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Title

Planning Performance Indicators: Access to Opportunity

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<https://escholarship.org/uc/item/6vx6g2sb>

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Publication Date

2022-06-01

Planning Indicators:

Access to Opportunity

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June 2022



Technical Report Documentation Page

1. Report No.	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle Planning Performance Indicators: Access to Opportunity		5. Report Date 2022-06-08	
		6. Performing Organization Code UCLA-ITS	
7. Author(s) Arturo Jacobo Aurelia Mora Camacho Danielle Parnes Luis Daniel Cruz Paola Tirado Escareño Rachel Lu Zhendong Long		8. Performing Organization Report No. LA2138	
		9. Performing Organization Name and Address Institute of Transportation Studies, UCLA 3320 Public Affairs Building Los Angeles, CA 90095-1656	
12. Sponsoring Agency Name and Address UCLA Institute of Transportation Studies www.its.ucla.edu		10. Work Unit No. N/A	
		11. Contract or Grant No.	
15. Supplementary Notes DOI: doi:10.17610/T6XG7X		13. Type of Report and Period Covered Final	
		14. Sponsoring Agency Code UC ITS	
16. Abstract <p>Access to opportunity is the idea that people have the means and ability to reach a destination that would in turn benefit them in a positive manner - this can include jobs, education, healthcare, and recreation.</p> <p>The purpose of this report is to inform and advise Los Angeles Metro and their stakeholders on ways in which access to opportunity can be measured and analyzed to improve services to positively impact marginalized communities.</p> <p>The guiding research questions of this project seek to identify how Metro can effectively and practically communicate and implement future programs in Los Angeles County and how Metro programs and projects impact access to social services, economic opportunities, and mobility options for communities throughout Los Angeles County.</p>			
17. Key Words transit transit ridership mobility as a service travel behavior program evaluation equity social justice Los Angeles equity analysis transit ridership commute travel		18. Distribution Statement No restrictions.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 46	22. Price N/A

PLANNING INDICATORS: ACCESS TO OPPORTUNITY

UCLA COMPREHENSIVE PROJECT, 2022



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ACKNOWLEDGMENTS:

This report was prepared in fulfillment of the requirements for the degree of Master of Urban and Regional Planning in the Department of Urban Planning at the University of California, Los Angeles. The planning client was Los Angeles County Metropolitan Transportation Authority (LA Metro). The views expressed herein are those of the authors and do not necessarily reflect those of the Department; the University of California, Los Angeles Luskin School of Public Affairs; the University of California, Los Angeles as a whole; or the client.

We would like to thank: Juan Matute, whose guidance throughout the project was invaluable; LA Metro’s Office of Extraordinary Innovation, and especially Emma Huang and Ryan Wiggins who provided regular and vital transportation expertise; and all of the community organizations and agencies that provided valuable insight.

The Institute of Transportation Studies at UCLA acknowledges the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (the Los Angeles basin and So. Channel Islands). As a land grant institution, we pay our respects to the Honuukvetam (Ancestors), ‘Ahihirom (Elders) and ‘Eyoohiinkem (our relatives/relations) past, present and emerging.



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EXECUTIVE SUMMARY

INTRODUCTION

Access to opportunity is the idea that people have the means and ability to reach a destination that would in turn benefit them in a positive manner - this can include jobs, education, healthcare, and recreation.

The purpose of this report is to inform and advise Los Angeles Metro and their stakeholders on ways in which access to opportunity can be measured and analyzed to improve services to positively impact marginalized communities

The guiding research questions of this project seek to identify how Metro can effectively and practically communicate and implement future programs in Los Angeles County and how Metro programs and projects impact access to social services, economic opportunities, and mobility options for communities throughout Los Angeles County.

METHODS

First, we reviewed existing literature to detail our initial approach towards understanding how access to opportunity is currently measured and defined by researchers and public agencies, and what metrics exist and are used to measure access. During our literature review process, we reviewed several academic journals and reports, city-and-state level transportation plans, and reports published by public agencies.

During this first phase of the project, we also reached out and interviewed public stakeholders, including two transportation agency employees and eight community based organizations and mobility advocates. We sought to incorporate feedback and insights that were shared with us throughout our outreach and engagement processes to help us develop recommendations that are grounded in community priorities.

We then analyzed and synthesized the key takeaways from our previous key research sections, which include similarities and differences, key opportunities and constraints, and implications of our literature review and engagement outcomes.

Lastly, we listed our proposed recommendations and their relevance to our project goals, Metro's priorities, and the key themes identified throughout the report.

Throughout the steps outlined above we met with our client at Metro's Office of Extraordinary Innovation bi-weekly to get their feedback on the direction regularly, and particularly help us understand some of the on the ground limitations and opportunities related to our recommendations.



KEY TAKEAWAYS

LITERATURE REVIEW

Our review of literature highlighted four key themes:

- **Access to what and for who:** Much of the research and plans we reviewed focused on general access to destinations, while in contrast, more recent efforts focus on more specifically analyzing who has access.

- **Data:** Key takeaways related to data revealed the importance of collecting demographic data and disaggregating it and identifying the limitations of existing data and modeling tools, the limitations of quantitative data alone, and the importance of complementary qualitative data.
- **Importance of mode in determining access:** Which modes of transit individuals have access to plays a critical role in what destinations are easily accessible. Low income, people of color, elderly and youth often have less access to cars. It is therefore critical that models of analysis thoughtfully include particular modes of transportation.
- **Land Use:** Impact of land use in terms of where jobs and services are located, where people are able to live, and developing a broader understanding of Metro's authority and the ability to influence these things beyond transportation.

COMMUNITY INTERVIEWS

Our analysis of qualitative data highlighted five community priorities related to access to opportunity indicators.

- **Transit quality:** Half of all interview participants identified transit quality (frequency, reliability, and span) as important components of access to opportunity.
- **Destinations beyond jobs:** Six out of ten interview participants identified a need to consider access to destinations beyond jobs when developing access to opportunity indicators. The results of our interviews indicate that an exclusive focus on job access disregards the spectrum of reasons people need to travel.
- **Safety and policing:** Almost all interview participants discussed the relationship between safety—particularly as it relates to policing—and access to opportunities. Encounters with police can be not only dangerous to transit riders, but they also hinder access to opportunity by delaying travel time and reducing feelings of safety. At the same time, how data is collected for a metric around safety is important. Interview participants warned that evaluation methods may bias results towards one solution or another. An evaluation process that assesses perceptions of safety should include both quantitative and qualitative data and prioritize input from Metro transit riders that are in the most vulnerable groups.
- **Affordability:** Two aspects of affordability emerged as community priorities. The first is housing affordability and displacement. The second is fare free transit.
 - **Housing Affordability and Displacement:** People that are no longer able to live in high-opportunity areas (areas with plenty of jobs, transit service, healthcare, schools, and other essential resources), are often displaced into low opportunity areas where access to opportunity is hampered by distance, travel time, and cost.
 - **Fare Free Transit:** Financial costs and fare structures are important considerations to access opportunities for community organizations. Low or free fares increase access to opportunity for youth and low-income riders. Fare free transit both reduces financial burden and reduces policing and interactions with police that make transit less safe, which is particularly important for Black riders.
- **Micro Mobility and Car-share:** Metro should consider indicators that assess the extent to which micro mobility and car-share facilitate access to opportunities. One interview participant emphasized that support services like Metro Micro can fill the access gaps that transit is not able to address. For instance, large grocery trips may be better suited for cars than the bus.

KEY OPPORTUNITIES

Through our literature review and interviews with stakeholders, we identified three potential opportunities to improve access to opportunities: specify goals for targeted riders, complete data types and details, and explore innovative data collection methods.

- Specifically, Metro currently focuses on network-level goals (e.g., reducing travel times) and fails to address specific needs on a human scale. **Customizing goals based on individuals' needs and problems** (e.g., reducing travel times for single mothers) can provide more effective and efficient outcomes.

- In addition, current data is mainly in the form of quantitative numbers (e.g., crime rate) and lacks deep understanding at the human scale. **Disaggregating existing and future data by demographics and incorporating non-numerical data** (i.e., qualitative data) in the data collection and analysis will lead to a better understanding of riders and their needs.
- Lastly, current data collection is, as many interviewees mentioned, relatively singular. More **innovative survey approaches** such as pop-up survey stations around transit stops or an expanded opportunity for the community members to be part of the decision-making process help bring a more direct and broader understanding.

KEY CONSTRAINTS

We identified five key constraints throughout our literature review, interviews, and discussions with our client that have informed our recommendations.

- The first constraint we identified is the **limitation and lack of data** in quantifying access to opportunity, especially for specific demographics of riders whom Metro has historically overlooked as a data collector.
- **Community trust and engagement** is the second constraint we identified from our interviews and are closely related to the limitations of finding and using data to quantify access to opportunity for marginalized populations. Historically, the relationship between Metro, transit riders, and communities of color has been marked by distrust because of harm inflicted on these communities by Metro policies and projects. In moving forward to improve access to opportunity, it's important that Metro continue its efforts to repair historic inequities and harm.
- **Time and resources** present an additional constraint given that data collection, modeling and analysis, outreach, and decision making are all critical steps in improving access to opportunity that require time and capital. Thus, our recommendations reflect these constraints and focus on what we have identified as top priorities for the agency.
- **A lack of political representation of transit riders** in local politics and among Metro's decision making bodies is a fourth constraint we identified through interviews. Transit riders have limited avenues to advocate for and implement changes that would improve their travel experience.
- Lastly, Metro is **limited in what it can and cannot control**. While land use, housing, and workforce and economic development influence access to opportunity, Metro does not have direct jurisdiction over these matters in most cases. Thus, our recommendations reflect what Metro can do with its direct authority.

RECOMMENDATIONS

Based on the previous analysis, we developed eight specific metric recommendations and three best practices. Our recommendations first look at who we're trying to improve access for, the importance of safety and perception, and then recommendations around key destinations and key barriers. Our best practices are focused on overall strategies that will help to move forward in the identified metrics.

RECOMMENDED METRICS

1. Service satisfaction of 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary, and gender non-conforming individuals.

We recommend that Metro measure the overall satisfaction with Metro service of 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary and gender non-conforming individuals. For each of these groups, we recommend further disaggregating by race and ethnicity to compare the riders of color and white riders. With limited resources, it is critical to focus efforts on communities that face the highest transportation barriers to accessing opportunities and those most reliant on public transit. These metrics can be easily integrated into the customer experience survey by adding or adapting existing questions, and by disaggregating data currently collected. This satisfaction measurement is meant to act as an overall baseline measurement to track year over year. The indicators that follow, #2-7, are informed by our focus on these populations, and provide a more in depth and nuanced understanding of why a group may be satisfied or dissatisfied with Metro service.

2. Monitoring Safety Experiences for Transit Users

Discrimination based on race, gender expression, and the presence of armed policing can create friction and harmful experiences for transit riders. A friction makes it more physically or emotionally difficult to use transit, inhibiting ridership and/or reducing comfort. The 2022 Draft Customer Experience Plan includes a series of safety measures under its Safety Action Plan that incorporates safety ambassadors, homeless outreach workers, and clinicians. The following metrics can help Metro measure the effectiveness of the proposed safety interventions in the 2022 Draft Customer Experience Plan while helping build an inventory of publicly available data that Metro and transit advocates can use to strengthen programs and projects over time. To cohesively measure safety and the impacts of the Safety Action Plan, we recommend Metro conducts a comprehensive analysis of the experiences of the demographic subgroups highlighted in Metric 1: 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary, and gender non-conforming individuals.

2A. Discrimination/safety/harm/friction

We recommend that Metro incorporate improvements that include changes in policing to reduce racial profiling, bias, and unnecessary escalated violence. These interactions create friction for Black, Latinx, unhoused, and youth. Considering that fare evasion citations are an interaction that leads to friction, we recommend incorporating an empirical metric that can measure the percentage of youth transit riders enrolled in the Fare-less System Initiative Program and the percentage of transit riders using the Low-Income Fare is Easy (LIFE) discounted program. Considering that both programs have developed low-barrier to entry and expanded eligibility, understanding the percentage of riders currently using the program can help determine if there is under-enrollment. Furthermore, Metro should aim to understand the percentage of cited riders (youth and adults) who qualify for these programs and implement a better outreach campaign through partnerships with Community-Based Organizations, specially those working towards fare-less transit campaigns. In addition, our team also recommends that Metro implements safety metrics involving the percentage of interactions with armed police through the empirical metrics developed by the Non-Auto Mobility group.

2B. Measure physical ease of travel for historically overlooked subgroups

We recommend that Metro measure physical ease of travel by tracking historically overlooked riders' satisfaction with Metro's services by adequately sampling and breaking out results of specific subgroups in the agency's customer survey approach. This can be done through targeted outreach to marginalized subgroups of riders. In addition to the annual customer survey, we recommend that Metro conduct focus groups with seniors, riders with disabilities and limited mobility, youth, and caregivers traveling with wheeled devices to better understand their distinct travel needs, identify their pain points, and measure their satisfaction with Metro's services. The agency should also continue to address the pain points vocalized from riders in the all-passenger customer survey through service improvements as well as improve infrastructure at transit stops to expand accessibility.

2C. Perception of Safety

We recommend that Metro conducts targeted outreach to focus groups through partnerships with Community-Based Organizations to understand the percentage of 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary, and gender non-conforming individuals who report feeling safe on transit. Focus groups should begin after the implementation of Safety Action Plan measures. In addition, focus groups will serve as an opportunity for Metro to understand the unique experiences of these groups, who have historically been underrepresented and face the highest safety concerns. This metric will measure how Metro is experienced by these vulnerable groups over time.

3. Perception of travel time and reliability

Various experiences contribute to negative perceptions about public transit. Such as late, missing, and skipping buses. Travel time considers that buses get caught up in automobile traffic and gridlock in the absence of designated bus lanes. These inconsistencies present a challenge for individuals' dependence on public transportation to access a myriad of destinations, including health care, education, and jobs.

Using Koopmans' General Travel Cost indicator, Metro can consider travel time and reliability while incorporating the financial cost of a trip for customers. The indicator uses a calculated average cost per mile of trips considering the transport mode, trip purpose, distance, region, and time of day.

Metro already implements a Customer Experience Survey and can benefit from analyzing riders' experience specific to a bus or rail line. By measuring the changes in GTC and implementing mitigation strategies, transit agencies can work to fill the gap and address consumers' needs and concerns more effectively.

4. Segment Job Access Indicator by Job Type and Income

Key Metrics:

- Number of low wage jobs within a 30 minute travel time of low-income households
- Number of retail, food service, and industrial jobs within a 30 minute travel time of low-income households

We recommend that Metro develop access to jobs indicators that disaggregate data based on both worker and job characteristics. The typical access to employment metric is measured as the aggregate of all jobs that can be reached within a certain time frame. However, aggregating all jobs ignores whether a job type and worker characteristics are realistically matched and inflates the opportunities that can be reached by marginalized residents. Segmentation by job type and socio-economic characteristics leads to increased accuracy in measuring job accessibility.

There are two methods Metro can use to segment job types. The first is measuring the number of low wage jobs within a certain travel time of low-income workers. This is the approach taken by the Atlanta Regional Commission in their transportation plan. Another method is to segment jobs by industry. We recommend measuring the number of retail, service (particularly food service), and industrial jobs within thirty minutes of low-income workers. The Boston Region MPO takes this second approach. To implement either indicator, Metro can work with the California Employment Development Department (EDD) to develop a custom dataset that includes disaggregated job type and income information for Los Angeles County.

5. Access to healthcare, grocery stores, schools

Key Metrics:

- Accessibility of healthcare facilities within 30 minutes by transit in Equity Focused Communities
- Accessibility of grocery stores within 30 minutes by transit in Equity Focused Communities
- Accessibility of schools within 30 minutes by transit in Equity Focused Communities

We recommend that Metro measure the accessibility of healthcare facilities, grocery stores, and schools accessible within 30 minutes by transit at all times of day for residents in Equity Focused Communities (EFCs). We recommend using a score based on the number of healthcare, grocery, and education jobs accessible within a 30 minute transit ride as a proxy for these locations, since job data is much more readily available.

This metric is important because our research, particularly the community engagement, revealed the importance of meeting the needs of a person as a whole, not just their ability to work. Further, we found that there are disproportionate and compounding barriers for people of color, low income, youth, and elderly populations to access these critical destinations.

6. Community Vulnerability metrics

We recommend that Metro measure Displacement Risk and Resiliency to Displacement as part of evaluation for their future construction of new transportation projects and the updates of existing services and routes. Specifically, Metro should adopt and expand the existing "Los Angeles Index of Displacement Pressure" used by the City of Los Angeles. This data assessment framework focuses on the census tracts where 40% of households' incomes are lower the city's median income and incorporate four major elements: transportation investment (distance to current and future rail stations); proximity to rapidly changing neighborhoods; housing market (housing prices change); displacement pressure factors (the percentage of renters, the percentage of households that are extremely rent burdened). Metro should expand this framework to the county level and establish an ongoing and permanent program to monitor the data

changes. This would be in addition to existing TOC efforts to measure how resilient communities are to displacement by the number of affordable housing units in each area.

BEST PRACTICES

In this section, we sought to highlight specific factors that we found were relevant to each of our recommendations. Throughout the research and engagement processes, we found that issues of safety, data collection, and community representation and engagement were key aspects in the development of existing metrics, as well as the development of our own proposed metrics, related to measuring and enhancing access to opportunity for historically disadvantaged and marginalized communities throughout Los Angeles County.

Safety

As noted above and throughout our report, safety and approaches to safety is a nuanced issue that requires intentional community engagement, communication, and evaluation to support the development of comprehensive and equitable alternatives to policing and the identification of areas for pedestrian-and-street infrastructure investments. Our recommended approaches to surveying and addressing safety needs and concerns can be supported by improved data transparency and broadened community engagement and representation efforts, as briefly mentioned below and further detailed in our Recommendations section.

Data

Data transparency and accessibility continuously came up in our conversations with public stakeholders as a recommendation for what they felt public agencies like Metro can improve to build trust with community partners and to provide timely information to better inform community education efforts. We recommend that Metro should regularly evaluate program/project indicators and provide publicly available progress evaluations through existing Metro webpages or the development of a public portal.

Representation & Engagement

Effective communication, outreach, and community education efforts is a recommendation that arose during several of our interviews with public stakeholders and is key to building trust between the agency and community members. To ensure that community members are aware of and engaged in the development and implementation of transit-related resources and projects, we recommend that transportation agencies use multiple strategies and mediums to communicate program information to the public, including, cultivating relationships with local CBOs to serve as primary outreach coordinators and intermediaries between Metro and community members and residents.

CONCLUSION

Through this project, we intend to provide a broad overview of existing research and implementation efforts to measure and increase access to opportunity for historically underrepresented and socioeconomically marginalized community members. While our recommendations sought to be more directly applicable to Metro's current and future projects, specifically their Traffic Reduction Study, we believe that these approaches can also be of use in broader Los Angeles County planning efforts. Our research has stressed the ways in which access and perceptions of access and accessibility are subjective and change according to the needs and experiences of specific demographic groups. Metro's recent efforts to more accurately measure transit service impacts and benefits for their key rider demographics are a step in the right direction. By developing our recommendations centered around the needs of vulnerable and marginalized demographics, we hoped to capture current levels of service and access and propose actions that can be implemented into Metro's current administrative operations, transit services, and project designs.

