Eno
Center for Transportation

Mobility on Demand in the Los Angeles Region:

EVALUATION OF THE USE AND PERFORMANCE OF THE MOD PILOT

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Contact: publicaffairs@enotrans.org
www.enotrans.org | 202.879.4700

Authors

Anne Brown, *Assistant Professor, University of Oregon*
Michael Manville, *Associate Professor of Urban Planning, UCLA*
Alexandra Weber, *Graduate Research Assistant, UCLA*

About the Eno Center for Transportation

The Eno Center for Transportation is an independent, nonpartisan think tank whose vision is for an American transportation system that fosters economic vitality, advances social equity, and improves the quality of life for all. The mission of Eno is to shape public debate on critical multimodal transportation issues and build a network of innovative transportation professionals. As an organization, Eno values independence, collaboration, relevance, excellence, and entrepreneurialism. These core values are reflected in everything we do

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About the Federal Mobility on Demand Program

Mobility on demand (MOD) refers to transportation services that can be hailed in real-time for an impending trip. MOD integrates data such as location tracking and traffic conditions, with user-entered destination and payment information. Though most MOD services are designed for users to interface using a smartphone, MOD can be requested through a web browser or call center, which can increase accessibility and equity of the service for people without access to a smartphone, people vision impairments, people who require non-English communication, and others. While MOD is not a new concept, recent technological advancements facilitate its deployment in a new way. Its role in the future of transit systems is yet to be determined.

In May 2016, the Federal Transit Administration (FTA) announced $8 million in funding for its Mobility on Demand Sandbox Demonstration Program. The program is part of FTA's support of transit agencies, government entities, educational institutions, and communities as they experiment with on-demand mobility tools such as smart phone applications and shared mobility services to augment and enhance existing transit agency services. MOD Sandbox was developed to test new ways to encourage multimodal, integrated, automated, accessible, and connected transportation. Among the key features of the program is its focus on local partnerships and demonstrated solutions in real-world settings.

Some of the eligible activities applicants could propose to advance MOD and transit integration were new business models for planning and development, the acquisition of new equipment, services, software and hardware, and operation of the project in a real-world setting. Eligible partners included public transportation providers, state and local departments of transportation, federally recognized Indian tribes, private for- and not-for-profit organizations, transportation service operators, state or local government entities, consultants, research institutions and consortia, and not-for-profit industry organizations. In October 2016, 11 projects were selected for funding (see the Appendix.)

The largest project awarded was a two-region partnership between Los Angeles and the Puget Sound Region. The Los Angeles County Metropolitan Transportation Authority (LA Metro) collaborated with King County, Washington Metro Transit (King County Metro) and the Central Puget Sound Regional Transit Authority (Sound Transit) on a project to contract with a transportation network company (TNC) to provide first/last mile service to select transit stations near disadvantaged communities. This proposal included evaluation and reporting by the Eno Center for Transportation and local research universities. The FTA awarded the team a grant of $1.35 million for the pilot and corresponding research.

The stated overall goal of the Los Angeles/Puget Sound project is to: 1) define how TNC services can be aligned with existing transit service to serve an effective first-mile/last-mile solution; 2) define how key partners can cost-effectively ensure equal access for individuals with disabilities and low incomes; 3) demonstrate payment integration across transit operator and TNC platforms, specifically to enable service to lower income and unbanked populations.

1. Introduction

Can subsidized ridehailing increase access to public transit, especially for people who are economically or socially disadvantaged? Almost since ridehailing's—also known as transportation network companies (TNCs)—advent, observers have expressed both concern and optimism about its implications for transit ridership. In offering auto-like access to people without cars, ridehailing could conceivably reduce transit use. Yet ridehailing could also make transit more accessible to current or potential riders. A ridehail trip could, for example, eliminate long, unpleasant, or unsafe walks to transit stations, which might otherwise deter transit use. One question, therefore, is whether such advantages actually accrue: do people use ridehailing to go to transit stops?

A second question, assuming these advantages do accrue, is to whom they accrue. Subsidized ridehailing could convert drivers into transit users, prevent current transit users from becoming drivers, deliver more convenience to transit riders who had no plans to switch away from transit, and/or give transit access to people who previously lacked it. These outcomes can overlap, but they advance different goals. Converting a regular driver into a transit rider or preventing a transit rider from switching to driving could advance environmental and efficiency goals—it could reduce vehicle miles, pollution, and potentially congestion. Providing better transit access to low-income people or to people with disabilities might be more likely to advance equity goals. Subsidized ridehail trips for these groups are less likely to reduce vehicle use (and may even increase it), but they could open up travel and opportunities to people whose mobility would be otherwise highly circumscribed.

The Los Angeles Mobility on Demand (MOD) program, funded by the United States Department of Transportation (USDOT), is a demonstration project designed to examine the impact of subsidized ridehailing to and from public transportation. The program has three overarching goals, two of them firmly embedded in the idea of enhancing access to transit for disadvantaged groups. Those goals, as the Eno Transportation Center (a partner in the MOD Program) explains, are: "1) to define how TNC services can be aligned with existing transit service to serve an effective first-mile/last-mile solution; 2) define how key partners can cost-effectively ensure equal access for individuals with disabilities and low incomes; 3) demonstrate payment integration across transit operator and TNC platforms, specifically to enable service to lower income and unbanked populations."

The MOD program began in January 2019 with service operated by the company Via. As a pilot program, it was rolled out at three LA Metro stations, all of which offered some form of transit on a dedicated lane or route. These stations included Artesia (which had "A" or Blue Line Light Rail service—although, due to maintenance disruptions, the rail line did not operate until June 2019), El Monte

(“J” or Silver Line Express Bus service), and North Hollywood (Red Line Subway and Orange Line Bus Rapid Transit).

This report summarizes findings from the Los Angeles MOD pilot between launch of service on January 28, 2019 until February 26, 2020. We analyze the pilot on two broad levels. First, we examine the overall structure: was the MOD structured in a way to offer a good test of the idea that ridehailing can expand access to transit? Second: taking the pilot as it was, do we see evidence that the MOD improved access for low-income and unbanked populations? There is also the broad question of whether a program most easily accessed by smartphone is the best way to help very low-income people, who may be less likely to have smartphone access.

Our results are mixed. With respect to the first question, some exigencies of transit scheduling made it difficult to offer subsidized ridehail trips in the evenings when transit services are less frequent and people may have greater safety concerns about traveling. With respect to the second question, our evidence (which has limits we will discuss) suggests that compared to typical transit users, most MOD users were younger, more affluent, less likely to be disabled, and less likely to be unbanked or lack cell phones. The spatial patterns of MOD riders and trips, moreover, reveal little about use across high and low-income neighborhoods; we find neither evidence that MOD services disproportionately served low-income neighborhoods nor evidence that MOD services eschewed them.

The first phase of the MOD program, in summary, offers some reassurance, from a logistics and administrative perspective, of “proof-of-concept.” Metro was able to contract with a ridehailing platform, and that platform successfully delivered rides to users who summoned it. What is less clear is whether delivering those rides advanced access and opportunity for disadvantaged people in these station areas.

2. Purpose

In the broadest sense, planners can use the MOD results to examine the complementarity between public transit and ridehailing. Ever since firms like Uber and Lyft emerged, observers have simultaneously worried that ridehailing will pull riders off transit and been intrigued by the possibility that ridehailing could increase transit ridership by making transit access more convenient and solving what are called “first-mile/last-mile” problems.

The first-mile/last-mile problem is a problem of transit access. It arises in places that have quality transit service, but in quantities limited enough to discourage transit use. Many, arguably most, United States metropolitan areas do not have areas with “high-quality” transit—places where the transit service does not mix with, and thus cannot be slowed down by, private vehicle traffic. The United States has hundreds of metropolitan areas and in the vast majority of these areas, transit service consists of slow and infrequent bus routes that traverse low-density landscapes. Transit in these places, as a result, is often a mode of last resort. At the other end of the spectrum are places like Manhattan, where virtually every household is a short walk from a subway, jobs and residences are packed in a tight linear grid, and few households own a car. Transit in Manhattan, as a result, is often a primary way of moving around. However, only a handful of areas that even slightly resemble Manhattan exist in the United States.

Between these two extremes are places, among them Los Angeles, with relatively few pockets of areas with high quality transit. In a congested region like Los Angeles, transit modes like light rail, subway, and bus rapid transit (BRT) can offer real advantages over solo driving. However, travelers wishing to capitalize on these advantages must first reach the transit station. If the station is difficult to reach—because it is physically distant, the traveler has physical limitations, or the traveler must make a trip at an off-hour when connecting buses are infrequent and walking feels unsafe—then people who might otherwise ride transit will choose to travel in some other way or be forced to stay home. This is the first-mile/last-mile problem.

The first-mile/last mile problem has multiple implications. Here we mention two. First is that transit ridership is lower than it would be otherwise because some people willing to ride are deterred by the inconvenience of reaching the station. The second implication is that some current riders, if transit is their best or only option, are probably already enduring a substantial inconvenience to reach transit. If that inconvenience is not mitigated, these riders may abandon transit for driving if given the opportunity.

A fast and inexpensive ridehail service could, in theory, help solve these problems. The person who steps off a train at 11pm, when no bus is coming and facing a mile-long walk home in the dark, can simply summon a car. The person who would take the train to work but has difficulty with buses (perhaps because of timing, perhaps because of a physical disability) can do the same. Right now, of course, some determined transit users in these situations could summon full-priced ridehail services on their own. But regular use of ridehail services can be expensive and for people without smartphones or checking accounts it is often impossible. For people who face these circumstances, subsidized ridehail trips could offer unambiguous improvements in access.

At the same time, however, it isn't clear that all or even most people availing themselves of subsidized ridehail services would be travelers with disabilities and/or low-income/unbanked people. The Federal Deposit Insurance Corporation (FDIC) estimates that in 2017 about nine percent of households in Los Angeles and Orange Counties were unbanked (meaning they lack a checking account) (FDIC 2017). The 2018 American Community Survey suggests that 11 percent of Los Angeles County households lack a smartphone, although LA Metro's Fall 2019 on-board rider survey suggests the percentage is far higher (40 percent) among current transit riders (LA Metro 2019). These are meaningful proportions, but they do nevertheless suggest that many users of a subsidized ridehail may not fall into these groups. If that is the case, then benefits of subsidized ridehail, while still real, will take a different form. People who currently drive to the station and pay to park, for example, or who get dropped off by a partner, could use the ridehail to save their money or their partner's time. People who currently ride a bus to a rail or BRT station could switch to ridehail for convenience or to cut down on total travel time. Finally, people who would pay for ridehailing (e.g. call their own Uber) could make the same trip for free or at a discount. These outcomes less clearly represent social benefits or even benefits to the transit provider. Understanding whether ridehail service meaningfully improves access to transit therefore requires understanding who takes it, for what purpose, and how they traveled before. Are users disproportionately people with disabilities, low-income people, or people who lack cell phones, checking accounts, or household automobiles? The MOD pilot and evaluation is intended to help answer these questions.

3. Background on LA MOD Pilot

As mentioned in the introduction, the LA MOD pilot involved LA Metro contracting with the ridehail service, Via, to offer rides to and from three stations: Artesia, El Monte, and North Hollywood. Each station began the pilot program with a Via service catchment area of six square miles. Users could take a subsidized trip within that service area, so long as it started or ended at the transit station. The subsidy itself at the program's outset was as follows. Every user got the first two Via rides free. After two rides, users who entered a TAP card number when they booked a ride (a TAP card is an LA Metro farecard) would be charged $1.75 (a standard Metro transit fare) for their ride. Users who did not link their Via account to a TAP card number would be charged $2 per Via ride. Finally, users participating in LA Metro's Low-Income Fare is Easy (LIFE) program, a fare subsidy program for low-income riders, would get Via rides for free if they linked their Via account to their registered TAP card number.

