RESEARCH REPORT

Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

Affordable Housing and Transportation Cost Burdens in San Diego County

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16. Abstract

The State of California has increasingly urged construction of affordable housing development in transit-rich areas (California Department of Housing and Community Development 2024) but so far transit-oriented development has generally not reduced vehicle miles traveled for low-income renters (Chatman et al. 2019; Lund, Cervero, and Willson 2004). This report quantifies the cost of daily travel needs for affordable housing residents in San Diego, California, especially seniors aged 62 and older, in two ways. First, it analyzes their trip travel time for the entire San Diego region using activity-based model (ABM) data. Second, it summarizes results from surveys of residents in six affordable housing buildings, three of which provide supportive housing to seniors. Overall, it finds that affordable housing residents use public transit more often than those who have access to a car. But traveling by public transit takes much longer on public transit than traveling by personal vehicle. Survey respondents under age 62 expressed greater dissatisfaction with the costs of public transit ridership, compared to seniors, and were also more likely to express dissatisfaction if they were working. Seniors were more likely to express dissatisfaction with the conditions of public transit stops.

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Executive Summary

Executive Summary

The State of California has increasingly considered housing and transportation needs together by encouraging affordable housing development in transit-rich areas (California Department of Housing and Community Development 2024). However, little research has been done on travel by low-income residents living in these developments. In this report we provide analyses of affordable housing residents' travel patterns and needs to shed light on the ways that transportation affordability and accessibility might be improved.

Specifically, we focus on quantifying the cost of daily travel needs for affordable housing residents in San Diego, California, with special focus on seniors. We do this in two ways. First, we analyze trip travel type and duration for the entire San Diego region using activity-based model (ABM) data provided by the San Diego Association of Governments (SANDAG, San Diego County's metropolitan planning organization). We cannot directly estimate travel behavior for affordable housing residents in the ABM, so we use a proxy of geographic areas with two or more buildings with 100 or more units of affordable housing. Second, we summarize results from transportation surveys of residents in six affordable housing buildings, three of which provide supportive housing to seniors. We elaborate on the following findings:

- The overwhelming majority of regional travel in San Diego County is completed by private vehicle, regardless of whether a person lives in an area with concentrated affordable housing or not, per the SANDAG ABM.
- The SANDAG ABM estimates suggest that 4.6 percent of trips taken by residents living in areas with concentrated affordable housing are by public transit while residents living in areas with no affordable housing use transit for an average of 1.9 percent of trips. Residents of areas with two or more affordable housing buildings are, on average, less likely to drive alone.
- Affordable housing residents spend less time on travel than their counterparts in other types of housing, but they take more trips, according to SANDAG ABM estimate. The exception is trips to work: affordable housing residents spend slightly more time traveling to work.
- Traveling by public transit in San Diego County has a high time cost. It takes longer to complete a trip on public transit than to travel by personal vehicle, per the SANDAG ABM. People living in areas with clustered affordable housing spend more time completing trips on public transit than people living in areas without affordable housing.
- Our affordable housing resident survey suggests that this is likely an underestimate as-53 percent of the 192 survey respondents use public transit as their primary transportation mode. Despite this, surveyed residents who have access to a car are much less likely to ever use public transit.
- Our affordable housing resident survey suggests that older adults spend more time on public transit than their younger public transit-using counterparts.

- Surveyed seniors, aged 62 and older, are less likely to use public transit for errands but more likely to use public transit for discretionary trips; people with disabilities are more likely to rely on public transit to get to work.
- Being dependent on a personal vehicle is costly for affordable housing residents. On average, car owners report spending $144 each week on gas and parking fees, as well as a further $64 dollars per week on vehicle repairs, payments and related expenses. Survey respondents who reported using public transit said they spent about one-tenth this amount.
- Survey respondents under age 62 expressed greater dissatisfaction with the financial costs of public transit ridership compared to senior participants. They were also more likely to express dissatisfaction if they were working.
- Residents of senior buildings in our survey sample were more likely to express dissatisfaction with the environment in and around public transit stops compared to other survey respondents.

Improvements in public transit infrastructure would benefit all residents of San Diego County, including residents living in areas where affordable housing is available. High dependence on personal vehicles in the region means that households across all income levels and housing types shoulder high transportation costs. We suggest that auto-dependency in the region is partly the result of high time costs associated with public transit. Our resident survey confirms the need to make public transit more appealing, prevalent, and efficient. In particular, it shows that seniors may benefit from more accessible and efficient transit options since transit travel times from senior buildings were on average 32-50 minutes longer than car travel times. Furthermore, affordable housing residents in general would benefit from better transit stop infrastructure, as most affordable housing residents (52.9 percent) were unsatisfied with that aspect of public transit.

Research on people already living in affordable housing can help the state better anticipate the needs of low-income renters who reflect, and may become, the residents of planned affordable housing in the future. Transit-oriented development has generally not reduced vehicle miles traveled for low-income renters in California (Chatman et al. 2019; Lund, Cervero, and Willson 2004). As the state continues to promote affordable housing with a transit orientation, we offer insights into the factors that complicate transit usage among residents.

Contents

Introduction

Affordable housing[1] units provide homes to some of California's lowest-income renters. In many affordable housing sites, tenants' rents are below market rates, but having extremely low incomes mean that other financial pressures–especially transportation–can become burdens (Hamidi, Jahan, and Moazzeni 2018). For seniors and people with disabilities who are on fixed incomes, transportation costs may be especially cumbersome and complicate challenges to accessibility they already face.

The State of California has increasingly considered housing and transportation needs together by encouraging affordable housing development in transit-rich areas (California Department of Housing and Community Development 2024). In this report we provide analyses of affordable housing residents' travel patterns and needs to shed light on the ways that transportation affordability and accessibility might be improved.

Specifically, we focus on quantifying the financial and time costs of daily travel needs for affordable housing residents in San Diego, California, with special focus on seniors.[2] We do this in two ways. First, we analyze trip travel type and duration for the entire San Diego region using activity-based model (ABM) data provided by the San Diego Association of Governments (SANDAG, San Diego County's metropolitan planning organization). Second, we summarize results from transportation surveys of residents in six affordable housing buildings, three of which provide supportive housing to seniors. We elaborate on the following findings:

- The overwhelming majority of regional travel in San Diego County is completed by private vehicle, regardless of whether a person lives in an area with concentrated affordable housing[3] or not, per the SANDAG ABM.
- The SANDAG ABM estimates suggest that 4.6 percent of trips taken by residents living in areas with concentrated affordable housing are by public transit while residents living in areas with no affordable housing use transit for an average of 1.9 percent of trips. Residents of areas with two or more affordable housing buildings are, on average, less likely to drive alone.

[1] The United States Department of Housing and Urban Development defines affordable housing as units where rent is approximately 30 percent of renters' income. See https://www.housingca.org/policy/focus/housing-affordability/ For the purposes of this report, we focus exclusively on multi-family buildings where all units in the building are set aside, through tax incentives, for tenants earning at or below 60 percent of area median income and paying 30 percent of their income in rent.

[2] For the purposes of this report, we define "senior" as any person aged 62 or older, because this is the age at which people become eligible for the vast majority of San Diego County affordable housing. See https://www.sdhc.org/uploadedFiles/Resources/Affordable-Housing-Resources-Guide.pdf

[3] Concentrated affordable housing refers to geographic areas, as measured in the SANDAG ABM, that include two or more affordable housing buildings. An affordable housing building in this data layer are buildings with 100 or more units of deed-restricted, affordable housing.

- Affordable housing residents spend less time on travel than their counterparts in other types of housing, but they take more trips, according to SANDAG ABM estimate. The exception is trips to work: affordable housing residents spend more time traveling to work. Travel time difference estimates are small, however.
- Traveling by public transit in San Diego County has a high time cost. It takes longer to complete a trip on public transit than to travel by personal vehicle, per the SANDAG ABM. People living in areas with clustered affordable housing spend more time completing trips on public transit than people living in areas without affordable housing.
- Our affordable housing resident survey suggests that 53 percent of the 192 survey respondents said public transit was their primary transportation mode. Despite this, surveyed residents who have access to a car are much less likely to ever use public transit.
- Our affordable housing resident survey suggests that older adults spend more time on public transit than their younger public transit-using counterparts.
- Seniors, aged 62 and older, are less likely to use public transit for errands but more likely to use public transit for discretionary trips; people with disabilities are more likely to rely on public transit to get to work.
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Research on people already living in affordable housing can help the state better anticipate the needs of low-income renters who reflect, and may become, the residents of planned affordable housing in the future.

Transit-oriented development has generally not reduced vehicle miles traveled for low-income renters in California (Chatman et al. 2019; Lund, Cervero, and Willson 2004). As the state continues to promote affordable housing with a transit orientation, we offer insights into the factors that complicate transit usage among residents.

Background

Housing and transportation costs are two of the largest expenses borne by households (Haas 2023). Rents and mortgages in transit-rich, walkable, mixed-use neighborhoods are expensive: the households who live there pay a rent or mortgage premium to live near work, shopping, and other necessities, while people who cannot afford the added housing costs live in more dispersed areas and pay transportation premiums to access these amenities (Cervero et al. 2006). Low-income households may find ways to reduce rent burdens by living far from work and other destinations, but as a result may pay a greater share of their income toward transportation costs. An overwhelming majority of Americans rely on cars for travel, meaning that even low-income families rarely save money by riding public transit (Chakrabarti 2017). Despite this, vehicle ownership is less likely for low-income households and transit ridership more common. Public transit use may save low-income households money, but often requires that they pay with their time: commute times on public transit in U.S. cities are longer than car travel times (Cervero et al. 2006). Travel time is critical to consider "since lost time imposes large costs to both individuals and society" (Cervero and Duncan 2006, 475).

Though lower levels of income are associated with higher rates of public transit use in the United States, public transit ridership has actually decreased over the past decade (Erhardt et al. 2022). Unfortunately, this is not because income inequality has improved, but rather due to a variety of other factors hampering the efficacy of public transit. Such factors include a decrease in the distance traveled by rail and bus services (Boisjoly et al. 2018), increases in rideshare services (Erhardt et al. 2022), and declining costs of driving in addition to nationwide gentrification which disperses low-income residents away from transit-rich city centers. Increased investment in public transit in American municipalities over recent years has kept transit ridership from trending downwards even more (Lee and Lee 2022), but failing public transit systems are a growing equity problem, affecting low-income groups the most.

In recognition of these tensions, planners have pushed for approaches such as transit-oriented development that locate affordable housing in areas where public transit is accessible and destinations easier to reach. Affordable housing has not always been built with low-cost transportation options in mind, however. For example, a study in Harris County, Texas shows that tenants in project-based affordable housing live further from rail stations and transit centers compared to housing choice voucher recipients who have more freedom to select the neighborhood where they rent (Park and Choi 2021). Likewise, a study of housing choice vouchers and low-income housing tax credit (LIHTC) units found that, from 2012 to 2019, housing choice voucher recipients showed increasing transit accessibility while transit accessibility for LIHTC units remained low (Ong et al. 2022). These findings are important because transportation affects multiple economic outcomes. A study of affordable housing residents in Dallas, Texas found that on average, residents were spending between 17 and 20 percent of their incomes on transportation costs (Hamidi et al. 2018). Other studies have found that because housing choice vouchers and LIHTC units are disproportionately in poor neighborhoods of color with high unemployment rates, better public transit access not only improves transit use but also increases economic opportunities (Millard and West 2020; Ong et al. 2022; Dawkins 2013; Won 2022). In some areas,

public transit access is better for LIHTC residents than non-LIHTC residents, even though neighborhood poverty rates are higher, and communities offer fewer resources (Ellen, Horn, and Kuai 2018).

Research focused on California shows that affordable housing in the state should be situated not only near public transit, but also other forms of sustainable transportation such as walking, cycling, and ridesharing options (Chatman et al. 2023; Ong et al. 2022). Increasing all types of sustainable transportation would simultaneously increase affordability and lower vehicle miles traveled, thereby making car ownership less of a necessity. However, this requires not only investment in affordable housing near rail, but also in buses, pedestrian and cycling improvements, and ridesharing resources in infill locations and inner ring suburbs (Chatman et al. 2019, 2023). One study of affordable housing complexes in the San Joaquin Valley found that 25 to 50 percent of residents were willing to use ridesharing or carpooling for work and education trips and 70 percent of residents would use these modes for appointments and errands, but many lacked a bank account or credit card necessary for participating in these programs (Pike et al. 2017). Much like with transit, affordable housing residents are willing to use sustainable forms of transportation but lack the economic means to participate in those modes of travel.

Older adults face additional barriers to mobility as they age. This is a key population to consider in transportation research given the aging of the population nationally and particularly in California (Beck and Johnson 2015). Studies show that most seniors rely on personal vehicles, which are more expensive than other modes of transportation and may be limiting as people age and can no longer drive (Loukaitou-Sideris et al. 2018). Older adults have serious concerns about safety on public transit and accessibility, especially if they have a disability (Remillard et al., 2022). While research shows that low-income older adults are one of the most mobility-challenged populations in California and the nation (Loukaitou-Sideris et al. 2018), researchers have not focused on the particular needs of low-income seniors living in affordable housing. This report fills an important gap in our understanding of the transportation challenges of this population.

