APPLIED POLICY PROJECT

How can Metro improve transit access for low-income Angelenos through the LIFE program?



Client: Los Angeles County Metropolitan Transportation Authority

Devin Mitchell Kirim Lee Shogo Yago Yuki Abe

UCLA Luskin School of Public Affairs

TABLE OF CONTENTS

Acknowledgments and Disclaimer	3
Executive Summary	
Findings	4
Policy Recommendation	5
L Introduction	6
About Client and Project	6
LIFE Program Strategic Double Enrollment Plan	7
Pilot programs (Fareless System Initiative)	
Policy Context	8
Policy question(s)	
II. Methods	
GIS analysis	11
Metro coverage	11
Geographic LIFE enrollment	11
Limitation	
Quantitative analysis	14
Correlation Analysis	14
Difference-in-differences Analysis	14
Survey	17
III. Problem Identification	
1. Metro coverage; mobility inequity in Los Angeles	
2. Eligible people for LIFE and LIFE enrollment	
Eligible population	
Enrollment data	
Target map	
Predict the enrollment and identify outliers	
Assess the impacts of outreach events on the enrollment increase	
3. Issues facing the LIFE program	
Customer Satisfaction Surveys by Metro	
(1) Overall satisfaction level	
(2) Components	
(3) Limitation	
Customer Experience Survey 2020 by Metro	
Original Survey of Metro Riders' Views of the LIFE Program	

IV. Policy Options	
Criteria for choosing policy options	
Summary: Evaluation criteria to assess the policy options	
Policy options and evaluation	41
1. Widening the enrollment eligibility: raising the annual income requirement	41
2. Increasing discount benefit	
3. Selecting more prospective areas for outreach events	
4. Addressing riders' non-fare concerns	
5. Increasing bus service	
Policy recommendation	
Our recommendation: Option 3	
Long-term considerations: Options 1, 2, 5	
V. Conclusion	
Bibliography	51
Appendices	
APPENDIX 1: Bus stop analysis	
Bus stop strategy	
Marginal effects of poverty rate on bus availability	55
Marginal effects of No car percentage on bus availability	
APPENDIX 2: The impact on the total discount	
APPENDIX 3: Survey Questionnaire	59

Acknowledgments

We could not have written this report without the guidance and support of our advisor, Dr. Martin Gilens. We particularly appreciated his patience in fielding our emails throughout the year and helpful suggestions in conducting our quantitative analysis. Dr. Zachary Steinert-Threlkeld and peer reviewers Yuki Sakaguchi, Stacy Songco, Shenjia Shao, and Merhawi Tesfai also offered useful feedback at multiple stages of our project. Our MPP colleagues Katherine Sanchez and Anahí Cruz translated our rider survey into Spanish. Thank you to Devon Deming, Drew Phillips, and Armineh Saint at Metro for the time and attention they dedicated to this partnership and for providing the data that formed the basis of our analysis. It was not lost on us that they did this while working hard to implement the fare-free pilot we evaluated in this report.

We are grateful for the Metro riders who took the survey and the interviewees we spoke with, including Scott Frazier of LA Podcast and Investing in Place, Metro Community Advisory Council Chair Henry Fung, and Maddie Trice from the Office of Congresswoman Ayanna Pressley. Their generosity with their time improved our research. Thank you also to UCLA Institute for Transportation Studies researcher and urban planning doctoral candidate Sam Speroni, who met with us early on in our process. His advice in conducting this kind of research proved to be prescient. Finally, what you're reading would not look as nice as it does if not for Nick Cuccia at the Luskin Center for Innovation, who designed this report.

Disclaimer

This report was prepared in partial fulfillment of the requirements for the Master in Public Policy degree in the Department of Public Policy at the University of California, Los Angeles. The views expressed herein are those of the authors and not necessarily those of the Department, the UCLA Luskin School of Public Affairs, UCLA, or the client.

EXECUTIVE SUMMARY

OUR APP PROJECT SEEKS to explore the efficacy of a fare discount program for low-income riders that the Los Angeles County Metropolitan Transportation Authority (Metro) Board of Directors is currently implementing. Metro's Board previously indicated a willingness to work towards a fare-free transit system, contingent on making such a shift financially feasible. Regular weekly and monthly passes are discounted by 50 percent between December 2021 and July 2022, which is being pursued in conjunction with an entirely fare-free transit for K-12 and community college students in L.A. County. The broader context of the COVID-19 pandemic and significant recent investments from the U.S. federal government in public transit agencies are also relevant to these pilot programs and our research.

Our team supports Metro's public vision of removing barriers to mobility. The report offers insights and provides recommendations regarding the LIFE program and Metro's operations by analyzing current levels of service and the agency's outreach efforts to increase enrollment.

Findings

Using the geographic information system (GIS), we discovered that the service coverage of Metro and other transportation agencies in L.A. County is extensive, covering 98.2% of neighborhoods with a high percentage of workers who do not have a car. This finding indicates that Metro's routes cover most of the areas of need and that improving Metro service would make transportation access in L.A. County more equitable.

Observing Census and LIFE enrollment data, we found that the current LIFE enrollees have been concentrated in areas with large numbers of eligible residents, suggesting that the LIFE program has been serving those in need. At the same time, however, we found that only between two and three percent (2-3%) of the eligible population were enrolled in the program as of February 2022, indicating that Metro still needs to attract more low-income Angelenos to the program.

Using GIS analysis and simple regression, we identified specific neighborhoods for Metro to provide more service to. While the areas that Metro has focused its outreach efforts on to date have been reasonably well-chosen in terms of reaching the eligible population, our GIS analysis found that it has not held outreach events in areas where a higher percentage of workers do not own a car and the enrollment has been lower than predicted from poverty levels. Thus, we suggest that Metro should focus more on areas in the latter category for the purpose of improving transit equity as well as increasing enrollment in the LIFE program.

Using the difference-in-differences research method, we discovered that Metro's outreach events were effective in encouraging LIFE enrollment. Specifically, we found that Metro's outreach events were estimated to increase enrollment by 15-16 people per ZIP code area per event. This finding was statistically significant at the 99% confidence level. This effect can be considered sizable given that our estimation found that without the events, there would be an increase of only 5 to 6 enrollments during the same period.

Finally, conducting a survey on eligible riders and analyzing recent Metro rider experience and satisfaction

surveys, we found that riders have concerns unrelated to fares that affected whether and how often they ride Metro, such as safety on buses and at stops. Additionally, many income-eligible riders surveyed were simply not aware of the existence of the LIFE program.

Policy Recommendation

Based on our analysis, we recommend that Metro conduct strategic outreach events in the areas of focus, starting by reviewing past events and planning future outreach efforts. In the longer term, we also suggest that Metro prioritize greater levels of service and reliability. We also suggest a long-term goal for LIFE of making the fare discount more generous and increasing the pool of people eligible for the program. Adopting these recommendations would help Metro achieve its transportation equity goals.

I. INTRODUCTION

ONE OF THE MOST IMPORTANT and difficult challenges facing public transportation systems is to make them inclusive. Administrators work with scarce resources and inevitably must prioritize efficiency, which can sometimes conflict with equity goals and providing high levels of service for all riders. Regardless of such challenges, the Los Angeles County Metropolitan Transportation Authority (Metro) defines its first vision as "Increased prosperity for all by removing mobility barriers" (Metro Strategic Plan).

In 2007, as part of the agency's efforts to make public transit more accessible, Metro initiated the Low Income Fare is Easy (LIFE) program. It had a \$5 million budget with the mission statement: "Provide transportation assistance to the most economically vulnerable and transit dependent in Los Angeles County" (LIFE FY18 Operating guidelines). This program started by providing fare subsidy coupons throughout Los Angeles County (L.A. County) via nonprofit and government agencies. However, the current budget has tripled up to \$15.6 million, and they provide coupons through reloadable fare cards, TAP, which makes it easier for riders to take advantage of the LIFE discounts.

Our team believes in the mission of this program, and we would like to support Metro's efforts to expand access to public transit through LIFE. The goal of this APP project is to improve the LIFE program by analyzing the present state of public transit in L.A., assessing Metro's work, suggesting policy options, and offering recommendations.

About Client and Project

Our client, Metro, operates the bus, bus rapid transit, light rail, and subway system in L.A. The focus of our project is Low-Income Fare is Easy (LIFE), a Metro initiative designed to reduce the cost of transit for low-income riders. Discounts on weekly and monthly Metro passes are available for qualifying L.A. County residents and are dependent on household size, as listed in the table below. Participants can self-certify their income level (L.A. Metro, TAP).

Household Size	Annual Income							
1	≤ \$41,400							
2	≤ \$47,300							
3	≤ \$53,200							
4	≤ \$59,100							
5	≤ \$63,850							
6	≤ \$68,600							

TABLE 1: Eligibility for LIFE program¹

TABLE 2: LIFE discount

Pass Option	LIFE Discount	Final Cost
Regular 30-Day Monthly	\$24	\$26
Regular 7-Day Weekly	\$6	\$6.50
Senior/Disabled 30-Day Monthly	\$8	\$12
College/Vocational 30-Day/Monthly	\$13	\$30
Student K–12 30-Day/Monthly	\$10	\$14
Regular EZ Transit Pass (base fare)	\$24	\$86
Senior/Disabled EZ Transit Pass	\$8	\$34

The annual income thresholds are based on the Very Low-Income Level set by The U.S. Department of Housing and Urban Development (HUD). The Very Low-Income Level means a threshold at which a family's income does not exceed 50 percent of the median family income. Data on this poverty threshold is created by the U.S. Census Bureau, where income is defined as income received on a regular basis (exclusive of certain money receipts such as capital gains) before payments for personal income taxes, social security, union dues, medicare deductions, etc.

https://www.huduser.gov/portal/datasets/il/il2021/2021summary.odn;

https://www.census.gov/topics/income-poverty/income/about.html

As part of a broader "fareless" (somewhat of a misnomer for the LIFE program) pilot program that the agency is pursuing, regular weekly and monthly passes are discounted by 50 percent from December 15, 2021, to July 20, 2022. Simultaneous with the program, which was implemented starting October 1, 2021, and scheduled to run through June 2023, K-12 and community college students of all incomes are able to ride Metro free of charge (Mass Transit; City News Service).

LIFE Program Strategic Double Enrollment Plan

To increase the LIFE enrollment, on November 18, 2021, Metro initiated the LIFE Program Strategic Double Enrollment plan (Enrollment Plan), which aims to double the current total enrollees: from 91,086 to 183,478 by the end of 2022. Metro defines its core strategies as follows:

- » Identify: Identify qualifying program participants
- » Inform: Let low-income riders know the enrollment program through outreach
- » Enroll: Provide a "seamless and streamlined" process to encourage enrollment

Enrollment plan includes various tactical actions to achieve these goals, including direct outreach events, partnerships with other agencies, and marketing and education of the program.

In January 2022, Metro reported to the executive management committee that as a result of actions including a simplified enrollment procedure, the launch of an online application portal, and direct enrollment pop-up activities, they achieved an increase of 8,197 in total enrollees from September 2021, which represented 9% of the way towards its' goal.

Pilot programs (Fareless System Initiative)

In August 2020, then-CEO of the Los Angeles Metropolitan Transportation Authority Phil Washington formed an internal task force to plan and implement a program piloting fare-free transit for the system. According to a presentation to the Board of Directors, Washington believed "that Metro has a moral obligation to explore how a fareless system can aid those that have been hit hardest by the pandemic." It continued, "if approved, this initiative will change the social and economic fabric of our region and like firefighting and police services would be fully paid out of the public purse as a social and public right and



FIGURE 1: LIFE Program Strategic Double Enrollment Plan (Abstract)

common good." The implication of this statement was that Metro sought to explore the feasibility of a farefree transit system as a long-term agency goal (Linton; OPERATION FSI).

In February 2021, the Fareless Systems Initiative (FSI) updated staff on plans to provide free rides, tentatively suggesting a January 2022 start date for low-income riders and an August 2022 start for K-12 students, with both concluding in June 2023. At an April 2021 Metro Board meeting, the student program was moved up to potentially start in time for the coming fall school term (Hymon; Linton).

At the May 2021 meeting, the Metro Board unanimously affirmed its support for developing some sort of fareless pilot program but "decided it still need[ed] a strong financial plan before greenlighting" the plan and committing to any deadlines or start dates," according to the *Los Angeles Times*. The \$321 million estimated cost of the 23-month pilot program reportedly concerned many on the Board, and "as a result, Metro staff [would] continue to explore funding scenarios, including state and federal grants (Congress is considering new legislation to support fareless transit initiatives around the country) and contributions from schools, sponsors and/or stakeholders," according to *The Source* (Vega; Hymon).

Ultimately, the Metro Board voted in September 2021 to move forward with a paired back plan. The proposal implemented free fares for K-12 and community college students and "improvements" to the preexisting low-income rider discount program, making registration easier, allowing for automatic renewal, extending eligibility from one to two years, and offering "expanded options for a set number of free rides, in addition to discounted single-ride fares and weekly/monthly passes," according to *StreetsBlog LA*.

Policy Context

2012 Report Supportive of Fare-Free Public Transit: In a July 2012 report, the Transit Cooperative Research Program summarized then-recent evidence from the implementation and outcomes of fare-free transit systems in the U.S. Relevant to the Metro Board's stated goals, the report noted that fare-free public transit made the most "internal business sense" for systems with low farebox recovery ratios. Replacement of fare revenue was described as the major obstacle for systems surveyed (TCRP).

Evidence was unambiguous that ridership would increase by some amount if fares were eliminated, potentially significantly based on the experiences of the transit systems examined. The Simpson–Curtin Rule was cited as a typical standard to measure the effect of fares on ridership. The rule estimates that a 10 percent fare increase would result in a three percent (3%) drop in ridership, so conversely fare-free (100% decrease in fares) would cause a 30 percent increase in ridership. In fact, a consideration for systems considering fare-free futures was the financial challenge posed by needing to maintain service quality to meet greater demand for service after the elimination of fare collection.

The report was more sanguine about the potential for fare-free transit to motivate travelers to reduce their passenger vehicle miles traveled, as "most new trips were made by people who would have otherwise walked or used a bicycle." Evidence did not indicate that commuters who get to and from work by car were drawn to public transit by the absence of fares.

TCRP also noted that practically, fare-free policies facilitated faster boarding. Though a consideration throughout was the need to balance increased numbers of disruptive passengers that arrived after the implementation of fare-free transit, according to the findings, "most managers of fare-free transit systems

did not regard disruptive passengers as a significant problem." Additionally, bus and rail operators said those costs were outweighed by the benefits of no longer needing to collect fares and adjudicate fare disputes (TCRP).

COVID-19 Pandemic: The COVID-19 pandemic has had a profound effect on public transit across the U.S., including in L.A. County. As of late 2020, ridership was at 30 percent of pre-pandemic levels on the New York City subway, by far the most transit-dependent metropolitan area in the country. In L.A. County, average weekly bus and train ridership declined to around 30 percent of pre-pandemic levels during initial stay-at-home orders before rebounding to around 50 percent by February 2021. In San Francisco and Washington, D.C. the decline was even more dramatic: ridership was closer to 15 percent of pre-pandemic levels (Goldberg).

Because financing of transit systems is dependent in part on fares from riders, this was a troubling development for the future of transit, even though the initial steep drop in ridership was due to public health directives. According to a December 2020 article in *The New York Times*, "public transportation systems are confronting an extraordinary financial crisis set off by the pandemic, which has starved transit agencies of huge amounts of revenue and threatens to cripple service for years. The profound cuts agencies are contemplating could hobble the recoveries of major cities from New York to Los Angeles and San Francisco, where reliable transit is a lifeblood of the local economies." The negative implications of the dire financial predicament for low-income and minority riders who rode buses and trains at disproportionately high rates was also discussed. San Francisco MTA Director Jeffrey Tumlin warned of the possibility of a "death spiral" of service cuts and ridership declines (Goldbaum & Wright; Verma).

