

Increasing Bus Ridership and Transit Cost-Assistance Awareness Among San Jose's Very-Low Income Community

Report by Sarah Abel

INCREASING BUS RIDERSHIP AND
TRANSIT COST-ASSISTANCE AWARENESS AMONG
SAN JOSE'S VERY-LOW INCOME COMMUNITY

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Executive Summary

Out of the seven transit agencies in the nine-county San Francisco Bay Area region, VTA has the lowest public transit ridership rates (VTA 2008). Between 1999 and 2006, VTA's average weekday bus ridership declined by 35% yielding a farebox recovery ratio of 14%—the lowest in the nation (VTA 2008). To address the problem of pervasive low ridership and limited fiscal resources, in 2006, VTA overhauled the existing transit system and implemented the programs and policies set out in the agency's Community Design and Transportation Program and Transit Sustainability Policy (TSP).

The TSP calls for cutting or rerouting all bus lines with low ridership and reallocating resources to lines with high ridership performance to boost efficiency along core transit lines and to increase farebox recovery. However, this reallocation method has a disproportionately negative impact on "high-need" transit users and transit dependent riders who live outside the primary service area and therefore raises social equity concerns. To balance achieving VTA's ridership goals and meeting the service requirements of the high-need community, the findings of this study emphasize the importance of addressing existing and potential customer needs when making service changes.

Since low-income people tend to fall within the high-need market, this study surveys food bank customers to investigate ways to make targeted improvements that are perceived to increase the bus user/customer experience and boost ridership among VTA's low-income customer pool in San Jose. Secondly, since transportation costs are an obstacle for low-income households, this study investigates the knowledge base surrounding transit-cost assistance programs and evaluates to what degree having access to a free or inexpensive bus pass is perceived to increase bus ridership within the study group. Lastly, outreach media preferences are identified in order to recommend ways to better distribute cost-assistance and resource information to the low-income community.

Study Methods

A total of 152 low-income San Jose residents were surveyed in order to collect six types of data: 1) demographics; 2) bus use and ratings; 3) current cost assistance and resource awareness; 4) bus service and customer service improvement preferences; 5) information dispersal methods; and 6) cross street information. Data was collected from food bank customers between April 30th and June 15th, 2010 at distribution centers located at Sacred Heart Community Services and a low-income housing facility called Paseo Senter.

Although this recruitment method prevented a random sample of participants, it allowed homeless and transient individuals to participate who otherwise would have been excluded with a telephone or mail survey.

To prevent language barriers during the recruitment and data collection process, survey questionnaires were provided in English, Spanish, and Vietnamese. Customers were asked to fill out the survey individually without being read the questions. Data were analyzed in SPSS using frequency, cross tabs, and chi square tests.

Findings

The key findings of this report are bundled under four categories: 1) vehicle ownership and mode choice; 2) VTA bus ratings and improvement recommendations; 3) transit cost assistance; and 4) information distribution methods.

Vehicle Ownership and Mode Choice

Three quarters of the group indicated that they use the bus on some kind of regular basis but only a third considered the bus or light rail their primary transit mode. Over half of the survey participants owned at least one household vehicle and roughly 45% said they use a vehicle as their primary mode.

Key findings:

- Although nearly 60% of the study group lived within a quarter mile of a bus stop and over half (53%) lived within an eighth of a mile of a stop, only 29% relied on bus or light rail to meet their principal travel needs.
- Mode choice was closely tied to vehicle ownership. Those who owned at least one vehicle tended to primarily drive, while those who did not own a vehicle had significantly higher rates of bus, light rail, walking, and bicycle use ($\chi^2=39$, d.f.=2, $p<0.001$).
- Vehicle ownership rates and vehicle use were significantly higher among families with children ($\chi^2=4$, d.f.=1, $p=0.045$).
- While elderly and disabled persons had the highest rates of bus use, people with children, students, working individuals, and those who owned an automobile had the lowest bus ridership.

VTA Bus Ratings & Improvement Recommendations

Current bus service ratings were generally positive; however, there is room for improvement as over a third said their experience taking the bus was fair or poor. Bus safety was seen as the top improvement to heighten the customer experience; however, to increase ridership rates, improvements in cost and transfer time were thought to have the most impact.

Key findings:

- Roughly half (52%) rated their bus user experience as good or excellent, and 35% said their experience was fair or poor.
- In order to increase the bus user experience, improvements in safety (30%), bus reliability (28%), and bus stop conditions (25%) were viewed as having the most positive impact.
- Cost (46%) and transfer time (39%) were the top two factors that discouraged ridership. These were also viewed as the top two improvement categories most likely to encourage ridership.

Transit Cost Assistance

Transit cost assistance is perceived to have a positive impact on ridership rates; yet, most are not getting assistance likely due to a lack of knowledge of where to apply for aid.

Key findings:

- Less than a quarter of the study group said they knew where to apply for transit cost assistance and only 13% indicated that they currently receive transportation aid such as a free or reduced transit pass or bus tokens.
- Transit cost assistance was viewed as having a 38% net increase in frequency of bus use—reducing the number of individuals who never take the bus by 6% and increasing the number of people who take the bus 4-7 days per week by 18%.
- Relative rates of transit aid were over ten times higher within the sub-group who knew where to apply for it. Therefore, educating the public about assistance programs would likely increase the rates of aid received.

Information Distribution Methods

The top information distribution preferences were 1) the VTA “Take One” publication (46%); 2) the VTA Customer Service Center (31%); 3) information posted at bus stops (28%); and 4) information distributed at food banks and other social service agencies (24%).

Policy Recommendations

Based on the results of this study, there is much potential for increasing ridership rates and service ratings within (a) the body of existing low-income customers and (b) the body of potential new riders. This could be achieved by VTA through targeted service and price structure improvements and by centralizing and dispersing information on transit subsidy programs.

Based on the findings of this study the following five actions are recommended to VTA:

1. **Enhance services and frequently update the public about service improvements** as a marketing strategy for boosting ridership rates.
2. **Consider implementing a more equitable price structure** for qualifying low-income households, especially families with children.
3. **Centralize and actively distribute information on transit subsidy programs** and transit aid resources to low-income people using outlets such as the VTA “Take One” publication, VTA Customer Service Center, bus stops, and through food banks and other social service programs.
4. **Continually survey low-income community members** to assess their transit needs and improvement recommendations in order to identify service enhancements that will target key customer demographic groups.
5. **Update strategic policies to incorporate a customer focused model** that balances the travel requirements of “high-need” customers with reaching ridership goals.

Chapter I: Introduction

The Santa Clara Valley Transportation Authority (VTA) is the transportation service provider for Santa Clara County in California. In the nine-county San Francisco Bay Area region, VTA has the lowest public transit ridership rates (VTA 2008). When compared to other transit agencies in cities such as San Francisco, San Diego, Sacramento, Portland, and Minneapolis, VTA has the lowest bus trips per revenue hour, lowest farebox recovery, and highest average operating costs (Hughes 2010) (see Table 1). Revenue has steadily declined within the last ten years due to a loss of sales tax inflicted by the burst of the dot-com bubble, forcing VTA to cut services back to what they were in the 1980s (VTA 2008). Between 1999 and 2006, average weekday bus ridership declined by 35% yielding the lowest farebox recovery in the nation—only 14% (Hughes 2010; VTA 2008).

Table 1. Comparison of VTA's service characteristics to other transit agencies

	VTA	San Francisco	San Diego	Sacramento	Portland	Minneapolis
Population within Service Area (millions)	1.8	0.8	2.2	1.1	1.5	1.8
Size of Service Area	326	49	406	277	574	589
Population Density	5,546	16,827	5,469	3,964	2,555	2,990
Bus Trips per Revenue Hour	26	69	29	26	35	36
Light Rail Trips per Revenue Hour	52	77	86	72	86	76
Average Farebox Recovery	14%	26%	39%	19%	23%	32%
Average Operating Cost Per Revenue Hour (Bus & Light Rail)	\$216	\$194	\$102	\$184	\$153	\$146
Average Operating Cost Per Trip (Bus & Light Rail)	\$6	\$2	\$2	\$4	\$3	\$3

Source: National Transit Database 2008 as cited in Hughes 2010

While transit ridership has suffered, auto ownership has reached an all time high, even among the lowest income quintiles. Although transportation is the third largest expense for Bay Area residents, two thirds of low-income households have at least one vehicle, and only five percent of household trips are made by public transit (Rice 2004, 16). The preference for costly automobile use, particularly among income-limited households, indicates that non-monetary factors such as service quality, access, frequency, punctuality, comfort, and safety may play an important role in transit mode tradeoffs.

Although promoting ridership remains a serious problem for VTA, little research has been done, especially at the local level, to better understand what improvements would encourage bus use.

Travel behavior across all income groups has been studied extensively in national, state, and regional surveys such as: the Nationwide Personal Transportation Survey (NPTS) and the American Travel Survey (ATS), conducted by the U.S. Department of Transportation; the 2000-2001 California Statewide Transportation Survey (CSTS), conducted by the California Department of Transportation (Caltrans); and the 1996 Bay Area Transit Survey (BATS), conducted by the Oakland Metropolitan Transportation Commission (MTC). However, studies have not been conducted to specifically assess the reasoning behind mode choice trade-offs, nor have they been designed to assess transit cost assistance rates within the low-income population (Lipham 1995, 1-5; U.S. Department of Transportation 2009; Caltrans 2002, 1; Oakland Metropolitan Transportation Commission 1996, 259-294).

Additionally, household travel surveys omit homeless travel behavior as they often employ telephone survey methods and/or require a mailing address for recording trip diary information (Lipham 1995, 3-4; U.S. Department of Transportation 2009; Caltrans 2002, 3-8; Oakland Metropolitan Transportation Commission 1996, 2). Furthermore, no studies to date have assessed bus ridership, mode choice, transit barriers, or transit cost assistance within San Jose's very-low income population.

The most relevant and recent studies conducted at the county level were a market segmentation analysis completed for VTA by Cambridge Systematics and the 2005-2006 On-Board Transportation Survey (VTA 2006). The segmentation analysis was carried out with in-depth telephone interviews and was designed to acquire information about Santa Clara County residents' attitudes towards travel. The onboard survey assessed ridership rates and ratings among VTA's current customers and was conducted at bus stops and on busses. Although the survey did capture information on bus ridership, VTA ratings, transit dependency rates, and payment type, VTA did not ask questions about transit cost assistance or resource awareness. Since the survey sampled passengers, some homeless people were captured in the survey but the general low-income population was not included (VTA 2006).

To address the problem of pervasive low ridership and limited fiscal resources, in 2006, VTA used the results of these studies to implement the Transit Sustainability Policy (TSP). The TSP was

designed to provide more cost-effective service to the county and to increase farebox recovery by attracting the time-sensitive market segment. In implementing the policy, VTA either cut or rerouted all bus lines with low ridership and reallocated resources to lines with high ridership performance. This tactic was meant to boost efficiency along core transit lines and to increase farebox recovery, while preventing an increase in operation costs.

This reallocation method has a disproportionately negative impact on “high-need” and transit dependent riders who live outside the primary service area and therefore raises social equity concerns. To balance the service requirements of high-need customers with meeting ridership goals, this study investigates whether addressing existing and potential customer needs is perceived by the high-need community to boost bus ridership.

Since low-income people tend to fall within the high-need market, this study surveys food bank customers to investigate targeted improvements perceived to heighten the bus user/customer experience and boost ridership within VTA’s low-income customer pool in San Jose. Additionally, since cost is likely a primary obstacle for low-income households, this study investigates the knowledge base surrounding transit-cost assistance programs and evaluates to what degree having access to a free or reduced bus pass is perceived to increase bus ridership within the study group. Lastly, outreach media preferences for distributing cost-assistance and resource information are identified so that VTA can perform better outreach and marketing to promote ridership within the study population.

Research Question

This research report seeks to answer two research questions. First, based on surveys conducted among San Jose’s very-low income community, how can the Santa Clara Valley Transportation Authority (VTA) improve the customer-experience in order to increase ridership among this population group? Answering this question will illuminate what factors discourage people from using the bus and point to specific improvements VTA can make to increase ridership rates within the very-low income community.

Secondly, are very-low income people in San Jose aware of resources that provide transit-cost assistance, and what can VTA do to increase awareness within the low-income community? Answering this question will allow VTA to better disseminate information about where and how low-income people can apply for transit-cost assistance.

Report Structure

This research report consists of seven chapters organized as follows. The second chapter provides an overview of San Jose and describes the problem of low public transit ridership. A detailed portrayal of VTA's customer composition and ridership trends over the last ten years is then presented, followed by a description of VTA's ongoing bus service improvement efforts. This chapter concludes with an overview of the transit cost assistance programs offered in San Jose.

The third chapter is a comprehensive literature review on low-income travel behavior. The chapter starts by evaluating the monetary cost burden of transportation on the poor using data from the Consumer Expenditure Survey (CES). Studies conducted on the relationship between job accessibility and transportation and major research findings conducted on the spatial mismatch hypothesis are then analyzed. The effects of mode choice and mobility constraints on the travel behavior of various demographic groups are identified. Finally, gaps pointing to areas for further research are called out.

Chapter four contains the survey design and methods. This section describes the survey objectives and the type of data collected. The data collection sites and survey population is identified followed by a description of the data collection methods. The chapter concludes by identifying the response rates for each question and the statistical methods used.

Chapter five details the survey results and interpretations based on 152 surveys conducted at Sacred Heart Community Services and Paseo Senter in San Jose, California. The chapter provides information on the study group's demographic characteristics; bus ratings and VTA improvement preferences; transit cost assistance awareness; and information distribution preferences.

Planning implications and recommendations are identified in chapter six. The chapter provides a series of recommendations based on the results of the study including service improvement suggestions, strategies for equitable pricing, information distribution methods, and strategic policy recommendations.

The seventh and final chapter suggests three areas for further research: 1) survey the low-income community at a citywide scale to further identify travel needs and mobility barriers; 2) research cost verses service tradeoffs in order to identify how best to balance quality and affordable services; and 3) evaluate price structure options to help make transit more affordable to income limited households.

Chapter II: Background

Overview of San Jose, California

The City of San Jose is located in the heart of Silicon Valley, fifty miles south of San Francisco, and is home to over a million residents. With over ten percent population growth in the last decade, San Jose has become the third largest city in California, after Los Angeles and San Diego, and is the tenth largest city in the nation (City of San Jose 2010a; City of San Jose 2010b). San Jose is known internationally as a technology hub, attracting people from all over the world to live and work in the City. San Jose prides itself on its racial diversity. The City is predominately comprised of Hispanics (32.7%), Whites (31.3%), and Asians (29.8%) with a 40% internationally born population (City of San Jose 2010a).

In San Jose there is a high spread in income, with the top quintile earning over \$150,000 annually and the bottom quintile earning less than \$14,000 per year (U.S. Census Bureau 2008). Roughly 8% of the population is below the national poverty line and 11% receive food stamps or some kind of public assistance (U.S. Census Bureau 2008). Those in poverty predominantly speak Spanish (37%), English (35%), or Asian and Pacific Island languages (22%), and most are low educated minorities with a high school degree or less (U.S. Census Bureau 2008). Most neighborhoods with high poverty rates are clustered near downtown and south San Jose. Although many minority and impoverished San Jose communities are located in proximity to public transit, only 12% use it to get to work (U.S. Census Bureau 2008). The vast majority (60%) drive alone in a car, truck, or van, 14% carpool, and 10% walk, bike, or use another means of travel (U.S. Census Bureau 2008).

The City's transportation network is built to support a wide array of transportation options for residents. Since Santa Clara County averages 2.26 vehicles per household, San Jose's transportation infrastructure is primarily built around auto travel (MTC 2010). The Santa Clara Valley Transportation Authority (VTA) is responsible for highway planning, construction, and congestion management. There are seven freeways that serve the area including I-880, leading to Oakland; I-680, to Sacramento; I-280 and Highway 101, providing access to San Francisco; Highway 17, leading to Santa Cruz; Highway 101 south to Monterey; and Highways 82, 87, and 237 providing intercity travel (see Figure 1).

The Norman Y. Mineta San José International Airport is located three miles north of downtown San Jose and is sandwiched between Highway 101 to the north, I-880 to the south, and Highway 87 to the

east (see Figure 1) (Crawford 2003). The airport serves nearly 30,000 passengers daily, offering national and international flights to sustain the travel needs of Silicon Valley and the San Francisco Bay Area region (City of San Jose 2010b).



Figure 1. Major roads and highways, City of San Jose. Graphic by Crawford, 2003.

Bike and walking paths are also offered throughout the City. Based on factors such as complete streets, pedestrian design, and land use, San Jose is considered “somewhat walkable,” with only some amenities within walking distance, and out of the top 40 largest U.S. cities, San Jose is ranked as the 17th most walkable city (Front Seat 2010). San Jose’s most walkable neighborhoods are located near the city center near Downtown San Jose; while the City’s most vehicle-dependent areas are located on the outer fringe (Front Seat 2010).

VTA operates bus, light rail, and paratransit services within the City of San Jose and the greater Santa Clara County region. Light rail operates between 5:00 a.m. and 2:00 a.m. every 15 minutes during peak times and every 30-60 minutes during early mornings and late evenings. San Jose’s core or primary bus lines operate daily between 6:00 a.m. and 2:00 a.m. at various frequencies depending on the line and time of day (VTA 2009). Local or secondary grid routes operate on arterial streets through low or medium density land uses and are less frequently traveled. These grid lines typically offer fewer night

and weekend services. Community bus routes offer local connections between transit centers, residential areas, and business districts. VTA provides express and limited stop routes that operate during peak hours and provide commuter oriented services along freeways and major streets (VTA 2009, 44). Non-fixed paratransit services are also offered to qualifying individuals if pre-arranged.

The Problem of Pervasive Low Ridership

VTA has the reputable title of having “the lowest farebox recovery in the nation,” hovering around 14% (see Figure 2) (Hughes 2010; VTA 2008). Revenue has steadily declined within the last ten years due a loss of sales tax revenue inflicted by the dot-com bust, forcing VTA to cut services and increase fares. Service cuts coupled by the national recession declared in 2008 has had a major negative impact on transit ridership, with bus ridership taking the biggest hit (VTA 2010).

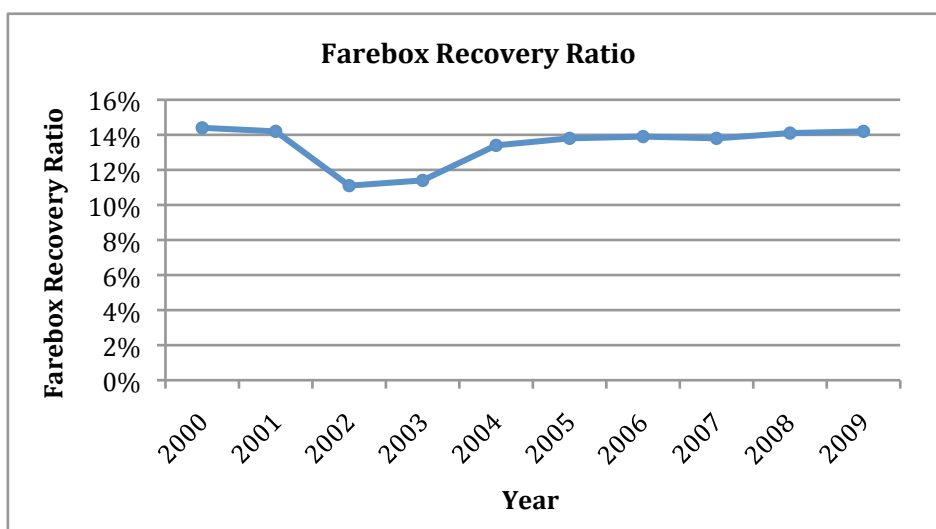


Figure 2. VTA’s farebox recovery ratio 2000-2009. Data from the VTA Department of Finance, 2009.

In an effort to boost ridership, better allocate existing resources, and improve farebox recovery, VTA adopted a new cost-neutral policy called the Transit Sustainability Policy (TSP) in 2006. The TSP was developed based on results from a Comprehensive Operations Analysis (COA) involving two studies conducted in an effort to better understand the transit markets in Santa Clara County (VTA Fiscal Resources Division 2008).

The first study was a market segmentation analysis conducted by Cambridge Systematics through an in-depth telephone survey designed to acquire information about residents’ attitudes towards travel in Santa Clara County. The survey results identified two transit

markets: those who are time-sensitive, and those who are price-sensitive. Most survey participants were time-sensitive, desiring faster and more frequent service.

Secondly, an On-board Passenger Survey was conducted among existing bus and rail users in order to identify current VTA ratings, transit behavior, and ridership demographics (VTA 2008; VTA 2006, 2). The survey results identified that a majority of transit riders were low-income, minority, or transit dependent riders, with limited alternative transportation options.

The COA results helped identify transit markets and guide the development of the TSP and Design Guidelines. The TSP was applied system-wide as a means to evaluate service performance and to determine where to allocate available resources. Under the new policy community buses, local buses, bus rapid transit and light rail are evaluated against average boardings per revenue hour. For example, the Express Bus Standard requires that buses be filled to at least 60% seating capacity with a minimum of 15 boardings per revenue hour. If ridership rates fall below these thresholds, then marketing and outreach efforts are conducted to boost ridership, followed by a restructuring of the line. If ridership is unresponsive after two years then the line is cut.

The COA included a complete overhaul of the bus system. Every route was reevaluated and the TSP performance standards were integrated into daily operations planning efforts for bus service evaluation and scheduling. VTA either cut or rerouted all bus lines with low ridership and reallocated resources to lines with high ridership performance. This tactic was meant to boost efficiency along core transit lines and increase farebox recovery, while preventing an increase in operations costs.

VTA spent two years collecting data, and conducting community outreach to try to minimize negative impacts on the community. Still, VTA's new approach raises social equity concerns, as those who live along existing transit lines with poor ridership and transit dependent riders who live outside the primary service area are disproportionately impacted by this policy. Transit dependent riders tend to be comprised of low-income, minority, or elderly people who either are unable to drive or cannot afford the high cost of vehicle ownership. This group tends to have very few transit options and primarily rely on public transportation in order to access social services, food, health care, and other resources. Service cuts force people with limited transit options to use more expensive

transportation alternatives such as non-fixed shuttles, taxis, or private vehicles.

VTA adopted their new Bus Service Operating Plan in August 2007 and launched it in January 2008 (VTA 2009, 42). The plan moved from “coverage-based” to a “market-based” model, centered on matching service with demand (VTA 2009, 42). A Transit Operations Performance (TOP) Report was published in 2009 and evaluated changes in ridership and route performance since the launch (VTA Department of Operations 2009; VTA 2009).

In the first year, the performance reports showed increase in ridership and credited this towards the new service and approach to service planning. However, in July of 2009 VTA had to resort to cutting services system-wide in order to address a growing deficit owing to a sharp decrease in sales tax, state funding shortfalls, and delayed federal funding that resulted from the nationwide 2008 recession. Rising unemployment coupled by service cuts, brought VTA's average weekday system-wide bus boarding down by roughly ten percent (VTA 2009; VTA 2010).

Customer Composition & Ridership Trends

In 2005, as part of the Comprehensive Operations Analysis, VTA conducted an On-board Passenger Survey capturing ridership demographics. The majority of transit riders were young, low income, and Hispanic (VTA 2006, 1). Over half of VTA riders made an annual income of less than \$25,000 per year, and 11% were unemployed (see Figure 3)(VTA 2006, 23).

Those who used VTA did so regularly and had limited transportation options. Three quarters of riders said they used transit four days a week or more, did not have an automobile available, and typically walked to get to and from the bus stop (VTA 2006, 2-3). Bus users typically rode more frequently than rail users and had higher rates of transit dependency. Compared to light rail riders, bus users also had lower rates of employment and were lower income (VTA 2006, 4).

VTA bus ridership has decreased in the last decade—particularly after the dot-com bust in 2001 (see Figure 4). With rising unemployment rates and a national recession in 2008, trends within the past year have been especially bleak.

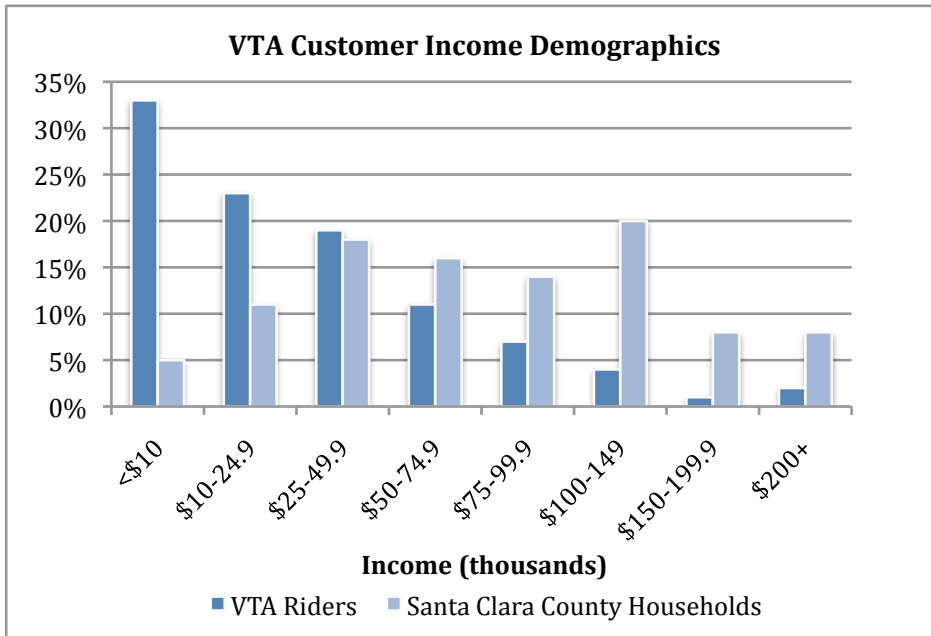


Figure 3. VTA customer income demographics compared to Santa Clara County households. Data from the 2005-2006 On-Board Passenger Survey.

As of September 2009, VTA's system-wide average weekday boarding was down 9.3%, bus boarding was down 9.2%, and light rail boarding was down 9.7% (VTA 2009a). Interagency ridership figures were also down: Caltrain use was down 9%; Altamont Commuter Express was down 26%, Monterey-San Jose Express was down 32%; Highway 17 Express was down 7% and Dumbarton Express was down 4% (VTA 2009a).

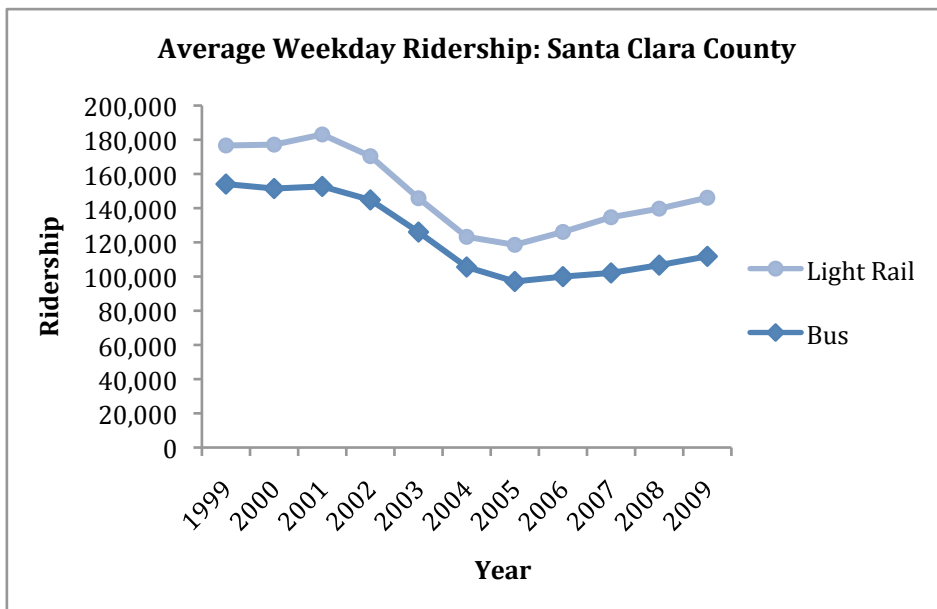


Figure 4. VTA average weekday bus and light rail ridership: 1990-2008. Data from the Santa Clara VTA Department of Finance, 2009.

To offset a loss of ridership and sales tax revenue, VTA increased their fees in October 2009. The cost of a single ride increased from \$1.75 to \$2.00 and the cost of a monthly pass increased from \$61 to \$70 (VTA 2009b). This fare increase was not the first of its kind. Fees have increased four times since 2003 (VTA Department of Finance 2009, 25). Fare increases have typically ranged from a ten to forty percent hike, with the highest fees placed on adult and youth fares (see Figure 5) and greatest percent increases placed on seniors and youth (see Figure 6) (VTA Department of Finance 2009, 25).

