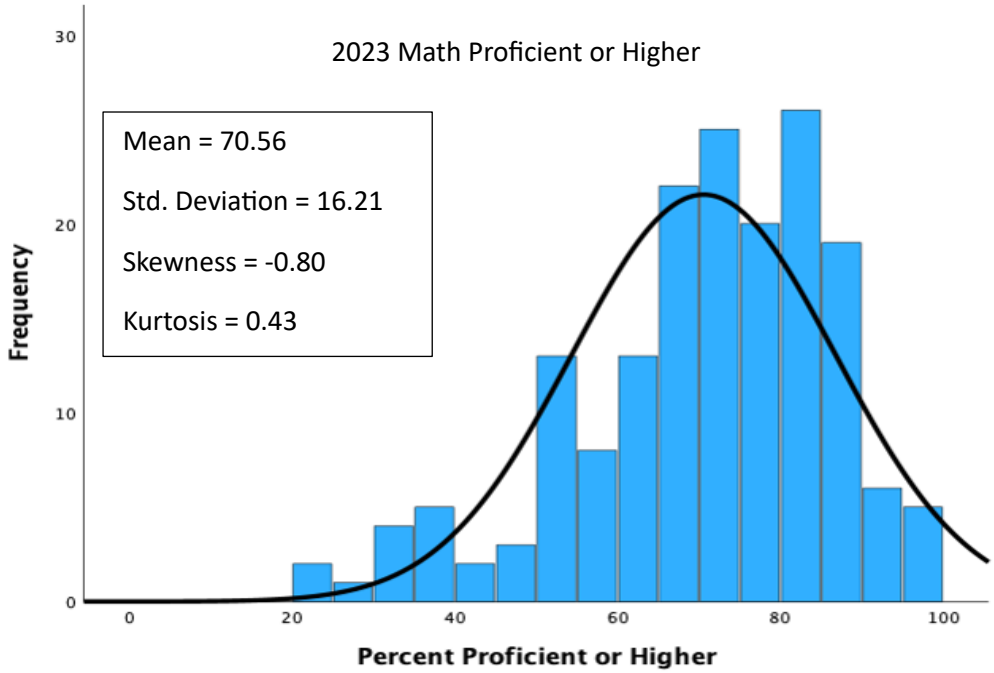


Figure 6

Histogram of 2023 Math Proficient or Higher



The 2019 ELA total of proficient or higher is normally distributed with a *M* =

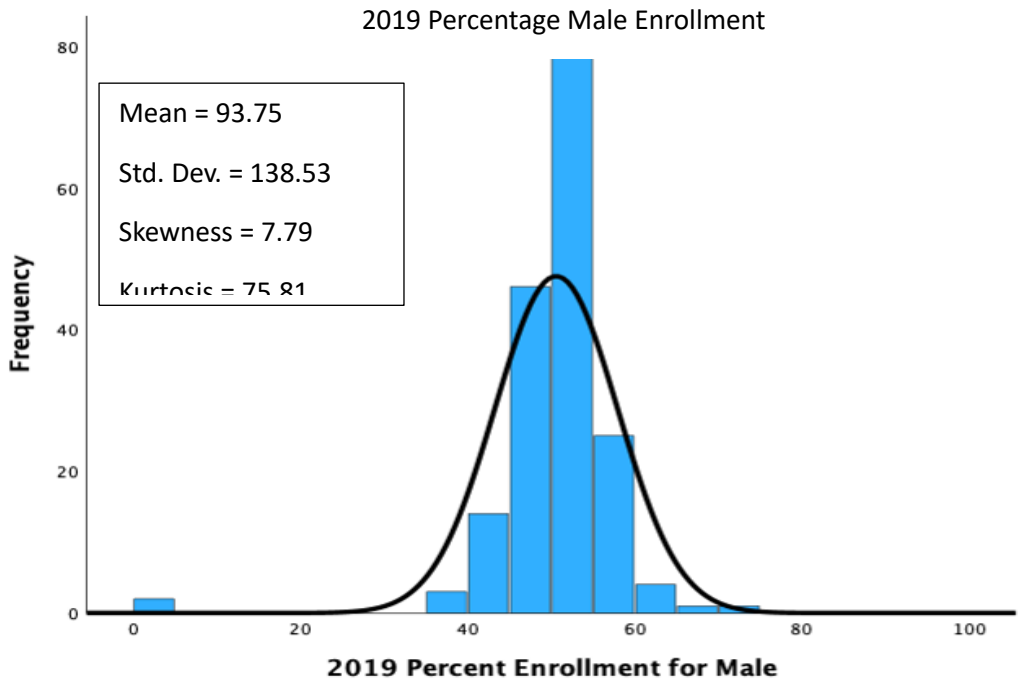
73.76, SD = 12.94, skewness (-0.74), and kurtosis (0.49) within acceptable ranges. The 2023 ELA total of proficient or higher is normally distributed with a *M* = 68.88, *SD* = 14.71, skewness (-0.66), and kurtosis (0.19) within acceptable ranges.

The 2019 math total of proficient or higher is normally distributed with a *M* = 74.48, SD = 13.32, skewness (-0.87), and kurtosis (0.62) within acceptable ranges. The 2023 math total of proficient or higher is normally distributed with a *M* = 70.56, *SD* = 16.21, skewness (-0.80), and kurtosis (0.43) within acceptable ranges.

The graphical histograms showing male and female enrollment in 2019 and 2023 are shown in Figures 7, 8, 9, and 10.

Figure 7.

Histogram of 2019 Percent Enrollment Male



Note: In 2019, two school districts reported total enrollment of males that was under 10 students, resulting in District Dashboard showing zero percent male enrollment.

Figure 8.