Declining Ridership Before the Pandemic: Even before the pandemic, bus and rail ridership had declined in Los Angeles and across the country during the 2010s. According to a report from the UCLA Institute for Transportation Studies, California lost 11 percent of its annual boardings between 2014 and 2018, and that figure was almost 18 percent in L.A. County. A 2022 *Transportation Research* paper examining the decline attributed it not to any one factor but a combination of "the declining cost of driving measured by the decreasing share of carless households combined with lower gasoline prices." Gentrification in high-density neighborhoods was cited as a contributing factor to this trend (Taylor et al; Lee & Lee).

Federal Funds Save Agencies: In March 2021, President Joe Biden signed the American Rescue Plan into law. The legislation appropriated \$30.5 billion in federal funding to support public transportation systems, to be distributed by the Federal Transit Administration, a division of the U.S. Department of Transportation. Metro alone was awarded \$1.24 billion of those funds in January 2022. The massive outlay in federal funding from Congress alleviated the immediate funding crisis facing local transit agencies. It also indirectly made it possible for Metro to pursue a temporary fareless pilot program. However, ARP was a one-time expenditure and the medium- and long-term future of transit in the U.S. remains uncertain and dependent on levels of future ridership (The Source; George).

Recent Fareless Transit Policy Experiments: Metro is not alone in exploring the possibility of a fareless transit future. In December 2019, the Kansas City Council voted to begin offering free bus service beginning in 2020, at a cost of between \$8 and \$9 million to the city annually to replace lost revenue from fares (for context, the city previously appropriated \$60 million to administer the bus system, with fares covering remaining costs). The mayor, Quinton Lucas, said the initiative sought to benefit the city's

"working poor" (<u>Mosley & McMahon</u>). The population of Kansas City is 508,090 and before the pandemic, 43,600 passengers on average rode buses on a weekday, both considerably less than in Los Angeles.

According to *Vox*, "in recent years, lawmakers in cities like Salt Lake City and Denver have [also] expressed support for a zero-fee bus system," and "transit advocates, activists, and residents from places like Portland, Seattle, and Nashville are asking: Can other cities work to subsidize their bus systems?" (Nguyen).

Meanwhile at the federal level, in June 2020 and then again in March 2021, Sen. Ed Markey and Rep. Ayanna Pressley (both D-Massachusetts) introduced the Freedom to Move Act in Congress. The proposed legislation would provide federal funds "to support state and local efforts to promote public transportation as a public good and provide fare-free public transit systems," according to a press release. The headline proposal of the bill is a \$5 billion competitive grant program local agencies can apply for to offset fare revenues for transit agencies (U.S. House).

Farebox Recovery: Compared to other big city transit systems, Metro has a relatively low farebox recovery ratio: the fraction of system operating expenses which are covered by passenger fares. Other sources of funding for transit come from federal, state, county, and city tax revenue, as well as from bond sales. According to a September 2021 Federal Transit Administration report, farebox recovery ratios for other large systems in 2020 were listed below (FTA).

A relatively lower farebox recovery ratio theoretically makes a fareless system more feasible to implement, as it means that policymakers must replace a lower amount of revenue that was previously generated by fares. Note also that the farebox recovery ratio in Los Angeles has declined in recent years, from 29 percent in 2011 and 26.2 percent in 2014, though the pandemic is a complicating factor in comparing 2020 to previous years (Investing in Place; Rubin & Moore).

Policy questions

» How can Metro improve transit access for low-income Angelenos through the LIFE program?

» How can Metro identify underserved communities?

» How has the LIFE program helped people?

» How effective were their efforts to encourage LIFE enrollment?

» How can Metro increase the number of LIFE enrollees?

IABLE	: 5: г	-arebox rec	overy	ratios	and	opera	ation	expenses	etro	opoli	itan areas	5
		-	_						- •	_		

TABLE 2. Equal of very vertice and an evention symposic in matrice aliter average

Metropolitan Area	Farebox Recovery Ratio (2020)	Operating Expenses (2020)
New York	25.6%	\$9.04 billion
Los Angeles	11.7%	\$2.12 billion
Washington, D.C.	27.6%	\$2.15 billion
Boston	40.0%	\$1.86 billion
Chicago	17.8%	\$1.54 billion
San Francisco/Oakland	48.3%	\$849.40 million

II. METHODS

IN THIS CHAPTER, we introduce our data sources and our methodology for analysis. Since one of our client's most important and urgent missions is to double the number of LIFE program enrollees, we will focus on how Metro can expand the LIFE program effectively. To answer this question, we adopted the following three methods: GIS analysis, quantitative analysis, and an interview survey.

First, the GIS method examines how Metro's buses and light rail have played a role in improving equity in L.A. County. In this context, equity refers to the extent to which people in L.A. County have equal access to transportation. This analysis is important because before we discuss the need to expand Metro's program, it is necessary to make sure that Metro's routes cover most of the high-need areas. We also conducted a GIS analysis to visualize not only the eligible population for the LIFE program, but also the LIFE enrollment data to see where the LIFE program is most heavily used and where Metro should reach out to increase the enrollment. The second method is a quantitative analysis, in which we predict the number of LIFE enrollees per area and identify the areas with great differences between the predicted enrollment and actual enrollment. Quantitative analysis is also useful to examine the effects of the outreach events that Metro has held so far on the enrollment in the LIFE program. The third method is an interview survey to identify the reasons why eligible people do not enroll in the LIFE program.

GIS analysis

Metro coverage

To examine how Metro addresses equity in the first place, we visualize the Metro lines and the areas where a large population needs public transportation. This map is intended to show whether Metro's bus and rail services are helpful to the people who need them most.

We collected Census data as well as geographic information of bus stops published by Metro and other transportation agencies.¹ Since the existing customer surveys conducted by Metro indicate that Metro users are more likely to be in the low-income bracket and are less likely to own a car, we focus on the following data from the American Community Survey 2019 by the U.S. Census Bureau.

» Percentage of population below the federal poverty line (poverty rate) by Census tract

» Percentage of workers not having a car by Census tract

By adding these values to the Census tract shapefile, categorizing them according to the numerical value of the variable, and coloring the tracts by this classification, we are able to visualize the geographic disparities in public transportation needs in L.A. County and show how Metro and other bus lines cover areas of high need.

Geographic LIFE enrollment

The next step is to examine how the LIFE program has improved equity in the County. We focus on the data of LIFE program enrollees that we received from Metro, which contains the ZIP codes where each

¹ Antelope Valley Transit Authority, Culver City Bus, Foothill Transit, Gtrans, LADOT, Long Beach Transit, Montebello Bus Lines, Norwalk Transit, Pasadena Transit, Snta Monica Big Blue Bus, Torrance Transit (Santa Clarita is not included due to the lack of General Transit Feed Specification data)

enrollee lives. This data allows us to perform the following three types of analyses.

First, before plotting the LIFE enrollees, we examine the eligible population for LIFE per region as we can imagine that the number of eligible residents significantly differs among regions. Since the LIFE program is designed to subsidize residents whose household income levels are below the Very Low-Income Level set by Federal HUD Poverty Guidelines for L.A. County, we need to calculate the portion of the population whose income levels are below this threshold per Census tract. One of the difficulties in calculating the eligible population is that this income threshold varies by household size. In other words, the eligible population needs to be calculated for each household size. To overcome this difficulty, we look to the individual-level data from the Census Bureau's American Community Survey (ACS). Because this data contains the household size in each region. This distribution allows us to calculate the percentage of the population below the income threshold for LIFE and estimate the eligible population in each tract.

At this point, we have maps showing areas where a large number of people need public transportation and areas where there are many people eligible for LIFE. Next, we utilize Metro's internal data to plot the number of enrollees by ZIP code. By visualizing this and comparing it to the previous maps, we can infer whether or not the LIFE program has been serving low-income people.

Third, we visualize the population who are eligible but not enrolled in the LIFE program yet. This map helps us evaluate the Metro's outreach events. To double the number of LIFE program enrollees by the end of 2022, Metro hosted regional pop-up events to support applicants in cooperation with other community-based organizations and service provider partners from November to December 2021. So, the purpose of this part is to assess how accurately the locations of outreach events have been chosen to reach the prospective areas.

To show the prospective areas, we estimate the population that is eligible for the LIFE program but has not yet been enrolled per ZIP code. One of the challenges with this analysis is that while the number of eligible people can be calculated per Census tract, the LIFE enrollment is identified per ZIP code. To close this gap, we use several functions of GIS software called ArcGIS. This software enables us to calculate the proportion of Census tracts that fall within a ZIP code, and estimate the eligible population per ZIP code.

To better illustrate this method of calculation, let us take **Figure 2** as an example, where A, B, C, D, and E represent Census tracts and Z represents a ZIP code. **FIGURE 2: Intersect function in ArcGIS**

Suppose that we know the area and the estimated eligible population in each of the Census tracts A, B, C, D, and E as shown in **Table 4**.

First, use the Intersect function in ArcGIS to calculate the area of each Census tract that overlaps with Z. We can then calculate the percentage of this tract segment's area out of the full tract area and multiply that percentage by the eligible population in each tract to estimate the eligible population in each tract segment.



TABLE 4: Sample Census tract

Tract	Total Area (Square miles)	Eligible Population (People)
А	100	500
В	80	20
С	50	300
D	100	100
E	75	600

TABLE 5: Results of Intersect function

Tract	Total Area (Square miles)			Eligible Population (People)	Eligible Population in orange (People)
А	100	30	30/100 = 30%	500	500 * 30% = 150
В	80	56	56/80 = 70%	20	20 * 70% = 14
С	50	7.5	7.5/50 = 15%	300	300 * 15% = 45
D	100	20	20/100 = 20%	100	100 * 20% = 20
E	75	7.5	7.5/75 = 10%	600	600 * 10% = 60

As a result, we can find the values shown in red in **Table 5**. By summing the eligible population of each tract segment, we can estimate the eligible population of ZIP code area Z to be 289. The formula is as follows:

Eligible Population in Z = $500 \times 0.3 + 20 \times 0.7 + 300 \times 0.15$ + $100 \times 0.2 + 600 \times 0.1 = 289$

Finally, by subtracting the number of current enrollees from the eligible population per ZIP code, we can visualize the ZIP code areas where there are large numbers of people who are eligible but not yet enrolled. Plotting the locations of outreach events on this map will help us not only to evaluate the accuracy of the outreach event locations but also suggest where Metro should take the next step in its outreach efforts. In addition, we can also see if these areas are underserved by Metro's routes. If this is identified, it can reveal that low enrollment in these areas is due to a failure to provide transit service rather than a failure of the LIFE program.

Limitation

One of the limitations of these analyses is that there is no available data on utilization of the LIFE program, which means how many enrollees actually have used the LIFE discount and how often they ride is unknown. The utilization data would be important because it would allow us to assess how much low-income people truly need the discounts on transit and how much the LIFE program helps to improve equity in L.A. However, considering that one of the client's most missions is to double the number of LIFE program enrollees, we believe that it would be sufficient to analyze why eligible people do not enroll in the program and suggest the next steps for Metro to increase enrollment.

Quantitative analysis

Correlation analysis

Since GIS analysis has the weakness of only allowing visual and subjective examination, we decided to conduct a quantitative analysis to complement the results of GIS analysis.

In order to quantitatively assess how areas with a large number of LIFE program enrollees overlap with areas with high public transportation needs, we examine the correlation between these figures. This correlation analysis is then used to help us predict the number of LIFE enrollments per ZIP code and identify outliers, that is, areas with large differences between predicted and actual registrations.

Next, by incorporating these values of differences and the percentage of workers not having a car per ZIP code into a map, we can show Metro which areas it should focus on to not only increase the number of LIFE enrollees, but also to improve transportation equity. However, it is also possible that the reason for the low LIFE enrollment in these areas may be that they are underserved by Metro. Thus, we utilize geographic information of bus stops again. By using the Intersect function in ArcGIS, we can count the number of bus stops in each ZIP code area and color them based on the number of bus stops per square mile. This map will help Metro to distinguish between areas where it should conduct outreach efforts and areas where more bus stops should be added to increase LIFE enrollment.

Difference-in-differences analysis

Another quantitative analysis is to assess the impact of outreach events on increases in enrollment. Because the increased enrollment would be attributable to various factors, it would be difficult to find a causal relationship between the outreach events and the increase in enrollment. In this situation, a difference-in-differences (D.D.) analysis would be useful to eliminate as much bias as possible. It compares not only enrollment growth for outreach and non-outreach areas, but also the changes before and after the events in these areas. This method allows us to estimate the differential effect of the event.

In addition to asking Metro to provide detailed information on each outreach event, we also requested that the agency tabulate the weekly increase in LIFE enrollment by ZIP code, as time-series data are needed for the D.D. analysis. As can be seen in **Table 6**, Metro conducted 20 outreach events in 12 locations during November and December 2021.

First, to estimate the effect of outreach events on enrollment growth, it is necessary to assume how long the effect lasts after the event. Because these events are designed to help applicants sign up for the LIFE program on the spot, they would tend to increase enrollment on the day of the outreach event. However, it is also expected that some people may not be able to apply or decide to apply due to time constraints, and registration may occur over the weekend. In addition, the dataset only records the number of increases for the fixed weeks, meaning that if an event is held on the last day of the week, for example, the impact of outreach events may be reflected as an increase for the following week. Therefore, it is reasonable to consider the increase in enrollment for the two weeks following the event as the post-event enrollment increase.

Next, it is important to determine how to compare these enrollment increases. One of the simplest approaches is to compare the same period of enrollment growth in outreach and non-outreach areas. This would enable us to control the time trend of enrollment growth. However, the ZIP code areas selected

TABLE 6: List of Metro outreach events

Zip code	Location	Address	Date
90002	Grant AME Church	10435 S. Cental Ave., Los Angeles, CA 90002	11/12/21
90005	Wilshire/Western Outreach Event	3775 Wilshire Blvd, Los Angeles, CA 90005	12/8/21
90012	Union Station Outreach Event	One Gateway Plaza, LA, CA 90012	11/17/21
90018	FAME's Office	1968 W. Adams Blvd., Los Angeles, CA 90018	11/15/21
90027	La Linterna Program	4650 Sunset Blvd, Los Angeles, CA 90027	11/5/21
90027	La Linterna Program	4650 Sunset Blvd, Los Angeles, CA 90027	11/19/21
90027	La Linterna Program	4650 Sunset Blvd, Los Angeles, CA 90027	12/3/21
90027	La Linterna Program	4650 Sunset Blvd, Los Angeles, CA 90027	12/16/21
90031	IILa's Office	3845 Selig Place, Los Angeles, CA 90031	11/12/21
90031	IILa's Office	3845 Selig Place, Los Angeles, CA 90031	12/3/21
90033	LAC+USC drive-through food distribution event	1200 N State Street, Los Angeles, CA 90033	11/12/21
90033	LAC+USC walk-up food distribution event	1200 N State Street, Los Angeles, CA 90033	11/17/21
90033	LAC+USC walk-up food distribution event	1200 N State Street, Los Angeles, CA 90033	12/15/21
90059	Community Fair and Celebration at Willowbrook/Rosa Parks Station	11611 Willowbrook Ave, Los Angeles, CA 90059	11/19/21
90650	Norwalk Outreach Event	12901 Hoxie Ave, Norwalk, CA 90650	12/1/21
90802	Long Beach TBD Outreach Event	130 E. First Street, Long Beach, CA 90802	12/16/21
91601	North Hollywood Outreach Event	5391 Lankershim Blvd, North Hollywood, CA 91601	12/2/21
91768	Pomona Station	100 W Commercial St, Pomona, CA 91768	12/6/21
91768	Pomona Outreach Event	100 W Commercial St, Pomona, CA 91768	12/9/21
91768	Pomona Station	100 W Commercial St, Pomona, CA 91768	12/20/21

by Metro for outreach efforts may have characteristics that differ significantly from other ZIP code areas. Therefore, in order to extract only the impact of outreach events, we will compare pre- and post-event enrollment increases in each area. Given these considerations, the model can be written as follows:

 $\begin{aligned} & \text{Increase in enrollment}_{i,t} = \beta_0 + \beta_1 \text{event}_i + \beta_2 \text{post}_t + \beta_3 \text{event}_i * \text{post}_t + \epsilon_{i,t} \\ & \text{Increase in enrollment}_{i,t} : \text{ average weekly increase in enrollment} \\ & \text{event}_i : \text{ a dummy variable which equals 1 if the region is an outreach area} \\ & \text{post}_t : \text{ a dummy variable which equals 1 after the event} \end{aligned}$

Table 7 shows a portion of the weekly enrollment data. ZIP codes in red indicate outreach areas, which is the treatment group consisting of 20 observations, while those in black indicate non-outreach areas, which is the control group consisting of 269 observations.