INTRODUCTION

PROJECT BACKGROUND

Our Comprehensive Project Capstone client is the Los Angeles Metropolitan Transportation Authority's (Metro) Office of Extraordinary Innovation (OEI). Through this project, and with our support, OEI hoped to better understand how to measure and identify appropriate access indicators to inform their transportation planning and decision-making processes. For the purposes of this project, OEI advised our team to identify access to opportunity indicators that could be easily applied to the wide breadth of their project portfolio, specifically, OEI's ongoing Traffic Reduction Study. In this project we are focused on accessibility-based measures, looking at the outcomes of transportation efforts (outcomes-focused), instead of mobility-based measures that focus on measuring characteristics about the actual means of travel (means-focused). While outcome-focused metrics are more challenging to use in practice and, therefore, underutilized, they are critical in ensuring that transportation improvements are actually resulting in the desired outcomes.

TEAM ORGANIZATION

With the guidance of Luskin Lecturer and UCLA's Institute of Transportation Studies (ITS) Deputy Director, Juan Matute, our team established a project timeline to outline our project deliverables, help us identify our research priorities, and maintain communication with our client. This project timeline was executed during the Winter and Spring quarters of the 2021-2022 academic year.

CLIENT

For the purposes of this project, OEI hoped to identify indicators to measure access to opportunities across their project portfolio. Our project builds on OEI's work, particularly current projects such as the Traffic Reduction Study which looks at the feasibility of congestion pricing in Los Angeles County. The key goals for our project were to produce recommendations that emphasized equitable outcomes, and would ultimately be practically applicable to the Traffic Reduction Study; this meant the recommendations around access indicators considered the type of data and information that is available to OEI. This required understanding what type of data OEI has and what they can realistically incorporate. In order to meet this goal, our team analyzed existing studies and plans within Metro such as Metro's Vision 2028 Strategic Plan, Understanding How Women Travel report, 2022 Customer Experience Plan, Transit-Oriented Communities (TOC) Implementation Plan, and the First/ Last Mile plans.

TEAM GOALS

Part of our project goals included researching the role of planning indicators in decision-making and planning processes related to access to opportunities in Los Angeles County. Through our research processes, we also sought to identify opportunities for the greater community and public stakeholder participation and inclusion in Metro's planning processes.

RESEARCH METHODOLOGY AND REPORT STRUCTURE

This report is organized into four key sections, including, Literature Review, Engagement, Analysis, and Recommendations.

The **Literature and Plans Review** section details our initial approach towards understanding how access to opportunity is currently measured and defined by researchers and public agencies, and what metrics exist and are used to measure access. During our literature review process, we reviewed several academic journals and reports, city-and-state level transportation plans, and reports published by public agencies.

The **Engagement** section breaks down our outreach process and objectives in reaching out to community based organizations, mobility advocates, and public agency representatives. Through our outreach and engagement processes, we sought to incorporate the feedback and insights that were shared with us to help us develop recommendations that are grounded in community priorities.

The **Analysis** section of this report names the key takeaways, similarities, differences, and implications of our literature review and engagement outcomes.

The **Recommendations** section lists our proposed recommendations and their relevancy to our project goals, Metro's priorities, and the key themes identified throughout the report.



Source: LA Metro

LITERATURE AND PLAN REVIEW

FINDINGS FROM LITERATURE AND PLAN REVIEW

Below is a summary of key findings from our Literature and Plan Review. The full literature and plan review can be found in Appendix A.

STATE OF INDICATOR AND TOOLS BEST PRACTICES

While exploring the extensive body of literature regarding the current state of indicators in relation to the concept of access to opportunities, the literature provided a thorough understanding of the lack of accessibility indicators. Through our analysis, we conclude that accessibility indicators should have the capacity to comprehensively capture, measure, and direct transportation planning practices encompassing the equity aspect of accessibility to opportunities. Concurrently, the literature notes an emphasis on the application of both spatial and temporal measurements to accessibility while often overlooking experiences of transit riders and the decision making processes influencing the manner through which they access certain opportunities.

Access to what?

When looking at access to opportunity through the lens of access to specific destinations, we found that while job access is a commonly used metric, both for its importance and for relative ease of access of information, more nuanced measures beyond distance to job centers is required in order to accurately understand job access for the heterogeneous nature of populations. For example, what mode of transportation they have access to or their level of education will also impact their access to jobs. Similarly to jobs, research about evaluating park accessibility reveals that it is difficult to measure by just one metric, and instead consideration of things like transportation mode, as well as things like gendered and racialized barriers to access is critical. School access, while also highly dependent on distance, transportation mode, and economic status, has additional complications relating to perceptions around youth safety, school schedules, childcare, and school choice factors that impact distance. The research related to healthcare access revealed similar trends about the importance of both distance and mode, but presents itself with particular importance because of the vast disproportionate barriers historically disenfranchised groups face, and because of the compounding negative health impacts of facing transportation barriers to necessary appointments.

Overall, when focusing on access to specific destinations, most research points to the complexity of evaluating this given so many compounding factors, the importance of accounting for a variety of modes, and an understanding of

social, economic, and demographic factors that may need to be considered in order to be able to disaggregate the impact or access provided for particular communities.

Access for who?

When looking at literature that focuses on who has access to opportunity, the impact of both historic disinvestment in both transportation, racialized land use/location barriers, and access to wealth all continue to play a strong role in access to opportunity today. We see that taking a more people centric approach reveals vast disparities in access to specific destinations based on things like race, gender, and age, and that a nuanced approach that includes the role of perception is important.

Current state of access to opportunity in planning practice

When looking at metropolitan transportation plans and reports, we found that transportation agencies use location-based measures to assess accessibility. We also found that many agencies use the terms 'access' and 'accessibility' vaguely when discussing their visions, goals, and objectives for their regions but do not take further steps to define and measure access and accessibility. The literature notes that when access is measured by mode, researchers found that the utility provided by each mode differs by one's income level. Similarly to measures by mode, when measuring access to jobs, we must consider income as well as job type to get a more holistic view of where people are traveling.

The financial cost of transportation is an indicator that is widely underused by agencies, while travel time is used commonly although it is more reflective of mobility rather than access. Mobility and access are frequently conflated in transportation plans and although mobility is an element of access, increased mobility does not signify increased access. Out of the plans that we reviewed, employment accessibility, person delay per capita, distance from fixed guideway transit, and travel time were common indicators used to measure access.

In practice, agencies are focusing their efforts on increasing the supply of housing in close proximity to quality public transportation and active transportation facilities. Improving intra-urban connectivity through a more integrated network is another area of accessibility in practice. By viewing the transportation system as one large network composed of multiple modes, planners can implement strategies to integrate different modes at different spatial scales.

Lastly, we found that transportation plans do not go into depth about the access challenges and barriers that underserved and historically excluded populations face. Such barriers further reinforce the inequities in our transit systems while placing constraints on mobility and opportunity for many.

Accessibility Indicator Tools (AITs)

Accessibility indicator tools (AITs) are computer models that help planners make informed decisions regarding issues of accessibility and equity. They assist planners with regulatory compliances and requirements, grant applications, decision making, and visualizing data by providing data from various sources including the US Census, the General Transit Feed Specification

(GTFS), and the Census Transportation Planning Products Program (CTPP). AITs can be accessed through private firms, research centers and organizations, and transportation agencies and are usually tailored to the specific needs of the user. In practice, AITs provide planners with data that help them better understand accessibility through metrics and indicators. AITs consider transportation mode, trip destination, and users to assess accessibility within the respective geographic context that planners are working in. These tools are informative resources that assess the effectiveness of transportation systems by considering outcomes produced by land use and transportation and can help the access to opportunities team's evaluation of what accessibility means and looks like in Los Angeles County.

THEMES AND IMPLICATIONS

What this means moving forward for our project, defining our scope, key themes we learned:

Destination versus people approach

In looking at the literature through both a destination and people approach, we noticed that while interrelated, it is important to acknowledge that each approach has distinct strengths and weaknesses influencing the capacity of analysis. When trying to understand access to a destination, the approaches tend to focus on spatially where the destinations are located relative to transportation networks. When analyzing access to opportunities through a more people-first perspective, themes of unique and particular experiences come about depending on the demographic being analyzed. This is a crucial element of analysis since people are not able to be divorced from their personal identities and the various facets that contribute to that composition. In a highly racialized society interactions between people, and between people and places are highly related to the perceptions they have of themselves and the perceptions others have of them. The historical context of racism, classism, and sexism within US society generally, and within land use and transportation more specifically, further contributes to the need to analyze access to opportunities with a nuanced understanding. Overall, simply looking at destinations or particular demographics will not provide a complete picture of access to opportunity.

Importance of mode in determining access

Another theme that was recurrent throughout the literature was transportation vulnerability (Patel et al., 2020) which denotes one's lack of access to transportation. Transportation vulnerability has a profound impact on quality of life as it affects an individual's social life, educational outcomes, finances, and health. Specific populations of people disproportionately experience transportation vulnerabilities because of income, age, gender identity, documentation status, and physical ability. As we move forward with our project, we find it important to focus on populations who experience greater access barriers with transportation modes.

Limited mobility: Improving public transportation and micro mobility options can expand access for those who may not be able to drive because of mobility disabilities, blindness or low vision, speech or communication disabilities, psychiatric disabilities or chronic health conditions. People with limited mobility

and physical disabilities have reported experiencing challenges on transit systems, so we must think about how we can provide alternative services like micro mobility as well as retrofit existing transit to make it more accessible.

Income, Race, and Gender: Households without the financial resources to purchase or maintain a car rely on public transportation. We'd like to further engage with how active transportation and micro mobility can serve as affordable primary modes of transit or improve first/last mile connections to transit. Literature from LADOT and LA Metro highlighted important intersections between income, race, and gender, specifically that women experience disproportionate financial burdens from transportation and use active transportation less than men. LADOT found that BIPOC women also experience additional transportation barriers due to historic disinvestment from BIPOC communities and economic disenfranchisement (Changing Lanes: A Gender Equity Transportation Study, n.d.). Transgender and gender nonconforming people experience gender based harassment and discrimination on transit and public spaces, thus agencies need to identify strategies to combat transphobia. We must further consider how to address the financial burdens, racialization, and violent gendering of transportation spaces regardless of mode.

Immigration status: The literature noted that many migrants living in large urban areas have less access to vehicles because of financial constraints and less access to driver's licenses because of documentation status. Furthermore, many individuals prefer not to drive to limit interactions with law enforcement. Other literature found that carpooling is a common form of transportation used within migrant worker communities because it is a more cost effective way to access destinations.

Land Use

Land use laws and zoning regulations are an essential component to understanding access to opportunities for communities across Los Angeles County. Land use is defined as the "general location and density of housing, business, industry, open space, public buildings... and other facilities within a community" (Strategic Opportunities to Create a Healthy, Equitable Land Use System in Los Angeles, n.d). Land use is a critical component to determining one's access and proximity to housing, jobs, schools, parks, and social services. Inadequate and inequitable land use decisions perpetuate inequities in access and mobility. Much of the research we reviewed pointed out how differences in density and destinations within neighborhoods impact access to opportunity for community members. Historically underfunded and under-resourced communities are disproportionately impacted by land use decisions, often resulting in inadequate access to basic needs services and resources, poor air/environmental quality, and limited mobility options. In their report, the Healthy, Equitable, Active Land Use (HEALU) network details the impacts of not engaging community members and those with lived experiences in navigating Los Angeles' landscape in land use and development processes. (Strategic Opportunities to Create a Healthy, Equitable Land Use System in Los Angeles, n.d). As it relates to our research, land use intersects with and shapes community access to jobs, transportation, and other health-promoting resources.

Data

Another key theme identified throughout our literature review was the importance of data, including these key points:

Importance of collecting demographic data and disaggregating data: We found that while transportation barriers to accessing destination in many cases disproportionately fell on populations based on demographics like race, gender, age, or income, when data is collected by transit agencies the associated demographic data is not always also collected. In cases where it is also collected, it is not always analyzed in a disaggregated way. Because it is well established that transportation barriers disproportionately impact different demographics, disaggregating the data provides a much more accurate picture of access.

Limitations to existing data and tools: Agencies often rely on what's available to lead decision making rather than ask what data they need to answer desired questions. Even if access is defined and goals are set, there are often limitations in both the data already available to the agency and the tools used to measure and model impact over time.

Qualitative vs quantitative data collection: Reviewing studies that took both quantitative and qualitative approaches, revealed differences in findings between more quantitative metrics like multiple choice surveys in comparison to more qualitative tools like focus groups. For example, when looking at how women would feel safer on transit, surveys pointed to increased security presence, but focus groups provided more nuanced insight into the limitations and cautions around increased policing. It is therefore critical to think through what level of nuance and context our recommended metrics are able to provide, and to be realistic about the meaning of the findings.

Safety

Considerations regarding safety as it relates to accessing opportunities was present within the literature. Our review of the available research and transportation plans noted the ways in which particular demographics have significant distinct concerns regarding the issue of safety. For example, the Metro "How Women Travel Report" highlights the various safety concerns women experience and consider when traveling such that only 20% of female riders feel safe commuting at night, with an even smaller portion of that feeling safe waiting at stops and stations (Understanding How Women Travel, 2019). Immigrants also consider safety in terms of traveling in ways that limit the experience of discrimination on public transportation (Chatman & Klein, 2009). Although these are only two instances, it is imperative that safety be at the forefront of advancing access to opportunities for the most vulnerable populations.

Perception

The notion of perception as it relates to accessing opportunities and deciding what transportation mechanism to use came about early on in the literature review. In this regard, the perception of how users might experience transportation to certain destinations influenced their decision of traveling using a certain type of mode. Although considerations do occur at a very personal level, it is important to understand how those decisions and perceptions are formulated in the context of the consumer experience. One of the most prominent issues within perception was the disconnect between the services being offered by transit providers and the consistency and frequency that riders perceived to be able to access (Pot et al, 2021).

ENGAGEMENT

RESEARCH QUESTIONS

We conducted ten interviews with eight community organizations and two transit agencies. Our research was guided by the following questions:

1. What access to opportunity indicator recommendations do interview participants have for Metro?
2. What challenges/barriers to access to opportunity indicators exist?
3. How can Metro communicate indicators/data in a more easily understandable way?
4. How can Metro better understand community needs and improve participation from residents and community organizations in indicator development?

METHODOLOGY

Our outreach and engagement process began by first identifying community-based organizations (CBOs) and public agencies whose work is centered around access to opportunity, equity in transportation, and mobility justice. Through initial email outreach, we identified individuals from our selected organizations who we believed were versed in transportation advocacy and community engagement. By first providing a project one-pager that detailed the scope of our project, the purpose of the interviews, and the project deliverables, we sought to gauge stakeholder interest in participating in our interview process.

We then developed two lists consisting of twelve interview questions each that would guide our conversations with CBOs and public agencies. Our list of questions for our conversations with CBOs were written to capture their assessment of current planning indicators that relate to the way community access and accessibility are measured. By asking CBOs about their work, the communities they engage with, and their opinion on the most pressing needs in regard to accessibility, we were able to identify key demographics and access barriers being prioritized by CBOs throughout Los Angeles County, which also informed our own project scope and our recommendations.

For our engagement with public agencies, our questions were more tailored for them to share any work their agencies are already doing around measuring and capturing access to opportunity indicators, if any.

Key questions that shaped our analysis include:

- What do you think are the key interventions that transit agencies can implement to increase access to the opportunities or destinations you just identified?
- Are there burdens or challenges associated with travel that you think are important to address in order to increase access to opportunity?
- What metrics do you think are missing from the conversation right now that should be considered?
- Are there burdens or challenges associated with travel that you think are important to address in order to increase access to opportunity?
- Are there particular groups or demographics you think should be prioritized in developing metrics for access to opportunity?

To allow for flexibility and ease in scheduling as we continued hybrid and remote work and learning, all interviews were held over Zoom. Prior to beginning each interview, we asked for permission to record and participant preference around anonymity.

To better organize ourselves internally, we assigned two people per each organization we were able to confirm an interview for. The pairs of team members would then organize the list of prepared interview questions according to who would lead the facilitation of the conversation and who would transcribe. These questions would then be shared with all participants 2-3 days prior to the interview itself.

Organizations Interviewed

Community-based Organizations

- Abundant Housing LA
- Los Angeles Walks
- Move LA
- People for Mobility Justice
- Slate-Z
- The Untokening
- Advocacy organization that elected confidentiality

Public Agencies

- Bay Area MTC
- Public transit agency that elected confidentiality

DISCUSSION

The discussion section is organized and synthesized by the four guiding questions in our report.

GUIDING QUESTION 1: INDICATOR RECOMMENDATIONS

“What access to opportunity indicator recommendations do interview participants have for Metro?”

1. **Transit quality.** Half of all interview participants identified transit quality (frequency, reliability, and span) as important components of access to opportunity. Our research highlighted the importance of indicators related to transit quality, such as transit frequency, reliability, and span. Interview participants focused on the importance of transit quality in retaining current riders and two participants emphasized that Metro should focus quality improvements on existing riders.
2. **Destinations beyond jobs.** Six out of ten interview participants identified a need to consider access to destinations beyond jobs when developing access to opportunity indicators. One interview participant shared that grocery store access is particularly important, while another identified access to affordable housing in high opportunity areas—areas with quality mobility options, economic opportunity, recreation, and more—as integral to ensuring access to opportunity. Faith-based organizations, recreation activities, and destinations related to errands were also identified as important. Taken together, the results of our interviews indicate that an exclusive focus on jobs disregards the spectrum of reasons people need to travel.

“It’s not just about someone’s ability to get to work, we are whole people we are more than just the jobs we show up to.” - Lena, People for Mobility Justice

**“IT’S NOT JUST ABOUT SOMEONE’S ABILITY TO GET TO WORK, WE ARE WHOLE PEOPLE WE ARE MORE THAN JUST THE JOBS WE SHOW UP TO.”
- LENA, PEOPLE FOR MOBILITY JUSTICE**

“SOMETIMES WE THINK OF TRANSIT FARES FROM A BUDGETARY PERSPECTIVE BUT THERE’S A SAFETY PERSPECTIVE TOO: WE SHOULDN’T CREATE UNNECESSARY INTERACTIONS WITH THE POLICE FOR VULNERABLE GROUPS.”
- DAVID BARBOZA, ABUNDANT HOUSING LA

3. **Safety and policing.** Almost all interview participants discussed the relationship between safety—particularly as it relates to policing—and access to opportunities. One interview participant noted that Metro disproportionately cites Black riders, with Black riders making up over 50% of all citation recipients. Encounters with police can be not only dangerous to transit riders, but they also hinder access to opportunity by delaying travel time and reducing feelings of safety.

At the same time, how data is collected for a metric around safety is important. One interview participant shared that they conducted targeted outreach to women, immigrant, and disabled transit riders to evaluate perceptions of safety and possible solutions. Their research found that these groups would feel safer on transit with an increased presence of Metro staff rather than police. However, the results of this smaller, targeted study were obscured by a larger survey conducted by another consulting firm that did not conduct targeted outreach. This larger study included results from people who did not ride transit and concluded that people would feel safer with greater police presence. Clearly, the evaluation method may bias results towards one solution or another. An evaluation process that assesses perceptions of safety should be targeted to existing Metro transit riders that are in the most vulnerable groups.