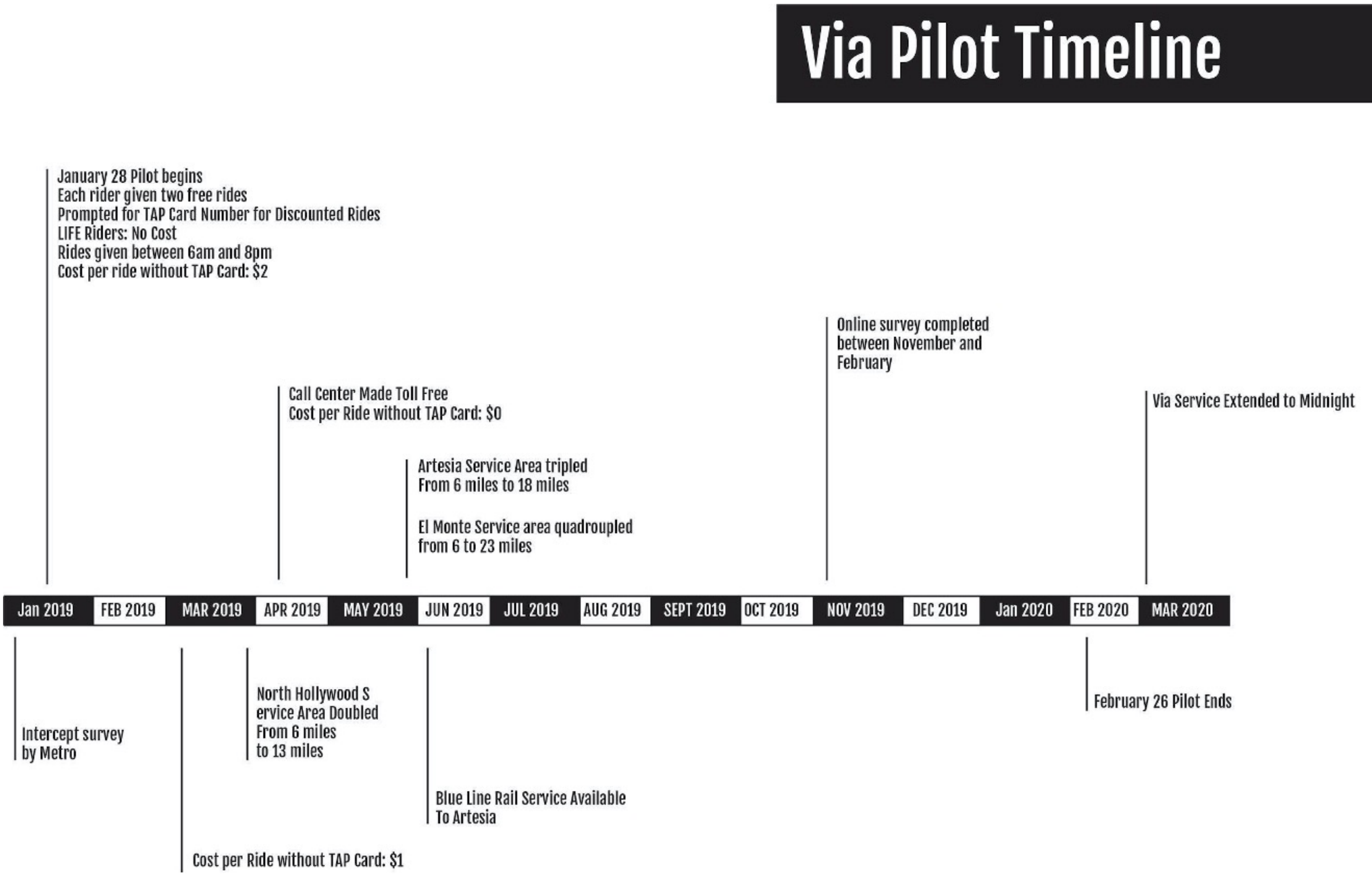
To hail a ride, users with smartphones could download an app, which they could use to summon a Via. If users did not have a smartphone, or did not want to use the app, they could request a Via through a call center (this number initially was not toll free but was made toll free in spring 2019). Via's service in Los Angeles was designed to be for sharing, like a carpool. However, if there were no available matches, it was possible that passengers could travel by themselves. Via had Wheelchair Accessible Vehicles (WAVs) to meet demand from people with physical disabilities.

When a rider requested a Via, the firm would first provide an ETA for the trip. If the rider then accepted the ride, Via would dispatch a vehicle. In some instances,

Via determined that it could not offer a ride, usually because it could not deliver a vehicle within a certain wait time (a vehicle may not have been available at all, or more likely was available but could not get to the rider within what Via considers an acceptable service time, which was 20 minutes). Rides were available weekdays between 6am and 8pm, an important condition and a point we return to later.
The above describes the contours of MOD at the program's outset. LA Metro designed the pilot as a flexible service to allow for adjustments and for a variety of reasons, Metro made changes to the program as it unfolded. On March 11, about five weeks into the pilot, Metro dropped all Via fares to $1 (while keeping the LIFE fares at zero) and then on April 8, it dropped all fares to zero. At the end of March (week nine of the pilot), Metro roughly doubled the size of the North Hollywood service area, from six square miles to over 13 square miles. In May 2019 (week 16) Metro tripled the size of the Artesia service area (to 18 square miles) and almost quadrupled the El Monte service area (to 23 square miles). As mentioned earlier, Blue (A) Line rail service was not available at Artesia until June 1, 2019, when scheduled maintenance ended and rail service resumed. Expanding the service areas also brought more stations into the program. Doubling the size of the North Hollywood service area, for instance, placed two rail stations served by Metrolink (the region's commuter rail provider) into the Via program and expanding the Artesia service area added four more Metro light rail stations.

What could have been the most important change occurred on March 2, 2020—the second year of the pilot—when Metro expanded service hours to midnight. Given the likelihood of first mile last mile problems being more acute at night when regular transit service is less frequent and people may be more worried about safety, this step may have offered new insight into the MOD program's utility. Within three weeks, however, the COVID-19 pandemic had come to Los Angeles, and shelter-in-place orders decimated transit use. Between March 19 and March 30, Metro took a number of steps that fundamentally altered Via service: allowing point-to-point trips akin to a typical ridehail platform, adding weekend service, ending all shared rides, and finally repurposing Via drivers and vehicles to provide emergency food delivery. Figure 1 outlines a full detailed timeline of the MOD program. The substantial services changes introduced during COVID-19 remain a topic for future research.

Figure 1: MOD Pilot Timeline



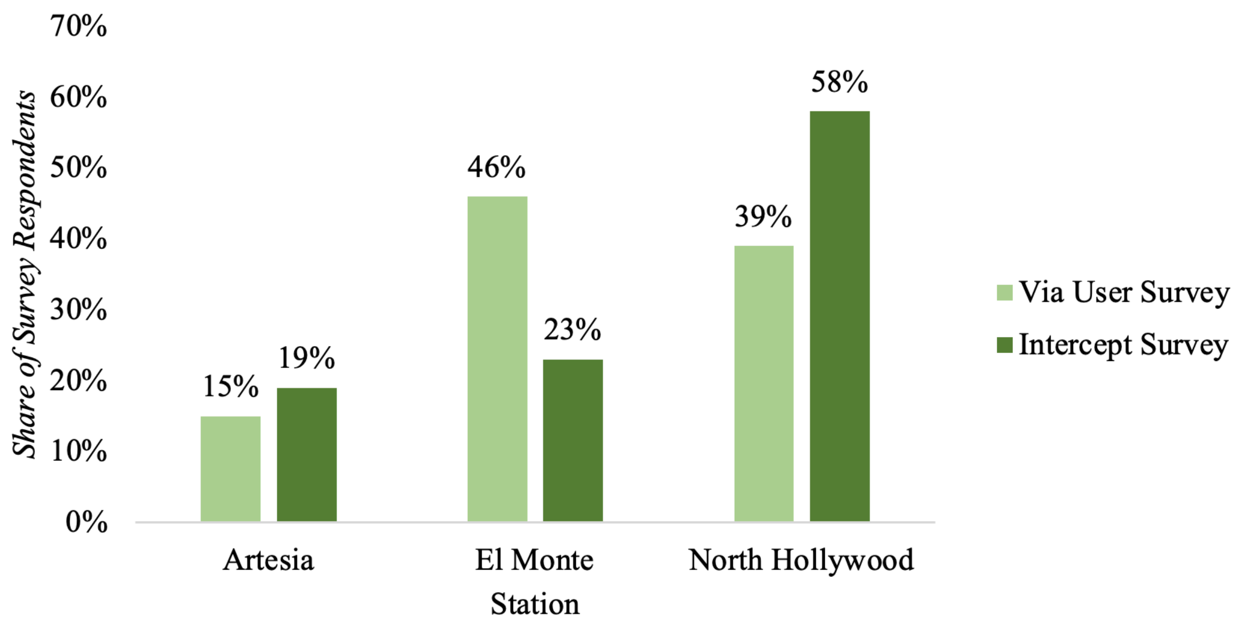
4. Data and Methods

We focus on the time period prior to the COVID-19 emergency and we analyze data from three sources: 1) an in-person, pre-pilot intercept of all transit riders at the three original MOD stations administered by Metro in early January 2019 (N= 668), 2) an online survey completed by 465 Via riders between November 2019 and February 2020, and 3) Via trip data for all trips requested or completed to or from these three stations between January 28, 2019 and February 26, 2020. Together, the three datasets enable us to examine: station users and how they traveled to/from stations prior the MOD program, Via trips and characteristics during the MOD program, and the characteristics of Via users compared to all station users. In principle, these data together should give us a window into most facets of Via use and its effects: we can see how people traveled at these stations before the pilot began, observe the pattern of Via trips during the pilot, and compare the characteristics of station users with Via riders.

The primary limitation we face is that the datasets are not directly comparable for a number of reasons. The Via trip data are an administrative record maintained by the firm and as such are both thorough and highly reliable: they show us the complete universe of Via trips taken. These data are also composed of trip details: when they happened, where they went, and so on. They include almost no data, however, about who passengers are or their motivations for choosing Via. For those data we need the station and Via rider surveys. Both of these surveys had response rates that are within the normal range for social science survey research, but they are surveys that rely on voluntary participation and are samples of a population whose underlying parameters we do not know. They do not show us the complete universe of station users or Via riders and as such they are inherently less reliable.

The Via user survey, in particular, gives us some cause for caution. Its geographic response was biased in a different direction than the pre-pilot Metro rider intercept survey. North Hollywood transit riders are overrepresented in the intercept survey data compared to the Via rider survey, while El Monte riders are relatively overrepresented in the Via user survey relative to the intercept survey (see Figure 2). As we will discuss further below, a major limitation is that the Via rider survey also under samples frequent riders. The people who used the service most were least likely to respond to a survey about it.

Figure 2: Share of Respondents by Station and Survey

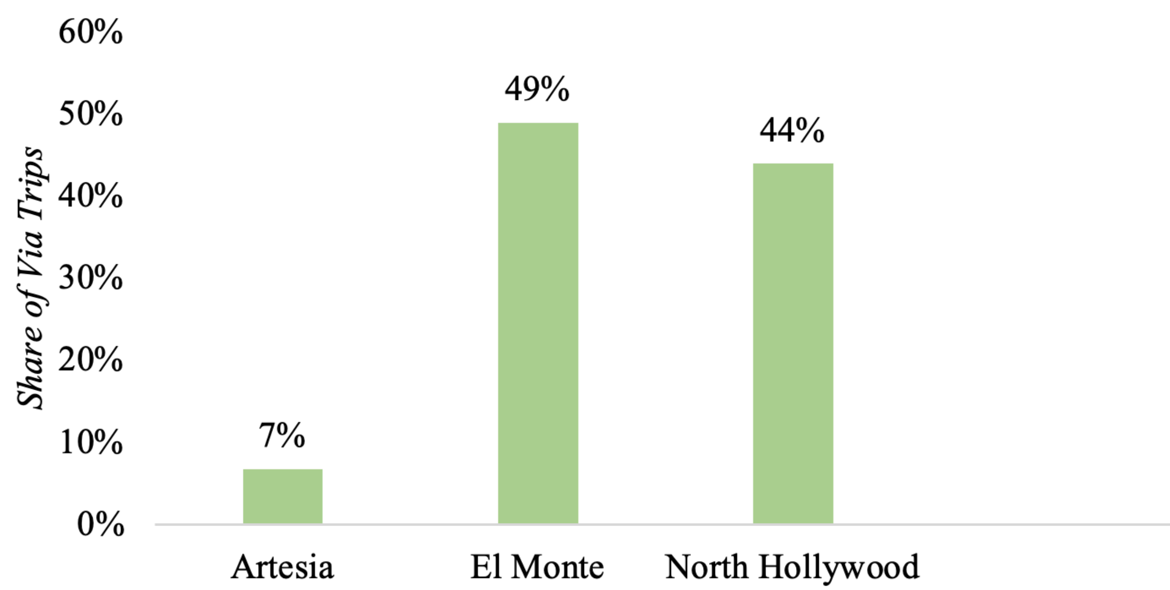


In part as a result of the limited comparability between these surveys, the following sections are divided into three distinct analyses: first, we examine Via trip characteristics and compare how Via trips stack up to next other modes used to access or depart Metro stations. Second, we compare surveyed Metro riders to Via survey respondents. And third, we examine the spatial patterns of Via trips serving the three Metro stations.

5. Results: Via Travel To/From Metro Stations

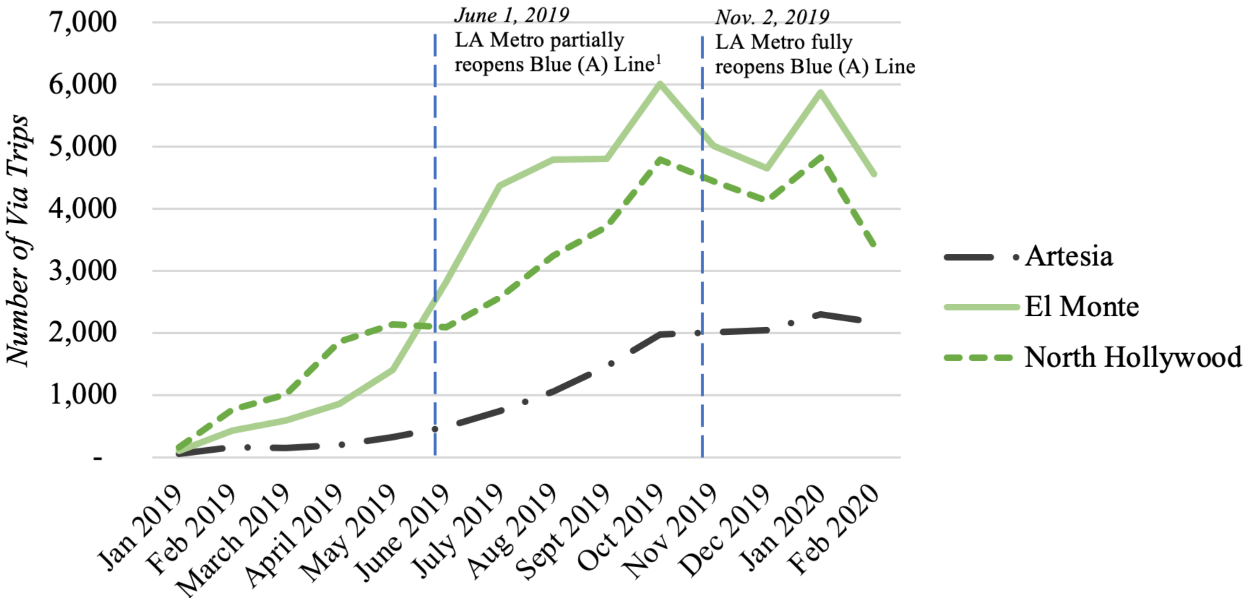
Between January 28, 2019 and February 26, 2020, travelers requested a total of 101,338 Via trips to/from the North Hollywood, El Monte, and Artesia stations as part of the LA MOD program (see Figure *2)*. Of these, 79,741 trips were completed. This works out to about 7,795 requested trips per month and 6,133 completed trips.

