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HOPE VI Relocations and Spatial Access to Safety Net Primary Care in Atlanta, GA

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HOPE VI Relocations and Spatial Access the Safety Net Primary Care in Atlanta, GA

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2007

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An abstract of

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Abstract

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By Stephanie Wodarski

The goal of HOPE VI is to relocate residents of severely distressed public housing facilities to less impoverished, safer areas of the city. The HOPE VI initiative's objectives include improving living conditions by demolishing or rehabilitating severely distressed public housing units, rehabilitating the neighborhoods surrounding public housing sites, creating or locating housing that has lower poverty rates and building communities that will be sustainable over time (Popkin et al. 2004).

Impoverished individuals who live in economically underprivileged communities, like public housing, often have limited or decreased access to healthcare (Anderson, Yu, Wyn, et al., 2002). The purpose of this research is to determine if participants of the Emory HOPE VI project have increased or decreased access to safety net primary care (providers that deliver a considerable amount of their services to populations that are uninsured, on Medicaid, or otherwise vulnerable) after they relocate from public housing into various areas of Atlanta.

Using Gravity Based Modeling, the potential access of 170 HOPE VI participants in the Atlanta area was measured pre- and post-relocation. Overall there was an overall decrease of 54% in potential access to safety net primary care after residents relocated from Atlanta Housing Authority public housing.

Some safety net primary care facilities are only able to locate clinics in areas that have met specific criteria that demonstrate the neighborhoods' need for that type of care. When residents relocate to less impoverished areas they are less likely to have access to safety net primary care.

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Introduction

Until 1994, when the Housing Opportunities for People Everywhere (HOPE VI) initiative was drafted, common practice placed impoverished populations that lived in public housing into geographically concentrated units, which were often high-rise or campus-like developments. Subsequent to the start of HOPE VI, housing policy began to dictate that residents of severely distressed units should be dispersed throughout the community and that the remaining structures should be torn down, or that those developments that could be revitalized should be redeveloped. The goal of this policy was that the residents would then relocate to less impoverished, safer areas of the city, and concentrated poverty and its associated problems would be reduced. The HOPE VI initiative's objectives include improving living conditions by demolishing or rehabilitating severely distressed public housing units, rehabilitating the neighborhoods surrounding public housing sites, creating or locating housing that has lower poverty rates, and building communities that will be sustainable over time (Popkin et al. 2004).

Impoverished individuals who live in economically underprivileged communities like public housing, often have limited or decreased access to healthcare (Anderson, Yu, Wyn, et al., 2002). Within primary care, there are two types of access which can be measured, potential and realized access. Potential access refers to the existence of resources or establishments that provide the necessary health services that these populations need (Anderson 1995). Potential access will be explored for the purposes of this paper. Access to health care has many definitions, but most simply stated by the

Institute of Medicine is "... the timely use of personal health services to achieve the best possible outcomes" (Milman 1993, pg 33).

Anderson's Behavioral Model of Health Care Use (BMHCU) posits that health care use and individual health outcomes are driven by predisposing characteristics, enabling resources, and need. Specifically, the enabling resources element, will be used to explore if spatial access to safety net primary care decreases post relocation for relocated, adult HOPE VI residents in the Atlanta metro area as a function of spatial access to safety net primary care facilities.

Background and Significance

Public Housing in the United States

Public housing in the U.S. first appeared as a result of the Great Depression and under the auspices of the New Deal in the early 1930's. These developments are the oldest in the nation and one of them was located in Atlanta, Georgia: Techwood Homes. These initial developments were considered to represent a vast upgrade in comparison to the slum-like units they were meant to replace and were expected to be in use for at least 60 years (Bowly 1978). Because the federal government deemed construction of public housing by the federal government to be unconstitutional, Congress passed the United States Housing Act of 1937. This legislation required a unit of new housing to be created to replace each unit of slum housing that was destroyed, shaping the face of public housing into what we know today. In the beginning, public housing could only be attained by those people who had sufficient income to pay rents that had to be high enough to cover operation costs of the properties, essentially creating housing that only working class, and not impoverished populations, could afford to live in (Fosburg et al. 2006).

By the 1940's and 1950's, a trend towards high rise developments had created the opportunity to place even more units on one piece of property (Bowly 1978). After World War II, there was an increase in demand for housing programs overall as well as new federal restrictions on who was eligible for public housing. Policies began to target low income families and require a specific gap between upper and lower income limits which effectively pushed families that fell outside of this gap out of housing programs and into subpar accommodations or homelessness. New policy also dictated that if a family currently in a housing program's income level rose above a specified limit, they were to be evicted. By 1949, new regulations were introduced that gave priority to veterans and families displaced by the destruction of degraded housing. Coinciding with these restrictions and increased demand, urban renewal programs began to tear down public housing that up until then had been accessible for impoverished populations drove the high rise trend to its limits. Chicago embodied the high rise craze by building a string of high rises made up of more than 4,000 individual units along a four mile long section of State Street to become the largest in the country.