“It’s important to think about how systemic racism impacts people using transit, in particular the issue of policing. Fare enforcement can be an occasion for people of color to interact with the police which can be dangerous for them especially as it relates to police and harassment of people of color. Sometimes we think of transit fares from a budgetary perspective but there’s a safety perspective too: we shouldn’t create unnecessary interactions with the police for vulnerable groups.” - David Barboza, Abundant Housing LA

4. **Affordability**

Housing Affordability and Displacement: Three interview participants emphasized the role of affordable housing and displacement in ensuring equitable access to opportunity. People that are no longer able to live in high-opportunity areas (areas with plenty of jobs, transit service, healthcare, schools, and other essential resources), are often displaced into low opportunity areas where access to opportunity is hampered by distance, travel time, and cost.

Fare Free Transit: Our interview results indicate that financial costs and fare structures are important considerations to access to opportunity. Several interview participants highlighted reduced fares as increasing access to opportunity for youth, while others emphasized that fare free transit improves access to opportunity by both reducing financial burden and by reducing policing and interactions with police that make transit less safe, particularly for Black riders.

5. **Micro Mobility and Car-share:** Our interview analysis shows that Metro should consider indicators that assess the extent to which micro mobility and car-share facilitate access to opportunities. Different transportation modes are better suited to different trip types and demographics. One interview participant emphasized that support services like Metro Micro can fill the access gaps that transit cannot achieve. For instance, large grocery trips may be better suited for cars than the bus.

“Make ride-sharing more equitable—are there discounted trips? What can we look to beyond fixed-route transit? Those things should be looked at closely. Metro Micro is a great example of having different service areas. Buses can’t always serve everyone in Los Angeles.” - Anonymous

GUIDING QUESTION 2: INDICATOR CHALLENGES AND BARRIERS

“What challenges/barriers to access to opportunity indicators exist?”

While some indicators are identified for implementation from our earlier literature and interviews, many challenges and barriers in practice make the implementation process harder or even impossible. By examining challenges related to implementing access to opportunity indicators, we hope to connect theory with reality so that we can better design the implementation process.

1. **Quality of Existing Transit Infrastructure and Services:** Almost all community interviewees identified agencies' failing to provide quality infrastructure and services to riders as one of the biggest challenges to access opportunities.

The specific aspects mentioned include on-time reliability performance and the availability of transit services for non-urban regions, non-rush hours, and non-commuting trips. For example, as shared by one of our interviewees, there is "a lack of transportation options when it comes to Metro in some communities, particularly South LA - bus lines and routes are infrequent, and we only have one rail line."

Another challenge that most CBOs pointed out is the potential gap between the agencies' services and riders' perceptions. Costs, safety, reliability, and convenience are relatively subjective perceptions. "If the riders are not satisfied with the services, they will be less likely to use them."

Safety for non-riders is another challenge identified by an interviewee, noting that it limits the general population's mobility options. "Riding bikes and walking on the streets are not safe in many situations." For such considerations, they may not use those active transportation options. We elaborate on this last point in our recommendation focused specifically on safety and perceptions of safety.

2. **Capture of Travel Data:** Both agencies and CBOs acknowledge that the data, especially rider-level experiences, is challenging to identify, collect, and interpret.

There are many barriers for the riders to contribute to the data collection, including language (e.g., non-English speakers), technology (e.g., require cell phone), etc. For example, the data should not be solely collected from cell phone and mobile device sources. On the one hand, "some people have no access to the internet or cell phones". Relying on such data sources potentially leaves those groups of people, more likely to be public transit dependents, behind the planning decisions. On the other hand, "those particular groups of people may have the same travel behaviors as others, making them less likely to benefit from future planning decisions."

In addition, the existing data pool is not complete and, although essential, is actually very hard to have a complete one. "Many existing models do not include data for people of color or disabilities." The insufficient survey and data available to the models cannot provide the agencies with a complete picture of different travel needs across all demographic groups.

3. **Equitable Engagement and Services:** Equity is a topic mentioned several times in our interviews and is discussed in the context of both engagement with the general population and the services provided to the riders.

While effective to some extent, many current efforts to improve accessibility fail to consider the equitable distribution of the benefits from the increased accessibility (i.e., the benefits only apply to specific groups of communities and riders as opposed to the general population or the prioritized groups). For example, "traffic congestion is an existing metric for LA Metro, but the efforts include widening the roadways and demolishing community buildings. The benefits from increased accessibility are more likely to flow to the drivers instead of the riders".

4. **Limited Time and Resources:** Both CBOs and agencies also identified limited time and resources as one of the challenges in imposing accessibility plans and practices.

In our interviews with transit agencies, they expressed that the limited time and resources on their hands force them to prioritize specific tasks over others. For example, in collecting trip data, one agency expressed their interest in and the importance of non-major trips like grocery trips, but they were unsure of how to effectively collect that data. As a result, they instead prioritize data capturing commuting trips between major job centers. On the other hand, sometimes their efforts to increase accessibility required collaboration with other departments and teams, seeing as the agencies themselves cannot solely implement effective plans. "Some regions in our city are geographically isolated from the major destinations, and accessibility requires the connectivity infrastructure first such as bridges and tunnels before the agency can make any further improvements."

GUIDING QUESTION 3: INDICATOR COMMUNICATIONS

"How can Metro communicate indicators/data in a more easily understandable way?"

Communicating indicators and data to the public seemed to be a less prevalent and pressing topic to our interviewees than some of the other research questions. We got the sense that they had more specific input around how access should be improved and around gathering community input about the barriers to access, rather than the specifics of communicating how agencies measure these improvements. However, there were some important points about ways to improve modes of communication and what information should be communicated.

1. Modes of communication

In terms of how to communicate indicators to the public, two themes arose. The first was the importance of using modes of communication that are already familiar to community members the agency is trying to reach. For example, LA Walks pointed out that using communication platforms that are popular amongst residents and non-English speakers, for example, WhatsApp or KakaoTalk can be an effective method to communicate with target populations.

The second key theme that arose around modes of communication is considering the level of trust the community has with the person or agency that is sharing the information. Many interviewees pointed out that the CBOs often already have a trusting relationship with community members, and can therefore be an effective conduit of information between an agency and a community. Further, CBOs or other community leaders are also often more effective at understanding where and when it's easiest to connect with transit riders, often meeting them where they are rather than inviting them to a community meeting. For example, a mobility justice advocate explained one effective approach: *"The approach of setting up focus groups/community workshops with CBOs that are deeply embedded within the community and work with diverse demographics within the community to host and organize these types of workshops. Doing pop-ups at specific metro stations and doing quick engagements with transit riders. More targeted approaches work for getting information to the public."* LA Walks also pointed out the effectiveness of hiring local community members to disseminate important information, pointing out that they can be primary intermediaries between public agencies and communities, leading outreach, allowing them to use their position as trusted leaders.

2. What information to communicate

Only one of our interviewees, MTC, discussed approaches to communicating metrics, given their experience doing similar work. The main point they highlighted was to prioritize the metrics the agency wants to communicate, noting that it is often more effective to narrow it down to a few of the most important metrics. They also noted the importance of defining the specific audience and catering to the metrics to their interests, stating, "You have to pick and choose what metrics are most applicable and try to paint a picture for different audiences based on what their life is like. [...] And you have to align the metrics with what goals you are trying to achieve." MTC also described the development of the website they use to show their indicators and progress, suggesting that this is an approach that can be replicated by other agencies to communicate and share data with the public.

Additionally, we found that the themes of disaggregating data, focusing on qualitative data, and addressing the limitations of models to incorporate these types of data was also important to pull into our recommendations around communication. For example, People for Mobility Justice stressed to us the importance of focusing less on monetary value when discussing data and instead focusing more on narratives around people's lived experiences, stating *"We live in a capitalistic world where everyone is concerned with generating monetary value. We have to shift the narrative, we have to place the value back to the people."*

GUIDING QUESTION 4: METRO'S BEST PRACTICES

"How can Metro better understand needs and improve participation from residents and community organizations in indicator development?"

1. Understanding Needs

In order for Metro to be able to promote and implement opportunities for access across its service region, it must consider the diverse needs across the wide range of communities and demographics it serves when developing indicators.

One example that came up during our interview with Slate Z are instances when demographic needs require specific, purposeful engagement and outreach tactics such as those needed to reach students that are eligible for Free Pass programs. The organization notes that with such programs, organizations sometimes miss students who are in foster care or non-traditional living arrangements. Indicators in this sense can be modified or altered to make sure that the diverse range of populations within the youth demographic can be accounted for and serviced adequately.

In additional interviews, the notion that Metro understands the needs of its service region and communities came up. Although we are aware that a general survey is frequently sent out by Metro to its consumers, it misses issues like those concerning fare enforcement, which is how policing comes into play. This is one example of a problem that can be better addressed by looking beyond the immediate layer of "fare evasion". With said issue, exploring why people are committing fare evasion can be an effective alternative in trying to help provide transportation access to the consumer. If fare evasion occurs in particular communities or within certain demographic populations, can that possibly be an urgent indicator presenting a cost burden for certain riders?

2. Improving Participation

Throughout our interviews, when asked about successful understandings of the needs of their service region/communities, it was suggested that transportation agencies need to place greater emphasis on improving the participation of the general public, public organizations, and entities that may better represent and advocate for community needs and perspectives.

In one of our interviews, the idea that Metro should be taking the first step to engage the public and community at large efficiently and effectively, arose. This idea came in response to identifying communities and populations that organizations have difficulty advocating for. The interviewee expanded on this point by recommending that Metro use its fiscal capacity to hire community organizers who already work in the community and tap into this resource instead of hiring outside entities or professionals that might not be familiar with the community and its needs or dynamics.

Further expanding on actions to improve participation was a proposal for Metro to establish a community engagement team that is responsible for organization-wide community engagement processes while specializing in fostering community. This was proposed as something that is more consistent and authentic and which every internal department can tap into when working with the public sphere.

Additionally, the impact of demographic representation and diversity from within the organization also came up. It was suggested that Metro's internal body should reflect the consumer population it serves. This could serve to improve communication between the agency's employee representatives, the general public, and the community which would further foster authentic connections and relationships between transportation agencies and the public it intends to serve.

FINDINGS FROM OUTREACH

From our engagement and literature review process, we have made some preliminary conclusions on safety, transit fares, land use, and community engagement. Safety has broad definitions and implications depending on demographics. Within our literature review, there was a focus on traffic safety pertaining to active transportation and certain demographic groups such as women. However, through the engagement process, community-based organizations and transit agencies shared a more detailed perception of safety. For one, community-based organizations emphasized engagement with sub-groups that would make outreach more meaningful and successful. This is a tool that can help mitigate access to existing resources and help residents access opportunities. The extent to which Metro has deployed engagement is still somewhat unclear. There appears to be a disconnect between what Metro feels they have done with community engagement versus what community-based organizations working on the ground have expressed. In general, community-based organizations have mentioned that Metro needs to do a better job at engagement, particularly around promoting key resources such as fare reduction policies.

ANALYSIS

SIMILARITIES AND DIFFERENCES BETWEEN LITERATURE, PRACTICE, AND INTERVIEWS

SIMILARITIES

Safety

The most prominent theme from both the literature review and the CBO interviews was the concept of safety. Although safety is generally understood to be necessary to maintain health and well-being, there are many layers to safety as it relates to transportation, particularly when it comes to preventing harm. There can be improvements in how safety is understood, managed, and implemented across transportation infrastructure and organizations. Improvements can include changes in policing to reduce racial profiling, bias, and unnecessary escalated violence. Concepts of safety in transportation should also include better cycling and walking infrastructure for pedestrians. Considerations can also be made for the built environment, such as bus stop locations to provide rest and shelter from environmental elements.

Data

Understanding how data works and how it is collected and interpreted are consistent themes between academic literature and our qualitative interviews. Data can easily be misinterpreted, collected in a way that biases responses, and misrepresented. This raises concerns about the policy decisions that stem from indicators and related evaluations. Metro has the capacity and access to available data to make and implement changes to ensure data is collected and shared in a way that leads to stronger policies. Metro should act to ensure data transparency, targeted quantitative and qualitative data collection from its most vulnerable and underserved customers, and ensure that it continues to serve the most dependent transit users.

Land Use

Both the literature review and interview data agreed that land use is a key component of access to opportunity. Land use was cited as particularly important for access to opportunity in relation to the housing crisis in California and Los Angeles. Residential land uses are most often the origin destination and final destination for travelers throughout the day. Thus, affordable housing located in or in close proximity to high opportunity areas—areas with quality jobs, schools, healthcare, and other key destinations—are important considerations to ensuring access to opportunity.

Perception: Safety, Reliability, and Travel Costs

The notion of perception arose in both the literature and interviews. How different demographics may measure or perceive safety in certain situations emerged as an important point. Rider perception of transit reliability may also differ from actual transit reliability. Lastly, travel costs have a strong influence on people's decision on how they travel, which can be measured by both a currency and time value. Perception of travel costs can differ from actual travel costs. For example, travelers may anticipate that travel time may be less or more than it actually is based on different factors, such as time of day, faulty information, and feelings of safety or discomfort at transit stops.

DIFFERENCES

Free Public Transportation

One of the most noticeable differences between the literature review and the conversations with community-based organizations regarding the topic of access to opportunities was the subject of Free Transit. Community-based organizations uplifted the monetary and safety benefits of free transit. They identified that free transit makes transit more accessible for those that experience cost burdens. CBOs also identified that fare free transit removes travel friction and cost burdens resulting from fare evasion citations, which disproportionately impact Black riders. Although the literature review surfaced the topic of transportation costs both in monetary terms and time, contemplating or presenting the notion of simply making public transportation free for riders was overlooked.

KEY OPPORTUNITIES

SETTING SPECIFIC GOALS THAT PRIORITIZE INDIVIDUAL EXPERIENCES

Through our literature review and analysis, as well as conversations with OEI, we have found that it is essential to identify how systems-level goals differ from the needs being expressed by community members, CBOs, and mobility advocates. We believe these differences are a key area for growth and opportunity within our analysis and our project as a whole. Our conversations with public stakeholders stressed the importance of identifying and centering the disparities that exist when capturing individuals' experiences. Framing decision making processes around the diverse needs of various demographic groups has been a key topic in our conversations with public stakeholders. To set bold priorities that meet these needs, first, there must be concentrated efforts to gather comprehensive feedback from community members, rather than setting goals with the limited data and survey information that currently exists.

Why is it important to look at indicators by specific demographic?

One of the key constraints we heard was the lack of time and resources available, and we also recognize that there are a ton of different strategies to increase access to opportunity. It is therefore unrealistic to assume that an agency would be able to measure all the different ways transportation could improve access to opportunity for all people. Given this, we recommend instead being very specific about who the agency is measuring an increase in access to opportunity for. By setting clear goals about who Metro is trying to increase access to opportunity for.

We know that increasing access for these specific populations will also have a trickle down effect on other populations. For example, improving physical ease of access for elderly who specifically need additional shade or improved seating at bus stops will also improve the comfort of everyone at the bus stop. Or, for example, if trans individuals experience an increased sense of safety from harassment while riding the bus, it is likely that cis gendered women will also experience an increase in safety. In this way, it makes sense to focus on improving access for the most vulnerable transit riders.

It is also critical to look at metrics by demographic rather than the whole population because we often see different outcomes when data is disaggregated by categories including race, ethnicity, income and gender. Therefore, looking at metrics for the whole population of Los Angeles often does not reveal disproportionate impacts that changes might be having on specific populations.

How does this fit in with Metro's existing work around equity?

Further, setting specific goals prioritizing individual traveler experiences is aligned with Metro's equity goals as outlined in the Equity Platform. This approach also builds on a lot of work already being done by Metro, including the Equity Focused Communities, the Customer Experience Plan, the How Women Travel report and following efforts, and the Metro Traffic Reduction study efforts to look at impacts.

What demographics could we focus on, and why are they important to measure?

Through the literature review, interviews, and analyzing Metro's existing reports and efforts, we identified four key demographic groups to focus on.



Source: LA Metro

1. Seniors and People with Disabilities

The first group we are focusing on is those with disabilities and seniors. The literature review demonstrated that seniors often had different travel patterns than others, traveling to work less and to stores and for social activities more, they often have mobility challenges and have less car access. Similarly, those with disabilities often also face mobility challenges and have different travel patterns.

Our interviews also revealed the importance of this demographic to community organizations. For example, Slate Z mentioned the importance of ensuring transportation was accessible for disabled riders and seniors. Both metrics and customer reports from Metro reveal these challenges as well. For example, of 12,268 Metro bus stops, 46% have seating and 24% have shelters. The Metro Customer Experience survey report also highlighted barriers that disabled riders face both while getting to and waiting for transit, and while actually riding it. Shade and seating at stops were noted as key customer pain points, and one rider noted that there is "...no seating on stops and I'm handicap with a cane." It is also important to note that stops and shelters often need to be implemented in collaboration with the jurisdiction they are located in, and are not under the sole control of Metro.

This is also a particularly timely issue to address and measure because of the changes to bus routes through the NextGen plan. As noted in the Customer Experience Report, bus stop spacing was increased to make buses move faster, setting max distance to nearest stop at ¼ of a mile. While this was decided on to increase bus speeds, it is also a tradeoff for riders that might face barriers traveling ¼ of a mile. Now would be an ideal time to measure this to help understand the impact of this change on seniors and riders with disabilities.

Further, this focus on seniors and disabled individuals builds off of existing Metro efforts. For example, the Metro Customer experience points out a number of recent actions Metro has taken to improve the experience for those with disabilities, including improving ramps, crosswalks, signage, and wayfinding, and run trainings for Metro staff around disability awareness, among other actions. However, the Metro customer plan does point out that it does not yet include improvements for people that lack access to the internet or smartphones, which is particularly relevant for seniors. The Metro 2028 vision plan also noted the challenges of meeting mobility needs and expectations of a diverse region, specifically mentioning the unique needs of older adults and younger population.

2. Youth

Youth also emerged as critical throughout our literature review and community interviews. Community organizations pointed out the importance of public transit for youth, and for example, Slate Z mentioned the importance of looking at the way youth of varying ages are using public transit, and the importance of ensuring it is helpful and accessible for their needs. LA Walks also placed big emphasis on different travel patterns by generation.

The literature review revealed the importance of school transportation, and the barriers that many low income students face, and particularly the way in which both the physical environment and factors access to different modes of transportation impact. This also builds on work already being done by Metro. For example, they recently launched the Metro Youth Council. The Metro Customer Plan also points out that it does not yet include improvements for youth, indicating that they recognize it as a key opportunity area for improvement. Metro, with advocacy from some of the organizations we interviewed including Slate Z, also recently developed a free fare program for Los Angeles Unified School District students, after a pilot program showed that it greatly reduced the cost burden and increased access to education, jobs, and activities.

3. Caretakers

Caretakers emerged as demographics that were important to focus on both in the literature and community interviews. The literature review pointed out many specific transportation barriers faced by caretakers, including both unique travel behaviors they face such as being more likely to trip chain, physical challenges around things like traveling with a stroller, and service challenges such as difficulty paying for children with one Metro fare card. Further, caretakers are more likely to be women, and, therefore also often face additional concerns around sexual harassment and personal safety.

Many of our community interviews reinforced these points and added additional context. For example, Abundant Housing mentioned the gender based differences in how women travel and experience transit, including trip chaining, and pointed out the importance of prioritizing their needs on public transit particularly since they do not have other transportation options or access to a car. LA Walks also mentioned trip chaining and the role of gender and sexuality based barriers.

