



**LIMITS ON ACCESS IN LOW-INCOME NEIGHBORHOODS
AND
THE TRAVEL PATTERNS OF LOW-INCOME HOUSEHOLDS**

by

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16. Abstract In many poor urban areas, retail and service establishments are not abundant and those retail centers that do exist often offer lower quality products at higher prices. To compound the problem, poor households lack the personal resources that might compensate for inadequate local access. They often don't have the option of traveling to stores or other destinations beyond their neighborhood, and they can't move to neighborhoods with better local access. Despite the constraints of inferior access and limited resources, the poor must nevertheless find ways to take care of their household needs as best they can, whether that means making do with the goods and services available within the neighborhood, finding ways to get to destinations outside of the neighborhood, or simply doing without. The travel patterns exhibited by low-income households should thus reflect, although often indirectly, the limited options they have and the ways in which they are able to go about their household provisioning. This study takes a look at levels of accessibility to basic services in low-income neighborhoods and explores the implications of limited accessibility and household constraints on non-work travel for low-income households for the case of Austin, TX. Key findings include lower auto ownership, lower trip frequencies, higher use of transit and walking, shorter trip distances but longer trip times, and less person-miles-traveled for low-income households. The results raise interesting questions about how low-income households make the most of their limited choices.			
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ABSTRACT

In many poor urban areas, retail and service establishments are not abundant and those retail centers that do exist often offer lower quality products at higher prices. To compound the problem, poor households lack the personal resources that might compensate for inadequate local access. They often don't have the option of traveling to stores or other destinations beyond their neighborhood, and they can't move to neighborhoods with better local access. Despite the constraints of inferior access and limited resources, the poor must nevertheless find ways to take care of their household needs as best they can, whether that means making do with the goods and services available within the neighborhood, finding ways to get to destinations outside of the neighborhood, or simply doing without. The travel patterns exhibited by low-income households should thus reflect, although often indirectly, the limited options they have and the ways in which they are able to go about their household provisioning. This study takes a look at levels of accessibility to basic services in low-income neighborhoods and explores the implications of limited accessibility and household constraints on non-work travel for low-income households for the case of Austin, TX. Key findings include lower auto ownership, lower trip frequencies, higher use of transit and walking, shorter trip distances but longer trip times, and less person-miles-traveled for low-income households. The results raise interesting questions about how low-income households make the most of their limited choices.

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EXECUTIVE SUMMARY

In July of 1999 President Clinton took a tour of America's poorest areas, unveiling his "new markets" initiative for stimulating private-sector investment in the nation's economically disadvantaged areas. The President made a stop in East St. Louis, IL, to celebrate the opening a new neighborhood Wal-Green's drug store, the first new retail store to open there in 40 years. Events such as this one have focused public attention on many of the problems the poor face in accessing the goods and services necessary for maintaining their households - a process called household provisioning. In many poor urban areas like East St. Louis, retail and service establishments are not abundant and those retail centers that do exist often offer lower quality products at higher prices.

To compound the problem, poor households lack the personal resources that might compensate for inadequate local access. They often don't have the option of traveling to stores or other destinations beyond their neighborhood, since auto ownership among the poor is low, the automobiles that they do own are frequently unreliable, and transit service is not well suited to non-work travel. They can't move to neighborhoods with better local access, since their residential choices are limited by the availability and locations of affordable housing. The implications for these households may be profound: less and lower quality food, healthcare, etc.

Despite the constraints of inferior access and limited resources, the poor must nevertheless find ways to take care of their household needs as best they can, whether that means making do with the goods and services available within the neighborhood, finding ways to get to destinations outside of the neighborhood, or simply doing without. The travel patterns exhibited by low-income households should thus reflect, although often indirectly, the limited options they have and the ways in which they are able to go about their household provisioning. The fact that low-income households have more limited choices than the more affluent should result in marked differences in the travel patterns of the poor when compared to the non-poor. This study takes a look at levels of accessibility to basic services in low-income neighborhoods and explores the implications of limited accessibility and household constraints on non-work travel for low-income households for the case of Austin, TX.

BACKGROUND

Poor households face a variety of constraints on their ability to meet basic household needs. Beyond the obvious constraint of limited budgets for these needs, the instability of their income source and the frequent need for credit can further circumscribe their range of shopping choices (Andreasen 1975). Income constraints also lead to mobility constraints: poor households may not be able to afford an automobile, in which case they are dependent on a transit system not designed to serve their needs or on walking which can't get them far. Mobility constraints then lead to time constraints for

these households, since transit or walking is considerably slower than driving in most cases.

These constraints are compounded by a decline in neighborhood businesses in general and by poor accessibility to basic services in low-income neighborhoods in particular. The decline in local businesses in low-income urban neighborhoods - i.e. those neighborhoods whose residents most depend on local businesses - has been particularly acute, as examined in a number of studies over several decades. Over all, the number and scale of retail stores in poor communities have declined (Sexton 1973) enough that poor areas have fewer choices and smaller retail outlets than non-poor areas (Alwitt and Donley, 1996). Often when stores are present in neighborhoods, they are inferior to retail opportunities in more affluent areas and are inadequate in meeting the needs of the poor. Several recent studies have documented the failures of the food system to meet the needs of residents in poor communities (Ashman et al. 1993, Cotterill and Franklin 1995, Gottlieb et al. 1993, Public Voice for Food and Health Policy 1995 and 1996, Sustainable Food Center 1995). Often supermarkets are simply not present in neighborhoods, especially low-income neighborhoods. The movement of supermarkets to suburban locations paralleled trends in population shifts and new transportation corridors (Yim 1993); simultaneously, stores in urban areas located in or adjacent to poor neighborhoods were closed or sold. The combined effect has been to create an urban grocery store gap (Cotterill and Franklin 1995).

Some types of retailing and service outlets are missing altogether in economically distressed areas. For example, financial institutions have withdrawn from poor neighborhoods, opening the majority of branch facilities in suburbs or large regional centers. Banks have less than half the number of facilities in low-income communities than in non-poor areas (Alwitt and Donley 1996). This often results in inferior access to banks and other financial service establishments for residents of concentrated poor and minority neighborhoods in the central city (Avery 1991, Caskey 1994b, Leichter 1989, Stix et al. 1986). The physical withdrawal of banking establishments from poor and minority districts and the increasing requirements for deposit accounts has led to a decline in the ownership of deposit accounts among poor, young, and low-educated households (Caskey and Peterson 1994). Consequently, the poor have limited access to the financial vehicles necessary to participate in the economy.

IMPLICATIONS FOR TRAVEL

Travel behavior theory suggests that individual decisions about travel depend on the options available (the "choice set") and the relative value of the different options available (the "utility" of each choice). This theory assumes that individuals choose the option, from those available, that provides them with the greatest utility. However, different individuals may have different choice sets and different ways of evaluating utility, leading to different decisions about travel. As demonstrated above, the poor have a more limited choice set than the non-poor: they have fewer destinations to choose from locally and their ability to expand these options by taking advantage of regional centers is

restricted by their limited income and the lack of viable transportation options. Their limited choice sets will be reflected in their travel patterns.

Other factors can further reduce the set of choices that low-income households perceive to be available to them. The lack of knowledge of alternatives may limit the number of choices considered. For example, Andreasen (1975) has argued that the poor may be unable to minimize prices and shop effectively because they lack adequate knowledge to make informed decisions in the marketplace. The pressures on time interfere with the ability to comparison shop, read advertisements, travel to new stores, and research products prior to purchase. Understanding credit and financing alternatives may prove to be a daunting task, particularly for those with little education or few English language skills. This lack of knowledge exacerbates the problems facing low-income consumers by limiting their choices and the inability to take advantage of time or money saving opportunities.

Differences between the travel patterns of the poor and non-poor may also partly be explained by differences in their preferences, that is, in the way they evaluate the utility of the different options available. Low-income households are likely to put greater weight on low prices and close proximity when choosing a grocery store, for example. Beyond these obvious differences, many residents of poor neighborhoods are immigrants who may speak little English. Some may feel more comfortable shopping in neighborhood shops that cater to the demographic market. The decision where to shop may be influenced by availability of specific products and familiarity with merchants, as well as the opportunities for social interaction.

The combination of income, mobility and time constraints and the deficiencies in local businesses in low-income neighborhoods mean a substantially reduced set of choices for shopping and other household provisioning activities for low-income households. Their circumscribed choice set should be reflected in their travel patterns. In addition, low-income households may have different priorities in evaluating the choices available. These differences should also be reflected in their travel patterns. In comparing the travel patterns of poor households to non-poor households, several differences can be predicted:

- Lower levels of automobile ownership
- Greater use of non-automobile modes, especially transit
- Lower trip frequencies
- Somewhat short travel distances
- Longer travel times
- Less trip chaining

AUSTIN ANALYSIS AND RESULTS

To examine the accessibility issues and the non-work travel behavior of low-income households, this study focused on the case of Austin, TX. Access to retail and services was assessed using several measures based upon available local data and geographic information system analysis. These accessibility measures were compared for several low-income areas and contrasted with those for more affluent neighborhoods. The potential effects of these accessibility patterns were explored with data from a recent regional travel diary survey conducted in the Austin, TX metropolitan area. The data analysis highlighted the differences between the travel characteristics of persons living in households with varying income levels and suggests that local access does play a role on the activities and travel behavior of economically disadvantaged consumers.

Neighborhood Accessibility Analysis

In this analysis, two different types of measures of neighborhood accessibility were used to evaluate the neighborhood transportation and land use environment in seven low-income neighborhoods in Austin. By emphasizing the neighborhood as the unit of analysis, these accessibility measures say something about local access via transit and non-motorized modes, although indirectly. These measures lean more heavily toward one aspect of the local accessibility concept: the economic vitality of an area. They do not, however, provide information about the quality or scale of those establishments, the costs to consumers, or the level of pedestrian or bike infrastructure in the neighborhood.

The first set of measures was used to reveal the number and type of retail and service establishments that are present in and around the neighborhood. This set of measures – defined as intensity, variety, and choice – illustrated deficiencies in basic retail and service establishments and highlighted concentrations of nuisance or undesirable businesses that burden particular neighborhoods. A picture of the neighborhoods' access to food retailers was developed using the second measure, the percentage of the street network in the neighborhood that is within specified distances of a food store. This measure served as a proxy for the share of households that are within specified distances of a food store. In general, the analysis supports the argument that residents of low-income neighborhoods have relatively poor access to basic services, although patterns of accessibility vary considerably even for neighborhoods of similar income levels.

Travel Diary Data Analysis

The non-work travel patterns of low-income households in Austin, Texas were studied through an analysis of data from a regional travel diary survey. The differences in travel patterns between affluent and low-income households are manifestations of the differences in their resources, constraints, and choices, including differential access to retail and services. The results of this analysis point to the greater constraints facing low-income families and the fewer resources at their disposal. This constrained mobility can result in fewer opportunities, higher costs, and more difficulty taking care of household

needs, although the exact ramifications cannot be discerned from these data. Findings for low-income households include:

- Lower automobile ownership: Over 15% of low-income households do not have access to a vehicle, compared to less than 1% of those households with higher incomes. More affluent households are more likely to own multiple vehicles. Over 70% of the non-poor households reported owning more than one vehicle, compared to 28.3% of low-income households.