Research Procedures

We approached our research question—What is the transportation cost burden for residents of already existing, deed-restricted affordable housing?—through a case study of San Diego County, California. San Diego is an ideal site for this study because it has a mix of land use types, including a densely populated downtown area with accessible public transit and suburban and rural areas with little walkability and poor transportation access. Affordable housing buildings are situated throughout the county in areas that vary in density and population characteristics.[4] San Diego County is representative of the majority of metropolitan areas in the United States with high personal vehicle use and reliance. An analysis of SANDAG's regional plan shows that only 11.8 percent of low-income San Diego County residents live within a half mile of high-quality transit (SANDAG 2021). Despite this, lower-income and Black residents are among the most likely to use public transit (San Diego Regional Alliance for Fair Housing 2020). Older adults comprise 12.9 percent of the county population but represent nearly half of the region's public housing residents (San Diego Regional Alliance for Fair Housing 2020, 85). In addition, older adults are a growing segment of the county and state populations (State of California 2024). SANDAG found that just eight percent of seniors live within a half mile of high-quality transit in San Diego (SANDAG 2021). Low-income renters who are older or who have disabilities face additional challenges in both housing and transportation, which can affect access to important resources such as healthcare (Syed, Gerber, and Sharp 2013). Older adults are more likely to have a disability and be on a fixed income, making transportation accessibility and affordability particular concerns (Taylor 2016). Assessing the ease of access and cost burdens of affordable housing residents, including financial and time costs, could point to improvements that would benefit all low-income and minority residents, as well as seniors.

We estimate the transportation cost burdens of residents living in affordable housing through two approaches. First, we use SANDAG's Activity Based Model (ABM) data to compare residents of areas where affordable housing is sited with areas where it is not sited and estimate the travel time for different types of trips. Second, we surveyed nearly 200 affordable housing residents across six properties in San Diego County about their transportation activities, concerns, and needs. In this section, we briefly explain our methods and procedures, before detailing our findings. Additional details about data and methods can be found in the Appendix, Sections 1-3.

San Diego Transportation Access and Cost Burdens

Data for analyzing transportation access and cost burdens was provided by the San Diego Association of Governments (SANDAG), which is the Metropolitan Planning Organization (MPO) for San Diego County,

[4] https://www.sandiegocounty.gov/content/dam/sdc/sdhcd/docs/rental-assistance/housing-resource-2020-rev.pdf

California. SANDAG's ABM is a form of transportation demand modeling that simulates real-world travel to predict demand for various forms of transportation.

The SANDAG ABM data includes several features that were ideal for our analysis. First, it has a tour-based structure, meaning that all travel in the model starts and ends at the same point and trips form a closed chain called a tour (Davidson et al. 2010, 2). Second, it has an activity-based platform, where the types, destinations, and modes of travel are derived from residents' daily activities. And third, the SANDAG ABM relies on microsimulation, where travel is modeled at the individual and household level (Davidson et al. 2010, 2). These features combine to create a travel demand model that is consistent and realistic in how it models transportation demand. The SANDAG ABM is based on data on the behavior of San Diego County residents collected from surveys conducted from 2016 to 2017 (RSG 2018, 22).

Travel behavior in the ABM dataset is measured at the individual level where each observation represents a person-trip. This allows us to assess the influence of person-level characteristics (income and age). Our analyses use the ABM measurements for units of time to compare time costs across different modes of travel, demographic groups, and trip types. Trip duration is represented in the ABM as ranges in 15-minute increments. Rather than recording trip duration as an exact unit of time (35 minutes), the model provides a range (30-45 minutes). Thus, one limitation of the data is that the mean values in the tables below do not correspond to precise periods of time, as we cannot calculate this using ABM data. Another limitation of the ABM data is that it does not provide any direct measure of travel costs in monetary terms. Since we cannot directly summarize the financial costs of person-trips in the ABM, we show what the ABM predicts regarding travel mode, specifically personal vehicle use versus public transit. This is critical since riding public transit is less expensive than relying on a personal vehicle. We can assume that public transit ridership is less financially burdensome, although we do not make claims about the actual costs different populations incur traveling in San Diego County, as represented in the ABM.

We created a geospatial data layer of existing affordable housing developments in San Diego County using data from 2-1-1 San Diego, San Diego County Health and Human Services Agency, and the San Diego Housing Commission. We merged this layer with the ABM dataset by a geographic unit called the master geographic reference area, or MGRA.[5] Since the MGRA does not have direct correlation to geographic units such as city blocks, we refer to them as MGRAs throughout the remainder of this report. We identified MGRAs in the county where affordable housing is located to calculate travelers' trip times associated with each affordable housing site using different modes of transportation. We differentiate trip tours for households living in MGRAs with two or more affordable housing and those without, then further split the sample based on destination type (e.g., work, social, errands), age, and household income. We focus on areas with two or more

[5] In its ABM model, SANDAG uses the MGRA as its geographic unit of measurement. They define the MGRA as "very small, defined by census areas and in some cases sub-block areas. Sub-block areas are formed by overlaying block boundaries on those of other geographic areas such as spheres of influence and community planning areas." See https://sdgis-sandag.opendata.arcgis.com/datasets/SANDAG::mgra/about

affordable housing buildings, which we call *clustered affordable housing*, to improve our ability to capture differences in areas with and without affordable housing.

The ABM provides estimates of travel behavior and reflects the assumptions of the ABM model. In other words, the ABM is an indirect measure of travel behavior. Due to this, we do not use it for any inferential statistics as these would amount to estimates of estimates. Instead, we provide statistical tests of means in travel time for various populations represented in the ABM data based on trip type and origin. We performed a series of two-way ANOVA[6] calculations for people living in MGRAs with and without clustered affordable housing sites, to compare travel time based on person-trip types and income groups. We further break down this sample for people of all ages–seniors in particular–and for different trip modes. The analysis provides descriptive insights into the differences in travel pattern between households living in areas with affordable housing and those that do not.

We exclude trip types in this report that had a school or university as a stop, with the exception of adults driving children to school–an "escort" trip in the ABM—which we label as drop-off/pick-up for clarity. We also exclude all work-based trips, or trips that are taken as part of work activities, since we cannot be certain that driving during work hours represents a cost borne by travelers.

Affordable Housing Resident Survey Analysis

Using the data layer of affordable housing sites, we identified housing sites that had 50 or more units and where 100 percent of the units were designated affordable. Wakeland Housing and Development Corporation manages many of these sites, so we worked with contacts at the agency to gain access to the buildings for survey data collection.[7] Another property management company, Steadfast Management, provided us with access to a sixth building.[8] Management staff allowed us to distribute and post flyers in buildings, helped create sign-up sheets to accommodate interested participants, and provided us with space to conduct survey interviews. We selected buildings in regions of the county with varying density and transportation access. We also chose sites based on varying resident populations as we wanted to include senior and permanent supportive housing buildings to identify specific transportation barriers, needs, and costs associated with those populations.

The six affordable housing sites we selected through our purposive sampling include three general low-income sites—Atmosphere, Casa Anita, and Imperial Pacific Village—and three sites serving seniors—Talmadge

[6] ANOVA stands for Analysis of Variation and is a set of statistical techniques for estimating average differences between groups.

[7] Wakeland is a nonprofit affordable housing corporation that works with public and private stakeholders and draws on several local, state, and federal funding sources and tax credits to provide more than 8,500 units throughout California. https://www.wakelandhdc.com/

[8] Steadfast Management Company Inc. is owner and manager of thousands of properties in five states, including in California. These properties include conventional and affordable housing. https://www.steadfastmanagement.com/about-uswa

Gateway, The Grove, and Trinity Place. Atmosphere is a 205-unit complex in downtown San Diego, Casa Anita is a 96-unit complex in Chula Vista, and Imperial Pacific Valley is a 248-unit complex in Imperial Beach. All three complexes serve people whose incomes are at 60 percent or less of the area median income, although Atmosphere has some units specifically for residents at 30 percent and below, and Atmosphere and Casa Anita provide services and supportive housing for recently homeless people. Talmadge Gateway is a 60-unit complex in the Talmadge neighborhood of San Diego, The Grove is an 81-unit complex in Vista, and Trinity Place is a 74-unit complex in the Grantville neighborhood of San Diego. Both Talmadge Gateway and Trinity Place provide housing for formerly unhoused seniors, 55 years and older, with chronic health needs. The Grove is for seniors, 62 years and older, whose income is 60 percent or less of the area median income. All three sites provide some mix of social and medical services to support seniors living in the complexes. According to Wakeland Housing staff, Atmosphere opened May 2017, Talmadge Gateway opened July 2017, The Grove opened in 2020, Trinity Place opened September 2021, and Casa Anita was completed in 2022. Imperial Pacific Village opened in 1970.

Our team developed most of the survey questions designed to answer the research questions of this study, while other questions were borrowed from established, vetted surveys. These surveys include the National Center for Mobility Management's 2013 Worker's Commute Survey[9] and the 2015 Intercity Transit Customer Satisfaction Survey.[10] We anticipated that most affordable housing developments would have moderate to high transportation cost burdens, so questions addressed frequently visited locations, modes of transportation, accessibility and cost, as well as influences in transportation decisions.

We piloted the survey with former affordable housing renters and current property managers to ensure the survey design and questions were effective. Teams of student researchers and faculty surveyed residents one-on-one at housing sites. At all sites, researchers with bilingual Spanish and English ability were on hand. We used iPads to access our survey instrument, which we made using Esri's Survey123 platform. Surveys lasted about 20 minutes and participants were given a $20 Visa gift card upon completion. Our final sample size was 192 usable surveys. Our survey instrument is included in the Appendix, Section 2.

To analyze the survey data, we catalogued neighborhood features, including neighborhood walkability and the proximity of transit stops to their housing (within ¼ mile buffers), that could explain why tenants chose certain transportation modes, and the duration of their trips. Details on these variables and their provenance are in the Appendix, Section 3, as are additional details about other neighborhood-level variables tested in models not reported here. We combined neighborhood characteristics with person-level characteristics (age, gender, income, race/ethnicity, personal vehicle access, disability designation), as reported by tenants in the survey. Our modeling strategies varied based on the structure of the dependent variables. For continuous dependent variables, we employed ordinary least squares (OLS) regression models; for binary (yes/no) dependent variables, we employed logistic regression models.

[9] https://nationalcenterformobilitymanagement.org/wp-content/uploads/2013/12/Survey_Workers_Commute.doc
[10] https://www.intercitytransit.com/sites/default/files/CustomerSatisfaction2015.pdf

Results

San Diego Transportation Access and Cost Burden Estimations

We compared average travel times to determine the importance of affordable housing residence on travel time across population groups. In the ABM estimate data, the average age of persons executing trips is 38 years old. The vast majority (92 percent) live in areas with no affordable housing sites. Most person-trips are completed using a personal automobile. Table 1 provides descriptive information for the individuals and trips in the ABM model. Note that Age and Sex are based on individual-level estimates in the ABM. The Income samples are based on the number of households within each income category. All other sample characteristic information in Table 1 is based on person-trips.

Table 1. Sample Characteristics for SANDAG Activity Based Model (ABM) Estimates Dataset

Total number of persons 3,387,408	
Age	
Mean (SD)	38.0 (23.1)
Median [Min, Max]	36.0 [0, 100]
Sex	
Female	1,680,512 (49.6%)
Male	1,706,896 (50.4%)
Total number of households 1,274,814	
Household Income	
Less than $30, 000	330,764 (25.9%)
$30,000 to $59,999	271,752 (21.3%)
$60,000 to $99,999	275,022 (21.6%)
$100,000 to $149,999	200,602 (15.7%)
More than $150,000	196,674 (15.4%)

Total number of buildings 3,819,206	
Trip Volume from MGRAs by Affordable Housing Sites Amount	
No affordable buildings	3,511,868 (92.0%)
One affordable building	235,781 (6.2%)
Two or more affordable buildings	71,557 (1.9%)
Time Cost for Trips in Model (minutes)	
Mean (SD)	9.45 (7.88)
Median [Min, Max]	7.00 [0, 39.0]
Trip Purpose	
Discretionary	338,943 (8.9%)
Eating Out	59,991 (1.6%)
Pick-up/Drop-off	731,391 (19.2%)
Non-shopping errands	375,848 (9.8%)
School	581,158 (15.2%)
Shopping	336,341 (8.8%)
University	120,200 (3.1%)
Visiting	128,703 (3.4%)
Work	1,145,610 (30.0%)
Work-Based	1,021 (0.0%)

We performed a series of two-way ANOVA calculations for people living in areas with and without clustered affordable housing sites, to compare travel time based on person-trip types and income groups. We further broke down this sample for people of all ages—particularly seniors—as well as for different trip modes.