This focus also builds on existing Metro work, including the Understanding How Women Travel report and subsequent Gender Action Plan (GAP). The Customer Experience plan also points out how caregivers traveling with children, similarly to seniors, are often more concerned about stop infrastructure, as demonstrated by a rider noting that some [stops] are in the sun or when winter comes ... me and my little boy get wet or sunburned." These points are aligned with much of what we described in the previous safety section, and point out the importance of looking at issues of safety in an intersectional manner.

4. **Trans, non-binary, and gender non-conforming**

Our literature review also revealed the importance of going beyond just looking at what gender based barriers women face during transportation, and into the importance of looking at the experience of trans, non-binary, and gender non-conforming individuals. Community interviews pointed out that while some previous work by Metro was heading in the right direction, there were limitations and concerns about it. For example, the Understanding How Women Travel report did not attempt to understand the unique needs of trans, non-binary, and gender non-conforming individuals. We heard during CBO interviews that while sometimes they have brought up these issues during outreach processes, they find that they often get overshadowed by other issues and not included in end products such as reports or metrics. We also found that many trans serving organizations, such as the Trans Latina Coalition provide transportation services as part of their direct services, further demonstrating the importance and need for improved transportation service.

In contrast, other Metro efforts do point out the importance of the needs of trans, non-binary, and gender non-conforming individuals. For example, when discussing the customer experience survey results, the Customer Experience Plan pointed out: "Safety from sexual or racial harassment is also flagged (see red arrows) because harassment impacts some riders more than others. For example, women give lower marks than men on feeling safe from sexual harassment, with young women rating it even lower, and non-binary individuals rating it lowest of all, putting it squarely into the Target Issues quadrant for that group."

We also note that Metro has begun efforts to address some of these issues, even if not targeted at these specific populations. For example, the Customer Experience Plan notes a pilot stop request program to request a stop between posted stops when traveling alone 9pm-5am and plans to do ride along interviews with diverse riders.

DISAGGREGATING AND COMPLETING DATA

The second opportunity addresses the issue of data and corresponds to the first opportunity. While the agency collects extensive data, they fail to include detailed demographic information, making them unable to be disaggregated. Aggregated data is only able to tell the network-level performance from a high-level perspective, and the conclusions that came out from such data are able to tell human-level information. Therefore, the demographic data associated with the existing data should be collected as well.

In addition, the data should be complete in terms of both qualitative and quantitative aspects, addressing the earlier fundamental goal for the agencies regarding the perception of the services. The agencies have been primarily focusing on the quantitative perspectives due to their simpler collection process. For example, when evaluating the sense of safety, crime rate or arrest number are the common forms of data being collected. However, people have different responses and perceptions about both the built and social environments, which makes qualitative data unique and irreplaceable (e.g., the survey question of "do you feel safe when riding the transits"). Therefore, many data potentials have not been realized yet but could help interpret better conclusions that integrate both the system and the riders.

EXPLORING NEW DATA COLLECTION APPROACHES

Our literature review and qualitative data analysis indicates that Metro should expand its approach to data collection. First, the agency should use both qualitative and quantitative data in its indicator evaluations. The traditional and typical data collection relies more on the agencies' efforts in conducting mass surveys and quantitative data, and there is room for additional qualitative data. Second, our research highlighted a need for Metro to better center community voices in decision-making. This includes better representation in the agencies' governance boards or ongoing focus groups and qualitative interviews to complement quantitative survey data. Further, both interviews and literature reviews agree that indicators should focus on the most vulnerable and transit-dependent communities.

DESTINATIONS BEYOND JOBS

Our literature and plan review revealed that while many studies reveal barriers to accessing key destinations other than jobs for socially vulnerable and transit reliant populations, most transportation plans and metrics solely measure access to jobs.

During our community interviews many organizations pointed out the importance of measuring access to destinations other than jobs. For example, Abundant Housing mentioned the importance of measuring access for errands other than work. Another community organization pointed out the importance of public transit to connect community members to work, school, medical facilities, grocery stores, and the beach, pointing out that, "it's not just about someone's ability to get to work, we are whole people we are more than just the jobs we show up to, having the ability to go to a faith based place, i may want to go to the beach with my family, [...] that makes me feel connected. That creates a sense of full people. We should have access to all of these things. There's so many other things that are important than what makes revenue, and makes money for the city."

Another interviewee pointed out the importance of train lines directly to corridors with a lot of services. "Expo line will take you to Santa Monica, but having folks be able to take the same train line to get their doctors office, or to a park that gives them a spot, or to grocery stores. In downtown LA they closed the Kroger over on Crenshaw and Slauson. We don't have a lot of options where you can take a train to a corridor where there are tons of businesses or establishments. When you're in South LA or East LA, you're thinking of some of the randomness of these train lines, where we can't even access these spots. Usually they are focused on stadiums or arenas, where there's more money going to the city as opposed to things we normally need for ourselves."

LA Walks also pointed out the importance of access to schools, jobs, employment centers, play and recreation, pointing out that these destinations are not just for having fun, but that having accessible social and community gathering spaces are critical and deserving parts of communities.

Specifically looking at healthcare access, a couple of interviewees mentioned that transit is not always feasible for health care visits, in those cases often car share or other micro mobility is also important. The literature review also revealed unique travel needs for healthcare appointments, such as how critical

timeliness is, as well as revealed disproportionate barriers faced by various groups, such as having more limited healthcare facilities they can utilize due to insurance, cost, or other unique needs.

Specifically looking at grocery store access, a number of community organizations mentioned the importance of accessibility. Act LA mentioned the importance of food options for their members, and the role that land use plays here in how commercial rent is a barrier to needed neighborhood businesses.

Specifically looking at school access, Slate Z mentioned and has been involved in a number of efforts to improve public transit access and provide free public transit for students to schools as well as to other destinations like jobs and recreation. ACT LA also mentioned the importance of free transit for students. The literature review reinforced what we heard from community organizations, pointing out the disparities between school travel time for those with access to cars versus those without, and between those with access to yellow school buses versus those that take public transit.



Source: LA Metro

KEY CONSTRAINTS

DATA

One of the key constraints identified throughout the literature, interviews, and discussions with the client was the role of data. While much of the literature and conversations with the client focused on how to use existing data and the importance of being able to quantify access to opportunity, the literature that was focused on specific demographics such as trans populations, and many of the interviews pointed out both the limitations/existing bias of Metro as a data collector and limitations of quantitative data. This was particularly true around issues such as safety.

TRUST/COMMUNITY ENGAGEMENT

Related to the above-mentioned limitations of Metro as the data collector, the interviews and our existing understanding of the relationship between the transit agency and the public revealed a longstanding lack of trust, particularly among transit riders and communities of color. This is important to consider both when thinking about data collection methods and in thinking about how to communicate any results.

TIME AND RESOURCES

In order to fully communicate the impact of transportation on access to opportunity across all residents in all of Los Angeles, a lot of time and resources would be required for the data collection, modeling and analysis, and communication, not to mention the subsequent decision making process. With this as a key constraint, it's important to be realistic about what is possible and what will actually be implemented, meaning it likely makes more sense to narrow in on top priorities rather than try to address everything.

POLITICAL REPRESENTATION

A key constraint mentioned mostly in the interviews was the lack of political representation for transit riders both in local political leadership and in Metro leadership and decision makers.

METRO'S JURISDICTION

Another key theme that came up throughout both the literature review and interviews was that transportation itself is not the only aspect influencing access to opportunity. For example, issues like land use, housing, workforce and economic development all play important roles. It's therefore important to think through and be realistic around what aspects Metro does have control over and which aspects Metro may have other forms of influence on. Further, travel patterns span across governmental jurisdictions.

RECOMMENDATIONS

LA METRO'S EXISTING METRICS ON ACCESS TO OPPORTUNITY

Before we extend our recommendations on the topic, we want to acknowledge LA Metro's ongoing efforts in addressing the improvement of access to opportunities. As part of Metro's current Traffic Reduction Study project, they identified a series of preliminary quantitative performance evaluation metrics to compare "Build" and "No Build" scenarios. The list below is the metrics identified for the Access to Opportunity section. This list helped us build up the framework for indicator list at the early stage of the project and provided us with an excellent opportunity to extend the existing list to better help the agency's practices and policies.

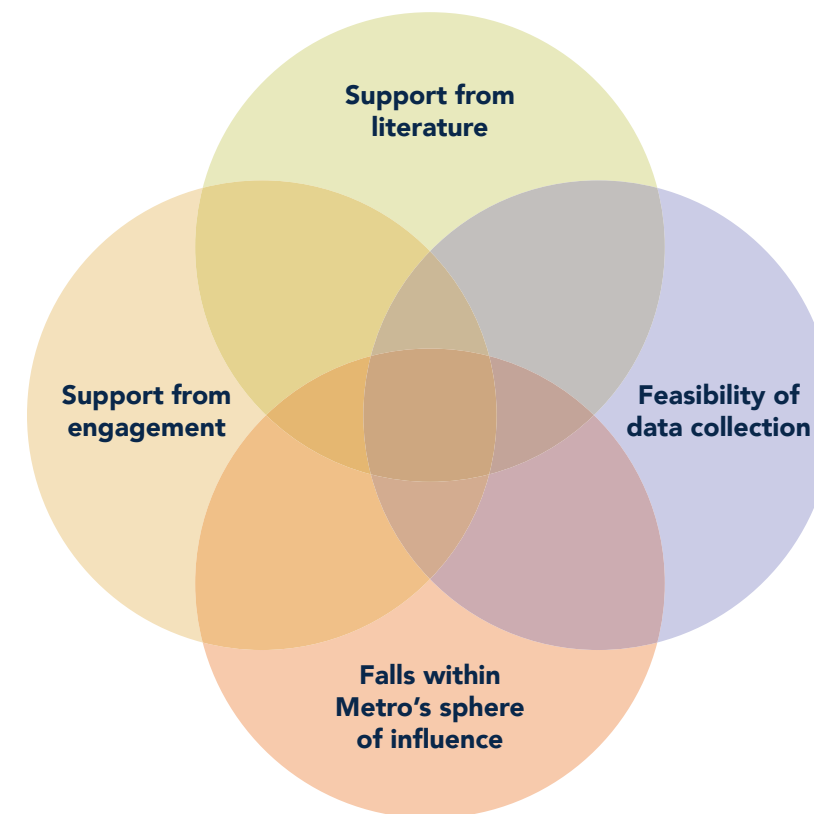
Metro's Traffic Reduction Study Preliminary Performance Metrics on Access to Opportunity (Source: LA Metro Staff Report)

Categories	Metrics and Considerations
Travel time	Improvement in travel times to key destinations
	Time period
	Representative origin-destinations
Job accessibility	Mode (auto, transit, active transportation)
	Number of jobs accessible within 30 minutes of travel time
	Household income
Diversion	Reduction in diverted trips through Equity Focus Community areas
	Alternative routes
Transit ridership	Change in transit ridership (boardings)
	Route or line
Transit mode share	Change in transit mode share
	Representative groups of origins and destinations

This list identifies five key metrics (travel time, job accessibility, traffic diversion, transit ridership, transit mode share) and several classifications that are used to break down key metrics (destinations, mode, routes, time of day, specific demographic group). Our recommendations will further develop this list by:

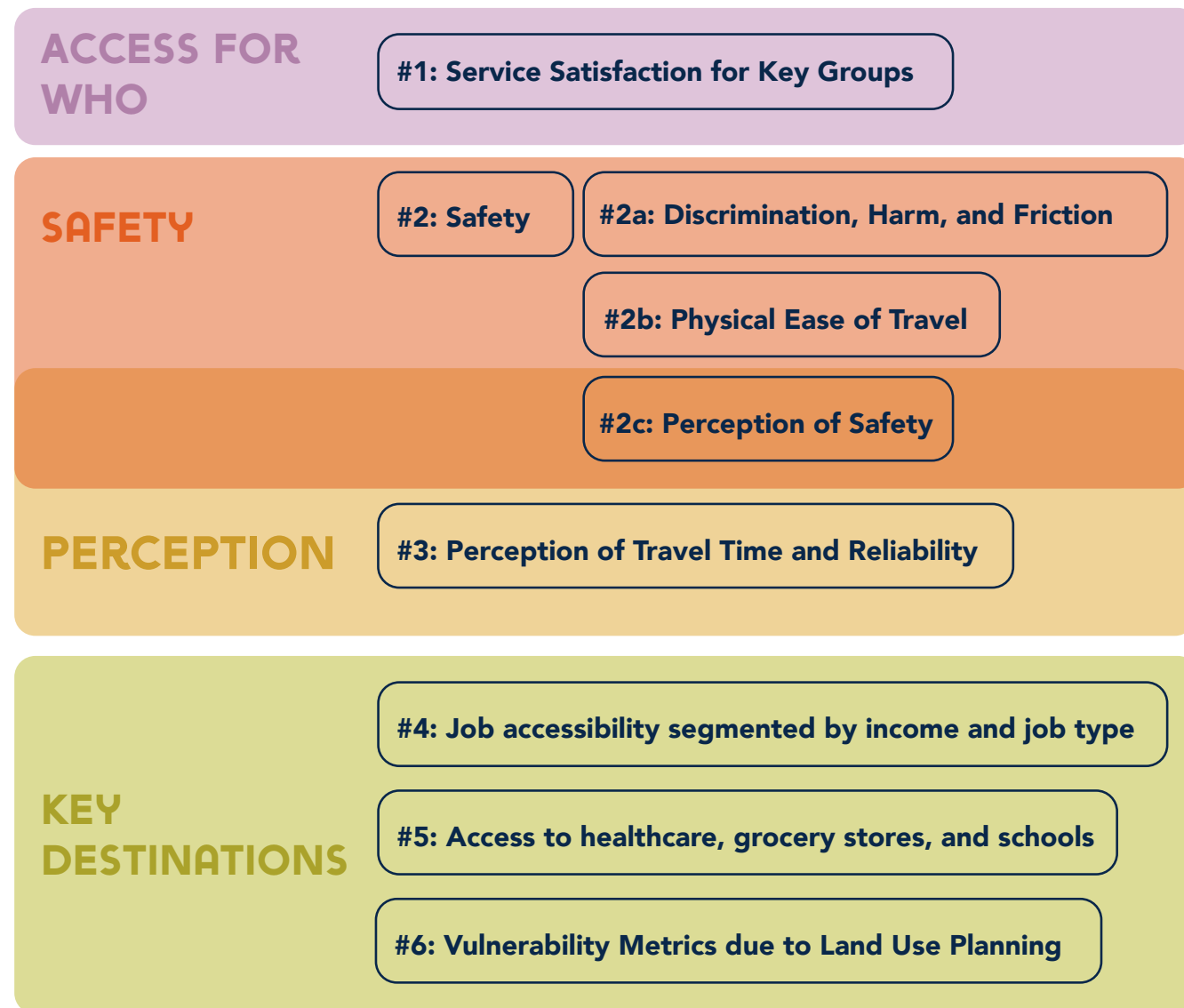
1. expanding new indicators that target high-priority goals (e.g., discrimination, safety, etc.),
2. specifying data requirements (e.g., rider-level qualitative data), and
3. providing recommended implementable action plans.

The following section includes a list of our recommendations on both specific indicators and best practices based on our exploration. For each recommendation, we provide justifications and specific considerations for implementation. Recommendations were made taking into consideration what we learned through the literature and plan review, community engagement, as well as taking into consideration both the feasibility of the data collection and an understanding of Metro's



RECOMMENDED INDICATORS

The chart below is an overview of our indicators, which first looking at who we're trying to improve access for, the importance of safety from a few different perspectives, the role of perception, and then recommendations around key destinations.



1 RECOMMENDED INDICATOR #1: RIDER SATISFACTION FOR 1) SENIORS AND PEOPLE WITH DISABILITIES, 2) YOUTH, 3) CAREGIVERS, AND 4) TRANS, NON-BINARY, AND GENDER NON-COMFORMING INDIVIDUALS.

Why

As discussed in the Key Opportunities: Setting Specific Goals That Prioritize Individual Experiences section previously, focusing on particular demographics ensures that resources are targeted and directed to areas that need the most improvement, and ensures that those that face the most barriers are prioritized. These four specific groups represent a range of barriers riders face, ranging from mobility challenges to varying travel times and patterns to personal safety. They are, therefore, the riders most vulnerable to both physical challenges while travelling and the effects of code-of-conduct violations and/or enforcement discrimination. If the needs of these vulnerable riders are met, then it can be surmised that the needs of less-vulnerable riders are also being met. They can, therefore, act as effective indicators.

The indicators that follow, #2-7, are informed by our focus on these groups, and provide a more in depth and nuanced understanding of why a group may be satisfied or dissatisfied with Metro service.

Metric

We recommend consistently measuring the satisfaction with Metro service of these four groups through the Customer Experience Survey as a baseline understanding of how the service is working for them, and of the impact of projects over time.

Measuring Satisfaction

We recommend using the existing Customer Experience Survey question "Thinking about your experiences during your entire journey door to door and all of your interactions with Metro, how satisfied are you with Metro Bus and Metro Rail?", which is answered on a scale of 1: Very Dissatisfied to 5: Very Satisfied. Metro should assess the mean, median, and standard deviation of satisfaction scores (e.g. 3.2 out of 5) for each population subgroup. We recommended that Metro use a z test to compare the mean for each subgroup against the population for all survey respondents who are not members of any of the subgroup identified.

Disaggregate by Race/Ethnicity

Within each of the four identified groups, we also recommend comparing non-white versus white riders utilizing the existing Customer Experience question that asks about ethnicity. This would help Metro to understand further how race and ethnicity act as additional barriers to accessing opportunity. For example, looking at the service satisfaction of non-white versus white disabled riders would help Metro understand that being disabled creates disadvantages to riding Metro, but understand if being white helps overcome these disadvantages, helping to further understand what countermeasures would be most effective to improve this metric.

Below we outline how to create the sample segments for each of the four groups using the Customer Experience Survey:

A.) Seniors and people with disabilities

How to create a sample segment for this group:

Aggregate the responses of those who have responded to the following Customer Experience Survey questions with the specified answers:

CUSTOMER EXPERIENCE SURVEY QUESTION	RESPONSES TO INCLUDE IN SAMPLE SEGMENT	NEW OR EXISTING QUESTION
What is your ethnicity?	Latinx/Hispanic, Black/African American, Asian/Pacific Islander, Native American, Other	Existing
AND		
Do you have any disabilities?	Yes	Existing
OR		
What is your age?	65+	Existing

B.) Youth

How to create a sample segment for this group:

Aggregate the responses of those who have responded to the following Customer Experience Survey questions with the specified answers:

CUSTOMER EXPERIENCE SURVEY QUESTION	RESPONSES TO INCLUDE IN SAMPLE SEGMENT	NEW OR EXISTING QUESTION
What is your ethnicity?	Latinx/Hispanic, Black/African American, Asian/Pacific Islander, Native American, Other	Existing
AND		
What is your age?	Under 18	Existing

C.) Caregivers

How to create a sample segment for this group:

Aggregate the responses of those who have responded to the following Customer Experience Survey questions with the specified answers:

CUSTOMER EXPERIENCE SURVEY QUESTION	RESPONSES TO INCLUDE IN SAMPLE SEGMENT	NEW OR EXISTING QUESTION
What is your ethnicity?	Latinx/Hispanic, Black/African American, Asian/Pacific Islander, Native American, Other	Existing
AND		
How many days a week do you usually ride Metro with someone else as their caregiver?	1-2 days 3-4 days 5+ days	New

D.) Trans, non-binary, and gender non-conforming individuals

How to create a sample segment for this group:

Aggregate the responses of those who have responded to the following Customer Experience Survey questions with the specified answers:

CUSTOMER EXPERIENCE SURVEY QUESTION	RESPONSES TO INCLUDE IN SAMPLE SEGMENT	NEW OR EXISTING QUESTION
What is your ethnicity?	Latinx/Hispanic, Black/African American, Asian/Pacific Islander, Native American, Other	Existing
AND		
What is your gender identity? (select all that apply):	Female Male Transgender Non-binary/non-conforming Prefer to self describe : _____ Prefer not to respond	Modified

Implementation

One challenge that may come up is the issue of low sample sizes. The issue of representation of marginalized groups within large data sets is well documented. We also heard about ways this issue has already come up in past Metro work. For example, Metro's Understanding How Women Travel Report utilized data from study looking at Metro's bike and bus interface that was incorporated. The report noted that in this dataset there were 15 responses from transgender individuals, but their responses were not taken into account, noting, "Given this small sample size, those responses have been excluded from this analysis." However, we caution against this kind of discounting, and think it's critical to have a standalone metric for this reason. Further, it is important to consider why the sample size is so small and potential implement strategies to increase the sample size. This could be done through doing more targeted outreach through partnerships with CBOs that already have deep relationships with the specific community to ensure target demographic groups are surveyed.