The yellow cells represent post-event increases, and the orange cells represent pre-event increases. Since the non-outreach areas have no outreach events, the average increase in enrollment for the entire 7-week outreach period is assumed to be the post-event increase. Also, since this data set records the enrollment increase after September 23, 2021, we assume the enrollment increase for the six weeks prior to the start of the outreach period to be the pre-event increase.

However, this model has several weaknesses. First, the assumed 7-week period for post-event increase in non-outreach areas might be too long to be a good control group. Because Metro made other efforts to increase the LIFE enrollment in addition to outreach events during this period, the post-event increase in enrollment in the control group might be more likely to be due to other factors.

Second, the assumption of a fixed six-week period as the period of increase prior to the event may also involve a bias. For example, this model takes the same six-week increase in orange as the pre-event increase even for areas where outreach events were held in December.

ID	Zip Code	Event date	9/23/21 - 9/29/21	9/30/21 - 10/6/21	10/7/21 - 10/13/21	10/14/21 - 10/20/21	10/21/21 - 10/27/21	10/28/21 - 11/3/21	11/4/21 - 11/10/21	11/11/21 - 11/17/21	11/18/21 - 11/24/21	11/25/21 - 12/1/21	12/2/21 - 12/8/21	12/9/21 - 12/15/21	12/16/21 - 12/22/21	12/23/21 - 12/29/21
1	90002	11/12/21	6		2	2	2		1	2	22	3	13	9	7	8
2	90005	12/8/21	1		-	2 2	2		5	6	18	19	24	31	24	16
3	90012	11/17/21			1				3	3	5	7	1	4	6	8
4	90018	11/15/21				1	. 3	. 4		1	8	8	10	10	8	9
5	90027	11/5/21				2			2	1	10	5	5	8	9	6
6	90027	11/19/21				2			2	1	10	5	5	8	9	6
7	90027	12/3/21				2			2	1	10	5	5	8	9	6
8	90027	12/16/21				2			2	1	10	5	5	8	9	6
9	90031	11/12/21						1	. 3	8	10		3	4	30	50
10	90031	12/3/21						1	. 3	8	10		3	4	30	50
11	90033	11/12/21	7	, ;	2 1	L 5	11	. 1	2	11	23	7	4	. 19	8	11
12	90033	11/17/21	7	· :	2 1	L 5	11	. 1	2	11	23	7	4	19	8	11
13	90033	12/15/21	7	· :	2 1	L 5	11	. 1	. 2	11	23	7	4	19	8	11
14	90059	11/19/21			1		1			1	46	7	4	13	4	4
15	90650	12/1/21							1		1	15	4		3	5
16	90802	12/16/21	2	2 4	4 3	3 4	1		6	2	11	2	4	2	38	8
17	91601	12/2/21			1	L	2	: 1	. 3	1	3	6	20	6	3	3
18	91768	12/6/21							1		1		13	11	14	3
19	91768	12/9/21							1		1		13	11	14	3
20	91768	12/20/21							1		1		13	11	14	3
21	90000										8					
22	90001				2	6	10) 1		2	4	5	9	7	7	5
23	90003		2	: :	1 2	2		1			10	9	10	13	24	9
24	90004		1		1	L 3		1	. 4	3	11	16	30	26	12	20
25	90006		3	1		1	. 6	1	20	12	18	21	41	34	19	27

TABLE 7: Weekly enrollment data (partial)

To overcome these weaknesses, we employ an alternative approach to calculate the effect of outreach events on enrollment growth. In this approach, we take a different period as pre-event period for each outreach event, as can be seen in **Table 8;** in some areas, such as 90027 and 91768, multiple events were held and the pre-event increase in enrollment for a certain event might be due to the previous event. In such cases, we consider the period prior to the first event as the pre-event period.

ID	Zip Code	Event date	9/23/21 - 9/29/21	9/30/21 - 10/6/21	10/7/21 - 10/13/21	10/14/21 - 10/20/21	10/21/21 - 10/27/21	10/28/21 - 11/3/21	11/4/21 - 11/10/21	11/11/21 - 11/17/21	11/18/21 - 11/24/21	11/25/21 - 12/1/21	12/2/21 - 12/8/21	12/9/21 - 12/15/21	12/16/21 - 12/22/21	12/23/21 - 12/29/21
1	90002	11/12/21		6	2	1	2	2 4	1 1	L 2	22	3	13	9	7	8
2	90005	12/8/21		1		2 2	2 :	2 2	2 5	5 6	18	19	24	31	24	16
3	90012	11/17/21			1				2 3	3 3	5	7	1	. 4	6	8
4	90018	11/15/21				:	1 :	3 4	1	1	. 8	8	10	10	8	9
5	90027	11/5/21				:	2		2	2 1	. 10	5	5	8	9	6
6	90027	11/19/21				:	2		2	2 1	. 10	5	5	8	9	6
7	90027	12/3/21				:	2		2	2 1	. 10	5	5	8	9	6
8	90027	12/16/21				:	2		2	2 1	. 10	5	5	8	9	6
9	90031	11/12/21						:	L 3	8 8	10		3	4	30	50
10	90031	12/3/21						:	L 3	3 8	10		3	4	30	50
11	90033	11/12/21		7	2	1 5	5 1	1 :	L 2	2 11	. 23	7	4	19	8	11
12	90033	11/17/21		7	2	1 5	5 1	1 :	L 2	2 11	. 23	7	4	19	8	11
13	90033	12/15/21		7	2	1 5	5 1	1 :	L 2	2 11	. 23	7	4	l <mark>19</mark>	8	11
14	90059	11/19/21			1			1		1	. 46	7	4	13	4	4
15	90650	12/1/21							1	L	1	15	4	•	3	5
16	90802	12/16/21		2	4	3 4	4 :	1	e	5 2	11	2	4	2	38	8
17	91601	12/2/21				1		2 :	L 3	3 1	. 3	6	20	6	3	3
18	91768	12/6/21							1	L	1		13	11	14	3
19	91768	12/9/21							1	L	1		13	11	14	3
20	91768	12/20/21							1	L	1		13	11	14	3

TABLE 8: Weekly enrollment data for the alternative approach

Next, we create 20 separate comparison observations, one for each of the treated observations, using the 269 ZIP codes that never had outreach events. This new control group allows us to compare, for each event, the difference in the average increase in enrollment before and after the event to the average difference for the same time period for all non-outreach areas. By repeating this comparison for 20 events

and taking the average difference between outreach areas and non-outreach areas, we can find the average impacts of outreach events.

Survey

The existing data such as Metro's Customer Satisfaction Surveys do not focus on the LIFE program and therefore it is difficult to get the gist of what people want for the LIFE program. To address this issue, we conducted a survey on riders who are eligible for the LIFE program. The survey was designed to answer the question of "Why did or did not people enroll in the LIFE program." The first section of the survey is about basic information of responders including demographics, travel behavior, and awareness of the program. In the second section, those who responded enrolled in the program were asked about their satisfaction and opinion on the program. The third section consisted of the questions for those who were eligible for but not enrolled in the program. (See Appendix 3 for the entire questionnaire)

To encourage participation, the entire questions were designed to answer online and within around 5 minutes. The survey was available in both English and Spanish. Participants who completed the survey were rewarded with a 5\$ Target gift card.

The survey was conducted between March 1 and March 31, 2022. To target people who might be eligible for the program, we reached out to social welfare networks such as International Institute of Los Angeles (IILA), FAME Corporation, and Strategic Action for Just Economy (SAJE) to collaborate with them to recruit responders. In addition, the flyers introducing the survey with Q.R. codes were posted on major bus stops (March 1, March 8, and March 13). Twenty-four (24) people responded to the survey. The bus stops to put flyers were identified by the spatial analysis conducted in **III. Problem Identification (Table 9).**

- » Union Station
- » K-Town (Wilshire/Western, Wilshire/Vermont)
- » Westlake (Westlake/MacArthur Park)
- » Expo/Vermont
- » Wilshire/Westwood

We also shared the survey on the online Reddit community r/SampleSize, which has 184,000 subscribers and allows for the sharing of surveys and polls for research purposes. Our post is shown below.

[Academic] How do you feel about LA Metro and its' low-income fare discount program? (Greater Los Angeles area residents only) Academic

Hi, I'm a graduate student at UCLA working on capstone project about public transit fares in Los Angeles. As part of our team's research, we are conducting a brief survey on LA Metro's Low-Income Fare is Easy (LIFE) discount program. Would very much appreciate if people who live in the Greater Los Angeles area would complete the survey! (links below)

English: https://luskinlab.sjc1.qualtrics.com/jfe/form/SV_0jhRWx1Jpn4CiAS?Q_CHL=qr_

Spanish: <u>https://luskinlab.sjc1.qualtrics.com/jfe/form/SV_3yna54N74Bw975Y?Q_CHL=qr</u>

Program background/information: <u>https://www.metro.net/riding/life/</u>

Limitation

Even with the continuous efforts to encourage participation, we managed to get a relatively small number of respondents during the survey period. Although we demonstrated later in this paper that the respondents fairly represent the ridership using the balance table, it will be useful to conduct a more rigorous survey of Los Angeles County residents who are eligible for the LIFE program.

Because of the distribution methods of the survey, it is likely that most respondents are frequent bus and Metro riders. (Flyers are likely to be taken down a few days after being posted). In addition, since the survey was distributed through the organizations previously mentioned, the respondents are most likely to be inside of the social network. Therefore, the overall respondents might be skewed towards frequent riders and people in that network.

III. PROBLEM IDENTIFICATION

METRO HAS CONDUCTED the LIFE program to address the mobility inequity that low-income people face. Following the methods introduced above, we examine the core problem of inequity, evaluate how much the program mitigated the challenges, and identify key challenges and opportunities to achieve our clients' policy goals.

1. Metro coverage; mobility inequity in Los Angeles

In 2019, of the workers in L.A. County, 83.8 percent commuted by driving, and 5.8 percent used public transportation (2019 Census).¹ While most workers use a car to get to work, 3.9 percent of workers have no car (2019 Census). Although this average number is not large, the percentage of workers not having a car by Census tracts differs within L.A. County, whose maximum reaches 78.7 percent (**Map 1**).

Metro and other transportation agencies in Los Angeles County³ cover 98.2 percent of areas belonging to the top quintile (greater than 6.0 percent) for the percentage of workers not having a car (Figure 3).



MAP 1: Percentage of workers not having a car by Census tract²

¹ Data source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates (ACS Census 2019) and General Transit Feed Specification data

² Data classified by quintile. (Data source: ACS Census 2019 and General Transit Feed Specification data)

³ Antelope Valley Transit Authority, Culver City Bus, Foothill Transit, Gtrans, LADOT, Long Beach Transit, Montebello Bus Lines, Norwalk Transit, Pasadena Transit, Santa Monica Big Blue Bus, Torrance Transit (Santa Clarita is not included due to the lack of General Transit Feed Specification data)

FIGURE 3: Relationship among bus availability in tracts, the percentage of workers not having a car, and population density per square mile



FIGURE 4: Relationship between the percentage of workers not having a car and the population below the poverty line



In addition, bus-unavailable areas are concentrated in the lower left part of Figure 3, which shows that such areas tend to be with low population density (rural areas) and that most workers have a car in such areas.

Also, Metro's surveys show that Metro riders are disproportionately likely to be low-income. For example, according to 2017, 2018, and 2019 Customer Satisfaction Surveys conducted by Metro, about 25% of riders have an annual household income of less than \$5,000, more than half of Metro users are below the poverty line, and the median total household income of users is less than \$20,000, which are well below the L.A. County median income of \$68,044 (2019 Census).

Looking into Census data per tract, we find that the percentage of the workers not having a car is positively correlated with the population below the poverty line. These results show that Metro is serving people in poverty.

In 2019, the average percentage of the population below the poverty line was 14.9% in L.A. County (2019 Census). However, this percentage per tract also has a gap within L.A. County, whose top quintile reaches 23%. **(Map 2)**.



MAP 2: Percentage of population below the poverty line, by Census tract⁴

Metro and other public transportation agencies cover 97.4% of tracts belonging to the top quintile **(Figure 5)**, Also, we find that many bus-unavailable areas are concentrated in the lower left part of Figure 5, which shows such areas tend to be with low-population density and lower poverty rate.

⁴ Data classified by quintile. (Data source: ACS Census 2019 and General Transit Feed Specification data)

FIGURE 5: Relationship among bus availability, percentage of population below the poverty line, and population density per square mile



Therefore, Metro and other transportation agencies have played an important role in mitigating mobility inequity for low-income people. Further analysis of the relationship among bus availability, poverty rate, and the percentage of workers not having a car is available in Appendix 1.

2. Eligible people for LIFE and LIFE enrollment

Eligible population

Before looking at current LIFE enrollment, we first analyze the eligible population in L.A. County. To expand the LIFE program, we need to know exactly who is eligible for LIFE, how many people in each area are eligible, and what percentage of them are currently enrolled in LIFE. As shown in Table 1, people whose income is below a certain threshold are eligible for LIFE, but this income threshold varies by household size. In other words, in order to calculate the number of eligible people, it is necessary to estimate it by household size.

Therefore, we examined individual-level data from the Census Bureau's American Community Survey. This data contains detailed information about the sampled individuals, such as where they live, household size, and household income. The regional units of this data are called Public Use Microdata Areas (PUMAs), which are larger than Census tracts. With this microdata, we estimated the income distribution by household size in each PUMA, calculated the percentage of the population below the income threshold for LIFE, and estimated the eligible population in each PUMA. The first step is to estimate the income distribution by household size in each PUMA. For example, using the microdata, we can estimate the income distribution by household size in L.A. County as a whole as shown in **Figure 6**.



FIGURE 6: Household income distribution by household size in L.A. County

Estimating this type of income distribution for each PUMA enables us to calculate the percentage of eligible people by household size per PUMA.

Next, we calculated the percentage of the population below the red line and multiplied it by the total population for each household size in each PUMA. The formula of this calculation is as follows:

⁵ Data source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates Public Use Microdata Sample (ACS PUMA 2019).

$\begin{array}{l} Eligible \ population = \sum_{k=1}^7 & \fbox p_k \times t_k \times k \\ k: \ household \ size \end{array} \\ p_k: \ percentage \ of \ eligible \ people \ for \ household \ size \ k \\ t_k: \ total \ population \ for \ household \ size \ k \end{array}$

As a result, we identified 10 regions with the highest number of eligible residents, where approximately 40% of the population is eligible for the LIFE program as shown in **Table 9**.