The majority of trips in the SANDAG ABM are completed using personal vehicles. Overall, 65.6 percent of trips were taken by driving alone or carpooling with one other person. These numbers are almost identical for the full sample and the sample of trips taken from areas with no affordable housing units. For areas with clustered affordable housing, 54.7 percent of trips were taken using personal vehicles. Trips are more likely to be taken using public transit if they originate from areas with clustered affordable housing: 4.6 percent compared with 1.9 percent for trips from areas with no affordable housing. The number of trips completed in a carpool with two people is also higher from areas with clustered affordable housing. The differences between trip mode averages from areas with clustered affordable housing and without any affordable housing are statistically significant for driving alone, carpool with two riders, walk to transit, and ride to transit.

Table 2. Percentage of Trip Share by Selected Travel Mode in One Week

	Overall Mean (SD)	With no Affordable Mean (SD)	With 2+ Affordable Mean (SD)	ANOVA
	(N=20049)	**(N=19967)**	**(N=82)**	**P-Value**
Drive Alone	42.7 (15.8)	42.8 (15.8)	29.2 (8.26)	0.00***
Carpool (2 riders)	22.9 (11.0)	22.9 (11.0)	25.5 (6.82)	0.03*
Carpool 3+ riders)	21.3 (12.5)	21.3 (12.5)	21.2 (8.55)	0.967
Walk to transit	1.38 (2.38)	1.37 (2.37)	3.83 (2.63)	0.00***
Ride to transit	0.372 (0.922)	0.372 (0.923)	0.605 (0.487)	0.022*
Drive & park to transit	0.166 (0.719)	0.166 (0.720)	0.139 (0.177)	0.735

*Significant at the <.05 level.
** Significant at the <.01 level.
*** Significant at the <.001 level.

Among different driving modes, a significantly higher percentage of driving alone trips originate from areas without any affordable housing. The opposite is observed for carpooling with two passengers, where areas with

clustered affordable housing have a higher percentage of such trips. No significant difference was observed for carpooling trips with three or more passengers.

In the ABM, people living in MGRAs with clustered affordable housing are more likely to use public transit, compared to people living in MGRAs with no affordable housing. Figure 1 shows the areas with clustered affordable housing (highlighted in red) and the percentages of transit trips as total trips. In general, a higher percentage of transit trips originate from areas (or MGRAs) with clustered affordable housing. This is at least partly because many of these areas are located in urban centers.

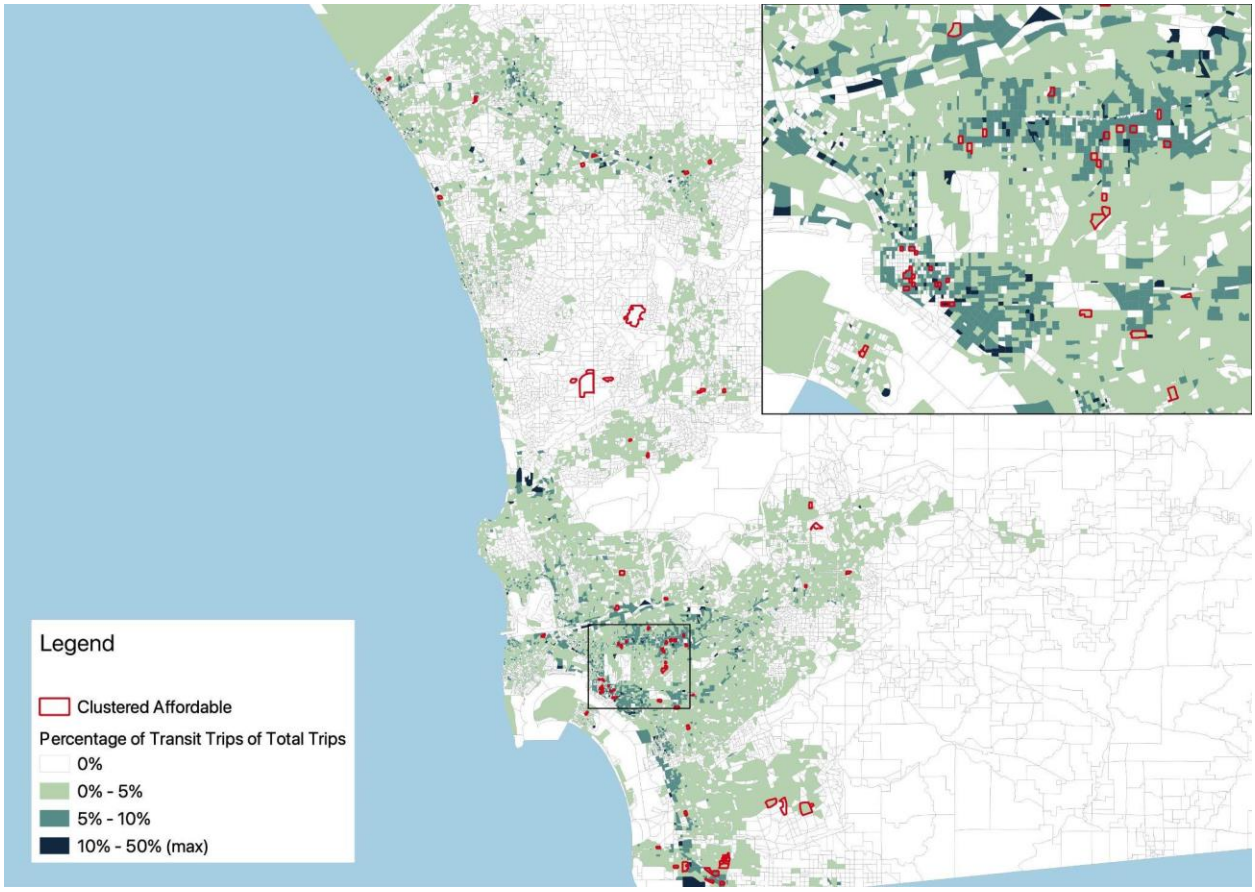

Figure 1. Comparison of Travel for Residents in Areas With and Without Affordable Housing Sites

Based on the ABM estimates, affordable housing residents' travel time burdens are higher under certain conditions and lower under others. Overall, *trips from clustered affordable housing were shorter on average, but more frequent (higher trip count) compared to trips originating from MGRAs with no affordable housing.*

Work trips, the most common type of trip in the ABM, are the exception to this general trend: person-trips to and from work are longer from areas with clustered affordable housing. The difference in means is statistically significant, or sufficiently different from zero as to suggest an observable difference. However, the practical interpretation of the means in Table 3 show that work travel time for trips originating from MGRAs with and

without clustered affordable housing are nearly identical, with less than a minute of additional time at the high end of the travel time range from MGRAs with clustered affordable housing.[11]

Table 3. Comparison of Average Travel Time (minutes) and Count by Trip Purpose and Affordable Housing Sites from Activity Based Model Estimates, San Diego County

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	ANOVA
		With no Affordable		With 2+ Affordable		p-value
Work	**Travel Time**	17.1 (5.80)	19.0 [0, 38.0]	17.3 (5.72)	19.0 [0, 37.0]	**0.00*** **
	Trip Count	1.03 (0.176)	1.00 [1.00, 2.00]	1.03 (0.172)	1.00 [1.00, 2.00]	0.307
Pick-up/Drop-off	**Travel Time**	1.60 (2.05)	1.00 [0, 33.0]	1.49 (1.94)	1.00 [0, 27.0]	**0.00*** **
	Trip Count	1.41 (0.668)	1.00 [1.00, 8.00]	1.43 (0.688)	1.00 [1.00, 6.00]	0.01**
Non-shopping errands	**Travel Time**	4.19 (3.92)	3.00 [0, 38.0]	4.09 (3.76)	3.00 [0, 31.0]	**0.04***
	Trip Count	1.11 (0.338)	1.00 [1.00, 4.00]	1.10 (0.315)	1.00 [1.00, 3.00]	0.01**
Discretionary	**Travel Time**	4.97 (3.86)	4.00 [0, 39.0]	4.74 (3.53)	4.00 [0, 36.0]	**0.00*** **
	Trip Count	1.06 (0.251)	1.00 [1.00, 3.00]	1.06 (0.242)	1.00 [1.00, 3.00]	0.251
Shopping	**Travel Time**	3.03 (2.82)	2.00 [0, 33.0]	2.92 (2.58)	2.00 [0, 25.0]	**0.00** **
	Trip Count	1.07 (0.271)	1.00 [1.00, 4.00]	1.06 (0.259)	1.00 [1.00, 4.00]	0.05**
Visiting	**Travel Time**	6.01 (4.95)	5.00 [0, 37.0]	5.69 (4.78)	4.00 [0, 33.0]	**0.00*** **

[11] The trip tour method used in the ABM means that the entire trip is included in the calculation, both the commute time as well as the time a person is at their work site. As a result, we cannot tell whether a factor in these differences in trip duration is the variation in the number of hours worked by people living in different types of housing.

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	ANOVA
		With no Affordable		With 2+ Affordable		p-value
	Trip Count	1.01 (0.110)	1.00 [1.00, 3.00]	1.01 (0.119)	1.00 [1.00, 3.00]	0.489
Eating Out	**Travel Time**	3.98 (3.47)	3.00 [0, 32.0]	3.69 (3.35)	3.00 [0, 27.0]	**0.00*** **
	Trip Count	1.01 (0.103)	1.00 [1.00, 3.00]	1.01 (0.100)	1.00 [1.00, 2.00]	0.869
Overall	**Travel Time**	9.46 (7.88)	7.00 [0, 39.0]	9.30 (7.88)	7.00 [0, 38.0]	**0.00*** **
	Trip Count	1.11 (0.377)	1.00 [1.00, 8.00]	1.12 (0.393)	1.00 [1.00, 6.00]	**0.00*** **

*Significant at the <.05 level.
** Significant at the <.01 level.
*** Significant at the <.001 level.

For pick-up/drop-off trips, the second most common trip type in the ABM, residents of MGRAs with affordable housing spent less time in transit and made slightly more trips. The same is true for overall travel time and trip counts, for all destination types. However, for non-shopping and shopping errands, travel time was shorter from MGRAs with clustered affordable housing and the number of trips also lower. Discretionary, visiting, and eating out trips were all also shorter in duration for trips originating at affordable housing MGRAs, but the number of trips were identical between the two area types. We further analyzed trip time and count differences by income group and found that trips were longer, but less frequent, for higher-income groups and differences within income groups by affordable housing concentration were rarely indicative of meaningful variation (see Table 2 in Appendix, Section 4).

For driving and other travel modes (i.e., walking, biking, rideshare companies like taxis or Lyft), travelers from areas with clustered affordable housing have shorter average total travel time but more frequent trips, compared to travelers that reside in MGRAs with no affordable housing. The trip mode data provides consistent support for the conclusion that residents of affordable housing take more frequent, shorter-distance trips than residents of areas with no affordable housing. The exception is transit trips: the typical travel time for an ABM trip for all purposes is longer for transit trips leaving from areas with clustered affordable housing (Table 4).

Table 4. Comparison of Average Travel Time and Count by Trip Mode and Affordable Housing Sites from Activity Based Model Estimates, San Diego County

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	
		With no Affordable		With 2+ Affordable		P-Value
Driving	**Trip time estimate**	9.56 (7.97)	7.00 [0, 39.0]	9.51 (8.01)	7.00 [0, 38.0]	0.101
	Trip count	1.13 (0.398)	1.00 [1.00, 8.00]	1.14 (0.424)	1.00 [1.00, 6.00]	**0.00*** **
Other	**Trip time estimate**	8.23 (7.00)	6.00 [0, 38.0]	7.57 (6.95)	5.00 [0, 36.0]	**0.00*** **
	Trip count	1.03 (0.183)	1.00 [1.00, 4.00]	1.05 (0.232)	1.00 [1.00, 4.00]	**0.00*** **
Transit	**Trip time estimate**	11.9 (7.47)	12.0 [0, 38.0]	12.3 (7.56)	13.0 [0, 33.0]	**0.00** **
	Trip count	1.01(0.120)	1.00 [1.00, 2.00]	1.01 (0.122)	1.00 [1.00, 2.00]	0.888

*Significant at the <.05 level.
** Significant at the <.01 level.
*** Significant at the <.001 level.

Trip time averages in Table 4 confirm that riding public transit costs riders more time. In other words, transit trips are longer than driving and other trip modes. In addition, this cost burden is higher for residents of areas with clustered affordable housing.

