Transportation Access to Healthcare in Durham

Research and Strategies for Durham's Nonprofit and Public Healthcare Agencies

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EXECUTIVE SUMMARY

Background

The Partnership for a Healthy Durham's Access to Care committee tasked a graduate student workgroup at the University of North Carolina's Department of City & Regional Planning (DCRP) with conducting an assessment of the state of healthcare transit access in Durham, North Carolina. The motivation behind this effort was the recognition (1) that Durham's low-income population faces significant economic and mobility barriers when it comes to accessing critical healthcare services and (2) that the lack of accessibility to healthcare centers is a determining factor in their health outcomes.

Major Findings

Bus pass expenditures

Seven Durham nonprofit and social service agencies reported spending $138,838 on bus passes for low-income clients. Several agencies and departments were unable to provide an estimate and therefore this is a minimum value. Clients used the bus passes to reach health centers, educational centers, social service agencies, employment centers, and recreation centers in addition to health centers.

Agency and Department Annual Bus Pass Expenditures for seven social service agencies:
$138,838
Annual One-ride Pass Expenditures
$5,400
Annual Monthly Pass Expenditures
$44,362
Annual Day Pass Expenditures
$27,560

Funding for low-income healthcare access

Many of Durham's low-income residents fall into the "donut hole" of healthcare access funding. This is because funding for programs to help low-income individuals who are neither elderly, disabled, nor eligible for Medicaid is lacking. The few renewable federal funding programs for implementing healthcare access that are available to these individuals are Medicaid, Job Access Reverse Commute (JARC), New Freedom, and 5310. There are also several private foundation grants that exist as one-time, non-sustaining sources of funding.

Model health care access programs: Examples of what to do and what not to do

We identified six case studies where transit agencies and health and human service agencies work together to provide either subsidized transit passes or streamline administrative efficiencies between the two agencies. Through interviews with representatives from each of these communities, we identified different models to provide mobility and health care access to low-income residents as well as their strengths and weaknesses.

We recommend that the Partnership conduct advocacy work at the state level to establish a definition of "transportation disadvantaged" that encompasses the low-income population. We also recommend that the Partnership negotiate a bulk bus pass purchase program to streamline the administrative process of so many agencies purchasing large quantities of bus passes. We also recommend negotiating a discount on a bulk purchase rate to reduce the cost burden to low-income individuals. For many Durham Agencies, the cost burden falls on the agencies purchasing the bus passes, as passes are often given to directly to individuals at no-cost. This may differ for some agencies; however, for the Durham Center (now Alliance Behavioral Healthcare), there is no cost burden to the individual While a number of communities struggle to find a sustainable source for a transit subsidy, this model ultimately provides the transit agency more flexibility in raising their fare structure. Lastly, we recommend further coordinating private para-transit service in the region to shift clients who use private para-transit, like Lincoln Community Health Center's van shuttle to DATA fixed-route service, when possible.

Transit accessibility analysis

The highest concentrations of Durham's low-income population are in central locations near Downtown and south of Main Street, in East Durham, and west of Duke University near the Damar Court public housing

development. Residents in South, West, and East Durham have the worst accessibility to Durham's main healthcare centers; most of them are not within 30 minutes of important healthcare centers.

Project Access, Durham Center Access, and Durham Regional Hospital have the poorest coverage; the Durham VA Medical Center and CAARE, Inc. have fair coverage; and the Healthcare for the Homeless Lincoln Clinic and the Durham County Health Department have the best coverage of all the healthcare centers we considered. Coverage is defined by the low-income areas of Durham that can reach the health care centers within 30 minutes using public transit.

Strategies

These findings lead to four main strategic goals that the Partnership could consider for the improvement of access to healthcare for Durham's low-income population.

1. ***Make healthcare access an explicit planning goal*** for Triangle Transit and the City of Durham in order to entrench healthcare interests into formal decision-making processes. This would allow the City of Durham to make more informed decisions regarding future siting of healthcare facilities and related public and private transit routing.

2. ***Improve client and expenditures data collection and management*** in order to provide agencies with strong evidence for grant applications or requests for discounts from the City. This data will also help evaluate the effectiveness of future healthcare access initiatives.

3. ***Pursue private grant funding*** to pay for consolidated data collection, program monitoring, eligibility tracking, and funding solicitation administration.

4. ***Support greater coalition development*** across the region and state and advocate changing the North Carolina's definition of "transportation disadvantaged." This could lead to increased political power, knowledge, and new resources for improving healthcare access for low-income populations.

Contents

Introduction

While traditionally underserved by the healthcare system, low-income and underinsured Durham residents can receive healthcare from a number of nonprofit clinics. Durham is served by seven Federally Qualified Health Centers (FQHCs), as well as major hospitals, county public health agencies, and other healthcare resources. Physically accessing these resources, however, adds another obstacle for low-income clients, many of whom lack automobile transportation. In January of 2012, the Partnership for a Healthy Durham's Access to Care Committee partnered with graduate students from the University of North Carolina's Department of City and Regional Planning to investigate barriers to healthcare access for low-income patients in Durham, NC and strategies for addressing these challenges.

This report details the findings of that investigation, examining physical and financial barriers to healthcare access for the clients of nonprofit clinics in Durham. The report begins by framing the problem, presenting a view of current transportation services and the population most likely to use them, as well as health-related origins and destinations. Next, the physical accessibility of key healthcare destinations via bus routes and para-transit is analyzed. The report then identifies and examines gaps in the resources and services available to meet the accessibility needs of the service population. Case studies of innovative responses to similar gaps and challenges are presented, with the intention of deriving useful lessons and tools for Durham. Finally, the report presents strategies and potential next steps for the Access to Care Committee to pursue.

Purpose and Need

Overview

The accessibility of transportation to healthcare centers impacts health outcomes. Accessibility requires that individuals can access healthcare centers in a reasonable amount of time and at a reasonable cost. The research conducted for this report was done so on the behalf of Durham nonprofit healthcare agencies whose low-income and uninsured and underinsured clients were unable to access healthcare appointments due to inability to afford transportation to those appointments.

Research objectives and scope of work

Research objectives and specific tasks for this project were developed through meetings and correspondence with Julia Gamble of the Lincoln Community Health Center and other members of the Access to Care Committee, including Erik Landfried of the Triangle Transit, Meg Scully of the County of Durham, and Sally Wilson of Project Access Durham County. A complete scope of work for this report can be found in Appendix A.

The project objective was:

To identify strategies to improve affordability and convenience of access to local healthcare facilities via fixed-route transit and para-transit for low-income residents of Durham.

Clients/Stakeholders

This project was commissioned by the Access to Care Committee of the Partnership for a Healthy Durham. The Partnership for a Healthy Durham is a coalition group of community organizations and local advocates that collaborate to improve physical, mental, and social health for Durham's residents (http://www.healthydurham.org/e). The Partnership is a member of the Healthy Carolinians network of local community health partnerships. The Access to Care Committee is one of the Partnership for a Healthy Durham's seven action committees. The Access to Care Committee advocates for legislative and programming changes that will expand healthcare coverage and access for all uninsured and underinsured Durham residents.

I. Background and Context for Healthcare Access

This report assesses the convenience of accessing healthcare in Durham using public transit, and the cost to healthcare agencies of transporting their patients to appointments. We start with an overview of the who, what, how, and where of the research objective. Who are the individuals seeking healthcare? What kinds of healthcare resources are available to them? What kinds of transportation can they use to access these services? Where are the clients and the healthcare services located?

Population

Nonprofit and public health clinics and agencies serve primarily uninsured and underinsured Durham residents. These clients are almost universally low-income or on fixed incomes, and frequently unemployed. They are more likely than the average Durham resident to be transit-dependent, lacking regular access to a personal vehicle.

Six demographic characteristics were identified as likely indicators of transit-dependency. These characteristics are: elderly, low-income, non-white, and receiving public assistance, supplemental security income, and social security. These characteristics, pulled from the ACS 2005-2010 5-year estimates, were chosen because they are common indicators used in transit ridership analyses and are mirrored by the 2011 DATA Onboard Survey of Users' ridership demographics profile. The DATA survey reports that 89% of their ridership is non-white and that 79% of their ridership comes from households that make less than $25,000 annually.

Transportation Options

Fixed-route transit

Public Local public transportation in Durham is provided by the Durham Area Transit Authority (DATA) and regional public transportation connecting Durham with nearby municipalities is provided by Triangle Transit In October 2010, Triangle Transit assumed the responsibilities for the planning, operations, and marketing for the Durham Area Transit Authority on behalf of the City of Durham. The term "fixed route" refers to a public transportation service provision in which a vehicle is operated along a prescribed route according to a schedule. DATA provides 18 bus routes including the Bull City Connector and for FY 2011, its ridership was 5.65 million (Schulz, 2011). The cost of a DATA bus pass depends on the type of rider and amount of time the rider will use the pass. A one-way pass is $0.25 for a student, $0.50 for riders with a DATA discount ID or Medicare card, free for youth and seniors (with stipulations), and $1.00 for all other riders. Regular DATA day passes range from $2.00-$36.00 depending on the number of days and the discounted DATA day passes range from $1.00-$18.00.

Para-transit

In addition to fixed-route bus service provided by DATA, there are a number of para-transit services provided by different organizations designed to bring people to medical appointments that are unable to access them via fixed-route. (Para-transit is an origin-to-destination transportation system for residents who are unable to use public transportation due to a physical or mental disability. Para-transit operates specially modified vans to transport riders with a range of disabilities, including those who use wheelchairs.)

Each has their own set of eligibility requirements customers must meet before riding. Below is a list of all para-transit options available to citizens of Durham, the cost, and eligibility requirements.

Durham Para-transit Options

Name	Cost	Type of Service	Who is eligible	Other requirements
DATA ACCESS	$2/one-way trip	Shared ride, curb-to-curb service	Durham City residents	Must meet criteria of ADA and be approved by DATA; Serves City of Durham and within ¾ mile of DATA fixed-routes that go outside the City limits.
Durham County ACCESS	$2/one-way trip	Shared-ride, demand-response	Durham County residents	Must be approved for Medicaid and by the county; traveling to/from outside city limits
Lincoln Community Health Center		Shared-ride, demand-response	Patients of the Lincoln Health Center	
American Red Cross		Individual, door-to-door service	Anyone	Must be traveling to/from a medical appointment with no other means of transportation
T-Linx (TTA)	$4/one-way trip	Shared ride, curb-to-curb service	Citizens of Wake, Durham, or Orange County	Must meet criteria of ADA and be approved by TTA; Within ¾ mile of TTA fixed-route

Healthcare Origins and Destinations for the Low-Income, Uninsured and Underinsured in Durham

Healthcare resources

In coordination with the Partnership for a Health Durham's Access to Care Committee, we identified 30 healthcare service providers and agencies as locations that Durham's low-income, underinsured, and uninsured healthcare clients would frequent. These health locations were classified into five health provider types: clinic, hospital, mental health facility, referral center and specialist. A more extensive list of health locations that were considered in this report can be found in Appendix B.

The clients served at these health locations are typically seeking adult medical examinations, evaluation and treatments, laboratory services, mental health and substance abuse counseling, immunizations, TB testing, health education, nutrition assessment and counseling, medical case management, medication adherence, and assistance with obtaining prescribed medications. The clients also utilize the clinics to receive referrals for specialty medical care, dental care, x-ray, family planning, housing benefits, food and clothing pantry, HIV case management, and legal assistance. Homeless individuals and families also make up a significant subset of the health clinics' clients. Of Durham's homeless population, 91.1% stay in a temporary shelter, 16.0% are mentally ill, 41.4% of adults have substance abuse problems, and 18.6% of adults are veterans. (Durham, NC 2011 Point-in-Time Count, January 26, 2011)

Many of the of the clients who access these locations are referred to Project Access, which provides referrals to roughly 160 local clinics, laboratories, pharmacies and hospitals in the city and county of Durham that donate specialist services. Project Access' clients are not covered by Medicaid, NC Health Choice, or Medicare and require specialty healthcare services, related to both general health and mental health. These clients, in order to be enrolled as a member, have to have received referrals from a primary care provider at Lincoln Community Health Center.

Clients also utilize Durham Center Access, is the gateway to all of the local mental health, developmental disability and substance abuse services that are part of the Durham System of Care and serves as an integral part of Durham County's Behavioral Health Services Crisis Continuum. 24/7 Crisis Services, including Facility Based-Crisis and Non-Hospital Based Detox are available at this location (309 Crutchfield Street Durham, NC 27704), and a Psychiatric Walk-In Clinic is available, which serves adults and children seeking immediate access to psychiatric clinical services by appointment or on a walk-in basis. The Durham Center Access-Assessment Team, which functions as a truly independent assessment and referral source for uninsured individuals entering or re-entering the service system is also located at this location. Individuals seen at Durham Center Access are referred and connected to providers that are contracted with and managed by The Durham Center (www.durhamcenter.org). One strategy that has been utilized to ensure uninsured individuals in need have access to behavioral health assessment and service is the co-location assessment and referral services at key locations in Durham. Several times per month, a clinician from the Durham Center Access-Assessment Team is staffed at Urban Ministries of Durham and the Durham County Detention Center to provide assessment and referral services to many of Durham's most vulnerable and/or in-need citizens. Another effort at co-location was realized in June 2011, when Lincoln Community Health Center partnered with The Durham Center and Durham Center Access to establish and open a Lincoln Clinic on-site at Durham Center Access. All individuals presenting at Durham Center Access are referred to and able to see a Lincoln Provider on-site and has allowed for improved coordination of behavioral health and primary care.

Major employment centers

Seven major low-wage employment centers were identified as likely origins or destinations for low-income or transit-dependent populations, all areas that featured 500 or more jobs earning $1,250 a month or less. Seven such centers were located around Durham. The majority of the centers are clustered within a few miles of downtown to the northwest with the exception of two centers that lie farther out from downtown and to the southwest.

Public Housing Locations

Sixteen public housing locations were also chosen to signify likely origins or destinations. The identified locations are: Durham Housing Authority Main Office, Club Boulevard/Bluefield, Cornwallis Road, Damar Court, Forest Hill Heights, Hoover Road, JJ Henderson Housing Center, Laurel Oaks, Liberty St., McDougal Terrace, Morreene Rd., Oldham Towers, Oxford Manor, Edgemont Elms, Preiss-Steele Pl., and Woodridge Commons. These locations are clustered within a few miles of downtown and are fairly evenly distributed to the north, south, east and west.

Spatial Layout: Clients and Destinations

The following maps display the identified origins and destinations of healthcare resources, major employment centers, and public housing locations, as well as areas of Durham with high proportions of low-income, minority, and elderly populations. We define low-income residents as those earning less than $25,000 annually. The Department of Housing and Urban Development (HUD) defines a household as 'very low income' if its income is less than 30 percent of the Area Median Income (AMI) (www.huduser.org). The household median income for Durham County was $49,894 as of the ACS 2006-2010 5-year estimates. We designated $25,000, which is roughly 50 percent of $49,894 as 'low-income.' We define 'areas with high concentrations of low-income residents' as those in the top 20th percentile in terms of residents earning less than $25,000 annually.

We define minority residents as those who identify as non-white according to the ACS 2006-2010 5-year estimates. We define 'areas with high concentration of non-white residents' as those with a non-white population that is 150 percent of the proportion of nonwhite population for the county. Durham County's non-white population was 56.9 percent as of the ACS 2006-2010 5-year estimates. 150 percent of 56.9 percent is 85.5 percent. We define elderly residents as those 65 years of age and over and we define 'areas with high concentrations of elderly residents' as those areas in the top 20th percentile of elderly population.

Additional maps displaying the spatial distribution of other likely transit-dependent populations, including populations on public assistance and populations receiving Social Security or Supplemental Security Income, can be found in Appendix C. Lists of neighborhoods where these transit-dependent populations are located can be found in Appendix D.

Fig. A: Durham Low-Income Populations, Origins and Destinations

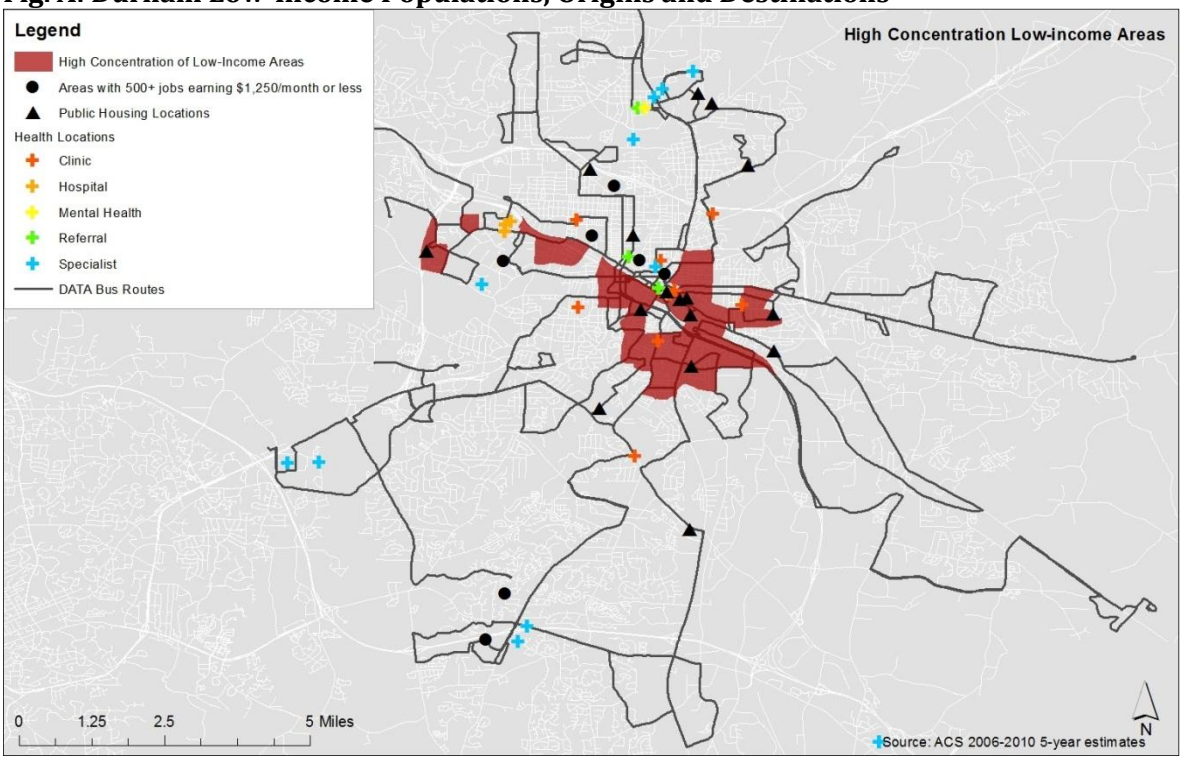


Figure A shows that the areas with high concentrations (top 20th percentile) of low-income residents earning less than $25,000 a year are located mainly in downtown Durham.

Fig. B: Durham Non-White Populations, Origins and Destinations

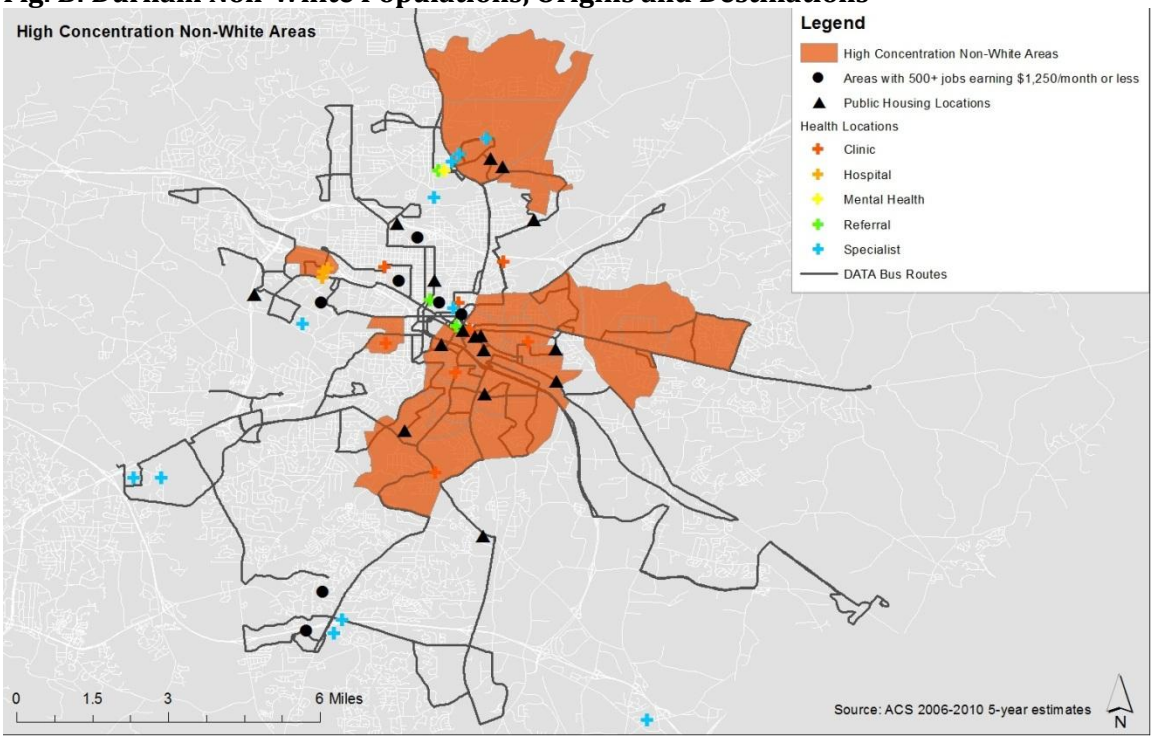


Figure B shows that the areas with high concentrations of non-white residents are located close

to downtown Durham, stretching south and east, with a pocket to the north.