Figure 3: Share of Via Trip Requests by Metro Station



More travelers participated in the pilot through the El Monte and North Hollywood stations compared to Artesia. Via use at all three stations grew steadily throughout the pilot until dipping in February 2020 (see Figure 4). The trend lines do suggest that ridership in each pilot area grew after the service areas were expanded.

Figure 4. Number of Trip Requests Over Time by Station



The Southern Segment of the Blue (A) Line between Downtown Long Beach and Compton Station reopened June 1, 2019.

An important point: almost all requested and completed trips (99 percent) were made through the app, with just 1 percent of requests made through the call center. Thus, the population without smartphones, which as we show below is a substantial portion of Metro riders overall, was either not reached by this program or did not find the program appealing.

About three-quarters (79 percent, n=79,741) of trip requests resulted in completed trips (i.e., the driver picked up the passenger and took them to or from the station). Table 1 shows that other trip requests were not fulfilled for a variety of reasons. The most common reason a request was not completed was because requesters did not accept the trip that Via offered (this was 12 percent of total trip requests, n=12,558). Trips that requesters did not accept, along with those that requesters cancelled, had longer average ETAs compared to completed trips (11.02, 12.04, and 9.01 min, respectively), which at least suggests that the requesters had hoped for faster travel. Among completed rides, the ETAs were quite accurate, averaged across rides; average actual wait times were just 0.03 minutes (2.1 seconds) longer than average ETAs. Actual wait times ranged from between 6 minutes faster to 8 minutes slower than predicted ETAs.[1]

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[1] This estimate excludes outliers in the bottom 1 percent and 99 percent of data.

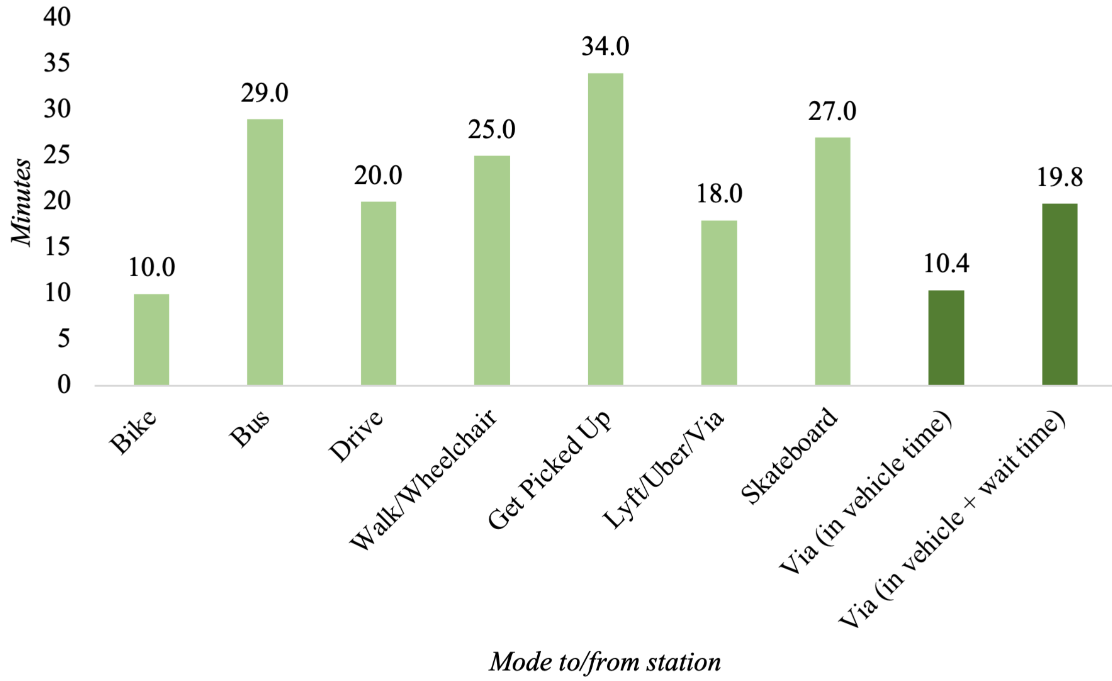
Of total trip requests, fewer than 1 percent (n=961) were WAV requests, although 9.9 percent of Los Angeles County residents report a disability including 5.7 percent with an ambulatory disability (2018 1-year ACS). About one-quarter (75.8 percent) of these trips were completed; a higher share of WAV requests was not offered trips compared to overall trips (7.7 percent vs. 3.1 percent).

Table 1: Trip Characteristics, All Trip Requests
January 2019 - February 2020

Ride Status	Number of Trip Requests	Percentage of Total Trip Requests	Mean ETA (min)	WAV Requests	Percentage of WAV Trip Requests
Completed	79,741	78.7 percent	9.0	728	75.8 percent
Admin cancelled	173	0.2 percent	10.8	10	1.0 percent
Rider no show	689	0.7 percent	11.1	4	0.4 percent
Rider cancelled	5,011	4.9 percent	12.0	68	7.1 percent
Trip not offered to riders	3,166	3.1 percent	N/A	74	7.7 percent
Rider did not accept trip offer	12,558	12.4 percent	11.0	77	8.0 percent
Total	*101,338*	*100.0 percent*		*961*	*100.0 percent*

Riders waited, on average, 9.0 minutes for a Via trip, and 85 percent of trips arrived within 15 minutes. A caveat to these results is that Via automatically cancelled a trip (refused a rider trip request) if a trip could not be provided within 20 minutes; average wait times would likely be longer if the acceptable wait time threshold were increased. Figure 4 shows that, combined with in-vehicle trip time, the average Via trip lasted 19.8 minutes from origin to destination, which—according to the pre-pilot survey data—was around the same time it took people to drive or ride hail to the station prior to the pilot.

Figure 5: Average Time To/From Station by Mode



Via trip requests were evenly distributed across the hours that Via service was offered (see Figure 6). We note again that for most of the pilot, Via service was not available after 8pm.

Figure 6: Temporal Trip Distribution

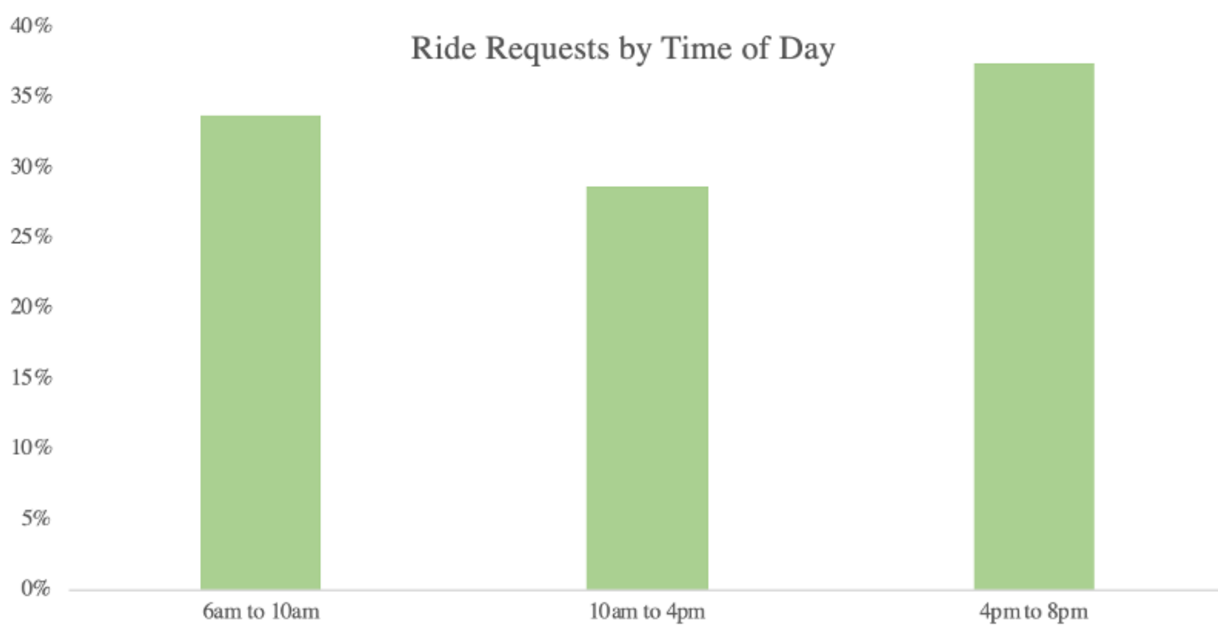
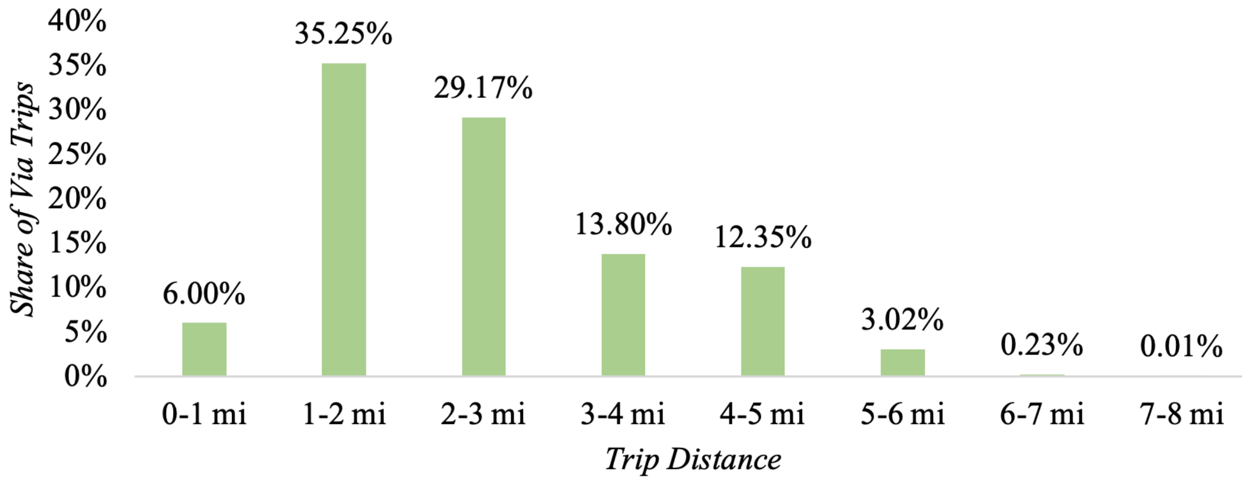


Figure 7: Via Trip Distances



We note that this distance could imply, as a result of the pilot program serving only some transit stations, that some trips were completed to a station that was not actually the closest station to the rider. The Universal City Red Line station, for example, is 2.7 miles from the North Hollywood station. Someone carried three miles by Via to the North Hollywood station, therefore, could conceivably have been driven past the Universal City station. As such, if more stations were included in a ridehail service, some ridehail vehicle trips could become shorter.

Of completed trips, most (90.5 percent) were hailed by a single person, with 7.6 percent of completed requests for two people and fewer than two percent of completed trip requests for three or more people. About one-third (32.7 percent) of completed trips were shared with another ride. Between trips with at least two passengers and trips that were shared with another ride, 40 percent of completed Via trips were shared.