- Lower share of non-work trips by automobile: 6.0% of non-work trips for low-income households used transit and 5.0% of low-income used walking, compared to 72.1% and 2.5%, respectively, of non-work trips for non-poor households.

- Shorter average non-work trip distances: The average trip length for low-income households was 5.6 miles, compared to 6.4 miles for non-poor households. Average trip lengths for non-poor households were longer for every mode.

- Longer average non-work trip durations: For example, the average time for an automobile trip to a non-work destination is 15.4 minutes for low-income travelers while the non-poor reach their non-work destination in 14.4 minutes. This pattern holds for all modes and all types of non-work trips.

- Lower frequency of non-work trips: Low-income households made 2.3 non-work trips on average per day, compared to 3.5 trips per day for non-poor households.

- Lower person-miles-traveled: Households with low-incomes traveled almost 43% less in a day as other households for their non-work trips.

- Children tend to increase travel: Low-income households with children had longer average non-work trip distances, greater average frequencies of non-work trips, and more person-miles-traveled.

ANALYSIS

The results of the travel analysis indicate that the poor make fewer trips, travel shorter distances, and expend more time traveling. The presence of children increases the household activity needs and more time is devoted to traveling to these activities. These results alone don't say much about the implications for low-income households, however. Traveling less is a good thing if it's a matter of choice, but traveling less is not a good thing if it means missing out on opportunities available to others. Traveling more may be a good thing if it's a matter of choice, but traveling more is not a good thing if it means that the only way to meet household provisioning needs is to spend more time and money traveling.

These results suggest the ways that the poor respond to the limited choices available to them. The shorter travel distances and higher trip times indicate that low-income households are making use of the local options available to them. These data also suggest that some low-income households may have some needs that are unmet. The lower trip generation rates of low-income households indicate that some trips are not made; however, determination of which needs are not satisfied is not possible from these data. The results raise interesting questions about how low-income households make the most of these limited choices, questions that cannot be answered from traditional travel diary survey data. A qualitative research approach offers promise as a way to explore these issues in more depth.

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CHAPTER 1. INTRODUCTION

In July of 1999 President Clinton took a tour of America's poorest areas, unveiling his "new markets" initiative for stimulating private-sector investment in the nation's economically disadvantaged areas. The President made a stop in East St. Louis, IL, to celebrate the opening a new neighborhood Wal-Green's drug store, the first new retail store to open there in 40 years. Events such as this one have focused public attention on many of the problems the poor face in accessing the goods and services necessary for maintaining their households - a process called household provisioning. In many poor urban areas like East St. Louis, retail and service establishments are not abundant and those retail centers that do exist often offer lower quality products at higher prices.

To compound the problem, poor households lack the personal resources that might compensate for inadequate local access. They often don't have the option of traveling to stores or other destinations beyond their neighborhood, since auto ownership among the poor is low, the automobiles that they do own are frequently unreliable, and transit service is not well suited to non-work travel. They can't move to neighborhoods with better local access, since their residential choices are limited by the availability and locations of affordable housing. The implications for these households may be profound: less and lower quality food, healthcare, etc.

Despite the constraints of inferior access and limited resources, the poor must nevertheless find ways to take care of their household needs as best they can, whether that means making do with the goods and services available within the neighborhood, finding ways to get to destinations outside of the neighborhood, or simply doing without. The travel patterns exhibited by low-income households should thus reflect, although often indirectly, the limited options they have and the ways in which they are able to go about their household provisioning. The fact that low-income households have more limited choices than the more affluent should result in marked differences in the travel patterns of the poor when compared to the non-poor.

This report explores some of the issues surrounding local accessibility and travel behavior for low-income neighborhoods and households in Austin, TX. First, we begin Chapter 2 by reviewing the literature on the various constraints that low-income households face as a consumer in meeting their household needs. Principal among these constraints are the household income and the stability of that income. The acquisition and maintenance of a private vehicle is hindered by these financial constraints and thus lead to mobility constraints, particularly in the low-density, auto-oriented cities of the Sun Belt. Mobility constraints lead to and exacerbate time pressures as working families struggle to travel to work and non-work destinations by transit and non-motorized modes. These time pressures, financial constraints and limited mobility lead to a greater dependence upon access to services within the neighborhood. But neighborhood access has been declining in general and in low-income neighborhoods in particular. The withdrawal of local businesses is more marked in low-income neighborhoods, and this reduction local accessibility combined with the various constraints that poor households face lead to a more difficult time taking care of household needs.

In Chapter 3, we discuss the implications that the household constraints and lack of local access have for daily travel. The travel behavior theories traditionally employ rational choice theory to explain how travel decisions are made. Daily travel is shaped by the activity needs, preferences, and constraints of the individual and household. Hypotheses about the travel patterns of low-income households relative to more affluent households are presented.

Chapter 4 explores these accessibility issues for low-income households in Austin, TX. The first section of this chapter evaluates the neighborhood environment in several low-income neighborhoods using two types of measures of neighborhood accessibility. The first set of measures assesses the intensity, variety and choice in commercial development in a neighborhood. The second measure looks at the percent of a neighborhood's street network that is within a specified distance of a specified land use, in this case grocery stores, as an indicator of neighborhood access.

The second section of Chapter 4 explores the non-work travel patterns for low-income households in Austin, TX using recent regional travel diary data. The empirical evidence shows that in general poor households make fewer trips, travel shorter distances, but take more time getting to their destinations than more affluent households. These patterns, combined with the fact that the poor tend to live in areas with relatively fewer retail and service establishments, suggest that these households do indeed have fewer choices available to them as well as less time and fewer resources available to explore other opportunities. Although more research is needed to fully understand the consequences of poor access for these households, these patterns begin to suggest some of the difficulties that low-income households face in meeting their basic needs.

CHAPTER 2. BACKGROUND

CONSTRAINTS ON LOW-INCOME HOUSEHOLDS

Poor households face a variety of constraints on their ability to meet basic household needs. Beyond the obvious constraint of limited budgets for these needs, the instability of their income source and the frequent need for credit can further circumscribe their range of shopping choices (Andreasen 1975). Income constraints also lead to mobility constraints: poor households may not be able to afford an automobile, in which case they are dependent on a transit system that may not be designed to serve their needs or on walking, which can't get them far. Mobility constraints then lead to time constraints for these households, since transit or walking is considerably slower than driving in most cases.

Transportation is more time consuming, less convenient, and more of a hindrance for poor consumers in going about their business compared to the rest of society (Alwitt & Donley 1996). Mobility constraints for the poor stem from lack of access to automobiles, inadequate transit service, and sometimes physical handicaps. The prohibitive costs mean that automobile ownership is often out of reach for low-income households and that the automobiles they do purchase are frequently unreliable. Transit is generally a poor substitute for driving, given bus routes and transit services that do not correspond to market locations, require long waits, necessitate multiple transfers, and maintain regressive fare structures. Transit routes and schedules have historically been designed for suburb-to-city commute trips, not for non-work trips. Even when routes and service hours connect residences with job locations, travel by transit can take a long time and require several transfers (US Department of Transportation 1998). Walking to the store, for those who are able, means carrying groceries home, limiting purchases to what one can manage.

When low-income households depend on these slower modes, the time available to them for other activities becomes more constrained. This problem is particularly acute for working adults: long commutes via transit to suburban employment centers and inflexible work schedules leave less time for household provisioning. If trips to the store or the doctor must also be made by transit or by foot, little time is left for less immediate needs - playing with the kids or helping them with their homework, for example. But economizing on time by linking trips may not be possible for families that do not have access to a private vehicle. The fare structure, wait times, and route design of public transit systems are not well suited to multi-purpose trips. The ability to link trips is further hampered by the dispersion of destinations throughout the urban area (Fox 1983, Oster 1978). Mobility constraints thus exacerbate household time constraints.

The freedom from mobility constraints that comes with owning an automobile may justify the financial strain for low-income households. For one thing, the reliability and flexibility afforded by the automobile may play an important role in maintaining employment after a job is secured by making it easier to arrive to work on-time, take care of household needs through linked trips, and take care of children during emergency situations. Rosenbloom (1992) and others have argued that the complicated responsibilities of home and work demand flexible, convenient and reliable transportation, characteristics that the private automobile have monopolized given the current urban form and inadequate transit systems of most US cities. Despite the benefits offered by the automobile, car ownership is often prohibited or discouraged

by many public assistance programs. It is often cited as an abuse of welfare benefits, and AFDC benefits may be blocked to individuals who own cars with a value exceeding a certain threshold (Wachs and Taylor 1997). Programs offering transportation assistance for welfare recipients often prohibit participants from using the transportation resources provided by the program for non-work activities, even when the desired activity is dropping off or picking up children from daycare.

Income, mobility, and time constraints together limit the range of destinations within reach of low-income households and thus the choices available to them: "Food shopping becomes a question of not what one would like to buy, but what is available, given mobility restrictions" (Gottlieb et al., p12). In concert, the constraints of income, mobility, and time result in greater dependence upon local options. However, neighborhood businesses have declined over time in favor of regional shopping centers and an emphasis on accessibility by automobile. These regional changes in activity patterns and the transportation system have compounded the problems of the poor and lead to even greater challenges in household provisioning.

REGIONAL CHANGES IN ACTIVITY PATTERNS AND TRANSPORTATION SYSTEMS

The changes in the activity patterns in metropolitan regions since the advent of the automobile have had important implications for urban neighborhoods, the transportation choices available to residents, and the availability of goods and services. In general, basic shopping and services have become more oriented to the region and the automobile and less oriented to the neighborhood and any mode but the automobile. Neighborhood shopping where it still exists rarely provides the quality and prices now found in regional centers.

Early in the twentieth century, retail locations adapted to the growing use of the automobile and followed the residential growth to the suburbs. Regional centers emerged along major transportation corridors at strategic highway intersections (Garrison 1959). These shopping centers became concentrated in shopping plazas designed to accommodate the automobile with ample parking and auto-access. Retail centers began offering a variety of convenience and durable goods while at the same time the stores within them became more specialized, catering to specific markets and demographic groups (Berry 1967). With the increased mobility provided by the automobile, consumers relied more heavily on these regional centers to meet their needs and expanded their shopping areas beyond their immediate area.

Modern transportation and rising real incomes have removed the tyranny of distance, and people's life spaces have widened immensely. Shopping centers no longer dominate an immediate, exclusive market area; instead, several centers serve the same community-of-interest area, and consumers at some time visit all of them. (Berry 1967: 124)

As regional centers became both larger and more decentralized, neighborhood businesses underwent significant transformations. Zoning, design practices and neighborhood opposition segregated these retail uses from residential area, shifting retail to the edge of neighborhoods along transportation corridors. The scale of neighborhoods centers increased, their numbers declined, and the range of services offered expanded. For example, food stores grew from individual local markets that sold distinct types of goods to large supermarkets that often included the bakeries, butcher shops, banking facilities, and pharmacies that were once

separate establishments. These large stores required more extensive market areas resulting in fewer numbers of larger stores spaced farther apart. Convenience stores may now partially offset the loss of food stores in neighborhoods, but they tend to have higher prices, sell mostly processed foods, and are predominantly located and designed for the automobile.