Fig. C: Durham Elderly Populations, Origins and Destinations

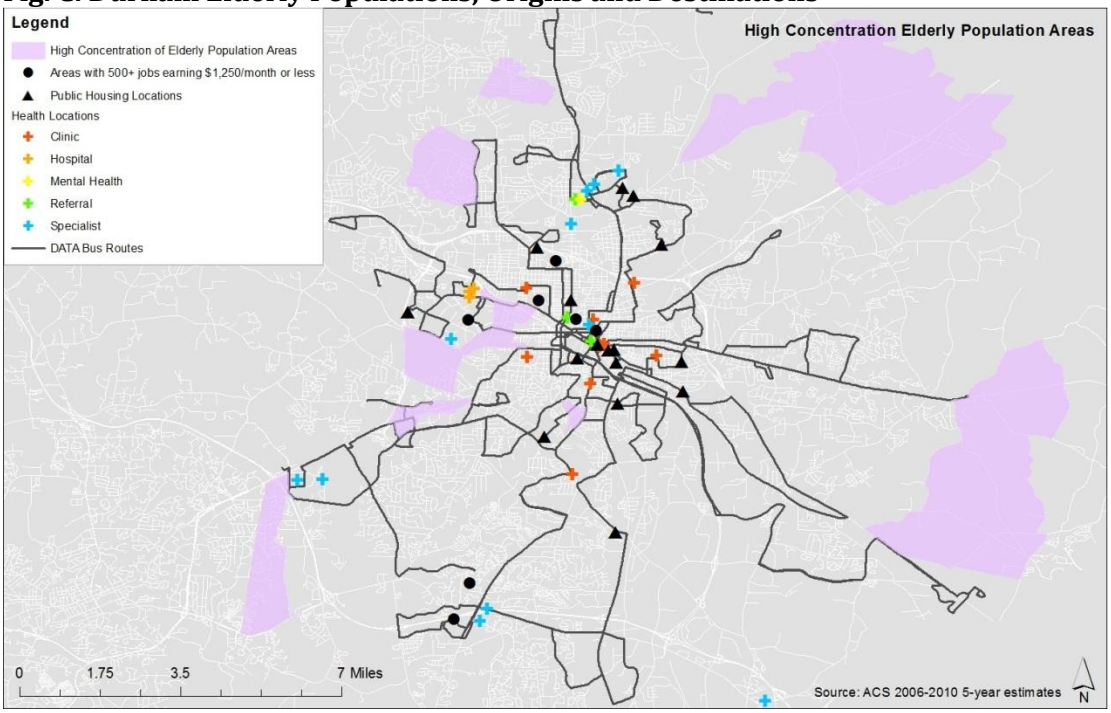


Figure C shows that the areas with high concentrations (top 20th percentile) of elderly residents are located on the west side of Durham and to the far north and east.

II. Riding Transit to Healthcare: Physical Accessibility

Understanding Bus Transit Coverage

Introduction

Like the city itself, DATA routes center on downtown Durham. Central Durham contains Durham Station, the main transfer station, and the Durham County Health Department, an important hub for a number of healthcare services. In contrast, healthcare destinations on the outer reaches of the system, like the VA Hospital, Durham Center Access and Project Access, may only be served by one or two city bus routes.

The number and path of routes near a healthcare center can affect how easy it is to get there by transit. While Chapter 1 shows that all healthcare centers are located within walking distance of a bus route, we find that spatial proximity does not guarantee that many Durham residents can reach healthcare destinations within a reasonable amount of time on transit.

Understanding the service areas, or "transit sheds," of healthcare destinations helps to paint a more accurate picture of transit accessibility. To determine the transit shed of each healthcare destination, we constructed the area from which any transit rider can reach each of Durham's healthcare providers based on current transit routes and schedules. The transit shed calculations help answer the following two research questions:

What is a transit shed?

A transit shed describes the area that can be reached from any healthcare center by walking and DATA buses within 30 minutes.

1) ***How far could someone travel from each healthcare center in 30 minutes by walking and transit?***
2) ***Do low-income areas have access to healthcare facilities within 30 minutes by transit?***

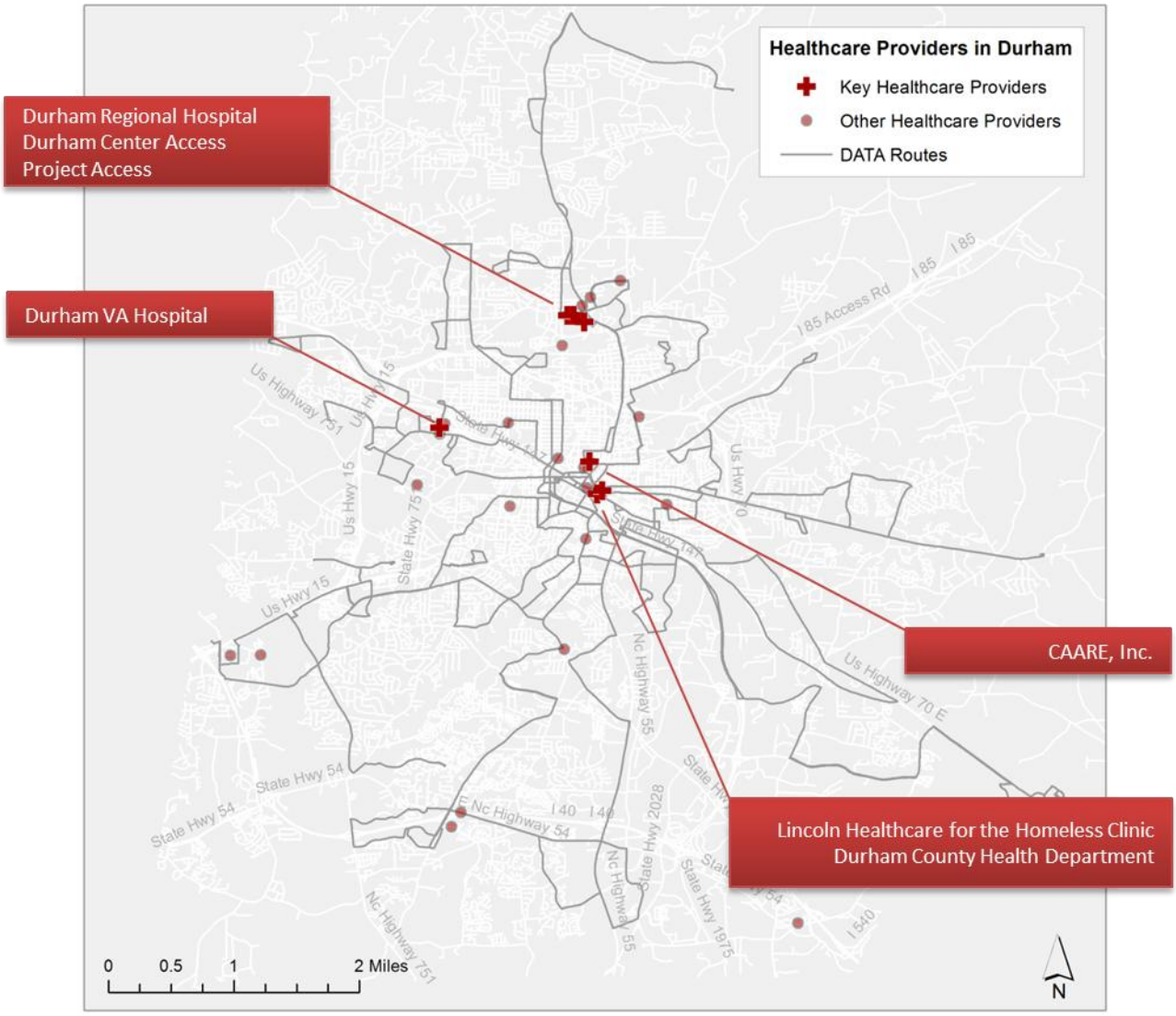
Methodology

As noted in Chapter 1, thirty healthcare providers of interest were identified in collaboration with the Partnership for a Health Durham's Access to Care committee ("the Committee"). Transit sheds – areas within which one could travel via DATA buses and walking within 30 minutes – were defined using each of the thirty health-related centers as trip origins. Based on industry standards, we selected a walk speed of 2 miles per hour to represent the walk speed of elderly and disabled individuals. We limited walk distance to no more than ¼ mile based on feedback from transit planners at Triangle Transit. Transit route and schedule data were obtained from Triangle Transit and are current as of August 2011.

Further, seven of these health centers were defined as key providers that warranted a finer-grained analysis. These included Project Access of Durham County (PADC), Durham Center Access, Durham Regional Hospital, Durham VA Medical Center, CAARE, Inc., Healthcare for the Homeless (a clinic within the Lincoln Community Health system), and the Durham County Health Department. They are shown in Figure D as red crosses. The list is meant to be representative of the five health categories mentioned above; the Committee confirmed the greater importance of these locations.

The final step in identifying accessibility for low-income residents was to compare the transit sheds' location with that of low-income residential areas of Durham. These areas, shown in the dark gray in Figure D, are located mostly in central Durham and south of Main Street; other areas include East Durham and a neighborhood west of Duke University near Damar Court public housing.

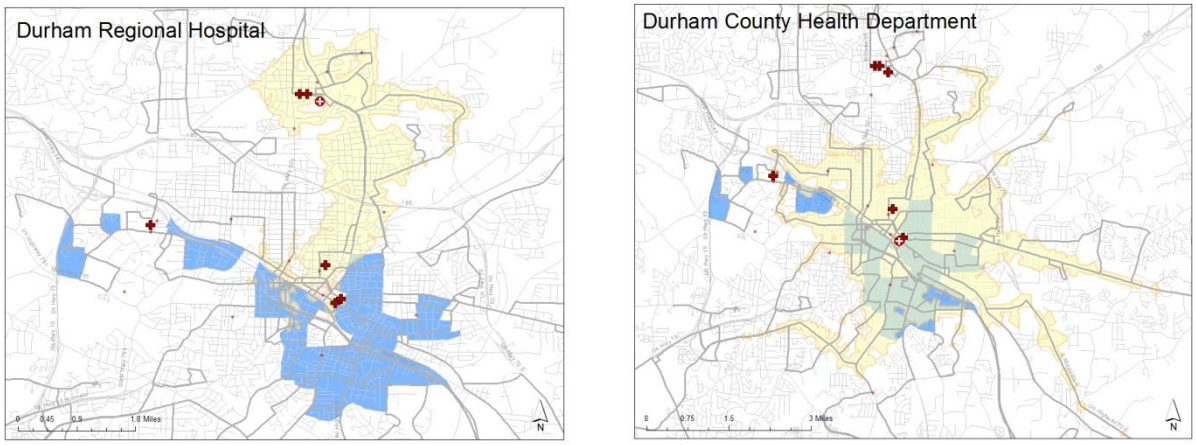
Fig. D: Key healthcare providers and bus routes



Transit Shed Analysis

By way of introduction, first we present two example transit sheds in Figure E. On the left map, the transit shed for Durham Regional Hospital is shown in yellow. This map demonstrates how far a transit rider can get from the hospital (shown by the red circle and white cross) within 30 minutes – not far enough to reach the low-income areas (shown in blue). In contrast, the map on the right shows the transit shed for the Durham County Health Department (shown by the red circle and white cross). Notice that the yellow transit shed overlaps with most of the low-income areas for this health center.

Fig. E: Example transit sheds: Durham Regional Hospital and Durham County Health Department



Transit Coverage of Key Healthcare Providers

In order of lowest to highest accessibility, the seven key health centers analyzed are Project Access, Durham Center Access, Durham Regional Hospital, Durham VA Medical Center, CAARE, Healthcare for the Homeless Lincoln clinic, and the Durham County Health Department.

The cluster of health centers located in northern Durham (north of I-85) has very poor accessibility to all areas we identified as concentrated low-income. Low-income residents in other areas of Durham (e.g. residents of public housing in northern Durham) have much better, but still limited, access to these health centers. However, each of the healthcare providers in northern Durham is within walking distance of each other.

Durham County Health Department is centrally located and highly accessible to all concentrated low-income areas. Lincoln's Healthcare for the Homeless Clinic is very accessible to low-income areas. However, it is difficult to know from publicly available data sources whether these areas also represent the homeless population

Figure F summarizes the three levels of access for these key healthcare destinations.

Fig. F: Summary of Transit Access to Seven Key Healthcare Providers

To illustrate our analysis, we examined several public housing developments and evaluated whether residents could access healthcare providers within 30 minutes on DATA. We found that residents of these areas can only access centrally-located health facilities such as the Durham County Health Department and Lincoln's Healthcare for the Homeless Clinic. Table A below summarizes transit access from these affordable housing developments; Table D1 in Appendix D shows the percentages of low-income areas with 30-minute access. Affordable housing developments marked with a red cross can access the marked healthcare providers in up to 30 minutes of bus travel.

Table A: Transit Access to Key Healthcare Providers from Selected Affordable Housing Developments

		Poor Coverage			Fair Coverage		Good Coverage	
	Healthcare Providers	**Project Access**	**Durham Center Access**	**Durham Regional Hospital**	**Durham VA Medical Center**	**CAARE, Inc.**	**Healthcare for the Homeless Clinic (Lincoln)**	**Durham County Health Department**
Affordable Housing Developments	**Damar Court**				✚			
	Forest Hill Heights						✚	✚
	Oldham Towers					✚	✚	✚
	Liberty Streets					✚	✚	✚
	Edgemont Elms					✚	✚	✚
	McDougal Terrace							✚
	300 Gary Street						✚	✚

As Table A shows, the following neighborhoods have the worst access to the seven healthcare providers of focus:

- Damar Court/west of Duke University
- Forest Hill Heights
- McDougal Terrace
- 300 Gary Street

Citywide Transit Coverage

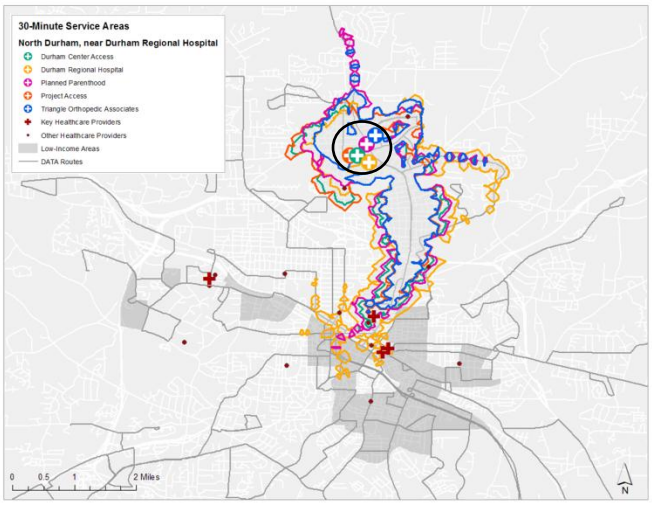
In addition to evaluating the transit sheds of key healthcare centers, we analyzed accessibility from low-income areas to all 30 important healthcare centers. In many cases, healthcare centers in close proximity to each other are served by a common set of bus routes. This results is similarly shaped transit sheds. Healthcare centers in close proximity to each other were grouped into Central, North, Northwest, South, West and East Durham. North Durham healthcare centers were further divided into facilities near Durham Regional Hospital and other healthcare centers in North Durham.

Two example transit sheds are presented in Figure G. The left map shows the transit shed for healthcare centers near Durham Regional Hospital, which includes Durham Center Access, Planned Parenthood, Project Access and Triangle Orthopedic Associates (colored crosses). Notice that the transit sheds overlap with only a small patch of the low-income areas (gray).

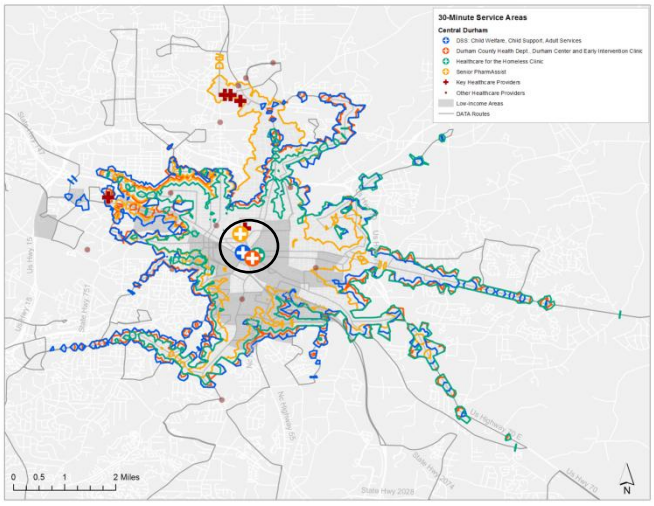
The right map shows Central Durham, which includes the Durham County Health Department, Durham Center, Health care for the Homeless Clinic and several other important services (colored crosses). Central Durham's transit sheds resemble each other closely. The transit sheds overlap with both low income areas (gray) and with other healthcare centers (red dots and crosses). This means that Central Durham healthcare centers are highly accessible by transit to the population of interest. Maps for each region are available in *Technical Appendix II – Citywide Service Assessment.*

Fig. G: Example transit shed groupings for citywide access analysis

North Durham – Near Durham Regional Hospital



Central Durham



Central Durham – Good Coverage

Overall, healthcare in Central Durham is highly accessible to low-income areas. All Central Durham transit sheds are almost identical, since the transit centers are located in close proximity to each other and have comparable levels of bus service. A strong east-west connection both along and north of Main Street means high coverage of low-income groups and key healthcare centers.

However, like other areas of the city, healthcare clients traveling from Central Durham have poor access to healthcare in North Durham. From Central Durham, only Senior PharmAssist has good access to the facilities in North Durham near Durham Regional Hospital.

Healthcare in Central Durham

- The Durham Center (Alliance Behavioral Healthcare/Lincoln satellite clinic
- Durham County Department of Social Services (DSS): Child Welfare, Child Support, Adult Services
- Durham County Health Department
- Healthcare for the Homeless Clinic
- Lincoln Center – Early Intervention Clinic
- Senior PharmAssist

Northwest Durham - Fair Coverage

Like Central Durham, Northwest Durham has coverage of healthcare providers and low-income areas in west and Central Durham, except for the facilities in North Durham near Durham Regional Hospital. However, residents of low-income areas in East Durham have poorer transit access to Northwest Durham.

Healthcare in Northwest Durham

- Duke Children's Hospital & Health Center
- Duke University Medical Center
- Durham County Department of Social Services (DSS): Crisis Center, Public Assistance
- Durham VA Medical Center
- Walltown Clinic

North Durham – Poor Coverage

The five healthcare facilities we studied near Durham Regional Hospital have very poor access from low-income areas in Central, South, West and East Durham. Routes 4 and 9 connect downtown to the Durham Regional Hospital cluster of healthcare providers, but 30-minute access from low-income areas is almost nonexistent.

CAARE is the only North Durham healthcare provider in North Durham with fair coverage. Otherwise, hospitals and clinics in other parts of North Durham have almost no accessibility from low-income areas or even from other hospitals besides the Durham Regional cluster. The poor service can be attributed to the hub and spoke nature of bus routes that converge in the downtown, but have few circumferential connections. Route 9 connects with Route 4 at Durham Regional Hospital, and may offer some opportunity for a connection. This may exceed the average 30 minute travel time.

Healthcare in North Durham

Further from Durham Regional Hospital

- Durham Rescue Mission/Samaritan Health Center
- Triangle Heart Associates
- Durham Nephrology Associates
- CAARE, Inc.

Near Durham Regional Hospital

- Durham Center Access
- Triangle Orthopedic Associates
- Durham Regional Hospital
- Project Access
- Planned Parenthood

South, West and East Durham are Transit Islands – Very Poor Coverage

Residents of downtown low-income areas may find it challenging to travel to healthcare providers in the outskirts of the city. Four of the eight important healthcare providers in South and West Durham are on transit islands, even though they are each served by at least one bus route. No downtown destinations can be reached from these islands within 30 minutes of bus transit.

Likewise, the Holton Clinic in eastern Durham has low access to most of Durham's low-income areas and key healthcare providers. Though there are few healthcare providers in East Durham, a high concentration of low-income households is situated within a 2-mile radius.

Given the low number of healthcare facilities in this area, clinic-centered access is not a priority; however, better transit access would benefit the low-income neighborhoods in East Durham.