Histogram of 2023 Percent Enrollment Male

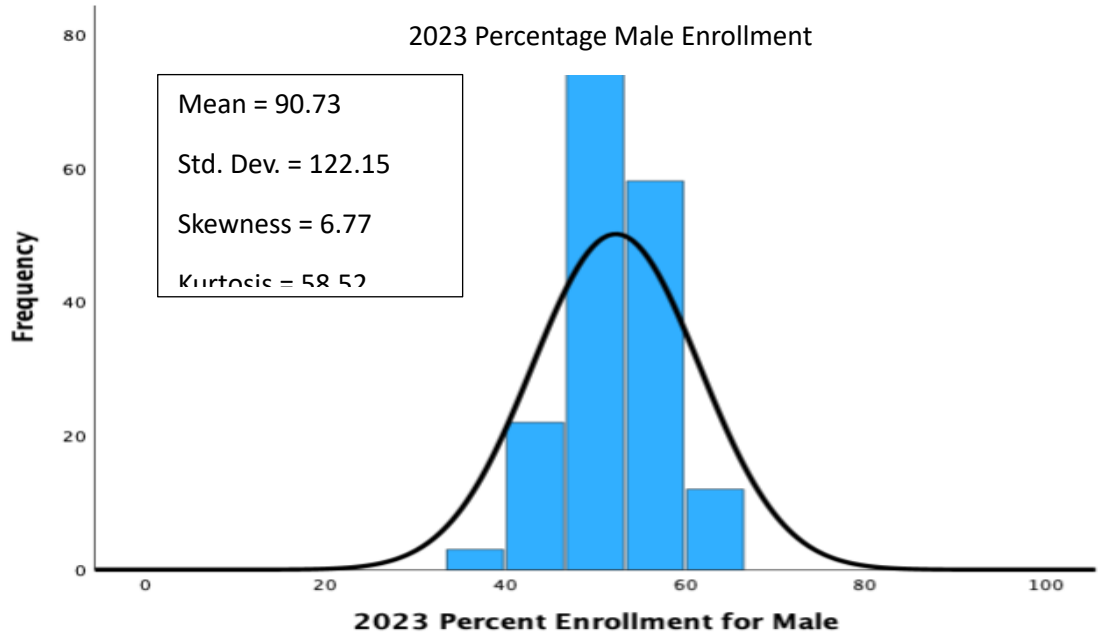
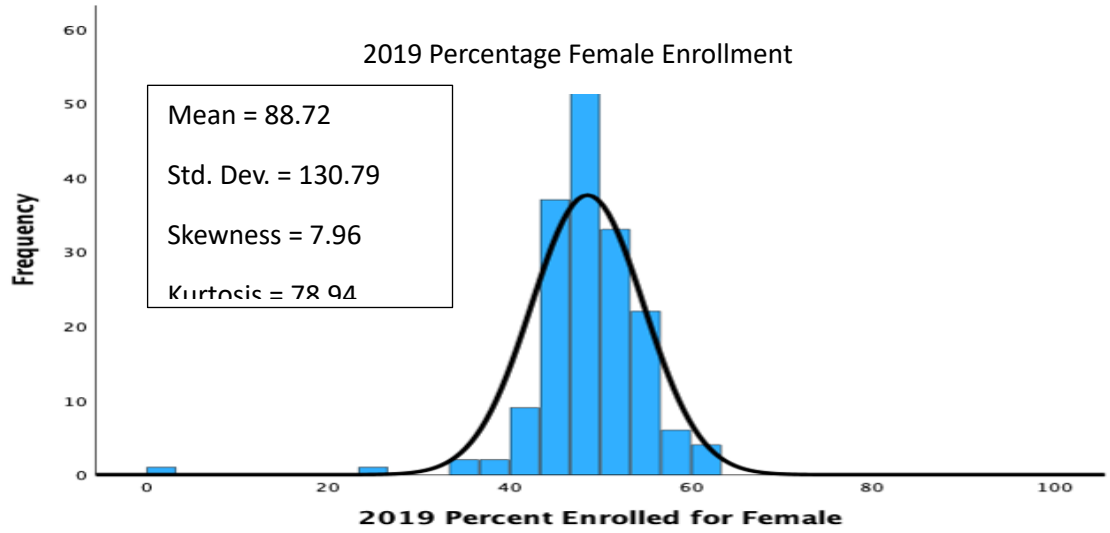


Figure 9.

Histogram of 2019 Percent Enrollment Female

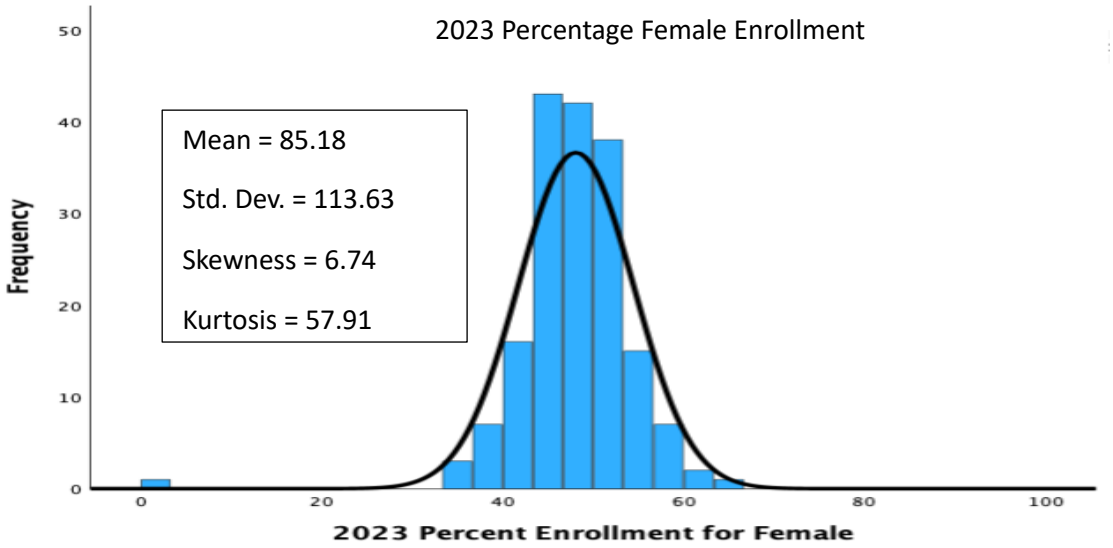


Note: In 2019, one school district reported total enrollment of females was under 10

students, resulting in District Dashboard showing zero percent female enrollment.

Figure 10.

Histogram of 2023 Percent Enrollment Female



Enrollment for males and females in 2019 and 2023 did not represent a normal distribution. Assumption tests reveal the following for 2019 third grade male enrollment: $M = 93.75$, $SD = 138.53$, skewness (7.79), and kurtosis (75.81); the following for 2023 third grade male enrollment: $M = 90.73$, $SD = 122.15$, skewness (6.77), and kurtosis (58.52); the following for 2019 third grade female enrollment: $M = 88.72$, $SD = 130.79$, skewness (7.96), and kurtosis (78.94) and for 2023 third grade female enrollment: $M = 85.18$, $SD = 113.63$, skewness (6.74), and kurtosis (57.91).

The results of distribution analysis for race or ethnicity, English language learner, economic disadvantage, homeless status and disability status are shown in Table 8 and Table 9.

Table 8.

2019 Distribution for Race or Ethnicity, English Language Learner, Economic Disadvantage, Homeless and Disability Status

	M	Std. Deviation	Skewness	Kurtosis	Min.	Max.
Black, non-Hispanic	27.21	166.67	10.77	125.95	0.00	2041.00
Hispanic	9.70	39.14	8.73	91.30	0.00	446.00
Multiracial	7.78	17.94	4.04	21.55	0.00	138.00
White, non-Hispanic	125.10	92.43	1.76	3.63	0.00	485.00
EL Student	2.97	15.62	7.95	71.00	0.00	161.00
Econ. Disadvantaged	99.25	265.25	9.05	93.30	0.00	3045.00
Homeless	2.44	17.19	10.40	118.86	0.00	207.00
Student w/ Disabilities	29.21	66.61	9.47	102.69	0.00	791.00

Note: Distributions are skewed by high numbers of school districts reporting zero students in a demographic category, with the exception of White, Non-Hispanic and Economic Disadvantage: n = 133 Black, Non-Hispanic, n =137 Hispanic, n =126 Multiracial, n = 3 White, n = 161 EL Student, n = 3 Econ. Disadvantaged, n = 165 Homeless, and n =33 Student w/ Disability.

School districts in the 2019 sample reported higher averages for White, Non-Hispanic (M = 125.10), followed by Black, Non-Hispanic (M = 27.21). As indicated above, the individual demographic characteristic most reported outside of race or ethnicity was economic disadvantage (M = 99.25).