Transportation planning, engineering and design practices have also privileged the automobile, largely to the exclusion of other modes. Residential roadway widths have increased, driven largely by concerns for emergency vehicle access. Requirements for commercial developments are concerned primarily with automobile access and parking allocation. Often these requirements disregard the negative impacts on access by transit, walking, or biking. In addition, commercial destinations tend to be decentralized and dispersed throughout the urban area, making them difficult to service by public transport.

These changes have resulted in a loss of neighborhood businesses, fewer transportation alternatives, and thus a decrease in accessibility to shops and services in and around the neighborhood. However, this decline in neighborhood accessibility is countered by an increase in regional automobile accessibility as larger stores offer more goods, often at lower prices, with convenient freeway access and ample parking. Of course, one needs an automobile to take full advantage of these regional opportunities. Berry's observation regarding the diminishing importance distance may hold for the middle-class consumer and households with access to an automobile. But for households with constrained mobility, these changes in urban retail patterns do not offer the same opportunities and convenience. For these households, the tyranny of distance remains.

ACCESS IN LOW-INCOME NEIGHBORHOODS.

The decline in local businesses in low-income urban neighborhoods - i.e. those neighborhoods whose residents most depend on local businesses - has been particularly acute, as examined in a number of studies over several decades. Over all, the number and scale of retail stores in poor communities have declined (Sexton 1973) enough that poor areas have fewer choices and smaller retail outlets than non-poor areas (Alwitt and Donley, 1996). Berry (1963) examined the structural changes in Chicago's neighborhood businesses as a function of income, population, and retail technology and found, not surprisingly, marked differences in the retail hierarchy between areas of differing income. High-income areas had more variety and hierarchical levels represented; establishments in low-income areas had a greater local orientation. This gap in retailing has remained, and in most areas it has widened.

Often when stores are present in neighborhoods, they are inferior to retail opportunities in more affluent areas and are inadequate in meeting the needs of the poor. Several recent studies have documented the failures of the food system to meet the needs of residents in poor communities (Ashman et al. 1993, Cotterill and Franklin 1995, Gottlieb et al. 1993, Public Voice for Food and Health Policy 1995 and 1996, Sustainable Food Center 1995). Often supermarkets are simply not present in neighborhoods, especially low-income neighborhoods. In the past 35 years, the supermarket industry has become increasingly more centralized; the total number of food stores has declined while at the same time, the average store size has increased steadily. The movement of supermarkets to suburban locations paralleled trends in population shifts and new transportation corridors (Yim 1993); simultaneously, stores in urban

areas located in or adjacent to poor neighborhoods were closed or sold. The combined effect has been to create an urban grocery store gap (Cotterill and Franklin 1995).

Some types of retailing and service outlets are missing altogether in economically distressed areas. For example, financial institutions have withdrawn from poor neighborhoods, opening the majority of branch facilities in suburbs or large regional centers. Banks have less than half the number of facilities in low-income communities than in non-poor areas (Alwitt and Donley 1996). This often results in inferior access to banks and other financial service establishments for residents of concentrated poor and minority neighborhoods in the central city (Avery 1991, Caskey 1994b, Leichter 1989, Stix et al. 1986). The physical withdrawal of banking establishments from poor and minority districts and the increasing requirements for deposit accounts has led to a decline in the ownership of deposit accounts among poor, young, and low-educated households (Caskey and Peterson 1994). Consequently, the poor have limited access to the financial vehicles necessary to participate in the economy.

While mainstream retail and service establishments are lacking, many low-income neighborhoods have a disproportionate number of undesirable or nuisance businesses. The lack of access to mainstream financial services has led to a disproportionate number of “fringe banking” establishments, such as pawnshops and check cashing outlets in low-income and minority neighborhoods (Avery 1991, Caskey 1994a). In a study of the distribution of retail and service establishments in Chicago, Alwitt and Donley (1996) found that poor residents are often burdened with more nuisance establishments, such as liquor stores and auto repair shops, and fewer social establishments, such as restaurants and bars.

The theories of urban dynamics have identified physical, institutional, and social factors that precipitate neighborhood decline. Explanations for changing urban activity patterns have focused on the increasing markets and inexpensive land in the suburbs, the importance of transportation corridors, and technological change in retailing. The lack of retail and services in poor inner-city neighborhoods is often explained in terms of declining demand: the low incomes of residents generate lower demand for commercial, financial, retail and other services (Hunter 1968). These explanations do not entirely account for the rapid movement of business out of central cities and for the disinvestment that has occurred in poor and minority neighborhoods. Racial discrimination (Andreasen 1971, Ross 1998), zoning and other planning practices, urban renewal, tax policies, insurance redlining practices, and lack of financial backing have contributed to the loss of neighborhood businesses in poor communities. Regardless of the cause, the loss of neighborhood businesses is more marked in poor neighborhoods than non-poor areas. This trend combined with a lack of viable transportation options leads to poor accessibility for many residents.

CHAPTER 3. IMPLICATIONS FOR TRAVEL

Travel behavior theory suggests that individual decisions about travel depend on the options available (the "choice set") and the relative value of the different options available (the "utility" of each choice). This theory assumes that individuals choose the option, from those available, that provides them with the greatest utility. However, different individuals may have different choice sets and different ways of evaluating utility, leading to different decisions about travel. As demonstrated above, the poor have a more limited choice set than the non-poor: they have fewer destinations to choose from locally and their ability to expand these options by taking advantage of regional centers is restricted by their limited income and the lack of viable transportation options. Their limited choice sets will be reflected in their travel patterns.

Other factors can further reduce the set of choices that low-income households perceive to be available to them. The lack of knowledge of alternatives may limit the number of choices considered. For example, Andreasen (1975) has argued that the poor may be unable to minimize prices and shop effectively because they lack adequate knowledge to make informed decisions in the marketplace. The pressures on time interfere with the ability to comparison shop, read advertisements, travel to new stores, and research products prior to purchase. Understanding credit and financing alternatives may prove to be a daunting task, particularly for those with little education or few English language skills. This lack of knowledge exacerbates the problems facing low-income consumers by limiting their choices and the inability to take advantage of time or money saving opportunities.

Differences between the travel patterns of the poor and non-poor may also partly be explained by differences in their preferences, that is, in the way they evaluate the utility of the different options available. Low-income households are likely to put greater weight on low prices and close proximity when choosing a grocery store, for example. Beyond these obvious differences, many residents of poor neighborhoods are immigrants who may speak little English. Some may feel more comfortable shopping in neighborhood shops that cater to the demographic market. The decision where to shop may be influenced by availability of specific products and familiarity with merchants, as well as the opportunities for social interaction.

The combination of income, mobility and time constraints and the deficiencies in local businesses in low-income neighborhoods mean a substantially reduced set of choices for shopping and other household provisioning activities for low-income households. Their circumscribed choice set should be reflected in their travel patterns. In addition, low-income households may have different priorities in evaluating the choices available. These differences should also be reflected in their travel patterns. In comparing the travel patterns of poor households to non-poor households, several differences can be predicted:

AUTOMOBILE OWNERSHIP AND USE

Available data consistently show that low-income households are less likely to own an automobile and own fewer automobiles on average than middle- and upper-income households: the 1995 Nationwide Personal Transportation Survey found that 26 percent of low-income households do not have a vehicle, compared to 4 percent of more affluent households (Murakami and Young 1997). However, the levels of automobile ownership are, at least in some areas, surprisingly high given the share of their income it takes for these households to own an

automobile. This finding may be explained by the limited choices available to those without an automobile; the expanded choices for work, for household provisioning, and for other activities available to those with an automobile may justify the expense.

Because of the increased opportunities that automobiles bring, households without an automobile (or with fewer automobiles than household members who need them) may actually depend on automobiles though in a variety of different ways. First, non-auto households may sometimes borrow cars from family, friends or neighbors. Second, they may ride along with them on shopping or other kinds of trips. Third, they may have family, friends, or neighbors shop or run errands for them. Finally, they may make use of taxis, which are expensive but still less of a financial strain than owning a car, to get where they need to go when no alternatives are available; because of the cost, taxi trips are likely to be infrequent. The first, second, and fourth alternatives should be observable in travel data, but the third is not.

USE OF NON-AUTOMOBILE MODES

Transit is often assumed to be the primary mode of travel for low-income households, given their lower levels of automobile ownership. However, transit service often accommodates the work trip more readily than shopping trips and other non-work trips. For this reason, the use of transit for trips related to household provisioning may be lower than the use other modes, and the use of transit for these non-work trips is likely to be lower than the use of transit for work trips. However, transit does play a notable role in the non-work travel of low-income households, and these households use transit and other non-automobile modes more frequently than the more affluent (Murakami and Young 1997). Walking is another important mode of travel for low-income households. Pedestrian trips within the neighborhood area to convenience stores and local shops should be more frequent than for the non-poor. Walking trips may also be made in conjunction with transit, a necessary link in reaching many destinations. However, the limited number of businesses and other activities in many low-income urban neighborhoods and the lack of adequate pedestrian infrastructure may impede walking to destinations in many neighborhoods. Bicycle use by low-income households has not been well-documented, but anecdotal reports point to its importance as well.

TRAVEL FREQUENCY

Travel models generally assume that trip frequency depends on income, presumably that higher incomes lead to greater participation in activities - work, shopping, leisure, etc. - which thus requires more frequent travel. The income, mobility, and time constraints that low-income households face may limit the number of different activities they can participate in and the frequency with which they do so. Their constraints may also force low-income households to plan their trips more efficiently, to reduce the number of times they have to visit a particular destination and thus save the time and cost of travel.

TRAVEL DISTANCE

Travel distances depend on the specific destinations chosen. If low-income households have shops and services nearby, they are likely to choose these nearby destinations to minimize the time and cost of travel. However, if they do not have nearby opportunities, they may be forced to travel longer distances to reach the shops and services they need. More affluent households, on the other hand, may have more nearby opportunities but also a greater ability to travel longer distances if they choose; preferences for certain activities and specific retail

locations may lead to more travel and longer travel times, despite the availability of retail locations closer to home. Overall, low-income households are likely to travel somewhat shorter distances on average than more affluent households. However, these differences in travel distance between income groups may not be straightforward, as they are shaped by the specific constraints, available choices, and preferences of households, regardless of income.

TRAVEL TIME

Travel time depends on the destination as well as the mode and thus the speed of travel. Trips by public transportation are usually slower than those by private automobile. If travel distances for poor and non-poor households are similar, then time spent traveling should be greater for the poor due to their greater dependence upon transit and other non-automobile modes. Even if distances are shorter for low-income households, their travel times might be greater. The poor may also spend more time preparing for travel, making arrangements for rides, and coordinating household activities; this time would not be reflected in travel data.