Healthcare in South, West and East Durham

South Durham
- Lincoln Community Health Center
- Hillside Wellness Center
- Triangle Endoscopy Center
- Duke South point

West Durham
- Duke Sports Medicine
- Lyon Park Clinic
- NC Orthopedic Clinic
- Duke Patterson Place

East Durham
- Holton Clinic

Conclusions on Transit Coverage of Healthcare Services

Most low-income residents in downtown Durham have a high level of transit accessibility to healthcare. Almost all 30 health centers examined are located on or very near to the existing fixed-route system. Accessibility is high from this perspective; the need to walk at the destination end of the trip is small. For example, Durham County Health Department is near the hub of the transit system in Central Durham. Almost all low income populations, which are concentrated in the center city, can access DCHD within 30 minutes by bus and walking. In contrast, almost no low income areas have 30-minute transit access to the healthcare centers near Project Access and along DATA Route 4.

However, almost all areas of Durham with a concentrated low-income population have very low access to healthcare centers in North Durham including Project Access, Durham Center Access, and Durham Regional Hospital. Physical access to healthcare via the fixed-route transit system is limited, especially for facility-based behavioral health crisis services..

This analysis faces several limitations. First, this analysis does not consider patients that need to travel from health center to health center. Secondly, we have only calculated the weekday morning travel shed.[1] The analysis may be sensitive to small changes in time (e.g., 8:30 AM vs. 8:31 AM) due to its reliance on a fixed route schedule. Additionally, the routes and schedules used are missing data on most bus transfers, which could expand the transit sheds considerably. Thirdly, the street network obtained for this analysis was created for vehicles, and therefore lacks data on sidewalk access and crosswalks (over-estimating accessibility), as well as footpaths and pedestrian-only bridges (under-

[1] Weekday midday travel sheds are similar.

estimating accessibility). As a result, healthcare users may need to walk across barriers like train tracks or highways when traveling from low-income neighborhoods.

Strategies for Improving Transit Access to Healthcare

Public agencies and private healthcare providers can use the system access analysis to improve the quality of travel to healthcare for transit-dependent populations across the City of Durham.

Incorporate Transit Shed Maps into Healthcare Planning

Provide clients with appropriate transportation services

Partners: Healthcare centers

Healthcare providers can use the transit shed maps to understand travel times and accessibility for clients. When making referrals, healthcare centers should send clients to facilities that are more accessible by transit if possible. Additional transportation assistance can be furnished when clients are sent to locations with poorer transit access, but should only be provided when necessary.

Focus paratransit and private transportation services where transit service is poor

Partners: Healthcare centers, Triangle Transit/DATA

Para-transit and private transportation providers can use the transit shed maps to identify poor access pickup locations.

Site new healthcare services within system-wide transit shed

Partners: City of Durham, healthcare centers

Transit accessibility should be considered in the siting of new healthcare facilities. The City of Durham should make accessibility information available to private and nonprofit organizations seeking to serve transit-dependent populations, i.e., low-income, elderly, youth or disabled individuals.

Consider New Transit Services Connecting Peripheral Destinations

Improve circumferential travel, especially between North and West healthcare clusters

Partners: Triangle Transit/DATA

Most key healthcare facilities are in North, West and Central Durham. While Central Durham's healthcare facilities have broad transit coverage, healthcare providers in North and West Durham are missing a transit link. We recommend considering a partial ring route or shuttle service that would connect the two spokes, especially to low-income neighborhoods to the south and east of the city. The following table presents options for improving peripheral travel in the short, mid and long-term.

Table B: Considerations for a ring route linking peripheral Durham destinations

Short Term	**Consider a west Durham to north Durham-specific paratransit service (public or private).**
	• Evaluate data on existing origin-destination pairs for para-transit service to determine demand for this trip. • In North Durham, determine whether a shuttle service from Durham Regional Hospital, Project Access and Durham Center Access would be more efficient than an ad hoc system.
Medium Term	**Consider a partial ring route from west Durham to north Durham connector line.**
	• Evaluate travel demand from Duke students, faculty, and staff between Duke University and 501/North Duke St (near Durham Regional Hospital), in addition to travel demand from low-income healthcare users.
Long Term	**Consider a DATA ring-route serving perimeter locations.**
	▪ Link peripheral health and employment locations, including 501/North Duke St area, Durham Tech and NC Central University. ▪ Consider applying new half-cent sales tax towards this use.

Improve Evaluation and Monitoring of Healthcare Access for Transit-Dependent Populations

Improve monitoring and evaluation of healthcare access

Partners: Triangle Transit/DATA

Healthcare access can be improved through a better understanding of travel times between neighborhoods, healthcare facilities and other key destinations for transit dependent healthcare users. The ability to calculate travel sheds of key destinations is useful for identifying accessibility gaps, and can inform route planning decisions. This report presents a methodology that can be easily applied to test the effect of proposed route changes on access to healthcare and other key destinations.

Additionally, we recommend specifying metrics and/or goals for healthcare accessibility in transit plans and evaluating system performance when service changes are made.

Develop a more sophisticated understanding of individuals who regularly ride transit to health-related destinations

Partners: Triangle Transit/DATA, Project Access, Healthcare centers

Conversations with users of healthcare services can improve knowledge about gaps in healthcare access on the ground level. Though there are privacy restrictions, Project Access has a database of patient residential addresses that can provide a more accurate picture of patient origins. Other options include generating a ground-up set of target areas based on community feedback. Lastly, combining a

range of transit dependency factors specific to healthcare can capture a broader demographic than the low-income study population used in this analysis.

III. Cost Accessibility: Expense and Efficiency

Introduction

In addition to looking into the physical aspects of transit accessibility, this report also looks into the financial aspects. Although bus passes may seem relatively inexpensive, the cost of transit to and from healthcare has been identified as a challenge for clients of public and nonprofit healthcare agencies. This chapter first establishes, as best as possible, the amount spent by nonprofit and public agencies to provide transportation to healthcare resources for their clients. We then identify existing and potential funding sources for health-related and low-income transportation, including an assessment of their benefits and challenges. The overview of existing funding sources identifies a funding gap that specifically affects clients of nonprofit and public healthcare agencies. Next, we present case studies of municipalities and organizations with innovative approaches to this funding gap. Potential strategies for the Access to Care Committee and the Partnership for a Healthy Durham are drawn from the case studies.

Methodology

Information on current transit expenditures was compiled through a series of emails and phones calls to healthcare and social service agencies. We researched available funding opportunities for transit and healthcare, speaking to representatives from the Federal Transit Administration (FTA), United We Ride, and the National Resource Center for Human Service Transportation Coordination. The Transit Pass Toolkit from the National Resource Center was a particularly informative resource. We also identified several municipalities with innovative approaches to problems of transit access, both for healthcare destinations and in general. We interviewed representatives from the transit agencies, commissions, or other governing bodies associated with these innovative programs.

Transportation Expenditures for Nonprofit and Public Healthcare Agencies and Resources

The following table provides collected information on the transit expenditures of nonprofit and public healthcare agencies. The agencies collectively provide a variety of transportation options to clients, including free bus passes, taxi rides, and para-transit service. These estimates of expenditures are not precise; some agencies were unable to respond, some provided estimates rather than specific data, and some could provide estimates for all transit expenditures but could not disaggregate expenditures that were specifically for health-related transportation.

Table C: Transportation Expenditures from Nonprofit and Public Healthcare Agencies

Agency	Annual Total Cost of Transp. Services	Annual Cost of Bus Passes	Pass Type	Other Transportation Services	Source of Funds
Lincoln Community Health Center	$255,000	$2,400	Day pass	Para-transit	No line-item; funds from general fund
Project Access	$50,000	$1,160	Day pass	Taxi rides: $86,958 Para-transit: $25,526	?
Durham Rescue Mission Samaritan Health Clinic	?	$400	One-ride pass	Vans, used to access food banks more than medical centers	No line-item; from petty cash

Local Access to Coordinated Healthcare (LATCH) and Durham Community Health Network (DCHN)[2]	$200	Data not available	Day pass	Taxi rides, van para-transit	Cost-sharing partnership with Durham Social Services and Project Access
CAARE	?	$24,000	Day pass	Van para-transit	No line- item; funds from other projects
Veteran's Association	$3,500	$3,500	Greyhound/ TTA/DATA, 90% of funds are for day pass	N/A	No line-item; funds from general welfare fund
Vocational Rehabilitation	$46,453	DATA: $36,218; TTA: $8,144; PT; Total: $44,362	DATA and TTA monthly bus pass	Private vendor para-transit: $2,091	No line-item; funds from other projects.
Durham County Public Health Department	?	$5,000	One-ride pass	N/A	?
Criminal Justice Resource Center (CJRC)	?	$9,000	Data not available	?	?
Durham County Department of Social Services (DSS)	?	$47,516	Weekly, monthly, day pass	?	?
The Durham Center (Mental Health)	?	$1,500	Day pass and weekly pass. Monthly pass on a very limited basis	Van, used by Durham Center Access for para-transit-like support for accessing Durham Center Access. Mobile Crisis Services, which can provide and/or assist with transportation on a case-by-case basis.	No line item
Agency and Department Annual Bus Pass Expenditures: $138,838 Annual One-ride Pass Expenditures $5,400 Annual Monthly Pass Expenditures $44,362 Annual Day Pass Expenditures $27,560					

Sources: Julia Gamble, Lincoln Community Health Center; Sally Wilson, Project Access; Mike Stevens, Durham Rescue Mission Samaritan Health Clinic; Stephanie Trantafillou, LATCH Program; Sharon Elliot-Bynum, CAARE; Greg Hughes, Veteran's Association; Jessie Pickett-Williams, Vocational Rehabilitation; Sue Guptill, Durham County Public Health Department; Gudrun Palmer, Criminal Justice Resource Center; Bob Wallace, Durham County Department of Social Services; Bill Smith, The Durham Center.

Given these expenditures, the next step of the research was to investigate creative ways to lessen the cost burden of providing transit that falls on these healthcare providers.

[2] Both LATCH and DCHN are programs under Duke's Division of Community Health

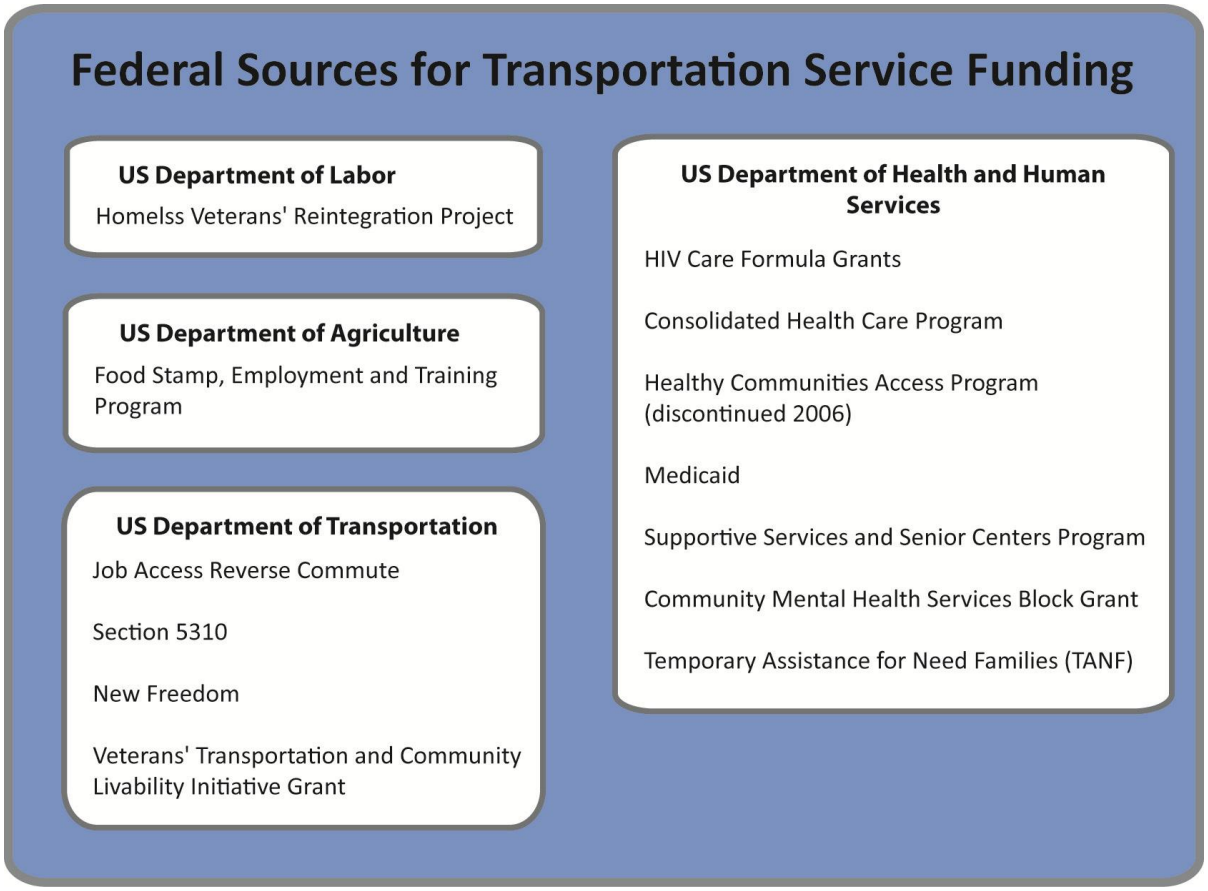
Existing and Potential Funding Options

Funding currently sourced by stakeholders

There are several outside funding sources already being utilized by DATA/TTA, the MPO, and Durham nonprofit health centers to increase access to health centers. These include federal grant programs 5307 (Urbanized Area Formula Program), 5309 (Bus and Bus Facilities), 5310 (Elderly and Individuals with Disabilities), and 5317 (New Freedom). The county has also received funding from the Human Service Transportation Management Program to develop a coordinated public transit-human services transportation plan, which includes consolidating para-transit call centers.[3]

Funding availability: Federal Funds

A number of federal agencies support programs and grants that fund transportation, including the Federal Transit Administration (FTA), but each program is largely limited to a specific service population. United We Ride, a technical assistance program of the FTA, outlines the various federal agencies and their grant programs that provide funding for transportation services. A brief outline is provided below. More information is available at www.unitedweride.gov.



[3] Via email correspondence with John Tallmadge of TTA and Meg Scully of Durham County Cooperative Extension

This report specifically focuses on funding made available through Medicaid and the FTA. These are renewable funding sources, although they general require the local applicant to provide a match.

Medicaid Funding

Medicaid is a primary source of funding for health-related transportation services for low-income individuals. However, only 11 percent of Lincoln Community Health Center's population is covered under Medicaid[4]. Many low-income and homeless individuals may not qualify for Medicaid due to cumbersome eligibility requirements including proof of residency, U.S. Citizenship and a valid social security number. Transportation funding programs are further limited.

Job Access Reverse Commute (JARC) Funding

Job Access Reserve Commute funds are intended to provide transportation services, both fixed-route and demand-response, to welfare recipients and eligible low-income individuals to access jobs and job-related activities. JARC funding can be used for service provision and administration costs but cannot be used for service subsidies. JARC funds also require a 20 percent local match for capital/administrative projects and 50 percent local match for operating support.

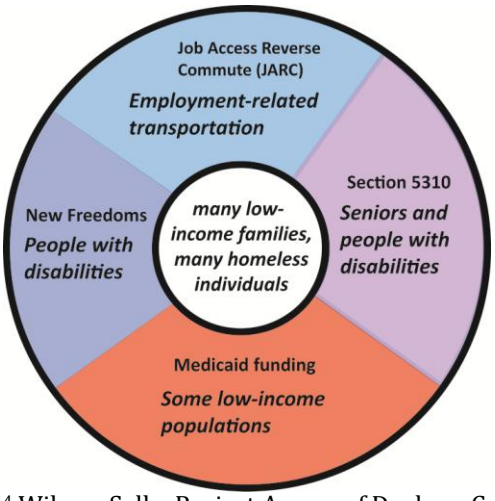
New Freedom Funding

New Freedom funds are intended to provide transportation services for people with disabilities beyond what is required by the Americans with Disabilities Act of 1990. Funds can be used for capital and operating costs to provide additional service for both fixed-route and para-transit service. Similar to JARC funds, New Freedom funds can be used to fund additional service and administrative costs but cannot be used to subsidize fares.

5310 Funding

5310 funds are intended to provide supplemental transportation services specifically for the elderly and persons with disabilities. 5310 funds are also formula funds that require a local match. All three funding programs outlined are part of the SAFETEA-LU transportation bill, which expired in 2005 and has been extended on an annual basis since 2005. These funds should be considered with some caution as they could possibility change with the adoption of a new federal transportation bill.

"Donut Hole" Funding Gap



Between these federal programs there is a funding gap, also referred to as the 'donut hole' of funding. There is a population significantly represented among the clients of nonprofits health centers that is not senior, not disabled (or doesn't meet criteria for being disabled), and is not eligible for Medicaid. This population can include low-income families with young children, or homeless individuals with chronic healthcare needs, and veterans.

[4] Wilson, Sally. Project Access of Durham County. Personal communication, February16, 2012.

Private Foundation Grant Funding

In addition to federal funds there are a number of grants from private organizations available. Some of these grants have fewer constraints than the federal funding and could thus be used to fill the 'donut hole' in funding. However, unlike federal grant programs, these grants tend to provide one-time funding opportunities and are not renewable. As such, they cannot be expected to support ongoing program administration and operations, especially for an annual subsidized purchase of bus passes.

Private foundation funding does offer potential for short-term funding, particularly for jump-starting a program by supporting overhead and administrative costs. Private funding could be used in conjunction with other more sustainable funding streams that would support long-term operations and management.

The following table outlines a number of private foundation grants that the Partnership for a Healthy Durham should consider pursuing.

Private Foundation Grant Options

Beverly Foundation	Supports new ideas and options to enhance mobility and transportation for seniors through research, community outreach, and technical assistance.
Mr. Goodcents Foundation	Specializes in community transportation for seniors and people with disabilities
Mary Duke Biddle Foundation	Provides funding for the arts, education, and health organizations in North Carolina or New York City
Blue Cross Blue Shield Foundation of North Carolina	Provides funding to improve the health outcomes for vulnerable populations in North Carolina
Triangle Community Foundation	Provides donor-advised funds for health and human service nonprofits in the Triangle area.

Best Practices

This section of the report is intended to provide an overview of program development around the topic of reducing transportation barriers for low-income populations. The prior section covering funding availability has highlighted specific funding needs for transportation access to healthcare. Case studies highlighting municipal programs that address some or all of these needs will be presented, with a focus on innovative tools to address funding and service gaps not covered by state and federal policy. Certain tools most applicable to Durham County will be analyzed in depth with an eye toward making specific recommendations for healthcare transportation programming.

Palm Beach County, FL

Program: Low-income bus pass program: discount fare through social service agency purchase
Administration: Citizens4Transit (mobility manager and transit advocacy organization)
Tools: Administrative management body, web-based database for monitoring
Funding Sources: Private grant from FL foundation, federal SAFETEA-LU funds including New Freedom

Citizens4Transit is the mobility manager in Palm Beach County, Florida that also serves as a transit advocacy organization. One of the organization's programs is to administer a low-income bus pass program in the county. Citizens4Transit purchases bus passes on consignment from Palm Tran, the local transit agency and distributes them by mail to social service agencies to distribute to low-income and transit dependent individuals. The bus passes are sold to residents on a sliding scale based on income. Any non-profit organization can apply to Citizens4Transit to distribute passes. Individuals who are 100% of the federal poverty level are able to purchase monthly passes for the discounted rate of $10. Citizens4Transit supplies 8,000 bus passes to 16 agencies per month. PalmTran distributes 60 percent of the passes and non-profit partners distribute the other 40 percent of the passes.

Citizens4Transit received a grant from the Quantum Foundation, a local Florida foundation with a focus on access to healthcare in the region, to build an on-line database to keep track of the bus pass program. It is a web-based database to which any non-profit can be added. Any member who purchases a bus pass through this program is added to the database, assigned a case manager and tacked to ensure they are eligible and participate.

In addition to private foundation funding, Citizens4Transit also uses several federal SAFETEA-LU grants, including funding from the New Freedom program. Citizens4Transit also runs the SILO tax-free voucher system for residents to have access to private taxis when the para-transit service does not operate. Citizens4Transit is able to use federal transit funds to support the bus pass program for the entire *transit disadvantaged* population because the state of Florida created the Commission for the Transportation Disadvantaged.

Lincoln, NE

Program: Low-income bus pass program: discount fare through individual purchase
Administration: Star-Tran (City of Lincoln transit agency)
Tools: Discount embedded in official fare structure
Funding Sources: City funding from property tax revenue, agency operating funds

Star-Tran offers a low-income bus pass program whereby low-income residents can purchase a 31-day bus pass for $8. There is no subsidy for the reduced-fare pass; Star-Tran offers this option as part of their fare structure. For every reduced-fare pass Star-Tran sells, they lose $30. Residents may purchase a reduced-fare bus pass at a number of different human service agencies or at the Star-Tran ticket office.

Prior to the reduced-fare bus pass program, the City of Lincoln's human service departments tried to coordinate with 18 non-profit agencies to fund full-price bus passes. The City received a grant to organize the bus pass program the first year but after the grant period expired, the Mayor requested that Star-Tran keep the reduced-fare program as part of its official fare structure. There is no subsidy to compensate for the loss of revenue. Rather, Star-Tran assumes responsibility for the loss of revenue, which is currently around $1 million annually. Star-Tran also noted that the human service agencies in the City actively lobby to maintain this program and keep passes low.

