AN ECOLOGICAL ANALYSIS OF GEOGRAPHIC VARIATIONS IN THE NEED AND AVAILABILITY OF SAFETY NET FACILITIES IN RACIALLY SEGREGATED COMMUNITIES OF CHICAGO

BY

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THESIS

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ABSTRACT

A growing body of literature hypothesizes that racial residential segregation is a fundamental cause of racial disparities in health and access to care in the United States. Safety net facilities, however, have the potential to play a major role in eliminating such disparities by improving access to care for vulnerable populations especially in racially segregated communities. The following study uses an ecological study design to examine the effect of Black residential segregation on the need for and availability of safety net facilities across communities and regions within the city of Chicago, Illinois.

Several data sources are used to identify the location of community health centers, free clinics, safety net hospitals, and local health departments that comprise the health care safety net in Chicago community areas. Descriptive statistics were calculated to measure differences in Black residential segregation, poverty, and the uninsured population across Chicago’s 77 community areas and 7 health systems planning regions. Nonparametric correlation analyses were performed to determine the relationship between segregation and both the need for and availability of safety net facilities. The correlation between the need for and availability of safety net facilities was tested as well. All data and measures were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.

Descriptive statistics show that measures of Black residential segregation, indicators of local safety net need (i.e., the poverty rate and percent of uninsured residents in a given area), and the availability of safety net facilities vary substantially across Chicago. Although correlations analyses also varied among Chicago regions, Black residential segregation was significantly correlated with both the poverty rate and percent of uninsured residents. The availability of safety net facilities was correlated with segregation and the need for safety net
facilities. Results suggest that segregated Black communities heavily populated by vulnerable uninsured and low-income residents may have limited access to safety net facilities. Chicago community areas in the Northwest and South regions appear to be particularly underserved. Analyses from the results of this study can aid health care reform efforts aimed at expanding health care services (i.e., safety net facilities) available to vulnerable populations and in medically underserved areas such as segregated Black communities.
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CHAPTER 1
INTRODUCTION

1.1 BARRIERS TO HEALTH CARE ACCESS

There are obvious disparities and gaps in the United States health care system. Disparities in the nation’s health care system are often attributed to economic and social barriers that prevent individuals from accessing health care services. National efforts to improve access to care tend to focus heavily on increasing health insurance coverage. Most recently, the Patient Protection and Affordable Care Act, also known as “Obamacare” or simply the Affordable Care Act (ACA), was enacted under President Barack Obama’s administration in 2010, with aims to improve the availability, affordability, and quality of health insurance and health care services for nearly all Americans (Rosenbaum, 2011). The law which was upheld by the US Supreme Court in June of 2012, plans to provide 25 million Americans with health care insurance through insurance exchanges, increase Medicaid enrollment by 13 million, and reduce the number of uninsured Americans to 31 million by 2024 (Congressional Budget Office, 2014). However, health insurance coverage does not necessarily translate into access or fully remove financial barriers to care.

The high cost of health care frequently impedes access to care for both the uninsured and insured. In 2012, for example, 54% of adults with no insurance, 20% of adults with Medicaid or public health insurance, and 10% of adults with private or employer health insurance delayed or missed care due to costs (Kaiser, 2013). Furthermore, barriers to care extend beyond financial constraints. Regardless of an individual’s insurance status or financial position, health care resources (i.e., medical providers and facilities) need to be available in order for individuals to
have access to care. To this end, the lack of available health care providers serves as a major barrier to care in many areas of the US. As of June 2014, there were over 3,000 geographic areas with a shortage of primary care, dental, or mental health providers (Health Resources and Services Administration, 2014). Within those federally designated health professional shortage areas (HPSAs), approximately 30 million Americans resided in primary care HPSAs, 14 million lived in dental HPSAs, and 83 million in mental HPSAs (Health Resources and Services Administration, 2014). Consequently, many areas across the US are medically underserved and millions of Americans are vulnerable to falling through the cracks of the health care system.

1.2 SERVING THE MEDICALLY UNDERSERVED

Research suggests that racially segregated neighborhoods are medically underserved areas populated by vulnerable populations. Of particular concern is the residential segregation of Blacks in the United States. Despite declines in racial residential segregation over the last several decades, Blacks remain the most segregated racial group in the United States (Logan & Stults, 2011). As it relates to health care access, the residential segregation of Blacks tends to be negatively associated with the availability of health care providers (White, Haas, & Williams, 2012). Recent studies show that primary care physicians and specialists are less likely to locate in segregated neighborhoods and areas with larger Black populations (Gaskin, Dinwiddie, Chan, &McCleary, 2012; Hayanga et al., 2009a). Additionally, vulnerable uninsured, low-income, and racial/ethnic minority populations are more likely to be adversely affected by health care provider shortages (National Association of Community Health Centers, 2009). This may be especially true for vulnerable populations that live in segregated Black communities.
Fortunately, a patchwork of health care providers and facilities known as the health care safety net specialize in serving medically underserved areas and vulnerable populations (Adashi, Geiger, & Fine, 2010). To demonstrate, 38% of patients at community health centers were uninsured, 39% were on Medicaid, 72% were at or below the federal poverty level, and more than 63% were racial/ethnic minorities in 2010 (National Association of Community Health Centers, 2012). Safety net facilities such as community health centers have the potential to play a major role in improving access to care for vulnerable populations especially in racially segregated communities. In fact, previous research suggests that safety net facilities compensate for provider shortages in segregated areas of the US (Ko & Ponce, 2013). Although safety net facilities provide a substantial level of health care services to those in need, concerns about the availability of safety net facilities in underserved communities exist.

Few studies, however, examine whether safety net facilities are distributed according to local community needs. Less is known about the supply of safety net facilities in underserved and segregated Black communities. Several studies examine the impact of racial residential segregation on health outcomes, but rarely do studies look at the effect of racial residential segregation on the need for and availability of health care resources. There is only one study in the current literature that specifically tests the effect of segregation on the availability of safety net facilities (Ko & Ponce, 2013). No studies to date explicitly examine the effect of racial residential segregation on the need for safety net facilities. For those reasons, this study seeks to assess the role of geography on access to care for underserved populations, specifically as it relates to the availability of safety net facilities in racially segregated communities of Chicago, Illinois. The exploration into this topic is guided by three critical questions. Primarily, are the
need for and availability of safety net facilities associated with the racial residential segregation of Blacks in Chicago?

Chicago has been one of the most racially segregated metropolitan areas in the nation since the 1980s (Logan & Stults, 2011). Additionally, Chicago’s public health department has emphasized the importance of safety net facilities for underserved populations and monitored the operations of community-based health care safety net facilities since 1990 (Salem & Ferguson, 2005). However, the extent to which racial residential segregation impacts the need for and availability of safety net facilities in Chicago communities is unknown. Considering claims that the racial segregation of Blacks contributes to adverse health outcomes and inequalities in health care access, the hypothesis for this study’s primary research question is that Black residential segregation is positively related to the need for safety net facilities, but negatively associated with the availability of safety net facilities in Chicago.

The final two research questions address concerns about the distribution of safety net facilities. Specifically, does the need for and availability of safety net facilities vary geographically across regions and communities of Chicago? If geographic variations exist, are safety net facilities in Chicago equitably distributed according to local health care needs? By definition safety net facilities are supposed to serve vulnerable populations or locate in underserved areas. Several national agencies including the Health Resources and Services Administration (HRSA) and National Association of Community Health Centers (NACHC) regularly report that safety net facilities do in fact provide services to a substantial level of vulnerable uninsured, low-income, and racial/ethnic minority groups. Despite that fact, a limited number of reports examine whether safety net facilities are distributed equitably or in areas where vulnerable populations live. The studies that do exist suggest that safety net facilities are
more likely to locate in disadvantaged areas where racial minorities and low-income populations reside (Gaskin & Hadley, 1999; Ko & Ponce, 2013). These studies use large geographic units of analysis (i.e., zip code or county) and do not capture variations that may exist on a smaller community level. Hence, this study hypothesizes that the need for safety net facilities varies geographically across Chicago, and that safety net facilities are not equitably distributed across Chicago according to local needs.

The following chapters of this thesis detail background information on the study topic, methods used to conduct the study, key results, and conclusions about the implications of the study’s findings. Chapter 2 contains the study’s literature review. The literature review provides context for why the study of Black residential segregation and safety net facilities is important in public health research. Chapter 3 outlines the study methods including data sources, variables, and statistical methodology used to analyze the need for and availability of safety net facilities throughout Chicago. The results from statistical tests are found in Chapter 4. Chapter 5 is the final chapter of this thesis. The final chapter elaborates on the key findings from chapter 4, lists limitations of the study, and offers policy recommendations about the expansion of safety net facilities in racially segregated communities of Chicago.
Chapter 2

LITERATURE REVIEW

The purpose of this chapter is to review the literature on health and health care disparities, racial residential segregation, and safety net facilities. Racial residential segregation is defined along five dimensions and examined as a fundamental cause of racial/ethnic health disparities. The health care safety net is also defined and examined as a solution to reduce disparities in health care access. Concepts related to geography are described to help explain the spatial components of access to care as they relate to the geographic distribution of safety net facilities in segregated Black communities. The literature review concludes with a description of ways in which the following study contributes to the current literature.

2.1 DEFINING HEALTH AND HEALTH CARE DISPARITIES

The consensus in public health research and among national health agencies including the Centers for Disease Control and Prevention (CDC), the Robert Wood Johnson Foundation (RWJF), and the Department of Health and Human Services (HHS) is that action must be taken to eliminate health disparities in the United States (CDC, 2013; Gold, 2014; US Department of Health and Human Services, n.d.). National policies and initiatives including Healthy People 2020, the CDC’s Healthy Community Program, and the Affordable Care Act are evidence of such efforts. While there is no universal definition of health disparities, the Minority Health and Health Disparities Research and Education Act of 2000, provides the basis for nearly all delineations of the term. The law legally defines a health disparity population as a population with, “a significant disparity in the overall rate of disease incidence, prevalence, morbidity,
mortality or survival rates in the population as compared to the health status of the general population,” (Minority Health, 2000, p. 2498).