TRIP CHAINING

Trip chaining is one way of organizing travel efficiently by combining trips for other purposes with those for household provisioning needs. For example, the journey to work may be combined with a trip to childcare; the journey home may be linked to a trip to the grocery store, to child care, and to children's extracurricular activities. But economizing on time by linking trips may not be possible for those without access to a private vehicle. For households making trips by transit or as a passenger in the automobile of another, travel patterns are expected to show less trip-chaining activity than those who own their own vehicle. The inability to link trips may thus result in a higher single-trip generation rate among poor households.

CHAPTER 4. AUSTIN ANALYSIS AND RESULTS

This section examines the accessibility patterns of low-income neighborhoods and the non-work travel behavior of low-income residents of Austin, TX. Access to retail and services is assessed using several measures calculated from available local data using the analysis capabilities of geographic information systems. These accessibility measures are compared for several low-income areas and contrasted with those for more affluent neighborhoods. The results are discussed in terms of the influence that the quality of local access to retail and services may have on travel behavior. These potential effects are explored with data from a recent regional travel diary survey conducted in the Austin, TX metropolitan area and through analysis of the differences between the travel characteristics of persons living in households of varying income levels. These travel data for low-income individuals and households throughout the Austin region suggest that local access does play a role on the activities and travel behavior of economically disadvantaged consumers.

Located in central Texas, Austin is a medium-sized city with a population of 613,458 in 1998 (Austin City Connection, 1999). Over the past decade, Austin's regional population has increased rapidly, due in part to the growth in the high-tech computer industry. Austin is the state capital and home to the University of Texas, now the largest public university in the nation. It is not surprising then that government and higher education are two of the largest local employers.

The rapid expansion in the economy has resulted in increased incomes for many in the Austin region. The medium income for the county has risen over \$10,000 since the 1990 Census, from \$27,488 to an estimated \$38,368 in 1995. However, not all residents are sharing in this wealth. The poverty rate was 15.7% for the regional and 19.9% for the city in 1989 and is estimated at 12.9% for 1995 for Travis County. The 1998 regional poverty rate among children was slightly higher than for the general population, 17.1% for persons under the age of 18 and 19.1% among children under the age of five (US Census Bureau, 1999). According to 1995 estimates, the majority of residents of the region are white (57.1%) but the Hispanic (27.3%) and African-American (11.5%) populations are substantial and growing (Austin City Connection, 1999). In 1990, a larger portion of these minority populations were living in poverty than the white majority in the metropolitan area: 25.6% of persons of Hispanic origin and 24.9% of African-Americans lived in poverty, compared to 11.4% of white persons (calculated from the 1990 Census Summary Tape File 3, STF3C).

NEIGHBORHOOD ACCESS ANALYSIS USING GEOGRAPHIC INFORMATION SYSTEMS

In this section two different types of measures of neighborhood accessibility are used to evaluate the neighborhood transportation and land use environment. By emphasizing the neighborhood as the unit of analysis, all of the accessibility measures say something about local access via transit and non-motorized modes, although indirectly. These measures lean more heavily toward one dimension of the local accessibility concept: the economic vitality of an area. They are simple measures and can be created using inexpensive commercially available data (Handy and Clifton 2000). They do not, however, provide information about the quality or scale of those establishments, the costs to consumers, or the level of pedestrian or bike infrastructure in the neighborhood. Such information would provide a more detailed description

of local accessibility; however, incorporation of these components would require a more extensive data collection process.

The first set of measures evaluates the number and type of retail and service establishments that are present in and around the neighborhood. This set of measures can illustrate deficiencies in basic retail and service establishments as well as highlight concentrations of nuisance or undesirable businesses that burden a particular area. A picture of the neighborhoods' access to food retailers is developed using the second measure, neighborhood coverage, defined as the percent of the neighborhood street network within a specified distances of a specified land use.

These measures are useful for planners and policymakers to evaluate the context that shapes the daily lives of neighborhood residents. They provide a means to assess needs and prioritize neighborhood planning projects, regardless of the socio-economic status of residents. These measures are particularly relevant given the rise of neighborhood planning efforts in many U.S. cities (e.g. Portland, Houston, Austin) and the increasing attention given to policies that attempt to reduce automobile dependence by improving the local land use and transportation environment.

These measures are particularly relevant to economically deprived neighborhoods, although application of these measures is not limited to poor areas (Handy and Clifton 2000). As noted in the background section, residents of poor and low-income communities face many challenges in taking care of their household needs. The decline in the number of retail establishments in these areas, combined with the higher percentage of households without access to vehicles, and thus a greater reliance on transit and non-motorized modes, compound the obstacles faced by households already struggling with a limited income. Accessibility measures that reflect these particular needs of low-income residents can aid in developing more targeted programs that cater to the specific deficiencies of an area.

Neighborhood Case Studies

Several low-income neighborhoods were selected as case studies for the project. These neighborhoods were chosen based upon their socio-economic status, location within the Austin metropolitan region, and the history of the area as an established neighborhood. The Community Registry was used to make an initial selection of established neighborhoods and planning personnel from the Neighborhood Planning Program in the Planning, Environmental and Conservation Services Department for the City of Austin were consulted to provide additional information about the neighborhoods. The locations and boundaries of the neighborhoods selected as case studies are shown in Figure 4-1.

Select characteristics for each of the neighborhoods are shown in Table 4-1 and Table 4-2 and can be compared to similar data for the City of Austin. These data are from the 1990 Census, and although the neighborhoods and Austin have changed considerably since the 1990 Census, relative conditions of these neighborhoods compared to Austin as a whole have most likely remained the same if not declined.

TABLE 4-1. NEIGHBORHOOD CHARACTERISTICS

	Area (sq. mi.)	Population	Households	Avg. Household Income	Zero-Vehicle Households
Dawson	0.50	3,166	1,269	\$23,204	11.6%
Dove Springs	0.68	5,361	1,490	\$29,044	5.8%
East Cesar Chavez	0.76	3,958	1,329	\$16,926	38.8%
Gardens	1.52	4,138	1,158	\$16,263	33.3%
Georgian Acres	1.04	6,599	3,268	\$21,957	10.0%
Montopolis	5.29	10,205	4,181	\$19,610	11.1%
Windsor Park	1.28	6,478	2,560	\$33,191	14.8%
City of Austin	225.40	465,577	192,136	\$33,947	9.0%

TABLE 4-2. NEIGHBORHOOD RACE AND ETHNICITY

	Race & Ethnicity				
	White	Black	Asian	Other	Hispanic
Dawson	53.3%	3.7%	1.5%	41.5%	57.1%
Dove Springs	44.7%	17.2%	2.9%	34.1%	47.6%
East Cesar Chavez	39.5%	2.0%	0.0%	58.2%	84.5%
Gardens	21.1%	39.8%	0.1%	38.9%	55.1%
Georgian Acres	62.5%	16.2%	2.1%	19.3%	29.1%
Montopolis	48.6%	12.4%	2.5%	36.5%	50.9%
Windsor Park	58.0%	32.7%	0.8%	8.4%	14.4%
City of Austin	61.7%	11.9%	2.9%	13.5%	20.5%

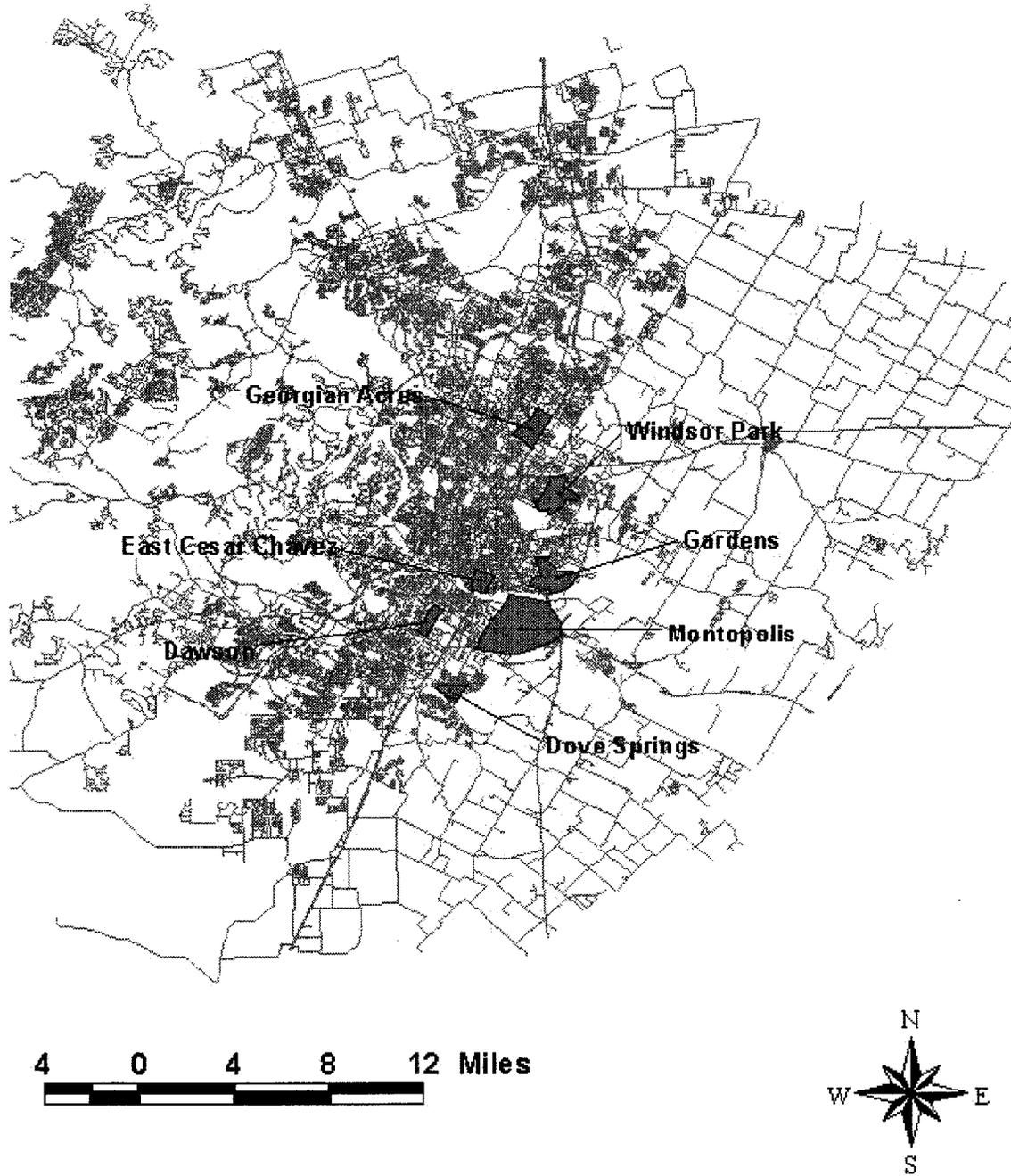


Figure 4-1. Selected low-income neighborhoods in Austin, TX.