However, by the late 1960's, several of these developments were considered to be unfit for those living in them; by the 1970's construction of these sweeping developments had slowed to a stop. Also during the 1960's, new legislation discouraged the construction of new developments and began to encourage the leasing of private housing. This eventually led to the Section 8 program. From the 1970's to the 1980's, concentration of very impoverished minorities increased due to a ban on discrimination as a result of the civil rights movement. The steadily declining income rate, due to the previously mentioned creation of new income policies that dictated who was eligible for

public housing, and an ever increasing concentration of the population in public housing was further exacerbated by regulations in the 1980's which favored exceptionally impoverished individuals (Fosburg et al. 2006). In short, poor management on the part of housing authorities and insufficient funding created large amounts of needed repairs that were never completed, and unsafe living conditions that created risk for injury and disease (Popkin et al. 2004).

The National Commission on Severely Distressed Public Housing

The National Commission on Severely Distressed Public Housing was established under Public Law 101-235 in 1989 with the task of eliminating all severely distressed public housing by 2000. The Commission was made up of commissioners who were appointed by members of the Senate, House of Representatives, and the Secretary of the U.S. Department of Housing and Urban Development (National Commission on Severely Distressed Public Housing 1992).

When the National Commission on Severely Distressed Public Housing gave its final report to Congress in 1992, it noted that not only were the physical buildings deteriorating, but the populations living within them were in great need of "immediate attention" and that these communities were considered severely distressed (Popkin et al. 2004). The Commission then defined severely distressed public housing by focusing not just on the deteriorating physical conditions of the structures, but also on the health and well being of the residents and surrounding community. Severely distressed public housing is thus now defined as having the following characteristics: (1) residents living in despair and generally needing high levels of social and supportive service, (2) physically deteriorated buildings, and (3) economically and socially distressed surrounding communities (Popkin et al. 2004).

This definition was reformatted and made into code in the Quality Housing and Work Responsibility Act of 1998, which defines severely distressed public housing as housing that (1) requires major redesign, reconstruction, redevelopment, or partial or total demolition . . . (2) is a significant contributing factor to the physical decline and disinvestment . . . in the surrounding neighborhood; (3) is occupied predominantly by . . . families with children that are very low income, whose members are unemployed and dependent on various forms of public assistance, or has high rates of vandalism and criminal activity; and (4) cannot be revitalized through assistance under other programs (Popkin et al. 2004).

Based on this definition the Commission determined that nearly 86,000 public housing units in the nation were severely distressed (National Commission on Severely Distressed Public Housing 1992). The Commission was careful to point out that even though the 86,000 units made up only about 6% of the national public housing supply, that that 6% represented a “significant number of families are living in extreme poverty in almost unimaginable and certainly intolerable conditions [sic],” and the remaining public housing that was providing an important service and doing so effectively (National Commission on Severely Distressed Public Housing 1992, pg. 2).

The Commission recommended that increased funding for support services and a nationally coordinated system would allow residents to eventually become self-reliant. This self-reliance could be accomplished by requiring Public Housing Authorities (PHAs) to address resident recommendations and implement them across the country when working to improve the severely distressed housing units. In order to improve the poor management practices associated with the distressed housing developments, the

Commission planned to better monitor and assess the performance of PHAs and create more appropriate operating subsidies, rent calculations, and eligibility requirements to encourage a more mixed income setting in public housing (Fosburg et al. 2006). As for the issues of physical decay of the developments, the Commission proposed to make more guidance available to PHAs in regard to the continuing maintenance and facilitation of their respective developments across the country (Fosburg et al. 2006).

HOPE VI

The HOPE VI initiative was developed in direct response to the National Commission on Severely Distressed Public Housing's charge to wipe out severely distressed public housing. HOPE VI was developed to accomplish this through physical and management improvements and the creation of services to help address residents' needs. The resulting Departments of Veterans Affairs and Housing and Urban Development (HUD), and Independent Agencies Appropriations Act of 1993 marked the birth of HOPE VI (HUD, 2008). HOPE VI takes action by working with local PHAs to raze severely distressed, geographically concentrated public housing communities and campuses and helping relocate residents into units in less impoverished areas around the community, as well as by rehabilitating dilapidated structures and revitalizing surrounding communities and neighborhoods that may have been affected by the decline of the complexes or structures.

According to multiple articles on the aftereffects of HOPE VI relocations, the majority of residents who lived in structures deemed severely distressed, as well as a high percentage of the people who live in neighborhoods surrounding severely distressed housing structures, were primarily black and impoverished (Fosburg et al. 1996, Popkin et al. 2002). National HUD data shows that most HOPE VI residents are black or Hispanic and that 88% of the residents of the neighborhoods located around the severely

distressed complexes were minorities as well (Fosburg et al. 2006). Although the original populations living in most of the HOPE VI developments were not the very impoverished, the original residents were displaced by homeless, severely impoverished, and other vulnerable populations due to lowered income qualifications and other federal policies (Fosburg et al. 2006).