Area name	Estimated eligible population	(%)
LA City (East Central/Central City & Boyle Heights) PUMA	86,774	49.7
LA City (East Central/Silver Lake, Echo Park & Westlake) PUMA	85,825	43.2
Bell Gardens, Bell, Maywood, Cudahy & Commerce Cities PUMA	79,270	56.7
LA City (South Central/Westmont) PUMA	78,333	39.5
South Gate & Lynwood Cities PUMA	77,500	46.7
LA City (Southeast/East Vernon) PUMA	71,691	53.8
LA City (North Central/Van Nuys & North Sherman Oaks) PUMA	69,749	42.4
LA City (East Central/Hollywood) PUMA	69,222	42.1
Lancaster City PUMA	65,102	41.4
LA City (East Central/Silver Lake, Echo Park & Westlake) PUMA	85,825	43.2

TABLE 9: Top 10 PUMAs with the highest number of the eligible residents

We also plotted the percentage of the estimated eligible population on **Map 3.** The darker green represents that a higher percentage of the total population is eligible, which means the darker areas are likely to be prospective areas that Metro should focus on to increase the LIFE enrollment.

Enrollment data

Next, to examine the current enrollment, we asked Metro to provide us with enrollment data aggregated by ZIP code. **Map 4** shows the number of enrollees per ZIP code as of February 22, 2022. This map helps us to see which areas LIFE enrollees have been concentrated in so far.

These two maps tell us two important points for our analysis. First, we can see that the areas with higher numbers of LIFE enrollees roughly overlap with the areas with large numbers of eligible residents. In particular, current enrollees, as well as the eligible population, are concentrated in and around Downtown Los Angeles.

Second, there are still too few enrollees compared to the eligible population. By adding up the eligible population in each region, we found that around 3 million people are eligible for the LIFE program in L.A. County as a whole. However, according to the data we received, the total enrollment as of February 22, 2022, is 69,254, which means that the current enrollment is only between two and three percent (2-3%) of the eligible population.



MAP 3: Percentage of the eligible population, by PUMA⁶

MAP 4: LIFE enrollment by ZIP code as of Feb 22, 2022⁷



⁶ Data classified by quintile. (Data source: ACS PUMA 2019)

⁷ Data classified by quintile. (Data source: Metro data)

It should be noted that there are limitations to this data. The homeless and victims of domestic violence are not included in this data because the program guidelines do not require them to provide a complete address. According to Metro officials, these individuals represented approximately 18 percent of the enrollment from September 2021 through February 2022. Based on this information, the total number of enrollees, including these individuals, is estimated to be about 85,000, which is still only 3 percent of the eligible population.

Target map

Next, we plotted the population who is eligible but not yet enrolled in LIFE, which we call the target population. This map helps us to find the prospective areas that Metro needs to focus on to increase the LIFE enrollment now. As mentioned in the Method chapter, to compare these figures, we estimated the eligible population per ZIP code from tract-based data.

As can be seen in **Map 5**, though the enrollment has been concentrated in the downtown area thus far, these areas still have a great number of eligible people for LIFE that remain unenrolled. This map suggests that Metro should focus on the dark areas for the purpose of increasing the LIFE enrollment.



MAP 5: Target population, by ZIP code

We then added to this map the locations of outreach events that Metro has already held since last November. Since Map 6 shows that the events are more likely to be held in areas with a large target population, it can be said that Metro has correctly chosen the locations of outreach events to reach the target population.

⁸ Data classified by quintile.



MAP 6: Target population, by ZIP code with outreach events⁹

Predict the enrollment and identify outliers

The purpose of the analyses to this point is to pursue Metro's goal of increasing LIFE enrollment. To incorporate an equity perspective into this, we also conducted quantitative analysis, which will help Metro not only increase the LIFE enrollment but also improve equity in transit access. First, we examined the relationship between the eligible population, meaning the low-income population, and the actual enrollment per ZIP code, and predicted the LIFE enrollment from the eligible population.

Figure 7 shows a scatter plot of the eligible population (x-axis) and the enrollment (y-axis) per ZIP code, with a regression line. First, we can find that the two variables are correlated to some extent. It means that areas with a large number of LIFE program enrollees overlap with areas where many eligible people live, indicating that the LIFE program has been used to improve equity in L.A. County. In addition, this scatter plot shows several outliers below the regression line. These outliers represent the ZIP code areas where the actual enrollment is lower than predicted. To visualize this, we plotted the differences between the actual and predicted enrollment on **Map 7** to identify the locations.

[°] Data classified by quintile.

FIGURE 7: Relationship between the eligible population (x-axis) and the enrollment (y-axis) per **ZIP** code with a regression line



Interestingly, this map tells us a different story than the previous maps. It indicates that most ZIP code areas in and around Downtown Los Angeles are performing well, showing higher than predicted enrollment. On the other hand, we found that in other areas such as Bell Gardens, Norwalk, and El Monte, the enrollment should be higher given the relative income levels of those cities.

It is possible, however, to conclude that these areas do not need public transportation. To examine this possibility, we plotted the percentage of workers not having a car per ZIP code on **Map 8.** As is the case with calculating the eligible population per ZIP code, we needed to use the Intersect function to estimate the ZIP-based values from the tract-based data.

Next, **Map 9** shows the areas where the enrollment is significantly lower than predicted and the percentages of workers without access to vehicles is significantly higher, in other words, where the top two dark blue areas on Map 7 and the top two dark pink areas on Map 8 overlap. We call them ZIP code areas of focus.



MAP 7: Difference between predicted and actual enrollment, by ZIP code¹⁰

MAP 8: Percentage of workers not having a car, by ZIP code¹¹



¹⁰ Data classified by quintile.

¹ Data classified by quintile. (Data source: ACS Census 2019 and General Transit Feed Specification data)

MAP 9: ZIP code areas of focus



To get a closer look at the areas in yellow, Map 10 zooms in and plots the outreach event again.

MAP 10: ZIP code areas of focus with outreach events (zoom-in)



This map shows that Metro has not yet focused on the areas in yellow. Therefore, it suggests that in order to not only increase the LIFE enrollment but also to reduce disparities in transportation access, Metro needs to pay more attention to the areas in yellow such as Valley Glen, Hawthorne, and East Los Angeles.

Lastly, we considered the possibility that these areas may be underserved by Metro. If so, in order to increase LIFE enrollment there, Metro would need to focus on expanding coverage of the bus and rail system rather than holding outreach events. Therefore, we plotted Metro's bus stops, counted the number of bus stops by ZIP code, and calculated the density of bus stops. To this end, we plotted Metro's bus stops, count the number of bus stops, counted the number of them in each ZIP code, and calculated the density. To count the number of bus stops, we utilized the Spatial Join function of ArcGIS.

Maps 11 and 12 show that Glendale, Valley Glen, and Bell Gardens have a high number of bus stops per square mile. Although many workers in these areas do not have access to a car and many low-income residents are expected to rely on public transportation, actual enrollment is well below projections. Despite this, outreach events have not been held in those neighborhoods. Therefore, we suggest that Metro focus more on these areas in order to effectively increase LIFE enrollment and improve equity in transit access. On the other hand, the yellow areas, including East Los Angeles and South Gate, have relatively few bus stops per square mile, suggesting that Metro could increase LIFE enrollment by adding bus stops in these areas.



MAP 11: ZIP code areas of focus with bus stops¹²

¹² Data source: ACS Census 2019 and General Transit Feed Specification data



MAP 12: ZIP code areas of focus colored by number of bus stops per square mile

TABLE 10: List of ZIP code areas of focus

ZIP code	Area name	Number of bus stops per square mile
90255	Huntington Park	66.8
90025	West Los Angeles	65.1
90036	La Brea	63.4
91401	Valley Glen	53.5
91205	Glendale	53.4
90270	Bell Gardens	47.1
91731	El Monte	46.6
90034	Westdale	42.1
90304	Inglewood	40.9
90710	Wilmington	39.5
90247	Gardena	37.5
90066	Culver West	32.1
90250	Hawthorne	29.4
90805	North Long Beach	28.2
90280	South Gate	27.7
91754	East Los Angeles	24.1
91367	Woodland Hills	21.7
91343	North Hills	20.6
91306	Winnetka	19.9
91733	South El Monte	14.1

Assess the impacts of outreach events on the enrollment increase

At this point, we have identified areas where Metro should focus its outreach events. In order to reach as many of the eligible but unenrolled individuals as possible, the darker areas of Map 5, such as Downtown Los Angeles, San Pedro, and Pomona, would be promising, whereas it would be more effective to focus on the dark brown areas of Map 12 to increase equity in transit access.

However, in order to validate the effectiveness of these suggestions, it is necessary to confirm that outreach events have a significant impact on increasing LIFE enrollment. To this end, as described in the Method chapter, we conducted two types of D.D. analyses:

Method 1

 $\begin{aligned} & \textit{Increase in enrollment}_{i,t} = \beta_0 + \beta_1 event_i + \beta_2 post_t + \beta_3 event_i * post_t + \epsilon_{i,t} \\ & \textit{Increase in enrollment}_{i,t} : a verage weekly increase in enrollment \\ & event_i : a dummy variable which equals 1 if the region is an outreach area \\ & post_t : a dummy variable which equals 1 after the event \end{aligned}$

The first model compares the average weekly enrollment growth in outreach and non-outreach regions, controlling for each region's pre-event trend. **Table 11** presents the results of this model.

TABLE 11: Results of D.D. analysis (Model 1)

	weekly enrollment				
Predictors	Estimates	Cl	p		
(Intercept)	0.51	0.19 – 0.82	0.002		
event dummy	0.77	-0.41 – 1.95	0.202		
post	1.48	1.04 – 1.92	<0.001		
event dummy * post	7.92	6.24 – 9.59	<0.001		
Observations	578				
R ² / R ² adjusted	0.341/0.338				

The results show that outreach events have a statistically significant impact on enrollment growth. Assuming that the impact of outreach events lasts for two weeks, it is estimated that these events increase enrollment by approximately 16 persons. This figure is significant because the coefficients of the other variables can be interpreted to mean that without the events, there would be an increase of only 5 to 6 enrollments during the same 2-week period for the outreach area. In other words, events tend to increase the number of LIFE enrollees per ZIP code by four times.

Method 2

The first model may have a bias due to the fact that it takes a longer post-event period of 7 weeks for the non-outreach areas and a constant pre-event period of 6 weeks for the outreach areas. To overcome these weaknesses, we adopted the alternative method to estimate the impacts of the events, as described in detail in the Method chapter. The results are shown in **Table 12**.

	Weekly avera in	Weekly average increase in enrollment in outreach area		Weekly average increase in enrollment in non-outreach area		Difference in non-outreach area	Difference in difference
eventid	pre-event (A)	post-event (2 weeks) (B)	pre-event (C)	post-event (2 weeks) (D)	B - A (E)	C - D (F)	E - F
1	2.43	12.00	0.58	1.34	9.57	0.76	8.81
2	5.70	27.50	0.83	2.84	21.80	2.01	19.79
3	0.86	4.00	0.58	1.34	3.14	0.76	2.38
4	1.14	4.50	0.58	1.34	3.36	0.76	2.60
5	0.33	1.50	0.51	0.93	1.17	0.42	0.74
6	0.33	7.50	0.61	1.68	7.17	1.07	6.10
7	0.33	6.50	0.83	2.84	6.17	2.01	4.15
8	0.33	7.50	1.16	2.72	7.17	1.56	5.61
9	0.57	9.00	0.58	1.34	8.43	0.76	7.67
10	0.57	3.50	0.83	2.84	2.93	2.01	0.91
11	4.14	10.75	0.58	1.34	6.61	0.76	5.85
12	4.14	10.75	0.58	1.34	6.61	0.76	5.85
13	4.14	13.50	1.00	2.99	9.36	2.00	7.36
14	0.38	26.50	0.61	1.68	26.13	1.07	25.06
15	0.22	9.50	0.75	2.09	9.28	1.34	7.93
16	4.58	24.50	1.16	2.72	19.92	1.56	18.36
17	1.70	13.00	0.83	2.84	11.30	2.01	9.29
18	0.20	9.75	0.83	2.84	9.55	2.01	7.54
19	0.20	6.50	1.00	2.99	6.30	2.00	4.30
20	0.20	5.25	1.16	2.72	5.05	1.56	3.49
Mean	1.63	10.68	0.78	2.14	9.05	1.36	7.69

TABLE 12: Results of D.D. analysis (Model 2)

The results of the alternative approach appear to be consistent with the results of the first model, meaning that it is estimated that the events increase enrollment by about 15 individuals. Therefore, we conclude that the outreach events were effective in increasing the LIFE enrollment.

3. Issues facing the LIFE program

Customer Satisfaction Surveys by Metro

To identify the reasons why eligible people do not enroll in the LIFE program, we first collected the results of the existing customer surveys. Metro has conducted the "On-board Customer Satisfaction Survey" each year since 2003. This survey is designed to be distributed on all rail lines and nearly all bus lines, where train riders and bus users evaluate rail service and bus service, respectively. It collects a variety of user information from nearly 15,000 riders including their demographics, overall satisfaction, and perceptions of cleanliness and safety, which enabled us to examine potential problems of Metro service. Given the complex impact of the COVID-19 pandemic on rider demographics and satisfaction, we mainly examined the results of the Fall 2019 On-board Customer Satisfaction Survey (Fall 2019 Survey), as well as the trends over the previous years.

		2017	2018	2019
Satisfaction	Bus	90%	91%	90%
	Train	88%	89%	89%
On-time performance	Bus	72%	83%	79%
	Train	84%	86%	86%
Safety	Bus	90%	91%	90%
	Bus stop	86%	87%	86%
	Train	79%	77%	79%
	Train station	80%	79%	80%
Cleanliness	Bus	84%	85%	85%
	Bus stop	72%	71%	69%
	Train	67%	64%	69%
	Train station	75%	74%	77%
Sexual Harassment	Bus	15%	18%	19%
	Train	21%	29%	28%

TABLE 13: Summary of On-board Customer Satisfaction Surveys from 2017 to 2019¹³

(1) Overall satisfaction level

As can be seen in Table 13 and Figure 8, the Fall 2019 Survey shows that 90% of riders are satisfied with Metro service and we found that this was a consistent trend over the previous years. The results also show that bus riders are more satisfied overall than train riders.



FIGURE 8: Trend of overall satisfactory level from 2017 to 2019

¹³ Each question is as follows.

• Satisfaction: "Generally Speaking, I am satisfied with Metro bus/rail service."

• On-time performance: "THIS bus/train is generally on time (within 5 minutes)."

Safety: "I feel safe waiting for THIS bus/train." / "I feel safe while riding THIS bus/train."
Cleanliness: "THIS bus/train is generally clean." / "THIS bus's stops/train's stations are generally clean."
Sexual Harassment: "In the past 6 months, while riding Metro, have you personally experienced any of the following types of sexual harassment (non-physical, physical, and indecent exposure)?"

For the four categories of satisfaction, on-time performance, safety, and cleanliness, the figures represent the percentage of respondents who answered "Strong Agree" or "Agree" to each question. For sexual harassment, the figures show the percentage of people who checked at least one type of sexual harassment.
(2) Components

We analyzed the reasons why rail satisfaction is lower than bus satisfaction by focusing on components such as safety and cleanliness. As shown in Table 12, it can be seen that the satisfaction level of buses exceeded that of trains every year in all components except for on-time performance and cleanliness of stops/stations.

As for the sources of dissatisfaction that Metro needs to address, according to the Fall 2019 Survey, roughly 30% of customers were not satisfied with the cleanliness of bus stops and trains. It is also worth mentioning that reported sexual harassment has increased overall, which may deter riders from Metro buses and trains.











(3) Limitation

It should be noted that these surveys do not include riders who have left the Metro system in the last few years, which might or might not raise the overall satisfaction level.