Intensity, Variety and Choice in Neighborhood Businesses

A set of accessibility measures has been developed which illustrates the availability of commercial activity within a neighborhood and the degree of complexity in the neighborhood economy¹: *intensity, variety, and choice*. Retail *intensity* is defined as the total number of all retail establishments found within the neighborhood boundaries (or within some fixed distance beyond the boundary). This measure reflects the overall commercial development within a neighborhood. The *diversity* of development measures the different types of establishments found within a specified area. This measure could be represented by the number of different SIC codes that are present in the study area. Finally, retail *choice* is the number of establishment of a particular type found in the neighborhood, for example, the number of grocery stores or pharmacies. Retail choice represents the level of competition within area. All of these measures can also be represented as density measures, which control for population or land area and facilitate comparisons between neighborhoods.

The variation in the intensity of commercial development across the neighborhoods is shown in Table 4-3. The intensity measure is shown for each of the neighborhoods, at a one-quarter mile buffer area and a one mile buffer area from the neighborhood. All of these neighborhoods have a limited number of businesses within the neighborhood boundaries; however, the number of establishments increases within a short walk or drive from their neighborhood. Dove Springs, a suburban low-income neighborhood, is more residential in nature than the others and somewhat isolated from any commercial development. This is reflected in the intensity measure which shows far fewer retail and service establishments within and around the neighborhood than the others.

¹ For a complete description of the methodology used to create these measures, see Handy and Clifton, 2000.

TABLE 4-3. NEIGHBORHOOD COMMERCIAL DEVELOPMENT INTENSITY

	Neighborhood	1/4 mile	1 mile
Dawson	34	143	388
Dove Springs	1	4	48
East Cesar Chavez	60	140	673
Gardens	54	79	184
Georgian Acres	32	170	416
Montopolis	66	117	369
Windsor Park	42	67	227

TABLE 4-4. NEIGHBORHOOD COMMERCIAL DEVELOPMENT INTENSITY PER SQUARE MILE

	Neighborhood	1/4 mile	1 mile
Dawson	68	287	779
Dove Springs	1	6	70
East Cesar Chavez	79	185	887
Gardens	35	52	121
Georgian Acres	31	164	402
Montopolis	12	22	70
Windsor Park	33	52	177

TABLE 4-5. NEIGHBORHOOD COMMERCIAL DEVELOPMENT INTENSITY PER 1000 RESIDENTS

	Neighborhood	1/4 mile	1 mile
Dawson	11	45	123
Dove Springs	0	1	9
East Cesar Chavez	15	35	170
Gardens	13	19	44
Georgian Acres	5	26	63
Montopolis	6	11	36
Windsor Park	6	10	35

Because the neighborhoods have different spatial areas and populations, normalizing these intensity measures by population or area facilitates comparison of neighborhoods. Table 4-4 shows the intensity measures for each neighborhood normalized by the neighborhood area. Table 4-5 shows these same measures normalized by the residential population of each neighborhood.

The measure of intensity says little about the qualities of this development, only the magnitude and density of commercial establishments in and around a neighborhood. Although businesses may exist in great numbers, they may not provide the types of goods and services that residents need, particularly low-income residents who may face mobility constraints and cannot readily travel outside the neighborhood. Of greater interest for the evaluation of accessibility in low-income neighborhoods are the kinds of establishments available to residents and whether this development can satisfy household provisioning needs. For example, this development may consist of a variety of retail and service establishments that serve household needs such as grocery stores, restaurants and discount retailers. In contrast, the neighborhood development may be concentrated in a few businesses that fall short of providing a full array of needed goods and services to consumers facing mobility and economic constraints. For poor areas that have a high level of commercial development, it is common for this development to have an overabundance of gas stations, convenience markets, pawnshops and liquor stores. Measures of retail variety and choice provide for a greater understanding of the character of development in an area

Retail variety for the selected neighborhoods is shown in Tables 4-6, 4-7, and 4-8. This measure shows the different types of establishments, as determined by SIC code, that exist in the various neighborhoods. Taken with the intensity measure, it paints a clearer picture of the commercial environment. For example, the Gardens neighborhood has fewer retail establishments in absolute terms than East Cesar Chavez: 54 versus 60 total establishments respectively. However, the development in the Gardens Neighborhood offers slightly more variety with 24 different kinds of businesses compared to East Cesar Chavez with 23 different kinds of establishments.

As with the measure of intensity, the variety measure increases with increasing distance from the neighborhood but the magnitude of this increase differs for each area. Some neighborhoods may be lacking development within their boundaries but they may easily access businesses within a short distance. Extending these measures beyond the confines of the neighborhood, but within a reasonable walk, drive or transit trip, provides a clearer picture of the character of the development surrounding a residential area and thus a more complete evaluation of neighborhood accessibility. Dawson and Windsor Park illustrate this point. Both have 18 types of businesses within the neighborhood boundaries but Dawson has much more variety within walking distance. Over 42 types of businesses can be accessed within a quarter mile of the Dawson neighborhood but the variety is much lower within the same distance of Windsor Park neighborhood, where only 24 types are represented.

TABLE 4-6. MEASURES OF VARIETY

	Neighborhood	1/4 mile	1 mile
Dawson	18	42	64
Dove Springs	1	4	21
East Cesar Chavez	23	37	62
Gardens	24	27	39
Georgian Acres	12	45	64
Montopolis	29	41	57
Windsor Park	18	24	51

TABLE 4-7. MEASURES OF VARIETY PER SQUARE MILE

	Neighborhood	1/4 mile	1 mile
Dawson	36	84	129
Dove Springs	1	6	31
East Cesar Chavez	30	49	82
Gardens	16	18	26
Georgian Acres	12	43	62
Montopolis	5	8	11
Windsor Park	14	19	40

TABLE 4-8. MEASURES OF VARIETY PER 1000 RESIDENTS

	Neighborhood	1/4 mile	1 mile
Dawson	6	13	20
Dove Springs	0	1	4
East Cesar Chavez	6	9	16
Gardens	6	7	9
Georgian Acres	2	7	10
Montopolis	3	4	6
Windsor Park	3	4	8

The choice measure offers another level of refinement to the analysis by specifying the number of establishments of a particular type that are found in the neighborhood. Table 4-9 shows the measures of choice for the top three most frequently occurring business establishments in each of the neighborhoods and at one-quarter mile and one mile buffers around the neighborhoods. The number in parenthesis indicates the absolute number of these establishments that are present. The neighborhoods have a similar profile in the type of businesses that exist, although in different numbers. Restaurants, convenience stores, beauty shops (including barbershops), and automobile-related establishments were the most abundant for all of the neighborhoods in the study.

But how do these measures of choice compare for businesses related to household provisioning? Table 4-10 shows the choice measures for a small sample of the types of retail and service establishments that serve household provisioning needs within a quarter-mile of the neighborhood. Included in this sample are grocery stores (this category includes supermarkets and small grocery stores), coin-operated laundries, clothing and shoe retailers, and drug stores. These establishments are less abundant than restaurants, drinking establishments, and beauty shops - activities that are more discretionary and require a higher level of disposable income.

In the East Cesar Chavez neighborhood, bars and other drinking establishments were the most common business with eleven different establishments within the neighborhood boundaries alone. When viewed in light of the intensity measure of 140 establishments within the area of one-quarter mile of the neighborhood boundaries, the 24 drinking establishments make up over 17% of the businesses available to residents. Compare this to the number of grocery stores, coin-operated laundries, clothing stores, and drug stores located within one-quarter mile boundary of the neighborhood shown in Table 4-10. The choices that residents have among establishments that deal in goods and services that serve household provisioning needs is far less than their choices of drinking and eating establishments.

TABLE 4-9. MEASURES OF RETAIL CHOICE FOR THREE MOST COMMON ESTABLISHMENTS

Neighborhood	1/4 mile	1 mile	
Dawson	Eating Places (6) Convenience (5) Auto & Home Supply (3)	Eating Places (37) Auto & Home Supply (11) Beauty Shops (10)	Eating Places (65) Beauty Shops (29) Used Merchandise (26)
Dove Springs	Eating Places (1) - -	Eating Places (1) Convenience (1) Child Day Care Services (1)	Eating Places (7) Auto Dealers (6) Convenience (5)
East Cesar Chavez	Drinking Places (11) Used Auto Dealers (8) Eating Places/ Beauty Shops (6)	Drinking Places (24) Eating Places (22) Used Auto Dealers (9)	Eating Places (150) Drinking Places (76) Beauty Shops (48)
Gardens	Eating Places (9) Auto & Home Supply (7) Convenience (6)	Eating Places (13) Convenience (10) Auto and Home Supply (9)	Eating Places (36) Convenience (26) Used Auto Dealers (16)
Georgian Acres	Eating Places (7) Convenience (5) Auto & Home Supply (3)	Eating Places (43) Convenience (13) Beauty Shops (13)	Eating Places (76) Beauty Shops (34) Convenience (32)
Montopolis	Eating Places (9) Convenience (9) Beauty Shops (6)	Eating Places (18) Convenience (14) Mobile Home Dealers (11)	Eating Places (79) Convenience (35) Beauty Shops (20)
Windsor Park	Eating Places (8) Beauty Shops (5) Convenience (4)	Eating Places (12) Child Day Care (11) Convenience (7)	Eating Places (46) Beauty Shops (26) Child Day Care (19)

TABLE 4-10. MEASURES OF CHOICE FOR PROVISIONING ACTIVITIES
WITHIN 1/4 MILE OF NEIGHBORHOOD

	Groceries	Coin-Operated Laundries	Clothing & Shoe	Drug Stores
Low-income				
Dawson	1	1	6	2
Dove Springs	0	0	0	0
East Cesar Chavez	2	1	2	1
Gardens	2	0	1	0
Georgian Acres	1	2	6	3
Montopolis	2	1	3	1
Windsor Park	1	2	1	2
Moderate-income				
Barton Heights	11	1	4	2
Cherrywood	13	0	3	0
Clarksville	7	1	11	3
Tanglewood	5	0	0	0
Travis Heights	10	1	8	1
Wells Branch	3	0	1	0

These measures of choice for retail and service establishments related to household provisioning for the low-income neighborhoods are also compared to those for a sample of moderate-income neighborhoods in the Austin area². Residents of moderate-income neighborhoods have a greater number of food stores proximate to their neighborhood from which to choose than the residents of poorer areas. Those living in non-poor area have better local access despite the fact that more affluent households tend to have more choices in their mode of travel; the auto ownership rate is much higher in these areas. Coin-operated laundries are not more numerous in moderate-income neighborhoods, perhaps because there are fewer multi-family units and residents may be more likely to have laundry facilities in their homes.