HOPE VI is a unique program in that it addresses the issue of severely distressed public housing by (1) requiring PHAs to center their attention not only on the physical conditions of the housing developments, but on the social and economic well being of the developments' residents and (2) allowing those PHAs to have some input and decision making power in determining in what manner they should go about accomplishing those goals (Fosburg et al. 1996). For an individual PHA to be eligible to apply to participate in the HOPE VI program, the development had to either (1) be located in one of the 40 most highly populated U.S. cities (as determined by the 1990 U.S. Census) or (2) be on HUD's Troubled Housing Authority list by March 31, 1992. To participate in the program, PHAs had to provide documentation of severe distress as determined by the categories described by the National Commission on Severely Distressed Public Housing's Final Report (Fosburg et al. 1996).

HOPE VI in Atlanta and the Atlanta Housing Authority

The Atlanta Housing Authority (AHA) is the local PHA in Atlanta, Georgia that carries out HOPE VI relocations. This organization, developed under state law, assists in the development and acquisition of affordable housing for nearly 50,000 individuals in the Atlanta area, making it one of the largest organizations of its type in the US. There are seven severely distressed AHA communities in the Atlanta area that this research is targeted towards. There have been several waves of relocations in the Atlanta area, but

this study focuses on the final and most recent one. Atlanta has embraced the shift to relocate public housing residents, as evidenced by the relocation of many of the public housing communities prior to the 1996 Olympic Games.

In 1994, a HUD sanctioned Inspector General's Audit Report determined that Atlanta Housing Authority developments were so severely inadequate that they were no longer safe or clean enough to be inhabited, so much so that AHA was very nearly disbanded and seized by the federal government. It was determined that 88% of the units that had been inspected did not even meet the minimum standards of safety or cleanliness. Of the units that were not found to be boarded up and abandoned, there were a myriad of problems such as huge numbers of rodents, exposed lead paint, electrical dangers, and in some cases even missing doors and windows. Funds had been poured into the failing structures, but because the structures themselves were deficient, no amount of repairs could correct the damage. The physical disorder as well as crime problems had created numerous vacancies across the city (Boston 2005). That same year, a new Executive Director of AHA was appointed and thus began a fundamental change in the methods the organization used to provide public housing services in the Atlanta area. The new director had four distinct arguments about the changes that AHA would undergo:

- 1) Traditional public housing developments had simply been a place to keep impoverished populations and had not provided a stable home structure for families.
- 2) A "cycle of social disorders that was impossible to break by simply rehabilitating housing units" had been created by intense population density and poverty along

with poor physical conditions called for total redevelopment instead of rehabilitation.

- 3) The focus of AHA and its policies should remain with the families residing in public housing, not just with the physical conditions of the buildings and developments.
- 4) Building stand alone affordable housing with no mixed development component would never work, instead, market rate housing should be built including an affordable housing component (Boston 2005).

Spatial Access to Care

Access, in the case of access to healthcare, “is the outcome of a process, determined by an interplay between the characteristics of the health care service system and the characteristics of the population-at-risk in a specified area and moderated by health care related public policy/planning efforts.” Although this definition makes access to healthcare research seem intrinsically spatial, the distinction between spatial and aspatial, or social, access to healthcare should be made apparent. Spatial access considers, in the most clear-cut consideration, distance variables. Distance can serve as either a barrier or facilitator for access to healthcare. Geographic or spatial access can also include mode of transportation, road networks, and simple spatial densities of populations or healthcare providers. Aspatial access, or social access, can be investigated on the individual or community level and takes any or all non-geographic variables into consideration. Social access can be influenced by health insurance status and income level.

Healthcare access barriers have been grouped into five different widely recognized and accepted categories including availability, accessibility, affordability, acceptability, and accommodation. Affordability, acceptability, and accommodation all speak to the

aspatial or social access to healthcare previously discussed, while availability and accessibility are both naturally spatial. Availability involves the amount or actual number of service locations (such as hospitals or clinics) that a person has to choose from, meaning simply the raw number of service locations that exist within the boundaries of the study area. Accessibility refers to the distance or time between the patient seeking care and the available service points. Research commonly recognizes the distinctive difference between these two categories but also notes that in urbanized areas where there are often multiple service locations that a patient could potentially access or choose from, that they should be considered as a joint measure. This practice is commonly referred to as measuring “spatial accessibility” or SA (Guargliardo 2004).

Safety net healthcare providers are those that deliver a considerable amount of their services to populations that are uninsured, on Medicaid, or otherwise considered vulnerable. The core of these healthcare providers are legally bound or were created with the sole intent of catering to populations whether or not they are able to pay, and the majority of their patient load are uninsured, on Medicaid, or considered to be vulnerable. These providers are most often public hospitals, community health centers, local health departments, and specialized clinics like those for AIDS (Millman 1993).