Table 9

2023 Distribution for Race or Ethnicity, English Language Learner, Economic Disadvantage, Homeless and Disability Status

	M	Std. Deviation	Skewness	Kurtosis	Min.	Max.
Black, non-Hispanic	23.53	129.67	9.90	107.20	0.00	1516.59
Hispanic	10.72	39.39	8.24	83.80	0.00	440.70
Multiracial	9.53	20.74	4.27	25.06	0.00	172.04
White, non-Hispanic	120.54	84.73	1.59	2.74	12.58	438.21
EL Student	6.52	29.87	8.53	80.14	0.00	317.60
Econ. Disadvantaged	91.31	229.19	8.27	77.11	0.00	2462.00
Homeless	2.06	12.51	9.15	93.13	0.00	140.33
Student w/ Disabilities	30.03	60.19	8.42	82.95	0.00	674.59

Note: Distributions are skewed by high numbers of school districts reporting zero students in a demographic category, with the exception of White, Non-Hispanic and Economic Disadvantage: n = 132 Black, Non-Hispanic, n =135 Hispanic, n =115 Multiracial, n = 0 White, n = 124 EL Student, n = 4 Econ. Disadvantaged, n = 164 Homeless, and n =31 Student w/ Disability.

School districts in the 2023 sample reported higher averages for White, Non-Hispanic (M = 120.54), followed by Black, Non-Hispanic (M = 23.52). As indicated above, the individual demographic characteristic most reported outside of race or ethnicity was economic disadvantage (M = 91.31).

The results of distribution analysis ELA and math change in achievement between 2019 and 2023 are shown in Table 10.

Table 10

Distribution of ELA and Math Change between 2019 and 2023.

	Mean	Sd	Skewness	Kurtosis	Minimum	Maximum
ELA	-4.88	9.74	-0.55	2.43	-49.60	25.90
Math	-3.92	10.42	-0.78	3.74	-56.50	27.30

ELA change in students achieving proficient or higher is normally distributed with a M = -4.88, SD = 9.74, skewness (-0.55), and kurtosis (2.43) within acceptable ranges. Math change in students achieving proficient or higher is normally distributed with a M = -3.92, SD = 10.42, skewness (-0.78), and kurtosis (3.74) within acceptable ranges.

Table 11 shows the ELA and math change between 2019 and 2023 based on rurality of county.

Table 11

ELA and Math Change by Rurality

		ELA Change	Math Change
Rural	Mean	-4.16	-3.51
	N	52.00	52.00
	Std. Deviation	7.68	8.74
Partial Rural	Mean	-5.11	-3.37
	N	51.00	51.00
	Std. Deviation	13.14	11.46
Urban	Mean	-5.24	-4.60
	N	72.00	72.00
	Std. Deviation	8.24	10.86

Table 12 and Table 13 show the ELA and math change between 2019 and 2023 by county.

Table 12

ELA Change by County

County	*M*	*n*	Std. Deviation
Ashland	1.10	4	2.01
Ashtabula	-5.31	7	6.38
Columbiana	-1.95	11	7.19
Cuyahoga	-7.53	10	4.57
Erie	8.80	6	9.86
Geauga	-6.94	5	7.12
Huron	-4.45	6	10.98
Lake	-8.79	7	5.85
Lorain	-9.55	13	21.11
Mahoning	-2.14	14	9.71
Medina	-6.24	7	10.84
Portage	-7.11	11	6.52
Richland	-2.47	7	8.64
Stark	-4.53	12	9.34
Summit	-2.75	17	5.52
Trumbull	-3.59	20	11.38
Tuscarawas	-7.15	8	7.01
Wayne	-2.55	10	6.68

Table 13

Math Change by County

County	*M*	*n*	Std. Deviation
Ashland	-1.65	4	8.53
Ashtabula	-7.70	7	9.47
Columbiana	1.21	11	6.53
Cuyahoga	-3.32	10	4.76
Erie	-7.97	6	6.16
Geauga	-6.92	5	7.99
Huron	1.13	6	12.67
Lake	-4.43	7	7.30
Lorain	-7.82	13	16.08
Mahoning	2.14	14	11.12
Medina	-4.06	7	8.26
Portage	-9.50	11	11.33
Richland	-3.51	7	4.70
Stark	-3.43	12	8.08
Summit	-1.88	17	7.49
Trumbull	-5.13	20	15.96
Tuscarawas	-5.24	8	7.15
Wayne	-5.26	10	8.68

The analysis shows that all counties in Northeast Ohio experienced a decrease in mean proficient or higher achievement for ELA from 2019 to 2023 with the exception of Ashland County (M = 1.10), and Erie County (M = 8.80). Columbiana County showed the smallest decrease in mean proficient or higher achievement (M = -1.95). Lorain County showed the largest decrease in mean proficient or higher achievement (M = -9.55).

The analysis shows that all counties in Northeast Ohio experienced a decrease in mean proficient or higher achievement for math from 2019 to 2023 with the exception of Columbiana County (M = 1.21), Huron County (M = 1.13) and Mahoning County (M = 2.14). Ashland County showed the smallest decrease in mean proficient or higher math achievement (M = -1.65). Portage County showed the largest decrease in mean proficient or higher achievement (M = -9.50).

Table 14 and Table 15 show the ELA and math change between 2019 and 2023 by ESC.

Table 14

ELA Change by ESC

ESC	*M*	*n*	Std. Deviation
Ashtabula County ESC	-5.13	7	6.38
Columbiana County ESC	-0.53	7	7.75
East Central Ohio ESC	-8.84	7	5.54
ESC of Eastern Ohio	-3.09	17	9.02
ESC of Lorain County	-9.55	13	21.11
ESC of Medina County	-6.24	7	10.84
ESC of Northeast Ohio	-6.83	25	5.35
ESC of the Western Reserve	-5.89	7	7.60
Jefferson County ESC	4.70	1	--
Mid-Ohio ESC	-3.16	5	10.44
Muskingum Valley ESC	4.70	1	--
North Central Ohio ESC	-0.75	2	1.77
North Point ESC	-6.63	12	10.20
Stark County ESC	-3.99	14	8.79
Summit ESC	-4.25	17	6.34
Tri-County ESC	-2.45	13	6.67
Trumbull County ESC	-3.59	20	11.38

Table 15.

Math Change by ESC

ESC	*M*	*n*	Std. Deviation
Ashtabula County ESC	-7.70	7	9.47
Columbiana County ESC	-0.14	7	7.94
East Central Ohio ESC	-4.96	7	7.68
ESC of Eastern Ohio	2.24	17	10.03
ESC of Lorain County	-7.82	13	16.08
ESC of Medina County	-4.06	7	8.26
ESC of Northeast Ohio	-6.09	25	8.18
ESC of the Western Reserve	-4.23	7	8.71
Jefferson County ESC	6.30	1	--
Mid-Ohio ESC	-3.82	5	5.55
Muskingum Valley ESC	-7.20	1	--
North Central Ohio ESC	-2.75	2	2.76
North Point ESC	-3.42	12	10.62
Stark County ESC	-3.11	14	7.54
Summit ESC	-2.75	17	8.76
Tri-County ESC	-4.88	13	8.67
Trumbull County ESC	-5.13	20	15.96

The analysis shows that ELA proficient or higher change between 2019 and 2023 was negative when categorizing school districts by ESC except for the ESC of Jefferson County ESC ($M = 4.70$) and Muskingum Valley ESC ($M = 4.70$) however, these ESC had

only one school district in the study, making the sample size too small to make any generalizations. School districts aligned with the Columbiana County ESC showed the smallest amount of decrease in achievement in ELA (M = -0.53). School districts aligned with the ESC of Lorain County showed the highest amount of decrease in achievement in ELA (M = -9.55).