The aging of California's population and fixed-income seniors' need for inexpensive housing and transportation options merit a closer look at the ABM travel time and mode estimates for seniors. In the next section, we revisit the comparisons presented above but limit the sample to people over the age of 62. We use 62 as the cut-off for our "senior" designation because it is the age at which a person can qualify for most senior affordable housing in San Diego County.[12]

[12] https://www.sdhc.org/uploadedFiles/Resources/Affordable-Housing-Resources-Guide.pdf

Comparisons of Travel for Senior Residents in Areas With and Without Affordable Housing Sites

We assume that people over the age of 62 exhibit different travel behaviors, especially if they reside in areas with concentrated affordable housing. They are more likely to be unemployed and to receive income through programs such as Supplemental Security Income, a means-tested income source for older Americans.[13] Older adults in affordable housing may take fewer trips overall because they are not working and are less likely to be escorting others to destinations (pick-up/drop-off).

To test these assumptions against ABM model predictions, we compared the number of trips taken by seniors living in MGRAs with clustered affordable housing and without any affordable housing and compared the duration of their trips. Table 5 shows trip duration for people over age 62 by trip type and purpose, and for all trip modes and income categories. Compared to travel times in Table 3 for the general population, seniors spend slightly less time on work trips (approximately 30 fewer minutes). Seniors spend slightly more time on pick-up/drop-off, non-shopping errands, non-mandatory, shopping, visiting, and eating out trips. Seniors also take more discretionary trips and fewer pick-up/drop-off trips than the full ABM sample.

The ABM model predicts shorter trip travel time for seniors living in MGRAs with clustered affordable housing for all trip types, with the exception of work trips. The shorter travel time for trips is not attributable to the total number of trips: the overall number of trips are identical in the ABM estimates across trip purposes for seniors living in MGRAs with no affordable housing and those with clustered affordable housing. For these trips, seniors travel for a slightly longer amount of time.

Table 5. Comparison of Average Travel Time and Trip Count for People 62 and Older by Trip Purpose and Affordable Housing Sites from Activity Based Model Estimates, San Diego County

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	ANOVA
		With no Affordable Building		With 2+ Affordable Buildings		p-value
Work	**Travel Time**	16.0 (6.18)	18.0 [0, 36.0]	16.1 (6.22)	18.0 [0, 31.0]	**0.544**
	Trip Count	1.04 (0.201)	1.00 [1.00, 2.00]	1.04 (0.204)	1.00 [1.00, 2.00]	0.805
Pick-up/Drop-off	**Travel Time**	2.04 (2.55)	1.00 [0, 33.0]	1.86 (2.42)	1.00 [0, 27.0]	**0.00****

[13] https://www.ssa.gov/redbook/eng/overview-disability.htm?tl=1%2C3

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	ANOVA
		With no Affordable Building		With 2+ Affordable Buildings		p-value
Pick-up/Drop-off	**Trip Count**	1.36 (0.602)	1.00 [1.00, 6.00]	1.36 (0.626)	1.00 [1.00, 5.00]	0.936
Non-shopping errands	**Travel Time**	4.46 (4.12)	3.00 [0, 35.0]	4.23 (3.85)	3.00 [0, 30.0]	**0.01***
	Trip Count	1.15 (0.393)	1.00 [1.00, 4.00]	1.15 (0.381)	1.00 [1.00, 3.00]	0.719
Discretionary	**Travel Time**	5.58 (4.45)	4.00 [0, 37.0]	5.22 (4.13)	4.00 [0, 35.0]	**0.00*****
	Trip Count	1.12 (0.330)	1.00 [1.00, 3.00]	1.12 (0.328)	1.00 [1.00, 3.00]	0.993
Shopping	**Travel Time**	3.19 (2.92)	2.00 [0, 31.0]	3.06 (2.66)	2.00 [0, 23.0]	**0.04***
	Trip Count	1.10 (0.336)	1.00 [1.00, 4.00]	1.10 (0.328)	1.00 [1.00, 4.00]	0.305
Visiting	**Travel Time**	6.42 (5.29)	5.00 [0, 35.0]	5.97 (4.88)	5.00 [0, 25.0]	**0.07**
	Trip Count	1.01 (0.114)	1.00 [1.00, 2.00]	1.01 (0.0941)	1.00 [1.00, 2.00]	0.431
Eating Out	**Travel Time**	4.30 (3.73)	3.00 [0, 32.0]	3.88 (3.31)	3.00 [0, 22.0]	**0.02***
	Trip Count	1.02 (0.133)	1.00 [1.00, 3.00]	1.02 (0.134)	1.00 [1.00, 2.00]	0.707
Overall	**Travel Time**	5.92 (6.21)	4.00 [0, 37.0]	5.35 (5.86)	3.00 [0, 35.0]	**0.00*****
	Trip Count	1.14 (0.394)	1.00 [1.00, 6.00]	1.15 (0.409)	1.00 [1.00, 5.00]	0.109

These averages suggest that seniors living in affordable housing generally travel for less time than their counterparts in city areas without affordable housing, which may be because affordable housing is often built in densely populated areas where services are closer.

We analyzed the trips for the senior population for differences by income and found shorter travel times for older adults living in areas with clustered affordable housing across income categories. We observed no significant differences in total trip count by income groups, which suggests that the differences observed in

average total travel time can be attributed to shorter trip lengths. The table showing averages, medians, and ANOVA correlation tests is in the Appendix, Section 4.

Table 6 shows travel time and counts by travel mode in the ABM for trips taken by older adults. By comparing travel time and trip count across modes we can identify any transit-related factors contributing to shorter travel times for senior residents of clustered affordable housing. For driving and other travel modes (i.e., walking, biking, rideshare), senior residents from locations with clustered affordable housing have shorter average travel time and more frequent total trips. As for transit, there is no significant difference between average total travel time, but senior residents at affordable housing sites make more transit trips in a week than senior residents of areas with no affordable housing.

Table 6. Comparison of Average Travel Time for People 62 and Older by Travel Mode and Affordable Housing Sites from Activity Based Model Estimates, San Diego County

		Mean (SD)	Median [Min, Max]	Mean (SD)	Median [Min, Max]	
		With no Affordable		With 2+ Affordable		P-Value
Driving	**Trip time estimate**	6.08 (6.34)	4.00 [0, 37.0]	5.57 (6.11)	3.00 [0, 35.0]	**0.00*** **
	Trip count	1.15 (0.409)	1.00 [1.00, 6.00]	1.17 (0.432)	1.00 [1.00, 5.00]	0.01**
Other	**Trip time estimate**	4.36 (4.47)	3.00 [0, 36.0]	4.14 (4.23)	3.00 [0, 31.0]	0.03*
	Trip count	1.05 (0.239)	1.00 [1.00, 4.00]	1.09 (0.310)	1.00 [1.00, 4.00]	**0.00*** **
Transit	**Trip time estimate**	8.86 (7.33)	6.00 [0, 33.0]	8.58 (7.36)	6.00 [0, 30.0]	0.589
	Trip count	1.01 (0.110)	1.00 [1.00, 2.00]	1.03 (0.182)	1.00 [1.00, 2.00]	0.01**

Table 6 suggests that the ABM estimates longer travel times for seniors regardless of trip origin compared to driving and other modes of transportation. The higher trip count for seniors from MGRAs with clustered affordable housing, compared to MGRAs with no affordable housing, suggests higher public transit use among affordable housing residents.

Although we are unable to estimate travel costs directly using the ABM dataset, we can infer that transportation costs are high for people living in affordable housing since the overwhelming majority rely on individual automobile travel. We assume that the minority of people living in affordable housing who rely on public transit spend less on transportation.

In the next section, we discuss survey results from our resident survey conducted in 2023. These findings reflect self-reported travel modes, destinations, and costs for sampled residents. The sample size is much smaller than the ABM data but does represent direct measurement as opposed to estimates. Likewise, the survey is recent, whereas the ABM is based on survey data captured from 2016 to 2017 (RSG 2018, 22).

Resident Survey Analysis

We collected survey data from 192 residents of six affordable housing buildings in San Diego County. Participant ages ranged from 18 to 87. The majority of survey respondents at Casa Anita and Imperial Pacific Village were Hispanic, while at other sites, such as Talmadge Gateway, the respondents were mostly non-Hispanic White. Most respondents stated that they made between $10,000 and $25,499 annually. Most respondents also had a high school education or some college education, with fewer respondents having a bachelor's degree or higher. Household size ranged between one and eight persons, with an average between one and 3.3 persons across buildings. The lower averages reflect buildings housing older adults which typically don't allow family members living with them. At most properties, except Casa Anita, the majority of respondents indicated that they currently did not work.

Table 7. Summary of Survey Participants' Demographics (N=192)

	Atmo-sphere (N=58)	Casa Anita (N=27)	Imperial Pacific Village (N=39)	Talmadge Gateway (N=22)*	The Grove (N=23)*	Trinity Place (N=23)*	Overall (N=192)
Gender							
Female	28 (48.3%)	15 (55.6%)	26 (66.7%)	7 (31.8%)	17 (73.9%)	11 (47.8%)	104 (54.2%)
Male	28 (48.3%)	8 (29.6%)	12 (30.8%)	15 (68.2%)	6 (26.1%)	12 (52.2%)	81 (42.2%)
Other	2 (3.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (1%)
No response	0 (0%)	4 (14.8%)	1 (2.6%)	0 (0%)	0 (0%)	0 (0%)	5 (2.6%)
Age							

	Atmo-sphere (N=58)	Casa Anita (N=27)	Imperial Pacific Village (N=39)	Talmadge Gateway (N=22)*	The Grove (N=23)*	Trinity Place (N=23)*	Overall (N=192)
Mean (SD)	47.6 (15.5)	36.3 (10.1)	54.3 (20.2)	65.3 (5.21)	72.1 (11.5)	65.3 (5.99)	54.5 (17.8)
Median [Min, Max]	46.5 [18.0, 78.0]	33.0 [18.0, 56.0]	55.0 [19.0, 83.0]	64.5 [56.0, 80.0]	72.0 [31.0, 87.0]	65.0 [58.0, 85.0]	60.0 [18.0, 87.0]
No response	0 (0%)	0 (0%)	1 (2.6%)	0 (0%)	0 (0%)	0 (0%)	1 (0.5%)
Race							
Hispanic	15 (25.9%)	17 (63.0%)	32 (82.1%)	6 (27.3%)	8 (34.8%)	3 (13.0%)	81 (42.2%)
Non-Hispanic White	19 (32.8%)	4 (14.8%)	1 (2.6%)	11 (50.0%)	6 (26.1%)	9 (39.1%)	50 (26.0%)
Other	24 (41.4%)	6 (22.2%)	6 (15.4%)	5 (22.7%)	9 (39.1%)	11 (47.8%)	61 (31.8%)
Household Income							
Less than $10,000	4 (6.9%)	4 (14.8%)	8 (20.5%)	4 (18.2%)	2 (8.7%)	4 (17.4%)	26 (13.5%)
$10,000 to $25,499	26 (44.8%)	8 (29.6%)	13 (33.3%)	16 (72.7%)	12 (52.2%)	15 (65.2%)	90 (46.9%)
$25,500 to $34,499	9 (15.5%)	4 (14.8%)	6 (15.4%)	1 (4.5%)	3 (13.0%)	2 (8.7%)	25 (13.0%)
$34,500 to $43,499	7 (12.1%)	2 (7.4%)	5 (12.8%)	0 (0%)	0 (0%)	2 (8.7%)	16 (8.33%)

	Atmo-sphere (N=58)	Casa Anita (N=27)	Imperial Pacific Village (N=39)	Talmadge Gateway (N=22)*	The Grove (N=23)*	Trinity Place (N=23)*	Overall (N=192)
$43,500 to $52,499	4 (6.9%)	3 (11.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	7 (3.65%)
$52,500 to $63,499	3 (5.2%)	4 (14.8%)	2 (5.1%)	0 (0%)	1 (4.3%)	0 (0%)	10 (5.2%)
$63,500 to $74,999	0 (0%)	1 (3.7%)	1 (2.6%)	0 (0%)	0 (0%)	0 (0%)	2 (1%)
$75,000 to $99,999	4 (6.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (2.1%)
$100,000 to $124,999	0 (0%)	0 (0%)	1 (2.6%)	0 (0%)	0 (0%)	0 (0%)	1 (0.5%)
No response	1 (1.7%)	1 (3.7%)	3 (7.7%)	1 (4.5%)	5 (21.7%)	0 (0%)	11 (5.7%)
Education							
High School and Below	18 (31.0%)	14 (51.9%)	26 (66.7%)	10 (45.5%)	10 (43.5%)	8 (34.8%)	86 (44.8%)
Some College/Associate Degree	25 (43.1%)	11 (40.7%)	13 (33.3%)	10 (45.5%)	8 (34.8%)	8 (34.8%)	75 (39.1%)
Bachelor and Above	15 (25.9%)	2 (7.4%)	0 (0%)	2 (9.1%)	5 (21.7%)	7 (30.4%)	31 (16.1%)
Household Size							
Mean (SD)	2.09 (1.26)	3.26 (1.43)	3.13 (1.67)	1.00 (0)	1.13 (0.344)	1.09 (0.288)	2.10 (1.45)