Health disparities, also known as “health inequalities” typically quantify differences between socially advantaged and disadvantaged populations (Braveman et al., 2011). Socially disadvantaged populations that experience health disparities are often identified in the public health literature as vulnerable populations. Vulnerable populations refer to populations that have a greater risk for experiencing adverse health outcomes or poor access to health care resources (Shi & Stevens, 2005). The identification of vulnerable populations is a key first step in health disparities research (Kilbourne et al., 2006). Policymakers and health disparities researchers target uninsured, underinsured, racial/ethnic minority, and low-income groups when identifying vulnerable populations. For example, the Affordable Care Act focuses on providing health insurance coverage to uninsured, underinsured, and low-income Americans who may be at risk of experiencing less access to health care services compared to the general population (Kaiser, 2012).

The growing disposition by policymakers to focus on health disparities among vulnerable populations is rooted in the principle of equity (Braveman et al., 2011; Shi & Stevens, 2010). Health equity can be thought of as the inverse of health disparities. Whitehead (1992) explains that health equity is an ethical construct that deems disparities in health to be avoidable, unjust, and unfair. Until recently, policies in the United States emphasized health disparities rather than health equity. The incorporation of equity into the health care debate in the United States may reflect an increased acceptance of the idea that health care is a basic human right. It further suggests that health care disparities are socially unjust (Braveman & Gruskin, 2003).

As demonstrated by the Affordable Care Act, policies that seek to eliminate health
disparities usually reduce disparities in access to health care, also known as health care disparities. According to the 2009 Medical Subject Headings developed by the US National Library of Medicine (NLM), health care disparities refer to differences in access to care or in the availability of health care facilities and services (US National Library of Medicine, 2014). Inadequate access to care is frequently cited as a cause of health disparities (Bahls, 2011; Kaiser, 2008; Frist, 2005). The Affordable Care Act includes several provisions to reduce health care disparities such as expansions in health insurance coverage, increases in the availability of primary care providers in underserved areas, and funding to develop new safety net facilities (US Department of Health and Human Services, 2014).

To date, national efforts to reduce health and health care disparities have achieved limited success. For example, Healthy People 2010 included several objectives related to access to health care services. Unfortunately, the Healthy People 2010 Final Report showed that health disparities for 80% of objectives did not improve and health disparities among 13% of objectives worsened (National Center for Health Statistics, 2012). The findings from the Healthy People 2010 Final Report suggest that health equity cannot be achieved solely by initiatives aimed at improving access to care. In order to remedy disparities in health and health care, the underlying causes of such disparities must be addressed.

2.2 SEGREGATION AS A CAUSE OF HEALTH DISPARITIES

Health disparities and inequalities in access to care have been associated with various social determinants of health including age, gender, race/ethnicity, and socioeconomic status. Health disparities research has recently focused increasingly on the relationship between disparities and racial residential segregation. Empirical evidence indicates that racial residential
segregation is associated with health and health care inequalities and may be an underlying cause of disparities.

In a landmark study on the dimensions of segregation, Massey and Denton (1988) defined residential segregation as the degree to which two or more groups live apart in an urban area. Massey and Denton (1988) went on to describe residential segregation using five dimensions: evenness (consistency in the spatial distribution of residents by race), exposure (level of contact between races), clustering (proximity of different racial groups to each other), centralization (degree to which minorities reside in an urban center), and concentration (concentration of minority residents within an area). Each dimension of segregation can be measured using various indices. High segregation is typically denoted by an index measure of 0.6 or higher. If a geographic area scores 0.6 or higher on at least 4 of the 5 segregation dimensions, the area is said to be hypersegregated. Current research suggests that Blacks are the only hypersegregated racial group in the United States (Wilkes & Iceland, 2004).

Unlike segregation experienced between different racial/ethnic minority groups and Whites, the segregation of Blacks from Whites dates back centuries in American history. The systematic separation of Blacks from Whites in the United States began with the practice of slavery and was perpetuated by explicit societal prejudices during the civil rights era. Residential segregation, in particular, grew in part due to discriminatory housing practices (Cutler, Glaeser, & Vigdor, 1997; Massey, 1993). In recent times, residential segregation has subsided significantly, but Blacks remain the most segregated group in the United States. Analysis of the 2010 US Census indicates that segregation indices for Blacks are considerably higher than measurements for all other racial/ethnic groups in the country (Logan & Stults, 2011). Consequently, most studies that look at the effect of segregation on health disparities...
focus on Black-White segregation.

The prevalence of Black-White residential segregation is often associated with negative health outcomes. As an example, racial segregation has been linked to higher rates of mortality, risk of late diagnosis of breast cancer, and increased odds of preterm birth for Blacks in the United States (Collins & Williams, 1999; Dai, 2010; Osypuk & Acevedo-Garcia, 2008). The impact of racial segregation extends beyond health outcomes to health care access. Many segregated communities lack access to health services and related resources. Segregated Black neighborhoods have been shown to have fewer ambulatory surgical facilities, less healthy food options, and inadequately stocked pharmacies (Hayanga et al., 2009b; Morland, Wing, Diez Roux, & Poole, 2002; Morrison, Wallenstein, Natale, Senzel, & Huang, 2000). In light of these associations, racial residential segregation may need to be explored further as an underlying cause of disparities in health care.

A growing body of research implies that racial residential segregation is the fundamental cause of racial health disparities (White et al., 2012; Gaskin et al., 2012; Williams & Collins, 2001). Such studies use the fundamental cause theory to explain the role of racial residential segregation on health and health care disparities. The central premise of the fundamental cause theory recognizes that social causes of health disparities, namely socioeconomic status (SES), are associated with multiple diseases and disease risk factors. The theory posits that despite intervening factors (i.e., vaccinations and proper sanitation), socioeconomic disparities in health continue to exist because individuals with high SES have access to resources such as money, knowledge, power, prestige, and beneficial social networks that can minimize both the risks and consequences of disease (Link & Phelan, 1995). Individuals with low SES do not possess similar social advantages. Likewise, researchers believe that residents of racially segregated
neighborhoods lack access to social resources (i.e., money and power) that could help them avoid adverse health outcomes.

Researchers are beginning to develop conceptual frameworks that specify the mechanisms by which racial residential segregation leads to health and health care disparities among Blacks. In a review of literature on segregation and health outcomes, Kramer and Hogue (2009) suggest that the association between segregation and health is mediated through individual and neighborhood socioeconomic status, social capital, and individual exposure and behavior. The framework explains that Blacks who live in segregated communities have fewer educational and employment opportunities, encounter unhealthy built environments, and experience deleterious health effects like stress and discrimination (Kramer & Hogue 2009). Additionally, racial segregation can impact the local health care infrastructure and provider behavior in a way that causes Blacks to experience poorer access, utilization, and quality of health care services (White et al, 2012).

There is also a major concern about the availability of health care services in poor segregated neighborhoods, where blacks are known to concentrate, particularly in urban areas (Massey & Fischer, 2000; Williams & Collins, 2001; Boustan, 2013; Kramer & Hogue, 2009). It is also well documented that poverty has an adverse impact on health care access, as poor neighborhoods are less attractive locations for physicians to practice (Auchincloss, Van Nostrand, & Ronsaville, 2001). Health care professionals prefer to locate in affluent neighborhoods (Guagliardo et al., 2004) where it is assumed that residents with higher incomes can better afford to pay for health care services. Consequently, segregated Black communities with high concentrations of poverty may experience provider shortages and require additional health care resources to avoid preventable lapses in care among residents.
2.3 SAFETY NETS AS A SOLUTION TO DISPARITIES

Attempts to eliminate health disparities often focus on the reduction of avoidable gaps in access to care for socially disadvantaged and underserved groups (Health Affairs, 2011). Gaps in access to care for vulnerable populations are largely covered by what is known as the health care safety net. In 2000, the Institute of Medicine published an in-depth analysis of the health care safety net that defined safety nets as a patchwork of providers who offer health services to uninsured, Medicaid, and other vulnerable populations (Lewin & Altman, 2000). The report went on to distinguish core safety net facilities as those bound by legal mandate or organizational mission to devote a substantial share of their services to vulnerable populations regardless of a patient’s ability to pay (Lewin & Altman, 2000). Since the publication of the IOM’s report, an extensive body of research has used those definitions to examine the role of the safety net in the US health care system (Jones & Sajid, 2009).

At its core, the safety net typically consists of community health centers (CHCs), local public health departments, and safety net hospitals. Although free clinics are not considered part of the core safety net, free clinics play a major role in the health care safety net. Free clinics maintain a volunteer based staff and provide health services for free or at a nominal cost exclusively to economically disadvantaged and uninsured individuals (Darnell, 2011). Thus, free clinics are particularly important for uninsured patients who are unable to afford care elsewhere.

The largest group of core safety net facilities is community health centers. Community health centers (CHCs) were created in response to President Johnson’s “War on Poverty”. The creation of CHCs was a part of the Health Center Program instituted under section 330 of the Public Health Service Act (42 U.S.C. §254b). The responsibilities of community health centers
are outlined in the Public Health Service Act, and state that community health centers must provide comprehensive primary care and related services to all residents living within a local underserved area. There are two categories of CHCs: 1) grant-funded federally qualified health centers (FQHCs) and 2) non-grant supported “look-alikes”. Look-alikes receive Health Center program benefits similar to FQHCs, but due to limited funds are not financially supported by the Health Resources and Services Administration (HRSA). The Health Resources and Services Administration (HRSA) was established under the Public Health Service Act and serves as the leading federal agency for assessing access and delivery of health care to underserved populations. As such, the HRSA is charged with monitoring community health centers.

In the same manner that FQHCs receive government funding from the HRSA, local health departments (LHD) are financed by local government agencies. Local health departments are primarily responsible for the surveillance and maintenance of social, environmental, behavioral, physical, and economic conditions that improve local health and wellbeing (Lenihan, Welter, Chang, & Gorenflo, 2007). Policymakers, public health officials, and clinicians debate the extent to which local health departments should offer direct patient care (Lewin & Altman, 2000; Keane, Marx, & Ricci 2003). Many health departments offer basic health screening and testing services, while others also provide specialized services related to HIV/AIDS, child and maternal health, and family planning (Keane et al., 2003).