6. Who Uses the VIA MOD Pilot Service?

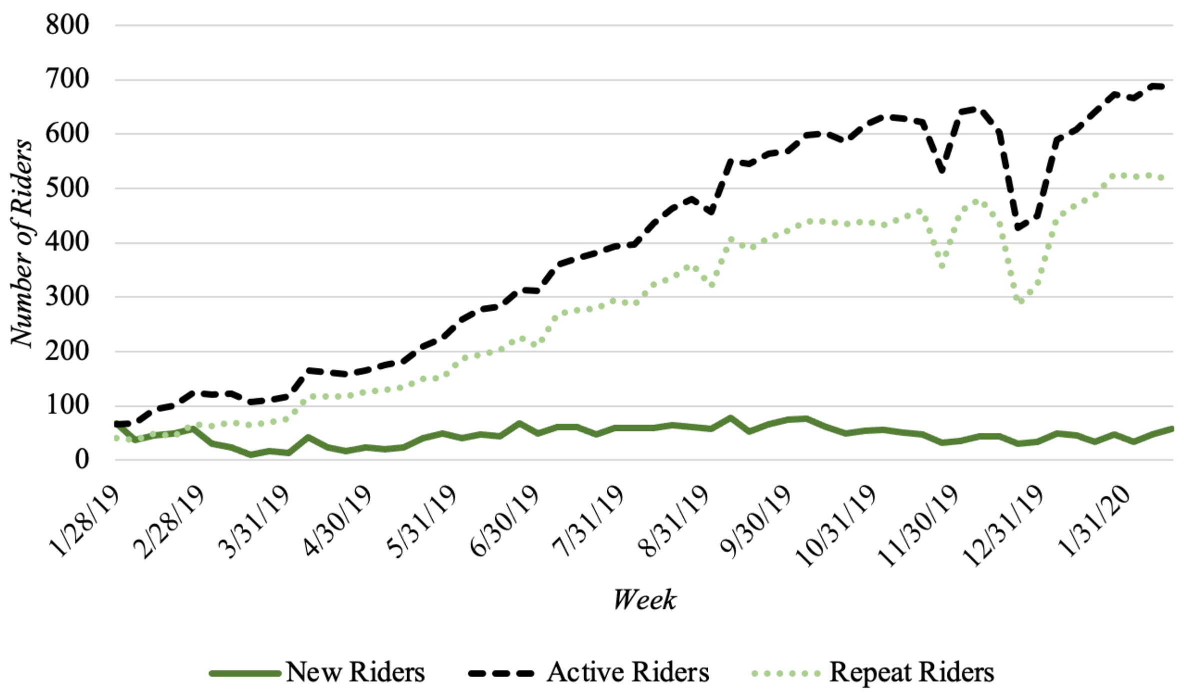
Between January 2019 and February 2020, 4,398 different people requested a ride through the Via MOD pilot and 2,575 people actually completed at least one ride. 79 percent of those who rode once (n=2,021) completed at least one additional ride, but over half of the people who requested never rode once. While some riders were avid users (the maximum number of rides requested per user was 521, or about 2 trips every weekday between January 2019 and February 2020), most were occasional. Table 2 shows that 40 percent of people who made a request did so only once, while another third (32.2 percent) requested Via less than once per month. Just 12.6 percent of requesters requested Via once a week or more. Though not shown, a small number of frequent users account for a large share of completed requests. Ten percent of riders made 66 percent of all Via trip requests.

Table 2: Share of Requesters by Trip Request Frequency

Number of Ride Requests	Number of Requesters	Percentage of Requesters
Once	1,772	40.3 percent
Less than once per month	1,415	32.2 percent
1-3 times per month	658	15.0 percent
1+ trip per week	553	12.6 percent
Total	*4,398*	*100.0 percent*

Figure 8 shows that, with the exception of December 2019—when the holidays likely altered people's typical travel patterns—the number of active and repeat requesters grew steadily over time. The number of new potential users was steady, with about 46 new people signing up for Via accounts each week.

Figure 8: Users Requesting Via Trips, Trends Over Time



We are unfortunately unable to say much about the riders who used the service most frequently, because—somewhat paradoxically—they did not participate at all in the rider survey. Of those riders who responded to the Via user survey, 85 percent were one-time riders, 13 percent used the service twice, and none used it more than four times.

With that caveat in mind, Table 3 shows rider characteristics across three surveys: the Via user survey was administered November 2019 to February 2020 (n=465); the pre-pilot intercept survey was administered to all station users in January 2019 (n=668); and Metro's systemwide on-board survey was administered in October and November 2019 (n=14,624). We note here that the Via rider survey had a much smaller sample size than the other two surveys, so it likely contains more error. In addition, many demographic questions had a high rate of non-response; on average, 13 percent of respondents did not answer a given demographic question. Given high rates of non-response to demographic questions, as well as self-selection bias among survey takers, we compare Via riders, station users, and all Metro riders rather than focusing on specific point estimates of Via user characteristics.

Compared to both station users and Metro riders overall, a higher share of Via survey respondents identified as Asian/Pacific Islander or white, were younger, had higher household incomes, and a larger share had a checking account and owned a smartphone. We cannot know at this point if this difference represents a true difference in users of the service or a differential willingness to answer the Via survey. *If* the Via user survey is an accurate representation of Via riders (and we emphasize that "if" for a reason), then the MOD may be reaching people who are disproportionately likely to have automobiles, higher incomes, and smartphones. Respondents to the Via rider survey were 3.5 times as likely as Metro riders overall to have household incomes exceeding $100,000, and ten times as likely to have a smartphone or cellphone.

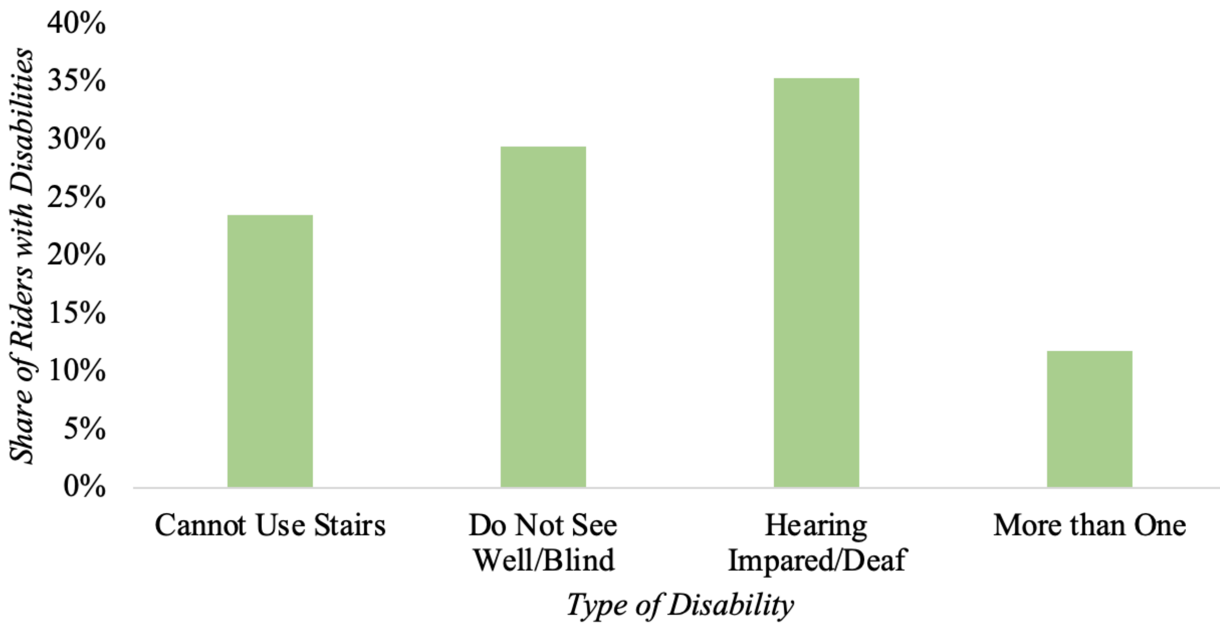
Table 3: Rider Characteristics Across Via Users, Station Users, and Metro Riders[1]

	Via Users	All Station Users[2]	Metro[3]
Race/Ethnicity			
Native American	0.7%	0.9%	1.0%
Asian/Pacific Islander	21.0%	9.3%	8.0%
Black	6.0%	15.3%	16.0%
Latino	26.0%	39.0%	59.0%
White	28.3%	18.0%	11.0%
Other	7.1%	4.7%	4.0%
Two or more races	11.0%	12.8%	
Phone Access			
Smartphone	94.6%	71.0%	60.0%
Cellphone[4]	4.9%	24.7%	35.0%
Neither	0.5%	4.3%	5.0%
Checking Account Access			
Yes	94.5%	75.9%	
No	5.5%	24.1%	
Car available to make this trip (yes)	49.8%	47.6%	21.0%
Gender			
Male	54.0%	53.1%	48.0%
Female	43.8%	45.8%	51.0%
Non-Binary	2.1%	1.1%	1.0%
Age			
<18	17.5%	2.9%	11.0%
18-24	36.7%	17.9%	21.0%
25-34	27.7%	25.8%	20.0%
35-49	14.5%	27.0%	22.0%
50-64	3.1%	20.4%	19.0%
65+	0.5%	6.0%	8.0%
Income			
<$5,000	5.6%	11.4%	23.0%
$5,000-9,999	2.5%	3.4%	7.0%
$10,000-14,999	7.5%	4.2%	6.0%
$15,000-19,999	4.4%	10.6%	16.0%
$20,000-24,999	8.4%	9.5%	10.0%
$25,000-34,999	7.8%	7.6%	7.0%
$35,000-49,999	10.6%	12.5%	12.0%
$50,000-99,999	27.7%	24.6%	13.0%
$100,000+	25.5%	16.3%	7.0%
Disability (yes)	3.7%	4.4%	

[1]Percentages reflect share of respondents who answered the survey question. Demographic questions had high rates of non-response, between about 8 and 31 percent.
[2]Pre-pilot intercept survey at pilot stations.
[3]Systemwide, October-November 2019
[4]Riders with cellphones may book Via rides by dialing the Call Center; they do not book trips using the Via smartphone app.

Table 3 also shows that a similar share of Via survey respondents reported having a temporary or permanent disability compared to intercepted Metro users (3.7 percent vs 4.4 percent); this figure is greater than the share of Via trip requests for WAV (one percent of total Via requests), but well below the 9.9 percent of Los Angeles County residents who report a disability (2018 1-year ACS). Figure 8 shows the breakdown of disability types among Via survey respondents; of respondents who reported a disability, about half (n=8) previously rode the bus to the station. (We note the small sample size here and advise interpreting data about this subgroup with caution).

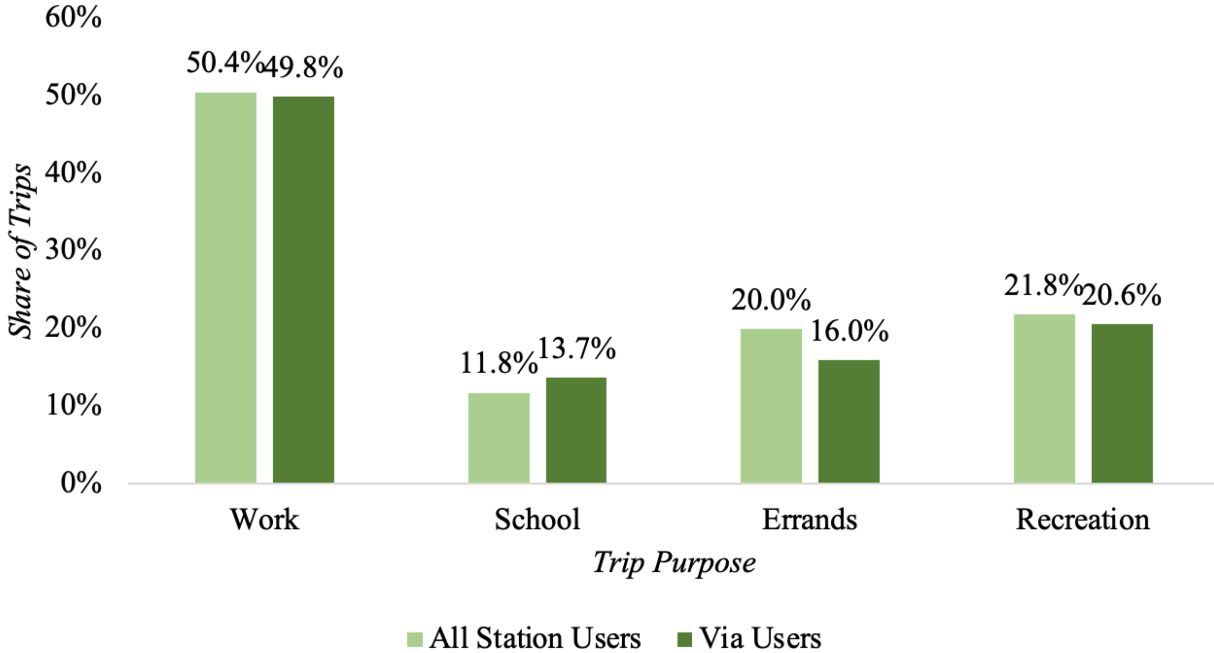
Figure 9: Via Rider Disability Types



n=17 Via survey respondents have a disability

Figure 10 shows reported trip purposes for intercepted Metro riders compared to Via survey respondents; trip purposes between the two groups are broadly similar.