The program is targeted at all low-income individuals, including seniors and people with disabilities and was never designed specifically for one user group. Eligibility is based on federal policy guidelines but income eligibility is vetted by the state. Nebraska issues credit card media that must be swiped to verify income level but Star-Tran does not have a mechanism to swipe the credit cards and has no way of verifying income eligibility. Now, Star-Tran requires all participating riders to sign a form confirming their low-income status.

The low-income bus pass program sells up to 3,000 passes per month, which amounts to about half of Star-Tran's riders using the reduced-fare passes. As a result of the program, ridership has increased substantially, as revenues have decreased. Star-Tran receives most of their funding from the City through property tax revenue. However, property taxes are limited and the increasing cost of fuel and wages have led to an increased burden on operating costs. Not surprisingly, Star-Tran has had to cut service.

Star-Tran recommends that a transit agency not take on administering a bus pass program as they have. The actual administration (verifying eligibility and pass distribution) should be carried out by social service agencies, which must also serve as partners in such a collaboration. Star-Tran also suggests that the magnitude of discount they offer is untenable. If they had the flexibility to make the discount 50 percent instead of 17 percent, the program would be more sustainable. Star-Tran also recommended limiting the number of bus passes allowed in this program. Also, earlier on in the program Star-Tran was able to do more analysis of the ridership and they found that only 10 percent of the pass users received the pass all 12 months. This suggests to them that this population is either transient or is in need of this program to help individuals get through significant life events like the loss of a job or family status. They suggest keeping this in mind, when designing a program. For example, monthly passes would be more appropriate than annual.

King County, WA

Program: Low-income bus pass program: discount fare through agency purchase
Administration: King County Metro, King County Department of Health and Human Services
Funding Sources: Line item in County budget

The King County Human Service Bus Ticket Program was established in 1993 by the King County Council to help increase access to the regional transportation system for homeless and low income persons. Human service agencies in the City of Seattle and surrounding King County must apply to

participate in the program. The agency pays 20 percent of the face value of the bus ticket and King County Metro subsidizes the remaining 80 percent. In 2011, the total ticket subsidy was $1.8 million. This amount is set by the County Council, which is the elected governing body. The subsidy is a line item in their general budget for total value of bus programs. King County funds both the transit agency and the human service agency so they have flexibility in shifting funds.

The program was established as a result of the grass roots efforts of an organization called SHARE and its sister organization, WHEEL, which have been active since the 1990s (http://www.sharewheel.org/). These two organizations serve as homeless advocacy groups in the County. SHARE started a housing program outside of the city center and they needed a transportation program to support the housing program. Since 1993, there has never been a year that the County Council has not supported the bus pass program although some council members are more supportive of the program than others. Recently, the program has been in the spotlight because the ride-free zone in downtown Seattle will be eliminated, which is increasing the cost of transit city-wide.

King County works closely with the City of Seattle in running the program. Program funds are split 50/50. King County only distributes passes to human service agencies outside city limits and the City is responsible for distributing funds within City boundaries. Overall they fund over 80 agencies, mostly shelter programs because homeless programs receive priority. King County Department of Community and Human Services is responsible for deciding which human service agencies will receive subsidized passes. They then send the list of approved agencies to King County Metro, where the agencies go to pick up the passes. They buy a combination of single ride and single day passes and youth tickets. Agencies do not have to purchase all tickets at once – they can go back throughout the course of the year but they are limited in the number of passes they are allowed to distribute. The agencies are judicious in distributing passes because they are limited.

The biggest issue the program is dealing with is ticket fraud. King County Metro has under-cover transit police who search for ticket fraud. Because subsidized passes have street value, some clients will sell them for a profit. Tickets can be traced though serial numbers so transit police know when a fraudulent ticket originated in a human service agency. This can lead to bad press for the program but overall does not negate the good that the program does.

Tucson, AZ

Program: Low-income bus pass programs: discount fare through individual and agency purchase
Administration: Sun-Tran (City of Tucson/Pima County transit agency)
Tools: Database to manage accounts, will be changing fare media to SmartCards
Funding Sources: City funding from general fund

Pima County, Arizona has a population of just fewer than 1 million, over half of whom reside in the City of Tucson. Pima County and Tucson's public transit needs are served by SunTran, which provides fixed-route bus service, para-transit, neighborhood shuttles, and rideshare programming.

SunTran provides a reduced fare program for low-income, senior, and disabled individuals through their 'Economy Pass' program. Low-income Pima County residents seeking the reduced fare ($ .50-$1.00) must obtain a SunGo ID card from the Special Services Office. This requires submittal of an application, and in-person presentation of a state-issued photo ID and documentation of each income source. The SunGo ID card costs $2 and is valid for a year. It must be presented to the bus driver when the reduced fare is used to board or at the Special Services Office when advance passes are purchased.

In addition to the SunGo ID cards, SunTran also operates a program through which registered nonprofit and charitable organizations can purchase bus passes in bulk at a discount. These organizations must demonstrate 501(c)3 status and verify that their clients meet the low-income requirements (although SunTran does not verify this, they do have the option of auditing these organizations for compliance). Due to budget constraints, SunTran is currently not accepting additional nonprofit organizations into this program. There are currently around 100 nonprofits registered to purchase bulk discounted passes on 130 separate accounts.
SunTran's approach to low-income fare reduction is partially attributable to its high proportion of low-income residents, in that City of Tucson politicians make transit affordability a political priority. The reduced fare program is funded through the City's General Fund, and over 50 percent of SunTran ridership is covered either through the SunGo ID individual reduced fares or the bulk pass purchase program.

Funding for this program is a challenge. The representative from SunTran interviewed, Jenny Sirnio, stated that the program is a great thing for low-income individuals, but the agency providing does lose a significant portion of fare-box revenue which must be provided through other means. Although the reduced fares are clearly a political priority for Tucson, and embedded within their General Fund, times of economic downturn present a challenge, as evidenced by the bulk pass purchase program being put on hold. Sirnio reported that SunTran did an audit of the bulk pass program a few years back, and found that many of the grantee organizations were receiving supplemental funds for transportation from outside grants. Tucson also recently canceled its reduced fares for students.

Maintaining accountability within the nonprofit program has also presented some challenges for SunTran. At the time the program was set up, recipients of reduced fares through nonprofit agencies were not required to have a SunGo ID if they were only purchasing two-ride passes, and the only monitoring was provided by the nonprofits. SunTran plans to convert their fare media within the next year to a system with "SmartCards." The SmartCard program will require documentation for any individual hoping to receive discounted fares either through SunTran directly or through nonprofits. Nonprofits will distribute passes through an online account that loads fares onto SmartCards – when a nonprofit puts a fare on the client's card, the serial number will notify the nonprofit of the client's eligibility. This is intended to enforce low-income documentation, and prevent 'double-dipping' by individuals who obtain fares through multiple nonprofits.

Cincinnati Metropolitan Area, OH-KY

Program: Low-income bus pass programs: discount fare through agency purchase
Administration: Everybody Rides Metro foundation
Tools: Centralized administration, coalition partnership
Funding Sources: Federal grant funding, City funding, private grant funding

The Cincinnati metropolitan region has a population of over 2 million people and encompasses portions of Ohio, Kentucky, and Indiana. The City of Cincinnati's transit needs are served primarily by the Southwest Ohio Regional Transit Agency (SORTA), and secondarily by the Transit Authority of Northern Kentucky (TANK). Jurisdictional challenges exist for both funding and operations due to this multi-state service area, but they are not examined here as they do not pertain to this report.

Cincinnati's Everybody Rides Metro foundation (ERM): It is a partnership of public and nonprofit agencies in the Cincinnati area with the mission of temporarily subsidizing transportation options for

low-income residents. Currently, ERM applies for and manages funding, which it uses to purchase transit passes from SORTA at cost ($1.75 for one ride). It then sells these passes in bulk to its nonprofit partners, still at cost, and then reimburses them $1 for each ride used in a month. ERM's nonprofit partners sign an agreement but don't contribute anything financially to qualify as partners; their $0.75 spent on each pass counts as a local contribution under federal grant reporting requirements.

ERM, the 'brainchild' of a former City finance executive, was formed in 2006 and began operation in 2008. It was founded with JARC funding through the FTA and some independent grants. In the first two years of operation, ERM had startup funding that allowed them to fund rides for low income residents to work-related, health-related, education-related, and 'other vital' destinations (such as grocery stores). In 2009, the first full year of operation, ERM subsidized 78,804 health-related rides for 17,783 riders. ERM is an innovative program insofar as it centralizes distribution and nonprofit partnership, and consolidates grant application separate from the City's and transportation agency's duties.

However, ERM was forced to cancel its subsidies for rides that were not related to job accessibility or job seeking at the end of 2009, as they did not have a federal match for these categories. Finding funding that does not fall under JARC is a major challenge for ERM and precludes it from offering subsidies for a wider variety of trips. ERM Executive Director Joe Curry reported that he has difficulty finding sustainable funding sources – many grants are available but none sufficient to fund the program's expenditures on non-job trips for more than half a year and none are consistently renewable sources. Although ERM receives donations and grants from the City of Cincinnati, the Greater Cincinnati Foundation, the FTA (through the OKI Regional COG), and SORTA, these funds are either constrained by institutional or federal requirements for job-focused assistance, or not sufficient to support health-care transit subsidies.

State of Florida

Program: Commission for the Transportation Disadvantaged
Administration: Separate administrative body with staff and 27 appointed representatives
Tools: State policy board and funding mechanism
Funding Sources: Federal grant funding, state funding; license tag fee, temporary disabled parking permits, state transportation trust fund

The state of Florida has a population of just over 19 million (American Community Survey, 2011). Historically, the state has had a higher than average proportion of senior residents. In 2011, 17.3 percent of the population were 65 years or older, compared to the U.S. rate of 13.0 percent (American Community Survey, 2011). Florida's senior population presents a challenge for the state, which has to ensure their existing transportation system is equitable and accessible to all residents. In addition, Florida recognizes that affordable access to essential life services (i.e. food, employment, and healthcare) affects more than just seniors but also people with physical and mental disabilities and low-income individuals who cannot afford to own a vehicle. To address these potential inequities the Florida Department of Transportation created an independent policy development and implementation agency called the Commission for the Transportation Disadvantaged.

The Commission consists of seven state agency representatives (Agency for Health care Administration and Medicaid, Department of Children and Families, Department of Elder Affairs, Department of Education, Department of Veteran's Affairs, Department of Transportation, and Agency for Workforce Innovation), five citizen representatives appointed by the Governor, one community

transportation coordinator representative, six transportation operators, six non-transportation businesses representatives. The Commission considers their mission to ensure the availability of efficient, cost-effective and quality transportation services for transportation disadvantaged persons. Florida Statute defines the transportation disadvantaged as:

> Those persons who because of physical or mental disability, income status, age are unable to transport themselves or purchase transportation and are, therefore, dependent on others to obtain access to healthcare, employment, education, shopping, social activities, or other life-sustaining activities or children who are handicapped or high-risk or at-risk.

According to a 2004 Annual Report for the Transportation Disadvantaged Program, the program is utilized in proportions by the following user groups: Elderly (44%), Low Income (8%), Disabled (15%), Children (17%), Disabled and Low Income (6%), Other (10%). In 2004, 37 percent of all trips supplied through the program were for a medical purpose.[5]

The Commission pools money from various state and federal agency funding programs including some revenue that is raised specifically for the Program (i.e. License tag fees). The following table describes the various funding sources the Florida Transportation Disadvantaged Program used in 2004. In other states, many of these funding sources are restricted to specific user groups but in Florida, the funds are consolidated into one program. As a result, Florida is able to provide transportation to a broader clientele.

Table D: Florida Transportation Disadvantage Program Funds, 2004

Funding Source	Amount
Commission for the Transportation Disadvantaged	$32,746,261
US DOT	$12,625,243
Florida Department of Children and Families	$20,866,012
Agency for Health Care Administration – Medicaid	$84,456,866
Department of Education	$1,104,652
Department of Elderly Affairs	$9,920,011
Departments of Health, Community Affairs, Juvenile Justice, Agency for Workforce Innovation	$1,135,679
Other Federal Programs	$8,020,550
Local Government	$107,238,019
Local Non-Government	$13,991,927
Fare Box	$14,902,005
2004 Total Revenues	$307,007,225

[5] Bacot, Lisa. (2005). *Overview of the Florida Transportation Disadvantaged Program*. [PowerPoint slides]. Retrieved from: http://www.lakesumtermpo.com/pdfs/workshops/rts/lisa_bacot_FCTD.pdf

The Commission for the Transportation Disadvantaged has been an award winning model for human service transportation, winning accolades from United We Ride during its initial year in 2004. Furthermore, a return on investment study found that the State of Florida invested $372,264,302 in its transportation disadvantaged programs in 2007. These funds generated benefits of $3,172,813,246. In other words, for every dollar the state invested in the program, they received a payback of $8.35.[6] The benefits were largely due to increased access to the workforce and job training for many individuals as well access to preventative healthcare services.

Tools for Durham: Strategies

After reviewing the available literature and conducting a number of interviews with social service providers, transit agencies and representatives from the Federal Transit Administration, we have compiled a number of strategies and next steps for the Partnership for a Healthy Durham to pursue. We have included both challenges and opportunities inherent in the different strategies as well next steps that we recommend.

Advocacy Work at the State Level

Establish definition of "transportation disadvantaged" that encompasses low-income population

Partners: NCDOT, healthcare and community advocates and allies

We recommend that the Partnership for a Healthy Durham consider advocacy work at the state level, to try to establish a definition of 'transportation disadvantaged' that encompasses a broader portion of the population.

Benefits: Advocating for a broad definition and statewide program to support the transportation disadvantaged would enable agencies to pool disparate funding sources, including both healthcare and transportation funding, to serve clients who would otherwise be excluded from these programs.

Challenges: State advocacy and particularly lobbying to create a program in the vein of Florida's Transportation Disadvantaged Program would be a long-term undertaking. Furthermore, such a strategy requires political support at the state level. Changing this definition would remove constraints on public funding and in some cases could increase the amount of public funding spent. It could be difficult to lobby for such a change in the current climate of fiscal restraint.

Next steps

Write memo and send to North Carolina Department of Transportation Board of Directors. NCDOT would need approval of the State legislature, but we think that the challenges of obtaining support from conservative politicians may be tenable. First of all, it does not necessarily increase the amount of state funding *spent*, rather, it increases the *flexibility of use* of federal funding. It also allows money to be pooled, and would increase the ability to fund rural transportation, which often resonates with representatives of highly rural counties who might otherwise oppose any expansions of government spending ability or flexibility.

[6] Cronin, Jr., J.Joseph, Jenna Hagerich and Jeff Horton. (2008). *Florida Transportation Disadvantaged Programs; Return on Investment Study.* Florida State University College of Business and the Marketing Institute.

Discounts and Bulk Bus Pass Purchase Programs

The healthcare and social service agencies that participate in the Partnership for a Healthy Durham currently spend around $130,000 per year on DATA bus passes. Agencies purchase bus passes at face-value; $1 for a one-way ride, $2 for a day pass, $8.50 for a five-day pass, $12 for a seven-day pass $36 for a monthly pass. These purchases tend to come out of agencies' general funds or petty cash; as a result, agencies are interested in finding a discount program that could reduce this cost burden.

Challenges: There are two major challenges that apply to any discount program, whether it be through agency bulk or single purchases, or an individual low-income discount fare.

Funding: First, any discount offered from the Transit Agency requires a renewable funding source to make up for the lost fare box revenues. If the population given the discount falls into the 'donut hole' of funding eligibility, the funding must come from the City if the program is to have any longevity. The case studies of Lincoln, NE and Tucson, AZ both illustrate the burden that a discount fare can place on the municipal budget. The Cincinnati case study illustrates the importance of securing a renewable source should grant funding be used. A number of cities have struggled with how to subsidize transit service for the transit-dependent but few cities have found sustainable funding sources to support these programs. From our research, we have not been able to identify a renewable, sustainable non-municipal funding source that has been used successfully in other regions. Furthermore, the City of Durham may not be able to underwrite a fare discount program at this point in time, given the City's significant budget shortfall in 2011/2012. The City of Durham already subsidizes transit access to health care more than any other source (including individual users and health care agencies).

Ridership and Incentive for City participation: Existing programs like the TTA GoPass program offer discounts that are intended to increase transit ridership by incentivizing people who would otherwise drive to use transit instead. The populations that are served by low-income healthcare agencies are already riders of transit. As a result, a fare discount program does not help achieve greater transit ridership and may not be as appealing an investment to the transit agency or City.

The following strategies illustrate potential iterations of fare discount programs.

Request individual low-income discounted bus pass rate from City of Durham

Partners: Community advocates and allies, City of Durham

Benefits: Advocating for an individual low-income discounted bus pass rate from the City of Durham would extend the benefits of a discount to cover a large portion of the transportation disadvantaged population. One way that a bus pass program can pay for itself, although we did not find any examples of agencies that were able to make this work, is that by providing subsidized transit for the very low income, the transit agency gains flexibility in altering its price structure.[7] The main opposition to fare increases are the very low income and transit-dependent riders who generally cannot afford an increase in fares. By operating a program that keeps these fares artificially low, the transit agency can increase their base fare either to make up the money lost for

[7] Metropolitan Transportation Commission. (2009). *Means-Based Transit Fare Discount Program White Paper.* Retrieved from: http://apps.mtc.ca.gov/meeting_packet_documents/agenda_1195/3b_White_Paper_Draft.pdf

the subsidized program. The result is a sliding scale system where low-income riders who can afford the market rate of transportation subsidize the riders who cannot afford the market rate of bus fare.

Challenges: Funding for such a program is not available through renewable federal grants, as these have constraints on the populations that may be served, and private grants are also not a reasonable option, as they are not a sustainable source of funding. This funding source would also need to be significant, as a large portion of transit ridership in Durham is low-income. It is unlikely that a request for an individual low-income discounted bus fare would be successful given the current City of Durham budget shortfalls.

Request bulk purchase discounted bus pass rate from City of Durham for healthcare agencies

Benefits: This strategy would allow healthcare agencies to purchase bus passes in bulk at a discount rate for future distribution to clients. One specific approach to this strategy would be for all nonprofit health agencies purchasing bus passes to pool their funds and make a very large annual bulk purchase of bus passes from the City of Durham. A large upfront investment could be beneficial to the City of Durham.

Challenges: A major challenge in creating a subsidized bus pass program involves accountability and coordination. If agencies are going to purchase bus passes in bulk, there must be a way to determine how many passes are purchased and how they are distributed per agency. Currently, some individual agencies keep track of these purchase figures while other agencies do not maintain this information. Coordinating a purchasing agreement between multiple agencies would require a centralized database to track which agencies purchase how many bus passes. Palm Beach County recently implemented a similar system. They used private foundation funding to design a database to be used by all agencies who distribute bus passes from PalmTran. The database is web-based to allow for case managers at different social service and healthcare agencies to record when clients receive bus passes.

Next steps

In order to get any kind of discount, healthcare agencies would need to put together a proposal for TTA. TTA will then examine the feasibility of the proposal and research it further, and if they feel it is viable they will make a recommendation for the City of Durham. As a bulk pass program would involve the budget, the recommendation would need the approval of the City Council.

Should healthcare agencies want to request a bulk purchase discount from the City of Durham, they should first determine the size of this bulk purchase. It is difficult to ask the City for a discount without being able to tell them how much money they would be expected to set aside for the program, and any discount does take away from transportation agency funding. Next, healthcare agencies should figure out whether they would make this bulk purchase annually or semi-annually, and request that TTA look into whether any money may be saved for TTA by making large advance bulk purchases.

We recommend exploring the resources available from the National Resource Center for Human Service Transportation Coordination[8]. This is a technical resource center that is part of the FTA's United We Ride initiative. The National Resource Center maintains a Transit Pass Toolkit that

[8] http://web1.ctaa.org/webmodules/webarticles/anmviewer.asp?a=342

walks a user through the sets they should take when considering establishing a transit pass program.

We also recommend Partnership for a Health Durham considers applying for private grant funding to support the development of a centralized web-based database to provide a consolidated/cooperative administrative structure between the different healthcare organizations. This would help to keep track of which agencies are purchasing passes and could be used to track eligibility requirements of transit pass recipients to better understand who is using the service and how frequently.

Coordinate private para-transit

Another area we recommend pursuing is the coordination of private para-transit services. As a federally qualified healthcare center Lincoln Community Health Center should receive Consolidated Health Center Program funding through the Health Resource and Services Administration (HRSA) Bureau of Primary Health Care (BPHC). It is HRSA's policy that health centers covered under section 330 must provide services that help ensure access to basic healthcare, including services that enable patients to access healthcare center services, including transportation.[9] Lincoln currently operates its own private para-transit service to transport clients. While we were not able to access data on Lincoln's client trips, many public para-transit providers have been able to cut costs by shifting demand response clients to fixed route service. We recommend Lincoln look into whether any of their clients regularly use the DATA system for non-medical trips. Any clients who are regular DATA riders, Lincoln could design a voluntary pilot program to offer these clients a monthly bus pass instead of a para-transit trip. The overall costs savings could be shifted towards subsidizing a bus pass program.

[9] www.unitedweride.gov

IV. Concluding Strategic Goals

Beyond the specific strategies outlined in the report, we found overarching themes that the Partnership and the Access to Care Committee should consider addressing. A complete list of the specific strategies can be found at the conclusion of this report.