Unlike community health centers and local health departments, safety net hospitals are not clearly defined. When the health care safety net was first described by the Institute of Medicine in 2000, public hospitals were synonymous with safety net hospitals. In the United States, public hospitals have a long history of providing charity and free care to the sick and poor (Lewin & Altman, 2000). Public hospitals are owned and financially supported by state and
local governments, but do not represent the full range of safety net hospitals. In an overview of safety net hospitals during the 1990s, Zuckerman, Bazzoli, Davidoff, & LoSasso (2001) warn that the term “public” hospital could be misleading. Hospitals other than public hospitals provide substantial safety net services, and some public hospitals are situated in wealthy areas that do not require safety net services (Zuckerman et al., 2001). Safety net hospital should not be distinguished solely based on a hospital’s ownership type, but several other criteria can be used. According to the National Association of Public Hospitals (NAPH), safety net hospitals are distinguished by their level of Medicaid Disproportionate Share Hospital (DSH) funding, low income cost ratios, and uncompensated care (National Association of Public Hospitals, 2004). In research, safety net facilities have been identified based on Medicaid caseload, the number of self-pay patients, and NAPH membership (McHugh, Kang, & Hasnain-Wynia, 2009).

Collectively safety net facilities successfully increase access to care for the uninsured (Hadley & Cunningham, 2004), reduce preventable hospitalizations (Rothkopf, Brookler, Wadhwa, & Sajovetz, 2011; Probst, Laditka, & Laditka, 2009), and help alleviate health disparities (Politzer et al., 2001). The success of safety net facilities may be threatened by external economic and political factors. Persisting economic challenges, shortages in the medical workforce, and dramatic changes in the health care system have had profound influences on safety net facilities (Mobley, Kuo, Bazzoli, 2011). Economic and political factors can be expected to continue to influence the operations of safety net facilities with the implementation of health reform in the coming years.

Provisions included in the Affordable Care Act (ACA) will impact safety net facilities in several ways. Most notably, the patient population of safety net facilities will likely change as a result of improvements in insurance coverage under the ACA. As the number of uninsured
Americans declines, some speculate that the need for safety net facilities will decline. To the contrary, survey data collected between 2006 and 2009 after the implementation of the state health reform in Massachusetts showed that despite reductions in the state’s uninsured population, utilization of services at safety net facilities increased (Ku, Jones, Shin, Byrne, & Long, 2011). The influx of newly insured Medicaid patients alongside existing uninsured patients may cause an increase in the need for services at safety net facilities.

In addition to possible increases in the need for safety net facilities, the availability of safety net facilities will rise as a result of the ACA. The ACA allocates $11 billion for the expansion of existing community health centers and the creation of new facilities (Kulesher, 2013). On the other hand, the health reform law reduces payments to hospitals that serve a disproportionately high share of low-income and Medicaid patients (Kulesher, 2013). It is uncertain what impact these conflicting funding measures may have on safety net facilities.

2.4 THE ROLE OF GEOGRAPHY ON ACCESS TO CARE

Both the need for and availability of safety net facilities vary geographically across space (Marquis, Rogowski, & Escarce, 2004). Geography therefore plays an integral role in access to safety net facilities. Access to health care encompasses two spatial components. The spatial components of access are accessibility and availability (Guagliardo, 2004). Accessibility measures the travel time and distance between services and consumers (Penchansky & Thomas, 1981). Travel barriers (i.e., transportation time and costs) influence accessibility measures, and may decrease the utilization of distant services. This inverse relationship between the proximity and utilization of health care services refers to distance decay. Distance decay is the notion that individuals are less likely to use services located further away from them. This may be
especially true for vulnerable populations. Studies show that shorter distances to safety net facilities increase utilization and access to care for the uninsured (Gresenz, Rogowski, & Escarce, 2007; Hadley & Cunningham, 2004).

The remaining spatial component of access is availability. Availability examines the supply of health care providers, services, and resources in relation to the volume of health care consumers in need (Penchansky & Thomas, 1981). The availability of resources in segregated neighborhoods tends to be scarce. For example, a study on the availability of primary care physicians found that segregated and predominantly African-American ZIP code areas were more likely to have primary care physician shortages (Gaskin et al., 2012). These shortage areas could benefit from the presence of safety net facilities. In fact, a recent study on the supply of safety net facilities found that federally qualified health centers were more likely to locate in highly segregated counties and may compensate for provider shortages in segregated neighborhoods (Ko & Ponce, 2013).

The simultaneous study of accessibility and availability is known as spatial accessibility (Guagliardo, 2004). However, numerous studies focus solely on the availability or supply of safety net services (Ko & Ponce, 2013; Hadley & Cunningham, 2004; Buchmueller, Jacobson, & Wold, 2006; Epstein, 2001). It can be argued that if services are not available in an area, they are likely inaccessible as well. Furthermore, availability can be used to measure the equity of access (Gulliford et al., 2002). Luo and Wang (2003) asserts that compared to accessibility, availability is a simple measure that does not assess the dynamic relationship of demand and supply across different regions. Instead, availability focuses on the “distribution of supply and demand within a region,” (Luo & Wang, 2003). Studies that explore the availability of health care resources within a region may be able to identify specific neighborhoods that are
underserved.

While safety net facilities are designed to fill gaps in health care access for underserved populations, the geographic distribution of safety net facilities is not always equitable. For example, the number of community health centers doubled between 2000 and 2010, but during that same time one in four US counties with high health care needs lacked a health center (National Association of Community Health Centers, 2012). This inequitable distribution of community health centers demonstrates the inverse care law. The inverse care law states that the availability of adequate health services tends to vary inversely with the need of the population served (Tudor Hart, 1971). In theory, the spatial distribution of safety net facilities should follow the notion of territorial justice rather than the inverse care law. First coined by Bleddyn Davies (1968), territorial justice describes circumstances when there is a positive relationship between the supply of resources and community need. Thus, under territorial justice, the supply of resources increases as the need for those services increases. Given previous examples of the limited access to health care resources in racial residential segregated areas, the distribution of safety net facilities in segregated Black communities may not follow the pattern of territorial justice.

The claim that racial residential segregation is the source of racial health disparities is a relatively new idea that warrants future investigation. The majority of studies that exist rarely examine the entire spectrum of safety net facilities simultaneously. Most research is broad and tends to use large units of analysis (i.e., state, MSA, county) that may underestimate the effect of segregation on access to care (White & Borrell, 2011). The following study makes novel contributions to the literature by a) analyzing a wide spectrum of safety net facilities and b) examining local community level variations in the need for and availability of safety net
services. The primary aim of the study is to determine if Black residential segregation is correlated with the need for and availability of safety net facilities in Chicago communities. This study also assesses whether or not safety net facilities are equitably distributed in Chicago communities according to local needs.

The investigation of the research aims mentioned above can contribute to health care policies that seek to assess and expand health care resources (i.e., safety net facilities) in underserved areas (i.e., segregated Black communities). Essentially, the results can help local public health officials identify medically underserved communities that may benefit from the development of safety net facilities. In doing so, this study has the potential to assist in efforts to improve health care access for many of the nation’s most vulnerable and underserved populations.
Chapter 3

METHODS

The following chapter explains the research methods used to conduct this study. Specifically, this chapter includes a description of the study area, data sources, outcome and explanatory variables, and statistical methodology. An ecological study design was employed to assess the impact of geographic location and Black residential segregation on the need for and availability of local safety net facilities in Chicago, Illinois.

3.1 THE STUDY AREA

This study focuses on Chicago, Illinois. Chicago is home to several vulnerable populations (i.e., racial minority and low-income groups) that tend to experience lower access to health care services. In 2010, Chicago had the second largest Black population in the United States (Rastogi, 2011) and was the most racially segregated metropolitan area in the country (Glaeser & Vigdor, 2012). During that time, 1 in 5 Chicago residents did not possess health insurance (DeNavas-Walt, Proctor, & Smith, 2012). Racial residential segregation and lack of insurance may present barriers to care for Chicago residents, which makes the study of local safety net facilities especially important in Chicago. In addition, access to health care resources may vary across Chicago because of the diversity in racial and economic characteristics from one neighborhood to the next. Chicago community areas, health systems planning regions, and the city as a whole are each studied to capture geographic variances in the need for and availability of safety net facilities within the study area.
Sociologists at the University of Chicago created Chicago’s community area boundaries during the 1920s. The sociologists were members of the Local Community Research Committee (LCRC) and partnered with the Chicago Department of Public Health to develop contextually relevant geographic units of analysis for the purpose of collecting vital statistics in Chicago neighborhoods (Venkatesh, 2001). At the time, the LCRC believed that census defined neighborhood boundaries were arbitrarily defined and ignored the settlement patterns of local residents (Venkatesh, 2001). Thus, Chicago community areas were based on the idea of “natural areas”. In their study on urban ecology, sociologists Robert Park and Ernest Burgess contended that competition for scarce resources caused urban space to be divided into “natural areas” characterized by the distinct social and ecological pressures consistently present in the area (Sampson, Morenoff, & Gannon-Rowley, 2002).

There are 77 formally recognized community areas in Chicago (Figure 1). Each community area consists of contiguous census tracts with similar social, cultural, and economic characteristics (Guest, Almgren, & Hussey, 1998). Chicago community areas (CCAs) are widely recognized by Chicago residents as neighborhoods and referenced by local government agencies for community planning purposes. Chicago’s community areas can be consolidated into 7 health systems planning regions (Salem & Ferguson, 2005). The 7 health systems planning regions in Chicago include the: Northwest, North, West, Central, South, Southwest, and Far South (Figure 2, Table 1). These health systems planning regions are used by the Chicago Department of Public Health in the Chicago Plan for Public Health System Improvement and for status reports on safety net providers in underserved areas (Salem & Ferguson, 2005). Demographic data for CCAs and health systems planning regions are aggregated from census tract level data.
3.2 DATA SOURCES

Data for this study include information from several publically available data files. The sources used to gather the study data are listed in Table 2.