The analysis shows that math proficient or higher change between 2019 and 2023 was negative when categorizing school districts by ESC with the exception of the ESC of Eastern Ohio (M = 2.24), and the Jefferson County ESC (M = 6.30). School districts aligned with the Columbiana County ESC demonstrated the smallest decrease in math proficient or higher achievement (M = -0.14). School districts aligned with the ESC of Lorain County demonstrated the largest decrease in math proficient or higher achievement (M = -7.82).

Table 16 shows ELA and math change between 2019 and 2023 in Appalachian and non-Appalachian counties.

Table 16

ELA and Math Change in Appalachian and Non-Appalachian Counties

		ELA Change	Math Change
Not App	Mean	-5.53	-4.62
	N	115	115
	Std. Deviation	9.99	9.42
Appalachian	Mean	-3.63	-2.58
	N	60	60
	Std. Deviation	9.18	12.08
Total	Mean	-4.88	-3.92
	N	175	175
	Std. Deviation	9.74	10.42

The analysis reveals that Appalachian and non-Appalachian counties showed negative decreases in ELA and math proficient or higher achievement from 2019 to 2023. Appalachian counties demonstrated smaller decreases in ELA achievement and math achievement than non-Appalachian counties.

Results

The dependent variables (ELA and math total proficient or higher) are continuous. The predictor variables (number of hospitals, number of ERs) are continuous. A Pearson's correlation was conducted to examine the data for multi-collinearity and the relationship of each predictor variable to the dependent variable. The results of that analysis are presented in Table 17.

Table 17.

Pearson's Correlational Analysis for ELA and Math Total Proficient or Higher and Number of Hospitals

	ELA	Math	# of Hospitals	# of ERs
ELA	1	.823**	.052	.046
Math		1	.057	.055
# of Hospitals			1	.953**
# of ERs				1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

As indicated above, none of the predictor variables are significantly correlated with the dependent variables of ELA or Math achievement.

The topographical and location predictor variables are nominal (Rurality, Appalachian, County, ESC). A Pearson's correlation was conducted to examine the data for multi-collinearity and the relationship of each predictor variable to the dependent variable. The results of that analysis are presented in Table 18.

Table 18.

Pearson's Correlational Analysis for ELA and Math Total Proficient or Higher and Topographical and Location Variables

	ELA	Math	Rurality	Appalachian	County	ESC
ELA	1	.823**	.072	-.048	.131	.114
Math		1	.005	.004	.022	.032
Rurality			1	-.186*	.311**	.264**
Appalachian				1	.009	-.255**
County					1	.529**
ESC						1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

As indicated above, none of the predictor variables are significantly correlated with the dependent variables (achievement).

The individual predictor variables are nominal for race or ethnicity ("Black, Non-Hispanic", "Hispanic", "Multiracial", and White, Non-Hispanic). A Pearson's correlation was conducted to examine the data for multi-collinearity and the relationship of each predictor variable to the dependent variable. The results of that analysis are presented in Table 19.

Table 19.

Pearson's Correlational Analysis for ELA and Math Total Proficient or Higher and Race or Ethnicity

	ELA	Math	Black, N-H	Hispanic	Multiracial	White, N-H
ELA	1	.823**	-.306**	-.403**	-.357**	.155*
Math		1	-.333**	-.383**	-.411**	.453
Black, N-H			1	.853**	.608**	.347**
Hispanic				1	.541**	.339**
Multiracial					1	.554**
White, N-H						1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

As indicated above, the predictor variables of Black, Non-Hispanic, Hispanic, and Multiracial are negatively correlated at 0.01 with the dependent variable of ELA proficient or higher. The predictor variable of White, Non-Hispanic is positively correlated at the 0.05 level with the dependent variable of ELA proficient or higher. The predictor variables of Black, Non-Hispanic, Hispanic, and Multiracial are negatively correlated at 0.01 with the dependent variable of Math proficient or higher. There is not a correlation between the predictor variable White, Non-Hispanic and the dependent variable Math proficient or higher.

The individual predictor variables are nominal for gender, economic

disadvantage, English learner, homeless and disability status. A Pearson's correlation was conducted to examine the data for multi-collinearity and the relationship of each predictor variable to the dependent variable. The results of that analysis are presented in Table 20.

Table 20.

Pearson's Correlational Analysis for ELA and Math Total Proficient or Higher and Gender, ELL, Homeless and Disability

	ELA	Math	Male	Female	Econ. Disadv.	ELL	Homeless	Disability
ELA	1	.823**	-.208**	-.207**	-.386**	-.299**	-.322**	-.271**
Math		1	-.262**	-.265**	-.413**	-.305**	-.337**	-.317**
Male			1	.993**	.934**	.902**	.887*	.970**
Female				1	.932**	.904**	.884**	.969**
Econ. Disadv.					1	.947**	.956**	.965**
ELL						1	.949**	.938**
Homeless							1	.938**
Disability								1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

As indicated above, the predictor variables of male, female, economic disadvantage, ELL, homeless status, and disability status are negatively correlated at the 0.01 level with the dependent variables of ELA proficient or higher and math proficient or higher.

Summary

As indicated in Table 17, the number of Medicare-certified hospitals or emergency rooms is not correlated with ELA or math achievement of proficient or higher. As indicated in Table 18, topographical and location variables (rurality, Appalachian status, and ESC) did not show an association with ELA or math achievement of proficient or higher. As indicated in Table 19, individual variables of race or ethnicity showed a correlation between ELA and math achievement of proficiency or higher. The variables "Black, Non-Hispanic", "Hispanic", and "Multiracial" showed a negative correlation at the 0.01 level with ELA and math achievement of proficient or higher (ELA: Black, Non-Hispanic p = -.306, Hispanic p = -.403, and Multiracial p = -.357; Math: Black, Non-Hispanic p = -.333, Hispanic p = -.383, and Multiracial p = -.411). As indicated in Table 20, individual variables of female, male, economic disadvantage, ELL, homeless status, and disability status showed a negative correlation at the 0.01 level with ELA and math achievement of proficient or higher (ELA: Female p = -.207, Male p = -.208, Economic disadvantage p = -.386, ELL p = -.299, Homeless p = -.322, Disability p = -.271; Math: Female p = -.265, Male p = -.262, Economic disadvantage p = -.413, ELL p = -.305, Homeless p = -.337, and Disability p = -3.17). While the driving research outcomes are not as hypothesized, the associations with achievement and demographics were consistent with the extant literature. These findings

and the implications are discussed in Chapter 5.

Chapter V

Discussion

The current investigation examined associations between number of hospitals in a county and student achievement in ELA and mathematics in public schools in Northeast Ohio. This investigation was prompted by a gap in research exploring associations between changing number of hospitals in a county a student achievement. The findings indicate no significant differences in student achievement in ELA and mathematics when the number of Medicare-certified hospitals and emergency rooms in a county were considered. The findings indicate a significant association between student achievement in ELA and mathematics and individual variables of race or ethnicity, gender, economic disadvantage English language learner, homeless, and disability. The following provides an explanation and summary of findings for the research questions proposed in this study.