	Atmo-sphere (N=58)	Casa Anita (N=27)	Imperial Pacific Village (N=39)	Talmadge Gateway (N=22)*	The Grove (N=23)*	Trinity Place (N=23)*	Overall (N=192)
Median [Min, Max]	2.00 [1.00, 5.00]	4.00 [1.00, 6.00]	2.00 [1.00, 8.00]	1.00 [1.00, 1.00]	1.00 [1.00, 2.00]	1.00 [1.00, 2.00]	1.00 [1.00, 8.00]
Car Ownership							
I own a car	21 (36.2%)	14 (51.9%)	20 (51.3%)	5 (22.7%)	11 (47.8%)	2 (8.7%)	73 (38.0%)
I share a car with people in my building	2 (3.4%)	2 (7.4%)	0 (0%)	0 (0%)	1 (4.3%)	0 (0%)	5 (2.6%)
I borrow a car from family or friend	3 (5.2%)	0 (0%)	4 (10.3%)	0 (0%)	1 (4.3%)	0 (0%)	8 (4.2%)
No access to car	32 (55.2%)	11 (40.7%)	15 (38.5%)	17 (77.3%)	10 (43.5%)	21 (91.3%)	106 (55.2%)
Go to Work							
No	33 (56.9%)	9 (33.3%)	23 (59.0%)	22 (100%)	21 (91.3%)	20 (87.0%)	128 (66.7%)
Yes	25 (43.1%)	18 (66.7%)	16 (41.0%)	0 (0%)	1 (4.3%)	2 (8.7%)	62 (32.3%)
No response	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4.3%)	1 (4.3%)	2 (1%)

*** Indicates buildings for senior residents only.**

Our analysis of the resident surveys suggests that a higher proportion of affordable housing residents rely on public transit than the ABM estimates. Eighty-six residents, or 44.8 percent, reported having access to a car through ownership, sharing, or borrowing. Fifty-three percent (101 individuals) used public transit on a regular basis. However, these numbers differ by building type: 29.4 percent of residents in senior buildings reported having access to a car and 46.3 percent reported using public transit regularly, while 53.2 percent of non-senior

building residents had access to a car and 56.9 percent used public transit regularly. Survey participants who relied on public transit reported significantly longer travel times—and therefore higher transportation time burdens—than people with access to cars, but car owners spent considerably more on transportation.

Transportation Time Cost Burdens for Affordable Housing Residents

Our building sampling strategy allowed us to compare the characteristics of affordable housing for seniors to affordable housing for the general population. Both building types were in neighborhoods that varied in density and proximity to public transit stops. We explored the relationship between travel times and residents' satisfaction by building type because the travel behavior of building residents differed significantly between buildings. For example, employment was rare for all senior buildings and travel to medical appointments frequent, in contrast to non-senior buildings where employment was more likely and medical appointments less common. Senior buildings were also served by modes of transportation rarely accessible to non-senior building residents, such as medical transportation and programs that provide rides to grocery stores.

Transit users in non-senior buildings (Atmosphere, Casa Anita, Imperial Pacific Village) reported higher average travel times for all trip types, compared to personal vehicle owners in the same buildings. Figure 2 shows that, on average, non-senior building transit users spent close to 8-10 more minutes traveling for work (7.7 min.), errands (9.7 min.), and social activities (7.6 min.), compared to car users.

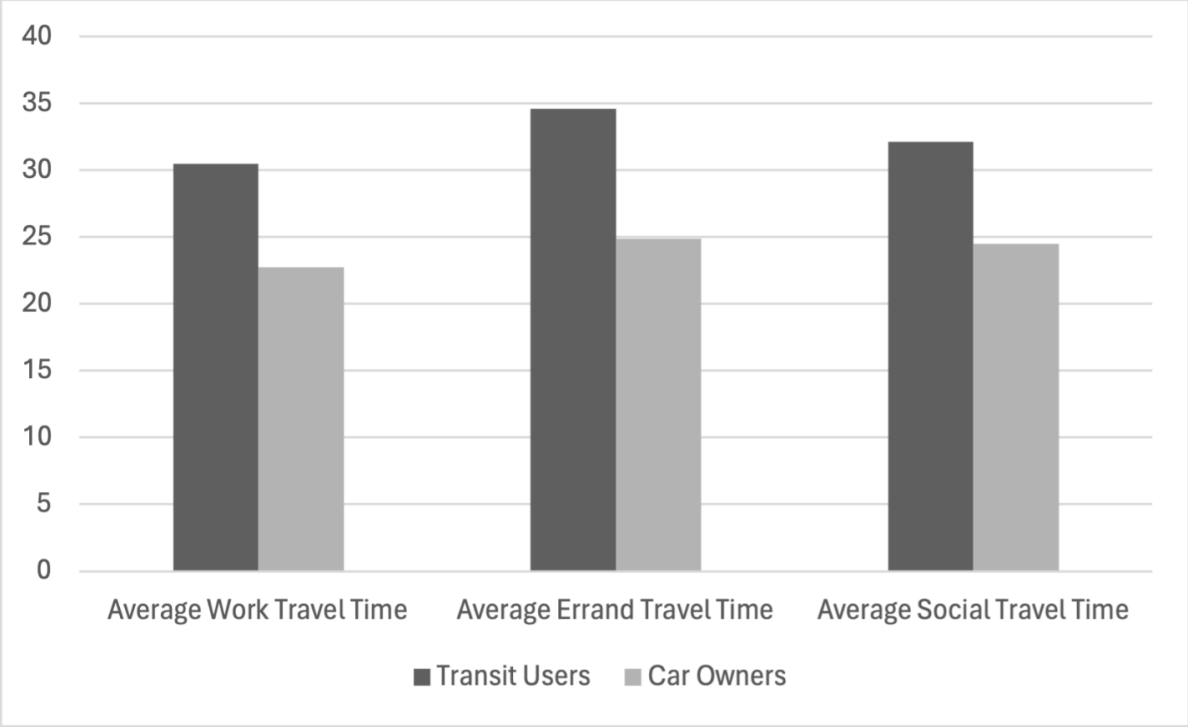

Figure 2. Average Travel Time for Non-Senior Buildings in Minutes (N=124)

In senior buildings (Talmadge Gateway, The Grove, and Trinity Place), transit travel times were significantly higher in every travel category. Transit users in senior buildings spent an average of 31-40 minutes more on travel to work—although only three senior building residents said they work—errands, and social activities, than car owners.

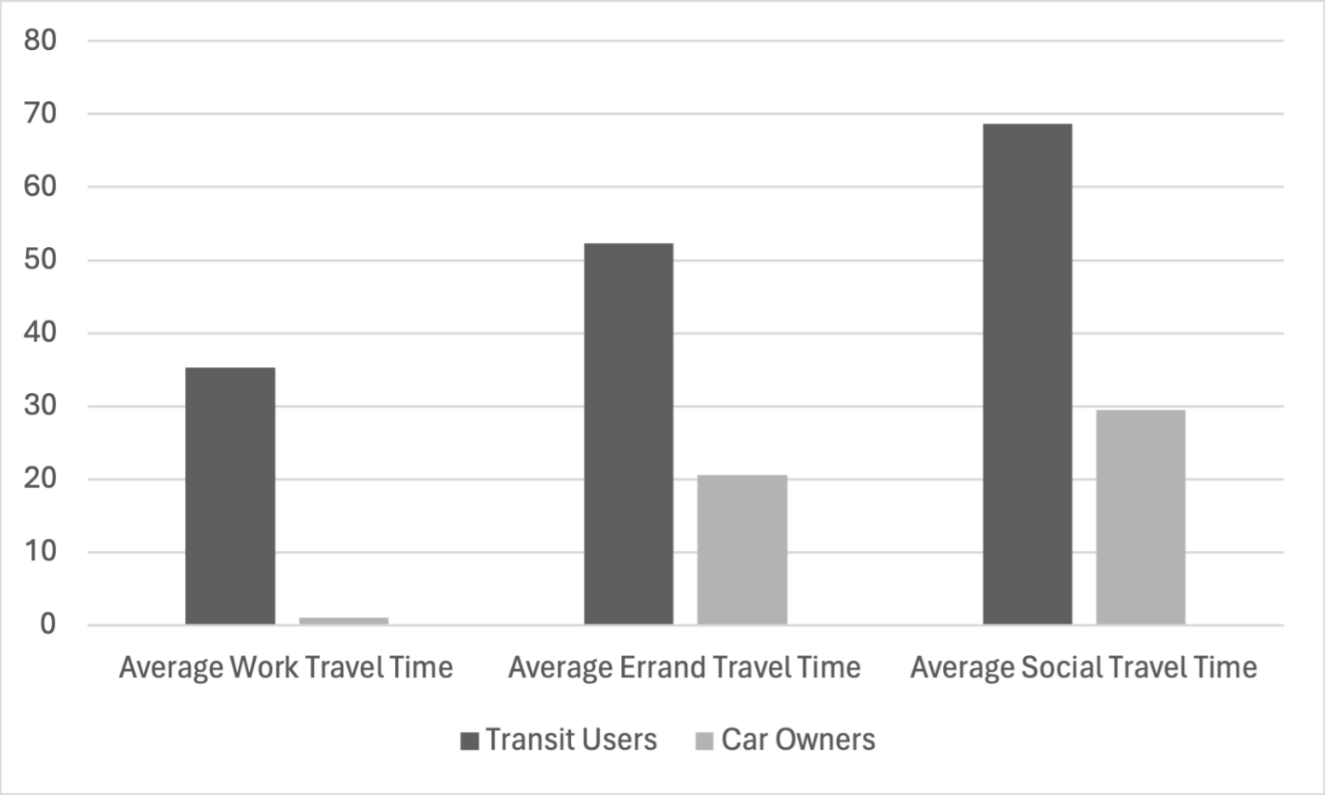

Figure 3. Average Travel Time for Senior Buildings in Minutes (N=68)

Table 8 shows the mean and median travel time by travel purpose for each of the six buildings. Generally, the mean values are all above the median values, and within a range of 23 to 40 minutes for each travel purpose. The outlier among these six buildings is Trinity Place, where mean travel time values are significantly higher than for the rest of the locations. Travel was much longer from Trinity Place because only one of 23 respondents had regular access to a car and the closest bus stop passed by infrequently, especially on Sundays.

Table 8. Summary of Travel Time by Travel Purpose

	Atmosphere (N=58)	Casa Anita (N=27)	Imperial Pacific Village (N=39)	Talmadge Gateway (N=22)	The Grove (N=23)	Trinity Place (N=23)
Typical Work Related Trip Travel Time (min)						
Mean (SD)	23.0 (18.1)	27.8 (16.4)	34.4 (16.4)	N/A	N/A	N/A
Median [Min, Max]	15.0 [5.00, 75.0]	22.5 [10.0, 60.0]	27.5 [15.0, 60.0]	N/A	N/A	N/A
Missing	34 (58.6%)	9 (33.3%)	23 (59.0%)	N/A	N/A	N/A
Typical Errands Related Trip Travel Time (min)						
Mean (SD)	29.5 (20.2)	27.5 (24.8)	35.9 (58.8)	31.7 (23.1)	23.4 (18.0)	56.4 (54.8)
Median [Min, Max]	20.0 [10.0, 120]	20.0 [5.00, 120]	22.5 [0.500, 360]	30.0 [3.00, 90.0]	20.0 [1.00, 75.0]	35.0 [10.0, 240]
Missing	3 (5.2%)	1 (3.7%)	1 (2.6%)	1 (4.5%)	2 (8.7%)	2 (8.7%)
Typical Social Related Trip Travel Time (min)						
Mean (SD)	27.3 (14.6)	29.7 (21.4)	29.7 (20.9)	39.4 (24.6)	26.3 (32.9)	71.1 (50.4)
Median [Min, Max]	25.0 [5.00, 60.0]	25.0 [6.00, 90.0]	22.5 [0, 100]	42.5 [15.0, 90.0]	15.0 [6.00, 120]	60.0 [30.0, 180]
Missing	15 (25.9%)	10 (37.0%)	9 (23.1%)	14 (63.6%)	11 (47.8%)	14 (60.9%)

Note: Talmadge Gateway, the Grove, and Trinity Place are senior housing.

To understand the relative importance of building location, neighborhood characteristics, and tenant characteristics, we analyzed their effect on travel time and mode. We use an ordinary least squares (OLS) model to estimate the influence of neighborhood and personal characteristics on travel time to five different destination types: work, essential errands (shopping, medical appointments), and discretionary trips (visiting, eating out). The greatest predictor of travel time for all trip types was whether the individual had access to a car (see Table 9). Access to a car reduced travel time by 36 percent or more, controlling for other factors. We defined access to a car broadly, to include not only car ownership but also frequent or reliable access to a car they could use, even if owned by someone else.