Within primary care and primary safety net care, there are two types of access which can be measured, potential and realized access. Potential access refers to the existence of resources or establishments that provide the necessary health services that these populations need. Realized access is measured by the actual use of these services, or whether or not the population in question is actually utilizing the services being offered (Anderson 1995).

Spatial Access to Care for Impoverished Populations

Impoverished individuals and those who live in economically underprivileged

communities like public housing, often have limited or decreased access to healthcare (Anderson, Yu, Wyn, et al., 2002). There is a well-documented occurrence of decreased access to healthcare among low income and minority individuals (Anderson et al. 2002, Millman 1993). Disparities in access to care can occur for a variety of reasons, including uneven distribution of federal or state resources, healthcare and welfare reform, and insurance rates.

Little work focuses on individual HOPE VI residents post-relocation and the effect on spatial access to care, but some have looked at the overall effect on health and well being. The HOPE VI Panel Study tracked over eight hundred public housing residents from five locations scheduled for redevelopment between 1999 and 2000. The baseline report states that prior to relocation the residents reported being in poor overall health at a rate higher than other low income households (HOPE VI Panel Study). Based on subsequent surveys, residents' health statuses have not improved after relocation to lower-poverty neighborhoods (Poor Health Adding Insult). The HOPE VI Panel Study also found that regardless of improved living conditions after relocation to market rate housing, there was no indication that the housing quality alone had a positive effect on the residents' health and that in some cases residents self reported a negative health effect after relocation. The authors call for "urgent attention and new approaches to providing effective services to this extremely vulnerable population" (Poor Health), but more research needs to be conducted to understand what variables or experiences have created no change in the health status of the relocated residents.

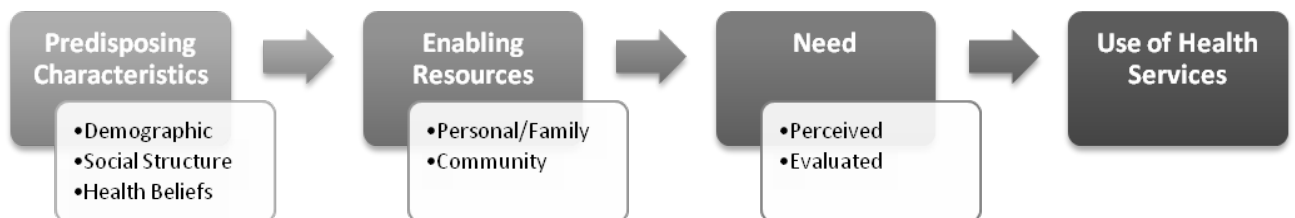
Even though some work shows that health status does not improve post relocation, there is some evidence that has shown that when residents of public housing relocate, the neighborhoods they relocate to are generally safer and are less impoverished overall. There is less violent crime, less drug activity, and have overall lower rates of poverty (Cromy, 2007). For residents this means that they live in areas that are less violent and have illegal drug activity, and have generally improved living conditions. While overall quality of life for the relocated residents may in fact improve, living in an area that does not have a history of providing care for impoverished populations could cause a reduction in spatial access to safety net primary care. The researcher expects to find that relocated residents will have decreased spatial access to safety net primary care according to GBM results.

Theory

Andersen's Behavioral Model of Health Care Use (BMHCU) was first created in the 1960's to help 1) understand why, at that time families, use health services, 2) measure and create definitions of equitable health care access, and 3) aid in the development of policies that help create more equitable access to health care. Initially the creator wanted to explain the pathways that factored into the use of services as opposed to what happened once a person actually received care. The family was the original unit being studied, but later Anderson switched to the individual because focusing on the family does not allow for the existence of "heterogeneity" of the individuals within the family unit (Anderson 1995). There has been a shift to focus not only on the individuals' decision making process, but on the influence of the community in which the patients live (Anderson et al 1973 and Anderson 1995). Characteristics of the community such as the quantity of facilities and how crowded those facilities are can

affect how likely people are to use them, as well as the attributes of the geographical area in which the patients live and where the medical facilities are located such as how urbanized an area is (Anderson et al 1973).

The original model from the late 1960's posited that health care use, and later individual health outcomes, was driven by three factors: predisposing characteristics, enabling resources, and need (Figure 1). Predisposing characteristics are those which exist prior to the start of an illness or health problem and shape how families or individuals seek care. These characteristics can include demographic characteristics like age and gender. Societal structures and health beliefs can also contribute to predisposition to seek care. The social structure is typically measured using variables like education, income, and occupation and speaks to how a person uses their available resources to manage problems, how they interact with their environment, and how those coping mechanisms or interactions can affect their health. This can also include the healthiness of the physical environment in which they live. Health beliefs are shaped by a person's "attitudes, values, and knowledge" about their health and how those attitudes and values can affect their perceived need to access healthcare (Anderson 1995).