Research Question 1

Is there an association between healthcare access, as measured by the number of Medicare-certified hospitals in counties in Northeast Ohio, and student achievement, as measured by the 2022-2023 third grade Proficiency Level Percentage Trends for ELA and mathematics for public school districts in Northeast Ohio. The number of Medicare-certified hospitals or emergency rooms in counties in Northeast Ohio were not correlated with ELA or math achievement of proficient or higher in this study.

George Wehby (2022) studied the association between healthcare coverage and student achievement and the findings of this study revealed an association between increased healthcare coverage and student achievement in reading. This study sought to explore an association between access to Medicare-certified hospitals and emergency

rooms and student achievement. An association between number of hospitals and student achievement was not revealed in the results. There is limited research on possible associations between access to healthcare providers, healthcare centers, and hospitals and student achievement. In a study involving data sets of public-school students across the Nation across a five-year period, Dr. Jessica Drescher and Dr. Benjamin W. Domingue (2023) found that school districts with more physicians show better academic scores than school districts with limited physicians. The current study results did not align with the findings of Drescher & Domingue (2023). The limitations of the study are explored below.

Research Question 2

To what extent do topographical and location features (rurality, Appalachian status, Educational Service Center alignment), individual variables (gender, race or ethnicity, economic status, English language learner status, homeless status, disability status), and healthcare access in 2019 and 2023 predict variability in student achievement, as measured by the 2019 and 2023 third grade Proficiency Level Percentage Trends in ELA and mathematics for public school districts in Northeast Ohio? Topographical and location variables (rurality, Appalachian status and ESC) did not correlate with student achievement change from 2019 to 2023. Individual variables (gender, race or ethnicity, economic disadvantage English language learner, homeless, and disability) significantly correlated to achievement change from 2019 to 2023.

Individual factors of race or ethnicity, gender, economic disadvantage, homelessness, limited English proficiency and disability are supported in the research literature as predictive of low achievement (Barshay, 2024; Gilmour, 2018; Liu et al.,

2022). Juan Liu et al. (2022) discussed that a correlation exists between socioeconomic factors and student achievement. Students with negative socioeconomic factors are significantly more likely to have low achievement as compared to students who do not experience negative socioeconomic factors (Liu et al., 2022). Jill Barshay (2024) reported that achievement for Black students has declined significantly since the Covid-19 pandemic and the overall gap in achievement between White students and Black and Hispanic students continues to be supported in current research (Barshay, 2024; Center for Education Policy Analysis, n.d.). Allison Gilmour (2018) conducted a meta-analysis to investigate achievement outcomes for students with disabilities across 23 studies and found that students with disabilities demonstrate academic achievement three years behind students who do not have disabilities. Students with limited English proficiency perform below those who speak English as their primary language (Soland, 2019).

Relationships between these individual variables and academic achievement in ELA and mathematics were determined using Pearson correlation analysis. All Pearson *r* values indicated a negative correlation at the 0.01 level between race or ethnicity, economic disadvantage, ELL, homelessness, and disability with ELA and math achievement of proficient or higher. This is consistent with existing research.

Variables Impacting Student Achievement

Individual factors of race or ethnicity, gender, economic disadvantage, homelessness, limited English proficiency, and disability are supported in the research as predictive of low achievement (Barshay, 2024; Gilmour, 2018; Liu et al., 2022). Juan Liu et al. (2022) discussed that students with low socioeconomic factors are significantly more likely to have low achievement as compared to students who do not experience low

socioeconomic factors. Poor academic achievement is associated with racial minority status (Barshay, 2024), disability status (Gilmour, 2018), and limited English language proficiency (Soland, 2019).

Relationships between these individual variables and academic achievement in ELA and mathematics were determined using Pearson correlation analysis. All Pearson *r* values indicated a negative correlation at the 0.01 level between race or ethnicity, economic disadvantage, ELL, homelessness, and disability with ELA and math achievement of proficient or higher. This is consistent with existing research.

Context of Findings

This study looked at existing data for Northeast Ohio. The study revealed a population composition in Northeast Ohio that experiences high economic disadvantage and over 24% identifying as either Black, Non-Hispanic, Hispanic, or Multiracial. The population expressed diverse topology, with 29.70% identified as rural, 29.10% identified as partially rural, and 41.10% identified as urban. The prevalence of students from economic disadvantage, racial or ethnic minority status, and those from rural and partially rural counties provided an appropriate sample to explore associations between healthcare access and student achievement based on previous research supporting the correlation between economic hardship and rurality (Anarde, 2019; Douthit et al, 2015; Harvey, 2019).

Implications of Findings

Theory

The systems thinking model supports the need for collaboration among stakeholders and a community-centered approach to supporting families (Ndaruhutse et

al., 2019; Tschannen-Moran, 2004). The social model of disability emphasizes the role of society to mitigate mismatches between individual ability and access for persons with disabilities (Bunbury, 2019; Goering, 2015). The data in this study support that between 51.89% and 54.33% of third grade students in Northeast Ohio enrolled between 2019 and 2023 reported economic disadvantage and between 15.99% and 17.07% have a reported disability. The extant research shows that in the years prior to the range for this study, rural residents faced increased travel time to a physician of up to 20 miles and that increased travel time was even more for emergency rooms (20.9 miles) and substance support services (39.1 miles) (United States Government Accountability Office, 2020). The current needs in Northeast Ohio call into question previously established models of healthcare delivery. With decreasing hospital access, and a significant percentage of families experiencing economic disadvantage, nontraditional approaches have appeared, delivering a community-centered approach to healthcare access.

In December 2021, Cleveland's Department of Public Health decided to move forward with mobile health clinics to reach individuals experiencing poor hospital and physician access (Indriolo, 2021). Remote Area Medical, a nonprofit company providing pop-up clinics Nation-wide, schedules pop-up clinics in Ashtabula County during scheduled weekends throughout the year (Washington, 2024). In addition to nonprofit companies and health department outreach, schools and Educational Services Centers have taken up the call to bring healthcare opportunities to residents in need. School-based mobile health units, providing primary care services to students and families, can be found in 15 schools within the Cleveland Metropolitan School District (Stringer, 2023). The findings in this study do not support an association between hospital access and

student achievement in Northeast Ohio, but the practice of alternative options for healthcare in Northeast Ohio may suggest a shift in the approach to systems-level care being provided. This shift to pop-up clinics is responsive to the needs of the community and addresses healthcare through the social model of disability because the approach mitigates the impact of disabilities that might go unchecked and unsupported without access to a hospital system. The pop-up clinic model might not adequately fulfill the systems model of care if care is acute and lacking of follow up, communication with a primary physician, and networking with related service needs. One example of the changing landscape of healthcare that may fulfill the need for systems level communication and community connection is the school-based health center.

School-based health centers (SBHCs) are clinics operating within a school building that offer primary care services to students. SBHCs have been found to increase student dental visits (+8.0%) and visits to a primary care physician (+5.2%) (Boudreaux et al., 2023). The research supports that SBHCs decrease the number of visits to emergency rooms and decrease usage rates of hospitals, and SBHCs are shown to bolster graduation rates and decrease rates of absenteeism (University of Wisconsin Population Health Institute, 2024). There is currently a gap in the research investigating possible associations between SBHCs and student achievement (Arenson et al, 2019). The approach to provide an SBHC within a school building follows the systems thinking model and the social model of disability because it incorporates needed healthcare access into the school building and during the school day, potentially lessening the burden on families to manage the schedules and transportation requirements to visit a physician who may be located a considerable distance from their home.