Neighborhood Coverage for Access to Food Stores

Much of the difficulty in operationalizing accessibility measures involves the collection and representation of urban form characteristics (Handy, et al. 1998). A measure of neighborhood coverage incorporates both land use and transportation characteristics. The land use data are the same described in the previous measure: retail and service establishments taken from commercially-available telephone listings. Although lacking in detail, such as the size of the establishment, the data can provide a picture of the neighborhood level access. The transportation component makes use of the street network centerline files. These data are not without drawbacks. Centerline files

² For a complete description of the moderate-income neighborhoods listed in this table, see Handy and Clifton, 2000.

may be lacking new road and a finer level of detail that would include alleys and smaller streets, important for pedestrian connectivity. However, it does indicate the nature of the transportation system and can be valuable when comparing neighborhoods of different street network structures.

These two data sources have been combined to create a measure of neighborhood coverage for access to food retail stores by calculating the percent of the street network that is within a specified distance (1/4, 1/2 and one mile) from various food stores (convenience stores, grocery stores, and supermarkets). This measure is important for assessing the actual distances that a resident must traverse to reach a destination. Many accessibility measures make use of straight-line distances, or buffer distances as used above. At the neighborhood scale, the choice between using straight-line distances and actual network distances can result in different assessments of the transportation environment. This is particularly true for pedestrian accessibility, where a discrepancy of one-quarter mile can influence the choice of whether to walk or drive to a destination.

The results for several of the low-income neighborhoods are shown in Table 4-11. In addition, the results for some moderate-income neighborhoods are presented for comparison.

TABLE 4-11. PERCENT OF NEIGHBORHOOD WITHIN SPECIFIED DISTANCE OF FOOD STORE

	Convenience	Grocery	Supermarket	Convenience	Grocery	Supermarket	Convenience	Grocery	Supermarket
	1/4 mi.			1 mi.			2 mi.		
Moderate-income Neighborhoods									
Barton Heights	9%	15%	4%	89%	81%	42%	100%	100%	93%
Cherrywood	26%	6%	6%	100%	100%	100%	100%	100%	100%
Clarksville	14%	26%	7%	95%	100%	77%	100%	100%	100%
Tanglewood	8%	1%	1%	81%	28%	28%	100%	88%	88%
Travis Heights	14%	2%	2%	100%	86%	56%	100%	100%	100%
Wells Branch	18%	0%	0%	91%	0%	0%	100%	0%	0%
Low-income Neighborhoods									
Dawson	66%	26%	10%	100%	100%	100%	100%	100%	100%
Dove Springs	15%	0%	0%	98%	0%	0%	100%	0%	0%
Cesar Chavez	23%	30%	0%	100%	100%	74%	100%	100%	100%
Gardens	15%	17%	3%	62%	63%	41%	100%	100%	81%
Georgian Acres	21%	4%	3%	100%	76%	53%	100%	100%	100%
Montopolis	16%	10%	2%	100%	73%	16%	100%	100%	55%

TRAVEL DIARY DATA ANALYSIS

This section describes the non-work travel patterns of low-income households in Austin as revealed by analysis of data from a regional travel diary survey. The differences in travel patterns between more the affluent and the low-income households are manifestations of the differences in

their resources, constraints, and choices, including differential access to retail and services. The results of this analysis point to the greater constraints facing these families and the fewer resources at their disposal. This constrained mobility can result in fewer opportunities, higher costs, and more difficulty taking care of household needs, although the exact ramifications cannot be discerned from these data.

The 1998 Austin Region Household Travel survey conducted for the regional metropolitan planning organization, the Austin Transportation Study (now called the Capital Area Metropolitan Planning Organization), provides data on the travel patterns of Austin-area residents. Participants were recruited from the Austin metropolitan area, which included Travis, Williamson, and Hayes Counties, using an initial letter followed by telephone solicitation. The sample was stratified by household income and size and based upon the 1995 Census estimates for the Austin metropolitan area.

Because the method of random selection of households did not result in a sufficient number of low-income participants, an additional recruitment method was employed to target these households. An in-person recruitment effort was initiated in low-income communities in the Austin area. Of the 240 participants in the lowest income bracket, 61 were recruited in this manner (NuStats, 2000).

Socio-economic data were collected for each member of the participating households. Respondents were asked to record all of the trips made by all household members over the age of five for a specified weekday. Trip data include origin and destination activities, locations, travel mode, travel time, route, number of passengers, and trip purpose. Travel durations and distance data used in this analysis are based on self-reported times and distances from the survey respondent, rather than those calculated from models. For a complete discussion of data collection methods, see Nustats (2000).

The sample comprises 1,997 households, including 5,192 persons making 19,694 trips. Of these, 412 (20.6%) households were designated as low-income using the criteria shown in Table 4-12. An additional subset of the low-income households was created for households meeting 1998 federal poverty guidelines (US Department of Health and Human Services 1998). Over half of those households classified as low-income also met the poverty threshold (216 households, 10.8% of the total). These criteria represent approximately two-times the poverty threshold for Texas, approximately 60% of the mean family income, and are similar to those used by Murakami and Young (1997) in their national study of travel by persons of low income. A summary of the income groups in the data set is shown in Table 4-13.

TABLE 4-12. LOW-INCOME CRITERIA

Number of Persons in Household	Low-Income Criteria Household Income
Any size	\$0 - \$14,999
Greater than or equal to 3	\$20,000 - \$24,999
Greater than or equal to 5	\$25,000 - \$29,999

TABLE 4-13. LOW-INCOME AND POVERTY STATUS IN DATASET

	Households		Persons	
	Number	Percent	Number	Percent
Not low-income	1,585	79.40%	4,050	78%
Low-income	412	20.60%	1,142	22%
Total	1,997		5,192	

Trip data were categorized according to several trip purpose categories including: home, work, work related, school, change of mode, serve passenger, shopping, personal, social/recreational and other. In this report, non-work trips are defined as those included in the categories of shopping, personal, and social/recreational trips. These non-work trip categories can be further disaggregated into several activity types. Shopping trips comprise two activity types: incidental shopping and major shopping. Incidental shopping trips include those trips made to purchase groceries, gas, household products, or other non-durable items. Major shopping trips include trips made to purchase clothes, appliances, furniture, or other durable goods. Personal service trips include trips made to engage in activities related to banking, medical services, personal business (such as laundry, dry cleaning, barber, etc.), and other services. Trips made for social and recreational purposes included dining out, civic activities, church activities, socializing, and recreation. The term *non-work trips* refers to all trips made for the purpose of social/recreational, shopping, or personal business unless otherwise specified.

Characteristics of survey participants are shown in Table 4-14. Persons living in low-income households are more likely to be Hispanic or African-American than those living in households with higher incomes. They are also more likely to suffer a disability that affects their mobility and less likely to have a drivers license. The Austin area is home to several institutions of post-secondary education, including the University of Texas at Austin, St. Edwards University, Huston-Tillotson College, and Austin Community College. For this reason, students taking courses at post-secondary institutions make up a significant portion of the sample. Over 9 % of the sample are adult students, and they are twice as likely to live in low-income households. Of those sixteen years of age and older, persons in low-income households are more likely to work part-time, be looking for work or not in the labor force than those in higher income households. It is interesting that of the employed persons, those with low-income are slightly more likely to have flexible work hours.

TABLE 4-14. CHARACTERISTICS OF PERSONS IN DATA SET BY INCOME CATEGORY

	All	Not low-income	Low-income
Sex			
Male	49.4%	49.7%	48.3%
Female	50.6%	50.3%	51.7%
Race/Ethnicity			
White	71.2%	79.8%	40.5%
Hispanic	16.3%	10.4%	37.3%
African-American	6.3%	3.6%	15.8%
Asian	1.6%	1.2%	2.9%
Other	2.9%	2.9%	2.7%
Disability (transport-related)	4.5%	3.9%	6.5%
Age (Average)	32.3	33.9	26.8
Licensed driver (of those eligible)	93.1%	96.3%	80.5%
Students (post-secondary)	9.2%	7.4%	15.5%
Employment Status (aged 16 and older)			
Full-time	62.1%	50.4%	45.1%
Part-time	10.3%	9.7%	12.8%
Unemployed - seeking work	2.2%	1.5%	4.90%
Unemployed/Retired	24.4%	21.5%	36.2%
Flexible Work Hours	47.1%	46.6%	49.7%

Several characteristics of the households in the sample are summarized in Table 4-15. Low-income households are less likely to have children and tend to have fewer persons living in the household than the more affluent. There are fewer licensed drivers on average in low-income households, averaging 1.3 drivers per household compared to 1.9 in non-poor households. In terms of household structure, more than half of the low-income households comprised a single adult, compared to only half that in households that earn more. Low-income households were also more likely to consist of single parents and unpartnered adults (with and without children). Wealthier households were much more likely to consist of couples than households with lower incomes.

TABLE 4-15. CHARACTERISTICS OF HOUSEHOLDS IN DATA SET BY INCOME-CATEGORY

	All	Not low-income	Low-income
Child in household	31.9%	33.9%	25.0%
Number of children	0.6	0.6	0.5
Number of people in household	2.5	2.6	2.1
Number of persons with drivers license	1.8	1.9	1.3
Household structure			
single adult	29.1%	22.9%	50.6%
single adult, children	3.9%	2.8%	7.4%
couple	27.8%	33.4%	8.6%
couple, children	23.7%	27.1%	11.9%
unpartnered adults	12.1%	10.8%	16.5%
unpartnered adults, children	3.4%	3.0%	5.0%

The number of vehicles available to low-income households defines the travel options available to its members. As shown in Table 4-16, low-income households are much more likely to not own a vehicle or to own just one vehicle than non-poor households. Over 15% of low-income households do not have access to a vehicle, compared to less than 1% of those households with higher incomes. More affluent households are more likely to own multiple vehicles. Over 70% of the non-poor population reported owning more than one vehicle, compared to 28.3% of those with low incomes.

TABLE 4-16. NUMBER OF VEHICLES AVAILABLE IN HOUSEHOLD

Vehicles	All	Not low-income	Low-income
0	4.0%	0.9%	15.3%
1	33.8%	27.5%	56.4%
2	43.0%	48.9%	22.0%
3	15.1%	17.8%	5.3%
4+	4.1%	4.9%	1.0%
Total			
Households	1,997	1,585	412

The average number of vehicles per driver is lower for low-income (0.92 vehicles per driver) than non-poor households (1.08 vehicles per driver). This ratio is more striking when the number of vehicles per person in the household is compared. Non-poor households average 0.90 vehicles per person compared to 0.72 vehicles per person in low-income households.

Consistent with these differences in auto-ownership and access, low-income households were less likely to drive and more likely to be a passenger in an automobile than more affluent households when engaged in shopping or other non-work activities. They were also more likely to walk and take transit: 6.0% of trips by low-income households used transit, while 5.0% of trips by

low-income households were walking trips. These differences, shown in Table 4-17, reflect the limited access to cars available to these households.