3.2.1 Demographic Data

Data from the American Community Survey (ACS) was used to gather local demographic information on Chicago communities. The American Community Survey is a component of the US Census program, but compiles data on an annual basis using a smaller national sample than the Census (Mather, Rivers, & Jacobsen, 2005). The ACS focuses on population and housing data that help communities forecast population changes (Mather et al., 2005). Both single-year and multiyear estimates are available for analysis. The racial composition, poverty rate, percent of uninsured residents, and total population for census tracts in Chicago were retrieved from the 2008-2012 ACS 5-Year Estimates.

3.2.2 Safety Net Data

Several data sources were combined to identify core safety net facilities and free clinics. The Public Health Service Act requires the Health Resources and Services Administration (HRSA) to monitor and collect data on all community health centers in the United States. This includes both grant-funded federally qualified health centers and non-grant-funded “look-alike” health centers. Program grantees and look-alike health centers are required to annually submit reports describing patient demographics, clinical operations, utilization, and health care costs. This information forms the Health Care Service Delivery Site (HCSD) data file and was accessed through the HRSA’s online data warehouse. The HCSD data file was sorted by state and then by
city to identify all HRSA-operated community health centers in Chicago, Illinois. The downloadable HCSD data file was checked with the HRSA Health Center and Look-Alike Site Directory to make sure all HRSA community health centers to date were accounted for. Both the HCSD data and health center directory are refreshed on a daily basis.

The location of the local health department in Chicago was retrieved online from the Chicago Depart of Public Health’s (CDPH) website operated by the City of Chicago’s government. The Chicago Department of Public Health also maintains a web-based directory of community health centers located in the city. This directory was updated as of April 2014 and reviewed to determine which Chicago community area each community health center was located in. Chicago community areas were identified for safety net facilities, not listed in the CDPH’s community health center directory, in Google Maps.

The Cook County Health and Hospitals System (CCHHS) is operated under the Cook County Department of Public Health and supports several community health centers throughout Cook County, Illinois that are not recognized as federally qualified health centers or look-alikes by the HRSA. CCHHS health centers function as safety net facilities and provide care to patients despite patients’ ability to pay. The addresses for CCHHS operated health centers in Chicago were found on the organization’s website. In addition to nationally and locally supported community health centers, several independent organizations fund free clinics. Online directories complied by the Illinois Association of Free and Charitable Clinics and the National Association of Free and Charitable Clinics were used to locate free clinics in Chicago.

Data on safety net hospitals were obtained from the 2012 Annual Hospital Questionnaire administered by the Division of Health Systems Development, Office of Policy, Planning and Statistics, of the Illinois Department of Public Health (IDPH). The data includes self-reported
hospital data from each hospital in Illinois. The questionnaire is mailed electronically to hospitals, approved by hospital administrators via certified mail, and checked for errors by the IDPH before the information is published.

The Annual Hospital Questionnaire, is available online in an Excel spreadsheet. The data spreadsheet contains records on hospital utilization, patient payment source, clinical procedures and surgeries, revenues, capital expenditures, community benefits, and general hospital information. Information relevant to identifying safety net hospitals was obtained from the “Hospital Information” workbook and the “Patients by Payment Source” workbook. The Hospital Information workbook was used to identify hospital names and addresses. The Patients by Payment Source workbook was used to identify the inpatient and outpatient Medicaid caseload for each hospital. The 2012 Annual Hospital Questionnaire was checked with the IDPH’s hospital directory to better assure that only currently existing hospitals were considered in the study. The IDPH’s hospital directory is available on the organization’s website, lists all licensed hospitals in the state of Illinois, and is current as of April 2014.

3.3 STUDY MEASURES

3.3.1 Outcome variables

All variables used in the study are presented in Table 3 along with variable measurements. The primary outcome variable measured was the availability of safety net facilities in Chicago. By definition, availability is a count measurement. To account for differences in the population size of community areas and regions, a ratio of the number of safety net facilities per capita for the population below the federal poverty level was used for analyses. This is in accord with similar studies that use provider-to-population ratios to measure the
availability of safety net services. The total number of safety net facilities was also calculated for Chicago, health systems planning regions, and community areas. The total count of safety nets facilities provided an overview of the overall supply of safety net facilities across Chicago.

For the purposes of this study, the health care safety net consists of community health centers, safety net hospitals, local health departments, and free clinics located in Chicago. Collectively, these safety nets comprise a representative sample of the entire spectrum of safety net services available for underserved populations. Community health centers, local health departments, and free clinics were identified based on national and regional directories. However, no such directory exists for safety net hospitals. Hospitals in Chicago that are members of the National Association of Public Hospitals (NAPH) and have a Medicaid caseload that is one standard deviation above the state average were considered safety net facilities. Previous research on safety net hospitals follows similar guidelines (McHugh et al., 2009).

The secondary outcome variable was the local need for safety net facilities. The Agency for Healthcare Research and Quality (AHRQ) recommends that the demand for safety net services be based on measures of insurance status, poverty, disability, and HIV/AIDS status (Agency for Healthcare Research and Quality, 2003). The patient population at safety net facilities primarily consists of uninsured and Medicaid patients. As such, the local need for safety net facilities was based on the percent of uninsured residents in the population and the poverty rate.

The poverty rate was used in lieu of Medicaid enrollment data because Medicaid enrollment information is not available at the neighborhood-level. Medicaid eligibility is determined by individual or household income in relation to the federal poverty level. Thus, the
percentage of residents below the federal poverty level can be used as a proxy for those who may be eligible for Medicaid and more likely to need safety net services.

3.3.2 Explanatory variable

Racial residential segregation is the primary explanatory variable. This study concentrates on the exposure dimension of segregation. Exposure is represented by the isolation index. The isolation index measures the probability that the average member of a racial/ethnic minority group is exposed only to other members of their racial/ethnic group rather than to members of a majority racial/ethnic group within a given area (Massey & Denton, 1988).

Although the dissimilarity index is the most commonly used measure of segregation, most studies do not justify their use of the measure (Acevedo-Garcia, Lochner, Osypuk, & Subramanian, 2003). Furthermore, a low dissimilarity index indicates that minority and majority groups are evenly distributed in an area, but may discount the geographic isolation and magnitude of racial minority groups (Chang, 2006; Vaughan Sarrazin, Campbell, Richardson, & Rosenthal, 2009). The isolation index, on the other hand, accounts for the size of racial minority populations in the study area. For that reason, the isolation index is a more suitable measure of racial segregation in Chicago where many communities have an overwhelmingly large population of Blacks. The isolation index has been measured in previous studies that examine racial residential segregation within Chicago community areas (Lee, 2009; Guest et al., 1998).

The formula for the isolation index is:

\[ xP^*_x = \sum_{i=1}^{n} \left[ \frac{x_i}{X} \right] \left[ \frac{x_i}{t_i} \right] \]
where $x_i$ represents the Black population within the $i^{th}$ census tract, $t_i$ is the total population of the $i^{th}$ census tract, and $X$ is the Black population citywide or in the $n^{th}$ health systems planning region or community area. The isolation index ranges from 0 to 1.0. Higher scores indicate that Blacks are more isolated in an area. Isolation scores between 0 and 0.3 signify low segregation, whereas scores from 0.3 to 0.6 symbolize moderate segregation. Scores greater than 0.6 imply that an area is highly segregated.

3.3.3 Neighborhood-level Demographics

In addition to the primary outcome and explanatory variables detailed above, measures of racial composition and total population size were gathered for analysis. Previous studies indicate that the racial composition of an area may influence the supply of health care resources (Ko & Ponce, 2013; Gaskin et al., 2012). Chicago is a racially diverse city with large populations of various racial/ethnic groups that are segregated in different parts of the city. Racial composition in this study was represented by the percent of Whites, Blacks, and racial/ethnic minority residents in the total population of an area. The percent of racial/ethnic minorities in an area included all racial/ethnic groups except non-Hispanic Whites. Lastly, the total population was calculated for Chicago, each health systems planning region, and all Chicago community areas and used as an estimate of the total demand for health care services in an area.

3.4 STATISTICAL ANALYSIS

All data and measures were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. The study data was evaluated using descriptive statistics, as well as nonparametric group comparisons and correlation analyses. Descriptive statistics were used to
calculate differences in the distribution of variables across Chicago. The significance of those group differences was tested using nonparametric analysis. Nonparametric correlation analysis was used to determine the relationship between the primary outcome and explanatory variables.

Descriptive statistics (i.e., frequencies) on all study variables were calculated for the entire city of Chicago as a whole, as well as for each of the 7 health systems planning regions and 77 Chicago community areas. Values for the total population, racial composition, poverty rate, percent of uninsured residents, and the isolation index were based on the sum of census tract level demographic data. The number of safety net facilities was totaled for the 77 community areas, 7 health systems planning regions, and for the city of Chicago overall. Those total counts were used to calculate the number of safety net facilities per capita for the population below the poverty level in each area.

Chicago community areas were then grouped by their health systems planning region. Weighted means for all variables were computed separately for each health systems planning region and based on variable values for community areas within each region. Variables were weighted by their community’s total population. Weighted means were used to account for differences in the population size of community areas. The Kruskal Wallis test was used to determine if the distributions of variable means were statistically significant across the 7 health systems planning regions.