Research

This study explored an association between access to Medicare-certified hospitals and emergency rooms and student achievement. The independent variable of Medicare-certified hospitals and emergency rooms was selected because it provided an operational definition of healthcare for the purpose of this study, and it was quantifiable due to access to archived public records through the Centers for Medicare & Medicaid Services. The study calls into question the best approach to operationalizing healthcare for the purpose of studying possible associations with student achievement.

Healthcare is changing. According to the American Hospital Association (2024), healthcare is experiencing a redesign due to changes in the way people access care (ex: telehealth, in-home care, community centers), the expectations that people have for care (ex: advances in care and technology), and the shifting landscape with cost transparency. This study supports the need for further research on possible associations between healthcare and student performance using innovative definitions for the independent variable of healthcare access.

Practice

The World Health Organization (2024) asserts that hospitals provide integrated care, linking patients with ancillary supports and ongoing follow-up. Although the trend towards pop-up clinics provides for present needs, the American Hospital Association (2024) emphasizes the importance of holistic healthcare that considers the interlocking aspects of functioning from physical to mental wellness. The practice of using smaller clinics and pop-up clinics and accessing providers who do not share information with one another regularly poses a question of quality of care. Educational leaders are tasked with

advocating for healthcare for students and families that promotes student success and operates equitably. In the race to find alternative means for providing healthcare to all families, educational leaders are positioned to consider the information in this study and to question to what degree the services in their communities contribute to long-term, holistic healthcare for all individuals and to look for ways to promote communication networks between their school system and the healthcare units and teams in their community.

Limitations

There were two limitations to note in this study. One limitation relates to the years from which the data was investigated for the purpose of this study, 2019 and 2023. This time frame was selected in part due to the need to have a consistent academic achievement variable. The Ohio State Test experienced changes in testing format following the 2017-2018 school year. To maintain the same dependent variable, the archival year for academic achievement (OST) was set at 2019. This impacted the operational definition of healthcare access to a data set available for hospitals for both 2019 and 2023, resulting in the selection of Medicare-certified hospitals and emergency rooms. The years of 2019 and 2023 are significant because they encompass the Covid-19 pandemic, which had an impact on both healthcare and academic achievement. Funding sources such as the Provider Relief Fund and the American Rescue Plan Rural Funds may have extended the life of hospitals who would have closed during this time period (Ochieng et al., 2022). This study shows that student achievement in ELA decreased between 2019 and 2023 (M = -4.88) and in mathematics between 2019 and 2023 (M = -3.92). The total number of Medicare-certified hospitals and emergency rooms remained

relatively stable. Future research investigating associations between healthcare and achievement may yield different results when conducted outside of a time frame when healthcare operations were impacted by pandemic funding, operating limitations, and supports. This time frame was also impacted academically by changes to schools during the pandemic.

This study assumed that hospitals and emergency rooms were an appropriate operational definition of healthcare for the purpose of this study. More specifically, Medicare-certified hospitals and emergency rooms were isolated for the purpose of this study because it was possible to access a reliable, archived list of hospitals for both 2019 and 2023, allowing the variable to be consistent across the years within the study. Research supports that there are a variety of service-delivery models for healthcare including small clinics, pop-up clinics, telehealth, and school- and ESC-sponsored and supported mobile providers. The list of Medicare-certified hospitals and emergency rooms was not inclusive of all hospitals within the area of Northeast Ohio. While appropriate for the purpose of operationalization and measurement, the independent variable of Medicare-certified hospitals and emergency rooms may not have been aligned with healthcare usage in the study area. There were limits to obtaining a list of all hospitals due there not being one regulatory agency maintaining such a list. Archival information for EMS-certified hospitals was requested from Ohio EMS, but archival lists were not made available to this researcher. Attempts to create a comprehensive list of all hospitals through an internet web search proved unmanageable and unreliable given the need to have a list from both 2019 and 2023. Hospital data was available through the American Hospital Association through the purchase of a text resource at a high cost, but

this data would have focused on American Hospital Association member hospitals and would not cover all hospitals. A 2023 list of hospitals was obtained through the Ohio Hospital Association member website, but an archival list from 2019 was unavailable to this researcher. Such a list would have only provided Ohio Hospital Association member hospitals. The choice to utilize lists of Medicare-certified hospitals proved obtainable and reliable for both 2019 and 2023.

Future Directions

There are considerations for practice and future research based on the information contained in this study.

First, a future study could look at understanding the changing landscape of healthcare access in Northeast Ohio and investigate the presence of quality-of-care indicators to explore if shifting approaches to healthcare access are increasing individual health. The practice of using hospitals as the operational definition for healthcare access may conflict with the direction of healthcare in areas that are currently underserviced by hospitals, and that experiences obstacles to care that come with low socioeconomic status, remote living conditions and limited broadband access. Future research could focus on investigating possible correlations between SBHCs and academic achievement to inform educational leaders on the impact of in-house primary care offerings on student success.

Another consideration for future study would focus on school- and ESC-based efforts to provide primary care to school district families and students and the potential measurable impact of those efforts on classroom engagement, participation and testing

scores. As healthcare moves toward a more mobile, acute, and as-needed infrastructure, future research would support ongoing efforts to check quality of care and impact.

A third area for future research would focus on the impact of partnerships between healthcare and schools on academic achievement. This study highlighted a few examples of alternative healthcare services ranging from pop-up clinics to school-based health clinics that respond to community healthcare needs. The systems model as a theoretical framework emphasizes the need for collaboration within and between systems serving the general population. Future research could investigate possible impact on student achievement when high levels of collaboration are present between school personnel and healthcare providers within a community.

This research study was conducted to determine if there was an association between Medicare-certified hospitals and emergency rooms and student achievement in ELA and mathematics for third graders enrolled in public schools in Northeast Ohio in 2019 and 2023. The call for investigations into the impact of hospital closures in rural locations has been ongoing for many years. Although the results of this study do not support the presence of an association, there remains a gap in research to better understand the educational implications of changes in healthcare that further inhibit equitable access to a continuum of healthcare services and access to quality healthcare for all individuals.

Conclusion

This quantitative study reported academic achievement scores along with topographical and location features (rurality, Appalachian status, ESC alignment) and individual variables (gender, race or ethnicity, economic status, English language learner

status, homeless status, disability status). The use of correlational statistical analysis determined that no association existed between number of Medicare-certified hospitals and emergency rooms and student achievement. The analysis determined that there was a strong correlation between individual variables such as Black, Non-Hispanic, Hispanic, Multiracial, economic disadvantage, ELL, homeless, and reported disability. No interaction effects were found between the independent and dependent variables. More research is needed on the possible associations between alternative forms of healthcare (ex: pop-up clinics) and student achievement. Research supports that alternative forms of healthcare are in use to compensate for the lack of hospital and emergency room access, but there is a gap in the research to investigate the potential impact of these healthcare outlets on student success.

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Appendix A

Internal Review Board Approval

Date: 7-7-2024

IRB #: 2024-271
Title: A Correlational Study Using Multi-Linear Regression Modeling of Hospital Access and Student Achievement in Northeast Ohio
Creation Date: 5-14-2024
End Date:
Status: Approved
Principal Investigator: Karen Larwin
Review Board: YSU IRB Board
Sponsor:

Study History

Submission Type Initial	**Review Type** Exempt	**Decision** Exempt

Key Study Contacts

Member Karen Larwin	**Role** Principal Investigator	**Contact** khlarwin@ysu.edu
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Member Cynthia Davenport	**Role** Co-Principal Investigator	**Contact** cjdavenport@student.ysu.edu

Appendix B

List of School Districts in Northeast Ohio used for analysis in this study.