Another way we have seen this type of metric play out is by measuring the overall percentage of riders that these populations make up, for example, measuring the percentage of disabled riders relative to overall riders. However, we do not recommend this route because it is less effective at understanding how well transit is serving them. Many within these groups utilize transit because they have no other options, not because it serves them well, and, therefore, it would be difficult to conclude that an increase or decrease in ridership was due to how well the service is meeting their needs.

2 RECOMMENDED INDICATOR #2: MONITORING SAFETY EXPERIENCES FOR TRANSIT USERS

The topic of safety and perceptions of safety consistently arose throughout our engagement with public stakeholders. Interviewees revealed that encounters with police, incidents of harassment and discrimination, and community perceptions of safety on and around public transit were each factors impacting an individual's decision to use public transportation and thus impacting their access to opportunity and mobility. Through these conversations, we also found that individual experiences when accessing public transportation and engaging in active transportation can have a trickle-down effect and impact the behavior, willingness, and comfort of other individuals within their personal networks in their decision to use multi-modal modes to access their destinations. Given the broad implications and impacts of approaches to safety and the sordid history of the policing of BIPOC communities on and near public transit, we recommend safety to be a three-way approach that considers friction, ease of travel, and perceptions of safety.

“ THROUGH THE ENGAGEMENT PROCESS, DISCRIMINATION BASED ON RACE, GENDER EXPRESSION, AND THE PRESENCE OF ARMED POLICING CAN CREATE FRICTION AND HARMFUL EXPERIENCES FOR TRANSIT RIDERS. ”

“ UNDERSTANDING RIDERS' EXPERIENCES ON TRANSIT AND WHILE ENGAGING IN ACTIVE TRANSPORTATION IS ESSENTIAL IN ASSESSING THE ACCESSIBILITY AVAILABLE TO CORE RIDERS AND THE PERCEPTIONS OF THOSE WITHIN THEIR NETWORKS. ”

Discrimination based on race, gender expression, and the presence of armed policing can create friction and harmful experiences for transit riders. A friction makes it more physically or emotionally difficult to use transit, inhibiting ridership and/or reducing comfort. The 2022 Draft Customer Experience Plan includes a series of safety measures under its Safety Action Plan that incorporates safety ambassadors, homeless outreach workers, and clinicians. The following metrics can help Metro measure the effectiveness of the proposed safety interventions in the 2022 Draft Customer Experience Plan while helping build an inventory of publicly available data that Metro and transit advocates can use to strengthen programs and projects over time. To cohesively measure safety and the impacts of the Safety Action Plan, we recommend Metro conducts a comprehensive analysis of the experiences of the demographic subgroups highlighted in Metric 1: 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary, and gender non-conforming individuals.

2A RECOMMENDED INDICATOR #2A: DISCRIMINATION/ SAFETY/HARM/FRICTION

Various experiences contribute to safety and the barriers they can create to access opportunities. We found that safety can have multiple meanings through the literature review and engagement process and is often defined by unique experiences. Understanding riders' experiences on transit and while engaging in active transportation is essential in assessing the accessibility available to core riders and the perceptions of those within their networks. Through the literature review process, we identified that experiences of discrimination influenced feelings of safety and friction. Friction makes it more physically or emotionally difficult to use transit or engage in active transportation, inhibiting ridership and/or reducing comfort. One example is migrants who account for a high proportion of public transit riders yet can often be discouraged from long-term reliance on public transportation due to experiences of discrimination (Chatman and Klein).

Furthermore, through the engagement process, discrimination based on race, gender expression, and the presence of armed policing can create friction and harmful experiences for transit riders. During the Untokening interview, we heard that it was crucial to use targeted outreach to Metro riders from vulnerable populations to evaluate perceptions of safety. While there was a strong emphasis on perception, a key takeaway was the alternatives to policing highlighted by individuals they surveyed. Their focus was on women who were core riders, emphasizing vulnerable subgroups such as the disabled, unhoused, and immigrants.

“Our design was to speak to women who were core riders (lots of experience on Metro) and women who were the most vulnerable, disabled, homeless, and immigrants. The data they got was tied to that lived experience - they said safety had nothing to do with increasing policing: they said we need more Metro staff and ways to ask for help. But unfortunately, they were just one component of this study. The firm doing a much larger survey didn’t do the targeted outreach and included a lot of non-Metro riders and ended up saying that safety should include policing.” -The Untokening, 2022

Notably, the 2022 Draft Customer Experience Plan includes a series of safety measures under its Safety Action Plan. Some alternatives include safety ambassadors, homeless outreach workers, and clinicians (LA Metro (Los Angeles County Metropolitan Transportation Authority)). However, through our analysis, we saw that safety is multi-faceted. For example, during the engagement process, Slate-Z highlighted the Fare-less System Initiative (FSI), a program by Metro that provides reduced fare rates for students attending a K-12 participating school. In addition, slate-Z has extensively worked on outreach to youth from participating schools to encourage enrollment. Finally, the organization highlighted reduced and fare-less transit to be crucial to help residents from areas like South Los Angeles access opportunities.

Experiences of safety (or lack of) impact transit users’ time, money, and mental/emotional well-being. An anonymous interviewee highlighted Black riders make up over 50 percent of all Metro citations. While armed policing is intended to increase safety, it serves the opposite purpose for many transit riders. Encounters with police can be dangerous due to bias, hinder access to opportunities by delaying travel time and reduce feelings of safety.

Implementation

We recommend that Metro incorporate improvements that include changes in policing to reduce racial profiling, bias, and unnecessary escalated violence. These interactions create friction for Black, Latinx, unhoused, and youth riders. Considering that fare evasion citations are an interaction that leads to friction, we recommend incorporating an empirical metric that can measure the percentage of youth transit riders enrolled in the Fare-less System Initiative (FSI) program and those enrolled in the Low-Income Fare is Easy (LIFE) discounted program. Like FSI, LIFE provides reduced transit costs and is not limited to only students but is open to low-income residents regardless of age. LIFE offers fare discounts that can be applied toward purchasing weekly and monthly transit pass on Metro and any LIFE participating transit agencies or 20 free rides on any one of the participating transit agencies. In addition, applicants can self-certify that they meet the LIFE Program income levels, making the application less burdensome.

Considering that both programs have developed low barriers to entry and expanded eligibility, we recommend that Metro measures the percentage of riders currently using the programs to help determine if there is under-enrollment. Metro can better understand under-enrollment by calculating the amount of enrollment both programs have and the outreach metrics used to help quantify engagement for the programs. Since Metro administers the programs, accessing the data can be achieved by partnering with the department managing the programs.

Furthermore, Metro should aim to understand the percentage of cited riders (youth and adults) who qualify for these programs. Similarly, Metro citation data should be accessible as contracted police departments issue them at transit or boarding stations. The goal is to reduce the percentage of citations by increasing the number of enrollments in FSI and LIFE. Considering that both programs developed over time through task forces and after years from fare-less transit advocates, this data analysis can help inform future fare-less campaigns. To better support these outreach efforts, Metro should foster partnerships with Community-Based Organizations, especially those working towards fare-less transit campaigns.

In addition, our team also recommends that Metro implements safety metrics involving the percentage of interactions with armed police through the empirical metrics developed by the Non-Auto Mobility (NAM) group. The metric developed by NAM calculates the number of incidents resolved by unarmed Metro personnel over total incidents.

2B RECOMMENDED INDICATOR #2B: PHYSICAL EASE OF TRAVEL

Why

Physical ease of travel was a recurring issue that surfaced throughout our literature review and our engagement. We recommend that Metro measure physical ease of travel by tracking historically overlooked riders’ satisfaction with Metro’s services by breaking out the agency’s customer survey approach. By failing to prioritize their travel needs, transportation agencies have historically neglected specific subgroups of riders including seniors, people with disabilities and limited mobility, youth, and caregivers traveling with wheeled devices. Therefore, we recommend that Metro expand its customer experience framework by adequately sampling and conducting focus groups with these subgroups to holistically identify their underserved travel needs and measure their satisfaction with the agency’s services. Focusing on vulnerable subgroups through the expansion of customer surveys allows Metro to make more informed changes to service and infrastructure that will improve travel for riders. In addition to disaggregating customer outreach, Metro should also continue working to address rider pain points vocalized in the all-passenger survey related to ease of travel. Our literature review and interviews also highlighted the importance of infrastructure from ADA-compliant sidewalks to accessible station facilities, in improving rider experience and satisfaction with transit service. When considering how to plan equitable transportation that meets the needs of all riders, Metro must take into account how customer experience, service quality, and the built environment accommodate the needs of these travelers and encourage the use of transit as a primary mode of transportation.

Implementation

Breaking out Metro’s Customer Experience survey

The annual Customer Experience (CX) Plan is an approach that Metro currently uses to evaluate riders’ satisfaction with the agency’s services and to identify areas of needed growth. The Draft 2022 CX Plan summarizes feedback randomly surveyed riders provided on cleanliness, public safety, bus stop

shading and seating, customer information, and time competitiveness and connectivity. While the feedback received reflected the diverse experiences of Metro’s riders, the access and mobility needs of the agency’s more underserved and overlooked populations cannot be comprehensively understood through an untargeted random survey. Slate-Z highlighted that Metro should prioritize youth transit rider experience and work to further understand what they need from the agency to better access opportunities. While there are youth who travel with parents and caretakers on Metro’s system, there are also youth who are working students who use Metro’s services to get to school and work. Thus, in addition to the annual CX survey, we recommend that Metro measure overall satisfaction with people from each subgroup as well as additional metrics discussed in this section that can provide more in-depth results regarding physical ease of travel .

In reviewing plans from other transportation agencies, we identified metrics that Metro could use in addition to the metric which measures key subgroups’ satisfaction with the agency’s services. Transport for London (2016) measures accessibility improvements using “Statistics on introducing step-free access and other accessibility improvements across the transport network” and the “Percentage of disabled people using the transport network and satisfaction surveys”. These metrics allow Metro to more precisely measure progress being made for people in the built environment while the satisfaction metric provides a method to measure the overall perception of riders’ travel experience.

In breaking out its customer experience framework, Metro can better address the pain points vocalized by vulnerable populations in the CX survey. SLATE-Z emphasized the importance of establishing “a feedback loop back to community members” to identify their needs and the implementation measures that will deliver these needs. Responses from the all-passenger survey revealed that many riders with limited mobility and disabilities encounter difficulties with boarding and alighting buses because operators are not stopping all the way at the curb or because stops are either not announced or they are not announced loudly enough. With this information, Metro should utilize focus groups to obtain a more detailed understanding of these patterns using the following metrics:

- % of seniors who have experienced difficulties boarding and alighting buses
- % of people with disabilities and/or limited mobility who have experienced difficulties boarding and alighting buses
- % of caregivers traveling with wheeled devices who have experienced difficulties boarding and alighting buses

Given that there is limited data on how youth travel using Metro’s system, the agency must first ask focus group participants where they are traveling to, what barriers they encounter while doing so, and their reliance on Metro as a primary mode of transportation in their daily lives. The answers to these questions will help guide the agency in choosing metrics to track progress being made to improve physical ease of travel for youth. In addition to these guiding questions, we recommend that Metro consider the following metrics to evaluate travel experience for youth:

- % of youth who believe wayfinding and travel information on Metro is legible and straightforward
- % of youth who have been affected by travel delays while traveling to school, work, or extracurricular activities

Improving infrastructure on transit and at transit stops and stations

We recommend that Metro continue to invest in infrastructure improvements to bus stops and train stations to ensure that they remain accessible and accommodating to all riders. Through our literature review process, we identified infrastructure enhancements that improved the physical ease of travel for parents, caretakers, and those with limited mobility. For example, Singapore’s Land Transport Authority (LTA) has equipped public buses with stroller restraint devices to allow people traveling with strollers to keep them unfolded. The LTA has also made plans to install seats with armrests for elderly riders at new and existing bus stops as well as provide nursing facilities at certain bus and train stations. While Metro doesn’t have control over the provision of bus shelters at stops, the agency should leverage its relationship with the City of LA and other municipalities in LA County to promote the installation of bus shelters to improve customer experience and demonstrate a commitment to invest in transit users. Investing In Place (2019) reports that only a quarter of Metro’s bus stops in the City of Los Angeles have shelters. As extreme heat worsens due to the climate crisis, bus shelters are critical for keeping all riders, especially the most vulnerable, protected from heat as well as rain and wind. To measure the progress of bus stop installation, we recommend that Metro measure the percentage of bus stops with shelters and benches annually. Given Metro’s constraints regarding the provision of bus shelters, we recommend that the agency establish a target of increasing the number of bus shelters by a feasible percentage each year.

Lastly, poor conditions of sidewalks near bus stops are significant access and mobility barriers for people traveling with wheeled devices, those with limited mobility, and elderly individuals. SLATE-Z highlighted that differently-abled and older riders should also be prioritized by the agency because they have found through their work with communities that ADA accessibility, including sidewalk repairs, infrastructure at stops, and waiting for the ramp on buses, all greatly impact people’s ability to access transit. While Metro does not have



Source: LA Metro

jurisdiction over sidewalk repairs, the agency can identify areas of concern near stops through customer outreach as well as conduct sidewalk audits. Leveraging its relationship with the municipalities in LA County, Metro can use this information to encourage sidewalk repairs near its stops throughout the county to improve riders' physical ease of travel.

2C RECOMMENDED INDICATOR #2C: PERCEPTION OF SAFETY

We recommend the development and implementation of more comprehensive surveying and greater transparency around budgeting processes related to the amount of funding that is allocated towards public safety. Additionally, we recommend that Metro broaden its approach to safety measures beyond policing and work with CBOs to develop alternatives to policing on public transportation.

Perceptions of safety and definitions of safety are extremely nuanced and informed by individual experiences. In terms of travel mode, perceptions of safety can strongly influence how and when people engage in active transportation or use public transit. Through Community-Based Organization interviews, we heard that people often rely on their networks to make travel decisions. Slate-Z mentioned that for many residents in Los Angeles, the perception of safety plays a huge role in their decision on whether or not to use transit and/ or to engage in active transportation. These experiences can include police interactions, citations, bias around citations, and sexual harassment. At times it's not whether they themselves experienced a violent or traumatic experience, but they may know someone who did or may have heard about it.

CBOs also stressed the ways in which policing on public transit impacts access to opportunity and mobility for community members. For certain demographics, who historically have or socially are more prone to harassment and violence, avoidance can be used as a precautionary safety tactic. Special consideration can be applied to groups such as Transgender and gender non-conforming individuals, youth (specifically Black, Indigenous, and Latinx), women, and unhoused individuals. While some studies such as Understanding How Women Travel analyze travel patterns amongst women, the exclusion of Transgender women in the report highlights the lack of insight into their experiences (Understanding How Women Travel).

Implementation

We recommend that Metro incorporate key metrics that help measure perceptions of safety held by the groups identified in recommendation #1: 1) seniors and people with disabilities, 2) youth, 3) caregivers, and 4) trans, non-binary, and gender non-conforming individuals. Metro can incorporate targeted outreach by working with Community-Based Organizations to form focus groups in the four identified demographics that can meet quarterly. Through these groups, Metro can track the progress these measures from the Safety Action Plan have made to address perceptions from these four groups. Furthermore, this metric will allow Metro to strengthen collaboration with community partners and advocacy groups and allow the agency to gather qualitative data on safety concerns revolving around vulnerable populations.

We hold that by addressing the needs and safety concerns of key demographic groups, including seniors and differently-abled, youth, caregivers, and trans, non-binary and gender non-conforming riders, Metro will be able to better prioritize and center the needs and experiences of vulnerable populations throughout Los Angeles County. The implementation of approaches to measure and address concerns around safety, harassment, and discrimination is not limited to station sites and Metro vehicles. Through our research and outreach processes, we have found that a riders' experience does not begin once they step foot on the bus or train. Rider experiences include their journey to a station, bus stop, etc. During our interviews with CBOs, several representatives shared that for their members, safety is not guaranteed by police presence, but is more nuanced and results when there is improved lighting, adequate shelter, and pedestrian-oriented infrastructure at their stops and destinations.

While Metro has previously conducted surveys around user experience and rider safety, there are disparities between the survey responses Metro has collected and the feedback we have received from CBOs when asked about the burdens and challenges their membership bases have encountered when using public transportation. As stated above, greater transparency around existing survey methods and analysis may provide greater insight for both mobility justice practitioners and planners outside of the agency to understand the level of work currently being led by Metro.

CBO interviewees (PMJ) encouraged the replacement of police officers on/ near public transit stations and stops with transit ambassadors. This approach would work with surrounding community organizations to empower and train their membership base and trusted community members to serve as the first intermediary between transit riders. Safety ambassadors are listed under the Safety Action Plan within the 2022 Draft Customer Experience Plan. Discussions around safety and the implementation of policies concerning rider safety offer an opportunity to reimagine and redefine what safety means for Metro riders in a way that is reflective and responsive to the diverse experiences, needs, and identities of Metro riders and community members.

3 RECOMMENDED INDICATOR #3: PERCEPTION OF TRAVEL TIME AND RELIABILITY

Why

According to our analysis of Community Based Organization interviews and literature review, commuters' perceptions of both travel time and the reliability of service provided was one of the most important and prominent themes to surface. Although various external factors can influence both the time of travel and the reliability of the service offered to users, the perception of both facets by transit riders is an element that should be considered.

Reliable and efficient transportation is necessary for people to access their point of destination consistently and regularly. Individuals who depend on public transportation services may not have other options but to endure negative experiences associated with public transportation services. Some negative experiences associated with public transportation include late buses or skipping buses, as well as unreliable time schedules.

Although low-income consumers may be able to experience upward social mobility throughout their lifetime, which can in time grant them access to a private vehicle, addressing the consistency and reliability of public transit can capture transit riders for a longer span of their lifetime while simultaneously ensuring consumers of reliable and efficient transportation options in the present time.

Commuters who have the privilege to choose between public transportation and private automobiles, on the other hand, need to be sold on the idea that the decision to ride public transit outweighs the contrary. According to Metro's 2022 Customer Experience Plan Report, "if transit takes twice as long as driving, most people who have a choice will drive instead" (Metro, 2022).