Table 9. Neighborhood and Personal Characteristic Correlates of Travel Time to Work, Errands, and Social Events, OLS Regression

	Work Travel Time			Errands Travel Time			Social Travel Time		
	Est.	**Pr(>|t|)**	**Sig**	**Est.**	**Pr(>|t|)**	**Sig**	**Est.**	**Pr(>|t|)**	**Sig**
(Intercept)	3.91	0.00	***	3.42	0.00	***	3.08	0.00	***
Walkscore	0.09	0.18		-0.02	0.60		-0.01	0.82	
Number Transit Stops w/in ¼ mile	-0.38	0.03	*	0.10	0.27		-0.005	0.96	
Access to Car	-0.60	0.01	**	-0.70	0.00	***	-0.36	0.02	*
Senior Building				0.18	0.38		0.44	0.03	*
Chronic Disability	-0.16	0.59		0.08	0.60		0.12	0.48	
Age	0.13	0.46		-0.12	0.18		-0.03	0.71	
Race (0=Non-Hispanic White)	-0.19	0.61		0.002	0.99		0.25	0.17	
Gender (0=Male)	-0.27	0.23		-0.13	0.30		0.03	0.83	
Household Income	0.07	0.47		-0.06	0.38		0.11	0.16	
N	64			186			124		
R-squared	0.2371			0.2251			0.1445		

*Significant at the <.05 level.

** Significant at the <.01 level.
*** Significant at the <.001 level.

Proximity to a transit stop has a clear and meaningful impact on travel time for work trips: having a transit stop within a quarter-mile of one's building location reduced work travel time by 38 percent. Travel times for social and other non-mandatory trips were longer for residents in senior buildings, controlling for age and other personal characteristics. The other neighborhood and personal characteristics in the model, such as neighborhood walk score and household income, are not clearly correlated with travel time.

Travel time is highly dependent on transportation mode for survey participants, so we also modeled the correlates of mode choice in four separate logistic regression models. The most interesting outcomes in the models presented in Table 10 are the factors that explain public transit use for work, essential errands, and discretionary trips, as well as all trip types combined. The dependent variables are equal to 1 if a survey respondent used public transit and equal to 0 if they used any other mode of transportation on a regular basis in the three categories.

Table 10. Neighborhood and Personal Characteristic Correlates of Travel Mode to Work, Errands, Social Events, and Overall, Logistic Regression

	Overall 1 = Transit User 0 = Non-transit user			Work Trip 1 = Transit User 0 = Non-transit user			Errand Trip 1 = Transit User 0 = Non-transit user			Social Trip 1 = Transit User 0 = Non-transit user		
	Estimate	Pr(>|z|)	Sig.	Estimate	Pr(>|z|)	Sig.	Estimate	Pr(>|z|)	Sig.	Estimate	Pr(>|z|)	Sig.
(Intercept)	1.14	0.07		-1.48	0.49		1.69	0.01	*	-0.66	0.42	
Walkscore	0.17	0.09		0.50	0.25		0.19	0.08		0.33	0.04	*
Number Transit Stops w/in ¼ mile	-0.36	0.16		-1.07	0.28		-0.31	0.27		-0.61	0.10	
Access to Car	-2.45	0.00	***	-5.43	0.00	***	-3.02	0.00	***	-2.77	0.00	***
Senior Building	-1.19	0.02	*				-1.21	0.02	*	1.31	0.07	
Go to Work	0.48	0.39										
Chronic Disability	0.18	0.70		3.12	0.05	*	-0.82	0.11		0.81	0.20	
Age	0.12	0.65		-0.35	0.65		0.33	0.22		-0.54	0.11	
Race (0=Non-Hispanic White)	0.13	0.76		2.22	0.25		-0.09	0.83		0.01	0.99	
Gender (0=Male)	0.38	0.30		2.15	0.08		0.59	0.14		1.05	0.06	
Household Income	0.18	0.40		-0.02	0.96		-0.15	0.54		-0.02	0.95	
N	192			58			173			112		
AIC	220.39			49.99			193.69			126.02		
McFadden Pseudo R2	0.1790			0.5685			0.2715		R	0.2983		

*Significant at the <.05 level.
** Significant at the <.01 level.
*** Significant at the <.001 level.

The travel mode models suggest that access to a car is negatively correlated with public transit use. Specifically, if a person reported having regular access to a personal vehicle, they were less likely to use public transit for any trip type, controlling for other conditions. Living in one of the three senior buildings in our sample was also negatively correlated with transit use overall and for errands. This is likely due to the availability of other non-public transit options that serve senior affordable housing communities, such as medical transportation vans. Living in a senior building is positively correlated with using transit for social events, although this relationship is imprecisely estimated and therefore could be due to chance. The errand trip model suggests that having a chronic disability increases the likelihood of using public transit for necessary errands, like medical appointments and shopping.

Transportation Financial Cost Burdens for Affordable Housing Residents

The affordable housing resident survey allowed us to estimate the average financial costs of transportation for affordable housing residents. Over half of the surveyed residents in all buildings indicated that they regularly used public transit, although there was considerable variation around this mean. A senior building located in a north county suburb, The Grove, had extremely low public transit ridership (13% of respondents) and Trinity Place had higher-than-average transit ridership (70%). Among transit users in the buildings, more than 80 percent used transit for errands. All transit users in Talmadge Gateway used transit for errands, while fewer residents in both Casa Anita (69.2 %) and The Grove (33.3%) used transit for this type of trip. Forty-six percent of transit users across all buildings used transit for social trips. The Grove (0%) and Casa Anita (30.8%) had far lower transit usage in this category, while Talmadge Gateway (61.5%) had the highest. Finally, work trips were the least common among transit users at all buildings, with only 19.6 percent of transit users reporting taking this type of trip. Transit use for work trips was highest at Atmosphere (32.3%) and Casa Anita (23.1%) and lowest at Trinity Place (12.5%), Talmadge Gateway (0%), and The Grove (0%); no residents of Talmadge and The Grove were employed and only a few were employed at Trinity Place.

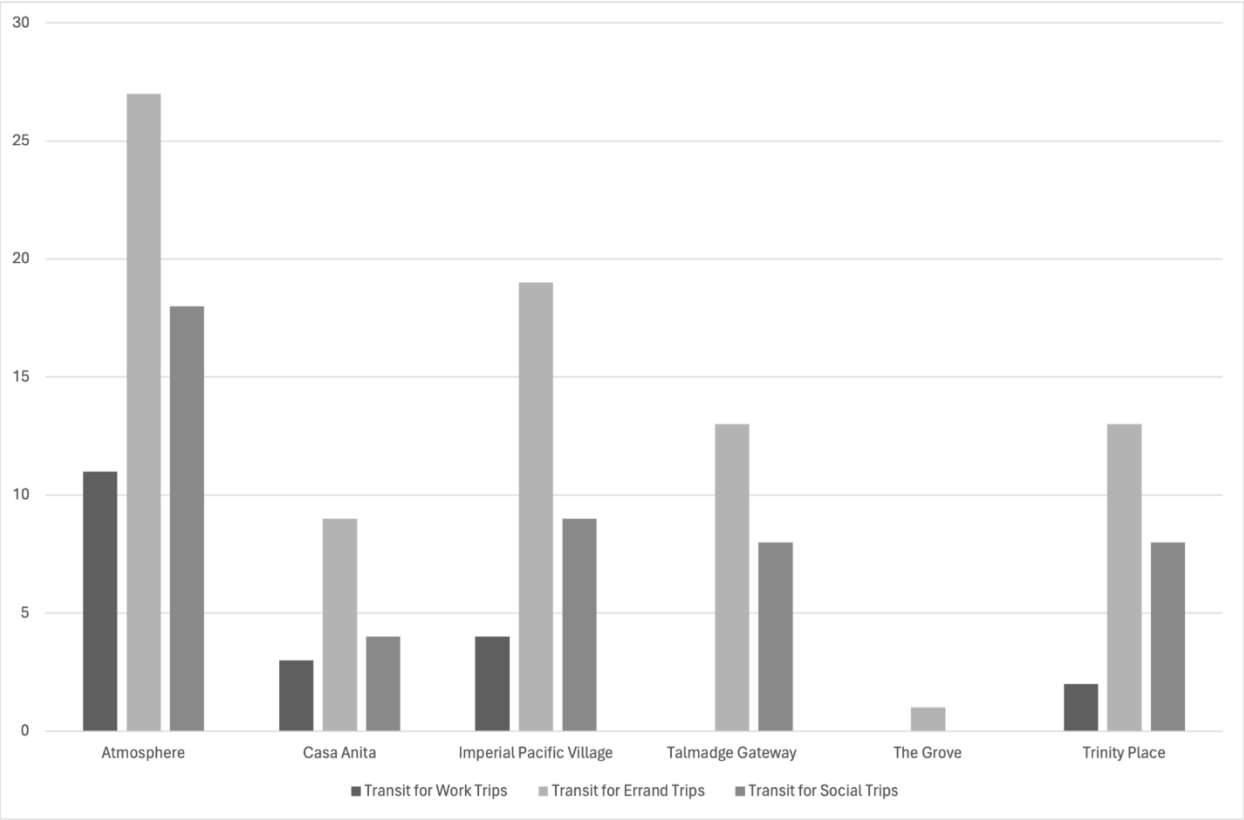

Figure 4. Transit Usage Overall and by Destination for Residents in Surveyed Buildings (N=192)

Survey respondents that used cars (n=83) reported spending an average of $144 per week on gas and parking costs, while those that used transit (n=104) reported spending $23 per week on transportation costs. Although the travel cost differences between residents using cars and those using public transit are large, some survey respondents spending more on transportation did not express concern about their transportation costs while other respondents using inexpensive public transit did.

We asked respondents who primarily used public transit to indicate their level of satisfaction with a variety of transit features, shown in Figure 5. If they were "not concerned" about a feature, they indicated a "1" on a four-point scale. If they were "highly concerned," they indicated a "4." Transit costs were not a high concern for most respondents: the majority reported being somewhat or very satisfied with costs (78.9%). Transportation time costs—or travel time—was of greater concern, but most reported being somewhat or very satisfied (68.3%). However, most residents were somewhat or very dissatisfied with the environment around transit stops (52.9%), indicating a clear concern for transit-dependent residents of affordable housing.

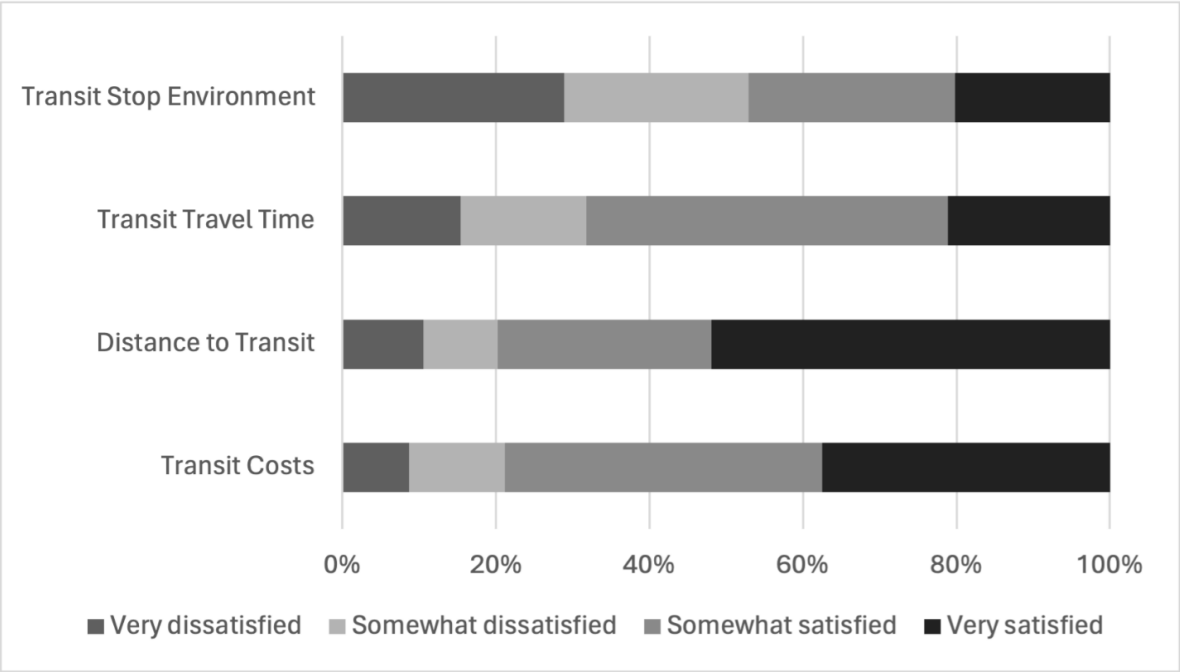

Figure 5. Satisfaction with Elements of public transit Among Transit Users (N=104)

In terms of satisfaction, residents at The Grove were the least satisfied overall with various features of public transit, although this may also be a function of a smaller sample size of transit users at this housing site. On the other hand, residents at Atmosphere were the most satisfied overall, showing medium to high levels of satisfaction regarding the distance from their home to the transit stop, travel cost, and travel time. This is to be expected, given Atmosphere's location in downtown San Diego, in proximity to a dense network of public transit options, in addition to nearby jobs and commercial areas.