Customer Experience Survey 2020 by Metro

To identify and address issues facing Metro and to help the agency best allocate resources, Metro developed the Customer Experience Plan in 2020 and launched a comprehensive customer experience survey tool, called the Customer Experience Survey. Although the 2020 Customer Experience Survey was conducted during the pandemic and the sample size was only one-tenth that of prior Customer Satisfaction Surveys, the result of this new survey contained customer ratings on more than 40 detailed service aspects, which helped us to identify more specific rider complaints.

Figure 10 shows the five lowest-rated customer experiences (scale: 1 = Poor to 10 = Excellent). In terms of bus satisfaction, it seems that bus riders are concerned about safety, particularly at night. This is a result that was not seen in the Customer Satisfaction Surveys, in which about 90% of bus riders seemed satisfied with the safety at a bus stop and on a bus.

For rail services, the lowest score was given to the extent to which Metro addresses homelessness on trains. It should be noted that this survey was conducted in October 2020, when the COVID pandemic had negative impacts on our economy and increased the amount of homelessness.¹⁴ In addition, we found that rail riders are also dissatisfied with safety on board trains and at train stations at night.



FIGURE 10: Bottom 5 aspects of customer experience¹⁵

As a result of examining existing customer surveys, we found general pain points of Metro services, such as safety concerns for both buses and rails, cleanliness at bus stops and on trains, and increasing sexual harassment. Although it is important for Metro to improve in all of these areas if it wants to double the number of LIFE enrollees, we also need to identify more specific issues of the LIFE program that have made eligible people unwilling to enroll in the program. Therefore, we conducted an interview with the LIFE enrollees and eligible people for the LIFE program to identify the reasons that eligible people do not enroll in the program.

Original Survey of Metro Riders' Views of the LIFE Program

Comparing the basic statistics from Metro's surveys (2018 Customer Satisfaction Survey, 2019 Customer Satisfaction Survey, 2020 Customer Experience Survey), the characteristics of respondents show similar composition.

¹⁴ According to the LA Homeless Service Authority, there were 66,436 homeless people in 2020, a 13% increase from a year earlier. In February 2022, it conducted the first homeless count since the COVID-19 pandemic began, and L.A. County Sheriff Alex Villanueva predicted that the number would probably rise to about 80,000 during the pandemic. (McGregor)

¹⁵ Source: Customer Experience Survey Results, Operations, Safety, and Customer Experience Committee, March 18, 2021

Below is the balance table comparing the summary statistics from the following surveys.

• 2022_survey: our survey on eligible riders

- » Conducted by our team on May 2022 with 24 respondents
- 2020_cus: 2020 Customer Experience Survey
 - » Conducted by Metro on Oct 2020 with 1,287 respondents
- 2019_sat: On-Board Customer Satisfaction Survey
 - » Conducted by Metro on Oct-Nov 2019 with 14,624 respondents

• 2018_sat: On-Board Customer Satisfaction Survey

» Conducted by Metro on Oct-Nov 2018 with 13,855 respondents

TABLE 14: Balance Table (unit: %)

Balance Table

Comparing with Existing Surveys (2018-2020)

	Ge	nder		Ethnicity					Age		
survey	male	female	latin	o non_la	atino	a18_	24 a	a25_34	a35_49	a50_64	a65_
2022_surve	y 39	56	5	0	50		11	44	39	6	0
2020_cus	49	50	6	7	33		21	23	33	10	7
2019_sat	48	51	5	9	41		21	20	22	19	8
2018_sat	47	52	5	7	43		20	22	22	19	7
		Car Own	ership			Ride	ership	Freque	псу	LIFE Enro	ollment
survey	more_on	e_car on	e_car	none_car	w_0	w_12	w_34	4 w_56	everyday	er	nrolled
2022_survey		17	11	72	0	0	17	7 28	56		44
2020_cus		NA	28	72	12	10	18	8 61	NA		NA
2019_sat		NA	21	79	4	7	22	2 67	NA		3
2018_sat		NA	24	76	5	7	23	3 65	NA		2

Considering the differences in choices for each survey, which are expressed as N.A. on the table, it seems that the respondents of our survey are representing the Metro riders in terms of gender, age, car ownership, and ridership. The enrollment rate of the LIFE program is notably different because we collected responses only from those whose income meets the eligibility for the program.

When asked about the reason for their less frequent ridership (multiple choices), 33 percent of respondents said 'I have to wait a long time (less frequent service)' and 17 percent said 'I cannot estimate the exact travel time (unstable service).' 83 percent of respondents replied that they ride Metro mainly for commuting to work or school. Most responders used TAP cards (39 percent), Passes (Day, 7-Day, and 30-Day Passes, 50 percent) to pay fares.

Forty-four percent (44%) of respondents said they never heard about the LIFE program. Among those who heard about the program, half of them said they heard about it on the bus or train. **FIGURE 11: Banner on Big Blue Bus (March 2022)**



Twenty-eight percent (28%) of respondents said they are not enrolled in any welfare program such as CalFresh and Medi-Cal. Fifty-six percent (56%) of respondents answered that they are not enrolled in the LIFE program, although they are eligible. Among those who are not enrolled in the LIFE program, half of them are not enrolled in any welfare program.

Among those who are enrolled in the program, all of them said the LIFE program is somewhat or definitely helpful in reducing financial burdens and is somewhat or definitely encouraging more public transit use.

Among those who are not enrolled in the program, 80% of respondents said they don't know whether they will apply for the program, while 87% responded that they don't know enough about the program. All respondents who are not enrolled in the program think that the program is somewhat or definitely helpful in reducing the financial burden and is somewhat or definitely encouraging public transit use. Most respondents who are not enrolled in the program think that the incentives Metro offers to increase the enrollment are helpful. Among those who stated the reason why the LIFE program might not encourage public transit use, 38 percent of respondents think the fare is not the main reason why people are not using transit, and 62 percent think that it is because current service lines are not covering enough areas.

To sum up, it seems that riders have concerns about less frequent and unstable service. Many riders did not hear about the LIFE program, and those who did hear about it did so on bus or train. Riders think that the program is helpful in easing the financial burden and encouraging ridership. However, eligible nonenrollees hesitate to enroll in the program without more information.

IV. POLICY OPTIONS

Criteria for choosing policy options

To decide the best option, we need to make a holistic judgment balancing pros and cons, rather than focusing on partial outcomes themselves. Thus, we first prepare evaluation criteria to comprehensively consider the important factors.

As the target of our policy recommendation is to increase the number of LIFE enrollments, we first measure the **effectiveness** of each policy option, which is the most essential criterion to evaluate the policy options. Next, we also measure the **net financial cost**¹ and **time to completion** for the policy. By those factors, we can assess the efficiency of the options, in other words, how much those options efficiently increase the number of enrollees.

On the other hand, these factors are not enough to evaluate the overall performance of policy options because **Metro's values** and the **LIFE program's objective** also matter. According to Metro's Vision 2028 Plan, it has pursued the following five goals (LA Metro).

- 1. Provide high-quality mobility options that enable people to spend less time traveling;
- 2. Deliver outstanding trip experiences for all users of the transportation system;
- 3. Enhance communities and lives through mobility and access to opportunity;
- 4. Transform L.A. County through regional collaboration and national leadership; and
- 5. Provide responsive, accountable, and trustworthy governance within the Metro organization.

Moreover, the goal of the LIFE program is not exclusively to increase the number of enrolled, but to make it easier for low-income Angelenos to get around. Accordingly, we consider how much these policies are aligned with Metro's stated goals. Additionally, our analysis seeks to detect any possible positive and negative externalities not limiting our scope to the program but considering the total impact on society. Finally, we consider the relative levels of feasibility in implementing different policy options, which might hinder Metro.

Summary: Evaluation criteria to assess the policy options

- * Main criteria:
 - » Effectiveness
 - »Net financial cost
 - » Time to completion
- * Additional considerations
 - » Metro's values / LIFE program's objective
 - » Externalities
 - » Feasibility

¹ We assess the impact of the increase in LIFE enrollment in Appendix 2. Also, Increased enrollment could lead to two indirect costs. One is the cost of requiring Metro to add more routes or services due to increased ridership. The other is the loss of fares as existing riders switch to the LIFE program. This evaluation assumes that these effects are common to the policy options and therefore are not explicitly discussed in each part.

Family Sizo	Annual Family Income (HUD)						
Failing Size	Low Income Level ¹ Very Low Income Level ²		Extremely Low Income Level ³				
1	\$66,250	\$41,400	\$24,850				
2	\$75,700	\$47,300	\$28,400				
3	\$85,150	\$53,200	\$31,950				
4	\$94,600	\$59,100	\$35,450				
5	\$102,200	\$63,850	\$38,300				
6	\$109,750	\$68,600	\$41,150				
7	\$117,350	\$73,300	\$44,000				
8	\$124,900	\$78,050	\$46,800				
add 1 person	-	-	-				

TABLE 15: HUD's Poverty and Lower Living Income Level for L.A. County 2021²

Policy options and evaluation

1. Widening the enrollment eligibility: raising the annual income requirement

Description

The first option is widening the enrollment eligibility. Raising the current upper limit to receive the LIFE discount could encourage more people to enroll in the program. The current income eligibility limit is set for the Very Low-Income families defined by HUD's Poverty and Lower Living Income Level for L.A. County 2021, which does not exceed 50 percent of the median family income. (U.S. Department of Housing and Urban Development) According to the guideline, HUD's Low Income Level is still higher than the LIFE program eligibility. Metro could raise the current upper limit to this level.

Effectiveness: High

This expanded eligibility would allow more people to meet these criteria, thereby enabling the LIFE program to benefit more people in need. The more people who are eligible, the more likely it is that enrollment will increase, making this option highly effective. However, it should be noted that the projected increase in LIFE enrollment would be less than the increase in the number of eligible individuals, since those between the Very Low and Low Income Level are more likely to have a car than those below the Very Low Income Level.

Cost: Mid

The increase in the number of enrollees means a decrease in the Metro's fee collection, which is a direct financial burden for Metro, but it will not increase the cost for existing riders, so the magnitude of

² 1) Low-Income level: 80 percent of the median family income.

²⁾ Very Low-Income level: 50 percent of the median family income.

³⁾ **Extremely low income level**:30 percent of the median family income. The FY 2014 Consolidated Appropriations Act changed the definition of extremely low-income to be the greater of 30/50ths (60 percent) of the Section 8 very low-income limit or the poverty guideline as established by the Department of Health and Human Services (HHS), provided that this amount is not greater than the Section 8 50% very low-income limit. Consequently, the extremely low income limits may equal the very low (50%) income limits.

the effect should be moderate³. In addition, Metro needs to change systems, manuals and documents regarding the LIFE program, which will also cost Metro.

• Financial cost:

The increase in enrollment * discount per person

- Update costs for systems, manuals and documents.
- Opportunity cost: Metro could have spent the cost to save very-low-income people.

Time to completion: Long

This option requires changing a basic rule for the LIFE program, including the Metro Board's approval and a budget request for the program. It will take more than one year to implement the policy.

Additional considerations:

Value / Objective: Mid

Although this policy increases the number of enrolled participants and benefits relatively low-income people, it would not on its own necessarily achieve the goals of the LIFE program. We should note that this option actually does not affect the very-low-income people (who are already eligible) and would likely benefit people who are working-class but not very poor.

• Externalities: Uncertain

We could not find any distinctive externalities for policy option 1.

• Feasibility: Mid

There might be a challenge to expand budgets due to the redistribution problem, where the budget is spent for low-income people rather than very-low-income people. Budget constraints may also limit the feasibility of this option.

TABLE 16. SUMMARY OF POLICY OPTION1

Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity
Option1: Ease requirement	High	Mid	Long	Mid	Uncertain	Mid

2. Increasing discount benefit

Description

The LIFE discount rate is currently about half the cost of transportation, but this may not be enough to attract low-income people. Metro survey in 2019 showed that 63 percent of riders receive fare discounts, and yet only 8 percent of them are enrolled in the LIFE program. In fact, our survey result showed that 11 percent of low-income riders were not satisfied with the current fee system. To address this problem, the second policy option is to provide a fare-free transit to the LIFE enrollees.

Effectiveness: Uncertain

There is a large body of literature showing that fare-free programs or fare reductions have a positive effect on ridership (Bleich). For example, the New York City Metropolitan Transportation Authority introduced fare

³ We assess the impact of the increase in LIFE enrollment in Appendix 2.

incentives in the 1990s, including fare discounts for certain services and bulk purchases of MetroCard, which resulted in a 24 percent increase in systemwide ridership over a few years (Hirsch et al.). Also, the simplification and reduction in fares in Haifa, Israel in the late 2000s were shown to be effective, increasing ridership by 7.7 percent (Sharaby & Shiftan).

The volume of the positive effect is uncertain, however. Other literature also argues that free or reduced fares are not effective. For example, the introduction of free or reduced fares may have a short-term, positive effect on ridership and the effect diminishes over time (Zhang et al.). Therefore, given the uncertainty based on the literature, we evaluate that this option's effectiveness is uncertain.

Cost: High

The financial costs of eliminating fares for all of the LIFE enrollees would be enormous because Metro would lose revenue from around 70,000 riders. This increased cost would be larger than that for policy option 1 because this option would affect not only the additional enrollees but also the existing enrollees.⁴ In addition, as Perone argues, fare-free transit often attracts undesirable users who cause disruptions and commit crimes, which may increase the cost for Metro (Perone).

Time to completion: Long

As with the first policy option, this option would take more than a year to implement, as it would require approval by the Metro Board and a request for a budget increase for the LIFE program.

Additional considerations:

• Value / Objective: High

This option will increase the number of low-income riders, which will improve the equity in transportation access. This will meet one of the Metro's goals of enhancing communities and lives through mobility and access to opportunity.

Externalities: Negative

Externalities of fare-free transit include adverse effects on service quality. As noted in the cost assessment, fare-free service may cause disruption and crime, which may drive other users away. As a result, some people might suffer from transit inconvenience.

• Feasibility: Low

Since Metro just resumed charging for bus rides in January 2022, the policy inconsistency could lead to a loss of trust in Metro from the public. In addition, frequent changes to the transit fare system would cause inconvenience not only to users, but also to employees. Given these drawbacks, the feasibility of this option can be assessed as low.

TABLE 17: Summary of Policy option 2

Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity
Option2: Increase discount benefit	Uncertain	High	Long	High	Negative	Low

⁴ We assess the impact of the increase in LIFE enrollment in Appendix 2.

3. Selecting more prospective areas for outreach events

Description

This policy option focuses on the gap between the number of people in the eligible population and actual enrollment. Our GIS analysis showed that this gap varies geographically by ZIP code area and tends to be higher in and around Downtown Los Angeles. Also, through regression analysis, we have identified areas that fall into the outliers, which should have more enrollment than other areas. Metro can hold campaigns and outreach events concentrating on these prospective areas.

Effectiveness: High

Our difference-in-differences analysis showed that the outreach events statistically significantly increased the number of LIFE enrollees per ZIP code by approximately 15 to 16 persons. Given that all of the events in the data took place before Metro began charging for bus rides in January 2022, which increased the value of the LIFE program, the outreach events may have become more effective recently.

One limitation of our analysis is that we did not account for differences in outreach event design. For example, Metro has collaborated with other agencies on outreach events to increase enrollment and some of them were uniquely accompanied by drive-through/walk-up food distribution events. We attempted to estimate the differential impact of the food distribution events, but the sample size was so small that we did not find statistically significant impacts on the enrollment increase.

Therefore, while it might be a good idea for Metro to try holding outreach events in different ways to find the most effective design, our analysis suggests that Metro holding outreach events in more promising areas would be effective in increasing LIFE enrollment, regardless of their design.

Cost: Low

This policy option would make little change to the financial costs, as it only proposes that Metro resume its previous efforts and select more promising areas.