Weighted variable means were also used in correlation analyses. Nonparametric correlation analysis was used to determine if racial residential segregation was significantly associated with the availability of safety net facilities and indicators of safety net demand. Nonparametric correlation analysis was also used to test the association between the availability of safety net facilities and the need for safety net facilities as measured by the poverty rate and
percent of uninsured residents in the population. Correlations were tested for the entire city of Chicago and for each of the 7 health systems planning regions. Correlation analysis was based on the Spearman’s rank order correlation coefficient and p-values – significant at the 0.001, 0.01 and 0.05 levels (1-tailed).
## 3.5 TABLES AND FIGURES

### Table 1. Chicago Community Areas Listed by Health Systems Planning Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Community Areas</th>
</tr>
</thead>
</table>
| **Northwest** | Edison Park  
              O’Hare  
              Norwood Park  
              Jefferson Park  
              Forest Glen | Irving Park  
              Dunning  
              Montclare  
              Belmont Cragin  
              Hermosa | North Park  
              Albany Park  
              Portage Park  
              Avondale  
              Logan Square |
| **North**  | Rogers Park  
              West Ridge  
              Edgewater | Lake View  
              Lincoln Park | Lincoln Square  
              North Center |
| **West**   | Humboldt Park  
              West Town  
              Austin | Near West Side  
              North Lawndale  
              South Lawndale | West Garfield Park  
              East Garfield Park  
              Lower West Side |
| **Central** | Near North Side  
               Loop | | Near South Side |
| **South**  | Douglas  
              Oakland  
              Grand Boulevard  
              Kenwood  
              Greater Grand | Chatham  
              Avalon Park  
              South Chicago  
              Burnside  
              Calumet Heights | Washington Park  
              Hyde Park  
              Woodlawn  
              Crossing  
              South Shore |
| **Southwest** | Armour Square  
               Fuller Park  
               Ashburn  
               Garfield Ridge  
               Archer Heights  
               Englewood | New City  
               West Elsdon  
               Gage Park  
               Clearing  
               West Lawn | Brighton Park  
               McKinley Park  
               Bridgeport  
               Chicago Lawn  
               West Englewood |
| **Far South** | Roseland  
               Pullman  
               South Deering  
               East Side | Hegewisch  
               Auburn Gresham  
               Beverly  
               Washington Heights | West Pullman  
               Riverdale  
               Mount Greenwood  
               Morgan Park |
<table>
<thead>
<tr>
<th>Source</th>
<th>Data</th>
<th>Website Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2012 American Community Survey 5-Year Estimates</td>
<td>Neighborhood-level demographics (i.e., poverty rate, total population, racial composition, percent of population uninsured)</td>
<td><a href="http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_5YR_DP03&amp;prodType=table">http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_5YR_DP03&amp;prodType=table</a></td>
</tr>
<tr>
<td>HRSA Health Center and Look-Alike Site Directory</td>
<td>Community health centers (i.e., FQHC and look-alikes)</td>
<td><a href="http://datawarehouse.hrsa.gov/HGDWReports/OneClickRptFilter.aspx?rptName=FAHCSiteList">http://datawarehouse.hrsa.gov/HGDWReports/OneClickRptFilter.aspx?rptName=FAHCSiteList</a></td>
</tr>
<tr>
<td>Cook County Health and Hospitals Systems Outpatient Clinic Listing</td>
<td>Community health centers (i.e., ambulatory health centers operated by Cook County, Illinois)</td>
<td><a href="http://www.cookcountyhhs.org/locations/community-clinics-achn/maps-directions/">http://www.cookcountyhhs.org/locations/community-clinics-achn/maps-directions/</a></td>
</tr>
<tr>
<td>2012 IDPH Hospital Profiles and Annual Bed Reports</td>
<td>Safety net hospitals</td>
<td><a href="http://www.idph.state.il.us/about/Hfpb/HospProf_ABR.htm">http://www.idph.state.il.us/about/Hfpb/HospProf_ABR.htm</a></td>
</tr>
<tr>
<td>IDPH Hospital Directory</td>
<td>Safety net hospitals</td>
<td><a href="https://data.illinois.gov/Public-Health/IDPH-Hospital-Directory/wsms-teqm">https://data.illinois.gov/Public-Health/IDPH-Hospital-Directory/wsms-teqm</a></td>
</tr>
<tr>
<td>Chicago Department of Public Health</td>
<td>Local health department; Safety net facilities listed by community area</td>
<td><a href="http://www.cityofchicago.org/content/dam/city/depts/cdph/clinic/general/HealthCentersbycommunityareaApr112014.pdf">http://www.cityofchicago.org/content/dam/city/depts/cdph/clinic/general/HealthCentersbycommunityareaApr112014.pdf</a></td>
</tr>
</tbody>
</table>

HRSA: Health Resources and Services Administration  
IDPH: Illinois Department of Public Health
Table 3. Measurements for Primary Outcome and Explanatory Variables

<table>
<thead>
<tr>
<th>Outcome Variables</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of safety net facilities</td>
<td>Total count of community health centers, safety net hospitals, local health departments, and free clinics in an area; Total number of community health centers, safety net hospitals, local health departments, and free clinics per 10,000 residents with incomes in the last 12 months below the federal poverty level</td>
</tr>
<tr>
<td>Community health centers</td>
<td>Count of HRSA grant-supported federally qualified health centers, HRSA non-grant supported look-alike health centers, and Cook County Health and Hospitals Systems’ ambulatory health centers as of 2014</td>
</tr>
<tr>
<td>Safety net hospitals</td>
<td>Count of hospitals that are members of the National Association of Public Hospitals and have a Medicaid caseload that is one standard deviation above the state average as of 2014</td>
</tr>
<tr>
<td>Local health department</td>
<td>Count of local health departments located in Chicago</td>
</tr>
<tr>
<td>Free clinic</td>
<td>Count of free clinics listed in the Illinois Association for Free and Charitable Clinics</td>
</tr>
<tr>
<td>Percent Uninsured</td>
<td>2008-2012 estimates for the percent of individuals with no insurance in the total population</td>
</tr>
<tr>
<td>Poverty Rate</td>
<td>2008-2012 estimates for the percent of individuals in the total population with annual incomes in the last 12 months below 100 percent of the federal poverty level</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racial residential segregation</td>
<td>Isolation Index score ranging from 0 to 1</td>
</tr>
<tr>
<td></td>
<td>[ P_x^* = \sum_{i=1}^{n} \left( \frac{x_i}{x} \right) \left( \frac{x_i}{t_i} \right) ]</td>
</tr>
<tr>
<td>Neighborhood-level Demographics</td>
<td>Measurement</td>
</tr>
<tr>
<td>Race/ethnic composition</td>
<td>2008-2012 estimates for the percent of Whites, Blacks, and racial/ethnic minorities (racial/ethnic groups other than non-Hispanic Whites) in the total population</td>
</tr>
<tr>
<td>Population size</td>
<td>2008-2012 estimates for the total number of residents</td>
</tr>
</tbody>
</table>
Figure 1. Chicago Community Areas

Legend

Chicago Community Areas
1 Rogers Park  40 Washington Park
2 West Ridge  41 Hyde Park
3 Uptown  42 Woodlawn
4 Lincoln Square  43 South Shore
5 North Center  44 Chatham
6 Lake View  45 Avalon Park
7 Lincoln Park  46 South Chicago
8 Near North Side  47 Burnside
9 Edison Park  48 Calumet Heights
10 Norwood Park  49 Roseland
11 Jefferson Park  50 Pullman
12 Forest Glen  51 South Deering
13 North Park  52 East Side
14 Albany Park  53 West Pullman
15 Portage Park  54 Riverdale
16 Irving Park  55 Hegewisch
17 Dunning  56 Garfield Ridge
18 Montclare  57 Archer Heights
19 Belmont Cragin  58 Brighton Park
20 Hermosa  59 McKinley Park
21 Avondale  60 Bridgeport
22 Logan Square  61 New City
23 Humboldt Park  62 West Elsdon
24 West Town  63 Gage Park
25 Austin  64 Clearing
26 West Garfield Park  65 West Lawn
27 East Garfield Park  66 Chicago Lawn
28 Near West Side  67 West Englewood
29 North Lawndale  68 Englewood
30 South Lawndale  69 Greater Grand Crossing
31 Lower West Side  70 Ashburn
32 Loop  71 Auburn Gresham
33 Near South Side  72 Beverly
34 Armour Square  73 Washington Heights
35 Douglas  74 Mount Greenwood
36 Oaklând  75 Morgan Park
37 Fuller Park  76 O’Hare Area
38 Grand Boulevard  77 Edgewater
39 Kenwood

Isolation Index

Safety Nets Per 10,000 Below Poverty

Miles
Figure 2. Chicago Health Systems Planning Regions

Legend
Region
- North
- Central
- Northwest
- West
- South
- Southwest
- Far South

0 1 2 4 6 8 Miles

Legend
Region
- North
- Central
- Northwest
- West
- South
- Southwest
- Far South

0 1 2 4 6 8 Miles

Legend
Region
- North
- Central
- Northwest
- West
- South
- Southwest
- Far South

0 1 2 4 6 8 Miles
Chapter 4

RESULTS

The following chapter presents results from descriptive statistics, nonparametric group comparisons, and nonparametric correlation analyses. Descriptive statistics are reported for the racial composition, Black residential segregation, poverty rate, percent of uninsured residents, and availability of safety net facilities in Chicago. Descriptive statistics were measured on the city-level, regional-level, and community-level.

City-level measurements for Chicago as a whole are reported first. Regional-level measurements for each of the 7 health systems planning regions within Chicago follow. Descriptive statistics for Chicago and the 7 health systems planning regions are displayed in summary tables and bar graphs. Boxplots and maps created in ArcGIS are used to visually display differences in the distribution of descriptive statistics at the community-level across the 77 Chicago community areas (CCAs). Results indicate that racial composition, Black residential segregation, poverty, the percent of uninsured residents, and safety net availability varied substantially among Chicago’s health systems planning regions and across Chicago’s community areas. The chapter concludes with findings from nonparametric correlation analyses. The correlation between Black residential segregation and both the need for and availability of safety net facilities is explained. The relationship between the need for and availability of safety net facilities is also described. Correlations varied throughout the study area.

4.1 DESCRIPTIVE STATISTICS AND GROUP DIFFERENCES

4.1.1 City-level Descriptive Statistics
Table 4 displays descriptive statistics for the city of Chicago. In terms of racial composition on the city-level, Chicago’s population was 67.75 percent minority, 32.71 percent Black, and 47.21 percent White. Despite the city’s racial/ethnic diversity, Chicago had an isolation index of 0.8. An isolation index of 0.8 means that there was an 80% probability that the average Black resident in Chicago lived in a census tract where they were exposed only to other Blacks. Thus, based on the isolation index, Black residential segregation was high in Chicago.