1995).

Figure 1: Anderson's Behavioral Model of Health Care Use

Enabling resources are individual or community level factors that either enable or inhibit individuals from accessing and making use of health care facilities. For example at the community level there must be healthcare facilities available for use, but on the individual or family level a person must also have the resources to access them such as adequate income, insurance or transportation to the facility.

Thirdly, need is characterized as being either perceived, how one views their own state of wellbeing and health; or as evaluated, a professional judgment of the individuals' state of health or wellbeing. The creator of the model believed that perceived need is primarily the result of social structures and can be adequately accounted for by social structure and health beliefs.

The most recent version of the model includes health status outcomes which extends measures of access but is not appropriate for this research (Anderson 1995). The proposed model being used for this current research can be seen in Figure 2.

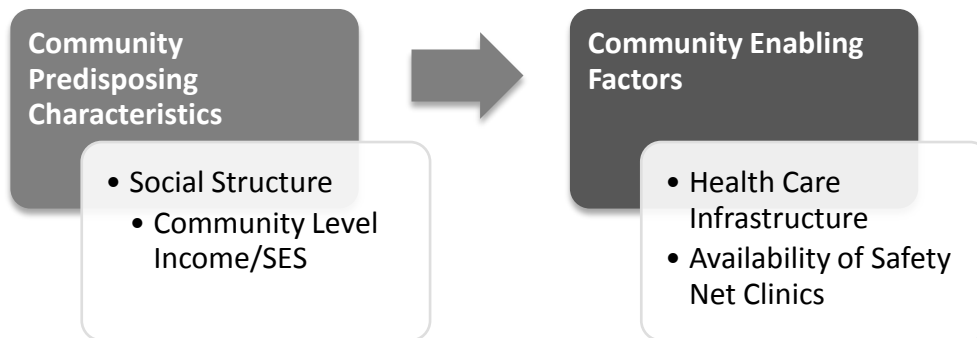


Figure 2: Predisposing Characteristics and Use of Health Services

Community level predisposing characteristics, in particular income level or social economic status (SES) of the community will be the driving force behind potential access

to care. These predisposing characteristics feed into enabling factors at the community level including the infrastructure of the health care system and the availability of safety net primary care.

No individual participant's address will be reported analyses will be conducted using individual addresses but results will only present analysis outcomes in order to protect confidentiality. Based on these findings and calls to action, this research will explore if spatial access to safety net primary care decreases post relocation for relocated, adult HOPE VI residents in the Atlanta metro area as a function of spatial access to safety net primary care facilities. Derived from this research goal, the researcher has the following hypothesis:

1. Relocated residents will have decreased spatial access to safety net primary care according to Gravity Based Model results

Data and Methods

Background on Original HOPE VI Research Study

The proposed research was conducted using data drawn from Drs. Hannah Cooper and Loida Bonney's Atlanta-based HOPE VI study. The study follows 180 residents of Atlanta's final seven relocating public housing structures. These seven communities are Thomasville Heights, Bowen Homes, Bankhead Homes, Roosevelt House, Palmer House, Hollywood Court, and Herndon Homes, which can be seen in Figure 3. The goal of the study is to track residents as they relocate throughout the city in order to evaluate changes in their neighborhood conditions and social networks and explore how those changes affect their health, specifically their HIV risk factors and substance abuse. To be eligible to participate in the study individuals must have resided in one of the 7 AHA communities, be at least 18 years old, African American, have been

sexually active in the past 12 months, and could not have been living with another study participant at baseline.

Quota sampling was used to create a sample that was diverse in regard to participants' alcohol and other drug (AOD) use status at baseline. A sample made up of 25% AOD dependent, 50% AOD abusing but not dependent, and 25% not abusing AODs the goal. Analysis was conducted with waves 1 and 2 of data collection.