Make healthcare access a planning goal for TTA and Durham

The Access to Care Committee and Partnership for a Healthy Durham should attempt to further institutionalize healthcare access as a planning goal for both land use and transportation planning in Durham and the greater Triangle area. Land use and transportation planning processes are generally governed by objectives that denote the prioritized outcomes of planned development. When such objectives are being developed or revised, the Committee and Partnership should participate in the planning process and advocate for the inclusion of healthcare access in these objectives. This would include participating in public hearings, workshops and working groups when planning documents like General or Consolidated Plans for land use, community development, or transportation are being created or updated. The Committee and Partnership should also attempt to place their members and representatives on boards of directors or commissions for governing and advisory bodies on these topics. These steps would help entrench healthcare interests and perspectives within planning processes, allowing the City of Durham to make better informed decisions on future land use and transportation systems.

Improve data collection

Efforts to address issues of funding and service are currently hobbled by a lack of data on the clients being served and types of service being provided. Although it would require additional staff time and coordination, we suggest that the Access to Care Committee work with nonprofit and public healthcare agencies to improve data collection on their transportation-related expenditures. In the short term, collecting data on the numbers and types of bus passes purchased by each healthcare agency is necessary, as accurate and precise data on bus pass purchases is an important component in proposing a bulk purchase program discount. In the long term, better data collection on the amount and type of all transportation expenditures and the types of clients served will enable better program evaluation and design, and greatly benefit grant applications.

Best practices from other areas suggest that a centralized database system shared by nonprofit and public healthcare agencies is an effective method for data collection.

Pursue private grant funding for consolidated administration

Consolidation of administration would greatly improve the quality and capacity of data collection, program monitoring, eligibility tracking, and funding solicitation for nonprofit and public healthcare agencies. Nonrenewable private grants are a good source of funding for setting up an administrative system to manage these program elements.

Explore greater coalition development

Beyond collaboration and consolidation among healthcare organizations, the Committee and the Partnership could benefit from developing alliances and working relationships with other service oriented interest groups in the Durham, Triangle, and North Carolina areas. Healthcare agencies share many issues of concern with other social service and community groups. Sharing political power, knowledge and resources through coalition building with these groups would benefit healthcare agencies.

V. Summary of Strategy Options

Physical Transit Accessibility

Public agencies and private healthcare providers can use the system access analysis to improve the quality of travel to healthcare for transit-dependent populations across the City of Durham.

1. Incorporate Transit Shed Maps into Healthcare Planning

1A. Provide clients with appropriate transportation services using transit shed maps

1B. Focus para-transit and private transportation services where transit service is poor

1C. Site new healthcare services within system-wide transit shed

2. Consider New Transit Services Connecting Peripheral Destinations

Improve circumferential travel, especially between North and West healthcare clusters

Short term: A west Durham to north Durham-specific para-transit service (public or private)
Medium term: A partial ring route from west Durham to north Durham connector line
Long term: A DATA ring route serving perimeter locations

3. Improve Evaluation and Monitoring of Healthcare Access for Transit-Dependent Populations

3A. Improve monitoring and evaluation of healthcare access

3B. Develop a more sophisticated understanding of individuals who regularly ride transit to health-related destinations

Cost Accessibility

1. Advocacy Work at the State Level: Establish 'transportation disadvantaged' definition.

2. Bulk Purchase Bus Pass Program and Discounted Bus Passes

2A. Request individual low-income discounted bus pass rate from City of Durham

2B. Request bulk purchase discounted bus pass rate from City of Durham for healthcare agencies

3. Improve and coordinate data collection on bus pass purchase and other transit expenditures by healthcare agencies

4. Coordinate Private Para-transit

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Resources

United We Ride Website: http://www.unitedweride.gov/

National Resource Center for Human Service Transportation Coordination: http://web1.ctaa.org/webmodules/webarticles/anmviewer.asp?a=342&z=78

Florida Commission for the Transportation Disadvantaged: http://www.dot.state.fl.us/ctd/index.htm

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Appendix A:
Scope of Work

Affordable Healthcare Access in Durham, NC

The University of North Carolina at Chapel Hill
Department of City & Regional Planning

Scope of Work
February 2012

Problem Statement: Improve affordability and convenience of access to local healthcare facilities via fixed-route transit and para-transit for low-income Durham residents

Client Relationship: University of North Carolina Department of City & Regional Planning graduate students in the Spring 2012 Transportation Workshop ("Students") are working with the Partnership for a Healthy Durham's Access to Care Committee ("the Committee"). The Committee has a particular interest in transportation for low-income patients.

Deliverables: The students will aid the client in developing a report on health-related transportation in Durham County, North Carolina, focused on this population. The report will provide a comprehensive overview of existing access to healthcare conditions, identify potential gaps in service, compile best practices for service provision as well as funding opportunities and ultimately make recommendations and direction for next steps for the client.

Task List

Task 1: Inventory of Data and Descriptive Maps
Task 2: Cost Estimate of Healthcare Transportation Services
Task 3: Healthcare Access Using Existing Transit Services
Task 4: Inventory of Innovative and Best Practices, Innovations in Healthcare Access and Funding Opportunities
Task 5: Recommendations
Task 6: Compilation of Report and Presentation

Task Detail

Task 1: Inventory of Data and Descriptive Maps

Develop an inventory of existing GIS data pertaining to healthcare services, population demographics and transit service in Durham County. All data sets currently exist but will be obtained from the various agencies that maintain the data and in some cases, will be updated. Create descriptive maps to frame the issue of affordable access to healthcare in Durham County. The inventory of data and maps will include the following:

Collect Data

- Collect demographic information for Durham (low-income, elderly, disabled, etc.) for use in GIS
- Collect information on the availability and cost of fixed-route and para-transit services
- Collect information on employment centers for use in GIS
- Collect information on health centers for use in GIS

- Collect information on current and proposed DATA routes in GIS
- Create descriptive maps showing physical proximity to health and health-supportive services (e.g. employment centers, health-related employment, employment services) for target riders using existing public transit routes.

Create Descriptive Client Profile

- Create descriptive client profile to complement information provided in maps

Task 2: Cost Estimate of Healthcare Transportation Services

In order to frame the issue of affordable access to healthcare in Durham, the Committee has requested that the Students estimate an annual dollar amount that is currently spent on transportation services by both public and private agencies. Estimating this figure will require requesting information from a number of sources in the County including Triangle Transit, Durham County Manager, and various low-income healthcare providers and social service agencies. Additionally, we will develop a cursory profile of the cost and user experience to those seeking care. The following agencies and individuals have been identified and will be contacted in an effort to estimate total cost:

Cost to Local Agencies

- Continue conversation with Julia Gamble, Ivan Parra and the Durham County Manager to obtain bus pass expenditure data
- Continue conversation with Julia Gamble about annual cost of Lincoln Community Health Center's para-transit service
- Contact Erik Landfried for background information on the Coordinated Public Transportation - Human Services Transportation Plan
- Contact Department of Social Services to find out dollar amount reimbursed by Medicaid for para-transit services

Task 3: Healthcare Access using Existing Transit Services

The Committee has also requested that the Students perform a spatial analysis of access to healthcare via existing fixed-route transit service provided by Durham Area Transportation Authority (DATA) and Triangle Transit Agency (TTA). A secondary concern is accessibility using demand-responsive para-transit systems.

Fixed-Route

- Evaluate known accessibility metrics and determine which are best-suited for the proposed analysis and audience
- Determine time proximity (30 minutes) to health facilities (hospitals, specialists, clinics, mental health) for target riders using existing public transit routes. We will examine accessibility based on three trip origin classifications:
  - All Durham residents (Census data)
  - Low-income block groups (Census data)
- Develop a series of maps to communicate the accessibility analysis
- Communicate a replicable methodology

Para-transit

- Provide a catalog of options other than fixed-route transit for access to healthcare
- Provide information on costs to the user and eligibility for using each option

Task 4: Inventory of Innovative and Best Practices, Innovations in Healthcare Access and Funding Opportunities

The Students will compile a scan of industry and agency best practices and innovations in coordinated transportation services related to healthcare. First, this section will identify program structures that efficiently and economically provide affordable access to healthcare using either fixed route and/or para-transit service. Secondly, the inventory will include an overview of public and private funding sources for coordinated transportation and healthcare services.

Program Structure

- Identify program coordinator from 4-6 programs and conduct phone interviews to understand local conditions, barriers to service, and funding resources and opportunities that make those programs possible and successful. Specifically we will document how these programs were established, how they are funded, and how program administration and fare media distribution works.
- Produce 4-6 written case study reports of programs that offer innovative responses to affordable healthcare access
- Evaluate Durham County fixed route and para-transit operations compared to best practices

Funding Opportunities

- Summarize available funding sources, including eligibility, application dates and amounts awarded

Task 5: Recommendations

The outcome of the above analysis will inform recommendations and next steps for the Access to Care Committee. Two scopes of recommendations will be made: system-wide funding and best practice recommendations; locally-based recommendations informed by the accessibility analysis.

Task 6: Compilation of Report and Presentation

In order to communicate the analysis and findings, an oral presentation will be given at the April meeting of the Access to Care Committee. A report will be submitted 2-3 weeks after the meeting.

Appendix B:
List of Health Locations

Health sites (key centers):

1. CAARE
2. Durham Center Access
3. Durham County Health Department
4. Durham Regional Hospital
5. Durham VA Medical Center
6. Healthcare for the Homeless (Lincoln clinic)
7. Project Access

Table B1. Low-income area accessible by each of the 7 key healthcare centers.

	Poor Coverage			Fair Coverage	Good Coverage		
Healthcare Providers	Project Access	Durham Center Access	Durham Regional Hospital	Durham VA Medical Center	CAARE, Inc.	Healthcare for the Homeless Clinic (Lincoln)	Durham County Health Department
% of low-income area with 30-minute access	0%	0%	3%	16%	30%	71%	77%

Additional health sites considered:

1. Duke Children's Hospital and Health Center
2. Duke (Page Road)
3. Duke (Patterson Place)
4. Duke (South point)
5. Duke Sports Medicine
6. Duke University Medical Center
7. Durham Center Access
8. Durham Center/Lincoln satellite clinic
9. Durham County Department of Social Services: Child Welfare, Child Support, Adult Services
10. Durham County Department of Social Services: Crisis Center, Public Assistance
11. Durham Nephrology Associates
12. Durham Rescue Mission/Samaritan Health Center
13. Hillside Wellness Center
14. Holton Clinic
15. Lincoln Community Health Center
16. Lyon Park Clinic
17. NC Orthopedic Clinic
18. Planned Parenthood
19. Senior Pharm Assist
20. Triangle Endoscopy Center
21. Triangle Heart Associates
22. Triangle Orthopedic Associates
23. Walltown Clinic

Appendix C:
Supplemental Demographic Indicator Maps

Client populations, origins and destinations

Figure C1 shows that the areas with high concentrations (top 20th percentile) of households receiving public assistance are located fairly near to downtown Durham, to the east.

Fig. C1: Durham Populations Receiving Public Assistance, Origins and Destinations

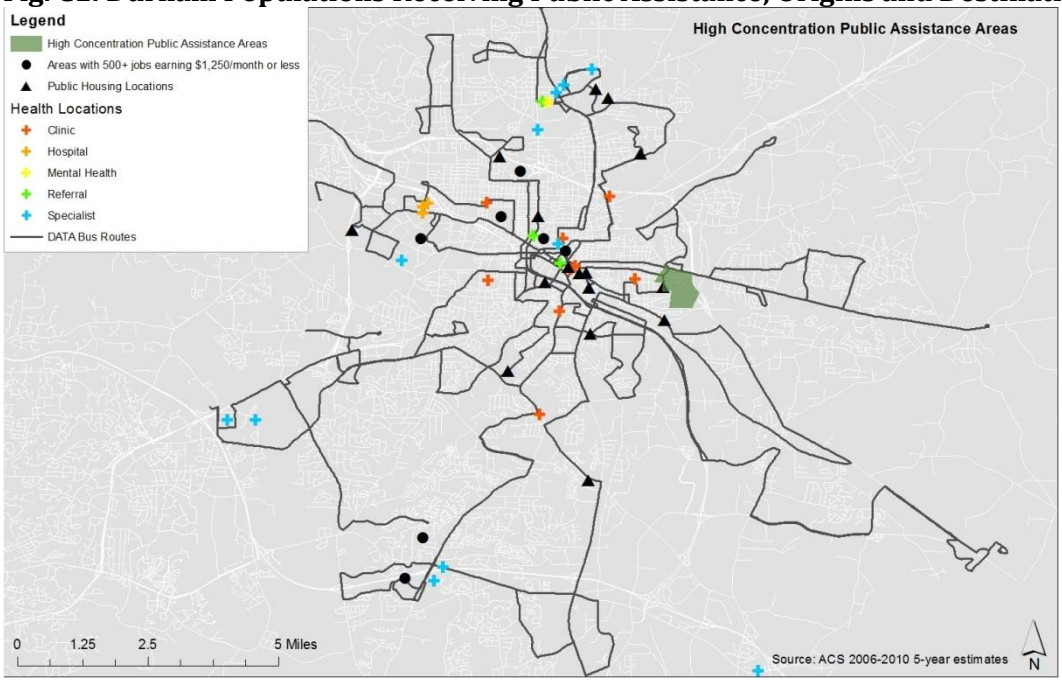


Figure C2 shows that the areas with high concentrations (top 20th percentile) of households receiving SSI are located in the downtown area, as well as to the north and east of downtown.

Fig. C2: Durham Populations Receiving SSI, Origins and Destinations

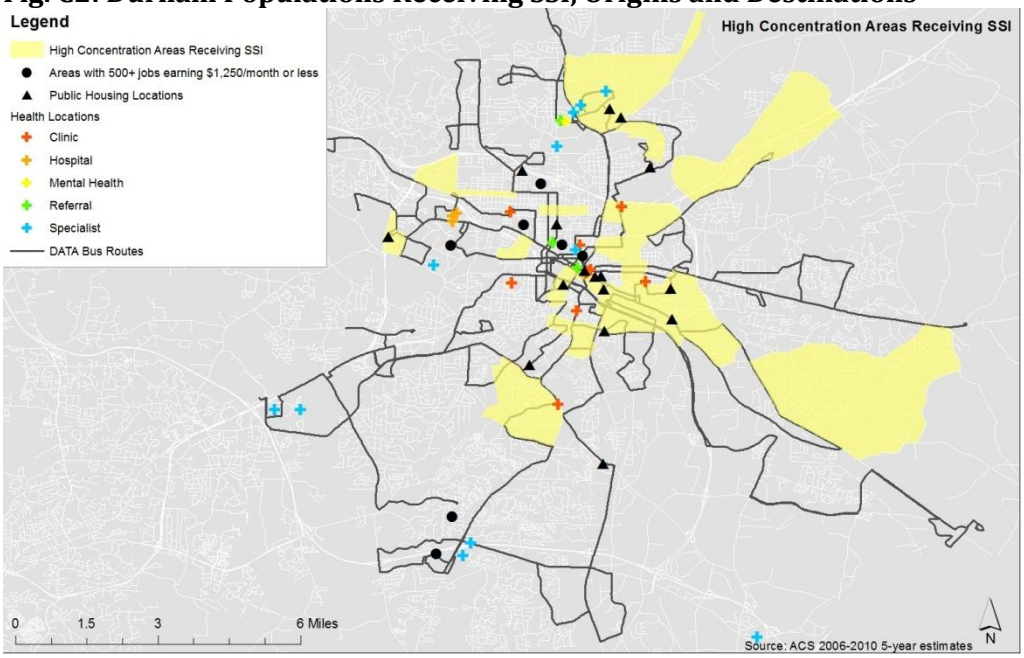
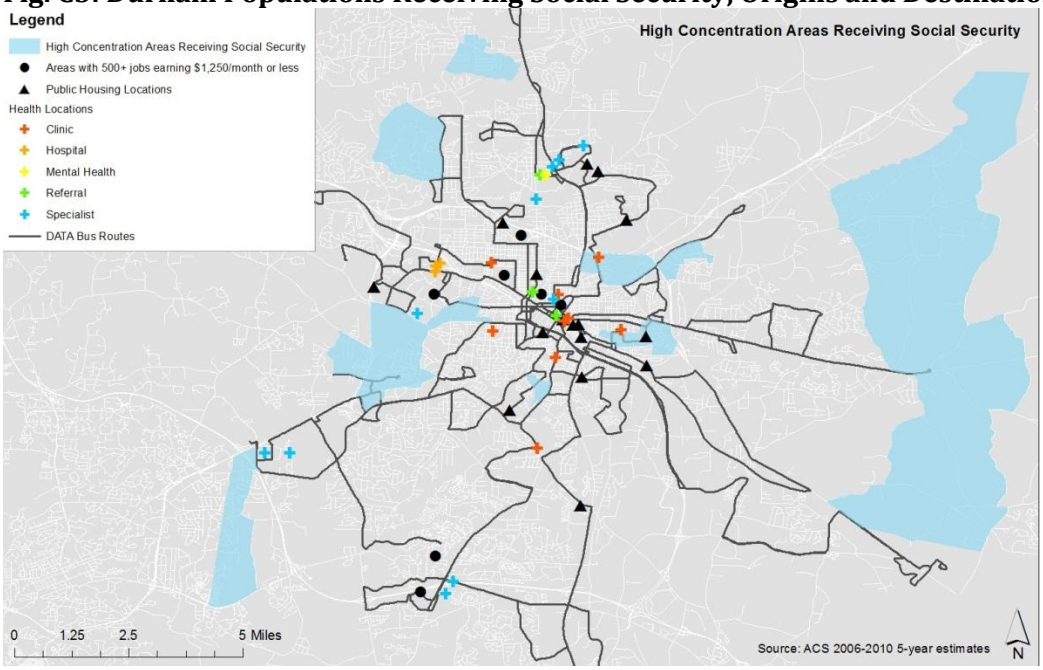


Figure C3 shows that the areas with high concentrations (top 20th percentile) of households receiving SS are located in pockets west of downtown, as well as in a large area to the far east of the county.

Fig. C3: Durham Populations Receiving Social Security, Origins and Destinations



Appendix D:
List of Neighborhoods With Demographic Indicators

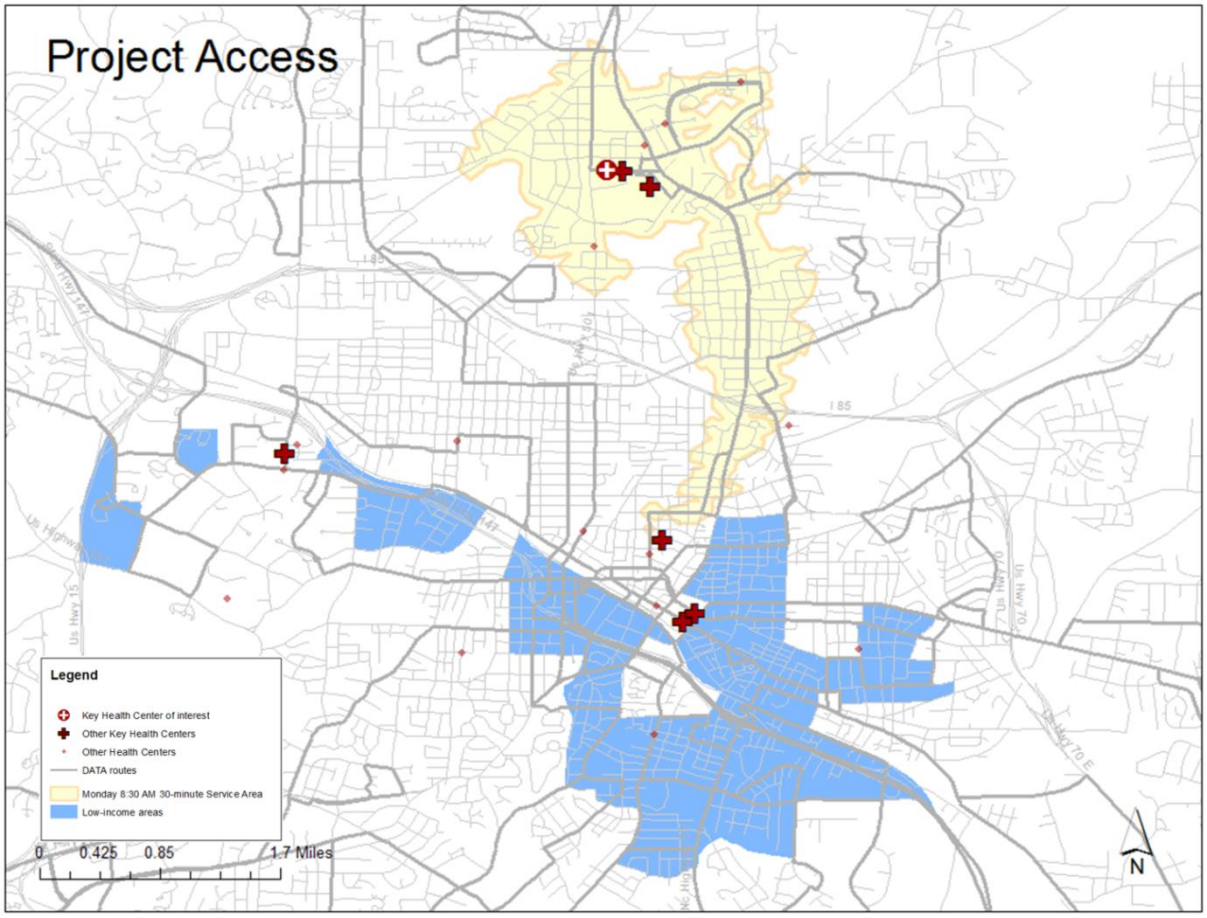
High Concentration of Disadvantaged Population	Neighborhoods
Elderly	Anderson St/Wrightwood Park, Parc at University, Lakewood Park, Lyon Park, West End, and Burch Avenue.
Low-income	Downtown, Morehead Hill, Southside/St. Teresa, Old East Durham, Eastway Village, Golden Belt, Edgemont, Albright, Cleveland Holloway, Old West Durham, and Crest Street.
Non-white	Lakewood Park, Lyon Park, West End, Downtown, South Side/St. Teresa, North Carolina Central University, Hope Valley, Stratford Lakes, Edgemont, Golden Belt, Eastway Village, Old East Durham, Gatewood Forest, Crown Points, Summer Meadow, Swann's Mill, and Old Farm.
Public Assistance	Wellons Village and Old East Durham.
Supplemental Security Income	Crest Street, Watts Hospital-Hillandale, Burch Avenue, Duke Park, Albright, Wellons Village, Old East Durham, Eastway Village, Edgemont, Golden Belt, Raven Stone, Hope Valley, and Stratford Lakes.
Social Security	Duke Forest, Colony Park, Cameron Woods, Parc at University, Anderson St./Wrightwood Park, West End, Duke Park, Wellons Village, Old East Durham, Edgemont, and Lochaven Hills.