The need for safety net facilities is based on the poverty rate and percentage of uninsured residents. Both the poverty rate and percentage of uninsured residents was 19.5 percent for Chicago. Overall there were 295 safety net facilities in Chicago. The total number of safety net facilities in Chicago included 1 local health department, 10 Cook County Health and Hospitals Systems ambulatory health centers, 17 free clinics, 17 safety net hospitals, and 250 HRSA community health centers. Per capita, there were 5.5 safety net facilities in Chicago per 10,000 residents with incomes in the last 12 months below the federal poverty level.

4.1.2 Local Variations in Racial Composition and Black Residential Segregation

The descriptive statistics for Chicago as a whole do not reveal the local variations in racial composition, Black residential segregation, the need for safety net facilities, or safety net availability across regions or communities of Chicago. Descriptive statistics were run separately for each health systems planning region and community area to reveal geographic variations in the distribution of variables within the city of Chicago.

Table 4 displays descriptive statistics measured for Chicago’s 7 health systems planning regions. The regional-level descriptive statistics presented in Table 4, for Black residential segregation, poverty, percent of uninsured residents in the population, and the availability of
safety net facilities are visually displayed in Figures 3, 4, 5, and 6, respectively. Table 5 lists weighted mean values for all variables in each health systems planning region. Variable measurements for each community area were weighted by the community’s total population and used to calculate the weighted mean values seen in Table 5.

In terms of racial composition, Chicago’s North, Central, and Northwest regions were predominantly White. At least 65 percent of residents in the North, Central, and Northwest regions were White (Table 4). Less than 40 percent of the population in the North and Central regions were from racial/ethnic minority groups. In the Northwest, racial/ethnic minorities accounted for 55 percent of the total population, but the region had the smallest Black population (Table 4). The mean percent of Blacks in the population was 3.24 percent for community areas in the Northwest, 11.21 percent in the North, and 12.92 percent in the Central region (Table 5).

In contrast to the North, Central and Northwest regions, the West, South, Southwest, and Far South regions had large racial/ethnic minority populations. More than 80 percent of the population in the West, South, Southwest, and Far South was minority (Table 4). Both the South and Far South regions of Chicago had predominantly Black populations. Blacks represented a mean of 84.21 percent of the population in community areas in the South and a mean of 69.12 percent in the Far South (Table 5).

With predominantly White populations, the North, Central, and Northwest regions of Chicago had low Black residential segregation. The North, Central, and Northwest regions had the lowest isolation indices in Chicago. The isolation index was 0.24, 0.29, and 0.07 in the North, Central, and Northwest, respectively (Figure 3). Black residential segregation as measured by the isolation index was high in the West, South, Southwest, and Far South regions.
The isolation index was 0.82 in the West, 0.90 in the South, 0.79 in the Southwest, and highest in the FarSouth at 0.92 (Figure 3).

Community areas in the Northwest had the least amount of Black residential segregation. The mean isolation index for Chicago community areas in the Northwest was 0.05 (Table 5). Black residential segregation was highest among community areas in the South. The mean isolation index for Chicago community areas in the South was 0.87 (Table 5). Compared to community areas in other regions, the isolation index for community areas within the Northwest and South regions had the least variability (Figure 4). All community areas in the Northwest had an isolation index below 0.3 (Figure 5). Each community area in Chicago’s South region was highly segregated with the exception of Hyde Park, which was moderately segregated (Figure 5).

Black residential segregation as measured by the mean isolation index was significantly different among several regions. On average, the isolation index for Chicago community areas in the South were significantly larger than isolation indices in community areas located in the North (P < 0.05) and Northwest (P < 0.001). To add, the mean isolation index in the Northwest was significantly smaller than that of the West (P < 0.01) and Far South (P < 0.001).

4.1.3 Local Variations in the Need for Safety Nets

The need for safety net facilities as measured by the poverty rate was lowest in the North, Central, and Northwest regions where the Black residential segregation was lowest. The poverty rate was approximately 16 percent in the North, 11 percent in the Central region, and 14 percent in the Northwest region (Figure 6). Health systems planning regions with the highest levels of Black residential segregation (i.e., the West, South, Southwest, and Far South) had the highest
poverty rates. The poverty rate was above 20 percent in the West, South, Southwest, and Far South regions (Figure 6).

Based on the poverty rate, community areas in the West and South had the highest need for safety net facilities. The mean community poverty rate was 23.97 percent in the West and 25.59 percent in South (Table 5). The mean poverty rate for Chicago community areas in the Northwest was significantly lower than the mean poverty rate for community areas in the West (P < 0.05) and South (P < 0.001). Among the regions with the four highest poverty rates, the poverty rate for community areas in the South region tended to vary the least (Figure 7). There were geographic differences in the poverty rate across Chicago community areas, but poverty appeared to concentrate in community areas located in the South region (Figure 8).

The percentage of uninsured residents fluctuated across health systems planning regions. Based on the percent of uninsured residents in the population, communities in the Northwest, West, and Southwest regions had the greatest need for safety net facilities. Over 20 percent of the population in the Northwest, West, and Southwest regions was uninsured (Figure 9). The percent of the population with no health insurance was highest in the Southwest region at 23.86 percent (Figure 9). The percent of uninsured residents in the population varied substantially for communities within each health systems planning region except for the Central region (Figure 10).

Both the Northwest and West regions had 2 community areas where the uninsured population accounted for greater than 26.9 percent of the community’s total population (Figure 11). There were 4 communities in the Southwest region that had uninsured populations larger than 26.9 percent of the community’s total population (Figure 11). The percentage of uninsured
residents for community in the Southwest was significantly larger than that of community areas in the Central region (P < 0.05) and Far South region (P < 0.05).

4.1.4 Local Variations in the Availability of Safety Nets

Most safety net facilities were located in the North and West. A total of 74 safety net facilities were located in the North and 110 were located in the West (Table 4). The North had a total of 9.72 safety net facilities for every 10,000 residents below the poverty level, and the West had 9.67 safety net facilities per 10,000 residents below the poverty level (Figure 12). The total number of safety net facilities in the West region alone was one less than the combined total number of safety net facilities in the Central, Northwest, South, Southwest, and Far South regions (Table 4). The mean number of safety net facilities per community area was about 10 in the North and 14 in the West (Table 5). On average, community areas in the Northwest, South, Southwest, and Far South regions had approximately 2 safety net facilities (Table 5).

Three of the four regions with the highest isolation indices and poverty rates also had the lowest number of safety net facilities per 10,000 residents below the poverty level. Specifically, the South, Southwest, and Far South regions had three of the top four isolation indices and poverty rates, but fewer than 4 safety net facilities per capita for the population below the poverty level (Figure 12). Only the Northwest region had fewer safety net facilities per capita at 1.89 safety nets per 10,000 residents below the poverty level (Figure 12). Both the total count and ratio of safety net faculties per 10,000 residents below the poverty level for community areas in the Northwest were significantly lower than the availability of safety net facilities in the North (P < 0.001) and West (P < 0.001) regions.
The availability of safety net facilities varied most among community areas in the North and West regions (Figure 13). Nevertheless, community areas in both regions tended to have more safety net facilities than community areas in other health systems planning regions. Only one community area in the North region had fewer than 3 safety net facilities (Figure 14). Every community area in the West had at least 3 safety net facilities (Figure 14). The community of Uptown (CCA 3) in the North region and the community of Austin (CCA 25) in the West region each had more than 17 safety net facilities (Figure 14). Despite the relative abundance of safety net facilities in communities located in the North and West regions, Chicago had 21 community areas with no safety net facilities. Of the 21 Chicago community areas with no safety net facilities, 2 were located in the Far South region, 11 in the Northwest region, and 4 each in the South and Southwest regions (Figure 14).

4.2 CORRELATION ANALYSES

Black residential segregation was associated with both the need for and availability of safety net facilities, but correlations varied across Chicago (Table 6). All of the correlations were significant at the 0.001 alpha level (1-tailed). Based on the isolation index, Black residential segregation had the strongest and most consistent correlation with the poverty rate. The isolation index and the poverty rate were positively correlated for the entire city of Chicago and in every health systems planning region. In addition, racial residential segregation had a strong positive correlation with the percentage of uninsured residents in the North, Central, Northwest, South and Far South regions (Table 6). On the other hand, there was a weak, but significant negative correlation between the isolation index and the percentage of uninsured residents for the city overall and in the West and Southwest regions (Table 6).
As for the availability of safety net facilities, racial residential segregation showed a positive correlation with the availability of safety net facilities for Chicago as a whole (Table 6). In other words, the number of safety net facilities (per 10,000 residents below the poverty level) increased as the isolation index (Black residential segregation) increased in Chicago. This relationship held true in the North, Northwest, Southwest, and Far South regions (Table 6). In the Central region of Chicago, the isolation index was negatively correlated with the availability of safety net facilities (Table 6). Similarly, the isolation index in the West and South were negatively correlated with the availability of safety net faculties (per capita for the population below the poverty level).