Figure 10: Trip Purpose, All Station Users vs. Via Users

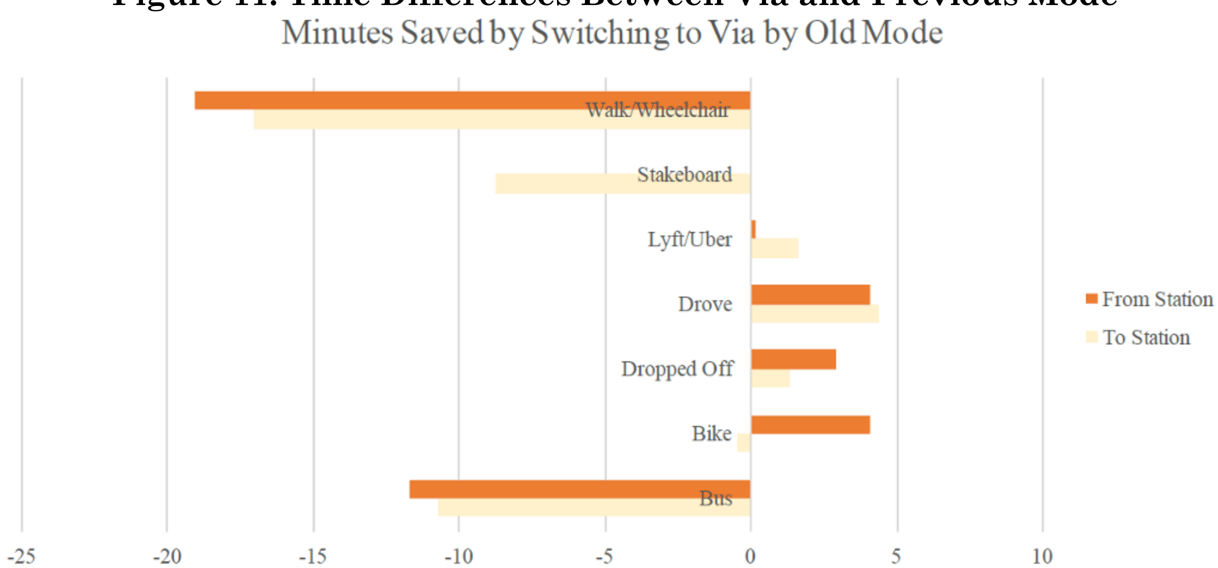


Across the three stations, the majority of transit riders (59 percent) take the bus to or from the station (see Table 4). Others drive (18 percent) or walk/wheelchair (17 percent). Compared to all station users, Via survey respondents were less likely to have previously taken the bus to/from a station (about 33 percent), more likely to have previously taken Lyft/Uber to/from the station (14-20 percent), to have been dropped off or picked up (five to seven percent), or taken other modes (six percent). About seven percent of surveyed Via users did not use the station before the MOD pilot. Figure 10 shows that Via trips to/from stations were faster than previous walk/wheelchair, skateboard, and bus trips. Via trips were slightly longer compared to Lyft/Uber, driving, or getting dropped off. We note that these estimates should be interpreted with caution as they are based on a small sub-sample of all Via users (those who responded to the survey) and also based on peoples' recall.

Table 4: Previous Travel Mode To/From Station

	Via Users Previous Mode To Station	Via Users Previous Mode From Station	All Station Users
Drive	18.9 percent	13.5 percent	17.5 percent
Dropped off/picked up	4.8 percent	7.3 percent	0.9 percent
Lyft/Uber	14.4 percent	19.7 percent	3.2 percent
Bus	33.6 percent	32.6 percent	59.0 percent
Bike	3.1 percent	2.6 percent	1.9 percent
Skateboard	0.8 percent	0.0 percent	0.5 percent
Walk/wheelchair	10.2 percent	12.4 percent	17.0 percent
Other	6.2 percent	6.7 percent	0.0 percent
Did not use station	7.9 percent	5.2 percent	0.0 percent
Total	100.0 percent	100.0 percent	100.0 percent

Figure 11: Time Differences Between Via and Previous Mode



Via rides are free in the MOD pilot, but riders were asked in the survey about their willingness to pay for the service in the future. Of those who responded, a majority (57 percent) said they would ride Via as much or more if a Via trip cost $1.75—the standard Metro fare. Travelers who previously drove to/from the station disproportionately reported that they would ride Via less or never if a trip cost $1.75; conversely, people who previously took Uber or Lyft to the station disproportionately stated that they would ride Via as much or more if a trip cost $1.75 instead of being free. We should note that prospective, "stated preference" questions such as this (asking if someone would pay) tend to be less reliable instances of "revealed preference" where we can observe how people act when actually confronted with a price. At the same time, however, the heaviest users of Via did not answer this question (since they did not answer the survey) and it is at least plausible that many of these heavy users would value the service at $1.75.

7. Spatial Patterns of Via Trips

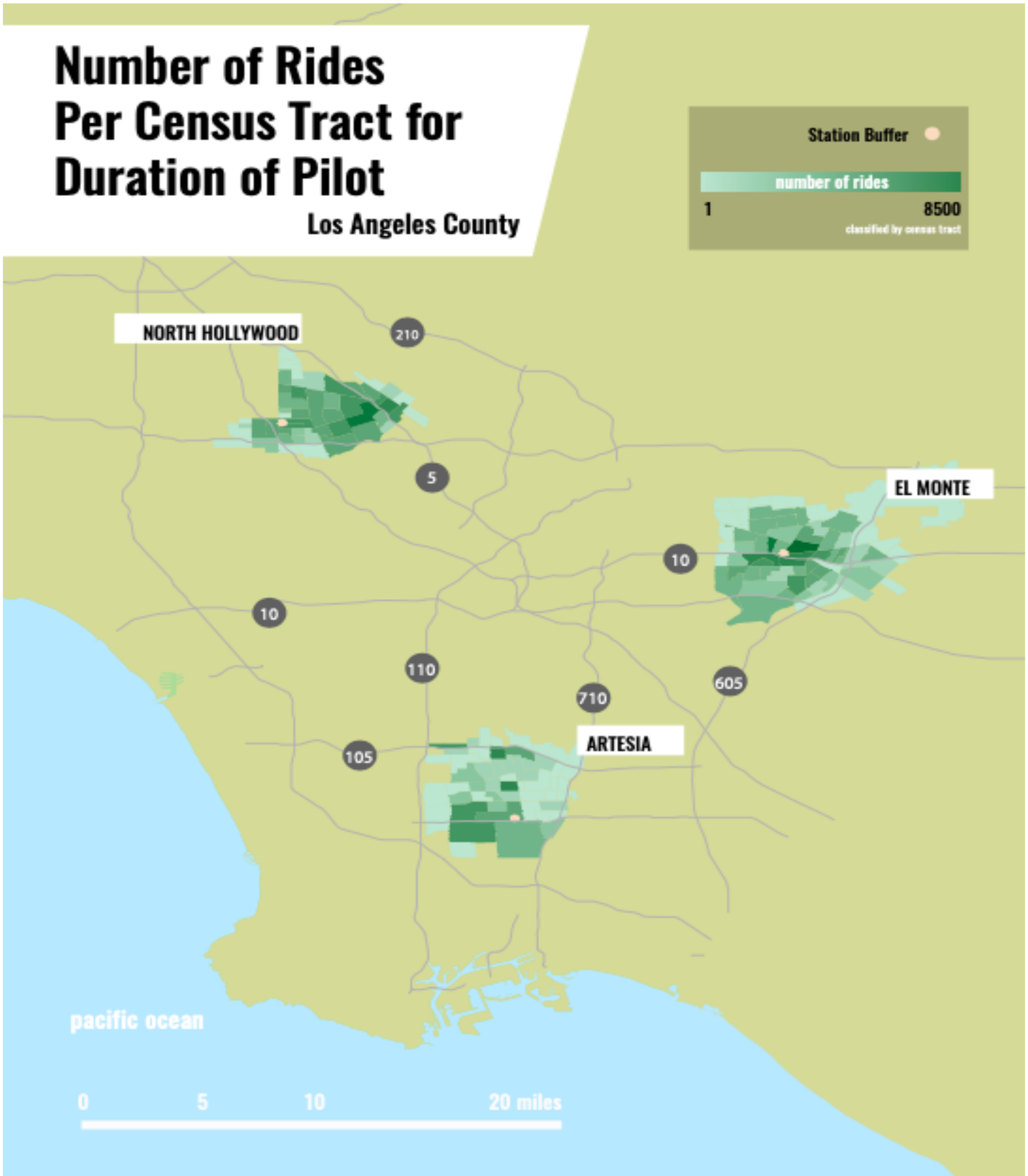
Our understanding of *who* the MOD benefits can be augmented by an understanding of *where* those benefits accrue—where are people coming and going from when they take MOD trips? Our user survey and trip data provide an important but, as we have discussed, incomplete picture of MOD services. The user surveys reflect only a small sample of users and trip descriptive statistics by themselves do not include any information about the passenger. One way to round out our analysis then is to plot trip origins and destinations and use the resulting data to examine spatial patterns in MOD usage. Doing so might show us, for example, that Via trips are more likely to originate or conclude in lower-income neighborhoods where the households are less likely to have cars. A finding like this would offer suggestive evidence that the MOD is reaching vulnerable populations who might otherwise have had difficulty traveling.

In this final section, we use trip request origins and destinations (Via provided latitudes and longitudes rounded to three digits after the decimal point) to examine the spatial patterns of trip requests, service quality, and requesters. Overall, we find that the spatial patterns of MOD riders and trips reveal little about potential equity implications of MOD services, either positive or negative; we find neither evidence that MOD services disproportionately served low-income neighborhoods nor evidence that MOD services eschewed them. This ambiguity probably stems from the relatively small number of trips and even smaller number of users that the MOD had. To put this more concretely: the typical Census tract has between 4,000 and 5,000 residents. Over the course of the MOD program, these tracts averaged about 75 ride requests apiece. Many of these rides, furthermore, were made by a small share of riders. Barring a very striking spatial pattern—for instance, virtually all rides occurring in tracts with low vehicle ownership or high poverty—it may be hard to meaningfully link these riders and rides with neighborhood characteristics.

7.1 Trip Request Patterns

Figure 11 shows the spatial distribution of trips across the three station areas; Appendix B shows the spatial patterns for trip request origins and destinations separately. Appendix C shows that the association between the number of Via trips in a tract and local characteristics is distance of the tract from the pilot station rather than local sociodemographic characteristics. Appendix A presents spatial patterns of neighborhood characteristics across the three station areas as well as the broader region. In each case, what stands out, perhaps unsurprisingly, is that trips are more common closer to the actual station. The Appendix also shows regression models that analyze the number of trips in each Census tract, which confirms a reasonably strong association between the number of Via rides and the distance between the tract centroid and the original station area. Roughly speaking, every additional mile in added distance is associated with between 173 and 188 fewer Via requests. The model also shows that trip requests are more common in Census tracts with more zero-car households. Each percentage point increase in the carless households is associated with between 60 and 70 additional Via rides. Our people were associated with more rides) none of these tests yielded significant results.