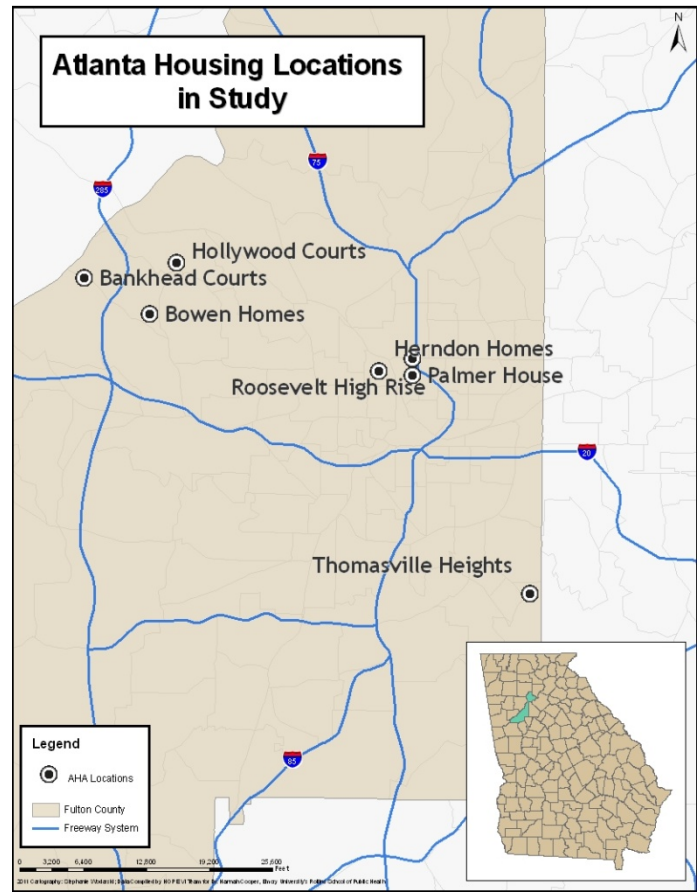


Figure 3: Map of Atlanta Housing Authority Locations Used in Study

The data analyzed here were gathered at baseline, before the participants relocated, and then at least six months after they relocated from the AHA housing structures. Study participants completed both a baseline and relocation (i.e. wave two), interview with a study staff member as well as provided up to date information on their current living situation at the time of each interview. Addresses for each participant were taken from this paperwork at each interview session and entered into the participant database.

For the purposes of this secondary research, two types of data were used. First, addresses of the participants of the HOPE VI study were collected from the participant database or paper files. The baseline or pre-relocation address corresponds to one of the

seven AHA residences from which the sample was initially drawn. The second address was the participant's address at which they lived when they completed their second, or wave two, interview.

Second, the locations of safety net primary care locations were compiled from Health Resources and Services Administration (HRSA), as well as state, county, and local health department websites. For the purposes of this study, safety net primary care was defined using the Institute of Medicine's definition from their report on safety net care in the United States which is as follows:

“Safety net providers are providers that deliver a significant level of health care to uninsured, Medicaid, and other vulnerable patients (IOM 2000).”

This definition was operationalized as facilities which (1) accept Medicaid and (2) either provide free services and/or offer a sliding scale fee structure for costs that are not covered by insurance or for those patients who are uninsured.

Methods

Data including participants' post-relocation addresses, the addresses of the original seven AHA locations, and primary care facilities were entered into a GIS (geographic information system). The GIS visualizes where the participants have relocated to as well as helps aggregate participant addresses to the census tract level in order to protect their information.

Potential spatial access to safety net primary care was assessed using Gravity Based Modeling (GBM). GBM will be used to model the potential spatial access of each HOPE VI resident before and after the relocations. GBM uses a Gaussian impedance function, which creates a friction parameter to decrease the likelihood of access as distance increases to determine how high the potential access is for each facility. GBM was

performed for the original seven AHA communities as well as each of the participants' post relocation residences. Gravity modeling was chosen because it allows for distance-decay (as distance increases, desirability or accessibility decreases), which lends itself perfectly to potential access (Fortney et al. 2000).

Spatial Access to Primary Care

Base Map Creation

Table 1: Data Collected, Data Source, and Date of Data

Data Collected	Data Source	Date of Data
Base Map		
Census tract boundaries, street networks, and county boundaries.	Atlanta Regional Commission (ARC)	2000
Gravity Model Variables		
Participants' addresses and pre relocation AHA housing community.	HOPE VI Relocation Study	2009-2010
Locations of county public health clinics obtained from Fulton and DeKalb County health services websites.	Fulton and DeKalb County Health Departments	2009
A list of Federally Qualified Health Centers in the Atlanta area.	Health Resources and Services Administration (HRSA)	2009

Table 1 shows a description of the various data sources and the data ultimately collected from those sources and what they were used to accomplish. The Atlanta Regional Commission's website provides reliable and accurate Atlanta regional geographic data files free for public use. Shapefiles containing Atlanta-metro census tract boundaries from 2000, the most up to date street networks, and county boundaries were all obtained from this website and were all used to create the basemap for analysis(ARC.com). Dr. Cooper's HOPE VI relocation study provided the participants' addresses both pre and post relocation which were collected during 2009 and 2010. Fulton and DeKalb County health departments as well as the Health Resources and Services Administration (HRSA)

websites were used to research and ultimately locate the addresses for service locations fitting the research criteria. These service locations were located by HOPE VI study staff and refer to the state of service locations in 2009.

All of the boundary files and street network files were loaded into ArcMap, a geographic information system (GIS) developed and marketed by Environmental Systems Research Institute (ESRI). This program is used to visualize and analyze geographic data.