Technical Appendix I:
Transit Access to Key Healthcare Centers

Project Access

Project Access of Durham County (PADC), serving the specific function of specialist referral, provides the lowest level of accessibility to low-income areas of Durham via the fixed-route transit system. There is no overlap between the 30-minute service area of Project Access and low-income residential areas. Route 9 and Route 4 connects Project Access to downtown Durham. Route 17 would require a transfer at Horton Rd, but would be within 30 minutes of this center as well. Additionally, the street network is this part of Durham is less dense, which has the effect of limiting walking accessibility as well.

One public housing location (Preiss-Steele Place) is located within the northern section of PADC's service area. This specific housing development, however, is not located within a concentrated low-income area as this report has defined them.

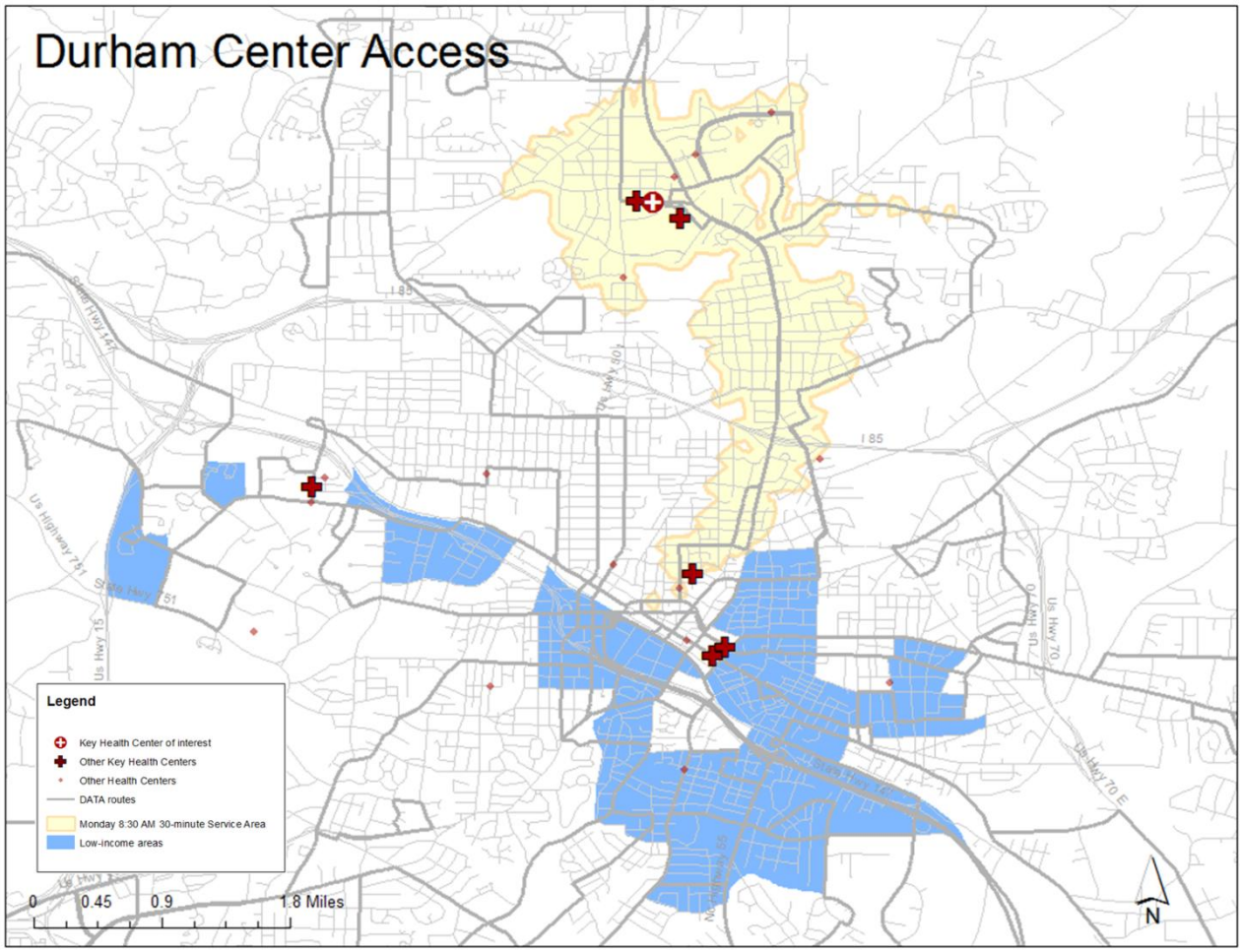


Durham Center Access

Durham Center Access ("Durham Access") provides mental health, substance abuse, and crisis services on-site 24-hours a day. There is essentially no overlap in the 30-minute service area for Durham Center and the low-income areas of Durham.

One public housing location, Preiss-Steele Place, is located within the service area. However, as noted above, this public housing development is not located within a particularly concentrated low-income area.

The service area, represented in the map above, shows transit coverage for a weekday morning. Durham Access provides 24-hour service – hours that DATA operates on a limited schedule or not at all. Therefore, as one of few health centers in Durham providing mental health and crisis counseling, Durham Center's accessibility is severely limited.

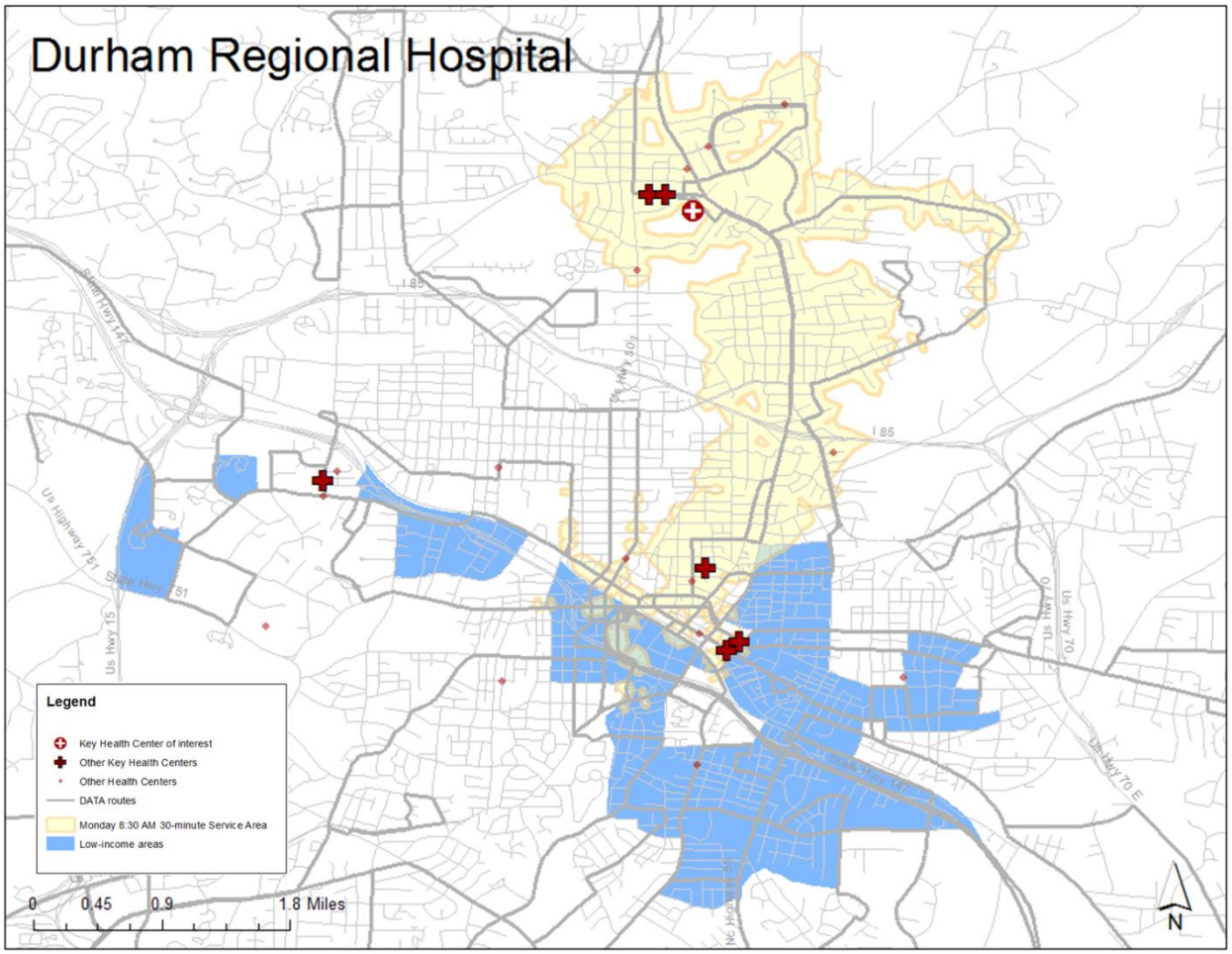


Durham Regional Hospital

Durham Regional Hospital is just far enough south that its service area overlaps slightly with the low-income neighborhoods in downtown Durham. Approximately 514 low-income Durham residents (of the 15,342 identified) are able to access their residences from the hospital in 30 minutes or less using the fixed-route transit system, never walking more than ¼ mile or faster than two miles per hour.

However, most of the neighborhoods with concentrated low-income populations are inaccessible to Durham Regional Hospital. Public housing locations within these neighborhoods include Forest Hill Heights, Damar Court, Oldham Towers, Liberty Street, Edgemont Elms, Gary Street, and McDougal Terrace.

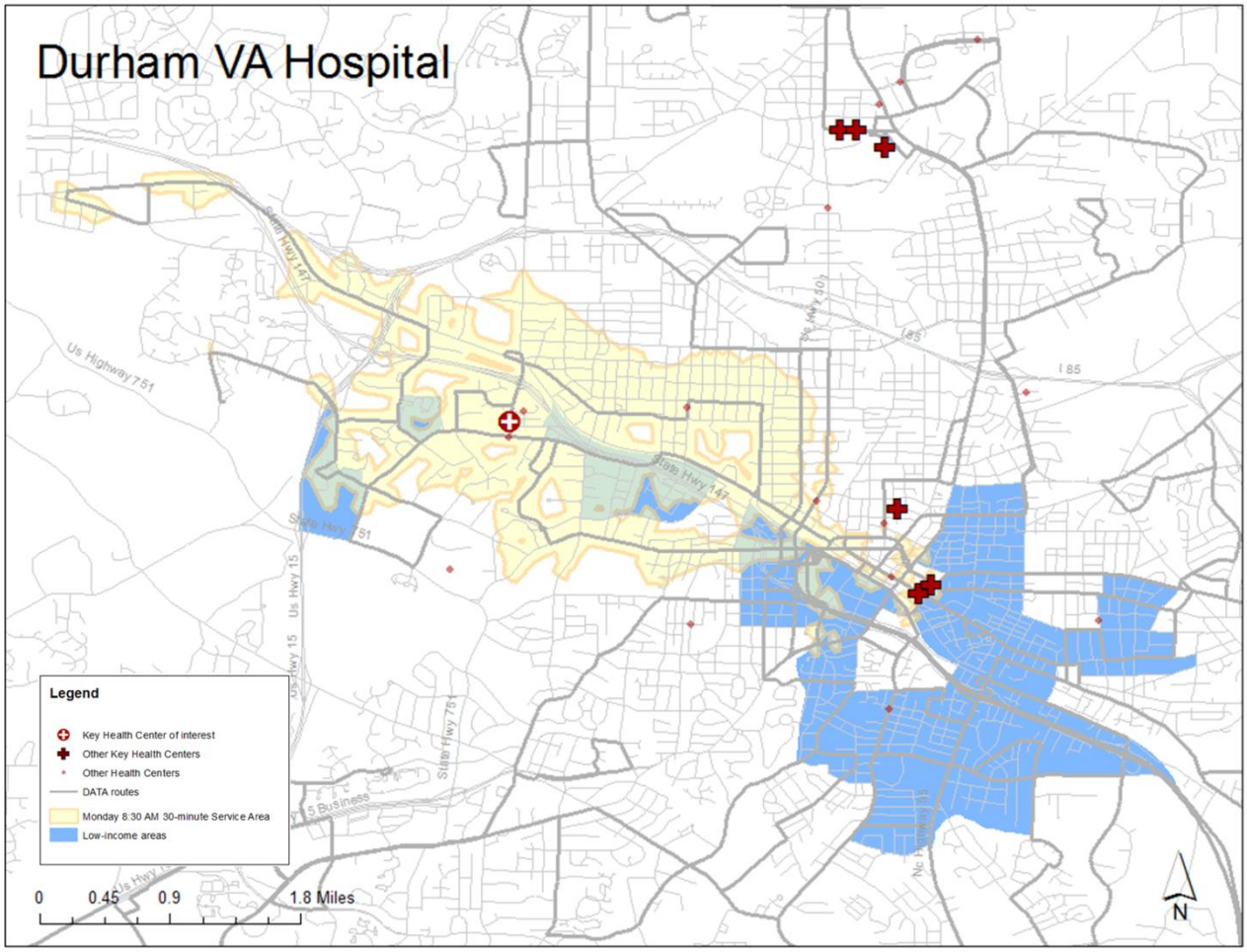
DATA Routes 4 and 9 are critical connections between the hospital and downtown Durham.



Durham VA Hospital

The Durham Veteran's Affairs Hospital ("VA Hospital") is located west of downtown near three DATA routes – the #6, #11, and the Bull City Connector (a fare-free route). It is also located along two Triangle Transit routes (400 and 405) and several Duke Transit routes. Its location provides much better accessibility to low-income areas of Durham than the Regional Hospital located to the north. Approximately 2,491 low-income residents have transit access to their residences within 30 minutes.

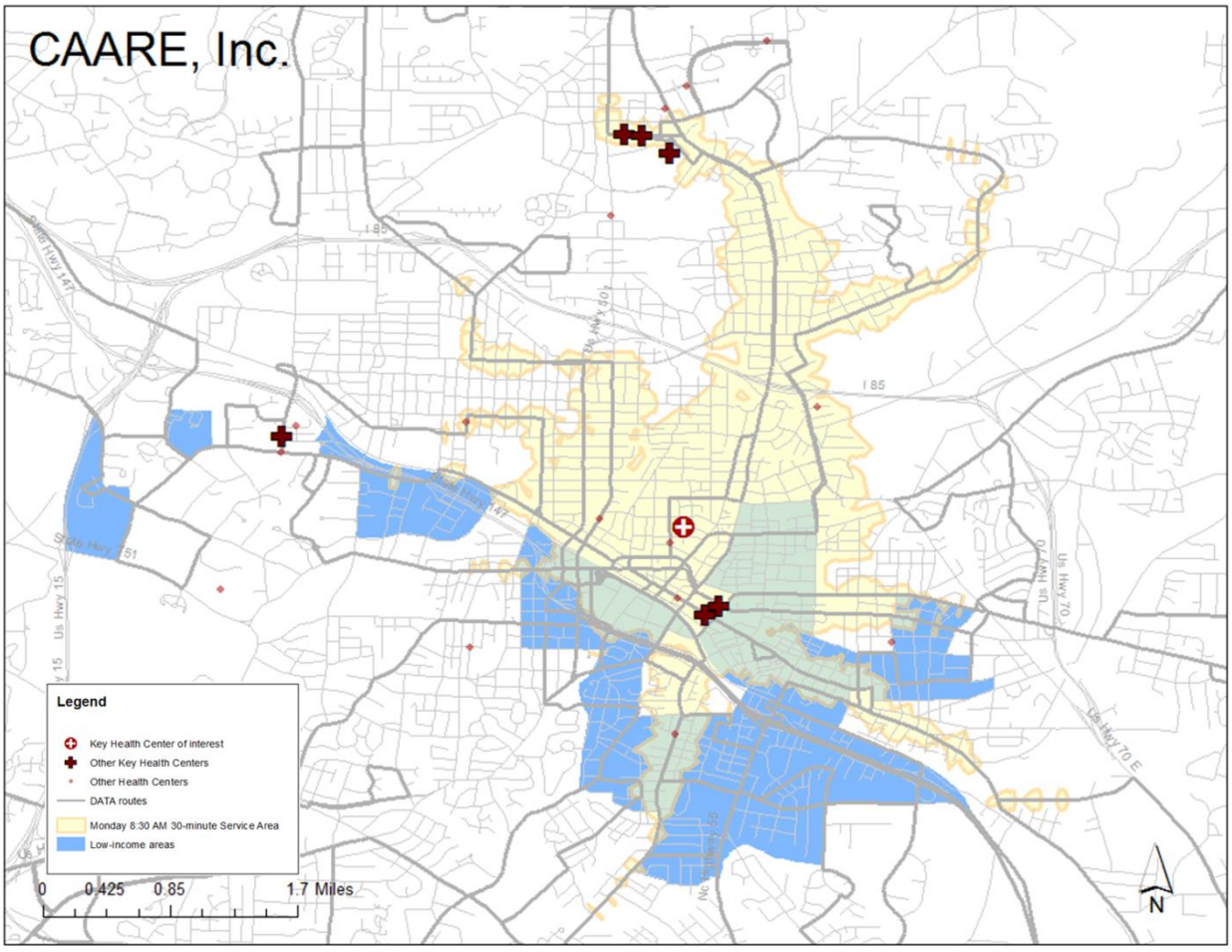
The VA Hospital is accessible to Damar Court, a public housing neighborhood located west of Duke University that has low access to many other important health locations in Durham. However, several locations are inaccessible to this location, including: Forest Hill Heights, Oldham Towers, Liberty Street, Edgemont Elms, Gary Street, and McDougal public housing.



CAARE, Inc.

CAARE, Inc. is a non-profit that provides health services to un-, under-insured and low-wealth individuals in Durham. As such, accessibility to their center is essential to the fulfillment of their mission.

CAARE provides access to approximately 4,563 (30%) of Durham's concentrated low-income population. It does not have good accessibility to the neighborhoods west of Duke University (including Damar Court), Forest Hills, McDougal Terrace, and Gary Street public housing, the neighborhoods surrounding Durham Technical Community College and NC Central University, and parts of East Durham.