Even if public transportation systems operate at an impeccably efficient rate, demystifying faulty and unreliable service misconceptions still needs to be considered and addressed by transit agencies.

Implementation

Various technical methods are available to track and measure the number of customers a specific bus or rail line might capture and how fast it might travel to reach a destination. Research shows that people's perceptions of reliability and travel time are critical factors that ultimately influence their decision to use public transportation.

To address concerns surrounding the perception of travel time and reliability as it pertains to accessibility, we recommend using Koopmans Generalized Transport Cost indicator, or GTC.

The GTC indicator considers travel time and travel time reliability while incorporating the financial cost of a trip. The indicator uses a calculated average cost per mile of trips considering the transport mode, trip purpose, distance, region, and time of day.

The various components necessary to formulate the 'cost' value allows for analysis to change at various facets of interest. For example, travel mode allows for the interchange between observations between light rail, bus, cycling, and even newer modes such as scooters and micro transit services.

The average cost presents an easy-to-understand indicator capable of informing policymakers of significant changes in accessibility for consumers by producing an index chart similar to the Consumer Price Index used to track and measure inflation. In this case - the indicator would measure and track changes in accessibility considering perceptions of travel time, reliability, and monetary costs.

By analyzing and measuring the GTC indicator, transit agencies can better understand the accessibility impact they are having on particular demographics and regions.

Key Metrics

In order to address the concern regarding perceptions users have in the agency - Metro can use data collected within its annual Customer Experience Survey as well as customer demographics data to create and track the General Travel Cost indicator.

According to Koopman, the generalized travel cost indicator measures the changes in the cost of a trip. The cost value considers miles of trips by transport mode, trip purpose, trip distance, the region of place, and the time of day (Koopmans et al, 2013).

Metro already has access to a wide range of data sources it can use to draw information from, such as the customer experience survey. However, to fully be able to develop the indicator, specific information regarding surveyors trips would be required. Some additional information would include: Origin and Destination of Trip, the Goal of the Trip, Transport Mode, Time of Day, Inflation, and Fuel Prices. As well as more technical values such as the value of time, unreliability, and inconvenience. According to Koopman, the GTC indicator demonstrates the changes that the average cost per mile experiences over time.

4 RECOMMENDED INDICATOR #4: SEGMENT JOB ACCESS INDICATOR BY JOB TYPE AND INCOME

Key Metrics

- Number of low wage jobs within 30 minutes travel time of low-income households
- Number of retail, food service, and industrial jobs within 30 minutes travel time of low-income households

Recommendation

Based on our review of the literature and feedback from interview participants, we recommend that transit agencies develop access to jobs indicators that disaggregate data based on both worker and job characteristics.

The typical access to employment metric is measured as the aggregate of all jobs that can be reached from an origin (place of residence) within a certain time frame. But aggregating all jobs ignores whether a job type and worker characteristics are realistically matched and inflates the opportunities that can be reached by marginalized residents (O'Kelly and Lee, 2005). For instance, a food service worker will likely have a different commute destination than a doctor, but an analysis that evaluates access to opportunity for all populations and all jobs at the aggregate level will obscure differences in accessibility. Segmentation by job type and socio-economic characteristics leads to increased accuracy in measuring job accessibility and better policy decisions.

Our interview analysis further emphasized the importance of differentiating both socio-economic characteristics and job characteristics. One public agency employee stated that agencies "must think of both proximity to transit and jobs and how that differs across income levels [...] and must match low-income jobs with low-income households"

Implementation

There are two methods agencies can use to segment job types. The first is measuring the number of low wage jobs within a certain travel time of low-income workers. This is the approach taken by the Atlanta Regional Commission in their transportation plan. Another method is to segment jobs by industry. We recommend measuring the number of retail, service

(particularly food service), and industrial jobs within thirty minutes of low-income workers. The Boston Region MPO takes this second approach. Both of these approaches to segmentation provide a more accurate evaluation of accessibility (Boisjoly & El-Geneidy, 2017b). To implement an indicator based on job type, Metro can work with the California Employment Development Department (EDD) to develop a custom dataset that includes disaggregated job type and income information for Los Angeles County.

5 RECOMMENDED INDICATOR #5: ACCESS TO HEALTHCARE, GROCERY STORES, AND SCHOOLS VIA TRANSIT IN EQUITY FOCUSED COMMUNITIES

Why

As outlined in the Key Opportunities: Destinations Beyond Jobs section above, both the interviews and literature pointed out the importance of measuring access to destinations beyond jobs. While measuring access to jobs is critical, and what is typically measured, particularly throughout the interviews we repeatedly heard the importance of meeting the needs of people as whole beings, beyond just their role as workers. We also found that there are disproportionate and compounding barriers for people of color, low income, youth, and elderly populations barriers to accessing other key destinations. While there are many destinations and key services that are critical to measuring access to, such as parks and childcare centers, we chose to focus on healthcare, grocery stores, and schools. These key destinations stood out because of the frequency we heard about them from our interviews, as well as their role in increasing access to opportunities in other ways, such as economic mobility and personal health. Additionally, there is relatively easily accessible proxy data for these destinations, making them more easily implementable more quickly, in contrast to, for example, something like childcare where there are a variety of home childcare locations that make that data more complicated and nuanced.

Key Metrics

- Accessibility of healthcare facilities within 30 minutes by transit in Equity Focused Communities
- Accessibility of grocery stores within 30 minutes by transit in Equity Focused Communities
- Accessibility of schools within 30 minutes by transit in Equity Focused Communities

This metric is meant to focus on accessibility not just at typical commuting times for those reliant on public transit. This metric is also focused in Equity Focused Communities (EFCs), which Metro defines as “areas in which at least 40 percent of residents are low-income (earning \$35,000 or less per year), and 80 percent of residents are people of color, or 10 percent of the households do not have a car.”

Data

Since it is difficult to get data on these locations, we recommend using job access data as a proxy. As discussed in the indicator #4, Metro could work

with the California Employment Development Department (EDD) to develop a custom dataset to acquire this data.

Measurement

While there are a number of ways this could be implemented, one option is to create a score based on the number of jobs in each sector, indicating that, for example, if there are many healthcare jobs within a 30 minute transit commute it means it is either a large healthcare facility or there are multiple healthcare facilities accessible, both of which would likely indicate higher access to healthcare services. Additional research would have to be done to determine the correct thresholds for these, but here is an example of how the score could be calculated.

- 1-10 healthcare jobs within 30 min transit commute: 1 point
- 11-30 healthcare jobs within 30 min transit commute: 2 point
- 30-50 healthcare jobs within 30 minute transit commute: 3 points
- Etc.

In this example, we could then utilize this to conclude something like individuals living in neighborhood A neighborhood score 2 in their access to grocery stores and it has increased in comparison to last year. You could also then compare it to other EFC or compare it to a citywide average.

We would recommend calculating this “score” for healthcare, grocery stores, and schools separately. While you could combine these to a total score, it is better to have an rating for each type of location rather than adding them together. Something like a large healthcare facility or large school that employs a lot of individuals could easily make one area score very high, and will make the score difficult to accurately interpret.

Implementation

It is important to recognize that access to key destinations is both a land use and transportation issue, meaning that access to key destinations is determined by both where key destinations are located and where people are able to live, and what transportation options are available. This metric is designed to measure increases in access from both land use changes and public transit improvements. For example, a new grocery store in the neighborhood would increase this metric, as would a new bus route that now allowed people to travel to a shopping center in less than 30 minutes.

This metric also builds on existing Metro work. For example, one of the existing proposed Traffic Reduction Study in the Access to Opportunity set of indicators, includes measuring the number of jobs accessible within 30 minutes of travel time, by mode and by household income. It also builds off of goals in recent Metro customer experience plan, including the goal to “Conduct an analysis to identify areas where NextGen Bus Plan implementation and post-COVID service restoration have improved access for Equity Focus Communities to a wide range of destinations, including jobs, medical centers, and food shopping as well as identify further areas for improvement.” In this way, this metric is meant to help measure progress toward stated goals across the organization to help build buy-in and organizational support.

6 RECOMMENDED INDICATOR #6: VULNERABILITY METRICS DUE TO LAND USE PLANNING

Why

Land use as one of the most fundamental and critical elements of accessibility: Through our literature and plan reviews, we realized there’s an agreement about how land use is the framework that determines the level of accessibility. Specifically, both land use mix and designated land use for particular uses or groups are the basics to create and preserve accessibility. A dense and highly mixed-use community promotes 24/7 activities and local mobility, while affordable housing units protected under land-use policies are essential to keep those benefits within those who are in need. Therefore, when possible, transportation planning and development policies should impact land-use practices at both the local and regional levels within their jurisdictions of power.

VULNERABILITY	INDEX	METRIC CATEGORY	EXAMPLE OF METRICS
Risk-Side	Index of Displacement Risk	Real estate market	Rent level for retails and housing, # of new development project, etc.
		Displacement pressure factors	% of the minority group, % of the low-income household, etc.
		Proximity to high displacement “hot spots”	Proximity to rail stations, proximity to rapidly changing neighborhoods, etc.
Opportunity-Side	Index of Resilience to Displacement	Housing opportunity	# of affordable housing units, average rent level for affordable units, etc.
		Transit opportunity	# of first/last mile projects, etc.
		Other opportunities	# of jobs, schools, groceries, etc.

Current concerns from communities about the impacts of transportation planning and projects: One of the most interesting points raised in our conversations with local CBOs is that while the transportation network itself is necessary, the impact of such planning lacks attention. “It’s good to have transit networks come in and increased accessibility for local residents, but what about when the local residents are eventually gone because of those infrastructures?” The concerns around gentrification and displacement, as we

see in the process of improving transit networks and mobility, are especially great among community members. Therefore, when addressing accessibility, it’s essential to make sure the benefits are realized as planned in the first place.

Agencies’ existing efforts on land use(TOC): MTC has been incorporating land-use models in-house with their transportation models to predict key land-use trends with and without the transportation projects. Here in Los Angeles, Metro has realized the importance of transit communities in addressing today’s mobility and accessibility challenges and has been actively engaging with TOC development within its jurisdiction. Specifically, in partnership with academic institutions and community-based organizations, Metro has planned to develop a TOC Corridor Baseline Assessments in their TOC Implementation Plan. By doing so, they hope to help local municipalities and community individuals better understand the current conditions and the opportunities and challenges presented around transit stations. The baseline includes four general data information: key community socioeconomic vulnerabilities (e.g., lower-income households), mobility trends (e.g., transit ridership), land use opportunities and challenges (e.g., affordable housing vs. low-density parcels), economic and real estate factors (e.g., the opportunities for joint development). This is a good framework where land-use policies and transportation planning intersect and an excellent opportunity to further expand on the access to opportunity initiative.

Metrics and Data

Through the table below, we recommend that vulnerability be measured by two types of index metrics – the risks and the opportunities. High vulnerability means the community has more risks and fewer opportunities. In contrast, low vulnerability means the community has a good balance of risks and opportunities or even more opportunities than risks.

Implementation

Take advantage of existing available data and evaluation framework to reduce the workload and resource-spending:

Metro should adopt existing evaluation frameworks that might be already used by other public authorities or academic research teams exploring displacement issues in the region to ease the potential implementation burdens. Metro’s TOC Implementation Plan has included a critical initiative – TOC Corridor Baseline Assessment – to understand each local community’s specific characteristics and challenges, including socioeconomic vulnerabilities, mobility trends, land use patterns, and real estate markets (LA Metro, 2020). Those factors included in the plan are already capable of providing displacement risk evaluations. However, this baseline assessment framework is very resource-intensive for the LA Metro team, limiting the ultimate outcomes of the effort.

One example of an existing available framework that similarly evaluates the risk of displacement is “Los Angeles Index of Displacement Pressure”, which was previously used by the City of Los Angeles. This particular framework considers income, proximity to transportation investment, proximity to rapidly changing neighborhoods, housing markets, and various displacement pressure factors such as the percentage of renters. The data used under this framework include LA Metro’s internal data, US Census data, city’s open data sources, ESRI data, and other similar ones (City of Los Angeles, 2015), which are open, accessible,

and available to collect. By using existing available data and developing the previously used framework, Metro will see less burden in maintaining the framework in the implementation process.

New projects and investment: use these vulnerability metrics to provide better transparent communication and facilitate the efforts to mitigate displacement risks:

For future new transportation investments and projects, especially rail transits, Metro should use these vulnerability metrics to construct a three-scenario analysis of “before development”, “after development without displacement mitigations”, and “after development with displacement mitigations”. This analysis framework should then be used in three ways. First, Metro should establish a clear and more enforceable threshold of reasonable vulnerability level and use it for future fund allocation when the local authorities’ efforts are involved. Currently, Metro plays an “advisory” role for local cities with recommendations and monetary support for local transit improvement or affordable housing development. With those metrics, Metro should evolve that advisory role into a more “reviewer” role. Second, Metro should apply this threshold in vulnerability level to own efforts in reducing displacement risks and expanding resilience to displacement (e.g., transit projects coupled with joint development projects) before making new infrastructure investment decisions. Third, Metro should use this three-scenario analysis as a way to communicate with the general population by introducing and justifying the impacts of the projects or investments to the communities.

Existing services: use these vulnerability metrics to increase the opportunity to expand displacement resilience:

For existing transit services, Metro should, referencing those metrics, regularly consider small adjustments or updates for their existing services, particularly the bus services that are relatively more flexible, as an attempt to make the network more effective and efficient. Collaboration with the local authorities who design housing and job opportunities would greatly benefit anti-displacement efforts, and Metro should leverage its role in adding and adjusting services to accommodate such efforts. This works well even in the communities with low displacement risks but also low resilience to displacement (i.e., potential future displacement-vulnerable communities). For example, when the city hopes to bring an affordable housing building to the area but no direct transit service in the proximity, Metro should provide adjusted routes and services, or even direct point-to-point shuttle services, that directly connect that property to other networks of transportation, which would further incentivize the locals to build resilience to displacement beforehand.

Consolidate the existing data evaluation framework into one integrated one for the entire county:

Metro should develop one central and integrated data evaluation framework that combines all existing ones so that the collaboration within teams would be easier. On the one hand, some of the current Metro framework and efforts focus on the “project” level. As a regional transportation operator and planner, Metro should focus on regional connectivity, at least from the perspective of data collection and analysis. Another limitation of the baseline assessment framework listed in the TOC Implementation Plan is that it focuses only on Measure M corridors instead of at the regional scale. That is similar to Metro’s

first/last mile efforts, where the measurements tend to focus on that specific station area. On the other hand, Metro should use one framework to measure everything that matters to its practice. For example, Metro established Equity Focused Communities (EFCs), the communities selected based on income, race, and car ownership. This framework would be potentially integrated into the vulnerability index framework as well to limit the distractions when Metro’s internal teams look at different maps and data.

FOR FURTHER CONSIDERATION: MEASURING MICRO MOBILITY AND CAR-SHARE’S IMPACT ON ACCESS TO OPPORTUNITIES

Relatively new concepts that have emerged in public transportation are micro-mobility and car-share services. Services of this sort may present more adaptable and advantageous opportunities and options for transit riders who may have different travel needs. Service of this nature can assist with traveling at a time during limited service hours or traveling with large quantities of items.

In our analysis of transportation plans from other cities, The Greater Manchester Transport Strategy 2040 describes their integrated approach to public transportation for optimal high-quality transit services, which include micro-mobility services. At the same time, some of the community organizations interviewed during the fieldwork portion of our research highlighted the positive impact and practicality provided by services like Metro Transit to marginalized communities and demographics.

As Metro continues to invest in its rail expansion efforts and update the bus network system - services like Metro Micro can make travel more comfortable. Tools like such can also provide safe rides for vulnerable populations who may have physical limitations or face violence at a disproportionate rate, such as women, older transit riders, and people with limited physical abilities.

Because the development and implementation of services related to micro-mobility are still in the test pilot phase - we recommend that further research occurs once more data becomes readily available. Beyond the scope of this report, considering the various facets related to measuring and improving access to opportunities within the micro-mobility framework can garner positive results.

GENERAL BEST PRACTICES

BEST PRACTICE #1: SAFETY

Being specific about what you mean by “safety”

As shared with us during our conversations with public stakeholders, safety has multiple definitions and holds different meanings for different demographics throughout communities in Los Angeles. Using a general definition of safety in relation to transit services, transit accessibility, and access to opportunity fails to capture the diverse needs and concerns of community members and transit riders. Additionally, as detailed in our second recommendation elaborating on the different approaches to safety and perceptions of safety, efforts to address concerns and needs regarding safety in and around public transit must

specifically identify what issue is being addressed and the justification for such an approach. More specifically, based on the feedback we received from our interviews with public stakeholders, we believe that approaches to safety, and the processes behind defining and ensuring rider safety, must be broad and incorporate the experiences of specific demographic groups to ensure that all vulnerable populations have access to transit services and view public transit as a reliable and safe service. Additionally, assessing existing public transportation and active transportation infrastructure, as well as disaggregating survey data/ responses related to safety needs, preferences, and approaches can serve to reveal whose needs are being prioritized and which rider demographics to be more engaged and prioritized in agency planning processes.

BEST PRACTICE #2: DATA

Data Transparency

We recommend that transportation agencies regularly (annually or bi-annually) evaluate their progress against indicators and make both their indicators and progress evaluations publicly available through an easy-to-use website.

One critique we heard through the interview process was the limited amount of publicly available data and the difficulty of interpreting the data. When possible, making all data that informs the implementation and design of specific transit projects and programs publicly available creates another level of transparency between agencies, partners, and communities.

The Bay Area's Metropolitan Transportation Commission (MTC) provides an example of data transparency in practice. The organization developed a publicly available website, Vital Signs, to track the region's performance against the indicators identified through its long range planning process. The website is designed to help MTC and its partner organizations make better decisions through understanding where the region is doing well and where it is underperforming against its goals. It also provides the underlying datasets free of charge to the public, enabling researchers, community based organizations, and others to benefit from MTC's work and develop their own analysis.

BEST PRACTICE #3: REPRESENTATION + ENGAGEMENT

Effective communication about existing programs

Beyond developing indicators, it is just as important for agencies to consider how they design and implement programs to meet access to opportunity goals. Through our interviews, effective communication, outreach, and education emerged as important components to increasing access to opportunity.

We recommend that transportation agencies use multiple strategies and mediums to communicate program information to the public. For instance, interview participants shared that few students know about the existence of reduced-fare programs for students. An agency's ability to increase access to opportunity through programs like reduced-fare initiatives relies on strong education and outreach to ensure people are aware of the initiatives in the first place. To develop a strong education strategy, interview participant Slate-Z suggested that agencies should consider how students connect with

information. They further recommended a holistic approach that is tailored to each sub-group of students.

We also recommend that transportation agencies leverage and cultivate relationships with CBOs to support communication, education, and outreach efforts. However, it is critical that agencies compensate CBOs for their work at an appropriate level and reduce administrative barriers in the contracting process, which place additional strain on CBOs that are already at- or above-capacity.

Representation of community

We recommend that Metro evaluate the composition of its board and staff and make intentional and substantial efforts to ensure that the agency leadership and employees reflect the communities they serve. Several interview participants emphasized that the demographics of Metro leadership and decision makers are not reflective of Metro users, and that increased representation would lead to solutions more aligned with community needs.