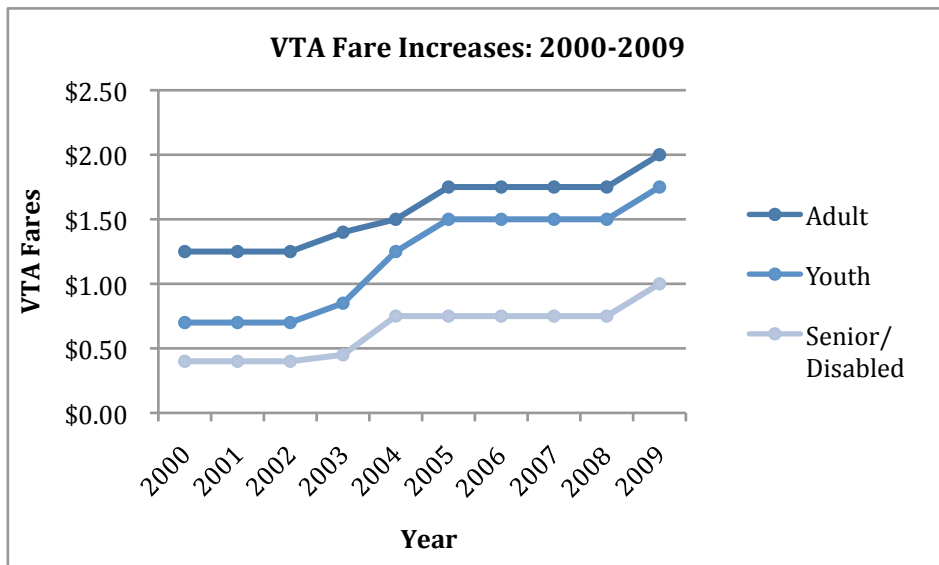


Figure 5. VTA fare increases 2000-2009. Data from VTA Department of Finance, 2009.

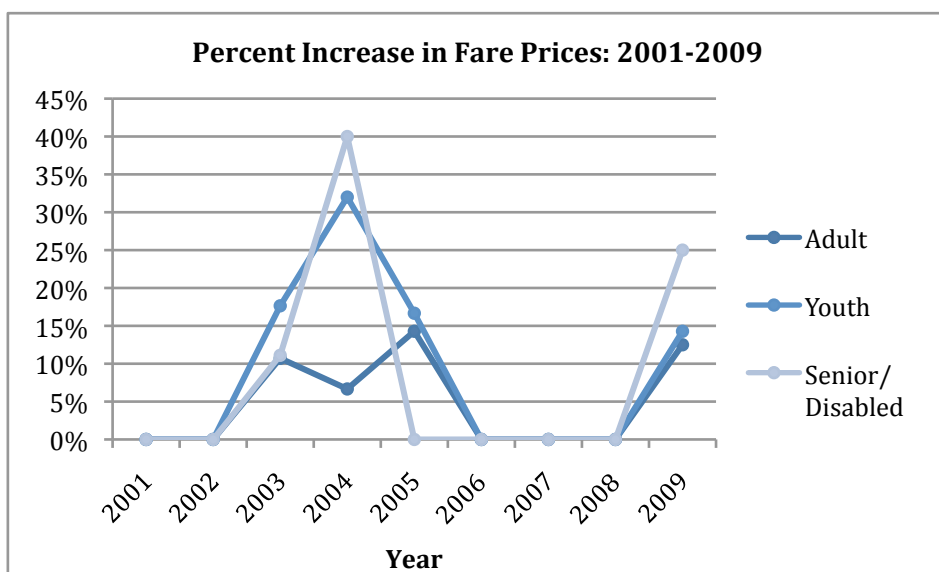


Figure 6. Percent increase (from previous year) in VTA's fare prices. Data from VTA Department of Finance, 2009.

VTA's 2005-2006 On-board Passenger Survey indicates that fares are a top concern for over fifty percent of existing passengers (VTA 2006, 35). Fare increases have a disproportionate effect on low-income riders because they have less flex money to offset fare increases (Blumenberg and Manville 2004; Rice 2004, 113; Sanchez 2008). Since over half of VTA bus riders are below the poverty line and are sensitive to fare changes, rate increases have historically had a short-term negative impact on ridership rates and then with time return to normal (Unites 2010).

Service reductions, however, have a more long-term impact on ridership. Studies have shown that ridership rates are twice as responsive to changes in service quality over changes in fares—regardless of income constraints (Cervero, Rood, and Appleyard 1999). A study by Niemeier (1997) analyzed consumer value of commute time and found that in order to compensate for the loss of transit accessibility, low-income households would require 1.5 times the compensation required by high-income households. This illustrates that transit service is highly valued—especially by low-income households. This holds true for Santa Clara County, where over two thirds of existing riders sampled in the 2005-2006 On-Board Passenger survey said improving service frequency should be a top priority (VTA 2006, 36).

VTA transit services have been greatly reduced within the last decade due to significant declines in sales tax revenue (VTA Department of Finance 2009). Bus services have been the most affected by cutbacks, receiving for example, a 12% cut in VTA's bus fleet since the year 2000 (VTA Department of Finance 2009, 25). Over a quarter of VTA passengers rate frequency and on-time reliability as fair or poor (VTA 2006, 35). These negative outlooks on transit services have contributed to falling ridership rates, especially among bus users.

Additionally, external factors such as unemployment have also influenced VTA's ridership trends. In Santa Clara County, unemployment first peaked in 2002 during the dot-com bust and has recently reached an all time high of 12% (see Figure 7) (US Department of Labor Statistics 2010). Peaks in employment coincide with dips in ridership, likely due to fewer commute trips.

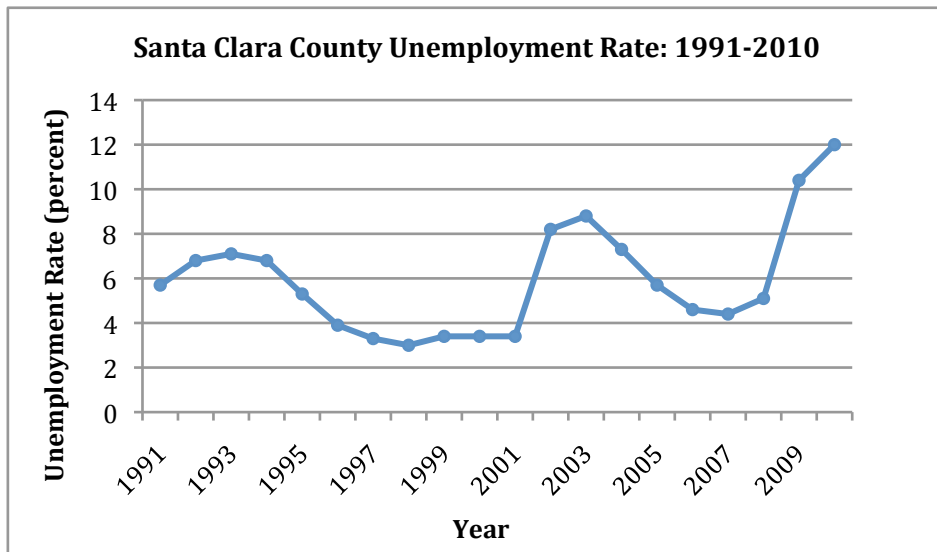


Figure 7. Unemployment rate in Santa Clara County, 1991-2010. Data from the U.S. Department of Labor Statistics, 2010.

Low ridership rates are a product of service cuts, fare hikes, high unemployment rates, and a downward economy. Low-income, transit dependent bus riders with limited transportation options are the most affected by these conditions because they less money to offset transit costs. However, no recent studies have assessed fluctuations in ridership rates among low-income riders or the severity of the recent recession on travel behavior or mode choice.

Bus Service Improvement Efforts

Two of VTA’s top strategic goals are to improve customer focus and to increase ridership rates (VTA 2009). VTA does not have an official customer service policy or a department that specifically works to improve the customer experience, but VTA does make ongoing efforts to satisfy existing riders and to attract new riders. These strategies include periodically purchasing new buses, improving bus stop conditions such as streetlight and shelters, improving the rider and operator interface, and increasing information distribution to customers using the both web and printed materials (Unites 2010).

In order to improve the riders’ on board bus experience, VTA updates its bus fleet by replacing old buses approximately every 15 years (Unites 2010). This fall 2010, 16% of VTA’s 425 buses will be replaced with a new hybrid model. VTA’s Deputy Director of Operations, Jim Unites, says these new stylistic buses will be designed to look similar to a BRT train, promoting a modern look that will hopefully work to attract new and existing riders (see Figure 8).

The hybrid buses will include new chair lifts and handrails for the elderly and disabled and will also incorporate a new mobility design for wheelchair passengers. However, no design features such as baby seats, seat belts, changing areas, or stroller storage, are provided in new or existing buses for families traveling with small children. Low-income parents interviewed by Agrawal et al. (2010) said traveling by bus with young children is difficult without adequate amenities.

Additionally, no discounts or price breaks are offered to families that would help encourage ridership in this market. Unities (2010) says that in the future VTA might consider offering special discounts to families such as days where children can ride for free with their parents. These would likely take place during special events such as downtown festivals and would not be offered on a regular basis.



Figure 8. New 2010 hybrid VTA bus model. Photograph provided by the Santa Clara VTA.

To improve the riders' experience at bus stops, VTA allocates \$500,000 to \$700,000 per year for annual bus stop improvements (Unities 2010). For example, VTA is currently adding new benches to 26 bus stops along King Road in San Jose (Unites 2010). In order to track and prioritize service changes, VTA maintains a database with information on their existing stops. On an annual basis, VTA reviews bus stop conditions and prioritizes improvement efforts based on available funding. Typical improvements include enhancing street lighting, mounting overhangs, and installing new benches.

Nearly 60% of VTA's 1,378 stops are sheltered (VTA 2006, 43). Sheltered stops encourage ridership on hot days and during the rainy winter months. VTA is in the process of sending out a Request for Proposals (RFP) for a new shelter program that calls to replace all existing shelters, and install and maintain an additional 200 shelters. The cost of implementing the shelter program will be paid for by the selected company in exchange for advertising rights. As part of the agreement, VTA will also benefit by claiming a percentage of the advertising profit.

Based on results from the 2005-2006 On-Board Passenger Survey, bus stop ratings are high—over three quarters of riders feel bus stop

quality is good or excellent, indicating that VTA's improvement efforts are paying off (VTA 2006, 35).

In addition to bus stop quality, VTA also attempts to improve the customer interface with transit operators. VTA employs 800 bus operators and 90 rail operators (Unites 2010). The agency provides extensive customer service training as part of the new hire process (Unites 2010). The eight-week training includes skill building and problem solving workshops on how to enhance customer service skills, handle fare disputes, and work with disabled passengers. A safety, security, and first aid training is also included to enhance onboard safety. As part of the program trainees are paired with a mentor, an experienced operator who provides ongoing advice and support. Separate workshops are also provided to prepare the mentors for this role. Unites (2010) says this program has helped boost operators' skills and attitudes toward their job, and has increased job attendance.

If an issue does arise between a driver and rider, customers can call the customer information center to voice a complaint. From there, the complaint is forwarded to the operator's manager who handles the issue and works to prevent the problem from arising again.

In addition to improving the operator interface, VTA employs a variety of tactics to provide information to customers (Loft 2010). VTA's website, vta.org, is their primary information outlet. VTA's website offers a number of resources to customers including "Google" trip planning, schedule information, bus and rail maps, popular destinations, fares, paratransit information, and tips for riders (Loft 2010; VTA 2010). Riders can also sign up on the website to receive automated information on specified routes.

According to Jeannie Loft (2010), VTA's Communications and Outreach Manager, VTA is also working on a program called RTI, Real Time Transit Information, which will allow passengers to access information on bus arrival times and real time schedule changes on VTA's website. Realizing that many people waiting at bus stops do not have access to the Internet, VTA is also working to eventually provide real time bus stop information using a telephone information line (Unites 2010, Loft 2010). The phone line will combine bus location information, collected using a Global Positioning System on all bus units, relative to bus stop locations in order to estimate when the next bus is scheduled to arrive (Loft 2010).

In addition to using technology, VTA also attempts to reach out to their riders in person (Loft 2010). During major services changes or

unexpected service disruptions VTA sends staff to the affected bus stops or transit stations in order to help riders get to their destination. For example, as part of the Comprehensive Operations Analysis (COA), VTA employees were placed along popular bus stop routes in order to explain service changes before they were implemented (Unites 2010).

Service information can also be accessed in VTA’s “Take One” publication, a newsletter posted at various locations such as bus stops, aboard buses, and at the VTA headquarters (see Figure 9) (Unites 2010). Pamphlets with schedule information are also sometimes distributed to local hospitals. VTA could improve information availability by posting schedules and brochures more widely on school campuses, community centers, and at social service agencies.

Occasionally, outreach takes place to distribute information to target groups. For example, under Federal Transit Administration (FTA) Title VI requirements, VTA evaluates proposed significant system-wide service changes or improvements in order to determine whether the changes will have a discriminatory impact on minority and low-income populations (VTA 2010). When evaluating a major change along a Title VI route, VTA typically analyzes a variety of route options, service hours, and frequency intervals and determines which option would promote the highest ridership rates (VTA 2010). Public outreach is incorporated into the Title VI evaluation process followed by a marketing campaign in order to distribute information about proposed changes to the community (VTA 2010). Once VTA determines which Title VI lines will be negatively affected, the marketing department again implements outreach efforts in order to inform the community about the changes. The 8% service cuts in January 2010 employed the following outreach efforts (VTA 2010):

- Multilingual advertisements and news releases were published in community newspapers, television, and radio stations including Spanish, Chinese, and Vietnamese outlets.
- Information was posted on VTA’s website homepage with a link to the service change information. Automated reminders were distributed to customers who signed up to receive email and phone updates using the automated customer service information system.



Figure 9: VTA “Take One.” Photo by VTA.

- English and Spanish notices were posted at impacted bus stops and VTA’s “Take-One” newsletter listed changes.
- Automated announcements in both English and Spanish were made on buses informing passengers of the upcoming changes.
- Mail or email information was sent to Eco Pass employers and community organizations, including annual and monthly pass holders, San Jose State University, and community centers such as the North-side Community Center and the Mountain View Senior Center.

Although VTA does attempt to improve the customer experience by enhancing bus and bus stop conditions, improving the rider and operator interface, and by distributing information to customers, VTA does not have an official customer service policy or guidelines in place for conducting and tracking routine improvements. Nor does the agency have a formal, documented outreach approach. This makes tracking the effectiveness of these tools and strategies difficult. VTA would likely benefit by developing marketing strategies that target specific demographic groups, and potential transit riders. However, no feasibility or campaign studies have been conducted by the agency.

Transit Cost Assistance Programs Offered in San Jose

Transportation is the third largest expense for low-income households in the Bay Area (Rice 2004, iv), placing mobility constraints on those who cannot afford to support their daily travel needs. A recent study on homelessness in Santa Clara County conducted by Applied Survey Research (ASR), asked study participants what factors might have prevented them from becoming homeless (ASR 2009). Roughly 15% attributed their homeless status to lack of transportation assistance and roughly a quarter said lack of transportation was a primary obstacle to obtaining permanent housing and securing employment (ASR 2009, 36-37).

Although there are ample resources for food and housing aid in San Jose, the cost burden of transportation is under-recognized and under-supported by social service programs. There are several federal, state, and local programs that provide opportunities for user subsidies, transit reimbursement, and free or reduced passes, but resources and information are not well publicized (see Table 2).

California Work Opportunities and Responsibility to Kids, known as CalWORKs, is the largest program funded by a federal grant called

Temporary Assistance for Needy Families (World Institute on Disability 2009; Santa Clara County Social Services Agency 2008) (see Table 2). OUTREACH is a local nonprofit organization in Santa Clara County offering several CalWORKS programs to qualifying families such as the Give Kids a Lift! Program (OUTREACH 2010; Mass Health 2009). However, qualifying income thresholds are so high, that when compared to the poverty standards set by the City of San Jose Department of Housing, even “extremely-low income” San Jose residents may not qualify for aid.

Another subsidized transit service for low-income and welfare participants is the Federal Job Access and Reverse Commute program (JARC) (see Table 2). JARC funds local programs operated by OUTREACH such as the Guaranteed Ride Program (U.S. Department of Transportation Federal Transit Administration 2009). Additionally, nonprofit groups such as St. Joseph's Cathedral Office of Social Ministry and the Salvation Army provide food and VTA vouchers to low income and homeless individuals (St. Joseph's Cathedral 2010).

Some low-income households may be able to receive free or reduced “Eco Passes” through their employer or place of residence. VTA offers businesses and housing complexes Eco Pass packages at a reduced price. The cost of transit packages are based on the provider’s proximity to VTA services and the number of passes purchased (VTA 2010). Several low-income housing complexes in San Jose are enrolled in the program and offer free transit passes to their residents.

VTA offers countywide discounted fares and transit passes to youth, disabled, and elderly customers (see Table 3) but there are no special discounts offered to low-income individuals or families. Therefore, unless a low-income person happens to be disabled or falls within the youth or elderly age brackets, individuals who are struggling to pay for transit services must rely on other sources for transportation aid.

In Santa Clara County, seniors can receive transportation aid, free transit passes, or paratransit fare subsidies through the Senior Outreach Program operated by OUTREACH (OUTREACH 2010) and people with a disability or medical condition are eligible to enroll in the ADA Paratransit Service program. Although eligibility is not based on economic status, some disabled participants in the program are low-income. Those who are enrolled can receive fare subsidies to reduce the cost of a single paratransit ride (OUTREACH 2010).

Table 2. Federal, state, and local transit subsidy programs

Program	Funding Source or Operating Agency Name	Who qualifies?	Free transit services	Cash Assistance	Free or Reduced Transit Passes	Mileage reimbursement	Taxi vouchers	Vehicle Maintenance vouchers	Para-transit fare subsidy
California Work Opportunities and Responsibility to Kids (CALWORKS)	Federal grant called Temporary Assistance for Needy Families	Caretakers with “deprived children” in support of “welfare-to-work” activities		X	X	X	X	X	
Give Kids a Lift!	Funded by CALWORKS operated by OUTREACH	People at or below 150% of the federal poverty line	X						
Jump Start Program	Metropolitan Transportation Commission and the Dept. of Consumer Affairs’ Bureau of Automotive Repair; implemented by OUTREACH	Low-income households		X				X	
Federal Job Access and Reverse Commute program (JARC).	Funded by JARC operated by OUTREACH	Low-income and welfare participants	X						
Guaranteed Ride Program	Funded by JARC	CalWORKS participants	X						
Senior Outreach Program	Operated by OUTREACH	Qualifying seniors over 65 years	X	X	X		X		X
ADA Paratransit Service program	Operated by OUTREACH	Disabled or qualifying medical condition	X		X				X
Road Runners	Volunteer based program through El Camino Hospital	Anyone in need of a ride to the hospital	X						
Road to Recovery (ACS 2010)	The American Cancer Society, Silicon Valley/Central Coast Regional Office (ACS)	Anyone in need of a ride to the hospital	X						
Medi-Cal	Medi-Cal	Low-income people in need of a ride to the hospital	X						
VA	Santa Clara County Veterans’ Administration (VA)	Veterans going to the hospital				X			
Universal Pass for Life Improvement in Transportation (UPLIFT)	UPLIFT (Up to 1,800 Passes dispersed quarterly)	Homeless seeking jobs, housing, and medical services			X				
St. Joseph’s Cathedral Office of Social Ministry	Non-profit	Anyone seeking free bus tokens			X				
Salvation Army	Non-profit	Anyone seeking free bus tokens			X				
Eco Pass Program	Funded by VTA; implemented by local businesses, employers, and housing complexes	Employees or housing residents affiliated with participating businesses			X				

Sources: ACS 2010; El Camino Hospital 2010; OUTREACH 2010; Mass Health 2009; UPLIFT 2009; St. Joseph’s Cathedral 2010; U.S. Department of Transportation Federal Transit Administration 2009; U.S. Department of Veterans Affairs 2008; VTA 2010.

Table 3. VTA fares effective October 1st, 2009.

	Single Ride	Day Pass	8-Hour Light Rail Pass	Community Bus Single Ride	Day Pass Tokens	Monthly Flash Pass/ sticker	Annual Pass Subscription
Adult	\$2	\$6	\$4	\$1.25	5 for \$27	\$70	\$770
Adult Express	\$4	\$12	N/A	N/A	N/A	\$140	\$1,540
Youth (5-17)	\$1.75	\$5	\$3.50	\$0.75	5 for \$22.50	\$45	\$495
Senior (65+) Disabled/ Medicare	\$1	\$2.50	\$2	\$0.50	N/A	\$25	\$275

Source: Santa Clara Valley Transportation Authority 2009b.

Several services are also provided locally to assist people in accessing health care including “Road Runners,” a volunteer based program through El Camino Hospital (El Camino Hospital 2010), and “road to recovery” funded by the American Cancer Society, Silicon Valley/Central Coast Regional Office (ACS) (ACS 2010). Medi-Cal also offers low-income individuals transit options to doctor’s appointments if pre-arranged. In addition, the Santa Clara County Veterans’ Administration (VA) offers veterans mileage reimbursement for trips to medical appointments (U.S. Department of Veterans Affairs 2008) (see Table 2).

Although transit cost-assistance resources do exist, accessing information on where and how to receive aid is difficult. There is no central location or web-accessible database providing a comprehensive list of local agencies that offer support. VTA’s website, which seems like the most logical place to look, does not offer any cost-assistance information outside of their paratransit services and OUTREACH program. There are only two web-accessible search engines that produce a small list of transit aid programs and resources: helpscc.org and 211scc.org.

Helpscc.org is created and maintained by the Community Technology Alliance. Although it offers easy access links on their home page to county benefits and CalWorks, there are no specific links provided on where to receive transit aid. In order to access transit information, the search function must be used. By searching for the key word “transportation,” one can access information about four agencies that offer transit aid including: Road Runners, UPLIFT, St. Joseph’s Cathedral Office of Social Ministry, and the American Cancer Society. Under the description of each of these agencies, information on transit support is provided along with their contact information and links to their websites.

The United Way website, 211scc.org, offers a more comprehensive list of transit resources, particularly programs affiliated with UPLIFT; however, accessing the list of information again requires the use of

the search function. The search function is not very effective and only yields results for specific key words.

Although these two web resources are available, they are not well known and transportation information is buried within each website. Neither site provides a comprehensive list of available programs. Additionally, non-English speaking users who are seeking aid may find these tools difficult to navigate and to understand as information is only provided in English.

Overall, there are few government and non-profit agencies that offer transportation assistance to low-income individuals. Most programs come in the form of subsidies and come with many restrictions on frequency and purpose of use. Although some programs do exist, without a central information source identifying where to apply for aid, information is difficult for users to access. Furthermore, it is challenging to assess whether the cost-assistance programs that are in place are, in fact, meeting the demand for aid due to limited research conducted on the topic.

Conclusion

While ridership rates continue to drop due to service cuts, fare increases, and poor economic conditions, the transportation needs of low-income San Jose residents remain poorly understood. Although VTA recently adopted a “market based” approach, placing services where ridership is highest, this strategy neglects to identify and serve the needs of riders—especially those with limited transit options who live in areas that are underserved by transit. Although VTA continually improves onboard and bus stop conditions and attempts to keep riders informed about service changes, VTA does not have a customer service policy or a comprehensive outreach strategy in place for targeting specific markets. Without a full grasp of customer needs, it is difficult to tell how services and fare structure could be improved to encourage ridership. Furthermore, although transit costs are seen as one potential barrier for low-income individuals, it is difficult to evaluate whether there are adequate services and social programs to meet the demand for aid without further research, especially at the local level.

Chapter III: Existing Research on Low-Income Travel Behavior

Chapter Overview

The high cost of transportation is thought to influence the daily travel behavior, mode choice, and mobility constraints of low-income people. This chapter discusses the main themes and debates regarding low-income travel behavior in an effort to identify the transportation barriers faced by low-income American households using fifty journal articles. Eight national surveys and thirty regional household transportation surveys are also reviewed to identify sampling method constraints and gaps in the literature.

This chapter starts by evaluating the monetary cost burden of transportation on the poor using data from the Consumer Expenditure Survey (CES). Studies conducted on the relationship between job accessibility and transportation and major research findings conducted on the spatial mismatch hypothesis are also analyzed. Next, the effects of mode choice and mobility constraints on the travel behavior of various demographic groups are identified from the literature. Lastly, planning recommendations commonly suggested by researchers, and gaps pointing to areas for further research are called out.

Main Themes and Debates

How big is the cost burden of transportation?

The monetary cost of transportation is shockingly high regardless of income. According to the Consumer Expenditure Survey (CES) transportation is the second largest expense next to housing—equating to the total cost of food and health care combined for the average American household (Piarski 2006, 131). What is more, housing and transportation costs are rising annually faster than incomes (Lipman 2006). Between 2000 and 2005, transportation costs rose 13%, while income only rose 10% (Lipman 2006, 17). Therefore the cost burden of transportation is increasing annually.

Automobiles make up the bulk of transit expenditures and are the primary reason why annual transit costs are increasing at such a fast rate—particularly among very-low income households (Piarski 2006)¹. Between 1983 and 1995 the proportion of households who owned at least one vehicle and made an annual income \$10,000 or less increased from 61% to 70%—the largest increase in auto

¹ Very-low income is defined as the average income within the lowest income quintile, which was \$10,608 in 2008 (U.S. Bureau of Labor Statistics 2008).

ownership among all income groups (Deka 2002). This increase in auto ownership caused a decline in public transit use. Today, public transportation accounts for less than 1% of very-low income household expenditures, while the cost of auto ownership alone is the third largest expense for the bottom quintile (U.S. Bureau of Labor Statistics 2008). This shift in mode choice explains why transit costs are increasing, and public transit expenditures are decreasing annually among low-income groups.

Transportation spending is proportionate to income, where higher income households have a higher proportionate cost burden than lower income groups (Piarski 2006; Sanchez et al. 2007). Spending also increases with the number of employed individuals in a household (Pisarski 2006, 132; U.S. Bureau of Labor Statistics 2008). Piarski (2006, 132) found that the lowest income group quintile (<\$20,000 per year after taxes) spent 17% of their income on transportation, while those who made <\$80,000 spent about 20%. This is consistent with the Bureau of Labor Statistics (2008), finding that the average household spent 19% of their income on transportation, while the lowest income quintile spent only 13%.

Overall, the CES points to an upward shift in transportation expenditures relative to income, and a lower overall cost burden for low-income households compared to other income groups.

What factors influence the cost burden of transportation?

Factors such as mode choice, job and housing location, commute time, and household size are the most commonly studied variables shown to influence the cost burden of transportation. Twenty studies investigate these factors and their effect on cost burden.

Mode Choice and Transportation Expenditures

Automobile owners have the highest transit costs compared to those who use alternative transit modes (Pisarski 2006, 132; U.S. Bureau of Labor Statistics 2008). Since lower income people have lower auto ownership rates, their transportation expenditures are naturally lower. Some studies also attribute lower auto ownership rates among low-income people to a recent finding that vehicles actually cost more for low-income people. Low-income people are inflicted with higher interest and car insurance rates (Waldron 2005; Ong and Stroll 2006). Low credit ratings and residential location drives up the cost of vehicle insurance for low-income households because lenders use “place-based” risk factors to set premiums (Ong and Stroll 2006, Waller 2005). Because of this risk assessment technique, poor

neighborhood characteristics can have a greater effect on insurance rates than even a person's driving record (Waller 2005). Higher insurance and interest rates coupled with rising gas prices make vehicle ownership less affordable for low-income people and may have an impact on mode choice tradeoffs.

Higher bus use also explains why transportation expenditures are lower among low-income groups. At a national level Taylor and Ong (1995), Garrett and Taylor (1999), Purcher and Renne (2003), and Ruttner and Kirk (1995) find high rates of transit use among low-income users contribute to lower average commute costs. Although over half of low-income people still choose to drive to work in the San Francisco Bay Area, twice as many low-income households use public transit compared to higher income groups (Rice 2004; Lipman 2006). These results are consistent with other studies, finding an inverse relationship between income and transit use (Deka 2002; Giuliano 2003; Johnston-Anumonwo 2000; Ong and Blumenberg 1998; Johnston-Anumonwo 2000; McLafferty and Preston 1992; Pucher and Renne 2003).

Clifton (2004) identifies the effect of low-income mode choice as more complex than simply rates of vehicle and transit use. Clifton (2004) finds that people use a variety of methods to keep their costs low in order to cope with the disadvantage of limited transit options. Households have complex strategies for getting around and tended to organize their transit activities around the resources available to them such as getting rides, borrowing cars, walking, or bike riding (Clifton 2004). Clifton's (2004) results are consistent with studies that show high rates of pedestrian travel such as walking and biking among low-income people (Kim and Ulfarsson 2008; Rice 2004; Babland and Schofield 2008; Beckman and Goulias 2008; Purcher and Renne 2003; McDonald 2008).

Although it has not been statistically tested, it is thought that a combination of higher rates of pedestrian and transit use might be used as a tactic for keeping commute costs low (Clifton 2004; Purcher and Renne 2003; Kim and Ulfarsson 2008; Rice 2004). Clifton (2004) and Agrawal et al. (2010) find that low-income people utilize pedestrian forms of transportation on short trips to save money on transit costs. Additionally, Edwards (2008) finds that high rates of public transit use are positively correlated with high rates of pedestrian travel. This could either be because transit is not a door-to-door service and therefore requires more walking to get to a final destination (Edwards 2008) or it could be a cost saving strategy (Clifton 2004). More research on the link between transportation

expenditures and travel behavior is needed in order to explain the relationship between mode choice and cost tradeoffs.