Based on the percent of uninsured residents, the need for safety net facilities was not positively associated with the availability of safety net facilities in many areas of Chicago. The availability of safety net faculties (per 10,000 residents below the poverty level) was negatively associated with the percentage of uninsured residents for the city of Chicago as a whole and in all health systems planning regions except for the Northwest and Far South (Table 7). That is, the availability of safety net facilities in most areas of Chicago (excluding the Northwest and Far South regions) decreased as the percent of uninsured residents in the population increased. To the contrary, the availability of safety net faculties (per 10,000 residents below the poverty level) was positively correlated with the poverty rate for the city of Chicago as a whole and for all regions excluding the Central and West regions (Table 7). This means that for the Central and West regions, the availability of safety net facilities was less in community areas with higher poverty rates.
### 4.3 TABLES AND FIGURES

**Table 4. Summary of Selected Demographic Characteristics and Safety Net Availability in Chicago Regions**

<table>
<thead>
<tr>
<th></th>
<th>Chicago</th>
<th>North</th>
<th>Central</th>
<th>North-west</th>
<th>West</th>
<th>South</th>
<th>South-west</th>
<th>Far South</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Racial Composition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Black</td>
<td>32.71%</td>
<td>11.21%</td>
<td>12.92%</td>
<td>3.24%</td>
<td>45.34%</td>
<td>84.39%</td>
<td>29.10%</td>
<td>69.12%</td>
</tr>
<tr>
<td>% Minority</td>
<td>67.75%</td>
<td>38.43%</td>
<td>34.21%</td>
<td>55.17%</td>
<td>81.56%</td>
<td>92.24%</td>
<td>83.60%</td>
<td>82.45%</td>
</tr>
<tr>
<td>% White</td>
<td>47.21%</td>
<td>70.47%</td>
<td>69.26%</td>
<td>65.89%</td>
<td>37.62%</td>
<td>10.04%</td>
<td>40.41%</td>
<td>26.24%</td>
</tr>
<tr>
<td><strong>Black Residential Segregation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation Index</td>
<td>0.8</td>
<td>0.24</td>
<td>0.29</td>
<td>0.07</td>
<td>0.82</td>
<td>0.90</td>
<td>0.79</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Safety Net Demand</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Uninsured</td>
<td>19.45%</td>
<td>15.85%</td>
<td>7.03%</td>
<td>22.27%</td>
<td>22.04%</td>
<td>17.05%</td>
<td>23.86%</td>
<td>15.98%</td>
</tr>
<tr>
<td>Poverty Rate</td>
<td>19.54%</td>
<td>16.03%</td>
<td>11.46%</td>
<td>14.22%</td>
<td>23.97%</td>
<td>25.85%</td>
<td>22.6%</td>
<td>21.56%</td>
</tr>
<tr>
<td>Total Population</td>
<td>2,733,126</td>
<td>474,802</td>
<td>127,124</td>
<td>594,182</td>
<td>474,652</td>
<td>299,442</td>
<td>474,978</td>
<td>287,946</td>
</tr>
<tr>
<td><strong>Safety Net Availability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Safety Net Facilities</td>
<td>295</td>
<td>74</td>
<td>12</td>
<td>16</td>
<td>110</td>
<td>29</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>Safety Net Facilities (per capita)(^a)</td>
<td>5.50</td>
<td>9.72</td>
<td>7.55</td>
<td>1.89</td>
<td>9.67</td>
<td>3.75</td>
<td>3.03</td>
<td>3.54</td>
</tr>
</tbody>
</table>

Source: 2008-2012 American Community Survey 5-Year Estimates

Note: Values are based on census-tract level data aggregated for the city of Chicago and each health systems planning region.

\(^a\) Safety net facilities per capita are per 10,000 residents with incomes in the last 12 months below the federal poverty level.
Table 5. Demographic Characteristics and Safety Net Availability for Chicago Community Areas by Region

<table>
<thead>
<tr>
<th>Racial Segregation</th>
<th>Chicago</th>
<th>North</th>
<th>Central</th>
<th>Northwest</th>
<th>West</th>
<th>South</th>
<th>Southwest</th>
<th>Far South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation Index</td>
<td>Mean</td>
<td>0.40</td>
<td>0.16</td>
<td>0.30</td>
<td>0.05</td>
<td>0.60</td>
<td>0.87</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.37</td>
<td>0.10</td>
<td>0.09</td>
<td>0.03</td>
<td>0.31</td>
<td>0.16</td>
<td>0.36</td>
</tr>
<tr>
<td>Racial Composition</td>
<td>% Black</td>
<td>Mean</td>
<td>32.71%</td>
<td>11.21%</td>
<td>12.92%</td>
<td>3.24%</td>
<td>45.34%</td>
<td>84.21%</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>36.86%</td>
<td>8.69%</td>
<td>6.48%</td>
<td>2.08%</td>
<td>35.96%</td>
<td>18.54%</td>
<td>33.50%</td>
</tr>
<tr>
<td>% Minority</td>
<td>Mean</td>
<td>67.75%</td>
<td>38.43%</td>
<td>34.21%</td>
<td>55.17%</td>
<td>81.56%</td>
<td>92.16%</td>
<td>83.60%</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>27.71%</td>
<td>16.77%</td>
<td>9.57%</td>
<td>21.55%</td>
<td>21.47%</td>
<td>13.06%</td>
<td>15.73%</td>
</tr>
<tr>
<td>% White</td>
<td>Mean</td>
<td>47.21%</td>
<td>70.47%</td>
<td>69.26%</td>
<td>65.89%</td>
<td>37.62%</td>
<td>10.16%</td>
<td>40.41%</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>29.84%</td>
<td>14.27%</td>
<td>9.98%</td>
<td>17.25%</td>
<td>27.91%</td>
<td>14.18%</td>
<td>24.49%</td>
</tr>
<tr>
<td>Safety Net Demand</td>
<td>% Uninsured</td>
<td>Mean</td>
<td>19.45%</td>
<td>15.85%</td>
<td>7.03%</td>
<td>22.27%</td>
<td>22.04%</td>
<td>16.98%</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>7.50%</td>
<td>7.03%</td>
<td>0.13%</td>
<td>6.92%</td>
<td>6.87%</td>
<td>3.74%</td>
<td>6.38%</td>
</tr>
<tr>
<td>Poverty Rate</td>
<td>Mean</td>
<td>19.54%</td>
<td>16.03%</td>
<td>11.46%</td>
<td>14.22%</td>
<td>23.97%</td>
<td>25.59%</td>
<td>22.26%</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>8.39%</td>
<td>5.83%</td>
<td>2.05%</td>
<td>5.31%</td>
<td>6.77%</td>
<td>5.31%</td>
<td>9.40%</td>
</tr>
<tr>
<td>Total Population</td>
<td>Mean</td>
<td>49,023.14</td>
<td>59,350.25</td>
<td>42,374.67</td>
<td>39,612.13</td>
<td>52,739.11</td>
<td>22,764.15</td>
<td>29,686.13</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>23,642.24</td>
<td>19,847.29</td>
<td>33,172.71</td>
<td>21,615.38</td>
<td>27,402.96</td>
<td>11,445.70</td>
<td>13,916.82</td>
</tr>
<tr>
<td>Safety Net Availability</td>
<td>Safety Nets (total count)</td>
<td>Mean</td>
<td>5.71</td>
<td>9.78</td>
<td>4.32</td>
<td>1.83</td>
<td>14.34</td>
<td>2.23</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>6.51</td>
<td>7.96</td>
<td>1.08</td>
<td>2.96</td>
<td>4.75</td>
<td>1.92</td>
<td>2.39</td>
</tr>
<tr>
<td>Safety Nets (per capita)</td>
<td>Mean</td>
<td>5.41</td>
<td>9.23</td>
<td>8.63</td>
<td>1.41</td>
<td>10.56</td>
<td>3.72</td>
<td>3.05</td>
</tr>
<tr>
<td>SD</td>
<td>5.42</td>
<td>5.82</td>
<td>6.09</td>
<td>2.10</td>
<td>4.92</td>
<td>3.75</td>
<td>3.01</td>
<td>2.30</td>
</tr>
</tbody>
</table>

Note: Means weighted by total population size of Chicago community areas.  

Safety net facilities per 10,000 residents with incomes in the last 12 months below the federal poverty level
Table 6. Correlation between Racial Residential Segregation and Safety Net Need and Availability

<table>
<thead>
<tr>
<th></th>
<th>Chicago</th>
<th>North</th>
<th>Central</th>
<th>Northwest</th>
<th>West</th>
<th>South</th>
<th>Southwest</th>
<th>Far South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Net Need</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Uninsured</td>
<td>-0.047***</td>
<td>0.875***</td>
<td>0.673***</td>
<td>0.638***</td>
<td>-0.107***</td>
<td>0.594***</td>
<td>-0.171***</td>
<td>0.348***</td>
</tr>
<tr>
<td>Poverty Rate</td>
<td>0.693***</td>
<td>0.935***</td>
<td>0.992***</td>
<td>0.811***</td>
<td>0.769***</td>
<td>0.095***</td>
<td>0.448***</td>
<td>0.587***</td>
</tr>
<tr>
<td>Safety Net Availability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Nets (per capita)</td>
<td>0.247***</td>
<td>0.043***</td>
<td>-0.947***</td>
<td>0.602***</td>
<td>-0.329***</td>
<td>-0.366***</td>
<td>0.256***</td>
<td>0.455***</td>
</tr>
</tbody>
</table>

Note: Racial residential segregation is based on the isolation index.

*** p < 0.001

Safety net facilities per 10,000 residents with incomes in the last 12 months below the federal poverty level
### Table 7. Correlation between Safety Net Availability and Demand

<table>
<thead>
<tr>
<th>Safety Net Demand</th>
<th>Chicago</th>
<th>North</th>
<th>Central</th>
<th>Northwest</th>
<th>West</th>
<th>South</th>
<th>Southwest</th>
<th>Far South</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Uninsured</td>
<td>-0.151***</td>
<td>-0.202***</td>
<td>-0.400***</td>
<td>0.249***</td>
<td>-0.409***</td>
<td>-0.247***</td>
<td>-0.011***</td>
<td>0.339***</td>
</tr>
<tr>
<td>Poverty Rate</td>
<td>0.153***</td>
<td>0.031***</td>
<td>-0.898***</td>
<td>0.639***</td>
<td>-0.662***</td>
<td>0.214***</td>
<td>0.026***</td>
<td>0.360***</td>
</tr>
</tbody>
</table>

*** p < 0.001
Figure 3. Black Residential Segregation in Chicago Health Systems Planning Regions, 2008-2012
Figure 4. Racial Residential Segregation Across Chicago Health Systems Planning Regions, 2008-2012
Figure 5. Black Residential Segregation in Chicago Community Areas, 2008-2012
Figure 6. Poverty Rate in Chicago Health Systems Planning Regions, 2008-2012

[Bar chart showing the poverty rate in different regions of Chicago. The rates are as follows:
- Chicago: 20%
- North: 16%
- Central: 14%
- Northwest: 24%
- West: 26%
- South: 22%
- Southwest: 22%
- Far South: 0%
]
Figure 7. Poverty Rate Across Chicago Health Systems Planning Regions, 2008-2012
Figure 8. Poverty in Chicago Community Areas, 2008-2012