County	School District	County	School District
Ashland	Ashland Hillsdale Local Loudonville-Perrysville Exempted Village Mapleton Local	Ashtabula	Ashtabula Area Buckeye Local Conneaut Area City Geneva Area City Grand Valley Local Jefferson Area Local Pymatuning Valley Local
Columbiana	Beaver Local Crestview Local East Liverpool East Palestine City Leetonia Exempted Village Lisbon Exempted Village Salem City Southern Local United Local Wellsville Local Columbiana Exempted Village	Cuyahoga	Bedford City Berea City Cleveland Municipal Mayfield City North Royalton Orange City Parma City Solon City Strongsville City Westlake City
Erie	Edison Local Huron City Schools Margaretta Local Perkins Local Sandusky City Vermilion Local	Geauga	Berkshire Local Cardinal Local Chardon Local Kenston Local West Geauga Local
Huron	Bellevue City Monroeville Local New London Local South Central Local Western Reserve Local Willard City	Lake	Fairport Harbor Exempted Village Kirtland Local Madison Local Mentor Exempted Village Painesville City Local Perry Local Wickliffe City
Lorain	Amherst Exempted Village Avon Lake City Clearview Local Columbia Local Elyria City Schools	Mahoning	Austintown Local Schools Boardman Local Campbell City Canfield Local Jackson-Milton Local

	Firelands Local		Lowellville Local
	Keystone Local		Poland Local
	Lorain City		Sebring Local
	Midview Local		South Range Local
	North Ridgeville City		Springfield Local
	Oberlin City Schools		Struthers City
	Sheffield-Sheffield Lake City		West Branch Local
	Wellington Exempted Village		Western Reserve Local
			Youngstown City
Medina	Black River Local	Portage	Aurora
	Brunswick City		Crestwood Local
	Buckeye Local		Field Local
	Cloverleaf Local		James A Garfield Local
	Highland Local		Kent City
	Medina City School District		Ravenna City
	Wadsworth City		Rootstown Local
			Southeast Local
			Streetsboro City
			Waterloo Local
			Windham Exempted Village
Richland	Clear Fork Valley Local	Stark	Alliance City
	Lexington Local		Canton City
	Lucas Local		Canton Local
	Madison Local		Lake Local
	Ontario Local		Louisville City
	Plymouth-Shiloh Local		Marlington Local
	Shelby City		Minerva Local
			North Canton City
			Northwest Local
			Osnaburg Local
			Plain Local
			Sandy Valley Local
Summit	Akron City	Trumbull	Bloomfield-Mespo Local
	Barberton City		Bristol Local
	Copley-Fairlawn City		Brookfield Local
	Coventry Local		Champion
	Cuyahoga Falls City		Girard City School District
	Green Local		Howland Local
	Hudson City		Hubbard Exempted Village
	Manchester Local		Joseph Badger Local
	Mogadore Local		Labrae Local
	Nordonia Hills City		Lakeview Local
	Norton City		Liberty Local

	Revere Local Springfield Local Stow-Munroe Falls City Tallmadge City Twinsburg City Woodridge Local		Lordstown Local Maplewood Local Mathews Local McDonald Local Newton Falls Exempted Village Niles City Southington Local Warren City Weathersfield Local
Tuscarawas	Claymont City Dover City Garaway Local Indian Valley Local New Philadelphia City Newcomerstown Exempted Village Strasburg-Franklin Local Tuscarawas Valley Local	Wayne	Chippewa Local Dalton Local Green Local Northwestern Local Norwayne Local Orrville City Rittman Exempted Village Southeast Local Triway Local Wooster City

Appendix C

List of Hospitals (2019)

Facility Name	County/Parish	Emergency Services
UNIVERSITY HOSPITALS SAMARITAN MEDICAL CENTER	ASHLAND	No
ASHTABULA COUNTY MEDICAL CENTER	ASHTABULA	Yes
GLENBEIGH HEALTH SOURCES	ASHTABULA	No
UHHS MEMORIAL HOSPITAL OF GENEVA	ASHTABULA	Yes
UNIVERSITY HOSPITALS CONNEAUT MEDICAL CENTER	ASHTABULA	Yes
GENERATIONS BEHAVIORAL HEALTH - GENEVA	ASHTABULA	No
EAST LIVERPOOL CITY HOSPITAL	COLUMBIANA	Yes
SALEM REGIONAL MEDICAL CENTER	COLUMBIANA	Yes
CLEVELAND-WADE PARK VA MEDICAL CENTER	CUYAHOGA	Yes
PARMA COMMUNITY GENERAL HOSPITAL	CUYAHOGA	No
METROHEALTH SYSTEM	CUYAHOGA	Yes
FAIRVIEW HOSPITAL	CUYAHOGA	Yes
EUCLID HOSPITAL	CUYAHOGA	No
LUTHERAN HOSPITAL	CUYAHOGA	Yes
UH ST JOHN MEDICAL CENTER	CUYAHOGA	Yes
UH CLEVELAND MEDICAL CENTER	CUYAHOGA	Yes
MARYMOUNT HOSPITAL	CUYAHOGA	Yes

SOUTH POINTE HOSPITAL	CUYAHOGA	No
SOUTHWEST GENERAL HEALTH CENTER	CUYAHOGA	Yes
CLEVELAND CLINIC	CUYAHOGA	Yes
HILLCREST HOSPITAL	CUYAHOGA	No
UNIVERSITY HOSPITALS AHUJA MEDICAL CENTER	CUYAHOGA	Yes
LAKE HEALTH BEACHWOOD MEDICAL CENTER	CUYAHOGA	Yes
RAINBOW BABIES AND CHILDRENS HOSPITAL	CUYAHOGA	No
CLEVELAND CLINIC CHILDREN'S HOSPITAL FOR REHAB	CUYAHOGA	No
HIGHLAND SPRINGS	CUYAHOGA	No
FIRELANDS REGIONAL MEDICAL CENTER	ERIE	Yes
UH REGIONAL HOSPITALS	GEAUGA	Yes
FISHER-TITUS HOSPITAL	HURON	Yes
MERCY HEALTH - WILLARD HOSPITAL	HURON	Yes
LAKE HEALTH	LAKE	Yes
WINDSOR LAURELWOOD CENTER FOR BEHAVORIAL MEDICINE	LAKE	No
UNIVERSITY HOSPITALS - ELYRIA MEDICAL CENTER	LORAIN	No
MERCY REGIONAL MEDICAL CENTER	LORAIN	Yes
CLEVELAND CLINIC AVON HOSPITAL	LORAIN	Yes
MERCY ALLEN HOSPITAL	LORAIN	Yes
CLEAR VISTA HEALTH & WELLNESS	LORAIN	No
ST ELIZABETH YOUNGSTOWN HOSPITAL	MAHONING	Yes