Housing Location, Commute Time, and Transportation Expenditures

Neighborhood characteristics such as average housing costs and commute distance has been found to play a significant role in the transportation costs of low-income households (Lipman 2006; Rice 2004; Waller 2005; Bhat and Guo 2007; Purcher and Renne 2003; Glaeser, Kahn, and Rappaport 2008). Housing and job location tradeoffs affect both transit accessibility and rates of vehicle ownership. Since the cost of auto ownership is significantly more than the cost of public transit, these tradeoffs subsequently influence the cost of transportation.

There is consensus that the further away people live from employment centers, the higher people's transportation costs become (Lipman 2006; Garrett and Taylor 1999). This effect is even more extreme for low-income households compared to medium income people (Lipman 2006, 6), who tend to live closer to work, have lower rates of vehicle use (Kawabata and Qing 2007; Bhat and Guo 2007, 519, Rice 2004, vi), and higher rates of public transit use (Deka 2002; Giuliano 2003; Johnston-Anumonwo 2000; Ong and Blumenberg 1998; Johnston-Anumonwo 2000; McLafferty and Preston 1992; Purcher and Renne 2003). These behavioral tradeoffs could help explain why transportation expenditures are lower for low-income households.

Studies have also investigated the relationship between housing location and transit access, in order to find out if low-income people live near transit to save money on commute costs; however, results have been conflicting. Glaeser, Kahn, and Rappaport (2008) and Kawabata (2003) argue that better transportation access could explain why low-skilled auto less workers live in central cities. Yet Bhat and Guo (2007) found no significant relationship between income and household location near transit or bus stops. Alternatively, Purcher and Renne (2003) argue that housing costs have actually risen near transit nodes and rail stations, pushing low-income households into less transit accessible areas and driving the cost of transit up (Purcher and Renne 2003).

In addition to a shift in housing values in central cities (Purcher and Renne 2003), jobs are moving into the suburbs (Pisarski 2006, 46-59), creating a reverse commute effect. Since the suburbs tend to have lower transit access compared to central cities the reverse

commute puts a larger strain on low-income commuters, who have lower rates of vehicle ownership and tend to live outside the suburbs (Lipman 2006; Purcher and Renne 2003). Since transportation costs increase with the number of miles traveled to work (Lipman 2006, 5), this could explain why neighborhoods with the highest transportation cost burden have low transit access, long commute times, and travel long distances to work (Blumenberg and Manville 2004, Lipman 2006, Garrett and Taylor 1999).

Hence, the literature points to a variety of factors, choices, and external constraints that influence the relationship between transit barriers and costs faced by low-income people.

What is the Cost Burden of Public Transit on the Poor?

Nationally between 1990 and 2000 public transit fares did not significantly increase when adjusted for inflation (Pisarski 2006, 136). The CES indicates the lowest income quintile spent only 6% of their transportation budget on public transit in 2008, accounting for less than 1% of their overall expenditures (U.S. Bureau of Labor Statistics 2008). Although we know people who use public transit spend about 17% less on transportation than auto users (Rice 2004), very little research has been done on the monetary cost burden of public transit on low-income riders.

In general, research has shown that fare increases and service cuts have a disproportionate affect on low-income households because they have less money to offset fee hikes and have higher rates of transit dependency compared to other income groups (Deka 2002, Levinson 2010). Additionally, fare increases impact larger households more severely (Clifton 2004, Purcher and Renne 2003, Rice 2004, 29). Ultimately, cost impacts are largely dependent on the transit fare-pricing scheme (Rice 2004). For example, the Santa Clara Valley Transportation Authority (VTA), which provides bus, rail, and paratransit service to Santa Clara county, charges admission per person; therefore, large transit dependant households are more burdened by fare increases than other households (VTA 2009b).

Rice (2004) found that VTA charges separate admission fees with each transfer unless a day pass is purchased. Out of the nine counties analyzed by Rice (2004), VTA was found to yield the most expensive public transit commutes due to this fare structure (Rice 2004, 51). Therefore, low-income transit-dependent families in Santa Clara County could be disproportionately burdened by public transit fees compared to the average low-income Californian. Additionally, Rice (2004, 60) says that auto-less families are more subject to the burned

of transfer cost because they may have to transfer buses in order to take their children to school or childcare.

Monthly discounted passes, offering about 45% off the regular price for unlimited rides, are sold to reduce the cost burden by about \$250 annually for the average commuter (VTA 2009b; Rice 2004). However, low-income households may face more difficulty paying for a \$70 VTA monthly pass (VTA 2009b) in one lump payment (Rice 2004, 51). Data from the 2005-2006 On-Board Passenger Survey revealed that nearly half of all low-income transit riders (<10,000 per year) purchased a day pass or paid in cash for a single ride, while only a third used a monthly pass (VTA 2006). It is possible that those who cannot afford a monthly pass in one lump payment, may really be spending more on day passes or single rides in the long run. More research is needed to determine the effect of fare structure on cost burden, especially at a larger scale.

Job Accessibility and Transportation Barriers

Spatial Mismatch Hypothesis

The shift toward a “service oriented” economy has dramatically restricted job opportunities for minority groups, particularly for minority men who historically worked in the manufacturing sector (McLafferty and Preston 1992, 406). With the rise of outsourcing and a shift in job locations to the suburbs, minority inner-city groups have low access to high paying jobs (McLafferty and Preston 1992, 406). “Welfare-to-work” policies have typically been installed to overcome the spatial mismatch hypothesis—conjecturing that people on welfare have a difficult time finding employment due to the distance between their inner-city residency and job locations in the suburbs (Blumenberg 2004). John Kain's spatial mismatch hypothesis was first proposed in the late 1960s (Kain 1968; Wilson 1991); however, it was not until the early 1980s when joblessness and growing rates of poverty in the inner-city spawned a new wave of research investigating the hypothesis and its influence on welfare-to-work policies (Wilson 1991).

Policies related to helping low-income people find work through transportation solutions are particularly relevant today, due to the large unemployment rate on the rise in the U.S. Additionally, job growth is commonly occurring in the suburbs, causing a reverse commute effect. As more low-income people lose jobs and employment nodes shift to transit poor areas, increasing access to employment opportunities for low-income minority workers will become priority in framing policy.

Many studies have supported the spatial mismatch hypothesis showing a strong relationship between low transportation accessibility and low job access (Blumenberg and Ong 1998; Allard and Danzinger 2003 as cited by Blumenberg 2004; Giuliano 2003; Johnston-Anumonwo 2000; Purcher and Renne 2000; Liu 2009; Taylor and Ong 1995; Garnett 2001). Transit accessibility, housing location, gender, and race are the variables most commonly studied, and are thought to influence the degree to which the spatial mismatch hypothesis holds.

Transit access play central role in the spatial mismatch of low-income groups. Automobiles have been shown to increase the likelihood of employment by increasing access to job opportunities (Cevero et al. 2002, Danzinger et al., 2000, Garasky, Fletcher, and Jensen 2006, Ong 1996, Ong 2002; Taylor and Ong 1995; and Cifton 2004). Conversely, transit users have longer commute times and significantly less access to jobs (Pucher and Renne 2003; Kawabata and Qing 2007). Therefore, lower rates of car ownership and greater use of public transit, common among minority central city residents, lowers employment access (Johnston-Anumonwo 2000; Glaeser, Kahn, and Rappaport 2008, 21; Liu 2009, 615). These findings support the spatial mismatch hypothesis, speculating that residential location and transportation access are employment barriers.

Lin and Long (2008) find that low-income minority neighborhoods tend to have the longest commute times, even though they travel shorter distances to work, making minority groups prone to employment barriers as a result of low transportation access. The minority group most affected are African Americans. Studies find the highest rates of transit use and lowest rates of auto ownership among African Americans—yielding a stronger spatial mismatch among Blacks compared to all other racial groups (Pisarski 2006; Purcher and Renne 2003; McLafferty and Preston 1992; and Johnston-Anumonwo 2000, 70). The difference in job access for blacks is reflective of mass transit use, poor spatial access to employment, lower wage jobs, and the reverse commute effect (Johnston-Anumonwo 2007; McLafferty and Preston 1992). Black woman, in particular, are found to face the biggest transportation barriers to employment access. Johnston-Anumonwo (2007) and McLafferty and Preston (1992, 428-129) found that black woman had a longer commutes than white women, due to higher rates of public transit dependency.

However, when comparing woman with men there is some debate as to which sex has higher rates of spatial mismatch. Liu (2009) found that female immigrants have more spatial employment barriers than

men, especially woman with children. This conflicts with McLafferty and Preston (1992), finding that woman have better access to jobs than minority men because men typically work in the declining manufacturing sector, while woman tend to do more service oriented jobs, which are on the rise (McLafferty and Preston 1992).

Studies Not In Support of the Spatial Mismatch Hypothesis

Some studies have contradicted the spatial mismatch hypothesis all together (McLafferty and Preston 1992; Bhat and Guo 2007; Taylor and Ong 1995; Blumenberg 2004). Blumenberg (2004) compared research on the spatial mismatch hypothesis to travel behavior studies containing data on welfare participant locations, jobs, and public transit, finding that the hypothesis is not relevant to the majority of welfare participants. Blumenberg challenges the premise of her argument on three factors: 1) the theory over simplifies the central city and suburb relationship and the relationship between welfare residency and jobs; 2) there is an overemphasis on long commute times to suburban job locations; and 3) the hypothesis is based disproportionately on the employment behavior of men, when woman account for the majority of welfare participants. Blumenberg's findings reveal that public transportation is an obstacle for long distance commuting to low-wage jobs, and that welfare participants, particularly single mothers, typically seek jobs close to home. This is similar to Bhat and Guo (2007) and Kawabata (2003, 1666), finding that low-income people, including welfare recipients, tend to live closer to high density job locations and therefore actually have an advantage over those in suburb neighborhoods in finding and retaining employment.

Also in contradiction of the spatial mismatch hypothesis, Taylor and Ong (1995) find that white and minority work travel patterns are converging over time. Travel distance to work increased for all racial groups in their study and the relative change in commute times among different racial/ethnic groups shrank over time (Taylor and Ong 1995). This could be because auto ownership is increasing among minority workers. Taylor and Ong (1995, 1469) found no significant relationship between job turnover and commute length among minority groups. Additionally, transit mobility and regional employment access factors did not play a significant role in explaining changes the status of those receiving "Temporary Assistance for Needy Families" (Zedlewski and Golden, 2010; Sanchez, Shen, and Peng 2004, 1325). Instead, personal characteristics such as health status and jobs skills had a significant impact on employment (Shanchez, Shen, and Peng 2004; Taylor and Ong 1995). Therefore, it is unclear how large of an influence

transportation really has on employment when compared to other variables.

Low-Income Transportation Barriers

Automobile Mismatch

It is widely accepted that automobiles increase mobility. As previously discussed, studies find a direct relationship between income and mobility with lower rates of auto ownership among low-income households (Babland and Schofield 2008; Bhat and Guo 2007; Clifton 2004; Deka 2002; Giuliano 2003; Rice 2004; Johnston-Anumonwo 2000; Lin and Long 2008; McLafferty and Preston 1992; Pucher and Renne 2003). This is formally known as “automobile mismatch” (McLafferty and Preston 1992). Researchers have sought to investigate the relationship between transit access, automobile mismatch, and travel behavior among low-income groups in order to understand mobility barriers faced by this population group.

Transit access is one factor shown to influence mode choice in low-income communities. Studies find an inverse relationship between auto ownership and transit use, with higher rates of transit ridership among those without automobiles (Giuliano 2003; Johnston-Anumonwo 2000; Ong and Blumenberg 1998; Johnston-Anumonwo 2000; McLafferty and Preston 1992; Pucher and Renne 2003). Deka (2002) found that vehicle ownership rates are lowest in impoverished areas and that elasticity in ownership is small in areas with higher access to public transit. This is consistent with Bhat and Guo (2007) and Glaeser, Kahn, and Rappaport (2008) finding that households in areas with high transit accessibility are less likely to own cars than those living in transit poor neighborhoods.

Knowing that transit accessibility, vehicle constraints, and high transportation costs are obstacles for low-income people, studies have sought to find out how people deal with mobility issues and what tradeoffs people make in order to increase their mobility. Travel behavior is one coping mechanism identified in the literature. Studies find that low-income people drive less, make shorter and fewer auto trips, and take the bus more than other income groups (Kim and Ulfarsson 2008, Limanond and Niemeier 2003; Purcher and Renne 2003; Rice 2004; Rittner and Kirk 1995). They also carpool more (Rice 2004; Blumenberg 2004) and choose to live closer to their work place, schools, and shops (Bhat and Guo 2007; Blumenberg 2004, Lin and Long 2008).

Clifton (2004) and Coveney and O’Dwyer (2009) conducted semi structured interviews with families with children and with people

with food access constraints, finding that low-income people use a variety of transit modes to overcome transit barriers by getting rides, borrowing a car, using volunteer transportation services for people in need, taxi vouchers, or by pedestrian travel. These findings are consistent with quantitative studies showing that low-income people walk and bike more than other income brackets and take significantly longer pedestrian trips (Babland and Schofield 2008; Beckman and Goulias 2008; Kim and Ulfarsson 2008; Rice 2004; Limanond and Niemeier 2003; McDonald 2008; Purcher and Renne 2008). High rates of pedestrian travel could be a tactic for reducing transit cost in addition to coping with mobility constraints; however, this was not tested specifically.

Demographics, Mobility, and Travel Behavior

Studies find that some demographic groups are more negatively affected by transportation barriers than others and that different demographic groups manage mobility barriers in different ways. The primary demographic variables studied are age, race, gender, family size, marital status, employment, time in the U.S., education, housing tenure, and health status.

With respect to age, the literature points to youth and elderly people as the least mobile, having the lowest rates of auto ownership and highest rates of public transit dependency (Babland and Schofield 2008; Purcher and Renne 2003). Consequently, youth and elderly people take fewer daily trips and travel shorter distances (Babland and Schofield 2008; Pisarski 2006; Purcher and Renne 2003). Youth cope by doing more transportation related physical activity compared to other age groups (Babland and Schofield 2008), while elderly people in their 60s and 70s tend to frequently work from home (Beckman and Goulias 2008).

Bus conditions also play a role in elderly mobility and mode choice. Patterson (1985) and Rittner and Kirk (1995) found that bus service conditions such as poor shelter at bus stops; low frequency of busses on the weekend; long wait times; dirty windows preventing customers from seeing their destination stops; and fear of being robbed due to overcrowding—all reduced the frequency of bus use among low-income elderly people (Patterson 1985 and Rittner and Kirk 1995). Therefore, bus conditions can decrease the mobility of elderly people and prevent them from accessing health care, and other social services (Rittner and Kirk 1995). A more recent study by Lee and Moudon (2008) found that traffic, distance, hilly terrain, and dangerous cross street conditions all prevented elderly people from

walking more frequently, which also has noteworthy negative impacts on elderly mobility.

In addition to age, race is commonly studied. With the lowest auto ownership rates (Pisarski 2006; Lin and Long 2008), highest overall rates of transit dependency (McLafferty and Preston 1992, Taylor and Ong 1995), and the longest commute times, African-Americans are considered to be the least mobile minority group (Johnston-Anumonwo 2000, 68; Lin and Long 2008; McLafferty and Preston 1992, 419; McLafferty and Preston 1997; Taylor and Ong 1995). Second to whites, Hispanics/Latinos are the most mobile compared to other groups and have high rates of vehicle ownership (Giuliano 2003; Lin, Jie, and Long 2008; Purcher and Renne 2003). Although Hispanics have been found to use public transit less than blacks, they are nearly three times more likely than whites to use it (Purcher and Renne 2003, 67). Pedestrian travel also varies by race. Hispanic youth have the highest significant rate of active transportation to school followed by blacks, Asians, then whites (McDonald 2008). Additionally, Latino adults have high rates of bicycle commute trips (Purcher and Renne 2003, 67). Therefore, race impacts both mode choice and travel behavior.

Although auto ownership does not differ by sex, travel behavior does differ when comparing low-income woman to men. Women take public transit less frequently at night compared to men, likely due to safety concerns (Blumenberg and Manville 2004). When driving, women tend to chain trips together (Blumenberg 2000) and carpool more than men (Purcher and Renne 2003, Rice 2004, 88-89). Additionally, low-income women seek jobs closer to home and make more household supporting trips (Blumenberg 2000). They also walk more than men (Kim and Ulfarsson 2008). Blumenberg (2000) and Purcher and Renne (2003) attribute variations in travel behavior among women to differences in family and household obligations—arguing that women’s travel behavior tends to be more centered on taking their children to school, sports events, and friends’ houses compared to men.

Family size also impacts travel behavior and mode choice. There are significantly higher rates of auto ownership among larger low-income families, especially single parent households with children (Clifton 2004; Bhat and Guo 2007; Purcher and Renne 2003, Rice 2004, 29). Households with children are also more likely to commute to work by car (Rice 2004, 88) and are less likely to ride the bus (Clifton 2004; Kim and Ulfarsson 2008) even though they choose to live closer to work and have shorter commutes (McLafferty and Preston 1997). This could be attributed to the logistics of

transporting multiple passengers, or due to cost and time tradeoffs between bus use and automobile use.

In addition to family demographics, education also impacts mode choice. Kawabata (2003) analyzed auto ownership by employment status in Los Angeles, Boston, and San Francisco using the 5% PUMS of the 1990 U.S. Census data. Kawabata (2003) found higher rates of auto ownership among people working more than 30 hours per week compared to those working less hours. He also found higher rates of zero auto households among the unemployed compared to those working less than 30 hours per week (Kawabata 2003). This is consistent with other studies finding vehicle ownership increases with individual employment status and with the number of employed adults in the household (Rice 2004, 32; Giullano 2003; Pisarski 2006; Kawabata 2003).

The same effect is true for immigrant status. Immigrants have lower rates of auto ownership (Pisarski 2006), and higher rates of public transit and walking trips (Clifton 2004). However as immigrants live in the U.S. for longer periods of time, vehicle ownership increases and pedestrian and bus trips decrease (Pisarski 2006; Kim and Ulfarsson 2008). Studies have not looked at how immigrants have modified their travel behavior in order to cope with lower mobility when they first arrive in the States.

Other demographic variables that are understudied include education, marital status, and housing tenure. Babland and Schofield (2008) found low-educated people have lower rates of auto ownership, while Kim and Ulfarsson (2008) found that people with college degree make more pedestrian trips. McLafferty and Preston (1997) show married men commute longer than unmarried men; however, no other studies have looked at the effect of marital status on auto ownership or mobility. Only two studies look at the effect of housing tenure on vehicle ownership finding higher rates of vehicle ownership by owners compared to renters, likely due to differences in income (Pisarski 2006; Bhat and Guo 2007).

The effect of health status on transportation mode choice is also highly understudied. Out of 35 household travel surveys conducted in metropolitan areas across the U.S. between 1987 and 2008, less than a quarter asked questions on health status (Florida Department of Transportation 2001; North Central Texas Council of Governments 1996; North Central Texas Council of Governments 1998; NuStats 2003a; NuStats 2003b; NuStats 2001) and only five of the surveys asked questions on whether the interviewees' health status had physical limitations on their travel behavior or mode choice (North

Central Texas Council of Governments 1996; North Central Texas Council of Governments 1998; NuStats 2003a; NuStats 2003b; NuStats 2001). Additionally, out of fifty peer reviewed journal articles, only two studies analyzed the effect of physical health on mode choice. Both Bhat and Guo (2007) and Rittner and Kirk (1995) found that physically challenged people or people in poor health had low rates of auto ownership. More research is needed to determine how health status effects mobility constraints.

Methods for Overcoming Low-Income Transportation Barriers

Knowing that low-income people face transportation barriers, studies have investigated how to overcome mobility constraints. Solutions discussed in the literature include better land use planning, public transit service improvements, subsidized passes, and fare restructuring.

Lipman (2006), Kawabata and Qing (2007), and Kawabata (2003) identify how land use planning could be improved. Since the relative distance between housing and job locations influence transportation barriers, low-income people would benefit if housing and jobs were developed close together. Kawabata and Qing (2007) find that improving job access by promoting job growth and affordable housing in the inner city would lower commutes for low-income people. Conversely, housing dispersal efforts, and low-income housing projects in the suburbs would have a negative effect on employment (Kawabata 2003). Lipman (2006) says planners should promote housing projects on infill property near job centers and should concentrate affordable housing along transit corridors so that transit dependent riders have more access to services. These types of land use policies would also reduce transportation costs, reduce commute distances, and would alleviate congestion at a larger scale (Lipman 2006).

Researchers have also made recommendations on how to improve transportation services. First, services should be concentrated in transit dependent neighborhoods such as low-income areas, immigrant rich neighborhoods, African American communities, and in neighborhoods with elderly people (Glaeser, Kahn, and Rappaport 2008; Rittner and Kirk 1995). Additionally, service improvements should be tailored to fit community needs. For example, targeted improvements that encourage elderly ridership include regular chair lift maintenance, better security safety measures, street lighting, and sheltered bus stops (Ho et al. 2007). Transit agencies should also employ non-fixed transit service options such as shuttles in areas

with infrequent transit services (Ho et al. 2007; Garasky, Fletcher, and Jensen 2006).

Fare packaging and discounts are commonly suggested to improve the cost burden of transportation on low-income households. Low-income people tend to be more price-sensitive than other income groups; therefore, fare vouchers or subsidized transit passes are highly recommended by Blumenberg and Manville (2004) and Cervero, Rood, and Appleyard (1999). Off peak transit rider discounts would also favor low-income people because they typically work night shifts more commonly than the average person (Pucher and Renne 2003). Low-income people tend to live closer to work; therefore, providing distance fare options instead of fixed rate fares would favor low-income people (Waller 2005; Blumenberg and Manville 2004; Blumenberg 2004).

Fare restructuring is also recommended to help low-income people and large families. Rice (2004) suggests restructuring the payment system so that people do not have to pay for a monthly pass in one payment. This would allow more people to take advantage of monthly passes. Paying for transit passes in full at the start of the month when other bills are due puts strain on families who are living paycheck to paycheck (Rice 2004). Rice (2004) also recommends that agencies offer free bus transfers, which could make transit more affordable for families who cannot afford monthly passes. She argues this would also support families with children who need to make more transfers to take their kids to school before riding the bus to work (Rice 2004). Lastly, discount packages could be offered to families with children to make public transit a more affordable option (Blumenberg 2004).

Inconsistencies & Shortcomings

There are a few inconsistencies and shortcomings in the articles analyzed. First, the journal articles all define the low-income bracket differently. Low-income was typically defined as under \$20,000 or under \$40,000. Two studies restricted their population to very-low income people, only including those who made less than \$9,000 per year (Rittner and Kirk 1995; Taylor and Ong 1995). Other studies used local or national poverty rates, or social service recipients as indicators for low-income status. The wide range in low-income definitions might have influenced the commonalities or differences in the literature.

Several of the journal articles analyzed also used the same data sources, which could also have impacted literature trends. For example, six of the fifty studies used the 2000 U.S. Census 5% Public

Use Microdata Sample (PUMS) (Beckman and Goulias 2008; Kawabata 2003; Lipman 2006; Liu 2009; Rice 2004; Pisarski 2006) and five of the studies used the 2001 National Household Travel Survey (Glaeser, Kahn, and Rappaport 2008; Lin and Long 2008; McDonald 2008, Pucher and Renne 2003; Edwards 2008) (see Table 4). In addition, two primary sources used for evaluating transportation expenditures, Rice (2004) and Pisarski (2006), used the 2001 Consumer Expenditure Survey, which leaves little room for variation or data comparison.

Table 4. Common data sources

Data Source	Articles
2000 U.S. Census 5% Public Use Microdata Sample (PUMS)	Beckman and Goulias 2008; Kawabata 2003; Lipman 2006; Liu 2009; Rice 2004; Pisarski 2006
2001 National Household Travel Survey (NHTS)	Glaeser, Kahn, and Rappaport 2008; Lin and Long 2008; McDonald 2008, Pucher and Renne 2003; Edwards 2008
2001 Consumer Expenditure Survey (CES)	Rice 2004, Pisarski 2006
2000 San Francisco Bay Area Travel Survey (BATS)	Bhat and Guo 2007; Rice 2004

The data methods could have also place limitations on the survey results in the literature. Most of the regional and national survey data used a random telephone survey and/or required a home address to participate. This recruitment method excludes transient and homeless people from the study population. Not including this very-low income subgroup might have influenced survey data by increasing the average low-income thresholds and by undercounting the number of zero auto households.

Additionally, survey questions on expenditures likely underestimate the cost burden of transportation. For example, the CES does not capture the complex tradeoffs people might make in order to meet their transportation expenses. Agrawal et al. (2010) conducted semi-structured interviews among low-income adults finding that many cut their food or household expenses to meet their travel needs, which was highly taxing on their lifestyle. People also exchanged favors such as babysitting or cooking dinner or traded resources such as cigarettes in exchange for rides. Therefore transportation “costs” are not always monetary and by excluding them studies undercount the true cost burden.

Gaps & Future Research

There are several gaps in the literature that warrant future research. Although much research has been done on transportation behavior and expenditures separately, very few studies try to understand the relationship between the two (Agrawal et al. 2010). Only two

national surveys, the American Household Survey and the Survey of Program Dynamics, asked questions on both transportation expenditures and travel behavior (see Table 5) (Agrawal et al. 2010).

Table 5. Comparison of national transportation survey instrument questions

Survey Name	Questions on daily travel behavior	Questions on vehicle ownership/availability	Questions on vehicle characteristics	Questions on housing expenditures	Questions on transportation expenditures	Questions on income	Can we look at individuals or households over time?
National Longitudinal Survey	No	No	No	No	No	Yes*	Yes
National Survey of America's Families	No	Yes--few	No	Yes--few	No	Yes*	No
Consumer Expenditure Survey	No	Yes*	Yes*	Yes*	Yes*	Yes*	No
American Housing Survey	Yes--few	Yes*	Yes*	Yes*	No	Yes*	Yes
Current Population Survey	No	No	No	No	No	Yes*	Yes
Panel Study of Income Dynamics	No	Yes	Yes	Yes	Yes	Yes	Yes
Survey of Income and Program Participation	No	No	No	No	No	Yes*	Yes
Survey of Program Dynamics	Yes--few	Yes	Yes	Yes	Yes	Yes	Yes

*Extensive number of questions on the subject

Source: Data was obtained by reviewing copies of the questionnaires for each of the surveys listed: U.S. Bureau of the Census. "Current Population Survey Interviewing Manual, 2007" (January 2007) http://www.census.gov/apsd/techdoc/cps/CPS_Interviewing_Manual_July2008rv.pdf (accessed September 3, 2010); U.S. Bureau of the Census, "Survey of Program Dynamics (SPD) 2000: Cross-Sectional File SPD_00CS" (accessed September 2, 2010) http://www.census.gov/spd/pubs/SPD_00CS.pdf (accessed September 3, 2010); and files downloaded from U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey Quarterly Interview CAPI Survey" (2008), <http://www.bls.gov/cex/capi/2008/cecapihome.htm> (accessed September 3, 2010).

Out of roughly thirty regional household travel surveys, only a third asked questions on both pedestrian travel and expenditures (see Table 6). Additionally, none of the fifty journal articles analyzed how low-income people change their travel behavior in response to fluctuations in the cost of travel. This leaves a great opportunity for future research.

Long-term studies could collect data on transportation expenditures and travel behavior data over multiple years and analyze how changes in transportation costs influence spending and travel patterns. For example, one could analyze how changes in transit fare prices among public transit users impact rates of pedestrian and auto travel; whether increased gas prices impact rates of auto or public transit use; or whether a decrease in transit fares encourage ridership among low-income households.

Table 6. Comparison of regional household transportation survey instrument questions.