TABLE 4-17. MODE OF TRAVEL FOR NON-WORK TRIPS

	All	Not low-income	Low-income
Drive	70.5%	72.1%	61.6%
Passenger	22.3%	22.3%	22.4%
Bus	1.1%	0.2%	6.0%
Walk	2.9%	2.5%	5.0%
Total Non-work Trips	6,435	5,435	1,000

Given their relative lack of constraints, it is not surprising that the non-poor travel longer distances for non-work trips. Those persons living in low-income households are the most mobility restricted, traveling fewer miles on average per non-work trip than non-poor trip makers do, as shown in Table 4-18. When trip distance is disaggregated by mode, trips by automobile were farther, on average, than trips made by other modes for most non-work trips. This finding suggests that access to an automobile is important for expanding the scope and number of choices available. In addition, the average distance for walk trips is shorter for low-income persons than for the non-poor for all non-work trips. This finding more likely reflects the limited choices available to low-income households near home than it does their ability to find what they need very near home.

TABLE 4-18. AVERAGE TRIP DISTANCE AND TIME BY PURPOSE AND MODE

	Non-work Trips					
	All		Not low-income		Low-income	
	N=5568		N=4720		N=848	
	Miles	Minutes	Miles	Minutes	Miles	Minutes
Drive	6.3	15.2	6.4	14.9	5.6	16.8
Passenger	6.4	14.6	6.4	14.4	6.2	15.4
Bus	7.0	16.5	7.2	16.6	5.9	16.1
Bus	3.2	32.6	3.7	22.7	3.2	34.7
Walk	1.6	10.4	1.8	9.7	0.9	12.3

Average non-work trip durations for the non-poor are consistently shorter than travel times for low-income persons, despite the fact that the non-poor are traveling farther distances. This is not surprising, given that the poor rely more heavily on transit, which generally is slower than travel by car. However, when travel times are disaggregated by mode and type of non-work trip, the trend holds. For example, the average time for an automobile trip to a non-work destination is 15.4 minutes for low-income travelers while the non-poor reach their non-work destination in 14.4 minutes.

At the same time, the poor are traveling a shorter distance on average so that the average implied speeds are 23.0 mph for low-income travelers and 26.5 mph for the non-poor. The explanation for this difference is not obvious. Many low-income households are driving older vehicles, which may be slower, for example. Longer travel times may also be a function of the

routes taken to destinations; the poor may live near more congested areas or areas less well served by freeways and expressways, which may slow their travel.

The frequency of non-work trips also suggests that the poor have fewer choices. As shown in Table 4-19, low-income households make fewer total trips per day than the non-poor. With regard to non-work trips, the household trip rates are 2.3 non-work trips for low-income households and 3.5 for non-poor households. The differences are equally significant on a per-person basis: 0.9 non-work trips per day per person versus 1.3 for the non-poor. The constraints on low-income households may be limiting their participation in non-work activities outside of the home or they may be substituting in-home activities for out-of-home activities, such as cooking a meal at home versus going to a restaurant. Of course, what can't be determined from the travel data alone is the degree to which the differences in trip frequency reflect differences in preference rather than opportunity.

TABLE 4-19. NUMBER OF TRIPS PER DAY

	All	Not low-income	Low-income
All trips			
Trips per household	9.6	10.3	7.4
Trips per person	3.8	4.0	3.1
Non-work trips			
Trips per household	3.2	3.5	2.3
Trips per person	1.2	1.3	0.9

Combining trip distances with trip frequencies yields the person-miles traveled. For non-work trips, the poor travel fewer miles in a day per household, per person, and per trip. These results are shown in Table 4-20. Households with low-incomes travel almost 43% less in a day than other households for their non-work trips. The combined effect of fewer trips, shorter travel distances, and longer travel times points to the difficulties that low-income families experience in their household provisioning. These results suggest that the poor may have fewer choices because their spatial mobility is more constrained. Travel is more difficult and time consuming and therefore fewer trips are made overall. However, one could also infer that the poor travel less because their needs can be met locally. These results are difficult to interpret without complementary data about the destinations available and the quality and prices of goods and services offered at those destinations.

TABLE 4-20. PERSONS MILES TRAVELED FOR NON-WORK TRIPS

	All	Not low-income	Low-income
All Trips			
PMT per HH	69.6	76.8	43.7
PMT per person	27.3	29.7	18.6
Non-work trips			
PMT per HH	20.2	22.1	12.9
PMT per person	7.6	8.4	4.9

Households With Children

The demand for activities and the required level of household organization become more complex as the number of household members increases. This is particularly true of children in that they often require supervision and may be unable to travel alone. As such, children may increase household constraints. At the same time, the presence of children in a household may increase both the demand for and the variety of activities in which they engage. For both reasons, the presence of children in the household has consequences for daily travel in how, when, and where trips are made.

To examine the effects that children have on travel, households were aggregated into groups as determined by the presence of children younger than sixteen years of age. Comparisons of travel characteristics were made across the income groups for households with children and without. Note that these descriptive statistics do not necessarily describe travel with children but rather travel by persons with children present in the household.

As noted above, the average trip distance for non-work travel is shorter for low-income households. As illustrated in Table 4-21, this pattern remains when trip distances are disaggregated by the presence of children, with the exception of transit trips, which are longer for low-income travelers with children. Within low-income households, the presence of children tends to increase the average trip distance. The averages for more affluent travelers have mixed results, however. Among this group, transit and passenger trips made by persons living with children tend to be shorter than trips made by persons living without children. The lack of consistency in these results may reflect tensions between the increasing need for activities and travel and increasing the constraints on travel that the presence of children in the household represents.

TABLE 4-21 AVERAGE NON-WORK TRIP DISTANCE (MILES) BY PRESENCE OF CHILDREN

	All		Not low-income		Low-income	
	None	Child	None	Child	None	Child
All modes	6.1	6.6	6.3	6.7	5.5	5.9
Drive	6.3	6.6	6.3	6.6	6.2	6.3
Passenger	7.0	7.0	7.3	7.1	5.9	5.9
Bus	3.0	3.9	4.3	2.2	3.0	4.2
Walk	1.4	1.8	1.6	2.1	0.8	1.1

The results for non-work travel durations for households with and without children are also mixed, as can be seen in Table 4-22. Among the low-income households, those with children have longer travel durations than those without. However, the reverse is true for the more affluent households; those with children have shorter travel durations than those without. When the results are disaggregated by mode, the results are consistent for more affluent households but mixed for the low-income households. It is not clear what factors contribute to these seemingly contradictory results.

TABLE 4-22. AVERAGE NON-WORK TRAVEL TIME (MINUTES) BY PRESENCE OF CHILDRE

	All		Not low-income		Low-income	
	None	Child	None	Child	None	Child
All modes	15.6	14.6	15.4	14.2	16.5	17.5
Drive	15.2	13.5	15.1	13.2	15.2	16.1
Passenger	18.4	15.4	18.4	15.6	18.3	14.1
Bus	29.7	39.9	23.4	21.0	31.0	43.6
Walk	10.0	11.1	9.2	10.8	12.4	12.1

Consistent with the idea that children increase a household's activity needs, Table 4-23 shows that the number of non-work trips per household is greater for trip makers with children. At the same time, the number of trips per person decreases for travelers with children in the household. Children tend to make fewer trips than adults, thus reducing the average trips generated per person. Overall, low-income travelers living with children in the household make fewer trips than the non-poor.

TABLE 4-23. NUMBER OF NON-WORK TRIPS BY PRESENCE OF CHILDREN

	All		Not low-income		Low-income	
	None	Child	None	Child	None	Child
All trips						
Trips per household	7.4	14.6	7.9	15.1	5.9	12.0
Trips per person	4.4	3.8	4.4	3.9	4.3	3.0
Non-work trips						
Trips per household	2.8	4.2	3.0	4.4	2.1	3.0
Trips per person	1.7	1.1	1.7	1.2	1.6	0.7

The effects of the presence of children in the household on the miles traveled for non-work purposes are shown in Table 4-24. Consistent with the findings above, the presence of children in the household increases the number of person miles traveled (PMT) per household but decreases the PMT per person. This may be due to the fact that children increase the number of people per household but travel less than adult members of a household. In all cases, however, low-income households with children have a considerably lower mobility than the non-poor living with children.

TABLE 4-24. NON-WORK PERSON MILES TRAVELED BY PRESENCE OF CHILDREN

	All		Not low-income		Low-income	
	None	Child	None	Child	None	Child
All Trips						
PMT per HH	52.7	106.1	58.5	113.0	33.8	72.9
PMT per person	29.9	27.6	31.3	29.5	25.4	18.4
Non-work trips						
PMT per HH	16.8	27.3	18.5	29.4	11.4	17.3
PMT per person	9.8	7.2	10.1	7.7	8.7	4.6

In sum, more affluent households without children make the most trips, since they have the most monetary resources and can participate in more activities. Less affluent households with children make fewer trips, since they have fewer monetary resources and are subject to a greater number of constraints. However, their trips have longer average durations, compounding their constraints.

Working Households

Non-work trips by working households also have greater constraints since most work schedules are relatively fixed. Non-work trips must be scheduled around work activities and the commute trip. Participants reported trips made on weekdays only; so trips by working families were subject to the constraint of their work schedule.

Table 4-25 shows the non-work trip generation rates by employment status at the household and person level. The highest number of non-work trips, an average of 3.7, is generated by more affluent households that are seeking work. Among the low-income group, households with a member employed full time generate the most trips on average, 2.5. Households with members working part time generate the lowest number of non-work trips. This ranking is consistent across income groups, but there are marked differences in the number of trips generated by households with part-time workers. Higher income households with part-time workers average 3.4 non-work trips per day compared to only 1.9 for those in the low-income group.

At the person-level, low-income travelers that are unemployed generate the fewest non-work trips, averaging just one per day. Possible explanations include the time and effort expended in their job search and the lack of a steady income stream. Non-workers generate the most trips among low-income persons, averaging 1.8 per day. This group contains retirees who may have more flexibility to engage in non-work trips and thus may run errands for family members who do not reside in the household in addition to their own social and recreational travel.

TABLE 4-25. NUMBER OF NON-WORK TRIPS BY EMPLOYMENT STATUS

	All	Not low-income	Low-income
Trips per household			
Full-time	3.3	3.5	2.5
Part-time	2.6	3.4	1.9
Unemployed	2.6	3.7	2.1
Not-working	3.0	3.6	2.2
Trips per person			
Full-time	1.4	1.4	1.3
Part-time	1.6	2.1	1.1
Unemployed	1.4	2.4	1.0
Not-working	2.1	2.3	1.8

The average non-work trip distance by employment status is shown in Table 4-26. Overall, non-work trips made by low-income persons seeking work are the longest, averaging over 12 miles per trip. Low-income workers working full time travel shorter distances than the more affluent; however, part-time workers from the low-income group travel farther than their wealthier

counterparts. These differences may be due to greater time and scheduling constraints for full-time workers.

Self-reported average travel times by employment status are also shown in Table 4-26. On average, those persons looking for work spend the most time per trip; this is not surprising since they travel longer distances, as discussed above. In general, more affluent travelers averaged less time per trip and those non-poor persons that are employed part time spent the least amount of time of all income and employment groups. Although not tested here, the ability and tendency to link trips may explain part of this shorter trip duration for part-time employees.