Our analysis also indicates that Metro has an opportunity to improve its community engagement. One participant stated that Metro should move away from an "outreach" model, where the agency focuses on informing and educating CBOs of its initiatives with limited opportunities for feedback, and move towards a meaningful engagement process, where CBOs and community members are in conversation with Metro staff. This means that engagement should not be limited to simply one-off meetings, and that Metro should develop and maintain more consistent communication loops throughout all phases of a project—not just at the initial design phase of a project. Communities should also have meaningful decision-making power over the projects intended to serve their communities.

APPENDIX

APPENDIX A: LITERATURE REVIEW

ABOUT LITERATURE AND PLAN REVIEWS

This literature review explores transportation planning metrics related to improving access to opportunity, in order to eventually develop recommendations for Metro, Los Angeles' public transit agency. This review aims to explore the questions: 1. How should transportation agencies define access to opportunity? and 2. With that definition, what metrics can be used to evaluate it?

We first review literature that helps to reveal best practices for defining and measuring access to opportunity in the field of transportation planning. For a variety of reasons, we often observe a disconnect between the defined agency goals, which usually include some version of "improving access" or "equity" and what is actually measured. Therefore, we then do a more in-depth look at how opportunity should be defined and explore two approaches. Approach one is a more place-based approach that looks at specific destinations typically and atypically thought of as places transportation should improve access to, and approach two looks at potential populations for which access might be prioritized.

After reviewing the literature, we then explore what access to opportunity metrics commonly look like in practice in the transportation planning field. We review a number of transportation plans to understand how they define access and how they measure it, and then review existing tools used to measure access to opportunity. Finally, our conclusion aims to identify key themes throughout all the literature reviewed that will inform our recommendations for Metro.

INDICATORS OVERVIEW

This section explores the literature on the conceptual framework of indicators and their definitions. It further explores how indicators are used in transportation planning and how they are applied and implemented when trying to understand access to opportunities within the field of transportation planning.

Available academic literature on indicators in the transportation planning field describes how indicators are used to understand and measure access to opportunities. According to available literature, access to opportunity indicators typically fall within four categories. The cumulative opportunities approach counts the compounding opportunities available to an individual within a specific time frame or distance. The gravity-based approach weighs closer opportunities as more important due to their proximity, despite alternative options existing further away. The utility-based approach emphasizes maximum utility. The constraint-based approach focuses on the set constraints individuals are imposed with and the feasibility of accessing opportunities within that scope (Bhusal et al., 2021).

Indicators are intended to be built and created in collaboration with experts hand in hand with community members from within the geography under consideration. They can be categorized into three indicator types: system performance, policy and program measurement, and rapid feedback (Innes & Booher, 2000). System performance indicators include composite indicators, which are designed using several different measures depending on the subject of analysis and can be used as a diagnostic, performance, and target indicator. This type of indicator can measure a program's effectiveness or diagnose a flaw in a more extensive operating system (Kitchin et al., 2015).

According to the literature, accessibility as an indicator falls short of its underlying purpose to help promote equitable outcomes to the most vulnerable. It does so by focusing on the spatial and temporal

components of travel, instead of the unique experiences that define how individuals interact and engage within said dimensions (Pot et al., 2021).

Pot et al.'s research notes that the focus on space and time overlooks travelers' perception of accessibility, which is often misaligned with accessibility calculations (Pot et al., 2021). This misalignment can be due to several factors, including inaccuracies in traveler awareness. Travelers may inaccurately perceive accessibility for reasons including incomplete knowledge about destination locations and travel options (Pot et al., 2021). Another reason presented is that transportation agencies may inaccurately measure accessibility due to a range of challenges, including flaws in the data, missing or incorrectly represented components, or incorrectly assessing the relevance of opportunities (Pot et al., 2021).

Because people make travel decisions based on their perceptions of accessibility (Pot et al., 2021), this research suggests that practitioners seek solutions to align accessibility measures with traveler perceptions of accessibility to improve access to opportunities effectively. Indicators typically measure accessibility through a temporal dimension emphasizing physical mobility as the critical element of importance. However, with data that incorporates riders' individual experiences such as satisfaction, the ability to produce a comprehensive analysis for accessibility can present a better-defined picture encompassing the various experiential dimensions commuters experience (Chaloux et al., 2019). By understanding how those perceptions affect and influence riders' decisions, transportation planners can incorporate user-focused data to help direct system-wide decision-making towards a more effective, efficient, and equitable transportation network.

HOW IS OPPORTUNITY DEFINED?

In this section we dive into the critical question of how we define opportunity.

ACCESS TO WHAT? (DESTINATION APPROACH)

This section looks at research that focuses on what destinations are most important to consider when evaluating access to opportunity. We evaluate the understanding of access to jobs, parks, school, and healthcare through looking at the importance of improving access to that destination, unique barriers or challenges to accessing the destinations, and how it has been measured. By understanding the role and barriers to accessing critical destinations, we can better understand if we should prioritize metrics related to specific destinations.

Jobs

Job access is one of the destinations most frequently talked about and measured. Here we aim to review research that goes beyond how job access is typically measured, which is by distance/proximity to job centers and transit fares. In their journal article, Dong Liu and Mei-Po Kwan bring awareness to the importance of measuring individual and household income when measuring overall job accessibility. By proposing the use of measurements that turn travel time, transit fare, and income into a single comparable unit, they sought to find how job accessibility differs for low-income and non-low-income individuals with the new measurement. In identifying access to opportunity indicators, income as a metric to measure job accessibility must be considered to provide a clearer picture of the total travel monetary costs associated with job access (Liu & Kwan, 2020).

Research also reveals other considerations beyond distance and proximity to measure job accessibility, specifically emphasizing the importance of competition for jobs. When looking at accessibility to jobs by education level, one study found that competitive measures are particularly relevant in measuring access to jobs for populations with lower educational attainment, and recommends competitive accessibility as critical to accurately measuring job accessibility (Merlin & Hu, 2017). Metrics used for an analysis of competition for jobs focus on the monetary and opportunity costs that are associated with travel and commuting, including those such as income, travel time, and transit fare.

Furthermore, research by Shen analyzing the Boston Metro Area found that although low income and less educated populations may be spatially concentrated closer to city centers where job opportunities have historically been centralized, similar job seekers with a vehicle who may live further out in the city's peripheries can access more jobs than those living closer within the city who do not have access to a private vehicle. This is an important distinction because although public transit and alternative modes of transportation may be integrated within the city core, the fact that workers from outside the immediate area can access more opportunities than workers already within the city indicates a disconnect between the services being provided by transit agencies for workers and the experiences of workers in seeking and finding employment (Shen, 2001).

Parks

Access to parks is an important factor in quality of life and has been associated with increases in physical activity, improved health, reduced stress, and stronger community connections (Bedimo-Rung et al., 2005). Thus, it is important that transportation agencies measure and evaluate park accessibility, and do so in a multi-dimensional way. Agencies should measure a combination of factors such as distance, travel time, transportation mode, facility characteristics, and perceptions of distance, park quality, and neighborhood environment. In terms of distance, access is often defined as being no more than a quarter mile from all key destinations (ie. residential areas, parks, jobs, shopping centers etc.) (Lund, 2003). While most research focused on park access focuses on the lack of green spaces in historically disinvested communities of color, issues around park access are also inherently tied to barriers to travel (Changing Lanes: A Gender Equity Transportation Study, n.d.). Most research around park access typically focuses on active modes of transportation as a means of reaching green spaces, while important, travel mode is dependent on one's proximity to their destination (Patel et al., 2021).

In terms of measuring access, the two-step floating catchment area method is a popular strategy. This strategy identifies areas that are underserved or close to access capacity by incorporating supply and demand. However, it assumes that demand relies on distance. Dony et al. (2015) assert that the two-step floating catchment area method provides an incomplete assessment. Their research makes clear that both travel mode and facility characteristics also play an important role in park access. To capture this broader definition of access, Dony et al. (2015) developed a Variable-width Floating Catchment Area (VFCA) method to model park attractiveness as a function of its size and number of amenities, and then further compares accessibility by bicycling, driving, public transit, and walking (Dony et al., 2015). Further, another study points out the psychological aspect of park accessibility, noting that it is derived from the perception of distance, park quality and the neighborhood environment. Authors note that these could be measured quantitatively or qualitatively, and point to a need to improve multiple factors beyond simply increasing the number of parks in order to improve accessibility (Park, 2017).

In 2018, Neighborhood Data for Social Change found that the County of Los Angeles has a median of 3.3 acres of park space per 1,000 people, well below the median of 6.8 acres per 1,000 people in high-density regions. Out of 262 neighborhoods in LA County, 41 have less than 1 acre of park space per 1,000 people. The demographic makeup of these neighborhoods ranges with respect to average median household income. However, it was also found that the wealthier neighborhoods that lack park space also typically have larger properties with more spacious yards, allowing for opportunities for neighborhood recreation, exercise, and socializing that often occurs in park spaces. In contrast, lower income areas often lack any access to outdoor recreation due to the presence of dense, auto-oriented infrastructure (Los Angeles Is Short on Parks, Ranking 74th Out of 100 Cities, 2018).

Although the need for park access - particularly equitable park access - is clear, few government agencies measure and track park accessibility in practice. We found one example of measuring park access within Chicago Metropolitan Agency for Planning's ON TO 2050 Long Range plan. This plan aims to ensure that 65 percent or more of the region's population has access to four or more acres of park space per 1,000 residents and that 40 percent or more of the region's population has access to ten

or more acres of park space per 1,000 residents (Chicago Metropolitan Agency for Planning, 2018). To measure this indicator, the Chicago Metropolitan Agency for Planning uses data from its most recent land use inventory (2013) and the U.S. Census (2010). The Chicago Metropolitan Agency for Planning (2018) further elaborates that “a subzone’s population is considered to have access to any park acreage within a half-mile radius of the subzone’s centroid, and additionally to any park acreage in “community parks” (larger than 35 acres) within a one-mile radius.” Their plan notes stark disparities in park access between the region’s Economically Disconnected Areas and the rest of the region. However, it falls short of setting specific targets for residents in economically disconnected and disinvested areas. Based on our research, agencies should consider the multi-dimensional nature of park accessibility beyond just distance, as well as differences between demographic groups and their experience of park accessibility. We elaborate on demographic differences in the section below, “Access for Who?”

School

Primary Modes of Transportation for School Aged Children: Research efforts on young people’s access to school is often tied to efforts identifying common factors in active transportation to schools (ATS) and how to improve active transportation infrastructure around schools. The implementation of Safe Routes to Schools (SRTS) programs revealed urban form as an indirect impact on a child’s commute to school. The built environment shapes parents’ opinions about the ability of various transportation options needed to commute to school (Stewart, 2011). Similar to factors of distance/proximity in accessing green spaces through active transportation, school-related travel mode is also determined by one’s proximity to their destination. Findings from research that examined various metrics including car ownership, household size, and annual household income found that children from socioeconomically disadvantaged communities were more likely to use active transportation as a means of traveling to school. These results may be because of limited financial resources or fewer transportation options. Similarly, households with fewer schedule constraints and more time to spare were more likely to use active transportation to get their children to school (Stewart, 2011).

Unique Barriers: A study analyzed transit ridership traits amongst Millennials, born between 1980 and 2004, and found that people born within these years are more likely to use public transit. There are many reasons, primarily based on lower incomes and where they lived. The study’s findings suggest that 41 percent of low-income households prioritized living in central city areas because there are transit-rich neighborhoods (Brown et al., 2016). In addition, the study found that transit use amongst teens and young adults was more frequent than older adults, as riding public transit use declined until about age 70. Finally, the findings show that transit ridership is highest for those between 16 and 24 due to “life cycle factors” such as being a student, not yet having children, and having lower incomes (Brown et al., 2016).

This is significantly important when understanding travel patterns amongst youth and younger adults, especially for students. A separate study found that across the United States public transit has served as an alternative to conventional student transportation, such as the yellow school bus. A series of strains have made providing yellow school buses challenging for most students, such as high costs in fuel, school choice, and open enrollment which require more complex routes (Vincent et al., n.d.). In addition, the Federal Mass Transit Assistance Act of 1974 has shaped funding as it states federal funds cannot be used for public bus services exclusively for students (Vincent et al., n.d.). The “tripper rule” resulted from this law and established restrictions to federal funding so that federal-funded buses would not pose competition to privately operated buses. The tripper does not limit transit agencies, as they can use extra services on regular routes to accommodate student demand but cannot solely provide services to students (Vincent et al., n.d.). While the federal government has instituted safety regulations, it also has limited funding through its policies. Leveraging public support for transit projects has been successful in cities with pilot programs. In places like Oakland, Boston, and Washington, DC, which have high levels of transit, communities supported transit subsidies used to fund student programs. The programs emphasized better transit service, and communities understood transit’s role in reducing traffic congestion.

Healthcare

Who faces transportation barriers to healthcare: Transportation is a well documented barrier to accessing healthcare. In 2017, 5.8 million people in the United States, 1.8% of the population, delayed medical care because of lack of transportation. This number has continued to grow due to suburbanization of poverty, the aging baby boomer population, and the general increase in population (Wolfe et al., 2020).

Much of the literature about healthcare access and transportation is focused on specific types of healthcare, such as prenatal care, cancer treatment, or youth care, with each population revealing unique barriers and potentially subsequently unique metrics. For example, one review of 61 studies revealed those with lower incomes or those who are underinsured or uninsured face higher barriers to healthcare (Syed et al., 2013). Another study revealed that those facing transportation barriers to healthcare are more likely to be older, poorer, less-educated, female, people of color, and people with chronic illnesses or disabilities (Wallace et al., 2005). Patients who are homeless, people with young children, chronically ill patients, public housing residents, people with disabilities, and pregnant women were all reported to be disproportionately negatively affected by transportation barriers (Wolfe et al., 2020).

Distance to healthcare locations is also often commonly cited, with varying results based on what population and destinations the study was focused on. For example, a study looking at cancer patients receiving their first chemotherapy treatment showed that distance to the facility was not a significant factor, while another study showed that patients that traveled more than 15 miles to healthcare were more likely to be white, male, college educated and had higher incomes, (Syed et al., 2013), indicating the importance of diving into demographic data when evaluating the impact of distance.

Modes and Barriers: Similar to the research evaluating the other key destinations, what transportation modes are accounted for plays a big role in measuring access. Some research suggests that vehicle access is positively associated with the ability to get to health facilities, even after controlling for socioeconomic status (Wolfe et al., 2020), and another showed that for low socioeconomic status adults in Atlanta, walking or public transit was an independent predictor of not having a regular source of care (Syed et al., 2013). Another study found that multi modal measurement methods are more accurate particularly in urban areas where there is more heterogeneity (Mao & Nekorchuk, 2013).

Implications and Metrics: The research around healthcare access and transportation makes it clear that there are transportation barriers to accessing healthcare, but the extent of it varied greatly potentially based on healthcare needs, modes of transportation, demographics, and the related barriers. The importance of both having that level of specificity and measuring this is critical though, particularly because of the compounding impacts of missed healthcare (one missed appointment often means the illness progresses, and a missed appointment sometimes means you are denied future appointments), and the disproportionate impact of transportation barriers on historically marginalized populations. Therefore, in thinking about measuring access to healthcare it seems that a more specific approach would be required in order to develop metrics that accurately reflect the information they are intending to reveal. For example, while a lot of research in the access to opportunity field does focus on transportation, Wallace et al. points out that how “transportation disadvantage” is specifically defined is critical. With the definition of “any household that does not own a vehicle” that amounts to 8.3% of all households in the United States. In the US, 26.5% of households with incomes less than \$20,000 do not own a vehicle and are far more likely to use public transit and non motorized modes (Wallace et al., 2005).

ACCESS FOR WHO? (PEOPLE APPROACH)

This section looks at research that focuses on specific groups of people that may experience different or disproportionate transportation barriers to access opportunity due to their positionality. Considerations include demographic characteristics such as race, age, gender, income, and ability. Looking at this literature we aim to understand both the unique travel patterns and transportation challenges uniquely

experienced by particular demographics. By understanding the needs of the people transportation agencies attempt to serve, we can better understand the metrics most appropriate for them.

This approach also brings to light the importance of acknowledging and understanding the historical context of land use and exclusion in the US. For example, disaggregating regional and urban populations in the field of transportation planning is important considering that transportation infrastructure and projects have historically favored more privileged and wealthier populations. This has in turn burdened communities of color and low-income communities with the brunt of new developments. One of the many examples of this type of socio-political occurrence noted in the research describes the ways in which Black and Latinx men were more likely to experience policing in transit stations, particularly those located within areas experiencing gentrification (Johnson & Patterson, 2021).

Older Adults

Travel Behavior and Unique Characteristics: A review of 19 studies looking at the travel patterns of older adults in car dependent environments revealed that the number of trips they take and the distance decreases, especially after 75 years old, but car dependency continues except after 85. The population of older adults born after World War II specifically relies on cars and travels more for social and shopping trips, while work trips decrease (Cui et al., 2017). When looking at older adults' travel behavior in highly walkable environments, the key destinations were also shopping, entertainment, and social. In contrast two third of trips were made by active modes and 22% were by car (Winters et al., 2015). However, travel patterns are also impacted by other factors in addition to age and location. For example, older adults are likely to ride transit more often if they are male, nonwhite, and low income (Hess, 2009).

Transportation Barriers and Challenges: There is extensive literature trying to understand the transportation barriers challenges older adults face, and while their specific conclusions vary, they generally reveal there are personal situation factors, built environment factors, and factors related to specific characteristics of the available transportation mode. One study categories the barriers into 1. Individual level: including both socio-economic factors such as gender, age, residential location as well as individual factors such as having a disability, having children nearby, or lack of vehicle access, 2. Neighborhood level: including built environment characteristics such as building and street density, land use mix, and destinations, and 3. City or regional levels including characteristics like land-use intensity, level of urbanization, and distance to public transit stations (Cui et al., 2017). Another study categorized the barriers into (1) transportation service: affordability, accessibility, availability and acceptability, lack of transportation options, service coordination, (2) built environment: safety and walkability; (3) social environment: language barriers and lack of information; and (4) individual attributes: being able to drive, walk, and "ask someone for a ride" (Dabelko-Schoeny et al., 2021).

Modes: Many studies also focus on how access to specific modes of transportation impact older adults' mobility. In terms of car access, older adults who don't drive and don't live with a driver are the most likely to report transportation challenges, followed by non-driver who live with a driver, and then older adults who drive (Weeks et al., 2015).

Implications + Importance: Older adults often have more limited mobility, potentially demonstrating that if public transit serves their needs well in terms of physical environment, it's likely that the needs of other people with mobility limitations, such as people with disabilities or families with young children will also benefit. In contrast, because destinations are unique, looking at metrics related to opportunity access for older adults only will likely leave out critical understanding of things like access to jobs. For older adults, similar to what we see in the other groups and destinations outlined here, it is clear that compounding factors of personal situation, built environment, and available transportation are integrated and it would be inaccurate to measure one without the other.

Gender

This section goes into more depth about the transportation barriers to access to opportunity specifically related to gender because of 1) The intersections at which women riding transit lie, as they are more likely to be low income, caretakers, and face disproportionate barriers if they are people of color and low income, and 2) because two recent reports completed by LA Metro and LADOT took an indepth look at the transportation barriers women face providing specific insight into the Los Angeles context. Further, looking at gender based differences is critical because most existing research confirms that women bear a disproportionate share of a household's transportation needs, while also having less access to transportation. Women make up more than half of Metro's existing riders and more than half of Los Angeles County's population (Understanding How Women Travel, 2019). We acknowledge that looking at gender issues beyond the male/female binary is critical, though most research talks about it this way. We used the language used in the study we are referring to, and included a dedicated section of research that does explore the unique experiences of transgender and gender nonforming individuals.