Survey Name	Year	State	Metro Area	Diary captures bike trips? (Y/N)	Diary captures walk trips? (Y/N)	Survey has questions specific to walking? (Y/N)	Survey has questions specific to biking? (Y/N)	Questions on travel expenditures? (Y/N)
Phoenix, Maricopa Regional Household Travel Survey	1988	Arizona	Phoenix	Y	Y	N	N	Y
Seattle, Puget Sound Regional Council	1989	Washington	Seattle	Y	Y	N	N	N
Seattle, Puget Sound Regional Council	1990	Washington	Seattle	Y	Y	N	N	N
Philadelphia, Delaware Valley Regional Planning Commission	1990	Pennsylvania	Philadelphia	Y	Y	N	N	Y
Los Angeles, Southern California Association of Governments	1991	California	Los Angeles	Y	Y	N	N	N
Seattle, Puget Sound Regional Council	1993	Washington	Seattle	Y	Y	N	N	N
Southeast Michigan Council of Governments (SEMCOG) Household-Based Person Trip Survey	1994	Michigan	Detroit, Southeast	Y	Y	N	N	N
Detroit, Southeast Michigan Council of Governments	1994	Michigan	Detroit	Y	Y	N	N	Y
Southeast Michigan Council of Governments (SEMCOG): Household-Based Person Trip Survey	1994	Michigan	Detroit, Southeast	Y	Y	Y	Y	Y
Cleveland Area Home Interview Travel Survey	1995	Ohio	Cleveland	Y	Y	Y	Y	Y
Fort Lauderdale, Florida Department of Transportation, Broward County Travel Characteristics Study	1996	Florida	Broward County	Y	Y	Y	Y	Y
Fort Lauderdale, Florida Department of Transportation, Treasure Coast Travel Characteristics Study	1996	Florida	Treasure Coast	Y	Y	Y	Y	Y
Seattle, Puget Sound Regional Council	1996	Washington	Seattle	Y	Y	N	N	N
Dallas-Fort Worth Household Travel Survey, Arlington North Central Texas Council of Governments	1996	Texas	Dallas	N	N	Y	Y	N
San Francisco, Metropolitan Transportation Commission	1996	California	San Francisco	Y	Y	Y	Y	Y
Fort Lauderdale, Florida Department of Transportation, Treasure Coast Travel Characteristics Study	1997	Florida	Fort Lauderdale	Y	Y	Preliminary Survey only	N	N
Seattle, Puget Sound Regional Council	1997	Washington	Seattle	Y	Y	N	N	N
New York Metropolitan Transportation Council	1995	New York	New York	Y	Y	N	N	Y
Dallas-Fort Worth Household Travel Survey	1998	Texas	Dallas	Y	Y	Y	Y	Y
Sacramento, Sacramento Area Council of Governments	2000	California	Sacramento	Y	Y	NA	NA	N
Phoenix, Maricopa Regional Household Travel Survey	2000	Arizona	Phoenix	Y	Y	Y	N	N
Fort Lauderdale, Florida Department of Transportation, Treasure Coast Travel Characteristics Study	2000	Florida	Fort Lauderdale	Y	Y	Y	Y	Y
Southeast Florida, Florida Department of Transportation	2000	Florida	Northeast, Jacksonville	Y	Y	Y	Y	Y
Philadelphia, Delaware Valley Regional Planning Commission	2001	Pennsylvania	Philadelphia	N	N	N	N	N
Los Angeles, Southern California Association of Governments	2001	California	Los Angeles	Y	Y	N	N	Y
Saint Louis, East-West Coordinating Council of Governments	2002	Missouri	Saint Louis	Y	Y	N	N	N
Texas Department of Transportation, Laredo	2003	Texas	Laredo	Y	Y	Y	Y	Y
Washoe County Travel Characteristics Study, Regional Transportation Commission	2005	Nevada	Reno	Y	Y	N	N	Y
Columbia, Central Midlands Council of Governments	2007	South Carolina	Columbia	Y	Y	Y	Y	Y

Source: Data was obtained by reviewing copies of the questionnaires for each of the surveys listed: Applied Management and Planning Group. 1994. *Household-based person trip survey*. Detroit: Southeast Michigan Council of Governments; Applied Management and Planning Group. 1996. *Report on survey methods*. Arlington North Central Texas Council of Governments; Barton-Aschman Associates, Inc. 1995. *Cleveland area home interview travel survey final report: Conduct of the survey*. Cleveland: Northeast Ohio Area-wide Coordinating Agency; Behavior Research Center, Inc. 1988. *Household travel survey*. Phoenix: Maricopa Association of Governments; Smith, Carr. 2000. *Southeast Florida regional travel characteristics study: Survey plan and findings*. Fort Lauderdale; Decision Data, Inc. 1990. *New recruits recruitment questionnaire*. Seattle: Puget Sound Regional Council; Decision Data, Inc. 1993. *Personal daily travel choices survey*. Seattle: Puget Sound Regional Council; Decision Data, Inc. 1996. *Personal daily travel choices survey*. Seattle: Puget Sound Regional Council; Decision Data, Inc. 1997. *Personal survey*. Seattle: Puget Sound Regional Council; Delaware Valley Regional Planning Commission. 2001. *Transportation for the 21st century: Household travel survey*. Philadelphia: Delaware Valley Regional Planning Commission; Florida Department of Transportation. Southeast Florida regional travel characteristics study executive summary report: Household travel survey. http://www.surveymarchive.org/Florida/SoutheastFlorida_2000.pdf; Florida Department of Transportation. Dallas-fort worth household travel survey: Report on survey methods. <http://www.surveymarchive.org/Central%20Texas/report.pdf> (accessed June 10, 2009); Hu, Patricia S. and Jennifer R. Young. 1995. *1995 New York NPTS: A comparison study*. New York: New York State Department of Transportation; Keller, Walter H. 1996. *Treasure coast travel characteristics study final report*. Fort Lauderdale: Florida Department of Transportation; Keller, Walter H. 1996. *Broward travel characteristics study*. Fort Lauderdale: Florida Department of Transportation; Marda Zimring, Inc. and Regional Research Associates, Inc. . Broward travel characteristics study: Final report no. 86000-1603. http://www.surveymarchive.org/Florida/Florida_Broward_96.pdf (accessed June 30, 2009); Metropolitan Transportation Commission. 1996. *Bay area travel study final report*. San Francisco: Metropolitan Transportation Commission; North Central Texas Council of Governments. Dallas-fort worth household travel survey: Report on survey methods. <http://www.surveymarchive.org/Central%20Texas/report.pdf> June 10, 2009); NuStats, Inc. 2000. *Sacramento area household travel survey: Final report*. Sacramento: Sacramento Area Council of Governments; NuStats, Inc. 2000. *Maricopa regional household travel survey final report*. Phoenix: Maricopa Association of Government; NuStats, Inc. 2001. *Travel and congestion survey: Travel diary*. Los Angeles Southern California Association of Governments; NuStats, Inc. 2003. *Household travel survey: Final report of survey methodology*. Saint Louis: East-West Coordinating Council of Governments; NuStats, Inc. 2003. *Laredo area household travel activity survey: Final report*. Laredo: Texas Department of Transportation; NuStats, Inc. 2007. *Midlands tomorrow household travel survey: Final report*. Columbia Central Midlands Council of Governments; NuStats, Inc. 2005. *Washoe county travel characteristics study*. Reno: Regional Transportation Commission; The Gilmore Research Group. 1989. *Recruitment questionnaire*. Seattle: Puget Sound Regional Council; Transportation Planning Division. 1990. *Home interview travel survey summary report*. Philadelphia: Delaware Valley Regional Planning Commission.

Secondly, many journal articles made reference to the disproportionate cost burden of public transit fares on low-income households but this cost burden has not been statistically tested. The literature reveals high rates of vehicle ownership among low-income families, especially those with children. It would be valuable to research whether price packaging is needed for families by investigating the actual cost burden of public transit on low-income families using different fare structures.

Future studies could also analyze time versus cost tradeoffs made by low-income families with children when deciding whether to invest in vehicle ownership versus public transit use. Understanding the threshold between choosing one over the other could help transit agencies make appropriate service improvements and create appropriate fare structures to accommodate families. This type of data could also be useful for affordable automobile programs that aim to support low-income household mobility.

In an effort to understand commute travel behavior and transportation constraints related to employment, the majority of studies researched work related travel. However, in order to holistically understand daily transit barriers researchers must further investigate mobility constraints surrounding non-work trips. For example, more research is needed to understand if transportation barriers limit access to food, health care, and other social services. Giuliano (2003) also notes that travel differences in work and non-work travel by race and ethnic groups are understudied.

Conclusion

As urban areas continue to grow so will the rising demand for auto travel and the threat of global climate change; therefore, it is pressing that transit agencies strive to provide competitive and sustainable transit options that attract both time and cost sensitive travelers. Transit agencies, non-profits, social service agencies, and planning officials, will have to work together to develop strategies that provide a wide variety of affordable transit options to the community that increase access jobs and amenities such as social services, health care, schools, and housing in order to help low-income people overcome mobility constraints. To accomplish this, more studies on travel behavior, expenditures, and mode choice tradeoffs are needed on an ongoing basis to assess changing community needs and to identify service improvements that will most benefit struggling population groups.

Chapter IV: Survey Design and Methods

Chapter Overview

This chapter discusses the survey objectives, the type of data collected in the survey questionnaire, and the data collection sites. Next an overview of the survey methods are described and the survey response rates are given. Lastly, the statistical methods are presented.

Survey Objectives

In this study 152 low-income San Jose food bank customers were surveyed in an effort to identify how the Santa Clara Valley Transportation Authority (VTA) can improve the customer experience in order to increase bus ridership rates. The project also seeks to identify if very-low income people in San Jose are aware of resources where they can receive transit-cost assistance and whether cost-reducing opportunities would help to encourage ridership. Lastly the study aims to identify methods for effective information distribution in order to recommend how VTA can better disseminate information on cost-assistance resources to the low-income community.

Survey Questionnaire

The survey instrument was designed as a self-completed questionnaire consisting of 34 questions (see Appendix A). The survey form was double-sided and pre-printed on an 8.5 x 11 inch page. The questionnaire was provided in three languages: English, Spanish, and Vietnamese. The foreign language surveys were printed on colored paper so they were easily distinguishable when administered to the participants. All of the surveys contained a unique three-digit identification code. Additionally, the survey location, date, and time was recorded at the top of the first page.

Questions were asked in three formats: multiple choice, check the box, and fill in the blank. Questions were grouped by format and directions were provided for each section. Some of the survey questions were modeled after questions asked in the *2005-2006 On-board Passenger Survey*, which collected data on origin and destination travel patterns, transit modes, VTA service evaluation, and passenger demographics (VTA 2006). Six types of data were collected and are described as follows:

Demographics: These questions were used to understand the demographic characteristics of the study population compared with San Jose's U.S. Census population data. Demographic questions were

also used to test if the results were consistent with travel behavior trends in the literature.

Current VTA bus use and ratings: Current VTA bus customer ratings were used to help describe the current customer satisfaction level within the entire study group and within different subsets of the study group. Although VTA offers both light rail and bus services, this study focuses on bus services; therefore, all questions related to ratings, service improvements, and current use were specific to VTA bus services.

Current transit cost-assistance and resource awareness: These questions were used to find out what percent of people currently receive free or reduced transit passes or bus tokens from a government agency or other social service program. This information was used to identify whether people in need are aware of where they can apply for transit cost assistance, illuminating the local knowledge base within the study group.

Bus service and customer service improvement preferences: These questions were used to assess whether factors such as bus stop conditions, safety, cost, frequency, cleanliness, and other bus conditions discourage bus ridership, and which improvement factors would encourage more frequent bus use.

Information dispersal methods: This question aimed to identify how best to disseminate information on transit cost assistance to the population group.

Cross street information: Location data was used to visually identify the general housing location of each survey participant relative to the data collection sites on a geographic information system (GIS) map.

Data Source

A total of 152 very-low income San Jose adult residents participated in the survey. Income thresholds were defined according to standards set by the City of San Jose Department of Housing (see Table 7).

Table 7. Annual low-income thresholds

Income Level	Household Size							
	1 Person	2	3	4	5	6	7	8
Extremely-Low Income	\$22,300	\$25,500	\$28,650	\$31,850	\$34,400	\$36,950	\$39,500	\$42,050
Very-Low Income	\$37,150	\$42,450	\$47,750	\$53,050	\$57,300	\$61,550	\$65,800	\$70,050

Source: City of San Jose Housing Department, 2009.

Note: Income limits are based on an area median income of \$105,500 per year for a family of four.

To ensure a very-low income population, survey participants were recruited while standing in line at food distribution facilities located at Sacred Heart Community Service and at Paseo Senter in the City of San Jose. Paseo Senter is a low-income housing facility that distributes food once a month to their residents. Their housing applicant income bracket cutoffs fall within the income thresholds defined in Table 7. Although Sacred Heart food bank does not require proof of income in order to qualify for aid, people who require food assistance are typically struggling to get by and are assumed to fall within the very-low income pool. The survey questionnaire also verified income level; therefore no pre-screen during the recruitment process took place.

By not employing a random phone or address survey, commonly used by most transportation behavior studies, this recruitment method ensured that understudied members of the low-income population were captured such as homeless and transient individuals. It is important to note that since the survey participants were not randomly selected, this sampling technique placed some limitations on the results, preventing the ability to make broad generalizations about San Jose's low-income population as a whole.

Data Collection Sites

Survey data was collected from customers at Sacred Heart Community Service and Paseo Senter at Coyote Creek, which are two food distribution sites in San Jose. Recruitment of food bank customers ensured a very-low income study population. Sacred Heart Community Service was chosen as the primary study site because they are the largest food distribution site in San Jose and attract a wide range of customers from across the city with varying rates of employment, housing, and transit access.

Sacred Heart Community Service is a food and clothing distribution center located on First Street and Alma Avenue. Sacred Heart provides job links, housing assistance, children's education, adult education, and legal assistance, serving approximately 1,500 customers per day (Sacred Heart Community Service 2009). The food program alone serves over 400 families per day and the clothing program serves over 300 families per day.

Sacred Heart has a small parking lot in the back for customers. Typically surface-street parking is readily available, except for street cleaning days, which occur on the fourth Friday of every month. Their customers use a variety of transit modes to access the facility including walking, biking, getting rides, or taking transit, which

ensured that a variety of transit mode users were included in the sample.

The facility is open until 5:00 p.m. Monday-Thursday and until 4:00 p.m. on Fridays. Customers are allowed to receive food twice a month, so their busiest days are around the first and fifteenth day of each month. They typically have a steady flow of people waiting in line from 9:00 a.m. to 1:00 p.m. on any given day.

Paseo Senter is operated by Charities Housing and is an affordable housing complex located on Senter Street between Tully and East Alma Avenue in San Jose. Paseo Senter differs from Sacred Heart in that they impose minimum income requirements on their customers. The facility is 70% low-income and 30% very-low income (Charities Housing 2009). There are 218 units with a density of 44 units per acre. The facility allows their residents to have one vehicle per bedroom parked onsite, however, the car must be owned and registered to a resident with a valid drivers license, which inhibits some tenants from retaining a vehicle onsite. The facility also has good nearby bus access. Paseo Senter offers food distribution to its residents on the third Friday of every month from 9:00 a.m. to 1:00 PM.

Data Collection Process

Data collection dates and times were pre-arranged with staff Sacred Heart and Paseo Senter. Data collection at Sacred Heart occurred on April 30th, June 4th, June 7th, June 9th, and June 14th, 2010 during regular business hours between 8:30 a.m. and noon. Data collection at Paseo Senter was scheduled for a single day at their once-a month food distribution event on May 21st, 2010 from 9:00 a.m. to 1:00 p.m.

A trial survey took place on April 28, 2010 from 9:00 a.m. to 10:45 a.m. at Sacred Heart Community Services. The trial survey was used to test the survey design and recruitment process. The questionnaire was not changed after the trial took place; therefore, the 28 surveys used during the trial were included in the analysis.

In order to recruit participants, customers waiting in line to pick up their food were approached and asked if they were willing to participate in a voluntary ten-minute survey on transportation used to improve transit in the area. Upon receiving the consent form (see Appendix B), participants were provided with a writing instrument, clipboard, and survey questionnaire. Participants filled out the survey on their own without being read the questions—unless otherwise requested. Multiple participants completed the survey simultaneously in order to reduce data collection time. I was

available to answer and clarify questions related to the survey as they arose.

Response Rates to Survey Questions

The number of responses (N) for each question varied. All demographic questions yielded an 80-100% response rate. Ninety percent of the study group answered the transit assistance awareness questions and 87% gave their preference for how best to distribute information on transit cost assistance. While questions related to current VTA bus use and ratings yielded an 87-93% response, roughly 80% gave their bus service and customer service improvement preference. Nearly three quarters (73%) of the study group gave their cross street information; however, some of the locations were difficult to read, contained missing information, or could not be located, yielding a total of 96 location points (63%).

The lowest response rates of 50-61% occurred under a hypothetical set of questions seeking to determine which bus condition improvements would encourage ridership. This is likely because the given factors were very specific and may not have related to every individual depending on their age, household composition, presence of children in their household, and other demographic characteristics. Response rates for bus improvement preferences were high under specific demographic group cohorts but low across the entire study group. For example, responses to questions relating to safety and child amenities were high among individuals with children, and response rates related to elderly and disabled amenities were higher among people over 55 years old.

The number respondents for each set of analyzed questions are noted accordingly in the charts and graphs found in the results section.

Study Population vs. Study Group

Based on the American Household Survey (2008), roughly 90,000 people (9%) live in poverty in San Jose. With only 152 study group participants, the survey group is not representative of the “global” study population; therefore, the results of this study cannot be extrapolated to describe the greater impoverished population in San Jose. Instead, the results of this report serve as a guide for understanding potential trends and identifying areas for future research.

Statistical Methods

Survey data was first entered into Excel and then imported into SPSS software. A codebook was used to convert the alpha responses to numeric data (See Appendix C). SPSS software was then used to run three types of statistical analysis: descriptive statistics, crosstabs, and chi-square tests.

Descriptive statistics were calculated for all questions and were used to describe key differences between the study population and the general population of San Jose. Crosstab tables and charts were used to compute frequencies categorized by demographic variables such as age, sex, or race (Salkind 2004, 384). In some cases, chi-square test was used to test how evenly distributed the data was from what was expected using the following formula (Salkind 2004, 263):

$$\chi^2 = \sum (O-E)^2/E$$

where

χ^2 is the chi-square value

\sum is the summation sign

O is the observed value

E is the expected frequency

When preparing the data to run specific tests all “can not choose/refuse” responses were deleted for each relevant variable tested; therefore, the number of response rates (N) listed in some of the figures vary.

Chapter V: Results and Interpretations

Chapter Overview

This chapter provides detailed information on the study group's demographic characteristics, VTA bus ratings and improvement recommendations, transit cost assistance awareness, and information distribution preferences based on 152 surveys conducted at Sacred Heart Community Services and Paseo Senter in San Jose, California.

Demographics

Demographic questions were asked at both an individual level (gender, age, time in the U.S., employment status, and race) and at the household level (housing tenure, number of adults, number of children under 18 years old, and income). Additionally, transportation related demographic data were collected to understand vehicle ownership rates, transportation mode choice, and current rates of bus use relative to different demographic groups.

Individual Demographics

A total of 123 surveys were conducted at Sacred Heart (81%) and 29 surveys were conducted at Paseo Senter (19%). The majority of the study group was female (58%). Most people surveyed chose to take the survey in English (59%); however, many spoke English as a second language and instead took a foreign language survey in Spanish (37%) or Vietnamese (5%) (see Table 8). Over half the study group was foreign born (52%) but less than 10% were recent immigrants (see Table 8). Therefore, although many were immigrants, most had lived in the U.S. for at least five years (43%).

Nearly half were Latino adults between the ages of 30 and 54 (48%) (see Table 8). Young adults, ages 18 to 29, were a Latino majority (18%), accounting for a quarter of the overall study group. The opposite was true for seniors (age 55 and over). The senior age cohort comprised only 12% of the study group but had the highest relative percent composition of non-Latinos (73%). This could be due to a lack of participation among Latino seniors, who frequently declined taking the survey due to literacy barriers.

Table 8. Survey participant demographics

Frequency		Percent	Frequency		Percent
Gender			US Time		
Male	63	42%	U.S. Born	60	40%
Female	88	58%	<5 years	14	9%
Unknown	1	1%	5+ years	65	43%
			Unknown	13	9%
Age			Education		
18-29	33	22%	<High School	34	22%
30-54	98	65%	High School		
55+	18	12%	Grad	60	40%
Unknown	3	2%	Some College +	48	32%
			Unknown	10	7%
Race			Employment		
Latino	91	60%	Unemployed	92	61%
Non-Latino	40	26%	Part time	16	11%
Unknown	21	14%	Full Time	20	13%
Survey Language			Student	4	3%
English	89	59%	Retired	8	5%
Spanish	56	37%	Unknown	12	8%
Vietnamese	7	5%			

Note: Percentages do not always add to 100% due to rounding

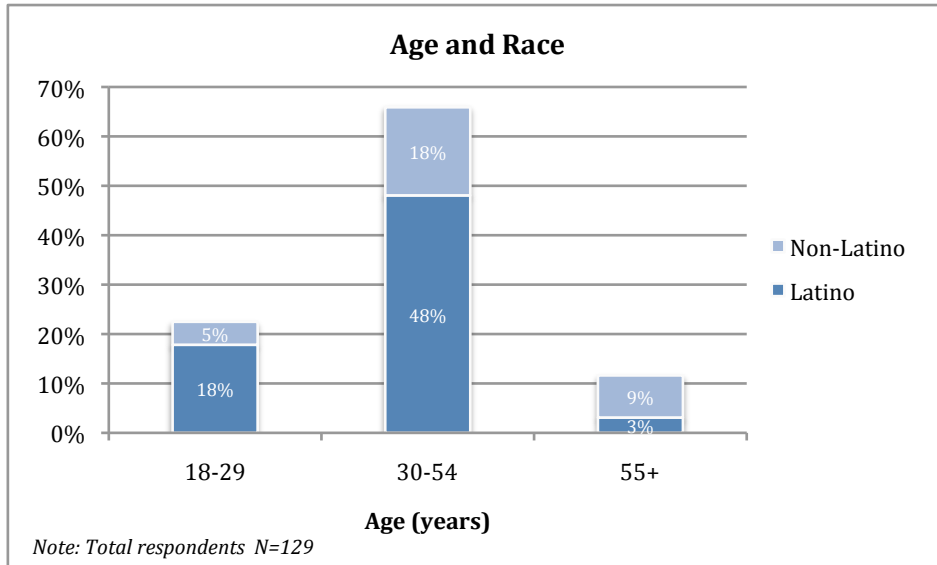


Figure 10. Composition of age and race.

Compared to the general population in San Jose, the study participants had a higher unemployment rate and were lower educated. According to the U.S. Bureau of Labor Statistics, in June 2010 the San Jose-Sunnyvale-Santa Clara metropolitan statistical area had an 11% unemployment rate. Comparatively, the study group had a significantly higher unemployment rate of 61%. The study group also had a large percent of underemployed individuals who only retained

part time jobs (11%). Less than 3% were students, and 5% were retired, leaving only 13% with full time employment (see Figure 10).

The education level of the study group was also lower than the City's general population. Over 60% of respondents had a high school diploma or less, compared to San Jose's population with only 37% with high school or less (see Figure 11).

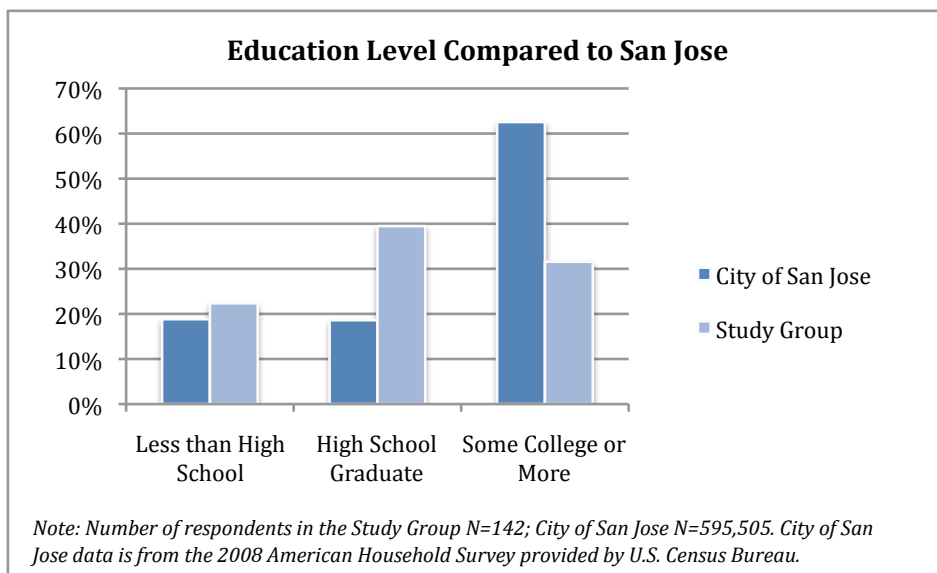


Figure 11. Level of education compared to the City of San Jose's general population.

Conversely, there was a lower concentration of higher educated individuals in the study group compared to the City's demographics. Roughly 30% fewer people in the study group had attended some college compared to the general population (see Figure 11).

Household Demographics

The households surveyed were very low income compared to the City's demographics. In San Jose, the median annual household income is \$80,616 and only 4% make less than \$10,000 per year (U.S. Census 2008). Comparatively, there was a much higher percent of low-income households within the study group (see Figure 12). Nearly half the study group made an income of less than \$10,000 annually (49%) and over three quarters made less than \$50,000 (78%).

Additionally, the study group had a much lower composition of higher income households compared to the general population. In San Jose roughly 70% make over \$50,000 per year; however, less than 3% of the study group indicated that they made that much (see Figure 12).

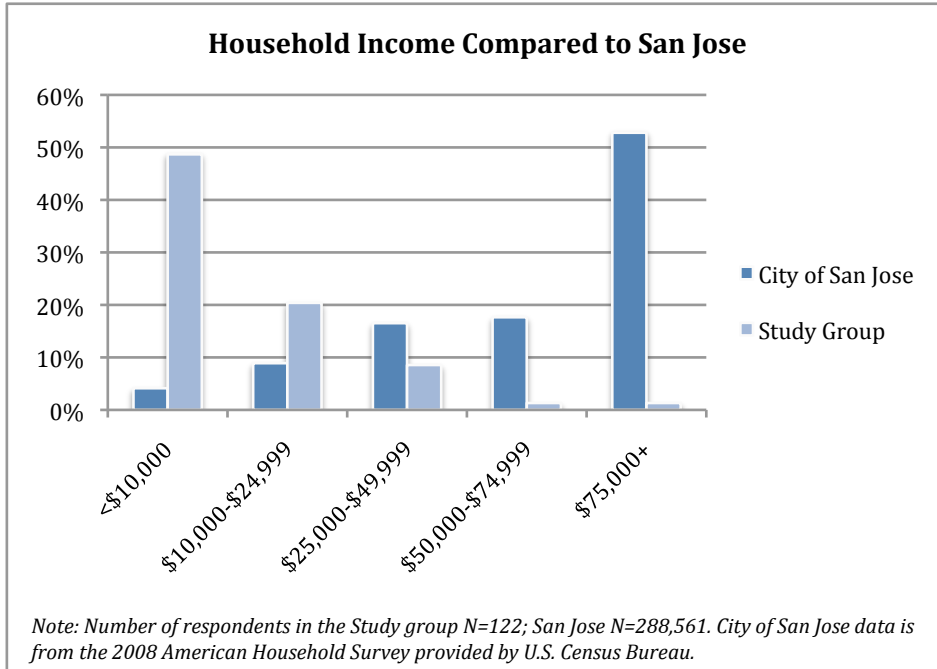


Figure 12: Household income compared to the general population of San Jose.

Homeownership rates were also extremely low (9%). Nearly 70% of the study group rented their home and 13% were homeless or living in a shelter (see Table 9).

Table 9. Household demographics

	Frequency	Percent		Frequency	Percent
Housing Tenure			Children 18 or younger		
Own	13	9%	0	45	30%
Rent	106	70%	1-2	63	42%
Homeless or Shelter	20	13%	3+	36	24%
Unknown	13	9%	Unknown	8	5%
Number of Adults (including participant)			Household Income		
1	29	19%	<\$10,000	74	49%
2	48	32%	\$10,000-\$24,999	31	20%
3+	62	41%	\$25,000-\$49,999	13	9%
Unknown	13	9%	\$50,000-\$74,999	2	1%
			\$75,000+	2	1%
			Unknown	30	20%

Note: Percentages do not all add to 100% due to rounding

Housing tenure was closely tied with income demographics (see Figure 13). The majority of the homeless subgroup made less than \$10,000 annually and most renters made less than \$50,000 per year. Although relatively few people in the study group made more than \$50,000 per year, those who did typically owned their home.

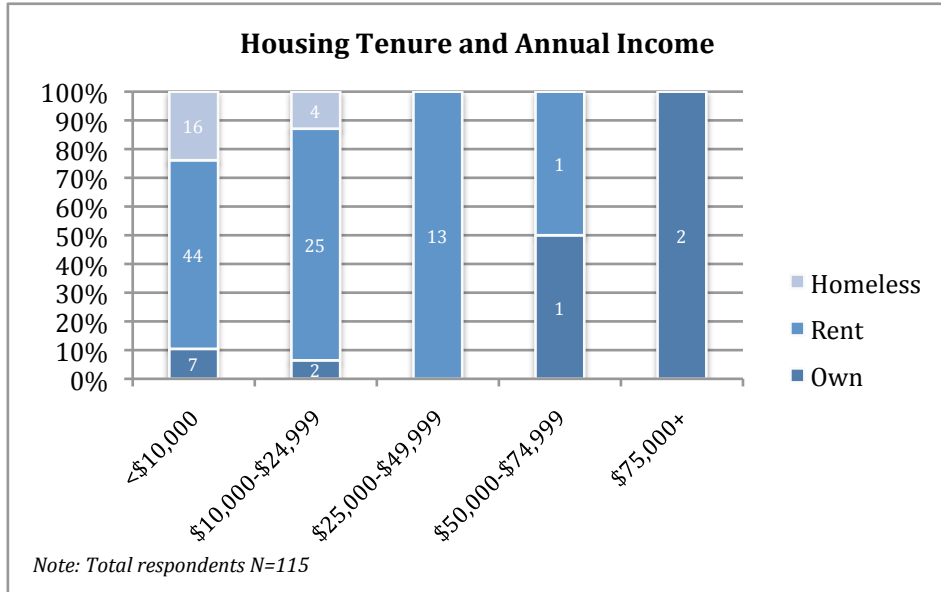


Figure 13. Relative percent of housing tenure and annual income.