Time to completion: Short

As Policy Option 1, the magnitude of the impact of increased enrollment should be moderate⁵. Metro has already implemented this option in November and December 2021, so this option would take very little time to implement.

Additional considerations:

Value / Objective: High

In the areas that our GIS analysis has identified, there are a higher percentage of workers who do not own a car and the enrollment has been lower than would be predicted from the number of eligible people. Therefore, if Metro focuses more on these areas, it can not only increase the LIFE enrollment but also achieve transportation equity improvements, consistent with Metro's organizational goals.

Externalities: Uncertain

Given that one of the reasons Metro suspended its outreach events was because of the increase in confirmed cases of COVID-19 from the end of 2021, one cost of this option might be the potential for

 $^{^{\}scriptscriptstyle 5}$ We assess the impact of the increase in LIFE enrollment in Appendix 2.

increased virus transmission. However, this risk has receded somewhat. L.A. County public health guidelines have changed to reflect declining numbers of COVID cases, as of April 2022.

Feasibility: High

As described in the assessment of time to completion, since Metro has already implemented this option, it would be easier for Metro to get approval from the Metro Board. Therefore, the feasibility of this option would be high.

TABLE 18: Summary of Policy option 3

Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity
Option3: Strategic outreach	High	Low	Short	High	Uncertain	High

4. Addressing riders' non-fare concerns

Description

This option would focus on improving the quality of service, especially focusing on rider concerns. According to the 2020 Customer Experience Survey, when riders were asked to rate (on a scale of 1-10) their level of satisfaction on 40 different aspects of the Metro experience, three bottom items were 'share at a bus stop (4.7)', 'presence of security staff on buses (4.6)', and 'personal security on Metro buses at night (4.8).' To encourage more ridership, it is important to address riders' most common concerns. Given the limited resources, Metro can start dealing with those concerns.

- Expanding bus shelters to improve the environment of bus stops.
- Hiring more security staff and tightening emergency protocol for drivers to enhance security on buses

Effectiveness: Uncertain

We expect the improvement in service would lead to an increase in ridership. However, it is not clear how much increase in ridership can be attributed to safety enhancement and bus stop improvement. Moreover, it is uncertain whether it would eventually increase LIFE enrollment.

Cost: High

In terms of installing bus shelters, there are about 8,000 bus stops in LA city and only 1,900 stops have shelters (Carpenter), and the average cost of a bus shelter is \$25,000 (Investing in Place). Based on a simple calculation, it requires \$152.5 million to install bus shelters in LA city.

It is difficult to estimate the overall costs of adding more police officers to buses and trains, but if Metro were to hire security for every night bus, the cost would be significant. In December 2021, Metro renewed its policing contract with the LAPD, the Long Beach Police Department, and the L.A. County Sheriff's Department at a cost of around \$75 million annually to the agency (Garrova). Additionally, it is not guaranteed that an increased police presence would make all riders feel safer. An unintended consequence of this policy might be an increased number of violent incidents involving police or Sheriff's officers.

Time to completion: Long

Installing bus shelters cannot be done within a year, considering the total costs. Also, adding more police or other security to Metro would have to be implemented in stages, observing the evidence throughout the process.

Additional considerations:

• Value / Objective: High

Although the impact of this policy option on LIFE enrollment is not clear, this option certainly deals with Metro's first and second goals.

Externalities: Positive

Improving the ridership experience has positive externalities. For example, improved service would make it easier for Metro to be perceived more positively by the public and the media. Also, increased ridership would boost economic activity.

• Feasibility: Mid

This policy option is not a challenging one in terms of technology. It requires an executive decision but often not considered as a priority. Therefore, the feasibility of this option is medium.

TABLE 19: Summary of Policy option 4

Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity
Option 4: Removing concern	Uncertain	High	Long	High	Positive	Mid

5. Increasing bus service

Context

In light of the pandemic and the resulting loss of demand for transit/financial pressures, Metro instituted cuts to bus and train service. From April 2020 to May 2021, buses ran at roughly 20 percent below prepandemic capacity (Nelson). In May 2021, the Board of Directors restored service cuts, citing the recent influx of federal funds from the American Rescue Plan. This was criticized as inadequate in an Investing in Place article about the restoration of service to pre-pandemic levels, given that bus service had been cut since the expiration of a federal consent decree in 2006 and ridership was in decline in the years immediately preceding the pandemic (Frazier).

During the COVID-19 omicron variant surge during the winter months of 2021-22, Metro re-instituted service cuts, largely due to staffing shortages and challenges that transit agencies across the country have faced in hiring bus drivers (Uranga).

Description

Given that reliability is consistently ranked as one of the reasons people don't ride transit and cited as a problem for those that do, increasing bus and rail service and meeting scheduled times, particularly for LIFE enrollees who rely on transit to get around, is critical. Failure to provide reliable service will limit any gains to riders or Metro from going fareless, as riders will continue to vote with their feet (away from transit).

Benefits of this proposal include:

- Increased service means increased mobility for L.A. County residents
- Benefit to businesses and employers of workers being better able to get to and from work
- Financial benefits to employees from being on-time to work more often (especially important for lowincome service and retail workers paid for hourly shifts)
- General environmental benefits of increased transit use (lower carbon emissions from reduced use of passenger vehicles)

Costs and Potential Obstacles:

- Funding challenge restoring or even increasing service above the previous baseline would be an investment of scarce resources.
- It may be wasteful, particularly at first given the pandemic's effects on ridership, and the specter of "ghost buses" with few or no passengers could reflect poorly on the Metro Board.
- In the immediate term, there are logistical challenges to delivering on this proposal, given the documented challenges with hiring bus drivers. Put another way, labor supply as well as budget constraints are an issue in implementing this policy proposal.

Effectiveness: High

We would anticipate increased bus service to be an effective policy in achieving the benefits listed above. More reliable service, particularly on buses, would be expected to stabilize and potentially increase ridership in the medium- and long-term compared to the current baseline. Relatedly, it would make participation in the LIFE program more valuable, as riders would be receiving better service.

Cost: High

The cost of this policy option is high. While estimating exactly how much is beyond the scope of this report, if increasing service in the ballpark of 10-20 percent from existing levels represented a 10 percent increase from Metro's FY 2021-22 budget, that would be \$800 million annually. This would likely require another American Rescue Plan-level investment of federal dollars or a new ballot measure along the lines of Measure M that increased the L.A. County sales tax rate, and possibly both of those steps in combination.

Time to completion: Mid-to-long

It's somewhat unclear how long it would take to implement the service increases. Given the need for Metro Board approval for prior changes in levels of service and that subsequent on-the-ground implementation of Board votes may take time, it would likely not be instantaneous. If service reliability is dependent on additional expenditures to hire, train, and compensate a significant number of new bus drivers, it could take years.

A possible indicator for the length of time it might take to implement service increases comes from the 1996 consent decree reached between Metro and advocacy groups including the Bus Riders Union, which alleged that the agency was disproportionately using federal funds to expand suburban-oriented light rail instead of maintaining and improving bus service. As part of the legal settlement that was reached by the parties, 102 new buses were purchased within two years and the agency pledged to increase service to

reduce congestion (average number of standees from 20 to 8) by 2002 (Mann). Based on this example, between two and six years is a plausible estimate for Metro to fully implement service increases.

Additional considerations:

• Value / Objective: High

This policy option by definition increases transit access for county residents, disproportionately benefits low-income Angelenos who make up the majority of ridership. As previously stated, increased service motivates LIFE program enrollment by making it more valuable, due to improvement to Metro experience.

Externalities: Positive

Previously summarized under "Benefits of this proposal include"

• Feasibility: Low

Costs and obstacles to implementation are considerable, as previously stated

TABLE 20: Summary of Policy option 5

Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity
Option 5: Restore service	High	High	Uncertain (Mid- to-Long)	High	Positive	Low

TABLE 21: Summary of Policy Options

Policy Options	Pros	Cons
1. Widening the enrollment eligi- bility: raising the annual income requirement	 » Increase the number of enrollees » More people can access the program 	 » Not effective to save people really in need » Financial burden
2. Increasing discount benefit	 » Increase the number of enrollment by higher incentive » Raise the low-income rider's satisfaction 	 » The effect might experience time decay » Enormous financial burden » Adverse effects on service quality
3. Selecting more prospective areas for outreach events	 » High statistical probability of increasing LIFE enrollment. » Improved transportation equity » Shorter time to completion 	» Criticism regarding public health
4. Addressing riders' non-fare concerns	» Positive externalities» Correspondence with Metro's goals	» Indirect prescription» Long period to complete
5. Increasing bus service	 » Increase the mobility » Benefit businesses and employers » Benefit employees » Environmental benefit 	 » Financial challenge » Logistical challenge

TABLE 22: Summary of Evaluation

	Criteria	Criteria					
	Main critria			Additonal considerations			
Policy options	Effectiveness	Net financial cost	Time to completion	Value / Objective	Externalities	Feasiblity	
Option1: Ease requirement	High	Mid	Long	Mid	Uncertain	Mid	
Option2: Increase discount benefit	Uncertain	High	Long	High	Negative	Low	
Option3: Strategic outreach	High	Low	Short	High	Uncertain	High	
Option 4: Removing concern	Uncertain	High	Long	High	Positive	Mid	
Option 5: Restore service	High	High	Uncertain (Mid- to-Long)	High	Positive	Low	

Policy recommendation

Our recommendation: Option 3

As examined above, the most direct and efficient policy to increase the number of enrollees is to improve the current outreach event to attract more possible enrollees.

Considering the timeline and cost-effectiveness, we concluded that policy 4 is not efficient in tackling LIFE enrollment issues. Although we acknowledge that the option would contribute to Metro's overall service enhancement, it is not addressing very-low-income riders specifically.

Long-term considerations: Options 1, 2, 5

On the other hand, policy options 1, 2, and 5 are still worth researching further in the long run. Although the financial cost and time to completion of these policy options are considerable obstacles to overcome, these policies align with the objective of the LIFE program and are essential to increasing mobility in ways that will meaningfully benefit low-income Angelenos.

At the beginning of the process that led to the fare-free pilot programs that are currently ongoing, the Metro Board expressed an intent to move towards a fully fare-free system. None of our findings indicate that this long-term goal should be abandoned. However, it is vital that the agency reverses the decline in ridership and service cuts as it pursues this goal. A fare-free Metro would represent something of a Pyrrhic victory if Angelenos can't actually get where they need to go. If the recent past is any indication, they will increasingly vote with their feet and seek out other transit options.

V. CONCLUSION

THROUGH A SERIES OF ANALYSES, we discovered that Metro's service covers most of the areas in need and its outreach efforts were effective in increasing LIFE enrollment. However, we also found that only few eligible people enrolled in the program and the eligible non-enrollees do not know about the program well. In addition, while Metro's selected areas for outreach events are concentrated on areas with many eligible people, it has not paid much attention to areas where a higher percentage of workers do not own a car and the enrollment has been lower than predicted from poverty levels.

Therefore, we recommend Metro enhance its outreach efforts by targeting specific areas in need which our analyses pointed out. The first step would be to review the previous outreach events and to devise action plans for future outreach efforts. In the long term, Metro should not only increase service frequency but also expand the range of eligibility and discount rate to achieve its larger goals.

BIBLIOGRAPHY

"About Income." Census.gov. US Census Bureau, November 22, 2021. <u>https://www.census.gov/topics/</u> income-poverty/income/about.html.

Bleich, Kevin. Thesis. A Review of Reduced and Free Transit Fare Programs at Public Colleges and Universities in California. Thesis, UC Irvine, 2020. <u>https://escholarship.org/uc/item/594122wf</u>.

Bullard, Robert D., and Eric Mann. "Los Angeles Bus:Riders Derail the MTA." Essay. In *Highway Robbery: Transportation Racism & New Routes to Equity*. Cambridge, MA: South End Press, 2004. https://sites.tufts.edu/carscultureplace2010/files/2010/10/Los-Angeles-Bus.pdf

Carpenter, Susan. "Los Angeles Bus Shelters Are about to Go High-Tech." *Spectrum News 1*, July 22, 2021. <u>https://spectrumnews1.com/ca/la-west/transportation/2021/07/22/los-angeles-bus-shelters-are-about-to-go-high-tech</u>.

"Fareless System Initiative (OPERATION FSI) Exploratory/Action Task Force." Metro, August 2020. <u>http://metro.legistar1.com/metro/attachments/7869781d-a8df-4bff-af6b-385157d53fd8.pdf</u>.

Federal Transit Administration , National Transit Database - Transit Profiles: 2020 Top 50 Reporters § (n.d.). https://www.transit.dot.gov/sites/fta.dot.gov/files/2021-11/2020%20Top%2050%20Profiles%20Report_0.pdf.

"FY 2022 Income Limits Documentation System." FY 2022 Income Limits Documentation System -- Summary for \$inputname\$. Accessed April 13, 2022. <u>https://www.huduser.gov/portal/datasets/il/il2021/2021summary.odn</u>.

Garrova, Robert. "LA Metro Votes to Extend Law Enforcement Contracts and Fund Public Safety Alternatives." LAist, December 3, 2021. https://laist.com/news/transportation/la-metro-votes-to-fund-lawenforcement-contracts-and-public-safety-alternatives.

George, Zach. "American Rescue Plan Provides \$30.5 Billion to Support America's Public Transit Systems." National Association of Counties, April 21, 2021. <u>https://www.naco.org/blog/american-rescue-plan-provides-305-billion-support-americas-public-transit-systems</u>.

Goldbaum, Christina, and Will Wright. "'Existential Peril': Mass Transit Faces Huge Service Cuts Across U.S." The New York Times, December 6, 2020. <u>https://www.nytimes.com/2020/12/06/nyregion/mass-transit-service-cuts-covid.html</u>.

Goldberg, Nicholas. "Column: Can L.A.'s Public Transit System Survive the Pandemic?" Los Angeles Times, April 7, 2021. https://www.latimes.com/opinion/story/2021-04-07/los-angeles-public-transit-crisis.

Hirsch, Lawrence R., J. David Jordan, Robert L. Hickey, and Valdemar Cravo. "Effects of Fare Incentives on New York City Transit Ridership." *Transportation Research Record: Journal of the Transportation Research Board* 1735, no. 1 (2000): 147–57. <u>https://doi.org/10.3141/1735-18</u>.

Hymon, Steve. "Fareless System Initiative Gives Update to Metro Board on Potential Pilot Program." The Source, February 18, 2021. <u>https://thesource.metro.net/2021/02/18/fareless-system-initiative-gives-update-to-metro-board-on-potential-pilot-program/</u>.

Hymon, Steve. "Metro Board Approves Going Forward with Development of Fareless Test Program." The Source, May 27, 2021. <u>https://thesource.metro.net/2021/05/27/metro-board-approves-going-forward-with-development-of-fareless-test-program/</u>.

Implementation and Outcomes of Fare-Free Transit Systems § (2012). <u>https://cvtdbus.org/wp-content/uploads/2018/09/2012-07-TCRP-fare-free-report.pdf</u>.

Investing in Place. "City of LA's Bus Shelter and Street Furniture Update." Investing in Place, December 9, 2020. <u>https://investinginplace.org/2020/12/09/city-of-las-bus-shelter-and-street-furniture-update/#:~:text=The%20average%20cost%20of%20a,expense%20after%20it%20is%20installed.</u>

Investing in Place. "The Farebox Recovery Ratio: A Misleading Metric for Los Angeles County." Investing in Place, May 11, 2017. <u>https://investinginplace.org/2015/10/27/the-farebox-recovery-ratio/#:":text=Farebox%20recovery%20is%20the%20percentage,of%20bus%20and%20train%20tickets</u>.

"L.A. Metro Board Approves Development of Fareless Test Program." Mass Transit, June 1, 2021. <u>https://</u>www.masstransitmag.com/technology/fare-collection/press-release/21224977/los-angeles-countymetropolitan-transportation-authority-metro-la-metro-board-approves-development-of-fareless-testprogram.