Legend
Chicago Community Areas
Poverty Rate
- 0% - 10.9%
- 11.0% - 21.6%
- 21.7% - 34.9%
- > 35.9%

0 1 2 4 6 8 Miles
Figure 9. Uninsured Population in Chicago Health Systems Planning Regions, 2008-2012
Figure 10. Uninsured Population Across Chicago Health Systems Planning Regions, 2008-2012
Figure 11. Uninsured Population in Chicago Community Areas, 2008-2012
Figure 12. The Availability of Safety Net Facilities in Chicago Health Systems Planning Regions, 2014
Figure 13. Availability of Safety Net Facilities in Chicago Health Systems Planning Regions, 2014
Figure 14. Total Number of Safety Net Facilities in Chicago Community Areas, 2014

Legend
Chicago Community Areas
Total Number of Safety Nets
0 – 2
3 – 5
6 – 10
11 – 17
> 17

* Community areas with no safety net facilities.
Figure 15. Safety Net Facilities per Capita for the Population Below the Poverty Level in Chicago Community Areas, 2014
Chapter 5

CONCLUSIONS

5.1 HEALTH CARE DISPARITIES IN SEGREGATED BLACK COMMUNITIES

Results from this study disclose valuable information about the effect of racial residential segregation on disparities in access to health care services in underserved neighborhoods. Specifically, correlation analyses reveal that the need for and availability of safety net facilities are associated with the racial residential segregation of Blacks in Chicago. However, correlations vary geographically across Chicago regions, as do predictors of safety net need and availability. Furthermore, safety net facilities are not equitably distributed according to local health care needs in certain regions of Chicago. Disparities were particularly pronounced in segregated Black regions and communities within the city.

For the purposes of this study, the need for safety net facilities was measured by the percent of residents with no health insurance and the local poverty rate. While the correlation between Black residential segregation and the percent of uninsured residents in the population was inconsistent across Chicago, Black residential segregation maintained a positive correlation with the poverty rate in each of Chicago’s 7 health systems planning regions. Based on the poverty rate, communities with higher levels of Black segregation have a higher need for safety net facilities than communities with lower levels of Black segregation. However, descriptive statistics showed that areas with higher levels of segregation tended to have fewer safety net facilities (per 10,000 residents below the federal poverty level). This infers that safety net facilities are not equitably distributed according to need in segregated Black communities.
The decreasing trend in safety net facilities in segregated Black regions with relatively high poverty rates was evident in the southern regions of Chicago (i.e., the South, Southwest, and Far South), but not in the West. While there were a total of 83 safety net facilities in the South, Southwest, and Far South regions combined, 110 safety net facilities were located in the West region alone. However, correlation analysis shows that the availability of safety net facilities was inversely related to the need for safety net facilities in community areas within the West region. This means that although the region as a whole had an abundant supply of safety net facilities compared to other Chicago regions, there were inequalities in the local distribution of safety net facilities on the community-level within the West region.

The extensive supply of safety net facilities in the West may be linked to the location of a group of medical and research related institutions known as the Illinois Medical District. Partners of the Illinois Medical District include: John H. Stroger, Jr. Hospital of Cook County, Rush University Medical Center, University of Illinois Medical Center, Cook County Bureau of Health Services, and the Jesse Brown VA Medical Center (Illinois Medical District Commission, 2014). John H. Stroger Hospital and the University of Illinois Medical Center are both major sources of safety net care in the West region. The construction of safety net facilities in Chicago appears to be concentrated in the West around the Illinois Medical District. This highlights the need for better regional planning in terms of the distribution of safety net facilities throughout the city. Safety net facilities should be formed in areas outside of the West where the health care infrastructure is less developed.

The findings from this study contribute to the existing literature on health care disparities in a number ways. For one, findings of a consistent positive relationship between Black residential segregation and poverty corroborates claims in previous studies that racial residential
segregation concentrates Blacks in neighborhoods with high poverty and subsequently leads to health and health care disparities (Williams & Collins, 2001). Segregated Black communities with high poverty rates may require an expansion of safety net facilities to prevent health and health care disparities among local residents. Prior research also suggests that segregated Black communities need safety net facilities to combat physician shortages (Gaskin et al., 2012). This highlights the importance of safety net facilities in segregated Black communities that may be underserved by the health care delivery system. Future studies should continue to explore the role of racial residential segregation on the need for health care resources such as safety net facilities. Of particular interest should be those community-level factors that not only represent a need for health care services, but also factor into the relationship between racial segregation and health disparities.

Secondly, the results of this study address issues related to using large geographic units of analysis to examine disparities in access to care. Ko & Ponce (2013) found that the supply of safety net facilities was greater in racially segregated counties. To the contrary, correlation analyses from this study reveal spatial variations in the relationship between Black residential segregation and the availability of safety net facilities within the city of Chicago. Despite novel contributions to the literature, the study by Ko & Ponce (2013) was unable to draw conclusions about the availability of safety net facilities in local neighborhoods because variables were measured on the county level. The current study uses smaller units of analysis and measures a wider range of safety net facilities to capture a more precise determination of where shortages in the availability of safety net facilities exist. Geographic variations in the need for and availability of safety net facilities across Chicago communities suggest that data analyzed at the city-level or higher may mask disparities in access to care on a more local community-level. For
those reasons, future assessments of local health care disparities should use smaller units of analysis. Local level analyses may improve the ability of researchers and policymakers to identify geographic disparities in access to health care services.

5.2 STUDY LIMITATIONS

This study has several limitations. Most notably, the areal units of analysis for this study posed several challenges. The geographic unit of analysis utilized in this study causes the results to lack generalizability. The community areas and health systems planning regions are specific to Chicago. As such, results cannot be generalized to places outside of Chicago.

Statistical analyses were run using variables measured on the city-level, regional-level and community-level. Results varied substantially between tests that used the city of Chicago overall as the unit of analysis and those that used Chicago’s health systems planning regions or community areas. The sensitivity to changes in the scale and zoning of the areal unit of analysis is referred to as the modifiable areal unit problem (Fotheringham & Wong, 1991).

Conclusions are also limited by the uncertain geographic context problem. The uncertain geographic context problem posits that uncertainty in the spatial and temporal dimensions used to measure areal-level characteristics may lead to erroneous results (Kwan, 2012). Thus, the geographic unit of analysis needs to be representative of the “true causally relevant” factors that influence the health related outcomes being studied (Kwan, 2012). The boundaries for community areas and health systems planning regions are based on census tracts. Additional research is necessary to determine whether Chicago’s community areas and health systems planning regions serve as appropriate areal units of analysis for public health research.
Besides concerns about the unit of analysis, it is important to note that the measurements for the availability of safety net facilities do not explicitly consider the supply of safety net facilities in neighboring regions. A community area may have a low number of safety net facilities, but access to safety net facilities may be available in nearby communities. To add, this study examined the availability component of access alone. Future studies should explore other dimensions of access. Studies that seek to build on work related to the geographic distribution of safety net facilities should pay close attention to the accessibility dimension of access. Studied together, availability and accessibility measures can explain the spatial accessibility of health care resources (Guagliardo, 2004).

5.3 POLICY IMPLICATIONS

The results of this study can be helpful for local public health policies, especially those related to the allocation of health care resources in underserved neighborhoods. The Chicago Department of Public Health currently has an initiative called Healthy Chicago that aims to improve the health of Chicago residents and access to care. The initiative includes an assessment of safety net facilities that serve medically underserved areas. The results from this study may be useful in such assessments. Specifically, assessments of the health care safety net in Chicago should focus on underserved communities in the Northwest, South and Southwest regions of the city. These regions were shown to have large uninsured populations and high poverty rates, but a scarce supply of safety net facilities.

In the North region, efforts to expand the health care safety net should focus on the communities of Avondale and Hermosa. Both communities have zero safety net facilities and rank among the community areas with the ten highest percentages of uninsured residents.
Attempts to expand the health care safety net in the Southwest region should focus on the Clearing and West Lawn communities. The availability of safety net facilities surrounding these communities is also limited. The majority of community areas surrounding Avondale, Hermosa, Clearing, and West Lawn have two or fewer safety net facilities. Thus, vulnerable populations in those communities may lack adequate access to care and be at risk of falling through the cracks for the health care system.

In the South region, the four communities that have no safety net facilities are clustered together. Those communities include: Burnside, Chatham, Avalon Park, and Calumet Heights. The need for safety net facilities is especially high in Burnside, which has the second highest poverty rate in Chicago and an uninsured population that accounts for greater than 22 percent of the community’s total population. Disparities in access to care may be exacerbated in Burnside because the community area neighbors 3 communities that also have no safety net facilities. The total population of Burnside is amongst the smallest in the city, but the relatively high prevalence of vulnerable low-income and uninsured residents in the area coupled with the limited availability of safety net facilities in nearby community areas should make Burnside and its neighboring communities in the South region a top priority in terms of building new safety net facilities.

In conclusion, provisions under the Affordable Care Act to build and expand safety net facilities deserve greater focus and commitment. As the Affordable Care Act is implemented, the health care safety net will play a vital role in providing health care to underserved areas and vulnerable populations that would otherwise lack access. The need for safety net facilities will likely be highest amongst individuals who remain uninsured and those who meet the expanded income requirements for health insurance coverage under the Medicaid program.
As demonstrated in this study, segregated Black communities heavily populated by vulnerable uninsured and low-income individuals may have limited access to safety net facilities. It is therefore imperative to expand the focus of health care reform policies beyond health insurance coverage to address disparities in access to care in underserved areas of the US. Policymakers must begin to examine the geographic distribution of safety net facilities more closely, particularly in racially segregated communities that may be underserved. A greater focus on the availability of health care resources in underserved areas can support efforts to reduce disparities in access to care and move the nation closer to achieving health equity.
REFERENCES


Darnell, J. (2011). What is the role of free clinics in the safety net?. *Medical Care, 49*(11), 978-984.