We also asked respondents to rate their concern with a variety of daily living costs to understand where transportation costs ranked relative to other household expenses. Residents were asked to rate their level of concern for a variety of expenses.[14] Residents at the three senior housing sites were less concerned about costs than those at other surveyed housing sites. This may be because many seniors reported traveling less frequently and had access to shuttle services for healthcare needs and transportation vouchers for public transit. Seniors almost universally qualified for free or extremely low-cost health insurance benefits that covered most medical costs. A majority of car owners in non-senior buildings also indicated no or low concern with medical costs, typically because these individuals were employed and may receive benefits through their employer and/or were in better health, suggested by their ability to work.

[14] We do not report childcare costs in the following figures since only a small percentage of our sample (n=44) lived with dependent children. Out of these 44 respondents, 11 indicated that they were highly concerned with childcare costs, 7 indicated they were moderately concerned, 4 indicated they were mildly concerned, and 22 indicated they were not concerned with childcare costs at all.

To understand what factors correlated with cost concerns, and therefore why different types of respondents might rank transportation costs at a low- to moderate-level, we employed an OLS regression technique. A positive coefficient in Table 11 indicates that the independent variable is correlated with a higher level of concern. Our model suggests that neighborhood characteristics, car access, building type, whether a person works, and most personal characteristics are not meaningfully related to levels of concern for transportation costs. Respondents' age is negatively associated with concern, suggesting that older respondents in our sample reported lower levels of concern than younger respondents. Because younger people in our sample were more likely to be employed, we included an interaction term for work and age. Appendix Section 5 includes additional details regarding the satisfaction scales.

Table 11. Reported Level of Concern for Transportation Cost, OLS Regression (N=192)

	Levels of Concern for Transportation Cost		
	Est.	**Pr(>|t|)**	**Sig.**
(Intercept)	2.28	0.00	***
Walkscore	-0.03	0.48	
Number Transit Stops w/in ¼ mile	-0.02	0.85	
Access to Car	-0.17	0.38	
Senior Building	-0.12	0.61	
Go to Work	0.45	0.12	
Age	-0.36	0.01	*
Go to Work * Age	0.66	0.01	**
Chronic Disability	0.47	0.05	*
Race (0=Non-Hispanic White)	0.35	0.08	
Gender (0=Male)	-0.32	0.08	
Household Income	0.16	0.13	
N	192		
R-squared	0.16		

*Significant at the <.05 level.
** Significant at the <.01 level.
*** Significant at the <.001 level.

The coefficient for the interaction term is positive and statistically significant. This suggests that people who worked had a stronger concern for transportation cost. Such concern is also found to increase with age, as suggested by the interaction term. On the other hand, for people who were not employed, the level of concern for transportation cost decreased with an increase in age. Respondents who indicated having a disability were more likely to report concerns with the cost of public transit. In open-ended responses, several residents with disabilities mentioned having difficulty obtaining a disabled bus pass. One had given up and decided to pay the full price, another was unsure of where to start.

The factors limiting transportation mobility for residents of the affordable housing sites in our sample are more complicated and nuanced than a structured survey can capture. Therefore, we specifically asked respondents to describe what made it difficult for them to get where they needed to go. Figure 8 shows the barriers to

mobility they described. Multiple issues means that they indicated more than one of the 12 categories we generated for Figure 8 based on their responses to the open-ended question.

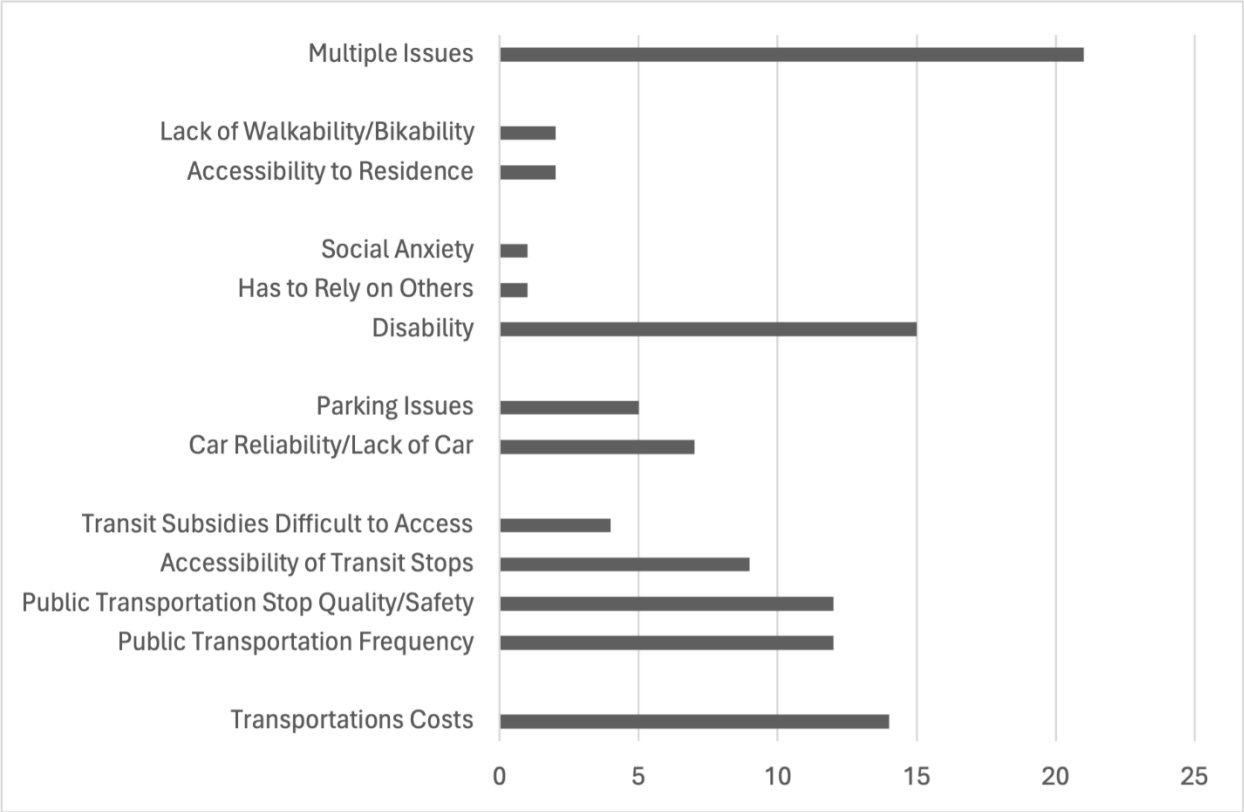

Figure 6. Write-in for Other Factors That Limit Transportation Mobility from Housing Sites (N=115)

Physical disability was the largest single issue, while transportation costs were second. Open-ended interview questions allowed us to collect data that identified how broader life circumstances impact transportation use and why disability was a particular concern. A limiting physical disability meant that even for residents of housing with nearby, accessible public transit, the quarter-mile journey from their building to a stop could take more than 20 minutes. It also meant that they often caught the bus nearest to their home, even if a more efficient option, such as a trolley stop, was a bit further away.

Discussion and Conclusion

The State of California and regional agencies like SANDAG are planning and siting new affordable housing near public transit to encourage transit ridership and discourage personal vehicle usage, to meet climate goals (California Department of Housing and Community Development 2024). This approach benefits occupants since transit is relatively inexpensive, compared to personal vehicle usage. Through our study of travel behavior, needs, and preferences among residents of existing affordable housing, we identify some of the barriers extremely low-income renters face in utilizing public transit and their ongoing challenges relating to transportation affordability.

The majority of regional travel in San Diego County is by private vehicle, but people living in MGRAs with clustered affordable housing use public transit more, on average. The SANDAG ABM estimates 4.6 percent of trips by residents living in areas with clustered affordable housing are completed on public transit, compared to 1.9 percent for residents in areas with no affordable housing.

Our resident survey, which allowed us to directly measure transit usage for a sample of affordable housing residents, suggests relatively high transit reliance: 53 percent of the 192 survey respondents in our sample reported that public transit was their primary mode of transportation. Over sixty percent of respondents with disabilities relied on public transit. Despite this, surveyed residents who had access to a car were much less likely to ever use public transit, even when they lived in areas with more accessible transit options.

Our survey findings show how expensive reliance on personal vehicles can be. Car owners spent nearly 10 times as much on transportation expenses as public transit users. However, the time incurred waiting for and taking public transit serves as a disincentive, especially for working people and seniors living in housing developments for older adults. The SANDAG ABM confirms that public transit travel times, as compared to personal vehicle travel, are significantly longer.

What remains unclear from our survey is whether there is a significant difference between affordable housing residents' reliance on public transit as compared to the general population, or whether there is a significant difference between the travel time costs incurred by these populations. Our analysis of SANDAG ABM data suggests that there are significant differences, but not in the way we might expect. We found that travel times for people in MGRAs with clustered affordable housing is slightly shorter, compared to those in MGRAs with no affordable housing. Affordable housing residents spend less time on travel than their counterparts in other types of housing, but they take more trips. Given that the SANDAG ABM does not directly measure or estimate public transit ridership in affordable housing, the differences in mode type and time cost may be underestimates.

The results of our research show the value of in-depth survey techniques with populations that would benefit from improved public transportation options. For older adults and people with disabilities, survey respondents made clear that they need enhanced micro mobility options that can connect them to more efficient trolley

lines or can shorten walk time to bus stops. Limitations in physical mobility make public transit use difficult. The barriers to public transit use can result in social isolation for seniors and people with disabilities.

While there are senior complexes throughout San Diego County, our senior building survey respondents were located east of downtown San Diego in the North County area where it is difficult to access transit stops and using transit to access the rest of the county can be expensive and time consuming. This particular housing site is less than one-half mile from a light rail stop, but almost none of the residents reported using it. Field notes by a member of our research team paraphrased what one resident explained: "[I have a] free bus pass, free train, but can't use the subsidies because I can't get to the transit stop, due to mobility issues." In both complexes east of downtown, residents could easily access bus stops, but further access to transit hubs and trolleys could further support access to quicker, more efficient routes. The responses of residents in senior buildings in this study reinforces the need for more sustainable transportation near affordable housing sites, especially in infill locations and inner suburbs (Chatman et al. 2019). To further support seniors in affordable housing, housing providers in our sample sought funding to being brought some services—like hairdressers and barbers—on site to reduce the need for travel. Reducing the need for travel for people more likely to have limiting disabilities can address transportation needs.

Residents of senior affordable housing in our sample often had access to transport services operated by private or non-profit companies, such as medical transport vans or services that took residents for a weekly or monthly trip to a grocery store. The combination of discounted senior transit passes (held by many senior respondents, but not all) and alternative transportation services resulted in seniors being less concerned about travel costs than other affordable housing residents, on average. Almost no older adults in our sample were employed, so they did not have to commute like other survey respondents. Despite having more transportation options and less need for daily travel, senior housing residents still ranked their concerns about transportation costs second after food. San Diego Metropolitan Transit System and North County Transit District both offer reduced fares for seniors, Medicare recipients, and people with disabilities; however, programs and discounts such as these are not always well known among non-transit users. And, as indicated by the quotation in the paragraph above, are not useful if a person cannot navigate from their housing to the nearest transit stop.

Residents of non-senior buildings were more likely to own cars and, when they relied on public transit, reported only slightly longer commute times. For these respondents, transportation costs ranked third in cost concerns after rent and food. Given that non-senior affordable housing residents often had lower rent subsidies and higher food budget needs, this is unsurprising. Although cost was not their highest concern, transit ridership could be further facilitated for working, affordable housing residents by providing inducements to employers to offer workers financial incentives to take public transit. Time cost concerns—which were especially high for working people who relied on public transit—could be addressed by developing additional transit lines near affordable housing complexes. Given the importance of transit access to obtaining employment for affordable housing residents (Millard-Ball and West 2020), this consideration is vital. In sum, planners should look closely at transit stop environments, proximity to housing, and additional subsidies for working people.

For example, residents of an affordable housing site in southeast San Diego reported particular concern with transit stop safety, lighting, and scheduling. Many residents in the Imperial Pacific Village neighborhood of San Diego, the southernmost neighborhood of the city, reported that there were no lights at bus stops or on streets near the bus. They felt unsafe using transit after dark. Buses did not come often enough, they reported, and did not run on Sundays at all. Field notes from one respondent showed the dilemma many car-dependent commuters find themselves in: “Bus times are not consistent enough, gas is so expensive, [I] worry about making it to work on time through [taking the] bus.”

Transit users in both housing types, but especially seniors, reported dissatisfaction with transit stop environments. Investment in improving transit stops could increase feelings of safety, as well as satisfaction. Increased investment in this area could likewise increase transit ridership for those not currently using it. The gains from increased investment would decrease travel costs for low-income people and decrease vehicle miles traveled (VMTs) for the region.