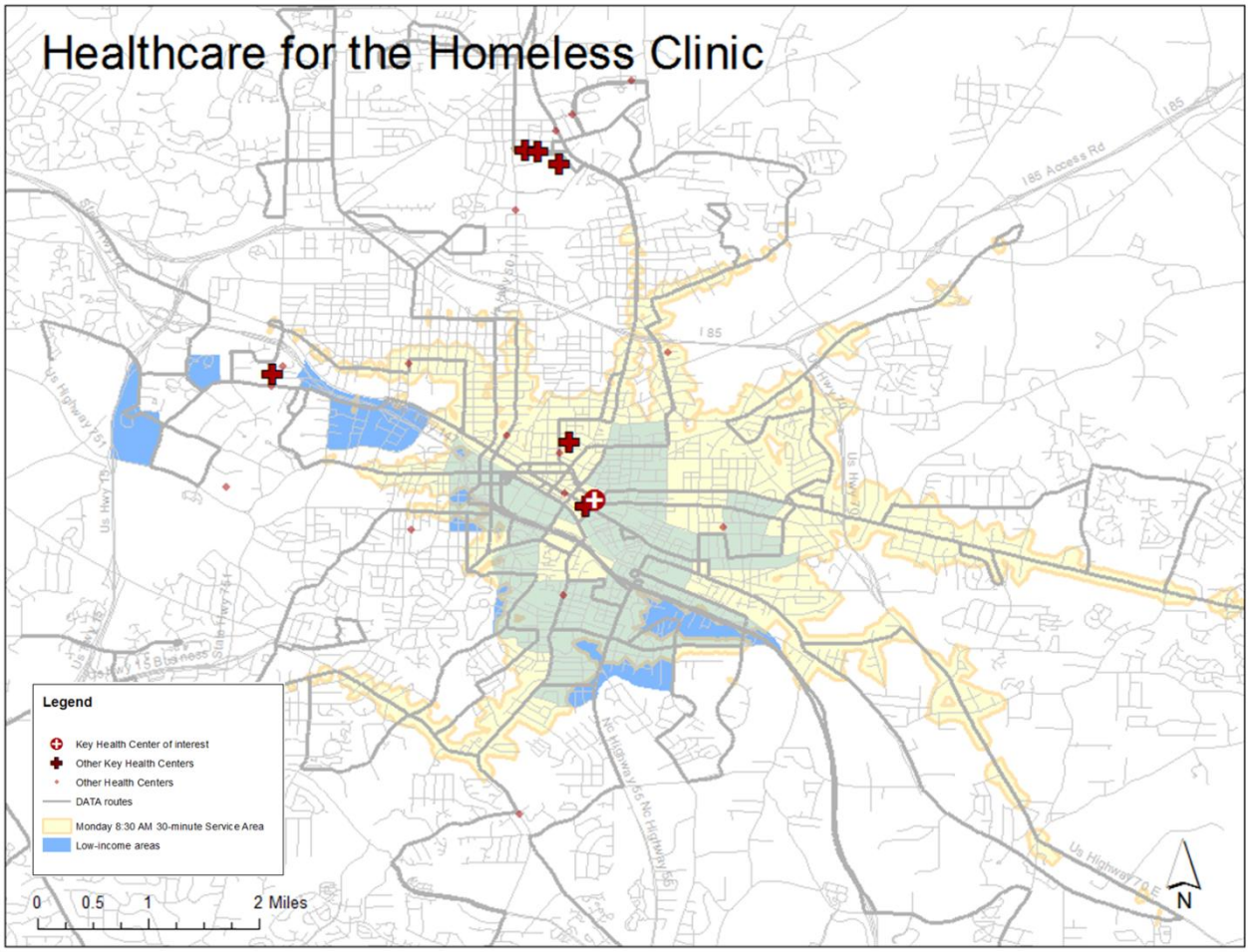


Healthcare for the Homeless – Lincoln Center

Lincoln Center's Healthcare for the Homeless clinic is centrally-located and very accessible to areas of concentrated poverty. Several fixed-route transit lines pass nearby the clinic. Approximately 10,880 (or 71%) of the concentrated low-income population of Durham resides within the 30-minute service area of this clinic.

That being said, this clinic is focused on the homeless population. To the extent that members of the homeless population transition between homelessness and public housing or lower-income neighborhoods of Durham, this measure could provide an estimate of accessibility for the homeless.

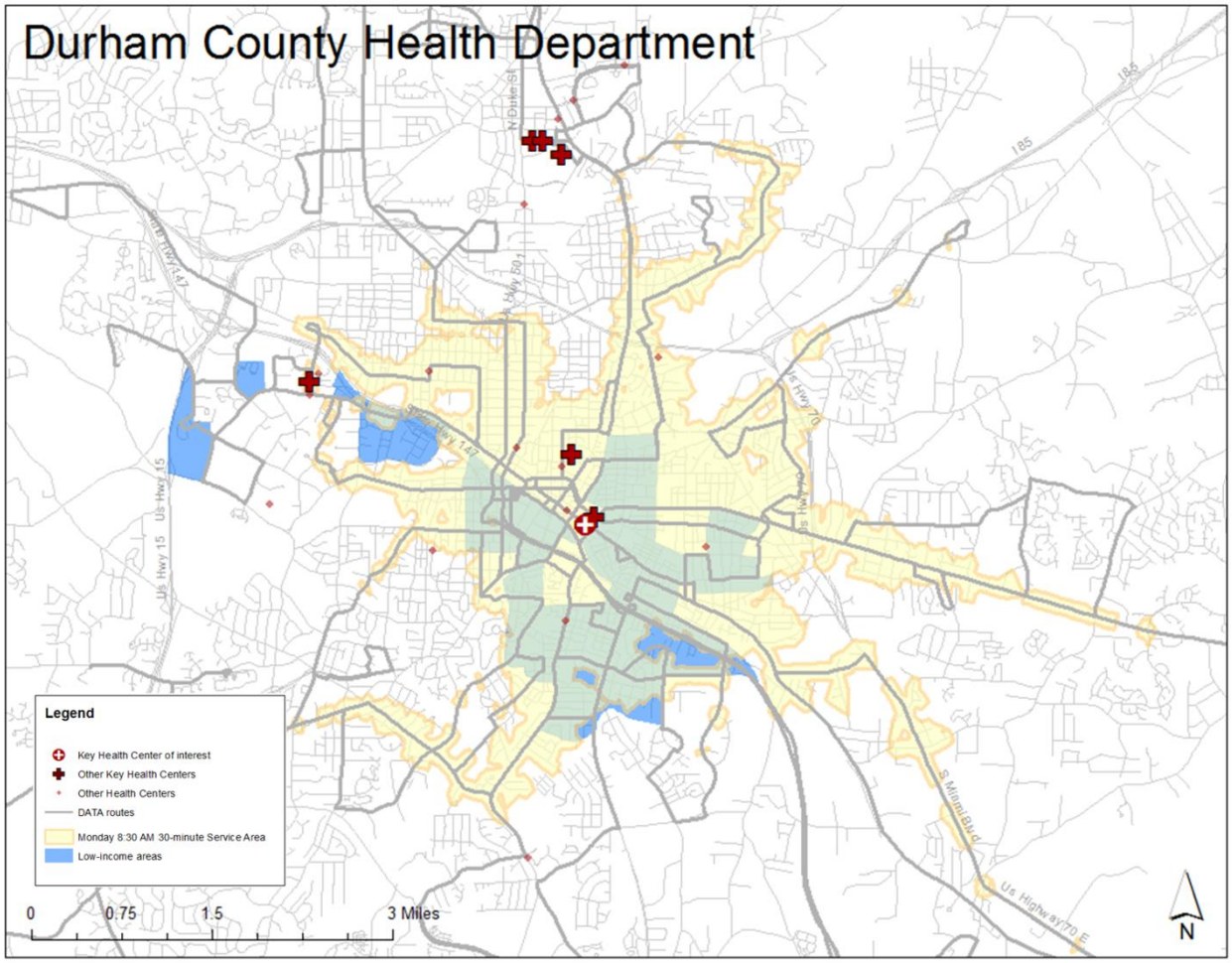
The low-income neighborhoods west of Duke University again are underserved by fixed-route transit to this health center.



Durham County Health Department

Durham County Health Department is unsurprisingly and fortunately the health center with the best access to low-income areas of Durham. Approximately 11,879 of Durham's low-income residents reside within the 30-minute service area of the county's Health Department.

Damar Court and the neighborhoods west of Duke University are located well outside of the 30-minute service area.

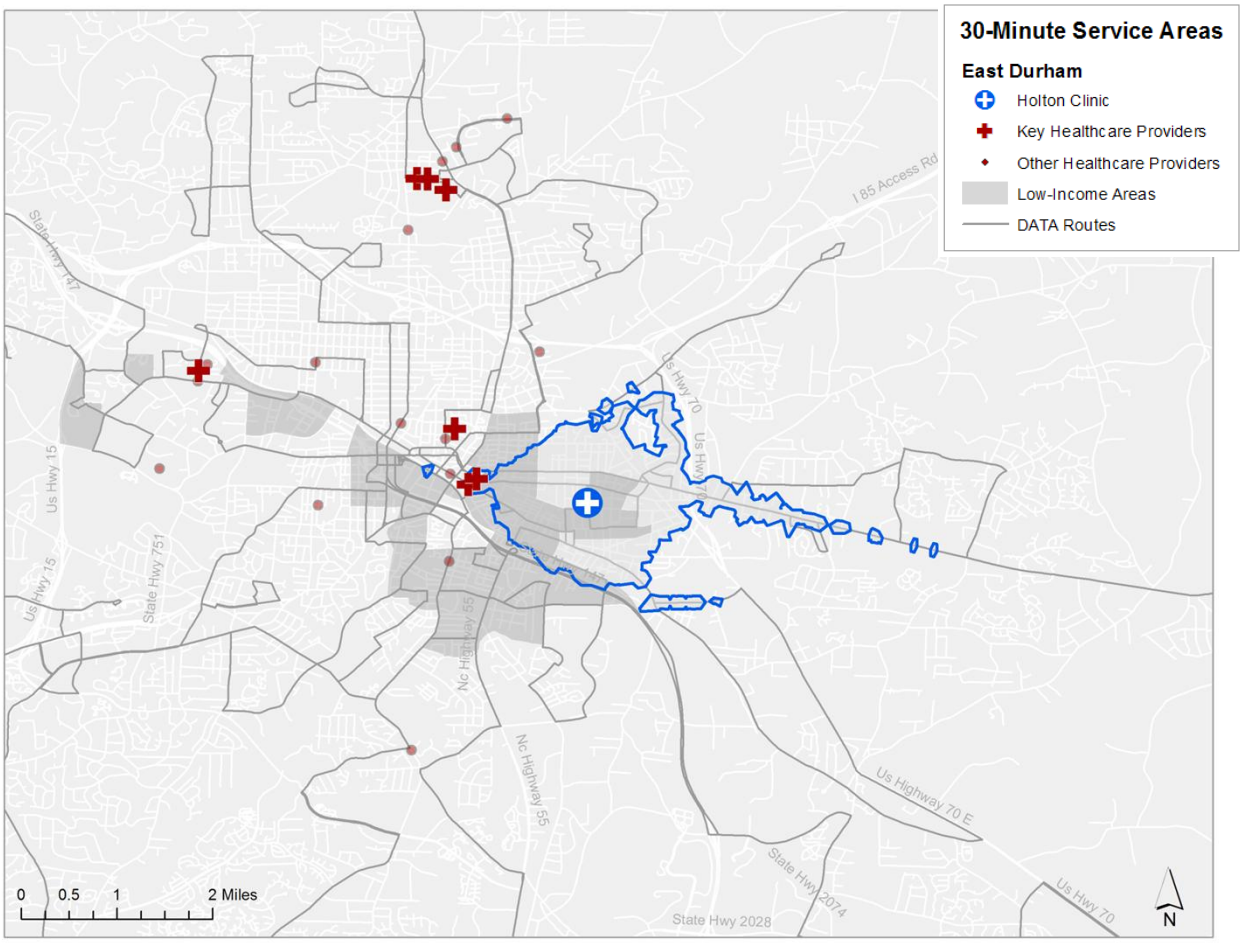


Technical Appendix II: Citywide Service Assessment

These maps group healthcare centers with similar transit sheds. Thirty-minute transit sheds of all 30 healthcare centers are shown.

East Durham

Low-Income Areas: *Poor Coverage*
Key Healthcare Providers: *Very Poor Coverage*



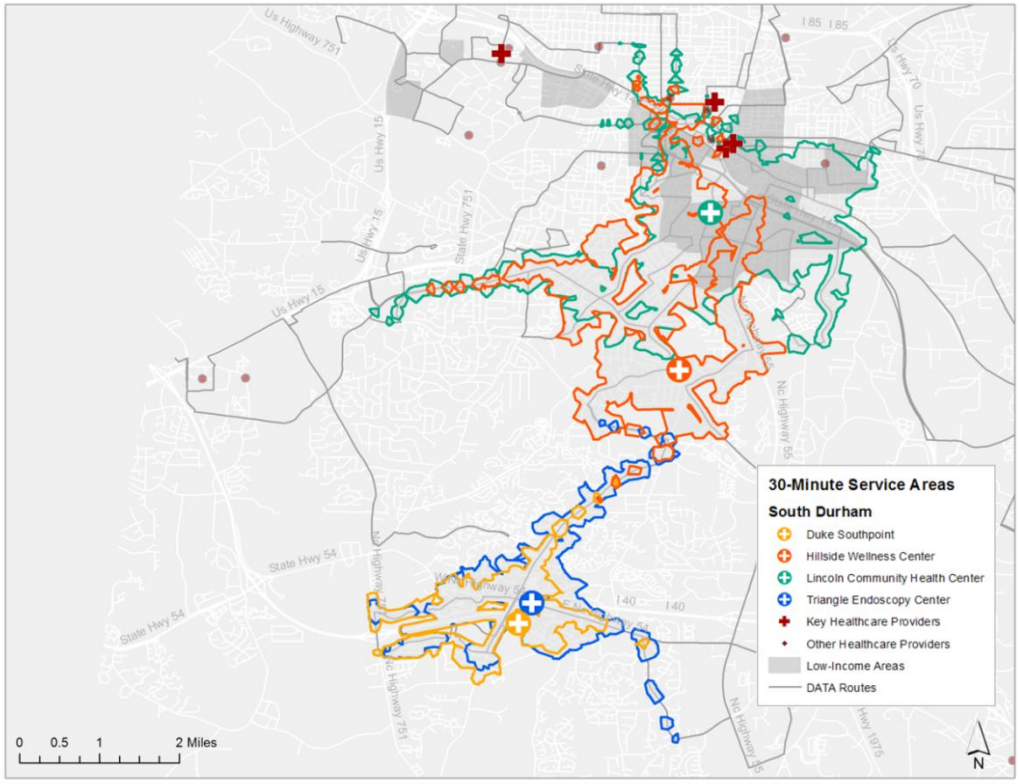
South Durham (next page)

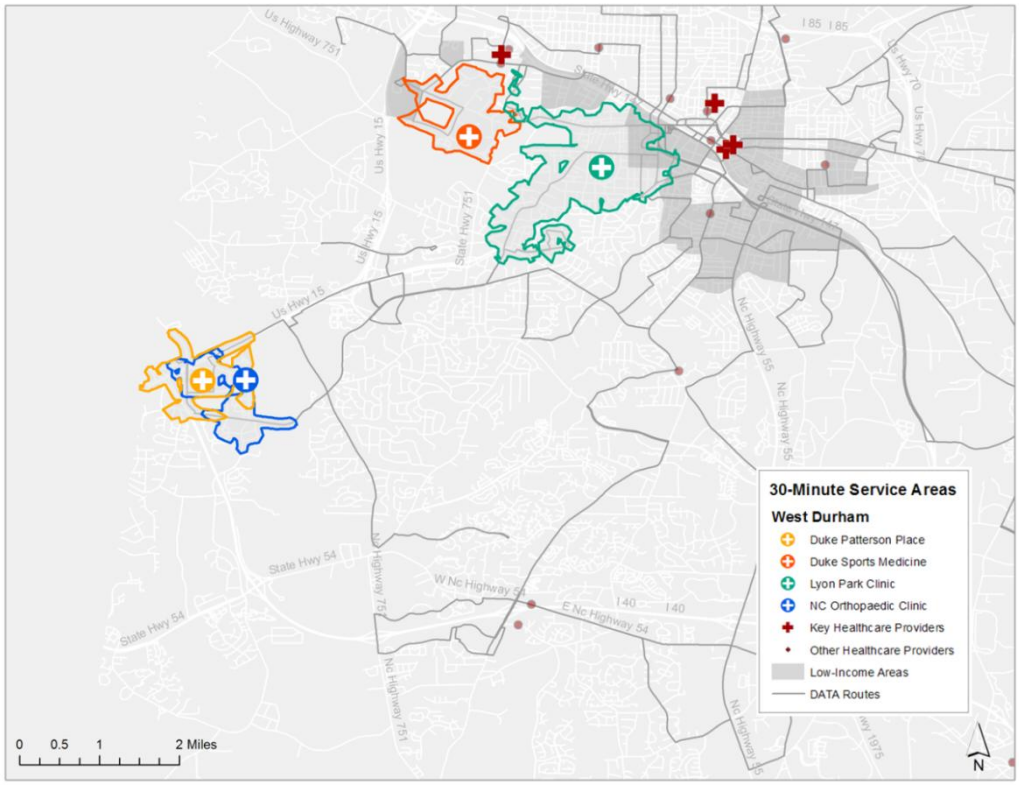
Low-Income Areas: *Poor Coverage*
Key Healthcare Providers: *Very Poor Coverage*

West Durham (next page)

Low-Income Areas: *Very Poor Coverage*
Key Healthcare Providers: *Very Poor Coverage*

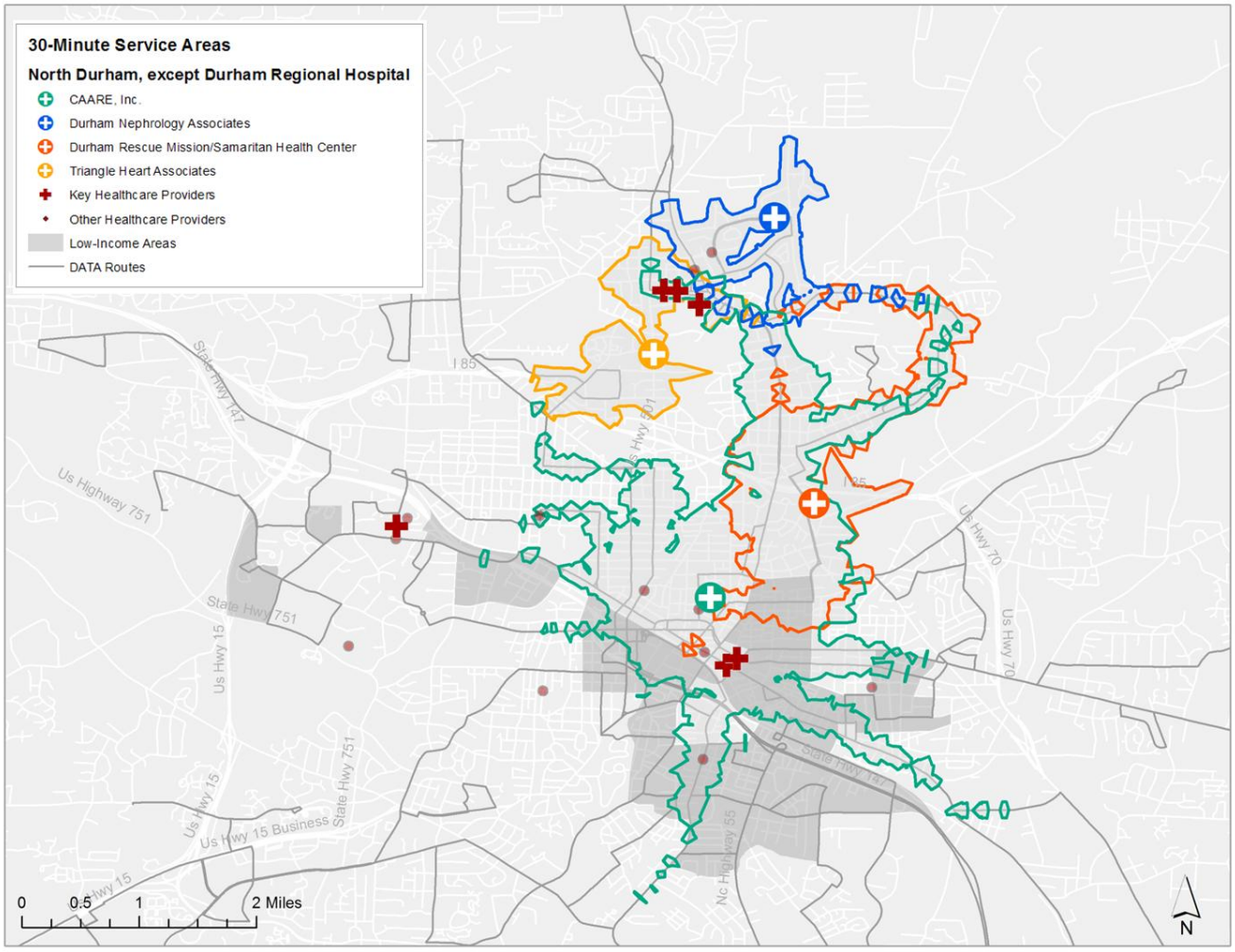
South and West Durham





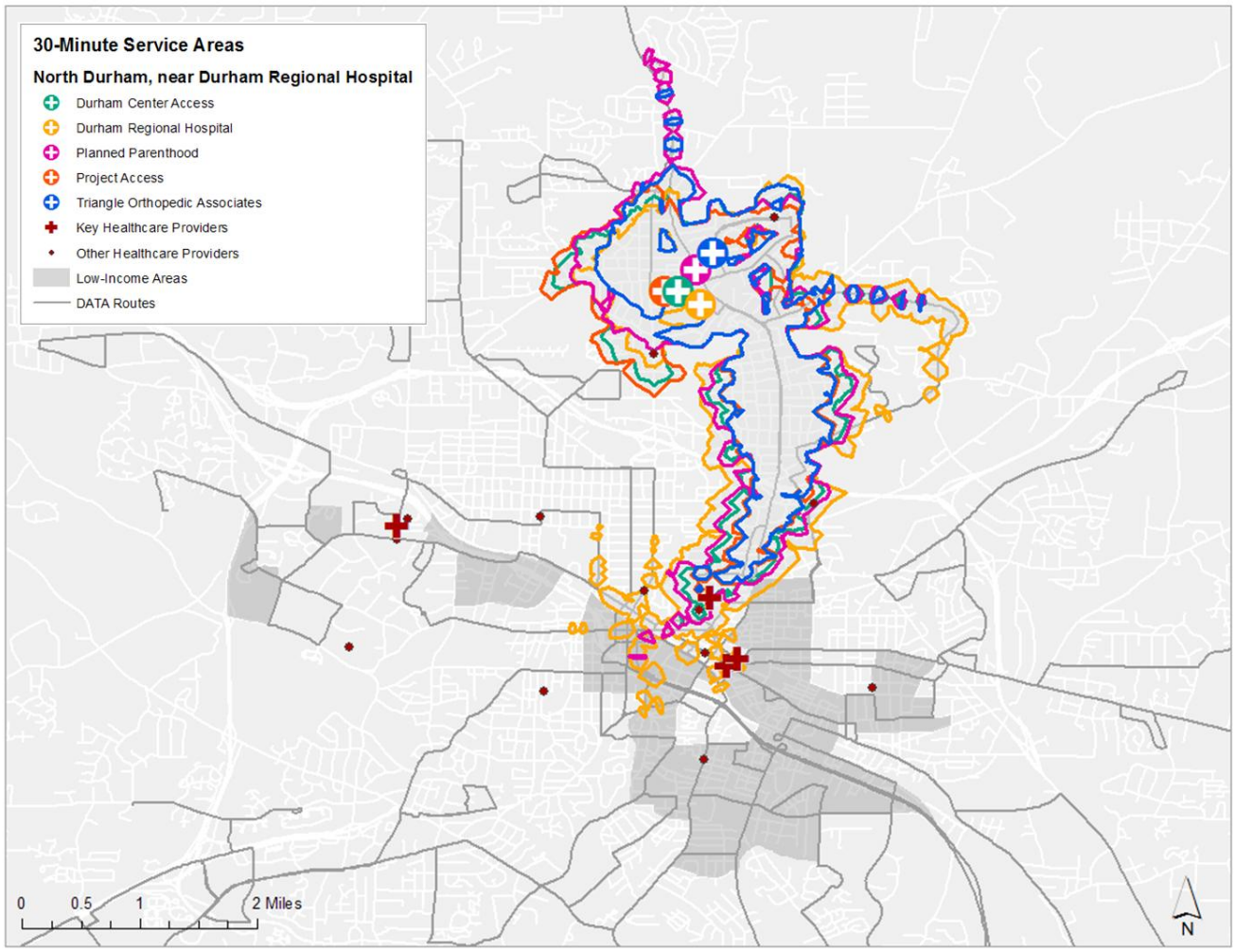
North Durham – Except Durham Regional Hospital Cluster