"La Metro Board Approves Free Transit Pilot Program for Students." LA Metro approves free transit pilot program for students, September 23, 2021. <u>https://spectrumnews1.com/ca/la-west/transportation/2021/09/23/la-metro-board-approves-free-transit-pilot-program-for-students</u>.

Lee, Yongsung, and Bumsoo Lee. "What's Eating Public Transit in the United States? Reasons for Declining Transit Ridership in the 2010s." *Transportation Research Part A: Policy and Practice* 157 (2022): 126–43. <u>https://doi.org/10.1016/j.tra.2022.01.002</u>.

"Life Program Strategic Double Enrollment Plan." Metro Board, November 18, 2021. <u>https://boardagendas.</u> metro.net/board-report/2021-0732/.

Linton, Joe. "Metro CEO Phil Washington Announces 'Fareless System Initiative.'" Streetsblog Los Angeles, September 20, 2021. <u>https://la.streetsblog.org/2020/08/27/metro-ceo-phil-washington-announces-fareless-system-initiative/</u>.

Linton, Joe. "Metro Fareless Pilot Could Start August 2021, Initially for Students." Streetsblog Los Angeles, September 20, 2021. <u>https://la.streetsblog.org/2021/04/21/metro-fareless-pilot-could-start-august-2021-initially-for-students/</u>.

"LOW INCOME FARE IS EASY (LIFE) FY18 OPERATING GUIDELINES." Metro Board, January 17, 2018. <u>https://board.agendas.metro.net/board-report/2017-0813/</u>.

"Low-Income Fare Is Easy (Life)." LA Metro, March 30, 2022. <u>https://www.metro.net/riding/life/</u>.

McGregor, Sarah. "LA Conducts First Homeless Count Since Pandemic Hit." *Bloomberg*, February 22, 2022. <u>https://www.bloomberg.com/news/articles/2022-02-22/los-angeles-conducts-first-homeless-count-since-pandemic-hit</u>.

"Metro Awarded \$1.24 Billion from Federal American Rescue Plan Act to Maintain Service and Project Progress during COVID-19 Pandemic." The Source, January 12, 2022. <u>https://thesource.metro.</u> <u>net/2022/01/12/metro-awarded-1-24-billion-from-federal-american-rescue-plan-act-to-maintain-service-and-project-progress-during-covid-19-pandemic/</u>. "Metro Strategic Plan." LA Metro, February 11, 2022. <u>https://www.metro.net/about/plans/metro-strategic-plan/</u>.

Mosley, Tonya, and Serena McMahon. "Kansas City, Missouri, May Become Largest U.S. City to Eliminate Bus Fares." Kansas City, Missouri, May Become Largest U.S. City To Eliminate Bus Fares | Here & Now. WBUR, December 11, 2019. <u>https://www.wbur.org/hereandnow/2019/12/11/kansas-city-free-bus-fare</u>.

Nguyen, Terry. "Kansas City Is Making Its Bus System Fare-Free. Will Other Cities Do the Same?" Vox, December 17, 2019. <u>https://www.vox.com/the-goods/2019/12/17/21026425/kansas-city-free-bus-system</u>.

Perone, Jennifer. "Public Transportation Syntheses Series: Fare, Free or Something in between?," 2004. https://doi.org/10.5038/cutr-nctr-rr-2002-05.

"Pressley & Markey Unveil Bold Legislation to Invest in Public Transit as a Public Good." Representative Ayanna Pressley, July 1, 2020. <u>https://pressley.house.gov/media/press-releases/pressley-markey-unveil-bold-legislation-invest-public-transit-public-good</u>.

Rubin, Thomas A., and James E. Moore. "Los Angeles Metro Bus Is Very Productive and Cost Effective, Rail ... - Reason Foundation." Reason Foundation. Accessed April 13, 2022. <u>https://reason.org/wp-content/</u> <u>uploads/metro-28-by-2028-effectiveness-bus-rail.pdf</u>.

Sharaby, Nir, and Yoram Shiftan. "The Impact of Fare Integration on Travel Behavior and Transit Ridership." *Transport Policy* 21 (2012): 63–70. <u>https://doi.org/10.1016/j.tranpol.2012.01.015</u>.

Tap. "LIFE." TAP, n.d. <u>https://www.taptogo.net/articles/en_US/Website_content/Fare-Subsidy-LIFE</u>.

Taylor, Brian D, Evelyn Blumenberg, Jacob L Wasserman, Mark Garrett, Andrew Schouten, Hannah King, Julene Paul, and Madeline Ruvolo. "Transit Blues in the Golden State: Analyzing Recent California Ridership Trends." UC Office of the President: University of California Institute of Transportation Studies, June 29, 2020. <u>https://doi.org/10.17610/T67W2Z</u>.

Vega, Priscella. "L.A. Metro Votes to Create Financial Plan for Offering Free Rides to Students, Low-Income Riders." Los Angeles Times, May 28, 2021. <u>https://www.latimes.com/california/story/2021-05-27/l-a-metro-votes-to-create-financial-plan-to-launch-program-offering-free-rides-to-students-low-income-riders.</u>

Verma, Pranshu. "Public Transit Officials Fear Virus Could Send Systems Into 'Death Spiral'." The New York Times, July 19, 2020. <u>https://www.nytimes.com/2020/07/19/us/coronavirus-public-transit.html</u>.

Zhang, Sijia, Shunping Jia, Cunrui Ma, and Yuqiong Wang. "Impacts of Public Transportation Fare Reduction Policy on Urban Public Transport Sharing Rate Based on Big Data Analysis." *2018 IEEE 3rd International Conference on Cloud Computing and Big Data Analysis (ICCCBDA)*, 2018. https://doi. org/10.1109/icccbda.2018.8386527.

APPENDICES

APPENDIX 1: Bus stop analysis

Bus stop strategy

Have Metro and other transport agencies effectively put bus stops in the area whose households experience more poverty and the percentage of workers not having a car? To answer this question, we analyze relationships among these factors, using Census estimate data per Census tract in Los Angeles County from the American Community Survey 5-year estimates 2019.

- Bus availability: Categorical value specified by intersecting Metro and other agencies' bus stops and Census tract area (Spatial join)
 - » The area has bus stop: 1
 - » The area does not have bus stop: 0
- **Poverty rate:** Percentage of the population below poverty level per tract in 2019, variable I.D. "S1701_C03_001E"
- **No car percentage:** The workers not having a car divided by to total workers per tract in 2019, variable I.D. "B08141_002E" "B08141_001E"

TABLE. 23: Descriptive statistics

Statistic	Ν	Mean	St. Dev.	Min	Max
Bus availability	2,346	0.922	0.268	0	1
Poverty rate	2,320	15.213	10.609	0	100
No car workers percentage	2,318	4.134	6.025	0	78.745

We can formulate the regression model, including interaction term, as follows:

Bus availability = $\alpha + \beta_1 * Poverty rate + \beta_2 * No car percentage + \beta_3 * Poverty rate * No car percentage$

TABLE 24: Result table of regression analysis

	Dependent variable:
	bus_avail
Poverty rate	0.005***
	(0.004, 0.006)
No car workers percentage	0.008***
	(0.005, 0.012)
Poverty rate * No car workers percentage	-0.0002****
	(-0.0003, -0.0001)
Constant	0.837***
	(0.815, 0.858)
Observations	2,318
R^2	0.039
Adjusted R ²	0.037
Residual Std. Error	0.259 (df = 2314)
F Statistic	31.060^{***} (df = 3; 2314)
Note:	*p<0.1; **p<0.05; ***p<0.01

As all coefficient's p-value < 0.01, these coefficients are statistically significant. The specified model is:

Bus availability = 0.837 + 0.005 * Poverty rate + 0.008 * No car percentage -0.0002 * Poverty rate * No car percentage

Marginal effects of poverty rate on bus availability

The marginal effect of poverty rate on bus availability is:

$$\partial Bus$$
 availability / $\partial Poverty$ rate = $\beta_1 + \beta_3 * No$ car percentage

Thus,

$$\partial Bus$$
 availability / $\partial Poverty$ rate = 0.005 - 0.0002 * No car percentage

To interpret this, we can take several values for No car percentage to see the specific relationship between Bus availability and poverty rate. We take mean – one standard deviation(Here, it is less than 0, so we use 0 instead), mean and mean + one standard deviation of No car percentages.



FIGURE 12: The relationship between poverty rate and bus availability given no car percentage

This result shows that in all three cases, Bus Availability is positively correlated with the poverty rate, but the slope is different depending on the No-car percentage. The marginal effect of the poverty rate decreases as no car percentage increases, but still always positive. (if the no-car percentage is smaller, the impact of poverty rate slightly becomes larger)

Marginal effects of No car percentage on bus availability

The marginal effect of No car percentage on bus availability is:

 ∂Bus availability / ∂No car percentage = $\beta_2 + \beta_3 * Poverty$ rate

Thus:

$$\partial Bus$$
 availability / ∂No car percentage = 0.008 - 0.0002 * Poverty rate

To interpret this, again we can take several values for poverty rate to see the specific relationship between Bus availability and poverty rate. We take mean – one standard deviation, mean and mean + one standard deviation of poverty rate.



FIGURE 13: The relationship between no car percentage and bus availability given poverty rate

This result shows that in all three cases, bus availability is positively correlated with the percentage of the workers not having a car, but the slope is dependent on the poverty rate. The marginal effect of the no car percentage decreases if the poverty rate becomes larger, but still always positive (if the poverty rate is smaller, the impact of no car percentage becomes larger).

As a result of the regression analysis, we conclude that bus stops are effectively put in the area whose poverty rate and bus stops are high, and if either variable is low(high), the increase of the other variable raises the bus availability more(less).

APPENDIX 2: The impact on the total discount

While Policy option 1 and 3 increase only the number of enrollees, Policy option 2 increases the discount rate as well. We conceptually examine the impact of each option based on some assumptions, taking an example for Regular 30-Day / Monthly Pass.

TABLE 25: The current discount for Regular 30-Day/Monthly pass

Fare Type	Normal Price	LIFE Discount	Final Cost
Regular 30-Day/Montly Pass	\$50	\$24	\$26

The figure below shows the simulated annual benefit increase before and after enrollee doubles from 90,000 to 180,000, and before and after discount rate increases.

FIGURE 14: Increase of the total annual discount by the increase enrollees and discount rate



Annual discount per enrollee

- 1. The current annual discount per person is \$288 (\$24 x 12 month), and if enrollment increases, it will cost additional \$288 per person annually, which is common to Policy option 1, 2 and 3.
- 2. In Policy option 2, if we increase the discount rate, the enhanced discount will benefit not only new enrollees but also existing enrollees. For example, when we increase the discount rate to 100%, it will double the discount benefit up to \$600 (\$50 x 12 month) for both new and existing enrollees.

The summary table is as follows, which shows Option 2 will cost more than Option 1 and 3, if we assume the number of enrollees is similar.

TABLE 26: The magnitude of impact on total annual discount

	Total annual discount	Enrollees
	(Million dollar)	(People)
Current plan	25.9	90,000
Option 1	25.9 ~ 51.8	90,000 ~ 180,000
Option 2	54~ 108	90,000 ~ 180,000
Option 3	25.9 ~ 51.8	90,000 ~ 180,000

APPENDIX 3: Survey Questionnaire

[English]

Start of Block: Introduction Block

Introduction: On behalf of L.A. Metro, a team of graduate students at the UCLA Luskin School of Public Affairs is conducting a study on the Low-Income Fare is Easy (LIFE) Program, a reduced fare program offered by L.A. Metro. Your experiences and perspectives on the program and Metro as a whole are a valuable part of their research.

Your answers will be used exclusively for the report.

The survey has three parts and is designed to be answered within 10 minutes. Questions are singlechoice, multiple-choice, or open-ended. Randomly chosen 50 people who completed the survey will be given a \$5 Target gift card. Any question on the study or this survey can be addressed to krlee20@g.ucla. edu.

Use of Survey Data and PrivacyNone of your answers will be presented in any way that identifies you or your agency without your explicit written authorization. Aggregate survey responses may be reported in publications or presentations in aggregate form. Your contact information (email address to get a gift card) will not be shared with anyone outside of the research team. All survey data will be erased one year after the completion of this study.

SCREENER1

The table below describes the eligibility of the LIFE Program. Do you satisfy this condition?

O YES (1)

O No (2)

** This survey is targeted to people who are eligible for the program. If you do not satisfy this criteria, you may discontinue this survey. **

End of Block: Introduction Block

Start of Block: Part I: About You

1. What is your gender identity?

- O Male (1)
- O Female (2)
- Non-binary / third gender (3)

2. What is your race/ethnicity? (Please select all that apply)

- Latino (1)
- African American (2)
- White (3)
- American Indian or Alaska Native (4)
- Asian or Pacific Islander (5)
- Other (6)_____

3. What is your age?

- 0 18-24 (1)
- 0 25-34 (2)
- 0 35-49 (3)
- 0 50-64 (4)
- O 65 or more (5)

4. Do you own a car?

- \bigcirc One in the household (1)
- \bigcirc More than one in the household (2)
- O None (3)

5. How many times a week on average do you ride Metro transit? (also includes Big Blue Bus, Culver CityBus, and other public transit within L.A. County)

- O Zero (1)
- O 1~2 a week (2)
- O 3~4 a week (3)
- 5[~]6 a week (4)
- O Everyday (5)

6. If you ride less than 1[~]2 a week, why? (please select all that apply)

- I have my own car and I mostly drive. (1)
- The fare is expensive. (2)
- I cannot estimate the exact travel time. (unstable service) (3)
- I have to wait a long time. (less frequent service) (4)
- It does not go places and neighborhoods I need to go. (5)
- I don't feel safe. (6)
- Other (please specify) (7) _____
 - NA those who replied to question 6 as more than 3 times a week (8)

7. What is your primary purpose of riding L.A. Metro?

O Commute to work or school (1)

O Run errands (2)

O Leisure activities (3)

O Others (please specify) (4) _____

8. What type of fare do you usually use?

O 30-Day Pass (1)
O 7-Day Pass (2)
O Day Pass (3)
O TAP (4)
O Cash (5)
O Token (6)
O Metro Transfer (7)
O EX Transit Pass (8)
O Inter-Agency Transfer (9)
O Metrolink Transfer (10)
O OCTA Pass (11)
O Other (please specify) (12)

9. Have you heard of the LIFE program?

O Yes (1)

O No, never (2)

LIFE The LIFE program offers fare discounts to eligible people that can be applied toward the purchase of weekly and monthly transit passes on Metro and any LIFE participating transit agencies, or 20 free rides on any one of the participating transit agencies.