Compared to San Jose, where roughly 40% of households have children 18 years or younger, there was a much higher composition of households with children within the study group (65%) (see Figure 14). Over 40% of households had one to two children and nearly a quarter had three or more children (24%) (see Table 9).

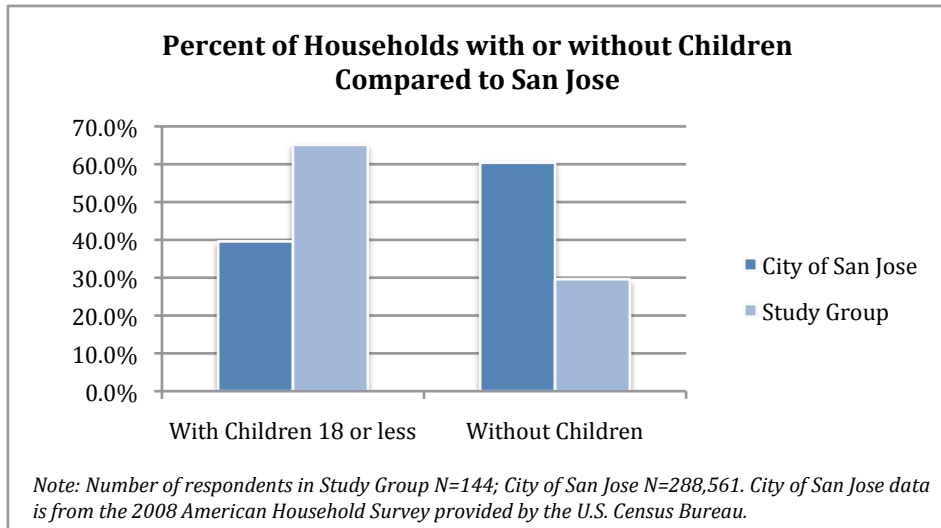


Figure 14: Households with and without children compared the City of San Jose.

In general, households tended to be quite large (see Figure 15). The majority of households had at least two adults (70%) and well over a third of households (41%) had three or more adults (see Table 9 and Figure 15). Over half the households had children and at least two adults present (52%); in fact, there were very few “single-parent” households (10%) (see Figure 15).

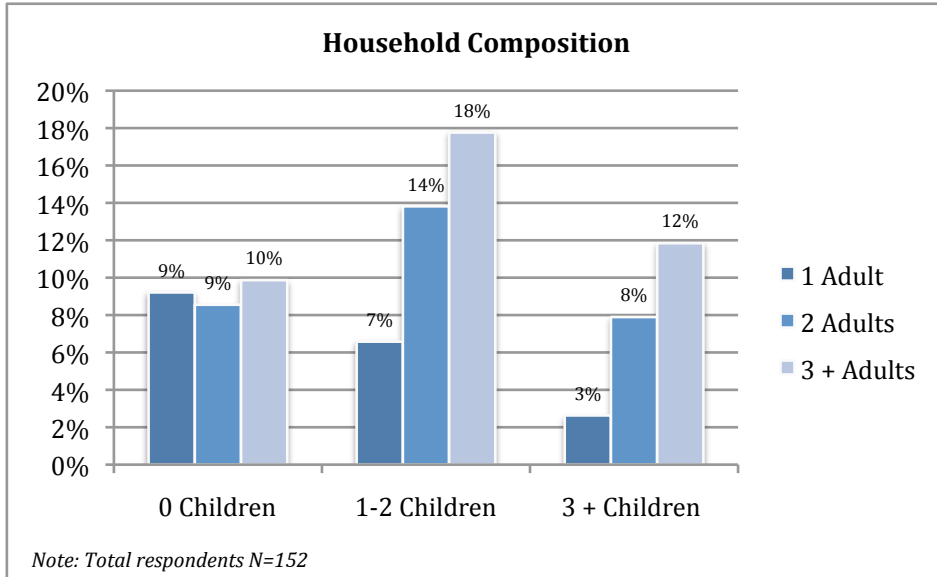


Figure 15. Household composition of adults and children.

Transportation Demographics

Vehicle Ownership and Mode Choice

Despite a low annual income, over half of the survey participants owned at least one household vehicle and roughly 45% said they use a vehicle as their primary mode of transit (see Table 10). This is consistent with other studies that have found low-income people to have high rates of vehicle ownership even though the cost of owning and maintaining a vehicle is higher than other transportation options such as walking, biking, or taking the bus (Bhat and Guo 2007; Blumenberg and Manville 2004; Clifton 2004; Deka 2002; Kim and Ulfarsson 2008; Pucher and Renne 2003; and Rice 2004).

Table 10: Transportation demographics

	Frequency	Percent		Frequency	Percent
Vehicles			Primary Mode		
0	55	36%	Walk or Bike	33	22%
1	61	40%	Bus or Light Rail	44	29%
2+	22	15%	Drive Automobile	69	45%
Unknown	14	9%	Unknown	6	4%

As a whole, San Jose’s general population is extremely vehicle dependent with 95% owning at least one vehicle (U.S. Census Bureau 2008). The study group had over six times as many zero vehicle households (36%) compared to the general population (5%) (U.S. Census Bureau 2008). The study group also had a higher percent of single vehicle households and relatively low percent of households with two or more vehicles, likely due to cost constraints of owning a second vehicle (see Figure 16).

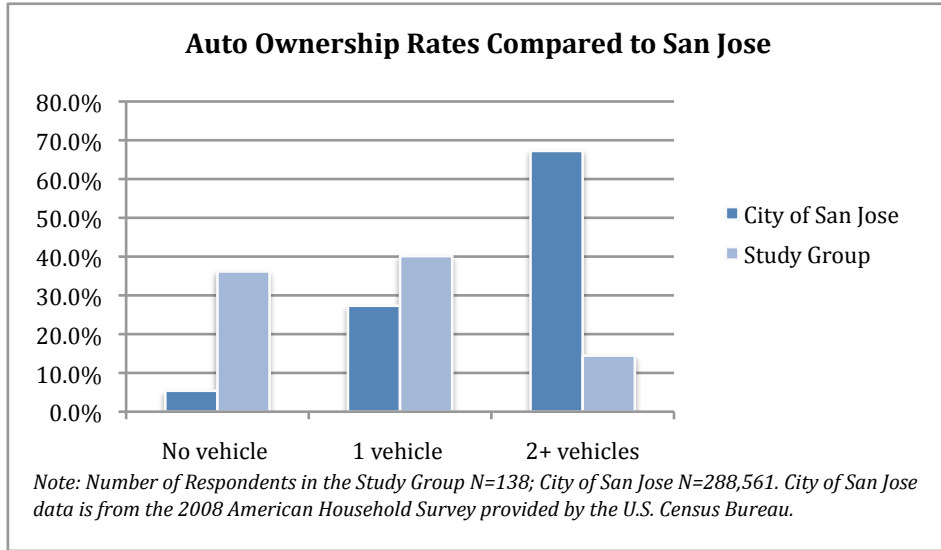


Figure 16: Auto ownership compared to the City of San Jose.

Within the study group, vehicle ownership varied by family composition. Households with children had higher rates of vehicle ownership, while households without children had higher rates of zero auto ownership. Specifically, the proportion of households with children that had at least one vehicle was 71%, whereas the proportion of households without children and at least one vehicle was only 38% (see Figure 17). The difference in observed proportions were significant ($\chi^2=12.8$, d.f.=1, $p<0.001$). Other studies have yielded similar results, finding that low-income households with children tend to have higher rates of auto ownership (Blumenberg 2000; Blumenberg 2004; Blumenberg and Manville 2004; Clifton 2004; Deka 2002; Kim and Ulfarsson 2008, Purcher and Renne 2003; and Rice 2004).

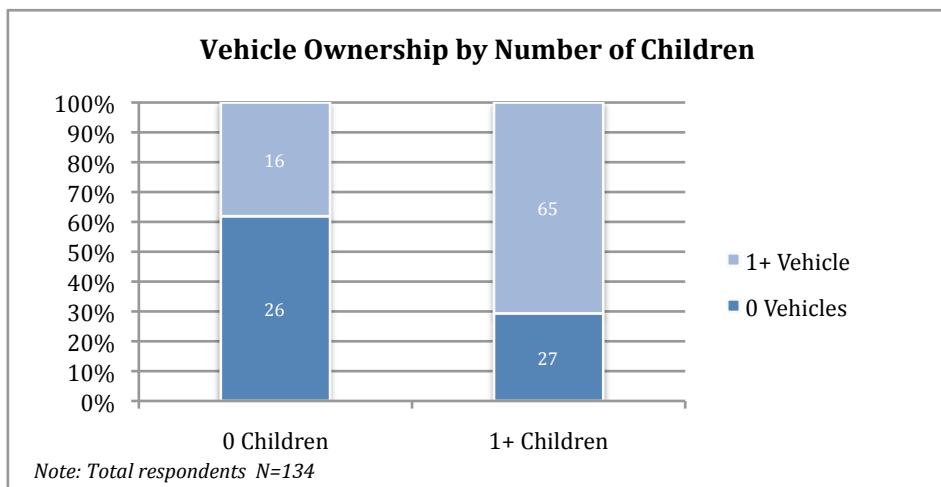


Figure 17: Vehicle ownership by number of children under 18 in the household.

Across all demographic groups, research has shown a positive relationship between automobile ownership and its affect on mobility (Deka 2002; Giuliano 2003; Glaeser and Rappaport 2008; Kim and Ulfarsson 2008; Limond 2003; Lin and Long 2008; Niemeier 1997; Waller 2005; Zegras and Srinivansan 2008). Those who do not own a vehicle are found to be less mobile and have a higher likelihood of transit dependency (Deka 2002; Kim and Ulfarsson 2008; Niemeier 1997). My results were consistent with this research. Those who owned at least one vehicle tended to primarily drive, while those who did not own a vehicle had higher rates of bus, light rail, and pedestrian transportation use (see Figure 18).

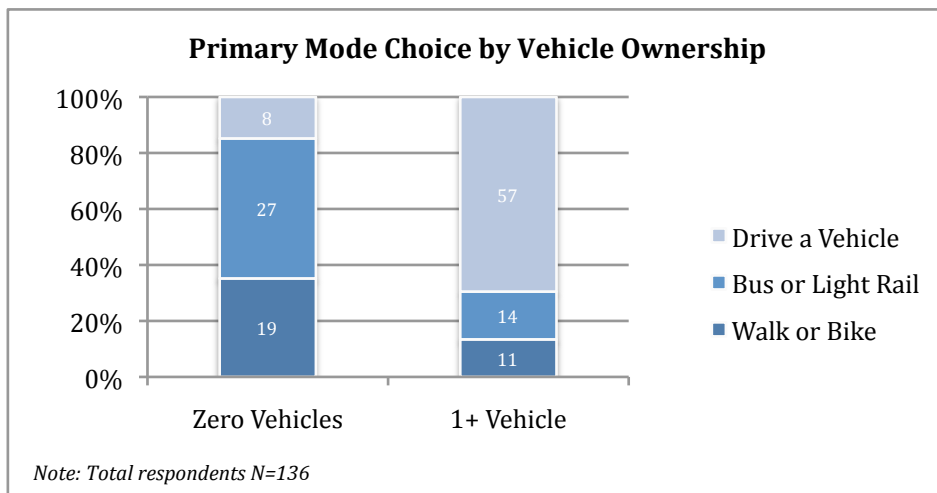


Figure 18: Primary mode choice by vehicle ownership.

Seventy percent of those who owned a vehicle drove as their primary mode of transit, while only 15% of those who did not own a vehicle chose to drive. Thirty five percent of people without a vehicle primarily walked or biked, compared to only 13% of people with at least one vehicle. A similar trend was true for bus and light rail users; fifty percent of those without a vehicle used public transit, while only 17% of those with vehicles primarily relied on transit. These differences were significant ($\chi^2=39$, d.f.=2, $p<0.001$).

Primary transit mode also varied based on factors such as presence of children in the household, employment status, and age. The majority of people with children present primarily relied on driving (54%), while most people without children utilize other forms of transportation such as walking, biking, bus, or light rail (64%) (Figure 19). The difference was significant ($\chi^2=4$, d.f.=1, $p=0.045$). This result is similar to studies such as Kim and Ulfarsson (2008) and Rice (2004), finding that low-income households, especially families with children, tend to have higher rates of auto use and are less likely to

walk or use the bus. This could be due to a number of factors including vehicle ownership and transit cost tradeoffs.

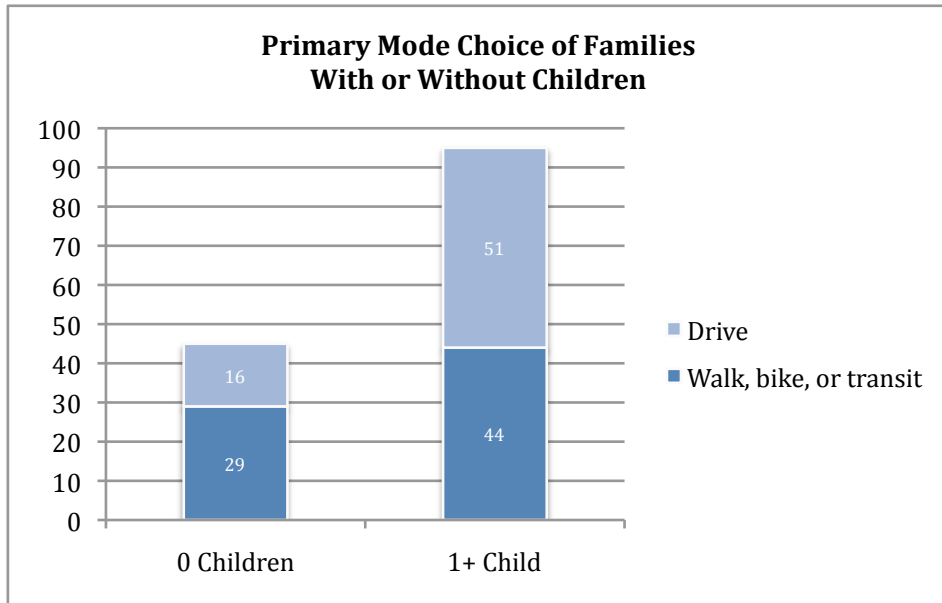


Figure 19. Primary mode choice of families with and without children.

There was also a trend between the number of children in the household and rates of auto use. As the number of children in the household increased the relative percent of driving also increased and rates of walking, biking, or riding transit decreased (see Figure 20); however the difference was not significant ($\chi^2=4.33$, d.f.=2, $p=0.115$).

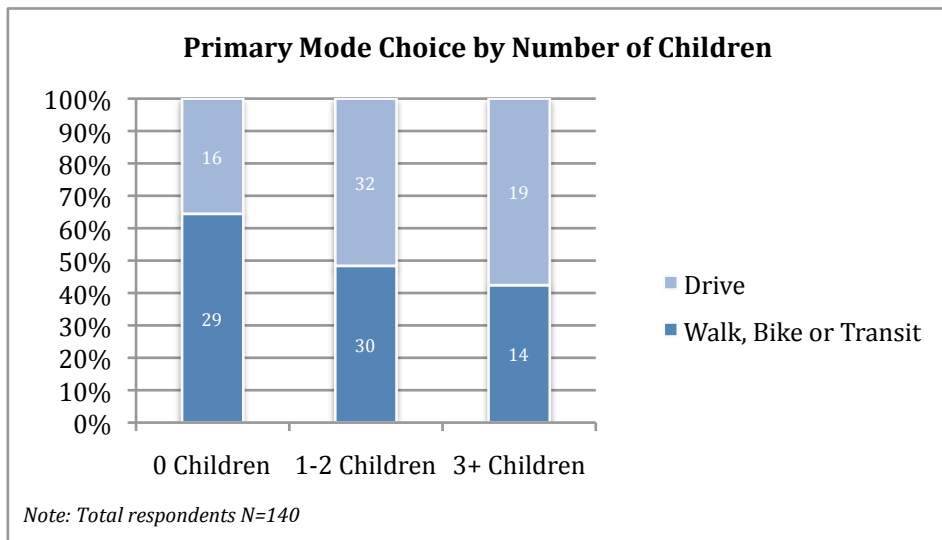


Figure 20. Primary mode choice by number of children in the household.

Primary mode choice also varied by employment status. Extensive research has been conducted on the spatial mismatch hypothesis, conjecturing that people on welfare have a difficult time finding employment due to transportation barriers and the distance between

their inner-city residence and job locations in the suburbs (Blumenberg 2004; Garasky, Fletcher, Jensen 2006; Garnette 2001; Sanchez 2002; Sanchez 2008; Schweitzer and Valenzuela 2004). The most common mobility barrier identified among unemployed welfare participants is lack of automobile ownership (Garasky, Fletcher, Jensen 2006). Since unemployment is correlated with low automobile ownership, and low auto access affects rates of transit dependency, I tested whether there was higher public transit dependency among the unemployed compared to those who were employed.

Unemployed individuals had the second highest rate of transit use, next to those who were retired; however, driving was still the most common primary mode of transportation among unemployed individuals (see Figure 21). Driving was most prevalent among students and full time employed individuals, and was least utilized among the retired population. Those who tended to have higher rates of pedestrian travel were unemployed, employed part time, or retired (see Figure 21).

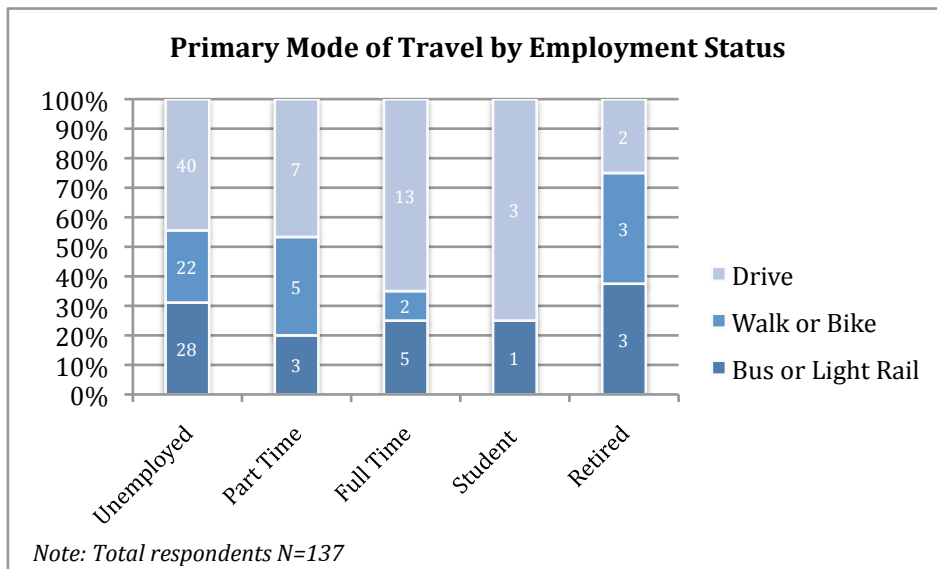


Figure 21: Primary travel mode by employment.

Additionally, primary travel mode choice varied by age. Bus or light rail was the most utilized mode of transit among the elderly and disabled (see Figure 22). Compared to youth and adults, fewer disabled and elderly people chose to drive as their principal way of getting around. Additionally, a higher proportion of disabled and elderly people primarily used the bus compared to youth and adults. This is consistent with the literature, finding that many poor disabled or elderly people are unable to drive or do not own a vehicle (Rittner and Kirk 1995). Additionally, studies have found that without a large social network and with limited resources for reciprocity, most

elderly are self-dependent and rarely rely on getting rides, lowering their dependency on auto use (Rittner and Kirk 1995; Auslander and Litwin 1990; Auslander and Litwin 1988).

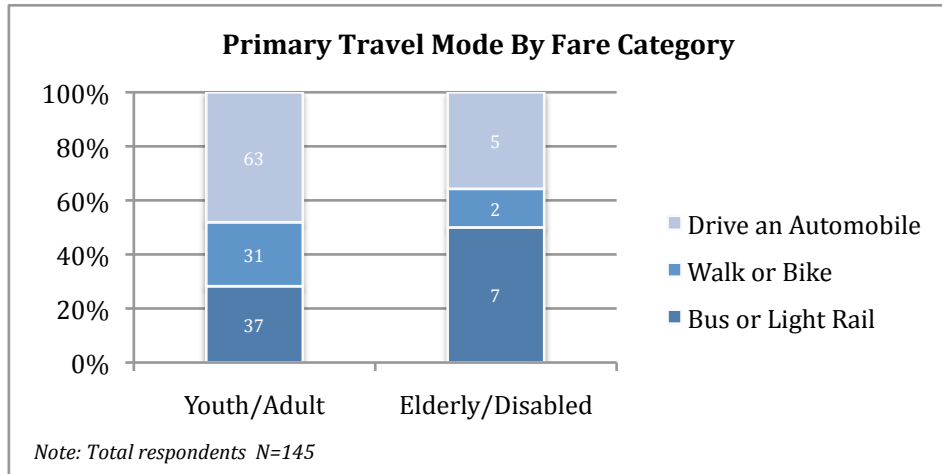


Figure 22: Primary travel mode by fare category.

Proximity to Bus Stops

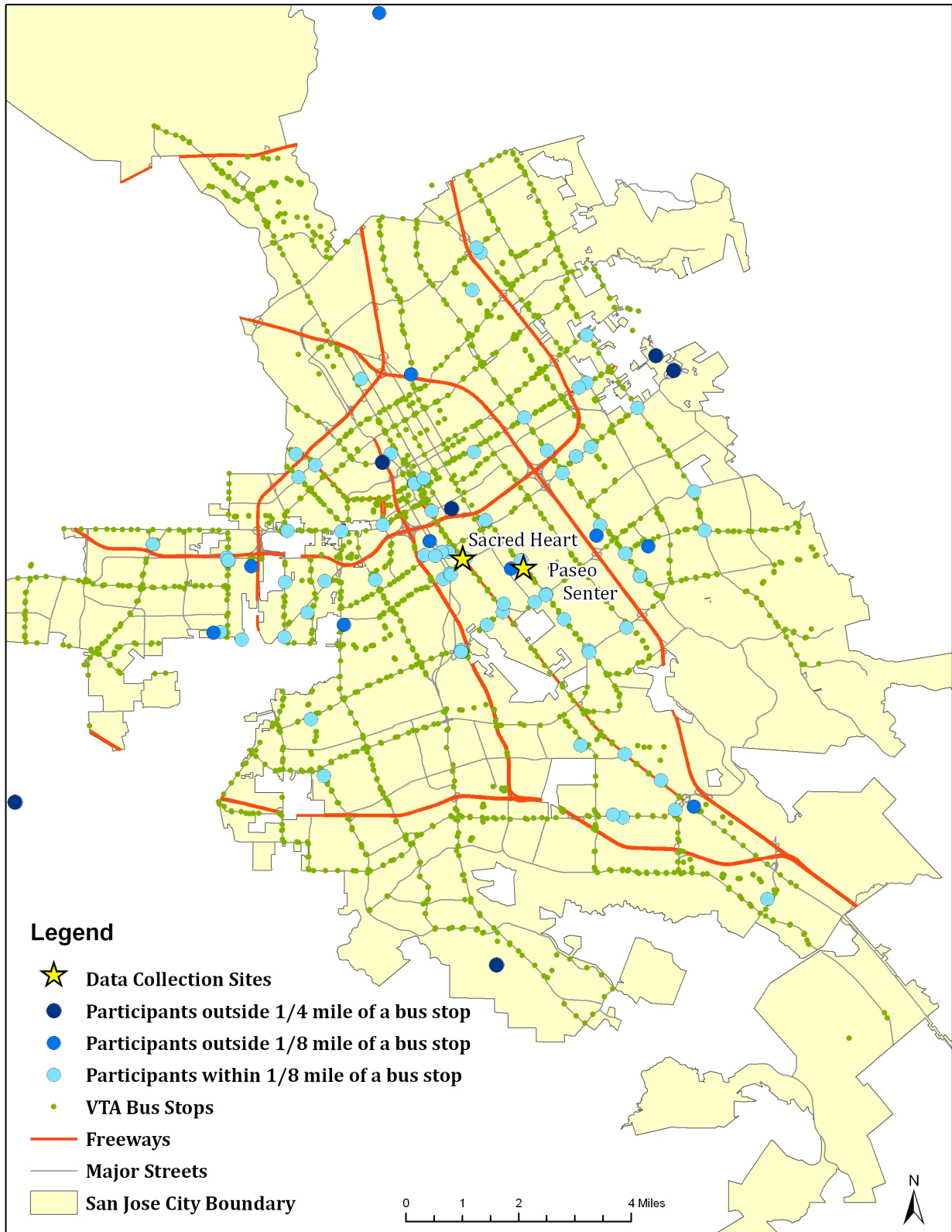
Nearly three quarters (73%) of the study group gave their cross street information; however, some of the locations were difficult to read, contained missing information, or could not be located, yielding a total of 96 location points (63%). Two participants lived outside of San Jose but were still served by VTA within Santa Clara County.

Most of the study group lived in close proximity to transit (see Figure 23). Nearly 60% lived within a quarter mile of a VTA bus stop and 53% lived within an eighth of a mile of a stop (see Table 11 and Figure 23). On average there were seven bus stops within quarter mile of each participant and three bus stops within an eighth of a mile of each participant. Hence, most of the study group lived within walking distance of a bus stop.

Table 11. Cross street location data relative to bus stops

	Frequency	Percent
Number of Home Cross Street Locations		
Total geocoded home location points	96	63%
Homes within a 1/4 mile of a bus stop	90	59%
Homes within an 1/8 mile of a bus stop	80	53%
Unknown	56	37%

The distance from the home to bus stop locations is only one measurement of “transit access.” It is important to note that the level of services provided at each stop such as routes, frequency, night and weekend service, and other indicators were not analyzed; therefore some stops could have low levels of service even though they may be in close proximity.



Source: Bus stop, freeways, major streets, and the San Jose City boundary layer were provided by VTA. GIS methods for identifying participant locations outside a 1/4 and 1/8 mile of a bus stop were developed by Matt Piven, graduate student, Urban Planning Department, San Jose State University (see Appendix D).

Figure 23. Map of cross street locations, data collection sites, and bus stop locations.

Frequency of Bus Use

As delineated by VTA's fare categories, roughly 85% of the study group considered themselves adults, 6% disabled, 5% youth, and 3% seniors (see Table 12). Roughly a third considered the bus or light rail their primary mode of transit, and around three quarters of the group indicated that they use the bus on some kind of regular basis. For example, roughly 40% said they use the bus at least once a week, and over a quarter take the bus at least once a month (see Table 12). Seniors tended to ride the bus most frequently, with over 70% taking the bus on a weekly basis (see Figure 24).

Table 12. VTA bus-rider demographics

Fare Category			Current Bus Use		
	Frequency	Percent		Frequency	Percent
Adult	129	85%	Never	39	26%
Youth	8	5%	1-3 Days/month	42	28%
Senior	5	3%	1-3 Days/week	22	15%
Disabled	9	6%	4-7 Days/week	38	25%
Unknown	1	1%	Unknown	11	7%

Although most said they use the bus for some trips, there is much opportunity to increase ridership frequency. Roughly 25-30% of adults, youth, and seniors indicated they never take the bus (see Figure 24). Disabled persons, students, and youth were the most infrequent users, with over half only using the bus only 1-3 days per month (see Figure 25 and Figure 24).

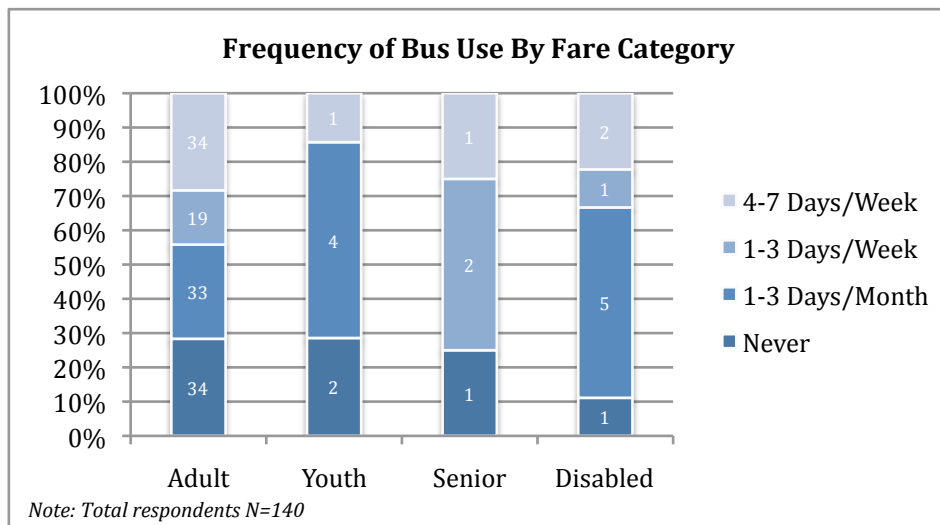


Figure 24: Frequency of bus use by fare category.

Bus use also varied by employment status. Employed people had the highest frequency and relative percent of non-bus riders (see Figure 25). Students also tended to use the bus sparingly, with over 70%

using it less than three days per month. The groups with the highest relative bus use on a weekly basis were, retired, unemployed and employed individuals.