Participant addresses, both pre- and post-relocation, and the addresses of safety net primary care facilities were entered into ArcMap using a process called geocoding. Geocoding is a process in which locational data such as postal addresses is transformed into an “absolute geographic reference (Goldberg et al).” An absolute geographic reference simply refers to a location that has been given a set of x,y coordinates that refer to the location’s latitude and longitude as opposed to using a more relative locational technique like addresses, which can vary across administrative or political boundaries. The outcome of this geocoding process is shown in Table 2. For the placement of safety net primary care facilities as well as relocation addresses, the majority of the placements were made automatically by the program while only a few had to be manually located. All of the original AHA housing communities were placed specifically by hand because many were located near census tract boundaries and study supervisors wanted to ensure proper placement.

Table 2: Safety Net Primary Care Geocoding Process Outcome

Safety Net Primary Care Geocoding Results		
Match Type	Number of Points	Percentage of Total Points
Automatic by Program	24	66.7%

Manual by Program	5	13.8%
Point Placed by Hand	7	19.4%
Relocation Addresses Geocoding Results		
Automatic by Program	130	76.5%
Manual by Program	14	8.2%
Point Placed by Hand	26	15.3%
Original AHA Locations Geocoding Results		
Automatic by Program	0	0%
Manual by Program	0	0%
Point Placed by Hand	7	100%

Measures

Gravity models allow for distance-decay, meaning that as distance increases, desirability or accessibility decreases. However, gravity models do have some limitations. This type of modeling results in “place access,” meaning that the results only apply to the specific circumstances of the patients and service locations that the model is applied to in one specific instance. This means that results of one gravity model cannot be compared to the results of a gravity model based on another location. Results to this type of analysis are region specific. This limitation will not be a factor in this case because both gravity models, pre and post relocation, will be conducted for the same area and thus allowing the comparison of changes in access (Kahan). The original model for potential access was created by Hansen (1959) and is defined as accessibility A at a location i :

$$A_i = \sum_{j=1}^n S_j d_{ij}^{-\beta}$$

In this equation S_j is how attractive a destination, j , is; d_{ij} represents the travel time or, in this case, the distance between the two locations i and j ; β is a distance decay function that determines how important distance is in the equation, and finally n is the total

number of destinations. For the purposes of this study, the attractiveness, or S_j , for each service location were all set equally to a value of “1” to make them all equally attractive except for the distance decay. Distances are calculated using ArcMap and are presented in a straight line distance matrix to be used to calculate the gravity score. After GBM scores were calculated for each participant, the percent change between baseline and wave 2 GBM scores were calculated for comparison.

Analyses

Descriptive statistics were used to explore and compare the results pre- and post-relocation. A GBM score was calculated using a tool created for ArcMap for each participant both pre and post relocation using the same set of safety net primary care facilities. A GBM score was calculated for each participant’s pre-relocation housing community as well as their post relocation address. Two participants had moved out of state and were thus removed from the pre and post relocation calculations. After each participant was assigned a GBM score, the mean, median, standard deviation, and interquartile range was calculated for all participants both pre and post relocation. Finally the percent change in GBM score pre and post relocation for the group of participants as a whole was calculated.

Ethics

All participant data is saved and accessed through a protected drive on Emory’s campus that can only be accessed via password from a HOPE VI relocation team member with IRB approval and up to date CITI Certification.

Results

Figure 4 provides a map that illustrates the location of the seven original public housing locations as well as a choropleth representation of the raw count of how many

participants relocated into each census tract. The black pushpins represent the locations of the 36 safety net primary care facilities that are included in the study. This map is simply a visual reference for where participants were pre and post relocation as well as the location of the safety net primary care facilities in relation to both the original AHA communities and the general areas where participants relocated.