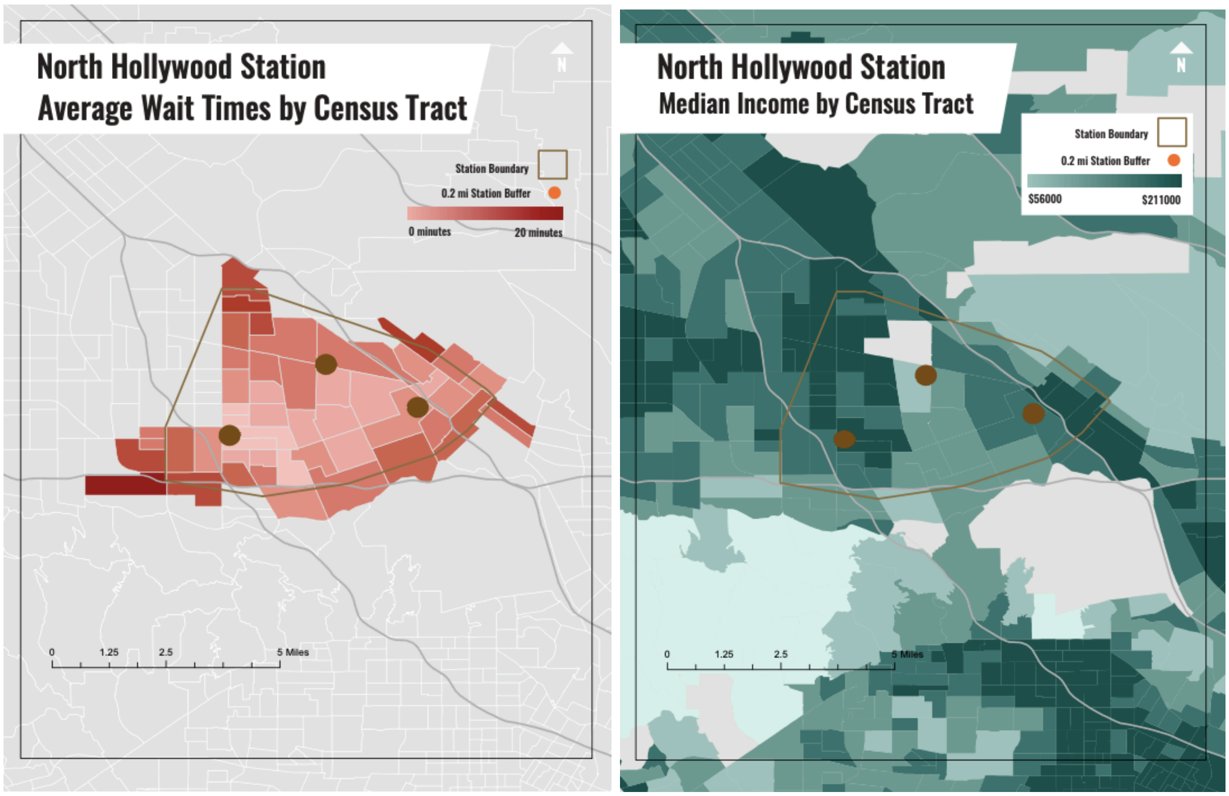
Figure 12: Trip Spatial Patterns

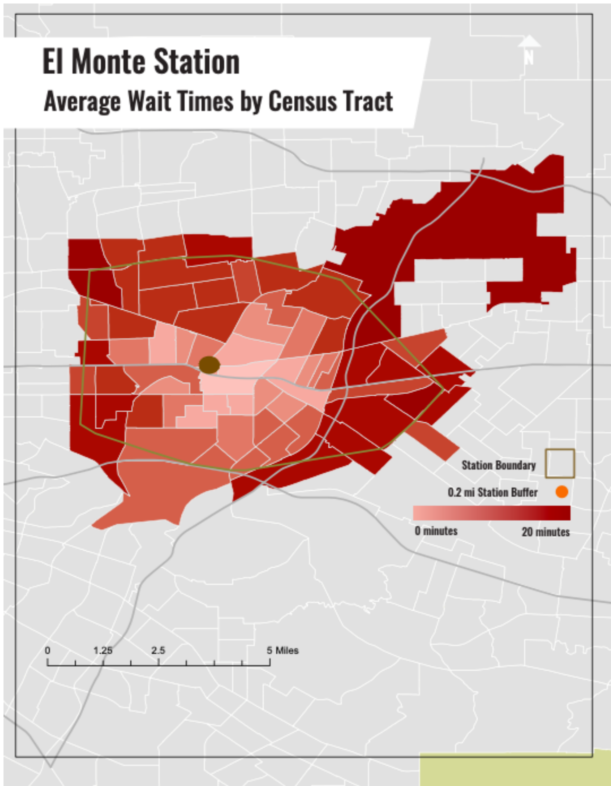


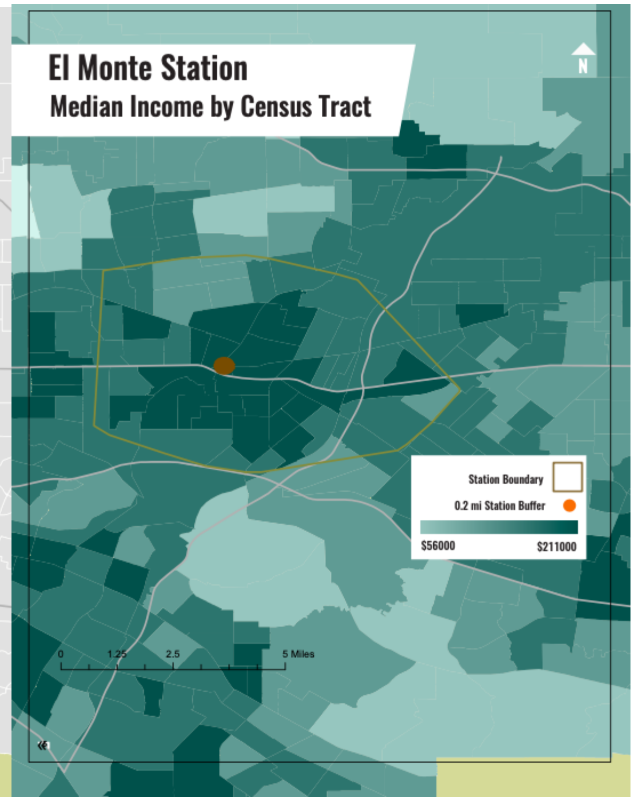
7.2 Service Quality Across Space

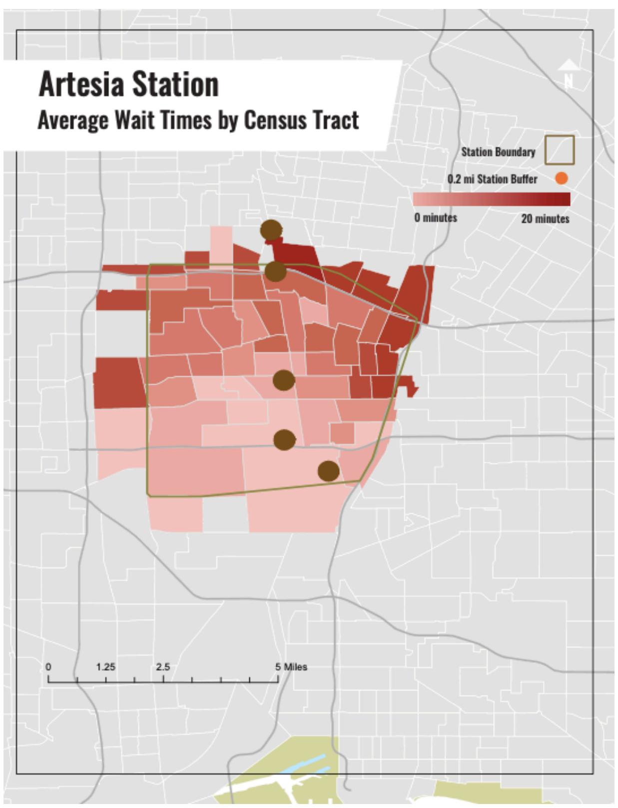
Figure 12 shows that across the three station areas, wait times were generally lowest in areas closest to the stations and increased with distance from the original station. The figure also shows that wait times do not appear related to neighborhood income, suggesting that service quality may be more a product of distance and MOD vehicle concentration rather than a reflection of neighborhood characteristics.

Figure 13: Average Wait Times Compared to Station-Area Income




El Monte Station
Average Wait Times by Census Tract
Station Boundary
0.2 mi Station Buffer
0 minutes
20 minutes
0
1.25
2.5
5 Miles
N


El Monte Station
Median Income by Census Tract
Station Boundary
0.2 mi Station Buffer
$56000
$211000
0
1.25
2.5
5 Miles
N


Artesia Station
Average Wait Times by Census Tract
Station Boundary
0.2 mi Station Buffer
0 minutes
20 minutes
0
1.25
2.5
5 Miles
N

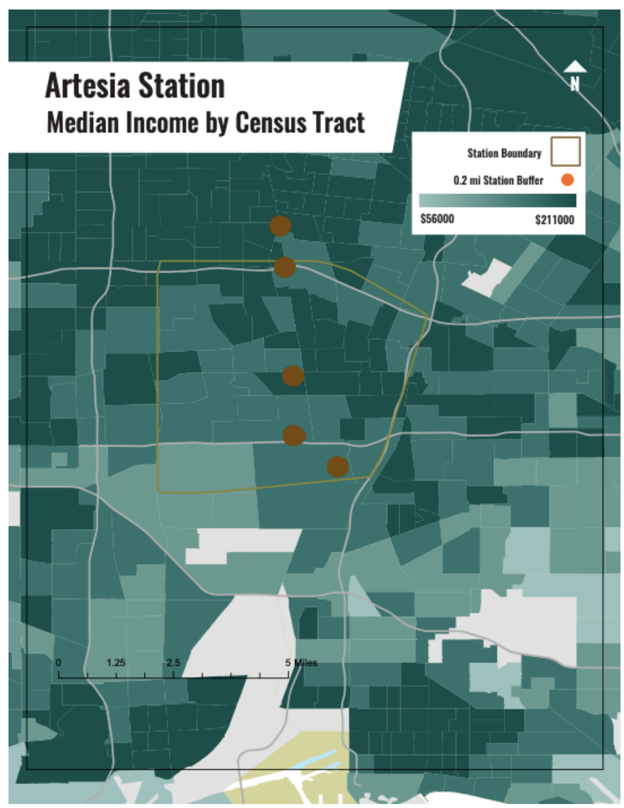
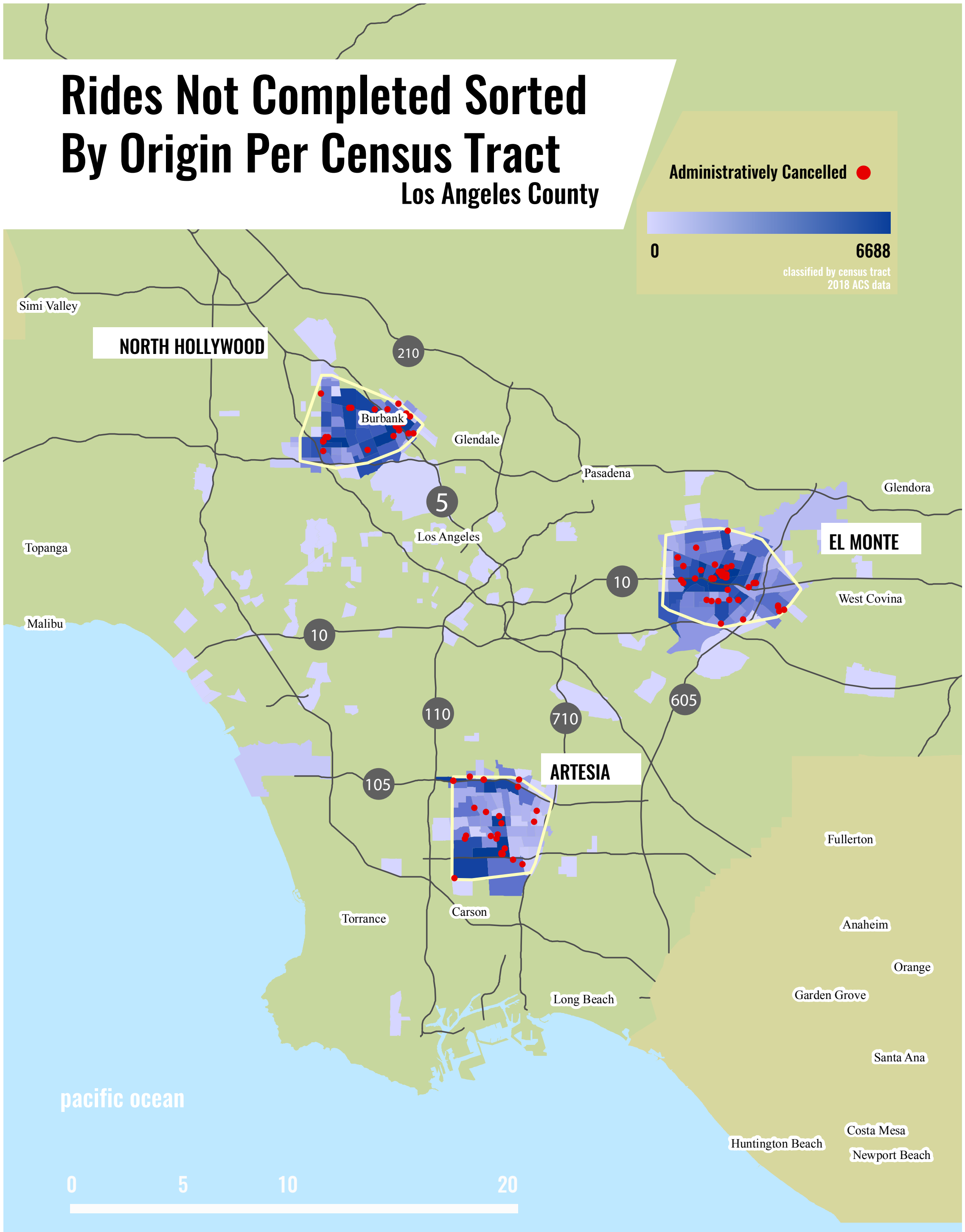

Artesia Station
Median Income by Census Tract
Station Boundary
0.2 mi Station Buffer
$56000
$211000
0
1.25
2.5
5 Miles
N

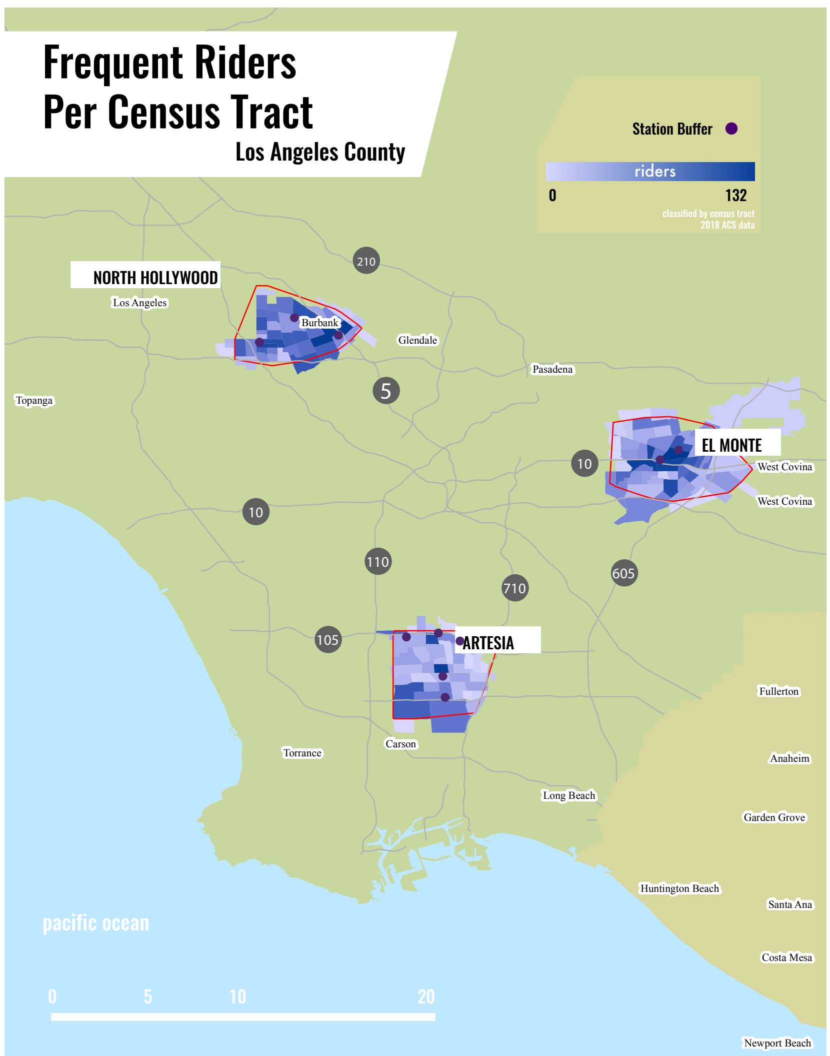
Figure 14: Request Cancellations Across Station Areas



7.3 MOD Requesters Across Space

Figure 15 shows the number of frequent requesters across the three station areas. We were also interested if people who requested MOD trips frequently lived in neighborhoods markedly different from those who requested MOD trips less frequently. Appendix B shows that overall, however, no clear patterns emerge of neighborhood characteristics by rider frequency. Station areas instead present inconsistent trends. For example, high-frequency requesters in North Hollywood live in neighborhoods with the highest percentage of households in poverty on average (12.1 percent) compared to less frequent requesters (between 8.5 and 9.5 percent); by contrast, frequent requesters in El Monte live in lower-poverty neighborhoods on average compared to less frequent requesters (13.2 percent vs. about 14.5 percent).