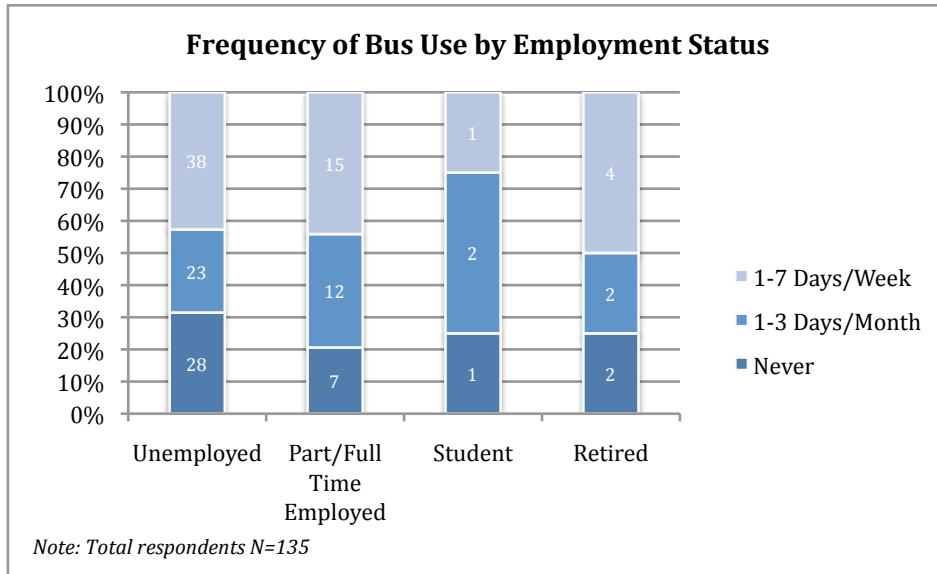


Figure 25: Frequency of bus use by employment status.

VTA Bus Ratings & Improvement Recommendations

Bus Ratings

Current bus service ratings were generally positive, with roughly half (52%) rating their experience as good or excellent. However, there is room for improvement as over a third (35%) said their experience taking the bus was fair or poor (see Table 13).

Table 13: VTA bus ratings

	Frequency	Percent
Rate Bus Experience		
Excellent	27	18%
Good	52	34%
Fair	41	27%
Poor	12	8%
Unknown	20	13%

Improvement Priorities

In order to pinpoint which service improvements could be made to boost ratings, study participants were asked to choose which non-monetary conditions would enhance their experience taking the bus. Options included: bus stop conditions (eg. lighting, shelter), onboard bus conditions (eg. seat availability, cleanliness), safety (eg. surveillance, seatbelts), and bus reliability (eg. on time service, boarding available). The key results are listed as follows:

1. **Safety** was the top scoring improvement (30%) (see Figure 26). Safety was a priority particularly among adults (33%), Latinos (36%), and those with children (36%) (see Figure 27).
2. **Bus reliability** was the second most common improvement preference (28%) (see Figure 26), scoring predominantly high among the disabled (43%), and those without children (27%) (see Figure 27).
3. **Bus stop condition** improvements were a top preference for a quarter of the study group, ranking third. In particular, this category was a top priority among seniors (75%), and non-Latinos (40%) (see Figure 27).
4. **Onboard bus conditions** were the lowest preferred improvement category (17%); however, a third of youth (33%), and over a quarter of those without children (27%) said it was their top priority.

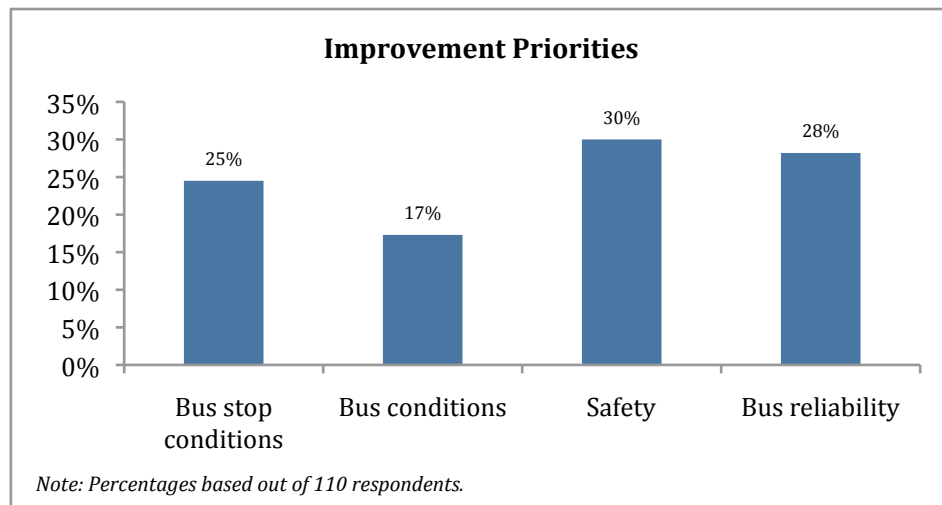


Figure 26. Bus improvement priorities.

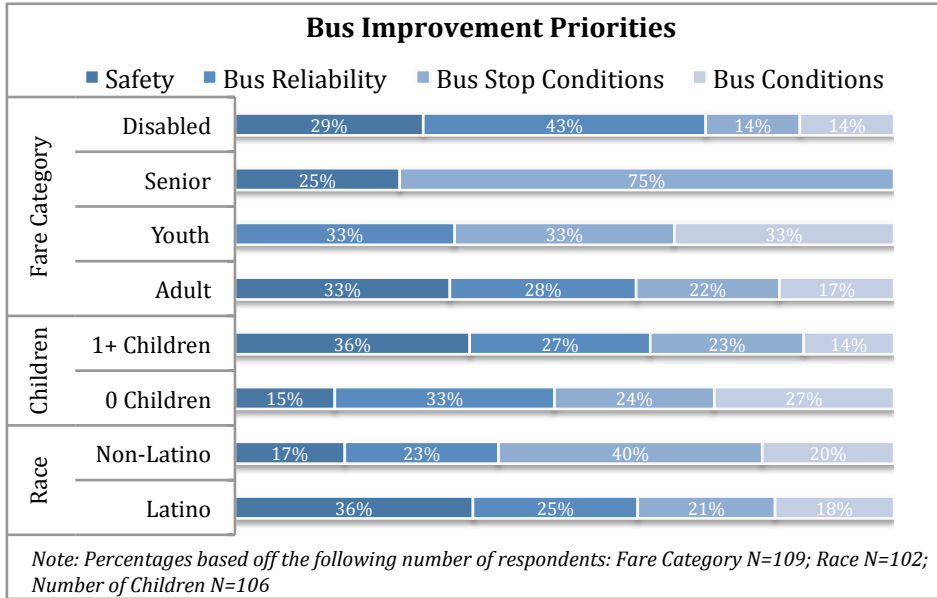


Figure 27. Bus improvement priorities by fare category, race, and number of children.

Discouraging Factors

Next the study group was asked to identify which (if any) bus conditions discouraged them from riding the bus more frequently. Factors were broken into five categories: 1) onboard bus conditions, 2) bus reliability, 3) cost, 4) bus stop conditions, and 5) safety. Across all categories the top three discouraging factors were:

1. cost (46%),
2. transfer time (39%), and
3. bus stop shelter conditions (34%) (see Figure 28).

The key results by category are as follows (see Figure 28):

- **Onboard bus conditions** discouraged 21-33% of the study group from riding the bus more frequently. Despite efforts by VTA to combat driver conduct issues, unpleasant bus drivers was the number one factor within this category to discourage ridership, followed by bus condition/comfort (32%), and overcrowding or lack of seating (31%).
- **Bus reliability** such late buses, no-show buses, window cleanliness, and temperature discouraged a third of the study group (32%) from taking the bus more often.
- **Cost/VTA fares** discouraged 46% of the study group from riding the bus more frequently, ranking it as the top most discouraging factor.

- **Bus stop conditions** impacted the ridership of 25-34% of the study group. Shelter (34%), safety (30%), and distance from their home to the bus stop (29%) were the top three factors of concern within this category.
- **Safety** issues at bus stops and onboard safety discouraged 27-30% of the study group from taking the bus more frequently, with bus stop safety as a top concern.

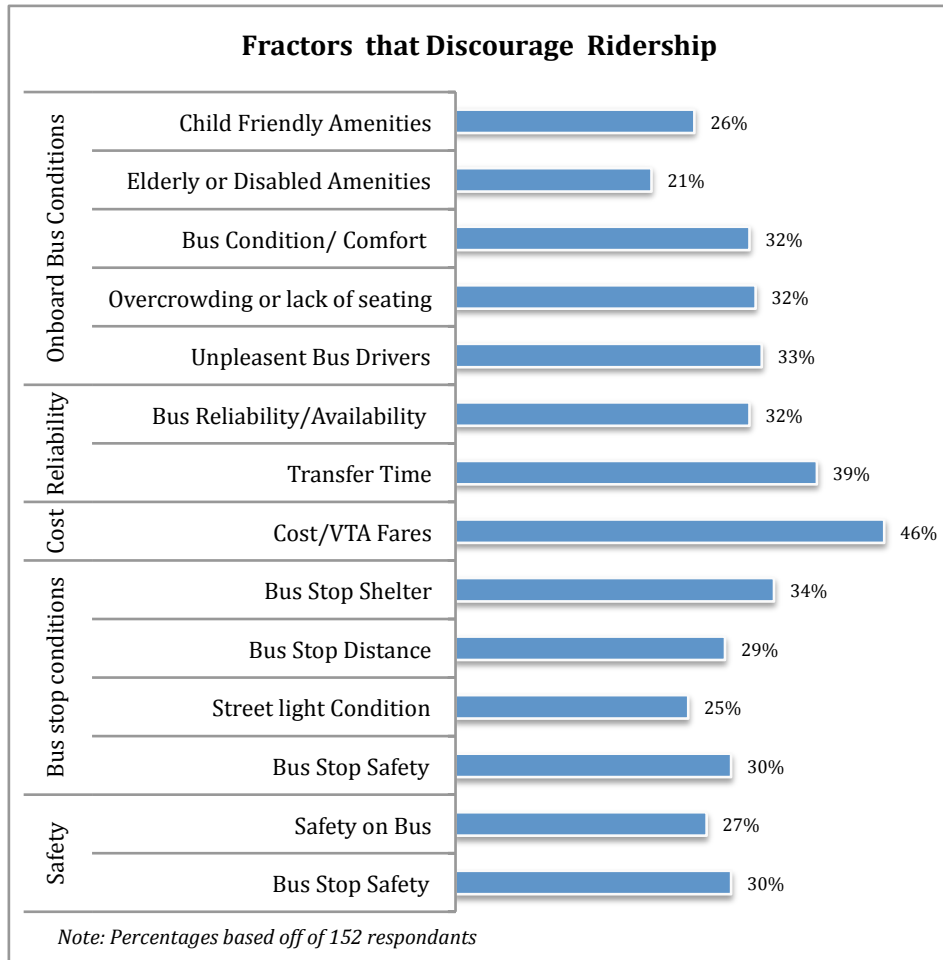


Figure 28. Factors perceived to discourage ridership.

Improvements Seen to Encourage Ridership

The study group was also asked whether the given factors would encourage them to ride the bus more often if the conditions improved. Any given improvement was seen to increase the ridership of least 34% of the study group. The two lowest scoring improvement categories were elderly and disabled amenities and child-friendly amenities (34%) (see Figure 29). These were likely the lowest scoring category because they did not relate to everyone in the study group. Relevant demographic groups, however, did view these improvement categories as having a positive impact on their bus use. For example,

38% of the 99 people with children said that better child-friendly amenities on the bus would encourage them to ride it more frequently.

Across the whole study group, the biggest increases in ridership were perceived to be invoked by improvements in cost (49%) and transfer time (43%) (see Figure 29). It is important to note that cost and transfer time were also the top-two factors said to discourage current rates of bus use. Since cost and transfer time currently have the most negative impact on ridership rates compared to other factors, and are also viewed as having the greatest potential for increasing ridership if improved, overall these two factors were identified as having the most influence over ridership rates.

To better understand which demographics groups felt they would ride the bus more frequently due cost and transfer time improvements, a breakdown of demographics including age, number of children, income, race, primary transit mode, employment, vehicle ownership, and current rates of bus use were analyzed and compared to the study group as a whole for both cost and transfer time improvements.

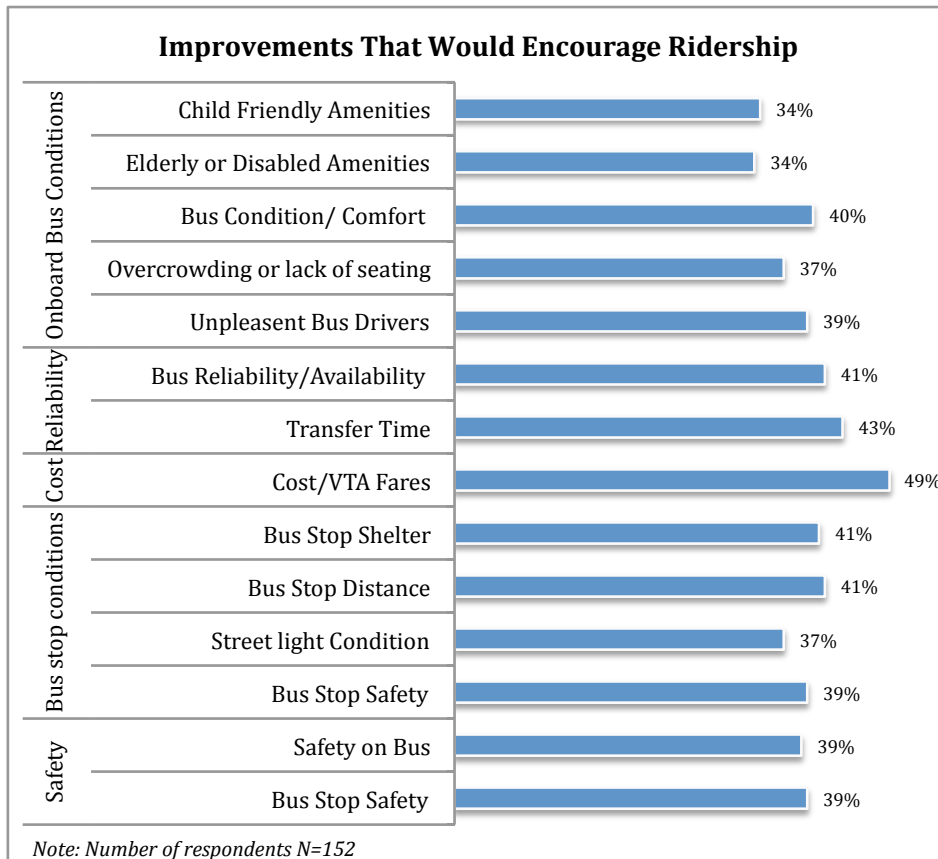


Figure 29. Improvement factors that would encourage ridership.

Cost Improvements

The 74 people (49%) who said costs improvements would encourage them to ride the bus more frequently were among the most income limited, with high employment, and many mouths to feed. Three quarters (75%) had a household income of less than \$24,999 per year, a 7% higher percent distribution compared to the study group, and over half (58%) were unemployed (see Table 14). Sixty four percent were between the ages 30-54, 60% were Latino, and two thirds majority (66%) had a child living in their household (see Table 14).

Cost improvements attracted a relatively higher percent of both vehicle and non-vehicle owners compared to the study group (see Table 14). Half the individuals (49%) in this cohort primarily relied on driving, 4% more than the study group. Cost improvements also attracted frequent bus users. Nearly a third (31%) said they currently ride the bus 4-7 days per week, 6% more than the study group.

Table 14. Demographic statistics of the 74 people who said cost improvements would encourage them to ride the bus more frequently.

	Frequency	Percent of 74 People	% Difference Compared to Study Group		Frequency	Percent of 74 People	% Difference Compared to Study Group
Age				Primary Mode			
18-29	20	27%	5%	Walk or Bike	15	20%	-2%
30-54	47	64%	-1%	Bus or Light Rail	21	28%	-1%
55+	7	10%	-2%	Driving	36	49%	4%
				Unknown	2	3%	-1%
Number of Children				Vehicle Ownership			
0	24	32%	2%	0	28	38%	2%
1-2	31	42%	1%	1	31	42%	2%
3+	18	24%	0%	2+	13	18%	3%
Unknown	1	1%	-4%	Unknown	2	3%	-6%
Income				Employment			
<\$10,000	39	53%	4%	Unemployed	43	58%	-3%
\$10,000-24,999	17	23%	3%	Part Time	6	8%	-3%
\$25,000-\$49,999	5	7%	-2%	Full Time	15	20%	7%
\$50,000-\$74,999	1	1%	0%	Student	4	5%	2%
\$75,000+	1	1%	0%	Retired	2	3%	-2%
Unknown	11	15%	4%	Unknown	4	5%	-3%
Race				Frequency of Bus Use			
Latino	44	60%	0%	Never	18	24%	-2%
Non-Latino	19	26%	0%	1-3 days/month	22	30%	2%
Unknown	11	15%	1%	1-3 days/week	6	8%	-7%
				4-7 days/week	23	31%	6%
				Unknown	5	7%	0%

It is evident that cost improvements could potentially attract a mode change for some trips, and encourage more frequent bus use among those who currently frequently use it. A quarter (24%) of those who said cost would encourage them to ride the bus said they currently never ride the bus, and 30% said they only use it 1-3 days per month.

Transfer Time Improvements

The 66 people (43%), who said improved transfer time would encourage them to ride the bus more frequently tended to primarily drive (56%). Fifty eight percent were unemployed, 54% had children, and 59% were Latino. Compared to the demographics of the total study group, improvements in transfer time attracted a larger relative percent of time-sensitive demographic groups including: full time employed individuals, students, non-Latinos, and people without children (see Table 15).

Table 15. Demographic statistics of the 66 people who said transfer time improvements would encourage them to ride the bus more frequently

	Frequency	Percent of 66 People	% Difference Compared to Study Group		Frequency	Percent of 66 People	% Difference Compared to Study Group
Age				Primary Mode			
18-29	18	27%	5%	Walk or Bike	10	15%	-7%
30-54	42	64%	-1%	Bus or Light Rail	18	27%	-2%
55+	6	9%	-3%	Driving	37	56%	11%
				Unknown	1	2%	-2%
Number of Children				Vehicle Ownership			
0	22	33%	3%	0	24	36%	0%
1-2	27	41%	0%	1	28	42%	2%
3+	15	23%	-1%	2+	10	15%	0%
Unknown	2	3%	-2%	Unknown	4	6%	-3%
Income				Employment			
<\$10,000	32	49%	0%	Unemployed	38	58%	-3%
\$10,000-24,999	17	26%	6%	Part Time	6	9%	-2%
\$25,000-\$49,999	4	6%	-3%	Full Time	14	21%	8%
\$50,000-\$74,999	1	2%	1%	Student	4	6%	3%
\$75,000+	1	2%	1%	Retired	1	2%	-3%
Unknown	11	17%	0%	Unknown	3	5%	-3%
Race				Frequency of Bus Use			
Latino	39	59%	-1%	Never	19	29%	3%
Non-Latino	19	29%	3%	1-3 days/month	20	30%	2%
Unknown	8	12%	-2%	1-3 days/week	7	11%	-4%
				4-7 days/week	16	24%	-1%
				Unknown	4	6%	-1%

Transit Cost Assistance

There is a great need to increase awareness about the transit aid resources available. Less than a quarter of the study group said they knew where to apply for cost assistance and only 13% indicated that they currently receive transportation aid such as a free or reduced transit pass or bus tokens (see Table 16).

Table 16. Transit cost assistance rates

	Frequency	Percent
Know where to Apply for Cost Assistance		
No	105	69%
Yes	32	21%
Unknown	15	10%
Currently Receive aid (eg. Free or reduced transit pass or tokens)		
No	120	79%
Yes	19	13%
Unknown	13	9%

Note: Percentages do not all add to 100% due to rounding

Overall, a two-thirds majority did not know where to apply for assistance and were not receiving any kind of aid (63%) (see Figure 30). This is consistent with Rice (2004) finding low rates of cost assistance (11%) among people living below poverty in the Bay Area.

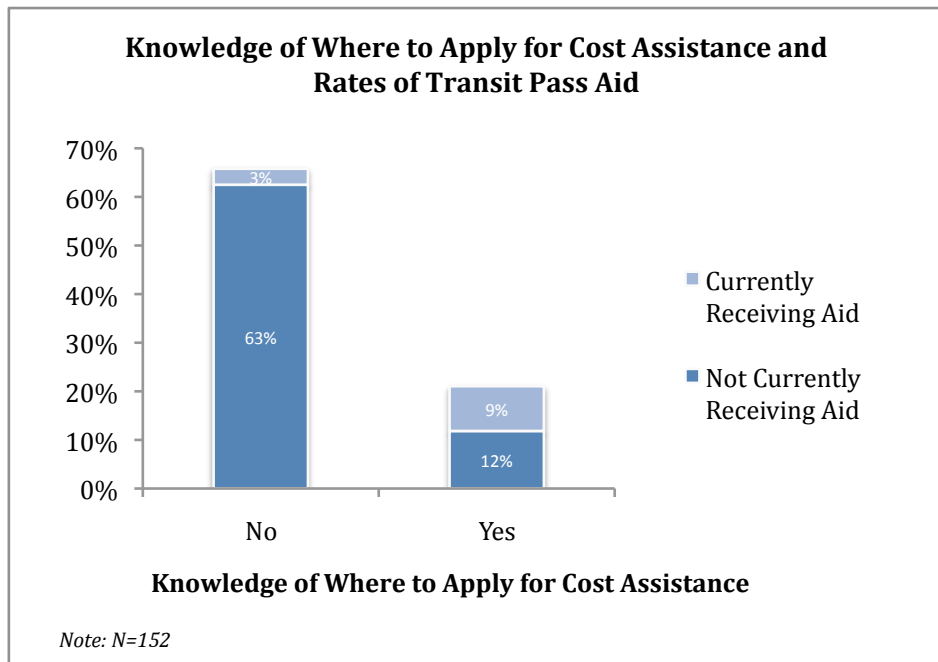


Figure 30. Knowledge of cost assistance resources and rates of transit aid.

There was a relationship between knowledge of where to apply for cost assistance and rates transit aid received. Forty four percent of those who said they knew where to apply for cost assistance were

receiving aid, and 95% of those who did not know where to apply were not receiving any aid. The difference was significant ($\chi^2=30$, d.f.=1, $p<0.001$) (see Figure 31). Since relative rates of transit cost assistance were over ten times higher within the sub-group of those who knew where to apply for it, educating the public about where to apply for assistance would likely increase the rate of aid received.

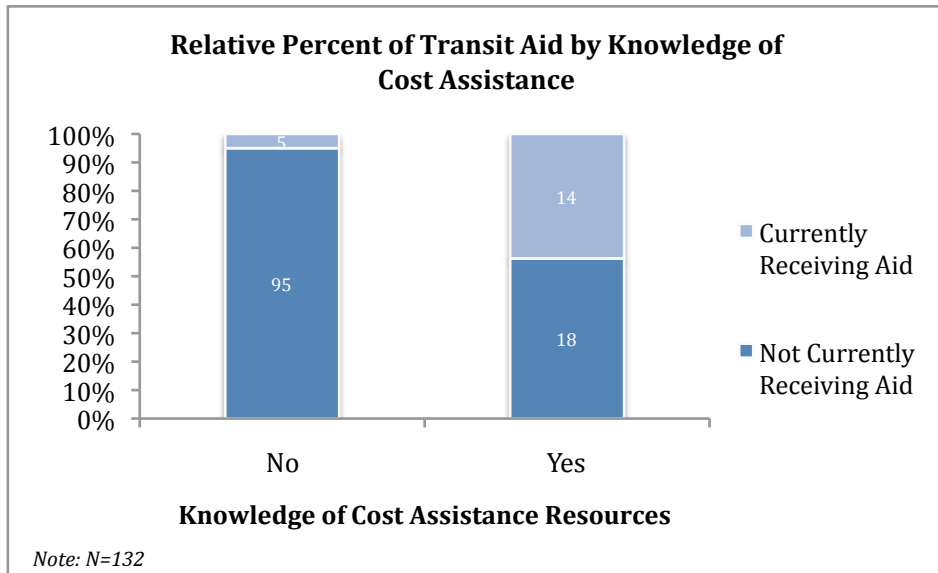


Figure 31. Relative percent of transit aid by knowledge of cost assistance.

The study group was also asked how often they thought they might use the bus if they had access to a free or reduced transit pass or bus tokens. Results were then compared current daily and monthly rates of current bus use. Thirty-six percent of the study group indicated that they would take the bus more often than they do at present (see Figure 32). Transit cost assistance was viewed as having a large impact on frequency of bus use—reducing the number of individuals who never take the bus by 6% and increasing the number of people who take the bus 4-7 days per week by 18% (see Figure 32).

These results indicate that transit cost assistance is perceived to have a positive impact on ridership rates; however, the majority are not getting transit cost assistance and do not know where to apply for it. Therefore, there is a great opportunity to increase ridership by distributing information on social service programs and resources that provide transit-cost aid.

The study group was asked to indicate the three best ways VTA could reach them. The most common preferred method was the VTA “Take One” publication (46%), followed by the VTA Customer Service Center (31%), and information at bus stops (28%) (see Figure 33).

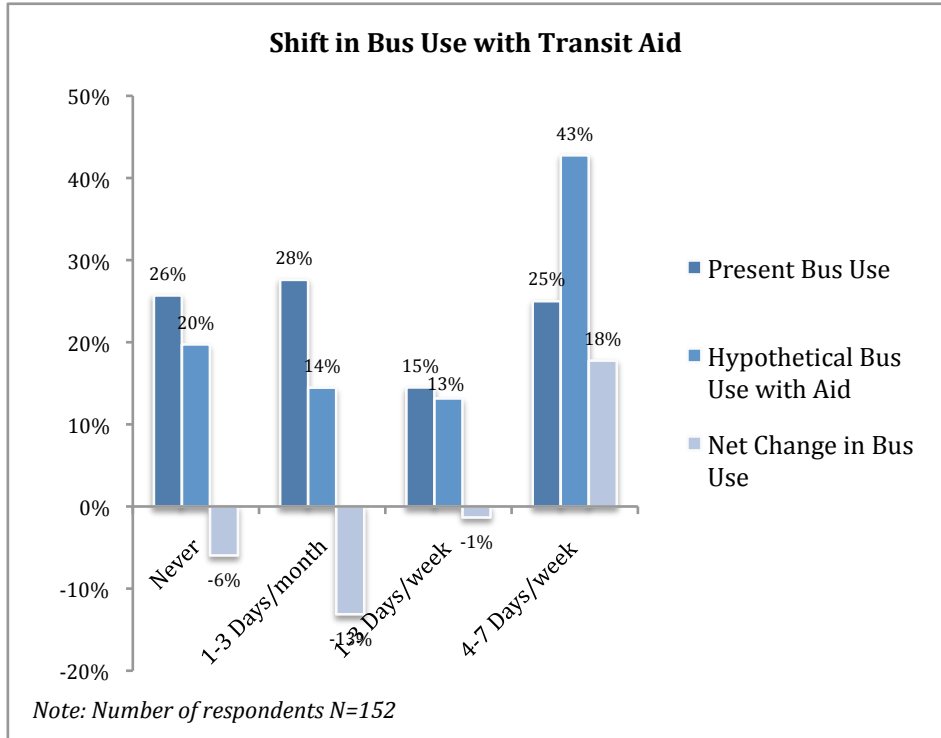


Figure 32. Perceived shift in bus use with transit aid.

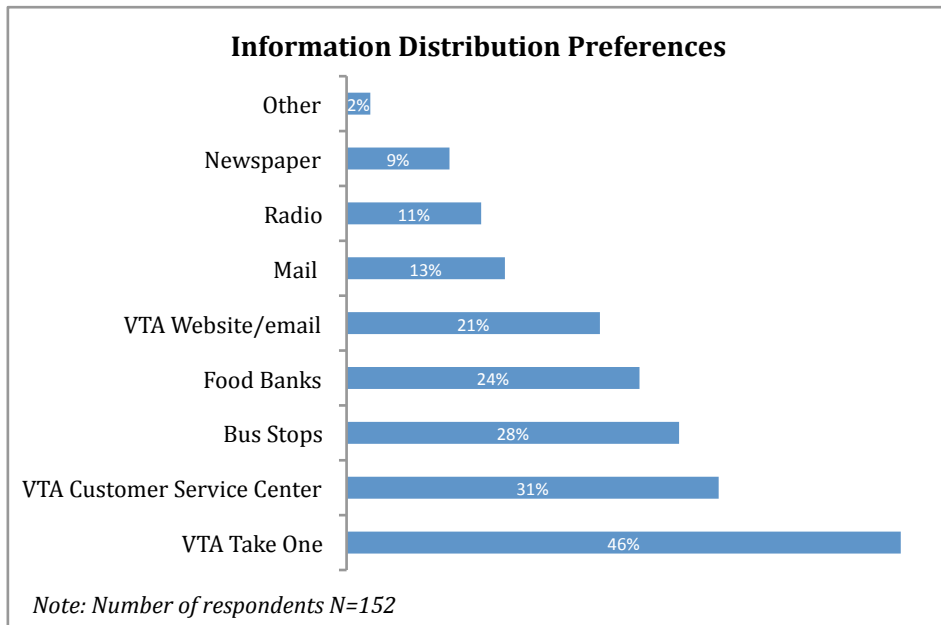


Figure 33. Information distribution preferences

Additionally, a quarter (24%) said food banks or other social service programs were a good place to administer information; however, this is likely influenced by fact that recruitment took place at food distribution locations. Newspapers, radio, and U.S. mail were the least preferred distribution methods.