HMHP ST ELIZABETH BOARDMAN HEALTH CENTER	MAHONING	Yes
SURGICAL HOSPITAL AT SOUTHWOODS	MAHONING	No
BELMONT PINES HOSPITAL	MAHONING	No
GENERATIONS BEHAVIORAL HEALTH-YOUNGSTOWN LLC	MAHONING	No
MEDINA HOSPITAL	MEDINA	Yes
LODI COMMUNITY HOSPITAL	MEDINA	Yes
UNIVERSITY HOSPITALS PORTAGE MEDICAL CENTER	PORTAGE	Yes
OHIOHEALTH MANSFIELD HOSPITAL	RICHLAND	Yes
AVITA ONTARIO	RICHLAND	Yes
OHIOHEALTH SHELBY HOSPITAL	RICHLAND	Yes
MERCY MEDICAL CENTER	STARK	Yes
AULTMAN HOSPITAL	STARK	Yes
ALLIANCE COMMUNITY HOSPITAL	STARK	Yes
HEARTLAND BEHAVIORAL HEALTHCARE	STARK	No
SUNRISE VISTA HEALTH AND WELLNESS	STARK	No
SUMMA HEALTH SYSTEM	SUMMIT	Yes
AKRON GENERAL MEDICAL CENTER	SUMMIT	Yes
SUMMA WESTERN RESERVE HOSPITAL	SUMMIT	Yes
CRYSTAL CLINIC ORTHOPAEDIC CENTER	SUMMIT	No
AKRON CHILDREN'S HOSPITAL	SUMMIT	No
NORTHCOAST BEHAVIORAL HEALTHCARE NORTHFIELD CAMPUS	SUMMIT	No

ASSURANCE HEALTH HUDSON LLC	SUMMIT	No
TRUMBULL REGIONAL MEDICAL CENTER	TRUMBULL	Yes
MH ST JOSEPH WARREN HOSPITAL	TRUMBULL	Yes
UNION HOSPITAL	TUSCARAWAS	Yes
TWIN CITY MEDICAL CENTER	TUSCARAWAS	Yes
WOOSTER COMMUNITY HOSPITAL	WAYNE	Yes
AULTMAN ORRVILLE HOSPITAL	WAYNE	Yes

Appendix D

List of Hospitals (2023)

Facility Name	County Name	Emergency Services
UNIVERSITY HOSPITALS SAMARITAN MEDICAL CENTER	ASHLAND	No
GLENBEIGH HEALTH SOURCES	ASHTABULA	No
GENERATIONS BEHAVIORAL HEALTH - GENEVA	ASHTABULA	No
ASHTABULA COUNTY MEDICAL CENTER	ASHTABULA	Yes
UHHS MEMORIAL HOSPITAL OF GENEVA	ASHTABULA	Yes
UH CONNEAUT MEDICAL CENTER	Ashtabula	Yes
EAST LIVERPOOL CITY HOSPITAL	COLUMBIANA	Yes
SALEM REGIONAL MEDICAL CENTER	COLUMBIANA	Yes
PARMA COMMUNITY GENERAL HOSPITAL	CUYAHOGA	No
EUCLID HOSPITAL	CUYAHOGA	No
SOUTH POINTE HOSPITAL	CUYAHOGA	No
HILLCREST HOSPITAL	CUYAHOGA	No
RAINBOW BABIES AND CHILDRENS HOSPITAL	CUYAHOGA	No
CLEVELAND CLINIC CHILDREN'S HOSPITAL FOR REHAB	CUYAHOGA	No
HIGHLAND SPRINGS	CUYAHOGA	No
ST VINCENT CHARITY MEDICAL CENTER	CUYAHOGA	Yes

METROHEALTH SYSTEM	CUYAHOGA	Yes
FAIRVIEW HOSPITAL	CUYAHOGA	Yes
LUTHERAN HOSPITAL	CUYAHOGA	Yes
UH ST JOHN MEDICAL CENTER	CUYAHOGA	Yes
UH CLEVELAND MEDICAL CENTER	CUYAHOGA	Yes
MARYMOUNT HOSPITAL	CUYAHOGA	Yes
SOUTHWEST GENERAL HEALTH CENTER	CUYAHOGA	Yes
CLEVELAND CLINIC	CUYAHOGA	Yes
UNIVERSITY HOSPITALS AHUJA MEDICAL CENTER	CUYAHOGA	Yes
LAKE HEALTH BEACHWOOD MEDICAL CENTER	CUYAHOGA	Yes
FIRELANDS REGIONAL MEDICAL CENTER	ERIE	Yes
UH REGIONAL HOSPITALS	GEAUGA	Yes
UH GEAUGA MEDICAL CENTER	GEAUGA	Yes
FISHER-TITUS HOSPITAL	HURON	Yes
MERCY HEALTH - WILLARD HOSPITAL	HURON	Yes
WINDSOR LAURELWOOD CENTER FOR BEHAVORIAL MEDICINE	LAKE	No
LAKE HEALTH	LAKE	Yes
UNIVERSITY HOSPITALS - ELYRIA MEDICAL CENTER	LORAIN	No
CLEAR VISTA HEALTH & WELLNESS	LORAIN	No
MERCY REGIONAL MEDICAL CENTER	LORAIN	Yes
CLEVELAND CLINIC AVON HOSPITAL	LORAIN	Yes

MERCY ALLEN HOSPITAL	LORAIN	Yes
SURGICAL HOSPITAL AT SOUTHWOODS	MAHONING	No
BELMONT PINES HOSPITAL	MAHONING	No
GENERATIONS BEHAVIORAL HEALTH-YOUNGSTOWN LLC	MAHONING	No
ST ELIZABETH YOUNGSTOWN HOSPITAL	MAHONING	Yes
HMHP ST ELIZABETH BOARDMAN HEALTH CENTER	MAHONING	Yes
MEDINA HOSPITAL	MEDINA	Yes
LODI COMMUNITY HOSPITAL	MEDINA	Yes
UNIVERSITY HOSPITALS PORTAGE MEDICAL CENTER	PORTAGE	Yes
OHIOHEALTH MANSFIELD HOSPITAL	RICHLAND	Yes
AVITA ONTARIO	RICHLAND	Yes
OHIOHEALTH SHELBY HOSPITAL	RICHLAND	Yes
HEARTLAND BEHAVIORAL HEALTHCARE	STARK	No
SUNRISE VISTA HEALTH AND WELLNESS	STARK	No
MERCY MEDICAL CENTER	STARK	Yes
AULTMAN HOSPITAL	STARK	Yes
ALLIANCE COMMUNITY HOSPITAL	STARK	Yes
CRYSTAL CLINIC ORTHOPAEDIC CENTER	SUMMIT	No
AKRON CHILDREN'S HOSPITAL	SUMMIT	No
NORTHCOAST BEHAVIORAL HEALTHCARE NORTHFIELD CAMPUS	SUMMIT	No
ASSURANCE HEALTH HUDSON LLC	SUMMIT	No

SUMMA HEALTH SYSTEM	SUMMIT	Yes
AKRON GENERAL MEDICAL CENTER	SUMMIT	Yes
SUMMA WESTERN RESERVE HOSPITAL	SUMMIT	Yes
TRUMBULL REGIONAL MEDICAL CENTER	TRUMBULL	Yes
MH ST JOSEPH WARREN HOSPITAL	TRUMBULL	Yes
UNION HOSPITAL	TUSCARAWAS	Yes
TWIN CITY MEDICAL CENTER	TUSCARAWAS	Yes
WOOSTER COMMUNITY HOSPITAL	WAYNE	Yes
AULTMAN ORRVILLE HOSPITAL	WAYNE	Yes