Figure 15: Requesters Across Station Areas



A final way of examining spatial trends in Via use is to match frequent requesters to their neighborhoods. As mentioned, we know little about frequent users, because none answered the Rider Survey. We can see, however, the location of the non-station end of their trips, which is presumably although not always their housing unit. We can therefore use our data to see if frequent users live in neighborhoods markedly different from those who requested MOD trips less frequently. To accomplish this, Table 5 shows average neighborhood characteristics broken down by service area and quartiles of trip request frequency. Each station area displays information across five columns: an overall column that shows mean neighborhood characteristics across the entire service area, and four additional columns correspond to the average neighborhood characteristics of riders in four ride request frequency quartiles from least to most frequent trip requests. For example, in Artesia, the bottom quartile (25 percent) of requesters requested six MOD trips across the study period on average and lived in 12 census tracts. The descriptive statistics in this column represent the average neighborhood characteristics in which these infrequent requesters live. The fourth column by contrast, shows average neighborhood characteristics for the service area's most frequent requesters—who requested MOD on average 158 times. Because a small number of mega-users (such as the person who individually made 521 requests) could throw off the top quartile (in that wherever that person lived would become the neighborhood with the most use) we cap the top quartile at 98 percent.

The table drives home the point that Via use is highly uneven. Even with the top quartile capped, the most frequent users are requesting Via 16 to 37 times as much as the least frequent. Yet overall, there are no clear patterns of neighborhood characteristics by rider frequency. Station areas instead present inconsistent trends. For example, high-frequency requesters in North Hollywood live in neighborhoods with the highest percentage of households in poverty on average (12.1 percent) compared to less frequent requesters (between 8.5 and 9.5 percent); by contrast, frequent requesters in El Monte live in lower-poverty neighborhoods on average compared to less frequent requesters (13.2 percent vs. about 14.5 percent).

Table 5: Neighborhood Characteristics by User Trip Request Frequency

	Artesia Station n=53 census tracts					El Monte Station n=58 census tracts					North Hollywood Station n=51 census tracts				
Percentile	25%	50%	75%	98%[1]	Overall	25%	50%	75%	98%[1]	Overall	25%	50%	75%	98%[1]	Overall
Mean # of Requests	6	19	47	158		7	32	72	261		13	32	103	208	
Tracts	12	14	13	13							12	12	13	13	
Total population	5,454	5,033	4,448	5,293	5,049	4,923	4,815	4,349	3,801	4,478	4,157	4,033	4,162	4,205	4,141
Median Income	$53,350	$47,311	$54,578	$50,880	$51,414	$61,630	$51,006	$55,075	$53,734	$55,285	$69,485	$61,597	$62,023	$67,411	$65,113
% Below poverty line	19.2	23.1	17.8	19.1	19.9	14.2	14.3	14.9	13.2	14.1	8.5	8.6	9.5	12.1	9.7
% Unemployed	8.8	8.4	10.1	12.0	9.8	6.3	5.4	5.1	7.6	6.1	8.0	6.4	6.2	6.6	6.8
% Bachelor's degree	9.0	7.6	10.0	8.2	8.7	20.3	16.5	13.6	13.9	16.1	38.1	33.2	39.7	33.9	36.2
% Disability	10.4	9.7	11.0	10.0	10.3	9.5	10.5	8.9	10.1	9.8	12.0	9.0	11.2	10.4	10.7
% Commute by transit	7.2	5.9	4.1	4.9	5.5	4.3	4.3	4.1	2.8	3.9	4.4	3.9	5.4	5.5	4.8
Avg. min. to work	33.0	32.2	29.8	30.5	31.4	31.0	30.2	30.5	29.6	10.3	28.5	27.9	29.8	28.9	28.8
% No Car	3.6	3.3	2.7	2.8	3.1	1.9	2.9	2.9	2.2	2.5	4.0	2.0	3.9	2.4	3.1
% Black	29.3	24.8	27.7	25.5	26.7	0.8	0.6	0.8	0.2	0.6	2.4	3.7	4.6	3.3	3.5
% Indigenous	0.4	0.6	0.5	0.9	0.6	0.6	0.3	0.9	0.6	0.6	0.7	0.6	0.4	0.6	0.6
% Latinx	66.7	70.7	66.6	71.0	68.8	53.2	56.2	67.0	62.3	59.6	28.9	37.8	28.1	41.2	34.0
% Asian	1.2	0.9	2.3	0.9	1.3	38.1	35.4	27.3	32.7	33.4	8.3	7.1	8.6	10.1	8.6
% White	37.0	38.8	35.1	41.1	38.1	33.3	36.4	44.5	38.2	38.1	77.8	66.4	73.5	68.4	71.5
% Two or more races	1.5	1.7	2.4	2.0	1.9	2.0	2.8	2.6	2.3	2.5	3.3	4.3	6.7	4.0	4.3
% Under five	7.6	8.1	7.6	7.9	7.8	5.2	6.0	6.2	6.4	5.9	4.3	5.7	5.1	6.0	5.3
% 25-34 age	16.7	15.9	14.6	14.7	15.4	13.5	14.5	15.1	15.0	14.5	19.2	16.9	21.4	18.9	19.1
% Over 65	8.5	7.9	10.8	9.0	9.0	15.4	15.4	12.2	13.2	14.1	16.1	10.4	14.5	12.6	13.4
Median Age	30.8	29.6	32.9	30.2	30.9	39.4	38.9	36.2	36.6	37.7	40.8	34.6	38.3	36.7	37.6
Average family size	4.4	4.6	4.4	4.6	4.5	4.1	4.1	4.1	4.3	4.2	3.2	3.1	3.1	3.4	3.2

[1]We excluded the top 2 percent of frequent riders due to extreme outliers.

8. Conclusion

The MOD pilot was designed with equity and access in mind: it sought to determine if dedicated, subsidized ridehail service could not just help more people ride transit, but particularly help people who might, without a ridehail, face substantial barriers to riding: people with disabilities, people with low incomes, people who live further away and/or need to ride at hours when getting to a station might seem difficult or unsafe.

Our evaluation offers little clear evidence as to whether these goals were being met. In part this lack of clarity arises because for most of the pilot the MOD service was not available in the evenings, when arguably it would have been most advantageous. That limitation was a product of budget constraints facing LA Metro, but it is not outlandish to think that our results would look different if the MOD had offered comprehensive evening service. Setting that obstacle aside, what we know about the MOD is that very few riders used the service regularly. The vast majority of people in the service area do not use it at all, and of those who use it, 40 percent use it only once. We see no evidence that people are dissatisfied with the service: most trips are completed in roughly the time that is estimated, and those times are competitive with other driving modes and faster than transit, cycling, or walking. Via thus appears to be an option that most travelers consider only in particular circumstances.

Riders who do use Via more than once, however, are likely to use it a lot. When we look at repeat users of Via, we see that a small share of riders account for a large share of trips. Clearly Via is delivering a benefit to these people. If these riders fall into the categories of disadvantage that we outline above, then these private benefits to riders would also indicate that the MOD is having social benefits by expanding access. Because none of these heavy users responded to the Via rider survey, however, we actually know little about them. Our analysis suggests that they are not more likely to come from disadvantaged neighborhoods, but that fact does not mean they are not disadvantaged. Place is real but imperfect proxy for personal circumstance.

The riders that *did* respond to the Via survey—the infrequent users—were of a higher socioeconomic status than both transit users at MOD stations and Metro users overall: they had higher incomes, were more likely to own automobiles and smartphones, and more likely to be white. Only about seven percent report never going to the transit station prior to the MOD pilot, while about 17 percent switched to MOD from driving themselves and 33 percent switched from the bus. Most riders, in other words, do not seem to fit the characteristics we would expect if the MOD was reaching a structurally disadvantaged population. But we emphasize the difference between most *riders* and most *rides*. The people who took the most rides, again, remain hard for us to examine.

Because we know little about the people who used the service most, we cannot draw hard conclusions about the efficacy of the MOD program as a way to increase access and opportunity. But the fact that almost every request came in via phone suggests that the program did not reach people who are disadvantaged by lack of a smartphone. The fact that rides were more common closer to stations suggests that it did not differentially help people who might have more trouble getting to stations in other ways.

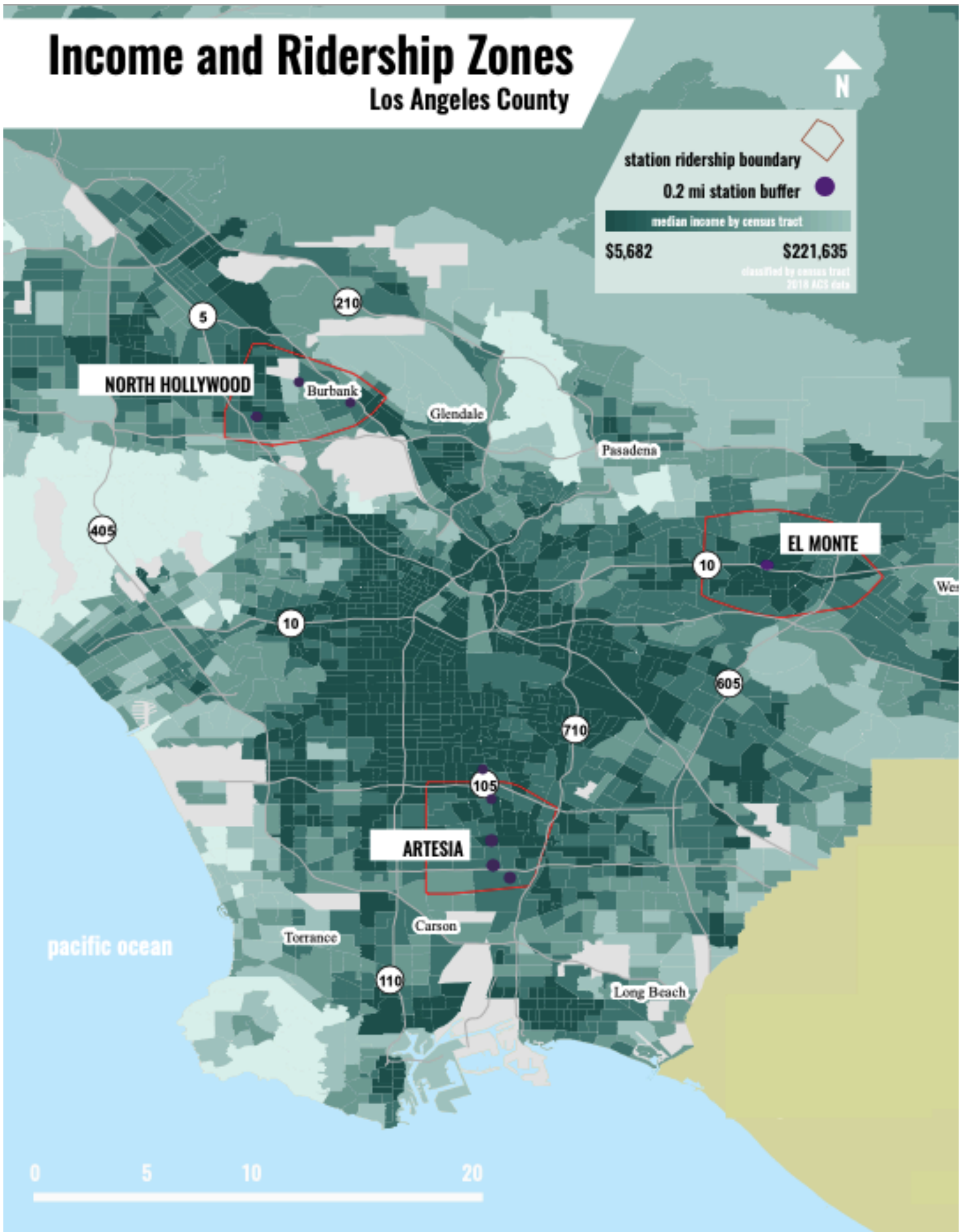
In summary, the MOD program to date suggests clearly that a ride-on-demand program can be run by a large transit agency. The service was delivered when called for and most riders who wanted a ride were successfully linked with one. What remains unclear, however, is whether the program delivered strong equity benefits that justified its expenditure. Future iterations of this program, or of other programs like it, should probably redouble efforts to reach the population that would benefit most from it and also make sure to offer ridehail service in the evening when disadvantaged travelers have the fewest options.