Survey Limitations

The sample size was small and was not random; therefore the study group's service improvement preferences should not blanket the needs of the low-income population without a larger study conducted at a citywide scale. Additionally, the source population was generated from food bank customers, which could have influenced the demographics of the study group. For example, Paseo Senter has a high proportion of Vietnamese customers, and Sacred Heart has a large proportion of Latino customers, which could have impacted the racial composition of the sample. There was also a low student, elderly, and disabled population in the sample, which limited the results pertaining to those demographic groups.

Many of the survey questions regarding recommended service changes and behavioral changes were hypothetical. I did not test if people's actual behavior would change under changing conditions such as service changes or cost structure changes. Therefore, more research is needed to determine how service changes would actually impact travel behavior and mode choice.

Although questions on cost and service preferences were asked, the preferential tradeoffs between the two were not evaluated. For example, I did not evaluate whether people would be willing to sacrifice service cuts for cheaper fares or vice versa.

Chapter VI: Planning Implications and Recommendations

Chapter Overview

Based on the results of this study, there is much potential for increasing service ratings and ridership rates. Although most of the study group lived conveniently within walking distance of a bus stop, less than a third relied on transit as their primary method of travel and over half said they either never take transit or use it very infrequently (less than three days per month). Low ridership rates within the study group point to an opportunity to increase the frequency of bus use within both the cohort of existing low-income customers and the body of potential new riders.

There is also an opportunity to improve service ratings. Thirty five percent said their experience taking the bus was fair or poor, and current on and off-board bus conditions were seen as discouraging ridership among roughly a third of the study group. Nevertheless, service improvements were perceived as having a positive impact on ridership among 34-43% of the study group. Therefore, with targeted service improvements, VTA has the potential to increase the bus user experience and boost ridership rates among the low-income community.

In addition to service improvements, there was also a high demand for lower fares. Although fare improvements were expressed as a top priority, cost assistance rates were low and most people did not know where to apply for aid. Access to transit cost assistance was perceived to boost the frequency of use among new and existing riders; therefore, VTA has a chance to improve ridership rates through price structure improvements, and by centralizing and dispersing information on existing transit subsidy programs.

Based on the findings of this study the following five actions are recommended to VTA:

1. **Enhance services and frequently update the public about service improvements** as a marketing strategy for boosting ridership rates.
2. **Consider implementing a more equitable price structure** for qualifying low-income households, especially families with children.
3. **Centralize and actively distribute information on transit subsidy programs** and transit aid resources to low-income

people using outlets such as the VTA “Take One” publication, VTA Customer Service Center, bus stops, and through food banks and other social service programs.

4. **Continually survey low-income community members** to assess their transit needs and improvement recommendations in order to identify service enhancements that will target key customer demographic groups.
5. **Update strategic policies to incorporate a customer focused model** that balances the travel requirements of “high-need” customers with reaching ridership goals.

Enhance services and keep the public updated

The results of this study indicate that there is room to improve customer service ratings and to increase ridership among the study population through 1) targeted onboard and off-board service enhancements and 2) by updating the community on actions currently being taken to improve services and bus conditions. This section proposes recommendations to accomplish these strategies based on the survey results and what is already being done by VTA.

Enhance Services

The study group felt that in order to increase the customer experience, VTA should improve safety (30%), bus reliability (28%), and bus stop conditions (25%). The following set of recommended improvements were compiled by assessing customer demographic preferences for each of these categories and by evaluating which factors within each category are perceived to have the biggest impact in ridership rates within the study population.

As a caveat, it is important to note that the study group was not representative of the entire low-income population group in San Jose; therefore, more research should be done to verify that these are the most pressing improvements before implementing service changes.

Safety improvements were perceived as a top priority particularly among adults (33%), Latinos (36%), and those with children (36%). Safety issues at bus stops and onboard safety discouraged 27-30% of the study group from taking the bus more frequently, with bus stop safety as a top concern. The following action is recommended based on these findings:

- **VTA should consider implementing onboard and bus stop safety measures targeted in Latino neighborhoods and in neighborhoods with a high density of children.**

Ridership benefit: Thirty nine percent of the study group said they would ride the bus more often if safety improved.

Target demographics: Adults, Latinos, and people with children.

VTA currently allocates \$500,000 to \$700,000 per year for annual bus stop improvements, with some funding going toward safety improvements such as better street lighting (Unities 2010). Further improvements could be made to increase the sense of security at bus stops by installing camera surveillance or emergency call button units at bus stops near low-income neighborhoods.

Secondly, street improvements around bus stop locations such as wider curb cuts, adequate crosswalks, and bike lanes could help increase pedestrian safety when accessing bus stops. Since safety improvements were seen as a particularly high priority among Latinos and people with children, these types of safety improvements should be targeted particularly at bus stops in neighborhoods with a high concentration of Latinos and children.

VTA could also further improve the perception of onboard safety conditions. VTA already requires drivers to complete safety, security, and first aid trainings but VTA's customers may not be aware of this. VTA could post signage on all buses indicating that drivers are trained as safety officials. Knowing that drivers are trained might discourage onboard conflicts and increase the sense of security on busses. Additional measures such as onboard surveillance cameras could accomplish the same goal but may be too expensive to implement across the entire bus fleet.

To help increase child safety on buses, VTA could install seatbelts and designate priority-seating areas for families with children—similar to elderly and disabled seat amenities. This would enable young children to be seated during travel, which is safer than standing.

Bus reliability was the second most common improvement preference (28%) in order to enhance the customer experience. Bus reliability scored predominantly high as an improvement preference among the disabled (43%) and those without children (27%). Transfer time was a top concern, discouraging ridership among 43% of the study group. Bus availability was a close second, discouraging 41% from taking the bus more frequently. Based on these findings,

- **VTA should improve bus reliability with faster transfers and real-time updates on bus arrival times.**

Ridership benefit: Forty one percent said they would ride the bus more frequently if bus availability and reliability improved and 43% said they would ride more often if transfer times were faster.

Target demographics: Time-sensitive groups including full time employed individuals, students, and non-Latinos. This was also a top scoring improvement priority among disabled persons (43%) and people without children (33%).

To improve transfer times, VTA could conduct a network analysis, analyzing the trip making patterns of target customer groups. This data could then be used to establish faster routes and connections to access key destinations such as job hubs, social service programs, health care facilities, and schools. Analyzing where people typically travel would help the agency design their schedules and routes to meet the travel needs of the community and would encourage low-income non-transit users to consider using transit instead of alternative travel modes.

To improve bus reliability, VTA is currently working on a project that would help provide real-time updates using a telephone information call line (Unites 2010; Loft 2010). This would be an excellent amenity; however, riders without a cell phone would potentially be underserved by this system. The congruent installment of payphones at bus stops would help alleviate this problem.

Bus stop conditions were a top improvement preference for a quarter of the study group, ranking as the third most common improvement category. Current bus stop conditions were said to discourage the ridership of 25-34% of the study group, with bus stop shelter (34%) and safety (30%) as the top two factors of concern within this category. Based on these findings,

- **VTA should continue to improve bus stop conditions particularly in senior communities.**

Ridership benefit: Forty one percent said they would ride the bus more often if bus stop shelters were improved, or if the distance from their home to the bus stop was lessened. Thirty nine percent said they would ride the bus more frequently if bus stop safety were better. Thirty seven percent said they would ride more often at night with better street lighting.

Target demographics: Bus stop condition improvements were a top priority among seniors (75%), non-Latinos (40%), and youth (33%).

Over 30% of VTA's 1,378 stops are unsheltered (VTA 2006, 43). Sheltered stops encourage ridership on hot days and during the rainy months (Unites 2010). As discussed in the background section of this report, measures by VTA are currently being taken to improve bus stop conditions. In order to track and prioritize service changes, VTA maintains a database with information on their existing stops. On an annual basis, VTA reviews bus stop conditions and prioritizes improvement efforts based on the funding available (Unites 2010). Typical improvements include enhancing street lighting, mounting overhangs, and installing new benches.

VTA is in the process of sending out a Request for Proposals (RFP) for a new shelter program that calls for replacing all existing shelters, and installing and maintaining an additional 200 shelters—reducing the current number of uncovered bus stops by about half. As part of the contract agreement, VTA will benefit by claiming a percentage of the advertising profit (Unites 2010).

VTA could further improve bus stop conditions by putting the money claimed by bus stop advertising toward improving safety and surveillance, maintaining and adding new shelters and benches, cleaning graffiti off bus stop infrastructure, and providing landscaping to improve the visual aesthetics at and around bus stops.

Since bus stop conditions were seen as a top priority among 75% of seniors, bus stop improvements should be a higher priority in and around senior communities.

Keep the Public Updated

As discussed in the background section of this report, VTA does make ongoing efforts to satisfy existing riders and to attract new riders. These strategies include periodically purchasing new buses, improving bus stop conditions such as streetlight and shelters, improving the rider and operator interface, and distributing information to customers primarily using the web and printed materials such as the VTA "Take One" (Unites 2010). Even though actions are being taken to improve service, this study indicates that current and potential customers are not satisfied with existing bus conditions, with 35% rating their experience taking the bus as fair or poor. The attitude of existing and potential customers is translating into low bus ridership—discouraging the frequency of bus use among 21-46% of individuals.

Since VTA is currently taking action to improve some of these conditions, it is possible that either a) current conditions are truly not meeting the community's standards, or b) the community is unaware of the improvements that are taking place, and therefore have negative perceptions of VTA even though bus conditions are not as bad as they seem. Without further research it is difficult to assess which phenomena are at play.

Regardless, there is clearly an opportunity to improve public perception. This could be accomplished through marketing strategies used to continually update the public on improvements that are being made by the agency.

Currently, VTA does not have an official customer service policy or guidelines in place for conducting routine improvements (Unites 2010). VTA would benefit from a formal, documented outreach approach that tracks and prioritizes outreach efforts. VTA could also use this program to assess the effectiveness of swaying the public's perception of VTA's transit service conditions and use it to track behavioral ridership changes.

Consider implementing a more equitable price structure

Despite the high cost of vehicle ownership, most people in the study group owned a car and many chose to primarily rely on driving. This was especially true among families with children. Other studies have found similar results, with high rates of vehicle ownership and use among large families (Clifton 2004; Bhat and Guo 2007; Purcher and Renne 2003, Rice 2004, 29). This trend is commonly attributed to the logistics of transporting multiple passengers and cost versus time tradeoffs between bus use and automobile use. Since the study group perceived cost as the top discouraging factor, it is possible that VTA's price structure plays a role in transit mode tradeoffs among this population group.

Knowing that low-income households are price-sensitive, VTA could encourage ridership by providing the following incentives:

- **Create transit subsidy programs for qualifying people**
- **Offer a flexible pricing structure**
- **Provide discounted price packaging**

Ridership benefit: Forty nine percent said they would ride the bus more frequently if cost/VTA fares were improved.

Target Demographics: Groups of people who are more price-sensitive including the lowest income brackets, households with children, the unemployed, and the homeless.

Transit Subsidy Programs

VTA currently offers lower fares for youth, seniors, and disabled persons in addition to programs such as OUTREACH in order to support groups with low mobility; however, low-income people, who are a price-sensitive demographic group, are not accommodated by VTA's current fare structure. Fare increases have been shown to have a disproportionate effect on low-income riders because they have less flex money to offset fare increases (Blumenberg and Manville 2004; Rice 2004, 113; Sanchez 2008). As discussed in the background section of this report, VTA's historical rate increases have had a short-term negative impact on ridership rates (Unites 2010). Since the study group viewed cost as a top barrier, and it was most seen as encouraging ridership, it is likely that reduced passes for low-income households would encourage transit use. As an added benefit for the community, transit subsidy programs would help low-income families cope with other life expenses by freeing up money for necessities such as housing, clothing, medical coverage, and food.

Other cities and counties have successfully implemented "Means-Based Transit Fare Discounts" for qualifying low-income customers. For example, the city of Tucson and unincorporated Pima County allows residents to purchase an economy fare bus identification card if the individual qualifies under their income standards (Tuscon 2010). Additionally, the San Mateo County Transit District (SMCTD) and the Alameda Contra Costa County Transit District (AC Transit) offer a similar "Lifeline Fare" program funded by the Metropolitan Transportation Commission (MTC) for income groups falling below 200% of the poverty line (Mineta Transportation Institute 2010).

Recently, Metro Transit in Madison, Wisconsin approved a six-month trial "Quest Card" program allowing 300 residents per month who are at or below 150% of the federal poverty level to purchase transit pass at half price (Madison Common Council 2010). A Low-Income Pass Program Committee was created to develop a sustainable, financially viable program that would meet community needs. During the initial trial period the committee surveyed people who purchased the passes in order to quantify new ridership rates generated by the program. Although new riders joined, the program still fronted a loss in revenue for each pass sold; therefore, supplemental funds are required to maintain the program through city funding and other revenue sources (Madison Common Council 2010).

VTA could strive to implement a similar program in Santa Clara County by seeking collaboration with local social service agencies and non-profit organizations that have existing institutional knowledge on how to implement social service programs. Potential funding sources could come through MTC, Temporary Assistance for Needy Families, or the Job Access Reverse Commute program.

As a last resort, if funding sources are not available, VTA could consider restructuring existing discounts by raising fares for other patrons to offset revenue loss. For example, VTA could increase fares for elderly, disabled, and youth subsidies to meet the federal minimum discount in order to subsidize low-income passes; although, this will likely be unpopular with the community.

Flexible Price Structure

In addition to increasing subsidy programs, VTA could offer a more flexible pricing structure offering lower day pass prices to offset transfer fees associated with single ride passes, or by implementing distance fares.

Rice (2004) analyzed the fare structure of transit agencies within the nine Bay Area counties. She found that commute costs in Santa Clara County were especially high, largely because of transfer costs (Rice 2004, 107). VTA charges a separate admission fee with each transfer, unless a day pass is purchased (Rice 2004, 51). Families tend to make more transfers in order to take their children to school or childcare and get to work and may therefore be disproportionately burdened by VTA's fare structure (Blumenberg 2000; Purcher and Renne 2003).

To offset the high cost of transfers VTA could reduce the cost of a day pass, or alternatively use a distance fare structure. Distance fares would make the cost of a single ride more affordable on short trips. This would benefit low-income riders, who tend live closer to work and travel closer to home (Waller 2005; Blumenberg and Manville 2004; Blumenberg 2004). Off-peak fares could also be reduced, benefiting low-income transit users who tend have a higher percent distribution of evening and weekend jobs compared to higher income groups (Pucher and Renne 2003).

Discounted Price Packaging

VTA's price structure could also be amended to make it easier for low-income people to take advantage of discounted monthly pass rates. Monthly discounted passes offering about 45% off the regular price for unlimited rides are sold to reduce the cost burden of commutes by about \$250 annually for the average commuter (VTA 2009b; Rice

2004). Low-income households may face more difficulty taking advantage of pass discounts because of the large \$70 lump payment for a monthly VTA pass (VTA 2009b; Rice 2004, 51). Data from the 2005-2006 On-Board Passenger Survey revealed that nearly half of all low-income transit riders making less than \$10,000 per year purchased a day pass or paid in cash for a single ride, while only a third used a monthly pass (VTA 2006). Inability to pay for a monthly pass could be due to a shortage of funds available at the beginning of the month when most bills are due (Agrawal et al. 2010). VTA could help low-income people cope with this cost burden by breaking up the cost of a monthly pass into smaller payments, or by offering discounted passes valid for two weeks instead of a month.

VTA's price structure could also be adapted to make transit more affordable for low-income families with children. The results of this study indicate that families with children have high rates of auto use and that cost is one primary factor that discourages ridership. The use of automobiles, although expensive, may be more attractive for larger families because multiple passengers ride for "free," where as separate bus passes must be purchased for each individual traveling in groups. VTA charges admission per person, therefore larger families are more subject to the burden of VTA's price structure because they have to pay for multiple passes to accomplish a single trip. VTA could adjust their price structure by offering discounted rates for multiple passes purchased at one time. Alternatively, VTA could allow installment payment plans for passes to reduce the bundled cost of a single payment.

Centralize and actively distribute information on subsidy programs

Although there are ample resources for food and housing aid in San Jose, the cost burden of transportation is under-recognized and under-supported by social service programs (Agrawal et al. 2010). As identified in the background section of this report there are federal, state, and local programs that provide opportunities for user subsidies, transit reimbursement, and free or reduced passes but resources and information are not well publicized. Additionally, there is no central location or web-accessible database providing a comprehensive list of local agencies that offer aid. VTA's website, which seems like the most logical place to look, does not offer any cost-assistance information outside of their paratransit services and OUTREACH programs.

Despite existing resources available, the results of this study show that few households are receiving aid or know how to apply for it. Knowledge about where to apply for assistance is perceived to lead to

an increase in transit aid and in turn an increase in ridership rates; therefore, as a method for increasing ridership VTA and social service agencies should partner to increase awareness about the transit aid resources available in the community and utilize demand for assistance to advocate for more funding to support aid programs.

A central list or database of programs should be compiled by VTA and distributed to the low-income community to help bridge the gap between the existing transit aid services and community need. The VTA “Take One,” VTA Customer Service Center, and information at bus stops, were seen as the top three ways to reach the population group. These methods happen to be more cost effective than other methods like radio and television ads, which coincidentally were the least preferred methods for information distribution among the study group.

Additionally, VTA could cost-effectively distribute information on assistance programs by providing fliers and handouts with information to social service agencies, hospitals, and non-profits that provide services to the community. This was seen by the study group as the fourth most effective distribution method.

Continually survey low-income community members

Based on this study, it is evident that service conditions are perceived to impact low-income ridership rates in San Jose. To satisfy customer needs, it is important that VTA monitor the public’s perception of bus amenities, services, and existing bus conditions so that VTA can tailor improvements to meet customer needs on an ongoing basis.

VTA already regularly conducts an On-board Passenger Survey, which identifies existing passenger demographics, travel characteristics, and service ratings. However, the survey does not collect data on which service improvements are perceived to boost ridership rates. Additionally, the survey is not distributed to non-transit users. By expanding the survey to capture both existing and potential riders, VTA could effectively identify ways to attract new riders.

Collecting data on service improvement preferences could also help tailor improvements toward meeting the needs of certain demographic groups depending on VTA’s ridership enhancement goals and priorities. Within the study group, frequency of bus use and improvement priorities varied by characteristics such as employment status, age, and children present. For example, while people with children 18 years or younger felt safety was a top concern, bus stop conditions were a top priority among seniors. This type of data collected at a citywide level could help guide VTA’s decisions,

targeting safety improvements at bus stops in low-income neighborhoods with a high concentration of children, and bus stop amenities such as overhangs near low-income senior communities.

By further analyzing priorities by demographic groups, and targeting improvements in certain neighborhoods or along transit lines with a high concentration of certain demographic characteristics, VTA could potentially yield higher ridership rates while saving money on a blanket improvement approach.

Additionally, VTA could use customer demographic data to identify which groups have the lowest ridership rates and the most aptitude for switching to higher rates of transit use. For example, the results of this study point to disabled persons, students, and youth as the most infrequent users, with over half taking the bus only 1-3 days per month. VTA could use this type of survey data to identify what is discouraging demographic groups with low ridership rates from using the bus more often and create a marketing strategy to combat identified barriers.

Since the group in this study was relatively small, more research is needed to identify the most effective strategies for targeting low-income demographic groups with low ridership rates on a citywide scale.

Update strategic policies to create a more customer-focused model

Currently, VTA's strategic policies are designed to primarily attract "choice riders," who tend to be less sensitive to price and more time-sensitive. VTA's Service Design Guidelines and Transit Sustainability Policy (TSP) call for cutting transit lines with perpetual low-ridership and reinvesting service improvements along more popular lines to make transit more efficient within the core network. This will improve customer focus, particularly within the time-sensitive market. While this strategy does help to boost ridership, it does not call to evaluate or specifically address the service requirements of the "high-need" market, which include existing and potential customers who may have few transit options and are more price-sensitive. Since low-income, minority, elderly, and the disabled tend to fall within the "high-need" category, VTA's service approach raises social equity concerns.

VTA's current system of monitoring, as outlined in the TSP, tracks ridership but not necessarily customer needs. As an alternative, VTA should consider implementing a more customer-focused model that would identify and prioritize the needs of customers through survey

data and community outreach and then devise cost-effective strategies to address them. This approach would help to increase the frequency of bus use among existing riders, attract new riders, and bolster the bus user experience.

The following strategies are recommended in order to strive toward a more customer-focused model:

- 1) Survey existing and potential customers regularly and implement service changes based on customer preferences.
- 2) Tailor service changes toward specific demographic groups to identify and address the needs of underserved communities.
- 3) Make public outreach efforts a priority in disenfranchised communities such as: low-income neighborhoods, elderly and disabled communities, and neighborhoods with a high density of children.
- 4) Document all public outreach and mitigation efforts and make them available to the public in multiple languages.
- 5) Bring the demand for transit cost assistance to the attention of social service agencies and make partnerships to advocate for programmatic funding to provide aid.
- 6) Quantify the benefits and costs of service impacts on the community before making changes.
- 7) Implement mitigation efforts that will help to reduce negative impacts on those outside the core service area with non-fixed route services, smaller busses or shuttles, call in pick up services or other transit solutions.
- 8) Combine long-term service plans with land-use planning strategies that place low-income housing and jobs closer to transit to make transit more accessible and appealing to the working poor.

Conclusion

In order to boost ridership and address the service requirements of high-need demographic groups VTA should update its strategic policies to incorporate a more customer-focused model. The results of this study indicate that there is room to increase ridership among current and new low-income customers with targeted service and cost improvements. It is important that VTA adapt to changing needs over time by deriving service updates from survey data, and continually updating their low-income customer pool on fare subsidy options and service improvements.

Chapter VII: Areas for Further Research

Chapter Overview

This chapter describes three primary areas for further research: 1) survey the low-income community at a citywide scale to further identify travel needs and mobility barriers; 2) research cost verses service tradeoffs in order to identify how best to balance quality and affordable services; and 3) evaluate price structure options to help make transit more affordable to income limited households.

Survey the low-income community to identify transit needs

The results of this study indicate that VTA's current level of service is not meeting the travel needs of the low-income community. At the same time, service and cost improvements are perceived as having the potential to increase ridership rates. However, the sample size in this study was small and not representative of the entire low-income population. More research is needed at a citywide scale to further unveil community needs, priorities, and tradeoffs.

The demographic characteristics of the study group such as age, race, number of children, income, employment status, and vehicle ownership all influenced the travel requirements, and priorities of the individuals surveyed. Further research should collect and compare the travel needs, mobility constraints, and service preferences of different demographic groups within the low-income population. In particular, more research is needed on students, youth, elderly, disabled, recent immigrant, and homeless population groups. These groups comprised a small subset of the sample size; hence, more data are needed to statistically evaluate their transit improvement priorities.

Future studies could also survey low-income students. Many local colleges and high schools offer free, pre-paid, or reduced passes to students, yet low ridership rates were identified among students. There could be other non-monetary factors discouraging them from using the bus system that are worth exploring. Additionally, this study only tested adult students and did not explore child-related travel, which could be worth exploring.

Survey methods should be carefully considered in future studies. To reach a wide audience of not only transit users but also of potential transit customers, researchers should survey the low-income population as a whole and not just existing transit customers. It is also recommended that future studies avoid a telephone or mail survey

because these methods overlook homeless and transient population groups. Instead, researchers could administer a citywide survey by partnering with existing social service agencies, low-income housing, and homeless shelters throughout San Jose to reach a wider pool of low-income people.

Previous studies conducted using qualitative methods such as semi-structured interviews have found that low-income travel behavior is complex and that survey data alone can oversimplify or leave out important behaviors, attitudes, or tradeoffs (Agrawal et al. 2010). Therefore, a combination of quantitative and qualitative methods should be employed when studying low-income travel.

Additionally, when identifying the service preferences of demographic groups, behavioral research should also be conducted testing which service or cost improvements strike behavioral changes and positive ridership outcomes. In this study people were only asked hypothetical questions about whether they thought they would ride the bus more often under certain changing conditions. This type of research strategy is limited in that it does not test actual behavioral change. Future studies could test what types of improvements would encourage current VTA customers to use transit more frequently and which improvements would attract new riders.

Research cost verses time tradeoffs to identify how best to balance quality and affordable services

Due to funding constraints transit agencies will certainly have to make tradeoffs when making service and policy decisions. This study did not analyze tradeoffs between service and cost priorities so further research is warranted. Other studies suggest that services are more important than low costs within the general population (Cervero 1990, 123 as cited in Rice 2004); however, low-income tradeoffs and priorities have not been repetitively tested, especially under changing economic conditions. Researchers could test for example, whether people would be willing to sacrifice certain service cuts to reduce fares, or whether people would be willing to pay more for better services even though they are income limited.

Agrawal et al. (2010) found that people's behavior, mode choice, and attitudes toward transit tradeoffs changed under changing conditions such as income availability and employment, and with gas price fluctuations and transit fare increases. Strategies to reduce transit costs such as behavioral mode choice decisions were made even on a short-term scale based on the availability of funds in a given month. Therefore, low-income people could have more sensitive behavioral

patterns with regard to price structure decisions and policies compared other income groups. More research is needed to determine thresholds for behavioral change before service and cost policies are implemented.

Evaluate price structure options to make transit more affordable

A feasibility study is needed to evaluate the cost and logistics of implementing various price structure options such as distance-based travel, family discounts, two-week passes, or reduced low-income fares. This will involve assessing target groups that will benefit from proposed programs, demand and expected ridership outcomes as a product of implementation, costs and funding sources needed for execution, and methods of implementation.

When researching the feasibility of implementing transit subsidy programs VTA could strive to learn from other agencies that currently serve low-income groups in the community. For example, VTA could survey and interview other non-profit and service agencies to determine how they operate and distribute programs such as food stamps and adapt a similar structure for implementing reduced low-income fares.

Lastly, researching case studies of other transit agencies that have successfully implemented “Means-Based Transit Fare Discounts” is a great way to identify funding sources and implementation solutions.

Conclusion

Although much research on low-income travel behavior has been done at a national and state level, little research has been done locally to determine low-income travel needs and priorities. Surveying the low-income community on an ongoing basis will help transit agencies make informed decisions and adapt services to meet changing needs overtime. Since funding is limited, researching customer tradeoffs will also help agencies identify cost effective ways to balance quality and affordable services, while making transit more affordable and socially equitable.

Closing Statement

With the anticipated growth in San Jose and a mounting divide between income groups, it is extremely important that the Santa Clara Valley Transportation Authority (VTA) collaborate with planners, economists, politicians, social service agencies, and community members to jointly develop long-term transportation solutions that are socially equitable and meet the needs of those who face mobility constraints. While much research has been done to understand low-income travel barriers, very limited research has been conducted at local level to assess transit desires, concerns, and tradeoffs. With ever changing transit needs, service preferences, and perceptions, it is important that long-term studies investigate the changing dynamics of travel patterns, expenditures, and non-monetary tradeoffs that people make relative to income and demographic characteristics.

Additionally with automobile ownership rates increasing at an alarming rate, and the threat of global climate change, understanding how to promote alternative transit options is critical. Policies and funding to support and promote transportation service updates and fare restructuring, combined with land use planning strategies that integrate housing, employment, and transportation are necessary to encourage ridership and to support those who struggle to meet their transportation needs.

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Appendix

Appendix A: Survey Questionnaire

Appendix B: Consent Forms

Appendix C: Analysis Codebook

Appendix D: Geocoding & GIS

Appendix A: Survey Questionnaire

[VTA] Bus Improvement Survey

Survey Objective: a) assess current rates of transit-cost assistance among low-income San Jose residents and b) identify how the Santa Clara Valley Transportation Authority (VTA) can work to improve the bus-user experience.