TABLE 4-26. AVERAGE NON-WORK TRAVEL DISTANCE AND TIME BY EMPLOYMENT STATUS

	All	Not low-income	Low-income
Travel distance (miles)			
Full-time	6.0	6.1	5.4
Part-time	5.6	5.6	5.8
Unemployed	7.9	6.5	12.1
Not-working	6.7	7.1	5.2
Travel time (minutes)			
Full-time	14.7	14.5	16.8
Part-time	14.8	13.4	20.1
Unemployed	20.1	18.8	24.5
Not-working	16.1	16.2	15.9

Trip Chaining

In addition to analyzing the travel data in terms of individual trips, it is also useful to analyze travel data in terms of trip chains or tours. For the purposes of this dissertation, a trip tour is a sequence of trips made in a given day that originates and ends at home. This method of analysis preserves much of the complexity of daily travel because a trip can be examined within the larger context of other trips made during the course of a day.

In this analysis trip tours have been categorized into four types: simple work, complex work, simple non-work, and complex non-work. A simple work tour consists of two trips: a trip from home to work and back again with no stops along the way. A complex work tour includes a trip to another destination on the way to work, on the way home, during lunchtime or other work hours, or any combination of these. One example of a complex work tour would include the following sequence: driving to day care to drop off children, going to work from there, walking to a deli to eat lunch and back to work, driving to day care to pick up children, making a stop at a convenience store for milk, and driving home again. A simple non-work tour consists of two trips: a trip from home to a non-work destination, such as a restaurant or bank, and home again. Multiple trips make up a complex non-work tour and include all destinations except those made for work purposes.

The findings presented previously show that low-income households tend to make fewer trips than households with more income at their disposal. This also holds true for trip tours. As shown in Table 4-27, low-income households make an average of 2.8 journeys away from home compared to 3.5 for the higher income group. This evidence suggests that low-income households are visiting fewer destinations and engaging in fewer activities away from home; however, the consequences of this for the households cannot be determined from these data.

TABLE 4-27. NUMBER OF TOURS AND TRIPS PER TOUR PER HOUSEHOLD

	All	Not low-income	Low-income
Tours	3.4	3.5	2.8
Trips per tour	2.9	2.9	2.6
Non-work trips per tour	1.4	1.4	1.3

A smaller proportion of trip making by persons living in low-income households is in complex tours. As shown in Figure 4-2 over half of the trip tours made by low-income persons are to a single destination and home again. The inability to link trips may cause greater inefficiency, in terms of travel time and distance, than visiting the same destinations in complex tours. This inefficiency may result in more time devoted to travel and/or fewer destinations visited.

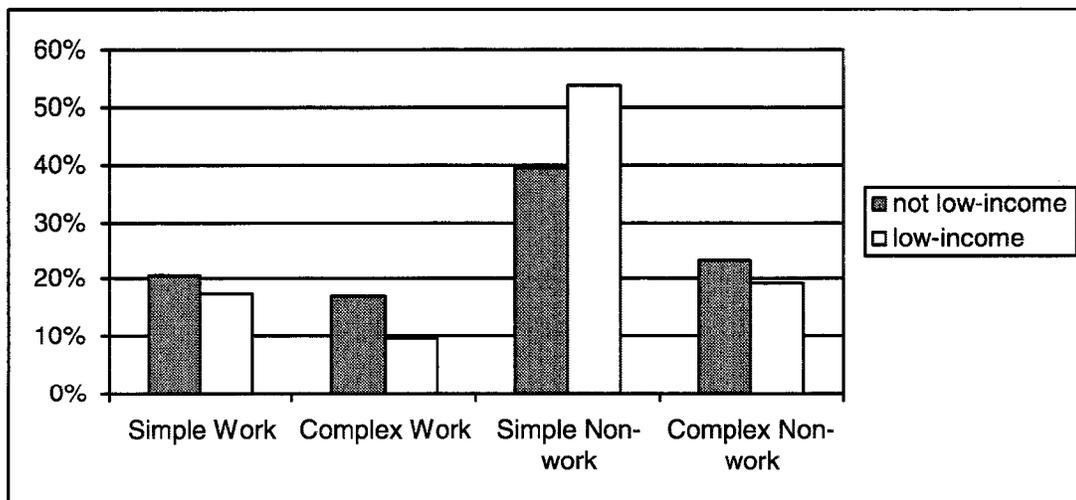


Figure 4-2. Distribution of trip chains by income status.

Moreover, the total distance traveled in any given outing is less for low-income travelers, as shown in Figure 4.3. The average tour distance is less for low-income persons than for the more affluent (16.2 miles, compared to 23.4 miles) and the number of person-miles traveled per day is roughly two-thirds that of the non-poor (29.7 miles and 18.6 miles respectively). Despite the shorter average distance traveled by low-income persons, the average duration of their trip tours is greater than or equal to those with higher incomes. As mentioned earlier, the poor tend to make a larger percentage of trips by slower modes such as by transit and walking, which is largely responsible for this discrepancy in travel time.

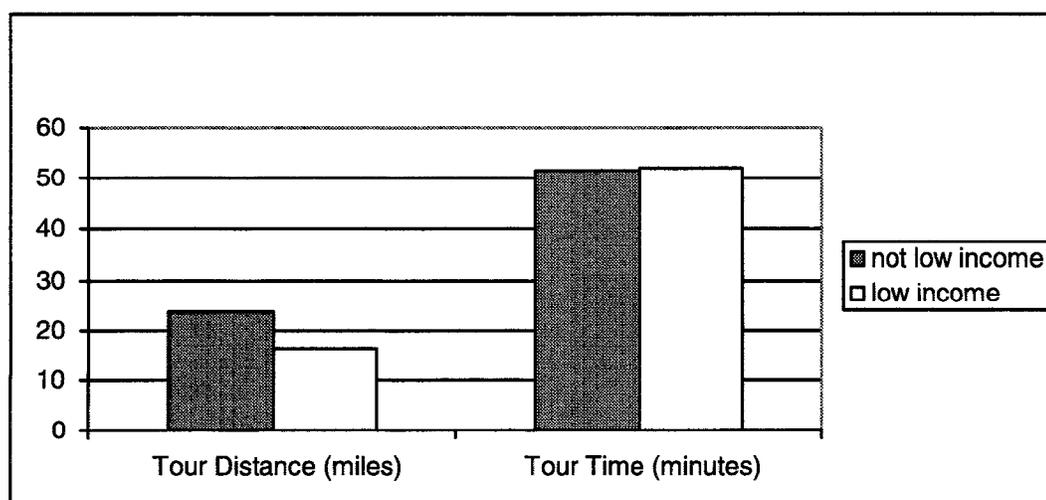


Figure 4-3. Average tour length by income status.

The data on travel distance and time per tour show interesting trends when controlling for mode and tour type, as shown in Table 4-28. Low-income persons travel shorter distances on average for all tour types, with the exception of those making complex non-work trip tours using multiple modes. Two types of simple tours, simple work and simple non-work, are of particular interest. These types of tours consist of two trips: a journey from home to a single destination and back again. Comparisons of the tour distances between the two income groups show that low-income travelers tend to work at locations and patronize non-work establishments that are located closer to their homes than the non-poor for all modes of transportation.

TABLE 4-28. TRIP TOUR DISTANCE IN MILES BY MODE

	Auto Only		Transit Only		Multi-modal Only	
	Not low-income	Low-income	Not low-income	Low-income	Not low-income	Low-income
Simple Work	23.3	18.8	25.6	11.3	18.5	9.9
Complex Work	38.7	33.8	-	-	29.3	17.9
Simple Non-work	15.3	13.0	15.1	11.0	12.8	6.9
Complex Non-work	30.3	26.7	-	8.9	25.6	27.7

Average trip tour time by mode is not as straightforward, however. Table 4-29 shows a division between the travel duration for trip chains that include a work trip and those that are for non-work purposes only. The low-income workers tend to have shorter travel times for the simple-work tours, regardless of mode. This is consistent with their shorter simple-work commute distances shown above. Low-income persons traveling via auto have longer travel durations for complex work tours and both types of non-work tours, despite the shorter average travel distance. One can only speculate about the basis for these confounding results. It may be because their residential or workplace locations tend to be in areas that require slower travel speeds, such as areas of high congestion. As an interesting aside, the fact that there are no cases of complex work trips made by transit points to the difficulties linking trips when traveling by this mode.

TABLE 4-29. TRIP TOUR TIME IN MINUTES BY MODE

	Auto Only		Transit Only		Multi-modal Only	
	Not low-income	Low-income	Not income	low income	Not low-income	Low-income
Simple Work	53.6	50.5	103.0	80.7	70.0	58.2
Complex Work	85.0	94.9	-	-	86.8	97.4
Simple Non-work	29.5	30.0	62.1	60.5	36.3	43.8
Complex Non-work	56.7	65.9	-	99.0	67.8	100.2

CHAPTER 5. CONSEQUENCES

David Caplovitz's pioneering research on the consumer practices of the poor in 1963 revealed that the poor often pay more for the same or lesser quality durable goods than those with higher incomes. This disparity is due, in part, to dependence on consumer credit, lack of information, unscrupulous selling practices, and as discussed above, lack of access to alternatives. Caplovitz's study views the poor as consumers, participants in mainstream capitalist society, albeit marginalized and exploited. In some regards, the poor are a captive market; their low incomes limit their choices, inadequate access and transportation further restrict their options.

The results of the travel analysis presented above indicate that the poor make fewer trips, travel shorter distances, and expend more time traveling. The presence of children increases the household activity needs and more time is devoted to traveling to these activities. Although the working poor are subject to greater time constraints, they make more non-work trips than the poor that are not employed, perhaps as a function of their increased activity needs. These results alone don't say much about the implications for low-income households, however. Traveling less is a good thing if it's a matter of choice, but traveling less is not a good thing if it means missing out on opportunities available to others. Traveling more may be a good thing if it's a matter of choice, but traveling more is not a good thing if it means that the only way to meet household provisioning needs is to spend more time and money traveling.

These results suggest the ways that the poor respond to the limited choices available to them. The shorter travel distances and higher trip times indicate that the poor are making use of the local options available to them. These data also suggest that some poor households may have some needs that are unmet. The lower trip generation rates of poor households suggest that some trips are not made; however, determination of which needs are not satisfied is not possible from this data. The results raise interesting questions about how low-income households make the most of these limited choices, questions that cannot be answered from traditional travel diary data. The poor develop strategies, take advantage of opportunities as they arise, and develop and strengthen their social support networks in order to get to the products and services they need for their household. To understand more about the decision making process and the household provisioning strategies employed by poor working households, a qualitative approach is necessary. Further research using in-depth interviews and participant observation techniques will attempt to understand the consequences that poor access and limited mobility have on low-income households and the ways in which they cope. This qualitative approach, driven by the results of the travel diary data analysis, should improve our limited understanding of the affects of limited access on the travel patterns of low-income households and the consequences of these patterns for their quality of life.

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