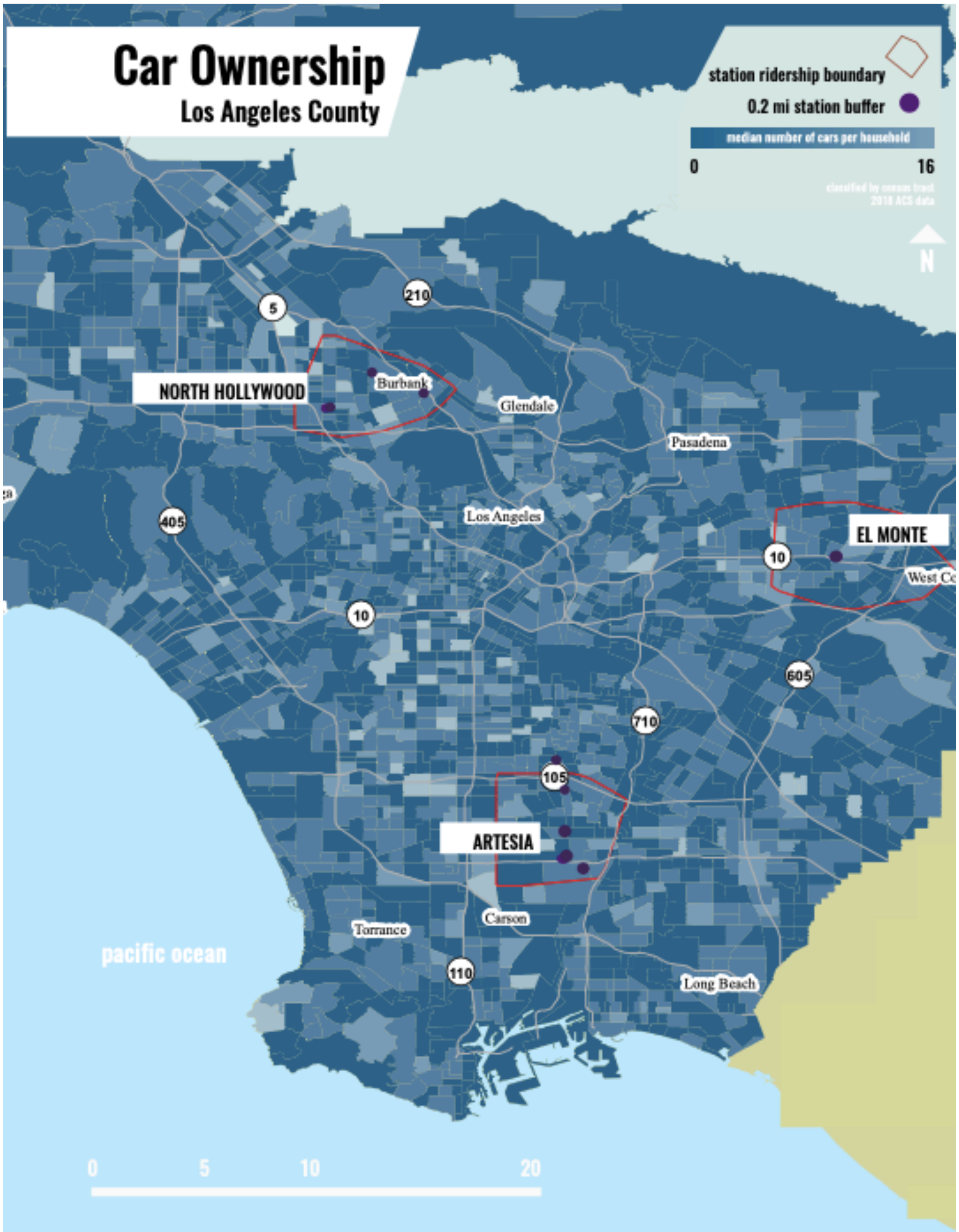
9. Sources

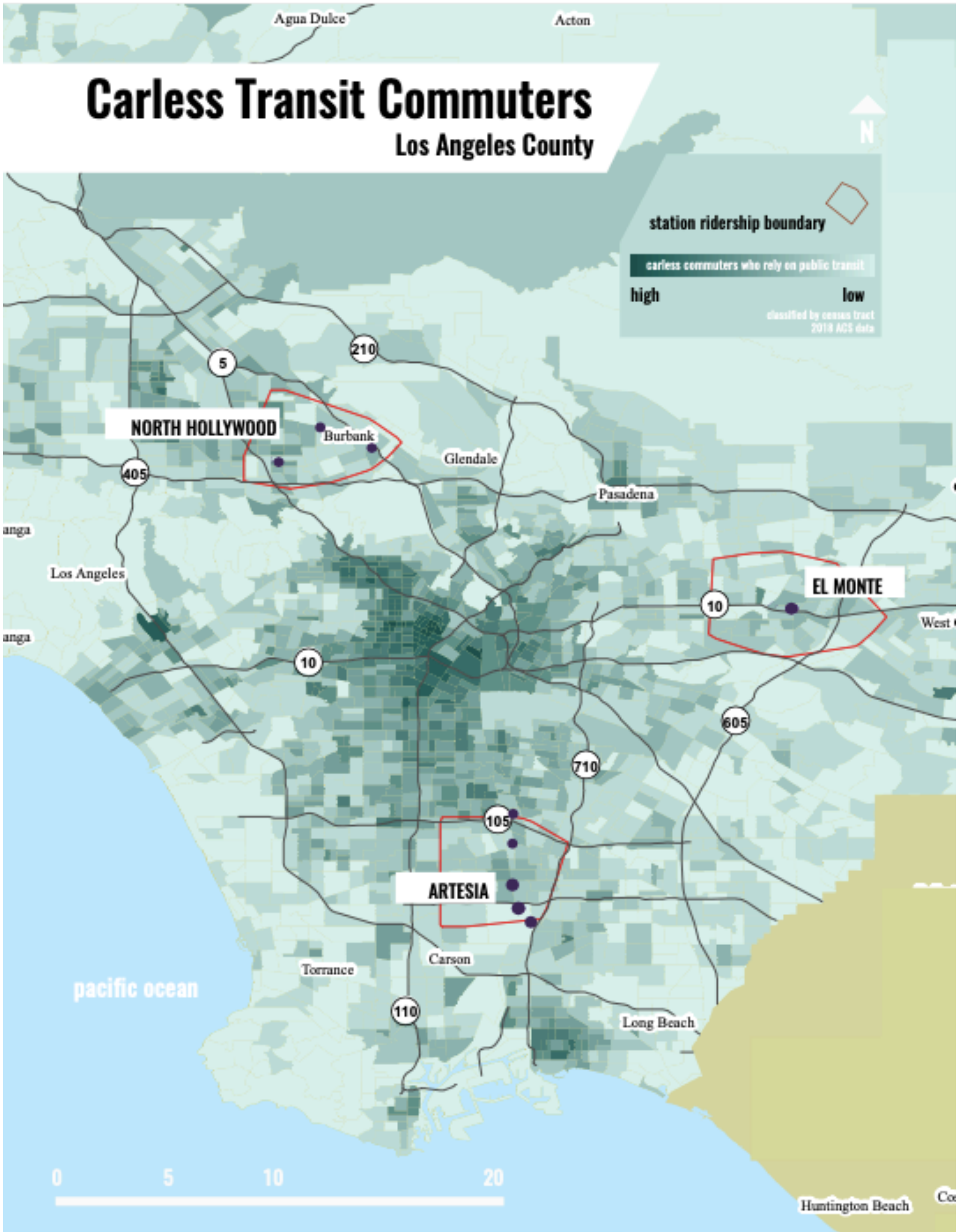
FDIC 2017. FDIC National Survey of Unbanked and Underbanked Households, Appendix Tables.

LA METRO 2019. Annual On-Board Customer Satisfaction Surveys: System Results (Fall 2019).

Appendix A: Station Area Context

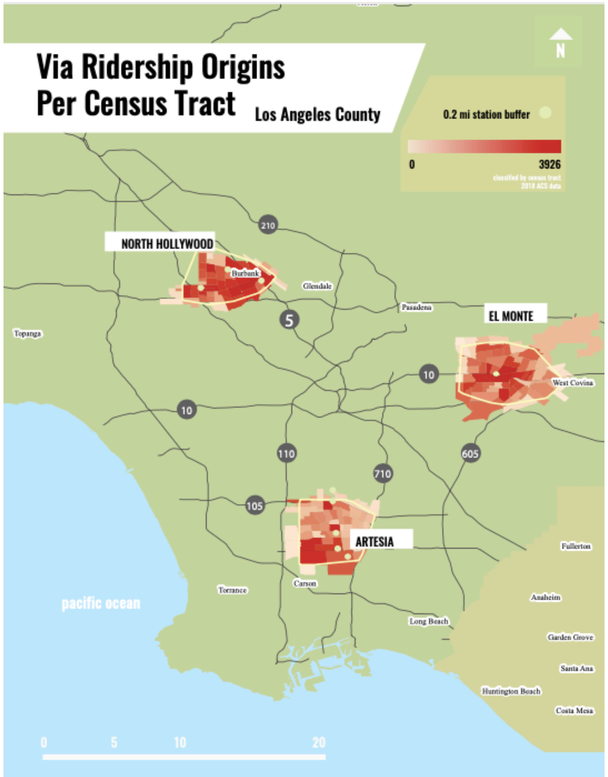


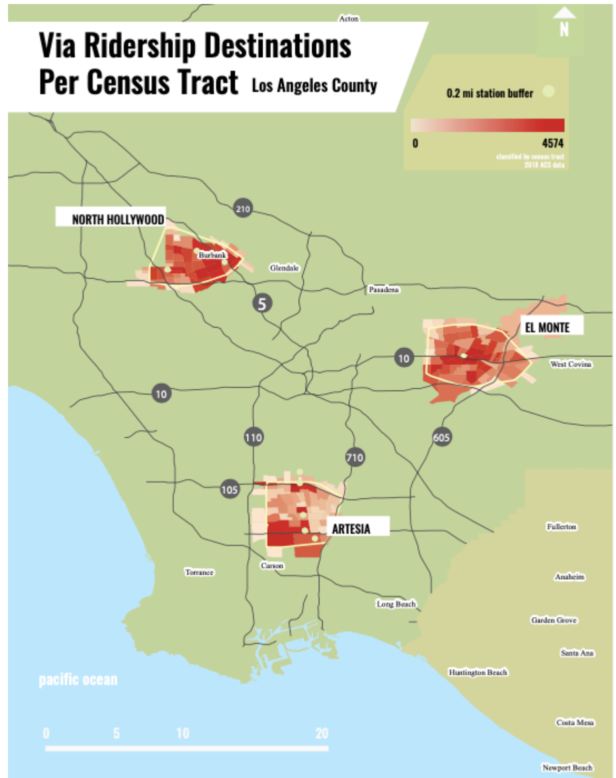

Car Ownership
Los Angeles County
station ridership boundary
0.2 mi station buffer
median number of cars per household
0
16
N
NORTH HOLLYWOOD
Burbank
Glendale
Pasadena
Los Angeles
EL MONTE
ARTESIA
Carson
Torrance
Long Beach
pacific ocean
5
210
405
10
605
710
105
110
0
5
10
20



Carless Transit Commuters
Los Angeles County
N
station ridership boundary
carless commuters who rely on public transit
high
low
classified by census tract
2018 ACS data
Agua Dulce
Acton
5
210
405
10
605
710
105
110
NORTH HOLLYWOOD
Burbank
Glendale
Pasadena
Los Angeles
EL MONTE
ARTESIA
Torrance
Carson
Long Beach
Huntington Beach
pacific ocean
0
5
10
20

Appendix B


Via Ridership Origins
Per Census Tract
Los Angeles County
0.2 mi station buffer
0
3926
NORTH HOLLYWOOD
Burbank
Glendale
Pasadena
EL MONTE
West Covina
Topanga
ARTESIA
Carson
Torrance
Long Beach
Fullerton
Anaheim
Garden Grove
Santa Ana
Huntington Beach
Costa Mesa
pacific ocean
210
5
10
110
710
605
105
0
5
10
20


Via Ridership Destinations
Per Census Tract
Los Angeles County
0.2 mi station buffer
0
4574
Acton
NORTH HOLLYWOOD
Burbank
Glendale
Pasadena
EL MONTE
West Covina
ARTESIA
Carson
Torrance
Long Beach
Fullerton
Anaheim
Garden Grove
Santa Ana
Huntington Beach
Costa Mesa
Newport Beach
pacific ocean
210
5
10
110
710
605
105
0
5
10
20

Appendix C: Linear Regression Analysis of Rides by Census Tract

	Model 1	Model 2	Model 3	Model 4	Model 5
	b/se	b/se	b/se	b/se	b/se
Distance[1]	-173.115**	-177.959**	-179.596**	178.446**	-188.521**
	(63.78)	(62.37)	(62.71)	(63.55)	(65.54)
% Carless population		63.358*	80.305**	78.636*	74.362*
		(26.66)	(29.26)	(30.21)	(30.70)
Total population		0.096*	0.109*	0.112*	0.115*
		(0.04)	(0.05)	(0.05)	(0.05)
% Population in Poverty			-10.385	-9.997	-7.776
			(8.41)	(9.37)	(10.98)
Avg. Commute Time (min)			-15.106	-16.656	-20.459
			(19.32)	(19.92)	(22.06)
% Transit Commuters				7.606	9.570
				(23.84)	(24.25)
% Population Unemployed				-7.82	-7.547
				(20.74)	(21.27)
Median Age					3.044
					(15.56)
% Population Disabled					16.204
					(22.22)
Constant	908.411**	294.899	795.912	844.766	666.405
	(128.40)	(237.71)	(572.58)	(587.30)	697.52)
R^2	0.044	0.108	0.122	0.124	0.128
BIC	2667.4	2666.4	2673.9	2683.9	2693.2

[1] Centroid census tract distance in miles from the original station

Data Source: ASC 5-Year Survey, 2018; * p<0.05, ** p<0.01, ***p<0.001

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1629 K Street, NW
Suite 200
Washington, DC 20006

CONTACT US:
publicaffairs@enotrans.org