DIRECTIONS QUESTIONS 1-20: Please write the letter of your answer in the space provided

- _____1. What is your sex?
 A. Male
 B. Female
 X. Can not choose/Refuse
- _____2. What is your age?
 A. 18 to 29
 B. 30 to 54
 C. 55 or older
 X. Can not choose/Refuse
- _____3. What is your fare category?
 A. Adult
 B. Youth
 C. Senior
 D. Disabled
 X. Can not choose/Refuse
- _____4. What is your race/ethnicity?
 A. Latino
 B. Non-Latino (*not of Hispanic or Latin origin*)
 X. Can not choose/Refuse
- _____5. How long have you lived in the United States?
 A. I was born in the United States
 B. Under 5 years
 C. 5 years or more
 X. Can not choose/Refuse
- _____6. What is your education level?
 A. Less than High School
 B. High School Graduate
 C. Some College or More
 X. Can not choose/Refuse
- _____7. What is your employment Status?
 A. Unemployed
 B. Part time
 C. Full time
 D. Student
 E. Retired
 X. Can not choose/Refuse
- _____8. What is your household income?
 A. Less than \$10,000
 B. \$10,000-\$24,999
 C. \$25,000-\$49,999
 D. \$50,000-\$74,999
 E. \$75,000 or more
 X. Can not choose/Refuse
- _____9. What is your housing tenure?
 A. Own
 B. Rent
 C. Homeless or staying at a shelter
 X. Can not choose/Refuse
- _____10. How many children 18 years old or less live in your household?
 A. 0
 B. 1-2
 C. 3 or more
 X. Can not choose/Refuse
- _____11. How many adults (not including yourself) live in your household?
 A. 0 (*I am the only adult*)
 B. 1 (*I live with one other adult*)
 C. 2 or more (*I live with two or more adults*)
 X. Can not choose/Refuse
- _____12. How many vehicles do you own?
 A. 0
 B. 1
 C. 2 or more
 X. Can not choose/Refuse
- _____13. What is your primary way of getting around?
 A. Walk or bike
 B. Bus or light rail
 C. Driving an automobile
 X. Can not choose/Refuse
- _____14. How often you currently ride the bus?
 A. Never
 B. 1-3 days per month
 C. 1-3 days per week
 D. 4-7 days per week
 X. Can not choose/Refuse
- _____15. How would you rate your experience riding the bus as a VTA customer?
 A. Excellent
 B. Good
 C. Fair
 D. Poor
 X. Can not choose/Refuse
- _____16. If you could improve your experience taking the bus in one way, which of the following areas of improvement would you choose?
 A. Bus stop conditions (*lighting, shelter*)
 B. Bus conditions (*seat availability, cleanliness*)
 C. Safety (*surveillance, seatbelts*)
 D. Bus reliability (*on time, boarding available*)
 X. Can not choose/Refuse
- _____17. Do you know where to go to apply for transit cost assistance?
 A. No
 B. Yes
 X. Can not choose/Refuse
- _____18. Do you currently receive a free or reduced transit pass or bus tokens from a government program or social service agency?
 A. No
 B. Yes
 X. Can not choose/Refuse
- _____19. If you qualified for a free or very inexpensive bus pass, how often do you think you would use it?
 A. Never
 B. 1-3 days per month
 C. 1-3 days per week
 D. 4-7 days per week
 X. Can not choose/Refuse
- DIRECTIONS QUESTION 20: Mark up to 3 answers
20. What are the best 3 ways for you to receive information on transit-cost assistance programs and resources?
 VTA Take One
 VTA website/e-mail
 VTA Downtown Customer Service Center
 Information at bus stops/stations
 Information at food banks and other social service programs
 Mail
 Newspaper: Which paper? _____
 Radio: Which station? _____
 Other: Specify _____

DIRECTIONS QUESTIONS 21-34: Please check the box that applies for both parts (a) and (b).

	(a) Do the following VTA bus conditions currently <u>discourage</u> you from riding the bus more frequently?			(b) Would you ride the bus <u>more frequently</u> than you do currently if this condition was <u>improved</u> ?	
	No. This condition <u>does not</u> currently discourage me from riding the bus more frequently	Yes. This condition currently discourages me from riding bus more frequently	Can not Choose/ Refuse	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
21. Bus stop <u>distance</u> from your home or place of residence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
22. Bus stop safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
23. Street light condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
24. Bus stop shelter/ presence of overhangs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
25. Transfer time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
26. Overcrowding or lack of seating on the bus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
27. Unpleasant or unfriendly bus drivers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
28. Cost/VTA Fares	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
29. Bus condition and comfort (floor, seat, and window cleanliness, temperature, humidity)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
30. Bus reliability/availability (late buses, no-show buses, unable to board because bus is full)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
31. Elderly or disabled amenities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
32. Child-friendly amenities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
33. Safety on the bus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse
34. Other: -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> Can not choose/ Refuse

DIRECTIONS QUESTIONS 35-36: Fill in the blank.

35. What is the closest major intersection to your home or place of residence? (*Print Clearly*)

----- AND -----
 (*Your Street Name*) (*Nearest Cross Street*)

36. What city do you live in? (*Print Clearly*)

 (*City*)

[VTA] Encuesta de Mejoramiento de autobuses

Encuesta Objetivo: a) evaluar las tasas actuales de tránsito, asistencia con los costes entre los residentes de bajos ingresos de San José y b) determinar cómo Santa Clara Valley Transportation Authority (VTA) se puede trabajar para mejorar la experiencia del usuario de autobús.

INSTRUCCIONES PREGUNTAS 1-20: Por favor, escriba la letra de la respuesta en el espacio.

- | | |
|--|---|
| <p>-----1. ¿Cuál es su género?
 A. Masculino
 B. Femenino
 X. No se puede elegir / nagarse</p> <p>-----2. ¿Cuál es su edad?
 A. 18 a 29
 B. 30 a 54
 C. 55 o mayor
 X. No se puede elegir / nagarse</p> <p>-----3. ¿Cuál es su categoría de tarifa?
 A. Adulto C. Anciano
 B. Juventud D. Persona de movilidad reducida
 X. No se puede elegir / nagarse</p> <p>-----4. ¿Cuál es su raza / origen étnico?
 A. Latino
 B. No Latinos (<i>no de origen hispano o latino</i>)
 X. No se puede elegir / nagarse</p> <p>-----5. ¿Cuánto tiempo ha vivido en los Estados Unidos?
 A. Yo nací en los Estados Unidos
 B. Menores de 5 años
 C. 5 años o más
 X. No se puede elegir / nagarse</p> <p>-----6. ¿Cuál es su nivel de educación?
 A. Menos de la Escuela Secundaria
 B. Graduado de Secundaria
 C. Algo de universidad o más
 X. No se puede elegir / nagarse</p> <p>-----7. ¿Cuál es su situación de empleo?
 A. Desempleado D. Estudiante
 B. A tiempo parcial E. Jubilado
 C. tiempo completo
 X. No se puede elegir / nagarse</p> <p>-----8. ¿Cuál es su ingreso familiar?
 A. Menos de \$10,000
 B. \$10,000-\$24,999
 C. \$25,000-\$49,999
 D. \$50,000-\$74,999
 E. \$75,000 o más
 X. No se puede elegir/basura</p> <p>-----9. ¿Cuál es su tenencia de la vivienda?
 A. Propio
 B. Alquiler
 C. Personas sin hogar o permanecer en un refugio
 X. No se puede elegir / nagarse</p> <p>-----10. ¿Cuántos niños de 18 años o menos viven en su hogar?
 A. 0 C. 3 o más
 B. 1-2 X. No se puede elegir / nagarse</p> <p>-----11. ¿Cuántos adultos (no incluido usted) vive en hogar?
 A. 0 (<i>Yo soy el único adulto</i>)
 B. 1 (<i>Yo vivo con otro adulto</i>)
 C. 2 o mas (<i>yo vivo co dos o más dultos</i>)
 X. No se puede elegir/basura</p> <p>-----12. ¿Cuántos vehículos tienes?
 A. 0 C. 2 o más
 B. 1 X. No se puede elegir / nagarse</p> | <p>-----13. ¿Cuál es su principal forma de transportacion?
 A. a pie o en bicicleta
 B. autobús o tren
 C. automóvil
 X. No se puede elegir / nagarse</p> <p>-----14. ¿Con qué frecuencia usa el autobús?
 A. Nunca
 B. 1-3 días al <u>mes</u>
 C. 1-3 días por <u>semana</u>
 D. 4-7 días por <u>semana</u>
 X. No se puede elegir / nagarse</p> <p>-----15. ¿Cómo calificaría su experiencia de viajar en autobús como un cliente de VTA?
 A. Excelente C. mas o menos
 B. Buena D. mala
 X. No se puede elegir / nagarse</p> <p>-----16. ¿Si usted puede mejorar su experiencia de tomar el autobús de <u>una manera</u>, cuál de las siguientes áreas de mejora elegiría?
 A. Las condiciones de parada de autobuses (<i>de iluminación, vivienda</i>)
 B. Las condiciones de autobuses (<i>disponibilidad de asientos, limpieza</i>)
 C. Seguridad (<i>vigilancia, cinturones de seguridad</i>)
 D. fiabilidad de autobuses (<i>a tiempo, el embarque está disponible</i>)
 X. No se puede elegir / nagarse</p> <p>-----17. ¿Sabe usted dónde acudir para obtener la asistencia económica para tránsito?
 A. No
 B. Sí
 X. No se puede elegir / nagarse</p> <p>-----18. ¿Actualmente recibe un precio reducido o pases gratis de tránsito o fichas autobús de un programa de gobierno o agencia del servicio social?
 A. No
 B. Sí
 X. No se puede elegir / nagarse</p> <p>-----19. ¿Si usted a calificado para un pase libre de autobus o pase precio reducido, con qué frecuencia usted cree que lo utilizaría?
 A. Nunca
 B. 1-3 días al <u>mes</u>
 C. 1-3 días por <u>semana</u>
 D. 4-7 días por <u>semana</u>
 X. No se puede elegir / nagarse</p> |
|--|---|

INSTRUCCIONES PREGUNTA 20: Marque hasta 3 respuestas

20. ¿Cuáles son las **3 mejores maneras** para que usted pueda recibir información sobre el tránsito-los programas de asistencia de costos y recursos?
- Tomar una VTA
 - sitio web VTA / e-mail
 - Centro de Atención al cliente VTA Centro de Servicio
 - Información en paradas de autobús o estaciones de
 - Información en los bancos de alimentos y otros programas de servicio social
 - Correo
 - Diario: ¿Qué papel ? _____
 - Radio: ¿Qué estación ? _____
 - Otros: Especifique _____

INSTRUCCIONES PREGUNTAS 21-34: Por favor, marque la casilla que se aplica para ambas partes (a) y (b).

	(a) ¿Elija las siguientes condiciones autobús VTA que actualmente lo desanima a tomar el autobús con más frecuentemente?			(b) ¿Quieres viajar en el autobús con mayor frecuencia, entonces lo que actualmente si se mejorara esta condición?	
	No. Esta condición <u>no me</u> desanima a tomar el autobús frecuentemente.	Sí. Esta condición actualmente me desanima a tomar el autobús con más frecuentemente.	No se puede elegir /nagarse		
21. Parada de autobús a distancia de su casa o lugar de residencia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
22. Seguridad de Parada de autobús	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
23. Condición del semaforo de la calle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
24. El refugio de la parada del autobús o la presencia techo del autobús	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
25. El tiempo de traslado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
26. Autobús sobre cargado o la falta de asientos en el autobús	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
27. Conductores de autobus desagradables o hostiles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
28. Costo / VTA Tarifas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
29. Condición de autobuses y la comodidad (piso, asientos, ventanas y limpieza, temperatura, humedad)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
30. Autobús fiabilidad / disponibilidad (autobuses tarde, los autobuses no se presenta, no pueden subir a bordo porque el autobús está lleno)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
31. Instalaciones mayores o con discapacidad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
32. Instalaciones para niños amistoso	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
33. Seguridad en el autobús	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse
34. Otro: -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Sí	<input type="checkbox"/> No se puede elegir/nagarse

INSTRUCCIONES PREGUNTAS 35-36: Llene el espacio en blanco.

35. ¿Cuál es la intersección más cercana a su domicilio o lugar donde vive? (Con letra clara)

----- AND -----
 (Su nombre Calle) (la calle más cercana de la Cruz)

36. ¿En que ciudad vive? (Con letra clara)

 (Ciudad)

[VTA] Khảo sát xe buýt cải thiện

Mục tiêu khảo sát: a) đánh giá tỷ giá hiện tại của quá cảnh, hỗ trợ chi phí thấp, thu nhập giữa các cư dân San Jose và b) xác định như thế nào Santa Clara Valley Transportation Authority (VTA) có thể làm việc để cải thiện kinh nghiệm người dùng xe buýt.

Chỉ Dẫn Câu hỏi 1-20: Xin vui lòng viết câu trả lời của bạn vào trong đường gạch cung cấp

- _____1. Giới tính của bạn là gì?
A. đàn ông
B. nữ
X. Không thể chọn / từ chối
- _____2. Tuổi của bạn là gì?
A. 18 tới 29
B. 30 tới 54
C. 55 hoặc cũ
X. Không thể chọn / từ chối
- _____3. Thẻ loại giá vé của bạn là gì?
A. người lớn
B. thanh niên
C. Cao cấp
D. Đình chỉ
X. Không thể chọn / từ chối
- _____4. Chúng tộc của bạn là gì / dân tộc?
A. nguồn gốc Tây Ban Nha
B. không - La tinh (không có nguồn gốc Tây Ban Nha hoặc tiếng Latinh)
C. Cao cấp
D. Đình chỉ
X. Không thể chọn / từ chối
- _____5. Bao lâu bạn sống tại Hoa Kỳ?
A. Tôi sinh ra ở Hoa Kỳ
B. dưới 5 năm
C. 5 năm trở lên
X. Không thể chọn / từ chối
- _____6. Trình độ giáo dục của bạn là gì?
A. Ít hơn trung học
B. trường trung học sau đại học
C. Một số trường cao đẳng trở lên
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____7. Tình trạng việc làm của bạn là gì?
A. thất nghiệp
B. bán thời gian
C. Toàn thời gian
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____8. Thu nhập của hộ gia đình là gì?
A. Ít hơn \$10,000
B. \$10,000-\$24,999
C. \$25,000-\$49,999
D. \$50,000-\$74,999
E. \$75,000 hoặc hơn
X. Không thể chọn / từ chối
- _____9. Nhiệm kỳ nhà ở của bạn là gì?
A. Mua
B. Thuê
C. Không nhà / ở tạm trú
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____10. Có bao nhiêu em 18 tuổi hoặc ít hơn sống trong gia đình của bạn?
A. 0
B. 1-2
C. 3 hoặc nhiều hơn
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____11. Có bao nhiêu người lớn (không bao gồm bản thân) sống trong hộ gia đình của bạn?
A. 0 (Chỉ tôi là người lớn)
B. 1 (tôi sống với một người lớn khác)
C. 2 hoặc nhiều hơn (tôi sống với hai hoặc nhiều người lớn)
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____12. Bạn có bao nhiêu chiếc xe?
A. 0
B. 1
C. 2 hoặc nhiều hơn
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____13. Bạn hay đi bằng phương tiện gì nhất?
A. Đi bộ hoặc xe đạp
B. Xe buýt hay xe lửa
C. Lái xe ô tô
D. Sinh viên
E. Nghi hưu
X. Không thể chọn / từ chối
- _____14. Bao lâu bạn đang đi xe buýt?
A. Không bao giờ
B. 1-3 ngày / tháng
C. 1-3 ngày mỗi tuần
D. 4-7 ngày mỗi tuần
E. Nghi hưu
X. Không thể chọn / từ chối
- _____15. Làm thế nào quý vị đánh giá kinh nghiệm của bạn xe buýt như là một khách hàng VTA?
A. Rất hài lòng
B. Tốt
C. Hài lòng
D. Không hài lòng
E. Nghi hưu
X. Không thể chọn / từ chối
- _____16. Nếu bạn có thể cải thiện kinh nghiệm dùng xe buýt thì trong những cách dưới đây cách nào bạn sẽ chọn?
A. Trạm dừng xe buýt (đen, mái hiên)
B. trên xe buýt (chỗ có sẵn, sạch sẽ)
C. an toàn (giám sát, dây an toàn)
D. Bus đt tín cậy (về thời gian, nội trú có)
E. Nghi hưu
X. Không thể chọn / từ chối
- _____17. Bạn có biết đi đâu để đăng ký cho quá cảnh chi phí hỗ trợ?
A. Không có
B. Có
C. Hài lòng
D. Không hài lòng
E. Nghi hưu
X. Không thể chọn / từ chối
- _____18. Quý vị hiện đang nhận được miễn phí hoặc giảm quá cảnh hoặc qua thẻ xe buýt từ một chương trình của chính phủ hoặc cơ quan dịch vụ xã hội?
A. Không có
B. Có
C. Hài lòng
D. Không hài lòng
E. Nghi hưu
X. Không thể chọn / từ chối
- _____19. Nếu bạn đủ tiêu chuẩn để được miễn phí hoặc trợ giá ☐ về thì bạn nghĩ rằng bạn sẽ sử dụng thường xuyên không?
A. Không bao giờ
B. 1-3 ngày mỗi tháng
C. 1-3 ngày mỗi tuần
D. 4-7 ngày mỗi tuần
E. Nghi hưu
X. Không thể chọn / từ chối
- Chỉ Dẫn Câu hỏi 20:** Gạch lên đến 3 câu trả lời
20. Ba cách nào là tốt nhất để bạn ba cách để bạn nhận được thông tin về quá cảnh chương trình trợ giúp chi phí và nguồn lực là gì?
 VTA quảng cáo
 VTA mạng lưới / email
 VTA trung tâm Dịch vụ khách hàng
 Thông tin tại các điểm dừng xe buýt / trạm
 Thông tin tại các ngân hàng thực phẩm và các chương trình dịch vụ xã hội khác
 Thư
 Báo những giấy? _____
 phát thanh: Những trạm? _____
 khác: Ghi Rõ _____

Chỉ Dẫn Câu hỏi 21-34: Xin đánh dấu vào ô đó được áp dụng cho cả hai loại (a) và (b).

	(a) Những điều kiện xe buýt sau đây có ngăn cản bạn từ chối xe buýt thường xuyên không?			(b) Bạn có đi xe buýt thường xuyên hơn nếu tình trạng này đã được cải thiện?	
	Không có. Điều kiện hiện tại không ngăn cản tôi từ chối xe buýt thường xuyên	Có. Tình trạng này hiện đang khuyến khích tôi từ chối xe buýt thường xuyên hơn	Không thể chọn / từ chối	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
21. Xe buýt dừng khoảng cách từ nhà của bạn hoặc nơi cư trú	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
22. Xe buýt dừng an toàn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
23. Điều kiện ánh sáng trên đường đi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
24. Có mái hiên ở trạm xe buýt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
25. Chuyển tiếp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
26. Tình trạng quá đông hoặc thiếu chỗ ngồi trên xe buýt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
27. Khó chịu hoặc tài xế xe buýt không thân thiện	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
28. Chi phí / VTA Giá vé	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
29. Xe buýt điều kiện và tiện nghi (sàn, ghế, cửa sổ sạch sẽ, nhiệt độ, độ ẩm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
30. Xe buýt độ tin cậy / khả (cuối xe buýt trễ, không được lên xe tại xe buýt quá đông)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
31. Người cao tuổi hoặc người tàn tật	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
32. Trẻ em-tiện nghi thân thiện	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
33. An toàn trên xe buýt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối
34. khác: -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Không có <input type="checkbox"/> Có	<input type="checkbox"/> Không thể chọn/từ chối

Chỉ Dẫn Câu hỏi 35-36: Điền vào chỗ trống.

35. Giao lộ lớn gần nhà của bạn hoặc nơi cư trú là gì? (In Rõ ràng)

----- VÀ -----
(Đường Tên của bạn) (Đường ngang gần nhất)

36. Bạn ở thành phố nào? (In Rõ ràng)

(Thành phố)

Appendix B: Consent Forms

College of Social Sciences
Department of Urban and
Regional Planning

One Washington Square
San José, California 95192-0185
Voice: 408-924-5882
Fax: 408-924-5872
urbplan@email.sjsu.edu

www.sjsu.edu

Agreement to Participate in Research

Responsible Investigator: Sarah Abel, Graduate Student, Department of Urban and Regional Planning, San Jose State University

Title of Protocol: [VTA] Bus Improvement Survey

1. You have been asked to participate in a research study that seeks to: (a) investigate current rates of transit-cost assistance among low-income San Jose residents, and (b) identify how the Santa Clara Valley Transportation Authority (VTA) can work to improve the bus user/customer experience in order to increase bus ridership in San Jose.
2. You will be asked to take the attached survey.
3. Completing the survey involves no risk to you.
4. You and other San Jose residents will benefit if this research is used by VTA to enhance the bus-user/customer experience and/or is used to promote awareness about where to receive transit-cost assistance.
5. Although the results of this study may be published, no information that could identify you will be included.
6. Questions about this research may be addressed to Dayana Salazar, Urban and Regional Planning Department Chair, 408-924-5854. Questions about a research subjects' rights, or research-related injury may be presented to Pamela Stacks, Ph.D., Associate Vice President, Graduate Studies and Research, at (408)-924-2480.
7. No service of any kind, to which you are otherwise entitled, will be lost or jeopardized if you choose not to participate in the study.
8. Your consent is being given voluntarily. You may refuse to participate in the entire study or in any part of the study. You have the right to not answer questions you do not wish to answer. If you decide to participate in the study, you are free to withdraw at any time without any negative effect on your relations with San Jose State University or with any other participated institutions or agencies.
9. Please keep a copy of this form for your own records. By agreeing to participate in the study, it is implied that you have read and understand the above information. Please do not write any identifying information on the survey/questionnaire.
Thank you for participating in this survey.

Sincerely,



Ms. Sarah Abel

Address:
Ms. Sarah Abel
Graduate Student
Urban and Regional Planning Department
San Jose State University
One Washington Square,
San Jose, CA 95112
Phone: 831-359-5521

**College of Social Sciences
Department of Urban and
Regional Planning**

One Washington Square
San José, California 95192-0185
Voice: 408-924-5882
Fax: 408-924-5872
urbplan@email.sjsu.edu

www.sjsu.edu

Acuerdo para participar en la investigación

Investigador Responsable: Sarah Abel, Estudiante de Doctorado, Departamento de Planificación Urbana y Regional, Universidad de San José

Título del Protocolo: Encuesta de Mejoramiento de Autobuses [VTA]

1. Se le ha pedido participar en un estudio de investigación que se propone: (a) investigar las actuales tarifas de asistencia con los costos de tránsito entre los residentes de bajos ingresos de San José, y (b) determinar cómo el Transporte Autorizado del Valle de Santa Clara (VTA) puede trabajar para mejorar el uso de autobús / experiencia del cliente para aumentar el número de usuarios de autobús en San José.

2. Se le pedirá participar en la encuesta adjunta.

3. Completar la encuesta no implica ningún riesgo para usted.

4. Usted y otros residentes de San José se beneficiarán si esta investigación es utilizada por VTA para mejorar la experiencia del cliente/usuario del bus o se utilizara para promover el conocimiento sobre dónde recibir asistencia con los costos de tránsito.

5. Aunque los resultados de este estudio pueden ser publicados, no será ninguna información incluida que puedan identificarlo a usted.

6. Preguntas sobre esta investigación puede ser dirigida a Dayana Salazar, Planificación Urbana y Regional del Departamento de Presidencia, 408-924-5854. Preguntas sobre los derechos de investigación del sujeto relacionada a lesiones que pueden ser presentadas a Pamela Stacks, Ph.D., Vice President, Estudios de Posgrado e Investigación, al (408)-924-2480.

7. Ningun tipo de servicio se les negara por participaren esta encuesta.

8. Su consentimiento será voluntario. Usted puede negarse a participar en el estudio en su totalidad o en cualquier parte del estudio. Usted tiene el derecho a no contestar preguntas que usted no desea responder. Si usted decide participar en el estudio, usted es libre de retirarse en cualquier momento y sin ningún efecto negativo en sus relaciones con la Universidad Estatal de San José o con otras instituciones o agencias que participaron.

9. Por favor, mantenga una copia de este formulario para sus propios registros. Al aceptar participar en el estudio, se supone que usted ha leído y entendido la información anterior. Por favor, no escriba ninguna información de identificación de la encuesta / cuestionario.

¡Gracias por participar en esta encuesta!

Atentamente,



Dirección:
Sra. Sarah Abel
Estudiantes de Posgrado
Planificación Urbana y Regional del Departamento
San Jose State University
One Washington Square,
San Jose, CA 95112
Teléfono: 831-359-5521

Hiệp định để Tham gia vào nghiên cứu

Người chịu trách nhiệm: Sarah Abel, đại học cho sinh viên, Sở Quy hoạch vùng và đô thị, San Jose State University

Tiêu đề của Nghị định thư: [VTA] Khảo sát xe buýt cải thiện

1. Bạn đã được yêu cầu tham gia vào một nghiên cứu mà tìm đến: (a) điều tra tỷ giá hiện tại của quá cảnh, hỗ trợ chi phí thấp, thu nhập giữa các cư dân San Jose, và (b) xác định như thế nào Santa Clara Valley Transportation Authority (VTA) có thể làm việc để cải thiện việc sử dụng xe buýt / kinh nghiệm của khách hàng để tăng số lượng người đi xe buýt tại San Jose.
2. Bạn sẽ được yêu cầu đi theo cuộc khảo sát trực thuộc.
3. Hoàn thành việc khảo sát bao gồm việc không có rủi ro cho bạn.
4. Bạn và các cư dân ở San Jose sẽ được hưởng lợi nếu nghiên cứu này được sử dụng bởi VTA để nâng cao kinh nghiệm người đi xe buýt và hoặc được sử dụng để thúc đẩy nâng cao nhận thức về nơi để nhận được hỗ trợ chi phí vận chuyển quá cảnh.
5. Mặc dù các kết quả của nghiên cứu này có thể được xuất bản, không có thông tin rằng có thể xác định bạn sẽ được bao gồm.
6. Các câu hỏi về nghiên cứu này có thể được gửi đến Dayana Salazar (người chủ tọa), vùng và đô thị Sở Kế hoạch, 408-924-5854. Các câu hỏi về các quyền của một đối tượng nghiên cứu, hoặc nghiên cứu liên quan đến thương tích có thể được trình bày cho Pamela Stacks, Ph.D., Associate Vice President, học Nghiên cứu và nghiên cứu, tại số (408)-924-2480.
7. Bạn sẽ không bị tổn hại nếu bạn chọn không tham gia vào nghiên cứu.
8. Sự đồng ý của bạn là cho tự nguyện. Bạn có thể từ chối tham gia vào nghiên cứu toàn bộ hoặc phần nào trong nghiên cứu. Bạn có quyền không trả lời câu hỏi mà bạn không muốn trả lời. Nếu bạn quyết định tham gia vào nghiên cứu này, bạn có quyền rút lui bất kỳ lúc nào mà không có bất kỳ tác động tiêu cực đến quan hệ của bạn với San Jose State University hoặc với bất kỳ tham gia các tổ chức hay cơ quan khác.
9. Vui lòng giữ một bản sao của mẫu đơn này cho hồ sơ của riêng bạn. Bằng cách đồng ý tham gia vào nghiên cứu này, bạn đã đọc và hiểu các thông tin trên. Xin đừng viết bất kỳ thông tin nhận dạng về khảo sát / bảng câu hỏi.

Cảm ơn bạn đã tham gia cuộc khảo sát này.

Trân trọng,



Địa chỉ:
Bà Sarah Abel
Sau đại học cho sinh viên
Đô thị và khu vực Sở Kế hoạch
San Jose State University
One Washington Square,
San Jose, CA 95112
Điện thoại: 831-359-5521

Appendix C: Codebook

Codebook

- | | |
|--------------------------|--------------------|
| 1. SEX | 23a. STREETLT-A |
| 2. AGE | 23b. STREETLT-B |
| 3. FARE | 24a. STOPSHELT-A |
| 4. RACE | 24b. STOPSHELT-B |
| 5. US | 25a. TRANSFER-A |
| 6. EDUC | 25b. TRANSFER-B |
| 7. EMPLOY | 26a. OVERCROWD-A |
| 8. INCOME | 26b. OVERCROWD-B |
| 9. TENURE | 27a. DRIVERS-A |
| 10. CHILD | 27b. DRIVERS-B |
| 11. ADULT | 28a. COST-A |
| 12. AUTO | 28b. COST-B |
| 13. MODE | 29a. CONDITION-A |
| 14. BUSFREQ | 29b. CONDITION-B |
| 15. RATE | 30a. RELIABILITY-A |
| 16. IMPROVE | 30b. RELIABILITY-B |
| 17. WHEREASSIST | 31a. ELDAMEN-A |
| 18. FREEPASS | 31b. ELDAMEN-B |
| 19. PASSUSE | 32a. CHILDAMEN-A |
| 20. <i>Unique Coding</i> | 32b. CHILDAMEN-B |
| 21a. STOPDIST-A | 33a. SAFETY-A |
| 21b. STOPDIST-B | 33b. SAFETY-B |
| 22a. STOPSAFE-A | 34a. OTHER-A |
| 22b. STOPSAFE-B | 34b. OTHER-B |
| | 35. <i>Fill in</i> |
| | 36. <i>Fill in</i> |

Answers: Questions 1-19

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4
- F. 7

Answers: Question 20

No=0; Yes=1 (Applies to each information distribution preference)

Answers: Question 21-34(a)(b)

No=0; Yes=1

Appendix D: GIS Geocoding Methods

GIS Geocoding Methods

The following steps were used to determine how many survey participant location points were within a quarter mile from a VTA bus stop (Piven 2010):

- 1) Geocode the cross street location points using batchgeo.com.
- 2) Upload the latitude and longitude coordinates of each location point and the layer of VTA bus stops into ArcMap.
- 3) Create a quarter mile buffer around all bus stop location points.
- 4) Select the layer of cross street points by location “within” the bus stop location layer and create a new output file of location points that fall within the buffer.
- 5) Get a count of the location points that fall within the buffer zone.

The following steps were used to determine the average number of stops within a certain distance of each bus stop (Piven 2010):

- 1) Create a (quarter mile or eighth mile) buffer around each cross street location point and create a new output file of the buffer zone.
- 2) Conduct a spatial join of the buffer and bus stops layer and create a new output file of the joined layers.
- 3) Conduct a statistics reading of the join to identify the mean number of bus stops within the buffer layer.