10. If you have heard about it, how? (Please select all that apply)

At metro's outreach events (1)
On the bus/train (2)
LA Metro's website (3)
From friends, colleagues, family (4)
Ads (5)
Community Center (6)
Social Welfare Center (7)
Other (please specify) (8)
No, I never heard about it. (9)

11. How long have you been using L.A. Metro?		
O Less than a year (1)		
O 1-2 years (2)		
O 3-4 years (3)		
O 5 + years (4)		
O Other (please specify) (5)		
12. Are you currently enrolled in any of the programs? (Please select all that apply)		
CalFresh (1)		
Foodstamp (2)		
Medi-Cal (3)		
CalWORKs (4)		
I have a case manager (5)		
Others (Please specify) (6)		
NA - I am not enrolled in any program (7)		
13. From where did you know/hear about this survey? (Please select all that apply)		
Bus Stop - Union Station (5)		
Bus Stop - K-town (6)		
LA Metro (1)		
International Institute of Los Angeles (2)		
FAME Corporations (3)		
Other (Please specify) (4)		
14. Are you currently enrolled in the program?		
O Yes (go to Part II) (1)		
O No (go to Part III) (2)		
End of Block: Part I: About You		
Start of Block: Part II: Enrolled		
1. How long have you been using this program?		
O Less than a month (1)		
\bigcirc More than a month, Less than 3 months (2)		
\bigcirc More than 3 months, Less than 6 months (3)		
\bigcirc More than 6 month, Less than a year (4)		
O More than a year (5)		
O Others (please specify) (6)		

2. Do you think this program is helpful or not helpful in reducing the financial burden?
O Definitely helpful (1)
O Somewhat helpful (2)
O Somewhat not helpful (3)
O Definitely not helpful (4)
O Others (please specify) (5)
3. If you do not think the program is helpful, why? (please select all that apply)
The discount is not enough. (1)
The eligibility is not realistic. (2)
I do not ride the Metro often. (3)
Others (please specify) (4)
NA - those who replied to question 2 as Definitely helpful or Somewhat helpful (5)
4. Do you think this program encourages people to use transit more?
O Definitely encouraging (1)
O Somewhat encouraging (2)
O Somewhat not encouraging (3)
O Definitely not encouraging (4)
O Others (please specify) (5)
5. If you do not think this program would encourage more transit use, why? (Please select all that
apply)
Because the discount is not enough. (1)
Because the cost is not the main reason why people are not using transit. (service quality matters more) (2)
Because current service lines are not covering enough places. (3)
Others (please specify) (4)
NA - those who replied to question 4 as Definitely encouraging or Somewhat encouraging (5)
End of Block: Part II: Enrolled
Start of Block: Part III: Not Enrolled
1. Are you planning to enroll in this program?
O Yes (1)
O No (2)
O I don't know (3)
O Other (please specify) (4)

2. If you are not planning to, why? (Please select all that apply)	
	I don't know enough about the program. (1)
	I don't think it would reduce the financial burden. (2)
	The application process is difficult and time-consuming. (3)
	I have a car and I don't plan to ride Metro often. (4)
	Other (please specify) (5)
	NA - those who answered Yes to question 1. (6)

3. Below are some incentives for those who newly join the program. Do you think those incentives help encourage people (including you) to enroll? (Please select all that apply)

Offers free 90-day pass for newly enrollees;

Provides online enrollment (starting Nov 1, 2021);

Will offer 50% off fares (Jan - July, 2022); etc.

	1 Yos (1)	
	I - fes (I)	
	1-No (2)	
	2 - Yes (3)	
	2 - No (4)	
	3 - Yes (5)	
	3 - No (6)	
	Other (please specify) (7)	
4. If y	ou think the incentives are not helpful, why? (please select all that apply)	
	People would not know about these incentives. (1)	
	The incentives are not enough (too small). (2)	
	The incentives are not in the form of something people would want. (3)	
	Other (please specify) (4)	
	NA - those who answered all Yes to question 3. (5)	
5. Do	you think this program is helpful in reducing your financial burden?	
O De	efinitely helpful (1)	
O Somewhat helpful (2)		
O Somewhat not helpful (3)		
ODe	O Definitely not helpful (4)	
Oot	hers (please specify) (5)	

6. lf yo	ou do not think the program is helpful, why? (please select all that apply)
	The discount is not enough. (1)
	The eligibility is not realistic. (2)
	I do not ride the Metro often. (3)
	Others (please specify) (4)
	NA - those who replied to question 5 as Definitely helpful or Somewhat helpful (5)
7. Do y	ou think this program encourages people to use transit more?
O De	finitely encouraging (1)
O So	mewhat encouraging (2)
O So	mewhat not encouraging (3)
O De	finitely not encouraging (4)
Oot	hers (please specify) (5)
8. lf yo	ou do not think this program would encourage more transit use, why? (Select all that apply)
	Because the discount is not enough. (1)
	Because the cost is not the main reason why people are not using transit. (service quality matters more) (2)
	Because current service lines are not covering enough places. (3)
	Others (please specify) (4)
	NA - those who replied to question 7 as Definitely encouraging or Somewhat encouraging (5)
End of	f Block: Part III: Not Enrolled
Start o	of Block: ENDING
Please	e fill out your email address through which you want to receive the gift card.

O Your email address to receive a gift card (1) _____

Thank you for participating in the survey. Your valuable response will be used to improve the quantity and quality of the LIFE Program.

End of Block: ENDING

[Spanish]

Start of Block: Introduction Block

En nombre de LA Metro, un equipo de estudiantes graduados de la Escuela de Asuntos Públicos Luskin de la UCLA está realizando un estudio sobre el programa "Low Income Fare is Easy" (LIFE), un programa de tarifas reducidas ofrecido por LA Metro. Sus experiencias y perspectivas sobre el programa y Metro como un todo son una parte valiosa de su investigación.

Sus respuestas serán utilizadas exclusivamente para el informe.

La encuesta consta de tres partes y está diseñada para ser respondida en 10 minutos. Las preguntas son de opción única, de opción múltiple o abiertas. Las 50 personas elegidas al azar que completaron la encuesta recibirán una tarjeta de regalo de \$5 de Target. Cualquier pregunta sobre el estudio o esta encuesta puede dirigirse a krlee20@g.ucla.edu.

Uso de los datos de la encuesta y privacidad Ninguna de sus respuestas se presentará de ninguna manera que lo identifique a usted o a su agencia sin su autorización explícita por escrito. Las respuestas agregadas de la encuesta pueden informarse en publicaciones o presentaciones en forma agregada. Su información de contacto (dirección de correo electrónico para obtener una tarjeta de regalo) no se compartirá con nadie fuera del equipo de investigación. Todos los datos de la encuesta se borrarán un año después de la finalización de este estudio.

La siguiente tabla describe la elegibilidad del Programa LIFE. ¿Cumples esta condición?

O Si (1)

O No (2)

** Esta encuesta está dirigida a personas que son elegibles para el programa. Si no cumple con este criterio, puede suspender esta encuesta. **

End of Block: Introduction Block

Start of Block: Part I: Acerca de ti

1. ¿Cuál es tu identidad de género?

- O Masculino (1)
- O Femenino (2)
- \bigcirc No binario (3)

2. ¿Cuál es su raza/etnicidad? (Por favor seleccione todas las respuestas válidas)

Latino (1)	
Afroamericano (2)	
Blanco (3)	
Indio americano o nativo de Alaska	(4)
Asiático o Isleño del Pacífico (5)	

Otro (6)_____

3. ¿Cual es tu edad?

- 0 18-24 (1)
- 0 25-34 (2)
- 0 35-49 (3)
- 0 50-64 (4)
- 0 65 + (5)

4. ¿Tienes un coche?

- O Uno en el hogar (1)
- O Más de uno en el hogar (2)
- O Ninguna (3)

5. ¿Cuántas veces a la semana en promedio viaja en Metro? (también incluye Big Blue Bus, Culver CityBus y otros medios de transporte público dentro del condado de L.A.)

- O Cero (1)
- 0 1~2 por semana (2)
- O 3[~]4 a la semana (3)
- O 5∼6 por semana (4)
- O Cotidiano (5)

6. Si montas menos de 1 o 2 veces por semana, ¿por qué? (Por favor seleccione todas las respuestas válidas)

	Tengo mi propio coche y sobre todo conduzco. (1)	
	La tarifa es cara. (2)	
	No puedo estimar el tiempo exacto de viaje. (servicio inestable) (3)	
	Tengo que esperar mucho tiempo. (servicio menos frecuente) (4)	
	No voy a los lugares y vecindarios a los que necesito ir. (5)	
	No me siento seguro. (6)	
	Otros (por favor especifique) (7)	
	NA - los que respondieron a la pregunta 5 más de 3 veces por semana (8)	
7. ¿Cuál es el propósito principal de viajar en LA Metro?		
$igodoldsymbol{O}$ Ir al trabajo o a la escuela (1)		
O Hacer recados (2)		
ΟΑ	O Actividades de ocio (3)	

O Otros (por favor especifique) (4) _____

8. ¿Qué tipo de tarifa sueles utilizar?

- O Pase de 30 días (1)
- O Pase de 7 días (2)
- O Pase diario (3)
- O TAP (4)
- \bigcirc Dinero en efectivo (5)
- O Simbólico (6)
- O Metro Transfer (7)
- O EX Transit Pass (8)
- O Transferencia interinstitucional (9)
- O Transferencia Metrolink (10)
- O Pase OCTA (11)
- Otros (especificar) (12) _____

9. ¿Has oído hablar del programa LIFE?

O Sí (1)

O No nunca (2)

LIFE El programa LIFE ofrece descuentos en tarifas a personas elegibles que se pueden aplicar a la compra de pases de transporte semanales y mensuales en Metro y cualquier agencia de transporte participante de LIFE, o 20 viajes gratis en cualquiera de las agencias de transporte participantes.

10. Si has oído hablar de él, ¿cómo? (Por favor seleccione todas las respuestas válidas)

	En los eventos de divulgación de metro (1)	
	En el autobús o tren (2)	
	Sitio de web de LA Metro (3)	
	De amigos, colegas, familia (4)	
	Anuncios (5)	
	Centros de comunidad (6)	
	Otros (por favor especifique) (7)	
	No, nunca he oído hablar de este programa (8)	
11. ¿Cuánto tiempo ha estado usando LA Metro?		
O Menos de un año (1)		
O 1-2 años (2)		
O 2-4 años (3)		
O 5+ años (4)		
O Otros (por favor especifique) (5)		

12. ¿Está inscrito actualmente en alguno de los programas? (Por favor seleccione todas las respuestas válidas)

válidas)		
Ca	alFresh (1)	
E Fo	podstamp (2)	
M	edi-Cal (3)	
Ca	alWORKs (4)	
Те	engo un administrador de casos (5)	
0	tros (por favor especifique) (6)	
	o Aplica - No estoy inscrito en ningún programa (7)	
13. ¿De (dónde supo/escuchó acerca de esta encuesta? (Por favor seleccione todas las respuestas	
válidas)		
pa	arada de autobús - Union Station (5)	
pa	arada de autobús - K-town (6)	
	A Metro (1)	
	stituto Internacional de Los Ángeles (2)	
Co	orporaciones FAME (3)	
01	tro (por favor especifique) (4)	
Está ; 14.	actualmente inscrito en el programa?	
O Sí (ir a la Parte II) (1)		
🔿 No (ir	r a la parte III) (3)	
End of B	lock: Part I: Acerca de ti	
Start of Block: Parte II: Inscritos		
1. ¿Cuán	to tiempo has estado usando este programa? (opción única)	
O Meno	os de un mes (1)	
O Más de un mes, menos de 3 meses (2)		
O Más de 3 meses, menos de 6 meses (3)		
O Más o	de 6 meses, menos de un año (4)	

- O Más de un año (5)
- O Otros (Opor favor especifique) (6)

2. ¿Cree que este programa es útil o no para reducir la carga financiera?		
O Definitivamente útil (1)		
O Algo útil (2)		
O Algo no útil (3)		
O Definitivamente no es útil (4)		
O Otros (por favor especifique) (5)		
3. Si no cree que el programa es útil, ¿por qué? (Por favor seleccione todas las respuestas válidas)		
El descuento no es suficiente. (1)		
La elegibilidad no es realista. (2)		
No viajo en el Metro a menudo. (3)		
Otros (por favor especifique) (4)		
No Aplica - aquellos que respondieron a la pregunta 2 como Definitivamente útil o Algo útil (5)		
4. ¿Crees que este programa alienta a las personas a usar más el transporte público?		
O Definitivamente alentador (1)		
O Algo alentador (2)		
O Algo no alentador (3)		
O Definitivamente no es alentador (4)		
O Otros (por favor especifique) (5)		
5. Si no cree que este programa fomentaría un mayor uso del transporte público, ¿por qué? (Por favor seleccione todas las respuestas válidas)		
Porque el descuento no es suficiente (1)		
Porque el costo no es la razón principal por la que la gente no usa el transporte público. (la calidad del servicio importa más) (2)		
Porque las líneas de servicio actuales no están cubriendo suficientes lugares. (3)		
Otros (por favor especifique) (4)		
NA - aquellos que respondieron a la pregunta 4 como Definitivamente alentador o Algo alentador(5)		
End of Block: Parte II: Inscritos		
Start of Block: Parte III: No inscritos		
1. ¿Está planeando inscribirse en este programa?		
O Si (1)		
O No (4)		
O No lo sé (2)		
O Otro (por favor especifique) (3)		

2. Si no lo planeas, ¿por qué? (Por favor seleccione todas las respuestas válidas)

- No sé lo suficiente sobre el programa. (1)
- No creo que reduzca la carga financiera. (2)
- El proceso de solicitud es difícil y requiere mucho tiempo. (3)
- Tengo un automóvil y no planeo viajar en metro a menudo. (4)
- Otros (por favor especifique) (5) ____
- No Aplica a los que respondieron Sí a la pregunta 1. (6)

3. A continuación se presentan algunos incentivos para quienes se incorporan por primera vez al programa. ¿Cree que esos incentivos ayudan a alentar a las personas (incluyéndolo a usted) a inscribirse? (Por favor seleccione todas las respuestas válidas).

Ofrece un pase gratuito de 90 días para los nuevos afiliados;

Proporciona inscripción en línea (a partir del 1 de noviembre de 2021);

Ofrecerá un 50 % de descuento en las tarifas (enero - julio de 2022); etc.

	1 - Sí (1)	
	1-No (2)	
	2 - Sí (3)	
	2 - No (4)	
	3 - Sí (5)	
	3 - No (6)	
	Otros (por favor especifique) (7)	
4. Si c	ree que los incentivos no son útiles, ¿por qué? (Por favor seleccione todas las respuestas válidas)	
	La gente no sabría acerca de estos incentivos. (1)	
	Los incentivos no son suficientes (demasiado pequeños). (2)	
	Los incentivos no tienen la forma de algo que la gente quisiera. (3)	
	Otros (por favor especifique) (4)	
	No Aplica a los que respondieron Sí a la pregunta 3. (5)	
5. ¿Cree que este programa es útil para reducir su carga financiera?		
O Definitivamente útil (1)		
O Algo útil (2)		
O Algo no útil (3)		
O Definitivamente no es útil (4)		
O Otro (por favor especifique) (5)		
6. Si no cree que el programa es útil, ¿por qué? (Por favor seleccione todas las respuestas válidas)		
--		
El descuento no es suficiente. (1)		
La elegibilidad no es realista. (2)		
No viajo en metro a menudo. (3)		
Otros (por favor especifique) (4)		
No Aplica aquellos que respondieron a la pregunta 5 como Definitivamente útil o Algo útil (5)		
7. ¿Cree que este programa alienta a las personas a usar más el transporte público?		
O Definitivamente alentador (1)		
O Algo alentador (2)		
O Algo poco alentador (3)		
\bigcirc Definitivamente no es alentador (4)		
O Otros (por favor especifique) (5)		
8. Si no cree que este programa fomentaría un mayor uso del transporte público, ¿por qué? (Seleccione		
todas las respuestas que correspondan)		
Porque el descuento no es suficiente. (1)		
Porque el costo no es la razón principal por la que la gente no usa el transporte público. (la calidad del servicio importa más) (2)		
Porque las líneas de servicio actuales no están cubriendo suficientes lugares. (3)		
Otros (por favor especifique) (4)		
No Aplica aquellos que respondieron a la pregunta 7 como Definitivamente alentador o Algo alentador (5)		
End of Block: Parte III: No inscritos		
Start of Block: ENDING		
Complete su dirección de correo electrónico a través de la cual desea recibir la tarjeta de regalo :		

O correo electrónico (1) _____

Gracias por participar en la encuesta. Su valiosa respuesta se utilizará para mejorar la cantidad y calidad del Programa LIFE.

End of Block: ENDING



UCLA Luskin School of Public Affairs