Our findings echo the findings of other studies that incentives and discounts must be widely promoted and easy to use to be effective in decreasing costs for users and addressing environmental concerns. For example, Pike and colleagues (2017) found that 60-70 percent of San Joaquin Valley affordable housing residents had no knowledge of incentive programs for car owners to reduce emissions. In contrast, a study conducted in Portland, Oregon evaluated a pilot program called the Transportation Wallet for Residents of Affordable Housing. As part of the program, residents were given a $308 Visa gift card (the same value as an annual transit pass) and were asked how they spent the money. The Transportation Wallet program encouraged some residents to explore new transportation options, such as shared micro mobility and rideshare, increasing residents' accessibility to a different transit modes, allowing them to make trips and travel to destinations that they otherwise would not have (Tan et al. 2021). Education about incentives must be coupled with future planning for better transit stop environments and placement of affordable housing sites within walking distance of transit to truly see gains in location affordability.

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Appendix

Appendix Section 1: Additional Information on SANDAG Activity Based Model

SANDAG's ABM is part of the CT-RAMP (Coordinated Travel and Regional Activity Modeling Platform) family of activity-based models. CT-RAMP models build off the fundamental features shared by all ABMs, adding several common features.

1) Population synthesis: where a list of households is created and distributed spatially based on an input population census (Davidson et al., 2010, p. 3).

2) Long-term location choices: where each person is assigned a 'workplace' based on their occupation, including persons such as students (school) and children (child-care center) (Davidson et al., 2010, p. 3).

3) Individual mobility choices: where persons and households are given attributes for free parking eligibility, car ownership, and toll lane transponder ownership (Davidson et al., 2010, p. 3).

4) Coordinated daily activity-travel pattern: where travel is generated for each person in a household, considering a wide range of factors (Davidson et al., 2010, pp. 3-4).

5) Tour-level choices: where each tour is assigned characteristics for its combination of tour modes, secondary stops frequency, purpose, and location, and trip departure times (Davidson et al., 2010, p. 4).

6) Trip-level choices: where each trip is assigned characteristics for its trip mode (based on tour mode combination), parking location, and trip assignment (for trips via auto or transit) (Davidson et al., 2010, p. 4).

CT-RAMP ABMs explicitly represent intra-household relationships. This is useful in determining the effectiveness of policies related to carpool lanes and tolled lanes (Davidson et al., 2010, p. 3). SANDAG's ABM features several additional model components beyond CT-RAMP which are not relevant for this project.

Appendix Section 2: Data Collection Instrument for Affordable Housing Resident Surveys

1 - Opening Questions

1a. How long have you lived in the San Diego area?

1b. Name of building/complex resident is staying in

1c. Approximately how many years have you lived here in this building?

2 - Transportation destinations and methods

2a. During a typical week, where do you need to go?

Options *(each option generates skip pattern to determine whether some categories below appear for respondent)*:

Go to work for yourself

Go to school for yourself

Go to grocery store, medical appointments, or other necessary errands for yourself

Eat out, social events, or religious engagements for yourself

2b. Besides needing to get places yourself, are you responsible for regularly getting other people where they need to go? For example, are there children, grandchildren, parents, a spouse/partner, or a roommate who you regularly take to school, work, appointments, or other places? *(generates skip pattern to determine whether some categories below appear for respondent)*

3 - Getting other people where they need to go

This section was skipped by all respondents who answered no to question 2b.

3a. You said you are responsible for regularly getting other people where they need to go. Who is/are the people who depend on you for getting where they need to go?

Options:

Spouse

Children

Parents

Grandparents

Siblings

Friends

Roommates

Other (fill in)

3b. When you help [indicated person(s) above] get to where they need to go, what are common destinations?

Options:

School (for other person)

Work (for other person)

Grocery store, medical appointments, other necessary errands (for other person)

Eating out, social events, religious engagements (for other person)

Other (fill in)

3c. How do you typically get [indicated person(s) above] where they need to go?

Options:

Driving

Bus

Trolley/Sprinter/Coaster

Bike or scooter

Walk

Uber, Lyft, or taxi

Other (fill in)

3d. Estimate how much time you spend per week getting other people where they need to go

4 - Work

This section was skipped by all respondents who answered no to "Go to work for yourself" under question 2a.

4a. What's your usual work location?

Options:

Usually the same location (outside home)

Workplace regularly varies (different offices or jobsites)

Drive for work (no set place)

At home (telecommute or self-employed with home office)

Other (specify)

4b. What is your typical departure time for work?

4c. How do you typically travel to work? (for self)

Multiple choice, options:

Do you drive alone

Do you drive in a car with others (e.g., carpool, friend or family gave you a ride, car share)

Bus

Trolley/Sprinter/Coaster

Bike or scooter

Walk

Uber, Lyft, or taxi

Work from home

Work shuttle

Other (specify)

4d. How long does it typically take you to get to work (all trip modes combined)?

4e. How many days do you leave your home to go to work in a typical week?

4f. Does a lack of transportation options limit where you can work at present?

Yes/No

5 - School

This section was skipped by all respondents who answered no to "Go to school for yourself" under question 2a.

5a. How do you typically travel to school? (for self)

Multiple choice, options:

Do you drive alone

Do you drive in a car with others (e.g., carpool, friend or family gave you a ride, car share)

Bus

Trolley/Sprinter/Coaster

Bike or scooter

Walk

Uber, Lyft, or taxi

School Shuttle / Bus

School from home so no travel

Other (specify)

5b. How long does it typically take you to get to school?

5c. What is your typical departure time for school?

5d. How many days do you leave your home to go to school in a typical week?

6 - Grocery store, medical appointments, or other errands

This section was skipped by all respondents who answered no to "Go to grocery store, medical appointments, or other necessary errands for yourself" under question 2a.

6a. How do you typically travel to the grocery store, medical appointments, or other errands?

Multiple choice, options:

Do you drive alone

Do you drive in a car with others (e.g., carpool, friend or family gave you a ride, car share)

Bus

Trolley/Sprinter/Coaster

Bike or scooter

Walk

Uber, Lyft, or taxi

Shuttle

Medical transport (through MediCal)

Other (specify)

6b. How long does it take you to get to a typical appointment or errand?

6c. How often do you leave your home to run errands, attend appointments, etc., in a typical week?

Options:

Daily

Multiple times a week

Once a week

Less than once a week

7 - Social, community, or religious engagements

This section was skipped by all respondents who answered no to "Eat out, social events, or religious engagements for yourself" under question 2a.

7a. How do you typically travel to social, community, or religious engagements?

Multiple choice, options:

Do you drive alone

Do you drive in a car with others (e.g., carpool, friend or family gave you a ride, car share)

Bus

Trolley/Sprinter/Coaster

Bike or scooter

Walk

Uber, Lyft, or taxi

Shuttle

Other (specify)

7b. How long does it typically take you to get to social, community, or religious engagements?

7c. How often do you leave your home to go to social, community or religious events in a typical week?

Options:

Daily

Multiple times a week

Once a week

Less than once a week

8 - Transportation Challenges

8a. How often do you need to get somewhere but you don't have a way to get there—you don't have transportation?

Options:

Never

Sometimes (1-2 times per week)

Often (3 or more times per week)

Daily / all the time

8b. Have you ever left a job or lost a job because you had no reliable transportation to get to work?

(yes/no)

8c. Has a lack of transportation limited you from doing any activities or accessing any opportunities?

(yes/no)

8d. Do you participate in any programs, or receive any subsidies, that help you cover your transportation costs?

(yes/no)

8e. If yes, do you know what that program is called?

9 - Satisfaction Regarding public transit and Costs

9a. Do you currently use public transit with any regularity, or on a regular basis?

(yes/no)

9b. to 9e skipped by those who answered no to 9a.

9b. Thinking only about your weekly travel costs on public transit, how much do you spend out-of-pocket each week on your transportation costs?

9c. public transit satisfaction

9ci. How satisfied are you with the cost of riding the bus or trolley?

9cii. How satisfied are you with the distance between where you live and a transit stop?

9ciii. How satisfied are you with the total travel time for your usual trips?

9civ. How satisfied are you with the environment at or near transit stops such as sidewalks, lighting, traffic, and safety?

Options for all 9c. questions:

Very satisfied [4]

Somewhat satisfied [3]

Somewhat dissatisfied [2]

Very dissatisfied [1]

9d. How do you get from home to the bus/trolley/Sprinter stop?

Options:

Do you drive alone

Do you drive in a car with others (e.g., carpool, friend or family gave you a ride, car share)

Bike or scooter

Walk

Uber, Lyft, or taxi

Shuttle

Other (specify)

9e. How many minutes does it take you to get from home to the transit stop?

10 - Questions regarding personal auto transportation experiences

10a. Do you have regular access to a car or other automobile?

(yes/no)

10b. to 10 skipped by those who answered no to 10a.

10b. How easy or difficult is it for you to find parking near your home?

Options:

Very easy

Somewhat easy

Somewhat difficult

Very difficult

10c. Whose car do you use?

Options:

I own a car

I borrow a car from family or friends

I share a car with people in my household

10d. During the past year, has there ever been a time when you could not pay to fill up your gas tank due to the cost?

(yes/no)

10e. Do you feel dependent on your car, like using a bus, trolley, bike, or other method of transport is not a possibility for you? Like you really have to have a car?

(yes/no)

10f. Could you tell me why you feel dependent on your car?

10g. Thinking only about your weekly travel costs in your car/motorcycle/similar, approximately how much do you spend each week on gas and parking fees?

10h. Do you have a current car payment?

(yes/no)

10i. How much do you spend monthly on car (or other vehicle) repairs, payments, and related expenses (but not gas)?

11 - Cost concerns

11a. Rental costs

11b. Utility costs

11c. Transportation costs

11d. Food costs

11e. Medical costs

11f. Clothing and household goods

11g. Childcare costs

All cost concern questions have the following 4 possible answers:

Highly concerned [4]

Moderate concern [3]

Low concern [2]

Not concerned [1]

12 - Demographic questions

12a. What is your age?

12b. Have you ever served on active duty in the U.S. Armed Forces, Reserves, or National Guard? (i.e., are you actively serving in the military or are you a veteran)

(yes/no)

12c. What race and/or ethnicity do you identify with? Select all that apply.

Multiple choice, options:

Black and/or African American

Hispanic and/or Latina, Latino, or Latinx

Middle Eastern and/or North African

Native American

Pacific Islander

White

Multiple

Other

12d. What is the total annual income of everyone in your household?

Options:

Less than $10,000

$10,000 to $25,499

$25,500 to $34,499

$34,500 to $43,499

$43,500 to $52,499

$52,500 to $63,499

$63,500 to $74,999

$75,000 to $99,999

$100,000 to $124,999

$125,000 or more

12e. How many people are in your household?

12f. Do you receive Social Security Income, SSI or Social Security Disability Income (SSDI)?

(yes/no)

12g. Do you receive income from CalWorks or general relief?

(yes/no)

12h. If yes, Is that for you or someone else in your household?

12i. What is your gender?

12j. Do you identify as a person with a disability or other chronic condition?

(yes/no)

How would you describe your disability or chronic condition?

Yes No

Attention deficit

Autism

Blind or visually impaired

Deaf or hard of hearing

Health-related disability

Learning disability

Mental health condition

Mobility-related disability

Other

12k. What is your highest level of education?

12l. Could you tell me how much you currently pay in rent?

12m. Has your rent increased recently or will it go up soon?

12n. How much is/was the increase?

12o. An eviction is when the property owner forces you to move. Have you, or a person you were living with, ever been evicted?

12p. Have you ever been unstably housed or homeless? As in you were living in your car, staying in a shelter, crashing with friends, or living on the street?

12q. Have you fallen behind on paying your rent since you have lived here, in this building?

12r. Can you tell me about anything else that makes it difficult for you to get to where you need to go?

Appendix Section 3: Neighborhood-level Covariates and Provenance for Regression Models

The walk score is calculated from the z-scores of three variables: population density, percent residential land, and street intersection density. We excluded highway and highway ramps from the street intersection density calculation. We applied a crude construction of walk score where:

> Walkscore = Z-score_Population Density - Z-score_Percent Residential Land + Z-score_Street Intersection Density

Sources from these three variables are as follows:

Population.Density (per Sq. Mile)	American Community Survey 2018-2022 (5-year-estimates)
Percent Residential Land	San Diego Planned Land Use - SanGIS / SANDAG GIS Data Warehouse
Street Intersection Density (per Sq. Mile)	SanGIS / SANDAG GIS Data Warehouse

Using walk score instead of these three individual variables addresses the multicollinearity problem without dropping any variables (Frank et al., 2006).

The transit stop variable is from the SanGIS/SANDAG GIS Data Warehouse. It is a binary variable equal to 1 if there is a transit stop within a quarter-mile buffer of the relevant affordable housing site.

We modeled the survey data with a range of other covariates, which are listed below in Appendix Table 1. We do not report on the results of these models since our goal was to identify the most parsimonious model with fewer degrees of freedom, and these covariates had no discernible influence on the outcomes of interest.