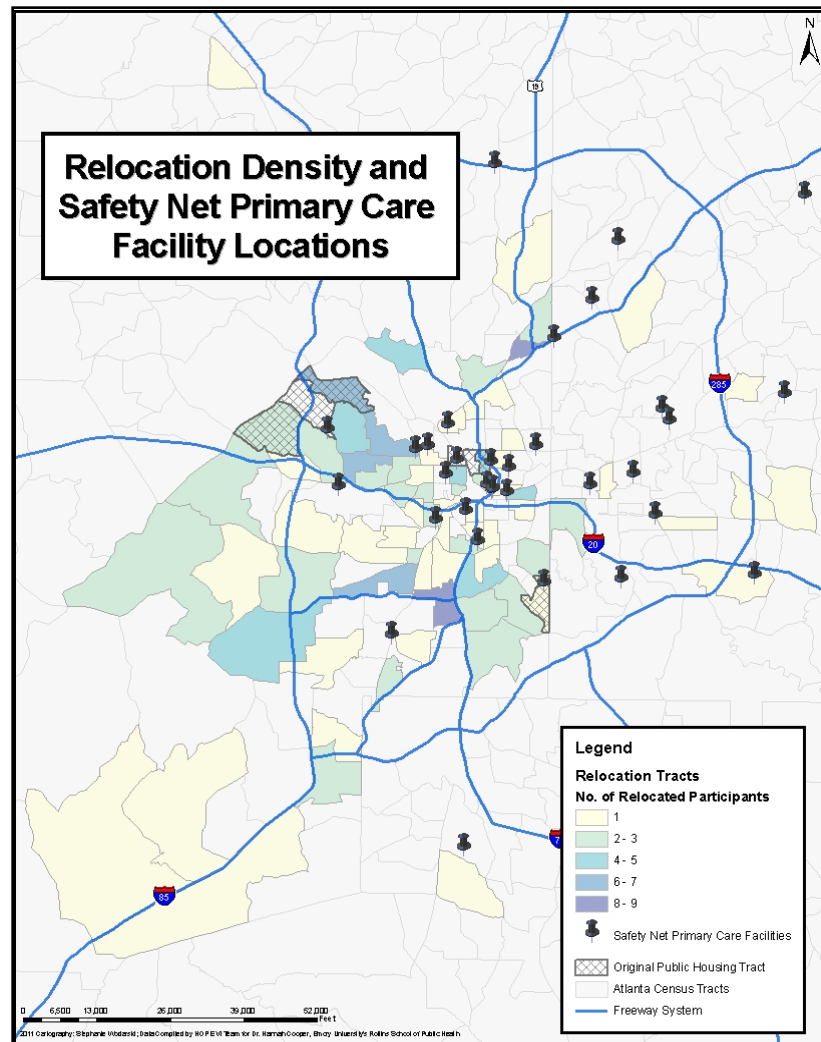


Figure 4: Map of Relocation Count and Safety Net Primary Care Facilities

As can be seen in Table 3, at baseline there was a mean GBM score of 9.830 with a median of 7.230 and a standard deviation of 2.000. At wave 2 there was a 54% decrease in mean access with an average score of 4.519. At wave 2 the standard deviation did not

change, but the median dropped to 41%, following the trend set by the mean. Overall the dispersion of the data did not appear to change between the two waves of data collection, but the average GBM score did decrease. It is important to remember that with GBM scores there is no scale or reference point for the numeric outcome. Instead of comparing the GBM output to a standardized score, compare the pre-relocation and post-relocation with each other.

Table 3: Gravity Based Model Results for Pre-andPost-Relocation

	Mean	Median	Standard Deviation	Interquartile Range
Baseline	9.830	7.230	2.000	5.695
Wave 2	4.519	4.253	2.000	2.205
Percent Change	-54.028%	-41.176%	0%	-61.282

Discussion

There was, as expected, an overall decrease in potential access to safety net primary care for HOPE VI residents after they relocated from AHA housing. As previously discussed, this study only considered the *potential* access to service locations and that an individual's enabling resources would be paramount to an individual's potential access. The GBM results show us that service locations do exist in the community, but that without even considering an individual's resources such as income, transportation, or insurance status, there is a considerable decrease in potential access to care.

Federally Qualified Health Centers (FQHC) can only open a clinic in an area if that area meets certain criteria that determine there is a need for that particular type of healthcare (HRSA 2010). When residents relocate to areas with higher SES rates, they are moving to areas that are less likely to provide or even qualify to have FQHC or safety net facilities.

Limitations

The data collection for the safety net primary care facilities could be a limitation for the study. The locations of the service providers were collected from data sources *after* the participants had started the relocation process. This could mean that the service locations used in both the pre and post relocation analyses may not accurately represent the healthcare environment before the relocations began. There were some clinic closings due to budget cuts between pre- and post-relocations. This means that some of the pre-relocation clinics were not included in the analysis. However, even without these missing clinics, the results show a very distinct decrease and potential access to safety net care. Adding in the missing clinics can only increase the power and robustness of the model.

In using straight line distance measurements between the origin and destination points for this analysis, much of the minutiae of day to day travel are lost. As we know, individuals travel by foot, car, or public transit and each of these types of travel can drastically affect how easily they can access services that they need.

Finally, there are many variables that could affect an individuals' decision making process or potential for access to safety net primary care including many social factors like type or lack of health insurance, access to transportation, and knowledge of community resources. It is also important to note that the sample used in this research is not representative of the population of interest.

Implications

The results of this study clearly indicate that there is an overall decrease in potential access to safety net primary care. These results could be seen as a call to action to implement more support services to those individuals and families who are relocated.

Support could be something as simple as providing pamphlets on information sources for finding new healthcare providers who accept public insurance or offer sliding scales based on income. Any type of support for individuals who are being relocated has the potential to be quite complex because there is no structured relocation plan. HOPE VI residents are responsible for finding their own housing in the private market.

Future Research

As this research only includes potential access based on distance decay, future research should consider social access variables as well as more detailed physical and spatial access variables. These types of studies could include street networks, traffic patterns, and type of transportation that participants use to access their healthcare provider. Much of the future research on relocating HOPE VI residents will, by necessity, need to focus on realized access. Within potential access there can be improvements made on the current study given time and resources. The gravity model can be made more complex and representative of the environment by adding an attractiveness component for each service location, or by considering different transportation routes or modes.

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