Low-Income Areas: *Poor Coverage*
Key Healthcare Providers: *Poor Coverage*



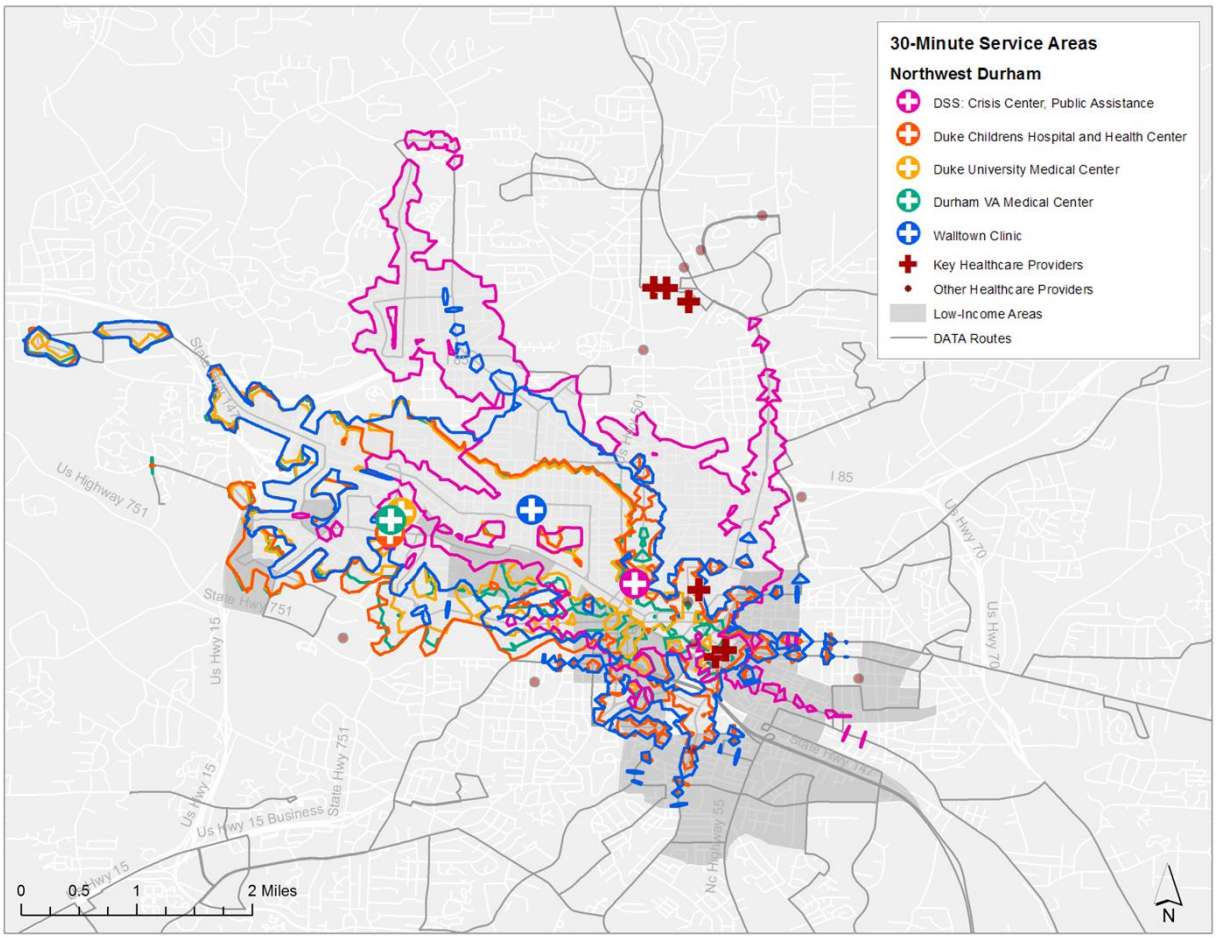
North Durham – Near Durham Regional Hospital

Low-Income Areas: *Very Poor Coverage*
Key Healthcare Providers: *Poor Coverage*



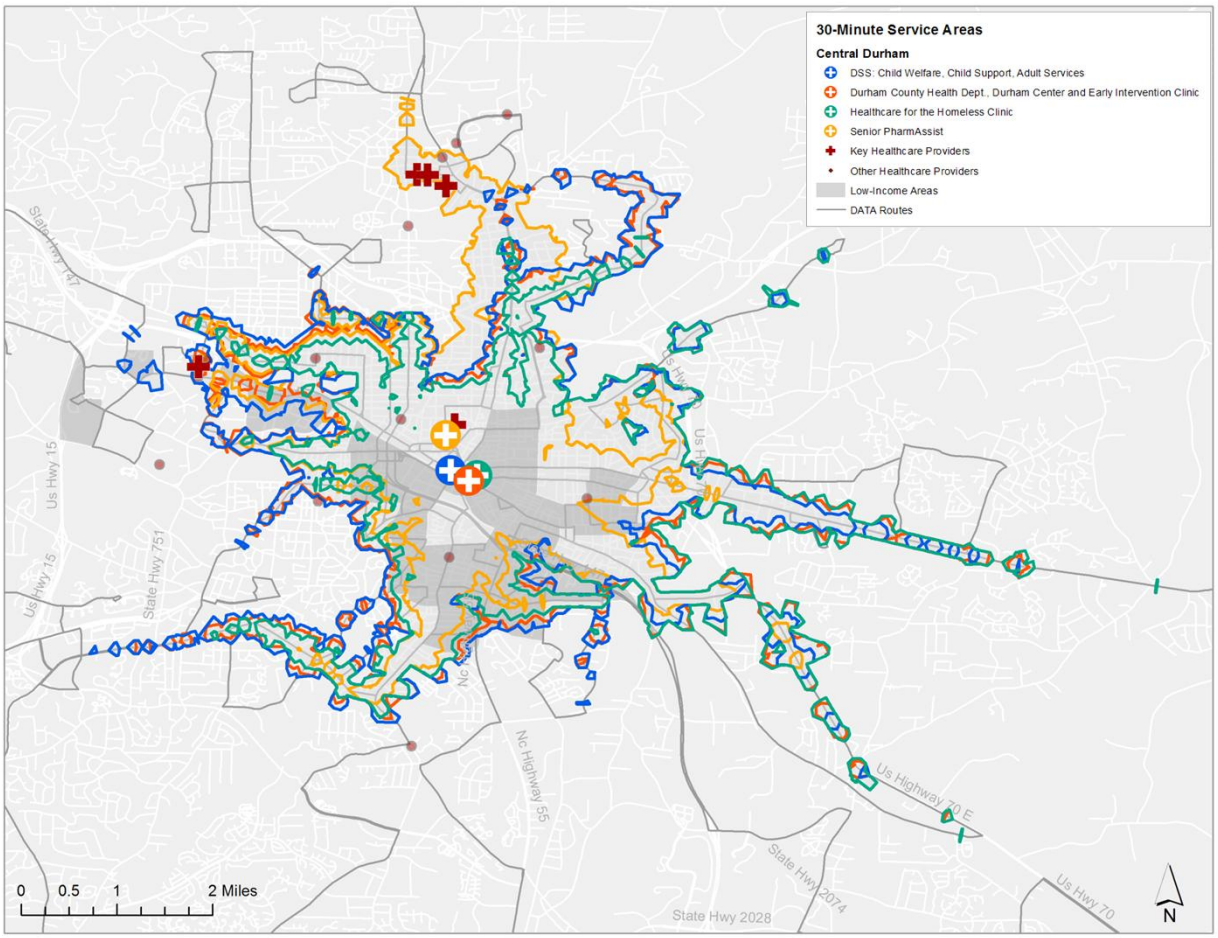
Northwest Durham

Low-Income Areas: *Adequate Coverage*
Key Healthcare Providers: *Adequate Coverage*



Central Durham

Low-Income Areas: *Good Coverage*
Key Healthcare Providers: *Good Coverage*



Technical Appendix III: Methodology Notes

Accessibility Analysis Methodology Notes

In our analysis of healthcare accessibility by fixed-route transit, we used a free, downloadable ArcGIS tool called GTFS_NATools[10] to identify transit service areas. We used the 30 identified health centers as origins in the analysis – points from which a client would have to travel using fixed-route transit. As destinations, we identified those areas of Durham with the highest concentrations of households living under the Federal poverty line. The overlaps between health center service areas and low-income neighborhoods informed our strategies for improvement.

Origins

A tool called GTFS_NATools enables the use of ArcGIS and Google Transit Feed (GTFS) data to define transit service areas for a given point of origin. We refer to these service areas as *transit sheds* – reachable areas by transit within a set amount of time. Assuming walking speeds of no greater than 2 miles per hour, a maximum walk distance of ¼ mile, a 30 minute trip time allocation, March 2012 DATA transit schedules for a Monday at 8:30 AM, and an ability of pedestrians to walk along any street in Durham, transit sheds were defined for each of the 30 healthcare centers identified.

Summary of Assumptions

Travel Behavior

- 2mph walking speed
- Monday, 8:30AM transit service

Transit System Characteristics

- Bus routes and schedules from general transit feed specifications (GTFS) furnished by Triangle Transit
- A network dataset of Durham streets

Low-Income Areas

- Data source: U.S. Census Bureau, American Community Survey, 2006-2010
- Defined as Census-designated block groups with the highest proportion of households earning less than $25,000 annually, minus Duke University. Population of 15,342.
- Population is evenly distributed across the block group

Destinations

Using the U.S. Census Bureau's American Community Survey (2006-2010), the Durham block groups with the highest concentrations of poverty were identified. The top 10 percent of Durham's block groups with the highest concentration of households earning less than $25,000 annually define our population of interest (14 in all, which excludes the block group that contains Duke University). Block groups are a Census Bureau-defined geography; generally, they are sub-units of cities and composed of many city blocks.

Note that this choice of a transit-dependent population definition was informed by the DATA Onboard Report from 2011, which cited that 78 percent of all survey respondents came from households earning less than $25,000 annually. Other methods for identifying the transit-dependent population are available, and could be pursued in future analyses:

- Use other demographic variables from onboard surveys in conjunction with U.S. Census data to identify the relevant transit-dependent areas
- Use patient data from Project Access to identify clustered residential areas of actual low-income, underinsured patients

[10] http://transit.melindamorang.com/

- Use Federal Highway Administration methodology for identifying transit-dependent populations[11]

Accessibility Analysis

For each of the seven key healthcare providers, the overlap between the service area and the low-income neighborhoods was examined quantitatively and qualitatively. The percentage of the concentrated low-income block group area overlapped by each healthcare provider's service area was calculated using ArcMap 10. These data are presented in the report as **Error! Reference source not found.**.

Then, we performed a qualitative assessment (by visually examining the maps for repeatedly-underserved areas) of all thirty health centers. We divided Durham into four regions: Northwest and Central, North, South and West, and East. This revealed the low-income neighborhoods that have low accessibility to healthcare in general.

Using the GTFS Tool for Accessibility Analysis: Step-by-Step Methodology

What you need

- ArcGIS 10.0 or higher
  - Network Analyst Extension
  - Python 2.5 or higher
- General Transit Feed Specification data for DATA bus routes
  - Ensure that the transfers.txt file is a complete representation of transfers within the system
- GTFS_NATools
  - Downloadable at http://transit.melindamorang.com/
- A network dataset of Durham streets
  - Include sidewalks if possible
- Points shape file of origins

Steps

1) Gather the necessary tools and data listed above.
2) Determine the origins (points) and destinations (points or polygons) of interest. Suggested methodologies are listed above.
3) Follow the detailed step-by-step tool guidance provided at the end of this section. It can be downloaded here: http://transit.melindamorang.com/GTFS_NATools_UsersGuide.pdf.
   - Step 1 of the tool uses the GTFS data to create a query-able SQL table of all the stops in the transit system.
     - Running time is relatively quick.
   - Step 2 of the tool uses input parameters on walking speed, time of day, time limit for travel, and a walking cutoff distance to create polygon service areas for each origin.
     - Running time is longer, but should take less than one hour.
   - Specifically, the tool figures out what stops a person can walk to from the analysis location within the time limit. It then goes back to the SQL file created in Step 1 and looks up each of those stops. It uses the stop-stop distance it calculated to figure out what other stops one could

[11] Federal Highway Administration. (2011, November 29). CTPP Status Report [website]. Retrieved from http://www.fhwa.dot.gov/planning/census_issues/ctpp/status_report/sr0406.cfm.

reach from that stop by walking. It uses the GTFS schedules to figure out what stops one could reach by transit. It then looks at those stops and figures out what other stops one could reach by walking or by transit within the remaining amount of time. Then, it repeats until the time runs out.

4) Use the resulting **_ServiceAreas* shapefile to map the service area of each origin point.
5) For polygonal destinations of interest, one can calculate the percentage overlap between the service area of the origin and the destination polygon.
    - Dissolve the block groups (or other polygonal destination areas)
    - Calculate geometry for the dissolved shape
        i. In the attribute table >> Add Field… (double)
        ii. Right click field >> Calculate Geometry… (square miles)
    - Intersect the dissolved shape with the service area polygon
        i. Intersect tool
    - In the resulting intersection shapefile: Add Field (double), right click new field and Calculate Geometry (square miles)
    - Then, Add Field again (double), Field calculator (square miles of intersection / square miles of dissolved shape)
        i. The result will be the percent of destination land area that is covered by the service area
    - Then, bring this into Excel and multiply the percentage of coverage by the total destination population to get an estimate of the number of people within the service area of the origin

General Tips

- Run everything from the same folder on your hard drive
- Network dataset needs to be saved in a write-enabled folder
- Use a locally-created network dataset that includes sidewalks and off-road pedestrian paths
- Use parameters that are representative of the population under consideration (e.g. walking speed and maximum distance willing to walk)
- Perform sensitivity analysis (vary time of day that trip starts)

Alternative Analyses using GTFS_NATools

- Use residential locations as origins rather than healthcare centers (e.g. public housing, low-income block group centroids, rental parcels, FHWA-defined transit-dependent population areas). Calculate the service areas for each residential origin of interest and calculate the percent of important healthcare locations (as identified by advocates or perhaps as classified by type) within each service area.
- Using boarding data, determine accessibility to destinations of choice (e.g. grocery stores, health centers, schools) from highest boarding bus stops. Potential metrics include:
    - Percent of all schools (or other destinations of interest) covered by *each* high-boarding bus stop (or other important origin) within a given amount of time
    - Percent of all schools (or other destinations of interest) covered by *all* high-boarding bus stops (or other important origins) within a given amount of time. Service areas for all high-boarding bus stops can be dissolved into one polygon to perform the percentage calculation. Overlaps can be color-coded on a spectrum to demonstrate those destinations with the highest accessibility (darker regions are accessible from multiple origins) within a given amount of time.
    - Percent of all schools (or other destinations of interest) covered by *clustered* high-boarding bus locations (or other important origins). Categorize particular origins by region (e.g. East

Durham, West Durham, neighborhood, etc.) and determine accessibility from regional/clustered origins.

- Study travel *between* health centers (rather than between residences and health centers) by looking at overlap of health center transit sheds
    - Is demand for inter-health center travel high or low?
        - Acquire data on patient transit service origin-destination pairs
        - Survey patients on their most common health-related trip origins and destinations
- Do health-related travel behaviors vary by time of day (e.g. more home-to-hospital trips morning; more center-to-center travel mid-day)? Incorporate into onboard surveys in the future.

GTFS_NATools User's Guide

The user guide for GTFS_NATools can be accessed at the following link: http://transit.melindamorang.com/GTFS_NATools_UsersGuide.pdf

Alternative Stata Methodology

We developed an alternative, backup methodology for running a similar analysis. For this tool, origin-destination pairs need to be user-defined. The output is travel times based on single-mode trips, rather than a polygon transit shed output, as with GTFS_NATools.

Notes:
1) All input files should be saved to a single folder, e.g., "Stata."
2) We believe that the tool calculates travel times for single-mode origin-destination pairs. See "Unresolved Questions" below.

Stata Backup Plan using travel time command

Step 1: Prepare input files
- Download GTFS files from TTA website: http://www.gotriangle.org/developers/agency
- Obtain and consolidate Origin and Destination shape files in a single folder, e.g., "Stata"

Step 2: Prepare origin/destination .csv files
- Assign a stop (or multiple stops) to each origin and destination in GIS (command: Select by Location, using ¼ mi distance)
- Create Excel files for each O/D pair
    - Input table needs to be formatted as follows:

Id	start_stop	end_stop	start_long	start_lat	end_long	end_lat	mode

    - id is numeric
    - start_stop and end_stop are string. Use stop names from gtsf stops file.
    - lat-longs are numeric. use values from gtsf stops file.
    - mode: 1 is car (default), 2 is transit, 3 is walk.
    - convert to .csv, then to .dta
- Save to Stata folder

Step 3: Prepare Stata tools
- Install geocode and travel time commands in Stata
    - commands: findit geocode and findit traveltime
- Review help menus to familiarize oneself with tool
    - commands: help geocode and help traveltime

Step 4: Run "traveltime" command
- Create .do file containing the script below (CalcTraveltime.do) and save in Stata folder
- Edit input and output locations as needed and run CalcTraveltime.do

Unresolved Questions
Can traveltime model travel times for multimodal trips, i.e., a single trip that contains a walking and a bus component? We believe these queries would have to be run separately and the travel times summed manually (transit from stop to stop + walk mode from lat/long of real origin to its closest stop.)

Stata .do file: Calctraveltime.do

Script for running the traveltime command based on the input files defined in the previous section.

Notes:
1) File paths will need to be changed.
2) "//" indicates a comment.

```
// Change directory to input folder

cd "C:\Users\Lauren\Documents\STATA"
clear all



// USING A FILE WITH NO MODE DESIGNATIONS

//use "traveltime_data.dta", clear
//list  start_city end_city start_long start_lat end_long end_lat

//traveltime, start_x(start_lat) start_y(start_long) end_x(end_lat) end_y(end_long)

// list start_city end_city start_long start_lat end_long end_lat days hours mins
traveltime_dist
//save "traveltime_data.dta", replace



// USING A FILE WITH MODE DESIGNATIONS
// mode==1 is car (default); mode==2 is transit; mode==3 is walk

use "traveltime_data.dta", clear // Input file must be in .dta format
list  start_city end_city start_long start_lat end_long end_lat mode

traveltime, start_x( start_lat) start_y( start_long) end_x( end_lat) end_y( end_long)
mode(mode) // Calculate traveltime

list start_stop end_stop start_long start_lat end_long end_lat mode days hours mins
traveltime_dist

save "traveltime_data_mode.dta", replace

outsheet using "C:\Users\Lauren\Documents\STATA\traveltime_data_modes.csv", comma
replace
```