Travel Behavior and Modes: The LA Metro report revealed that women ride transit because they do not have a car, have a desire to avoid traffic, or because they do not have a license (Understanding How Women Travel, 2019). Women are also less likely to use active transportation modes than men (Changing Lanes: A Gender Equity Transportation Study, n.d.). This demonstrates that women ride transit because they have fewer transportation options and, therefore, potentially less access to economic opportunities, pointing to the importance of improving public transit particularly for this demographic. Women are also more likely than men to utilize multiple modes of transportation in one day, and are also more likely to make multiple stops, called trip chaining. Women are making many more trips than men per day, shorter trips, and to a wider range of destinations, and trips that are more likely to serve the needs of others in comparison to men. Women in Los Angeles are more likely to travel mid-day, with the peak of travel being around 2pm when transit service is often less, and 57% of women bring their children on transit (Understanding How Women Travel, 2019).

In terms of land use, survey respondents in a neighborhood with a wider mix of destination types used a bigger variety of modes of transportation and were more likely to use active transportation than respondents in neighborhoods with fewer destination types. Further, in the neighborhood with fewer destination types, men were more likely to be able to access daily destinations within their neighborhoods than women were. In all neighborhoods, women were more likely to have longer grocery stores trips than men were (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Barriers to Transportation: The barriers to travel that the LADOT report identifies included fewer women having drivers licenses, safety concerns depending on neighborhood, lack of destinations nearby in specific neighborhoods, and lower access to smartphones and computers compared to men (Changing Lanes: A Gender Equity Transportation Study, n.d.). After safety, the Metro study identified the physical design of transit spaces, financial barriers for transit tickets for themselves and those they are caring for, challenges of traveling with kids, and the travel needs of women with disabilities as the main barriers to accessing transportation, pointing out that any small difference in physical needs, such as having a stroller, significantly impacts how the system works for you

Women were more likely to report that transportation was a barrier to recreation trips compared to men, and recreation, for both men and women, are most common trips not taken due to transportation barriers (Changing Lanes: A Gender Equity Transportation Study, n.d.). Women are more likely to live in car-free or car light households (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Safety: In the Metro study, safety on transit was reported as a top concern across all modes of data collection, with 60% of female transit riders reporting they feel safe on transit during the day, and only 20% feeling safe at night, with even fewer feeling safe waiting at stops and stations. Survey participants agreed that additional lighting at stops and on the way to stations, an increase in service frequency especially at night to decrease wait times, and the presence of security staff would make them feel safer. However, the focus groups, workshops, and pop-up events revealed more complex views of security

staff, with some participants expressing that police were slow or ineffective at responding to issues, and others expressing that police were too aggressive. The report also mentions that despite the increase in law enforcement over the years, this is still a major concern (Understanding How Women Travel, 2019). Further, LADOT study participants that identified as Latinx, Black, or Asian were more likely than those that identified as white or other races to report feeling unsafe while riding transit (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Built environment: In neighborhoods where destinations and opportunities are more spread out in low and medium density neighborhoods, the focus should be put on improving transportation modes that are more suited for long distance trips like car and public transit. In neighborhoods with more destinations, higher density mixed use neighborhoods, improving walking, biking, and other active modes is recommended. Because women tend to trip chain more, improving women's access to drivers licenses and cars through partnerships with agencies and CBOs is recommended. In low and medium density neighborhoods, land use changes are recommended, in partnership with the planning department, to ensure that destinations that women frequent, such as grocery stores, libraries, clinics, recreation opportunities, childcare facilities, and essential services (Changing Lanes: A Gender Equity Transportation Study, n.d.). This recommendation demonstrates the importance of different metrics and goals based on the density and land use of the neighborhood, and potentially points to a more nuanced and site specific approach.

Transit Service: Transit service itself can also be better adapted to the travel needs of women. The LADOT report recommends things like designing point-to-point weekend transit services that connect women caregivers in low-income neighborhoods directly to recreation and open space destinations such as the beach. Other recommended service improvements partnerships for van and car sharing programs in low-income BIPOC neighborhoods (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Race: In a recent report on gender and transportation in Los Angeles conducted by the Los Angeles Department of Transportation (LADOT), survey results indicate that Los Angeles' transportation system fails to serve women transit riders adequately. In particular, this affects BIPOC women that face race based barriers to safe and accessibility transportation related to historic disinvestment, racist housing and zoning practices, and economic disenfranchisement (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Income: Both the LADOT and Metro reports demonstrate the disproportionate financial burden of transportation on women. The LADOT report notes the significance of income, as high-income women are able to use money to address or avoid gender based travel issues (Changing Lanes: A Gender Equity Transportation Study, n.d.). The Metro report notes that female Metro riders are also more likely to have lower incomes than male riders, with 59% of female bus riders living below the poverty line compared to 50% of male bus riders. Since existing public transit often does not meet the transportation needs of women, they end up relying on more expensive transportation options, often referred to as the "pink tax" (Understanding How Women Travel, 2019). This understanding also points to the fact that understanding and measuring the financial burden of transportation for women is likely to also improve the financial burden on other low income populations.

Data: Similar to other demographics discussed, the availability of data related to gender is critical. At Metro, some of the data collection methods, such as the On-Board Survey, include gender information, but other datasets, such as ridership counts, do not include gender information. Further, even though the data is collected in some instances, prior to the Understanding How Women Travel Report, Metro did not disaggregate its data by gender. Further, the report also makes use of additional qualitative data collection measures in addition to the existing data to provide a more nuanced understanding (Understanding How Women Travel, 2019). The LADOT report recommends ensuring that data collection efforts include gender or perceived gender, race/ethnicity, and other intersectional categories like income, ability, and age, as well as involving CBOs involved in gender, race, sexuality, age, and disability advocacy are involved in identifying key issues related to mobility (Changing Lanes: A Gender Equity Transportation Study, n.d.).

Transgender and Gender Non-conforming Individuals: It is notable to mention that neither the LADOT nor Metro report looking at gender and transportation attempted to explore how barriers may be similar or different for transgender riders. The Metro report mentioned that one of their surveys, the Metro Bike/Bus Study Survey did have 15 responses from transgender individuals, out of 2451 responses, but excluded these responses due to the small sample size (Understanding How Women Travel, 2019).

While there is significant research looking at the unique gendered barriers women face in transportation, there is less research looking specifically at transgender and gender nonconforming individuals. While the presence of gender based harassment in public spaces is widely acknowledged, there is little ongoing measurement of or protection against it, particularly for transgender and other gender minority individuals. Even when measures are put in place to reduce discrimination based on gender identity, they are often limited to realms like housing or employment, but rarely protect against discrimination in public spaces like transportation. A study looking at discrimination in Massachusetts found that of the 65% of respondents that reported discrimination in public spaces, transportation was the most reported setting (Reisner et al., 2015).

In another study in Portland builds on the concept of transmobilities, "the ways that the normalization of violence toward transgender and gender non-conforming people affects their mobility," going beyond gendered mobilities that interrogated mobility limitations women experience in public spaces and on public transport. 22 of the 25 participants, all of whom were trans and gender non-conforming, reported reported negative experiences waiting for or riding public transit, and highlighted the "captured" nature of transit in that riders felt vulnerable and exposed waiting at bus stops as well as when on transit vehicles with no where to escape to. Participants frequently cite harassment from other passengers, passerbys, and from transit employees. The report also pointed out the role of intersectionality, with those presenting as white men experiencing less harassment, and those assumed to be higher income able to choose other modes of transit. Recommendations proposed include driver training and education around avoiding misgendering passengers, understanding the unique challenges gender minorities face when riding transit, and understanding when and how to intervene, as well as public messaging that include visuals of gender nonconforming individuals in advertising and public messaging and bystander intervention campaigns. The study also acknowledged the larger systemic, social, and cultural changes that are needed to address transphobia, which may seem like they are outside of the jurisdiction of a transit agency, but should be viewed as potential outcomes of agencies making visible and formal commitments to the right to mobility and justice for all passengers (Lubitow et al., 2020).

Metrics and Implications: Because men and women both the travel behaviors (like trip chaining, traveling with children) and unique barriers women, transgender, and gender non-conforming people face (like safety concerns, less car access), evaluating metrics by gender is critical to get a clear understanding of how access is changing overtime. This research also points to the importance of qualitative data that can provide more nuanced understanding particularly for topics around safety, gender and race, where both the environment in which the data is being collected plays a big role in what participants share.

Disability

Importance and Travel Behaviors: The importance of community participation — defined as access to employment, education, healthcare, and recreation, social, and spiritual activities — is well documented for individuals with disabilities. However, the US Department of Transportation data estimate that 15 million people face challenges accessing adequate transportation services, and people with disabilities make up 40% of that group. People with disabilities travel less frequently and rely on public transportation more (Bezyak et al., 2020). For jobs specifically, in the US it is estimated that the employment gap is more than 41% between those with and without disabilities (Maisel et al., 2021). Because of the barriers faced when using fixed route public transit, and because of ADA regulations, Paratransit service is often implemented, providing a door to door transportation service for those

with disabilities (Maisel et al., 2021). A national survey of people with disabilities found that the most common means of transportation was personal vehicle (32.3%), followed by fixed route bus (18.4%), ADA paratransit (18.2%), and riding with others (16.4%) (Bezyak et al., 2020).

Unique Barriers: It is well documented that people with disabilities face many transportation barriers that lead to increasing isolation and limited mobility. In a national survey of people with disabilities, the majority of respondents experience challenges using public transit (Bezyak et al., 2020). Insufficient level of service and inaccessible routes to stops and stations are the primary barriers (Maisel et al., 2021)

Barriers also vary greatly based on disability, including various physical barriers, barriers in drivers attitudes and understanding of disabilities, challenges being alerted to stops, service animal concerns, and difficulty navigating complex transit systems. Those with mobility disabilities, blindness or low vision psychiatric disabilities, speech or communication disabilities, and those with chronic health conditions or multiple disabilities were more likely to report transportation challenges (Bezyak et al., 2020). Those with intellectual and cognitive difficulties most commonly cite difficulty navigating complex trips as a barrier (Maisel et al., 2021). Barriers also vary based on where individuals live, pointing to the need for context specific interventions (Maisel et al., 2021). Further, activities that occur on an irregular schedule, such as doctors appointments, are more subject to transportation difficulties compared to regularly scheduled travel, such as work (Bezyak et al., 2020). In a study specifically looking at the barriers people with disabilities face in riding fixed route transit, individuals with mobility impairments consistently rated environmental factors as most important to deciding on transit mode compared to schedule related factors (Maisel et al., 2021)

Role of Gender and Race: The intersection of disability, gender, and race is also increasingly identified in the literature. According to data from the National Household Travel Survey, 7.5% of women reported that a medical condition that limits their travel, compared to 5.5% of men, which, combined with access to licensing, leads women to be more dependent on Access Services than men. In a report looking at transportation barriers for women in Los Angeles, Access Services were reported to be a critical service but operated in a way that devalued women's time, with a single trip for a single purpose often taking hours or an entire day (Understanding How Women Travel, 2019). From the perception perspective, women with disabilities were more likely to report that they perceive less equal access to transportation than others, in comparison to what men with disabilities perceived (Bezyak et al., 2020). In a national study, specifically for fixed route public transit, non-white participants reported more frequent barriers to getting to work and school, with Hispanic, Latino/a, or Spanish origin survey participants reporting a significantly higher frequency of problems accessing all community participation activities (Bezyak et al., 2020). These disparities between both access and perceptions of access point to the potential need to disaggregate data further by not only disability but also race and gender to get an accurate picture of access for these populations.

Metrics and Implications: Agencies often attempt to improve transit access for those with disabilities by either implementing more rigorous paratransit eligibility determination policies, and therefore reducing the number of people reliant on them, or by addressing factors that create barriers for people with disabilities to ride fixed route public transit. The main driver for this is cost when transit agencies are determining how to provide legally required or desired access to transportation for individuals with disabilities, with paratransit trips often costing agencies 3.5 times fixed route trips (Maisel et al., 2021).

Aspects mentioned like paratransit wait times, ADA accessible stops, stations, and vehicles are often measured. However, more recently agencies have started to focus on first/last mile improvements to the built environment to improve the journeys to and from transit stops or stations, a key barrier identified. In general, it is difficult to measure some of these built environment barriers, but some are seeking new technological methods to do so. For example, one team is using a combination of crowdsourcing and machine learning to gather data on sidewalk conditions, with the potential to both inform improvements and track progress, but also to inform transit riders with disabilities to help them better plan (Maisel et al., 2021). Further, it is also to consider metrics around the often less talked about non-built environment barriers mentioned, like difficulty navigating complex transit systems and schedule concerns.

Race

Race is an integral part of every facet of life in America, affecting people's individual experiences across their lifespan. In the field of transportation, research shows that whites have the highest share of driver trips and private vehicle share and the lowest transit and walk shares compared to all other racial and ethnic groups (Giuliano, 2003). According to this research, Black and Hispanic people have some of the lowest travel distances compared to white people, possibly due to a more significant percentage of low-income families living close to one another, an assumption which stems from a correlation analyzing the demographic composition of census tracts (Giuliano, 2003).

According to Golub and Martens, decisions within transportation planning related to geographic landscape, although attempting to operate through a race-neutral decision-making framework process - fail to account for the inexorably engrained racialized context through which land has historically been obtained (Golub & Martens, 2014). That is to say - historical legacies of land dispossession have facilitated transit agencies to develop and deliver transit that benefits wealthier communities by connecting them to the city from the suburbs while plowing through black and brown communities with disregard and lack of accountability on the basis of regional development and the benefits associated with it.

Furthermore, access to transportation continues to be characterized by highly racialized policing practices affecting black and latinx riders at a larger rate compared to their white counterparts. According to Johnson and Patterson, in geographies like Los Angeles, where sports and entertainment stadiums have been recently developed, there is an overwhelming policing presence at nearby train stations that overwhelmingly target Black and Latinx riders as the community goes through a demographic change, formally referred to as gentrification (Johnson & Patterson, 2021)

Immigrants and Immigration Status

Immigrants are a unique demographic to observe when considering access to opportunities due to their contribution to urban growth in the last decades. According to Chatman and Klein, immigrants contribute significantly to population growth in urban areas. It is reported that migrant workers are three times more likely to commute by transit than US-born workers and 50% more likely to carpool. The authors note that in California, foreign-born persons account for half of all transit passengers, and recent growth in transit is almost entirely due to the usage of migrant workers. Although migrants account for a high proportion of public transit riders, research finds that migrants may experience discrimination which discourages long-term reliance on public transportation (Chatman & Klein, 2009). Complimentary analysis by Bohon et al. notes that although public transit can be highly beneficial for migrants in larger urban areas, migrants in rural areas are typically unable to depend on it due to limited operating hours and constrained geographical operations (Bohon et al., 2008).

According to Bohon et al., migrants typically have fewer personal vehicles due to financial constraints. The Bohon research reveals that cars are expensive to maintain, and when migrants purchase a vehicle, it's often unreliable. Furthermore, access to driver's licenses, insurance premiums, and avoidance of interacting with public law enforcement are additional factors that deter migrants from driving (Bohon et al., 2008). Additionally, when a vehicle is available, it is typically used by men who tend to work in "better paying" construction or manufacturing jobs.

According to Chatman and Klein, carpooling may be more prevalent within migrant worker networks because it offers the car owner a way of reducing the cost of owning a car and can potentially serve as a supplemental income source (Chatman & Klein, 2009). However, it should be noted that limitations and restraints for workers within this innovative transportation system arise. According to Bohon, although migrant workers do benefit from carpool ride sharing with colleagues, the connotation behind the idea of carpooling, which can be associated with an economic or environmentally alternative by middle-class workers, does not apply. This is because the drivers often depend on or require that fellow workers contribute financially. It also limits people's ability to access different work opportunities or education

and training outside of the organized carpool route, further hindering opportunities for jobs, housing, education, and upward social mobility overall (Bohon et al., 2008).

Bohon's research found that social service programs provided by the government, such as support programs for teen mothers, were successful when they provided transportation vouchers for taxi cabs as opposed to other program services and resources that did not offer any remedy to the transportation disconnect (Bohon et al., 2008).

Recognizing that migrants are one of the most reliant and heavily dependent demographic groups which transit agencies attempt to serve - consideration for their unique transportation needs and usage patterns have the capacity to inform decision making processes to address both access inequities and agency deficiencies.

BIKING, WALKING, AND MICROTRANSIT

This section explores research about the impact that differing modes of transportation - such as cycling, walking, and micro-transit - have on access to opportunities. These alternative modes of transportation are typically used by people who don't own cars or choose not to drive. Typically people who can't afford to buy or maintain a car depend on less expensive alternatives to cars such as buses. Although public transportation does have to some degree the capacity to service low income travelers, access to bus and train stops can at times be too far from travelers and restrained operating hours might not align with the needs of the traveler.

Common concerns within active transportation encompass issues that affect both cycling and walking transportation modes. According to Agyeman & A. Doran, the issue of racial profiling in the form of disproportionate cycling and walking citations can serve as a barrier for BIPOC and Undocumented/ migrant commuters from participating in active transportation (Agyeman & Doran, 2021). Furthermore, according to the literature, disadvantaged groups benefit from active transportation the most due to cost effectiveness, however - they tend to experience more dangerous conditions when engaging in mentioned activities as compared to their more affluent counterparts. For example, the research finds that fatality rates for cyclists are 23% higher for Latinos and 30% higher for African Americans compared to their white counterparts. For people walking, the research notes that for every 100,000 people less than one person is killed compared to 1.4 Latinos, 1.74 African Americans, and 4.52 Native Americans (Agyeman & Doran, 2021).

Biking

For many individuals in urban regions cycling can be a feasible alternative to private vehicle use. Although costs associated with cycling for utilitarian purposes tend to take the brunt of the financial hit at the initial purchase of a bicycle and its associated accessories, cycling as a mode of transportation is not free of biases or implications for different demographics.

Through a block group analysis, L.M. Braun et al. found that block groups with bike lanes were significantly different from those without them across socio demographic composition. When considering access to opportunities, the authors found that block groups with bike lanes had less Black and Latinx residents, they were more "educated", and reported being of a higher socioeconomic status (Braun et al., 2019). This is particularly noteworthy considering the fact that people from lower socioeconomic status tend to benefit the most from using alternative means of transportation to those of a personal vehicle. According to Bill's and Walker, in communities like the San Francisco Bay Area, high income travelers derive much more of their utility gains from auto and transit modes, meanwhile low income travelers gain significantly more utility from walk and bike modes (Bills and Walker).

Furthermore, research by Agyeman & A. Doran revealed cycling specific concerns and barriers that deter lower-income and BIPOC transit users from participating in cycling as a mode of transportation. They include concerns surrounding theft, bike parking and storage, and cost (Agyeman & Doran, 2021).

Cognizant of cycling specific hurdles that discourage commuters from incorporating cycling as part of their trips, transit agencies can identify ways in which they can intervene to close equity gaps of access to opportunities through this alternative transportation mode.

Walking

According to Segar et al. when analyzing the perceptions of walking among low-income mothers, walking as a compulsory form of transportation appeared to have a negative connotation and stress individuals forced into relying on it as a form of primary transportation. While doing research on how to better frame and promote walking, it was found that low-income urban mothers who use walking as an instrumental purpose, had to opt for it out of necessity because they didn't have access to a car or public transportation (Segar et al., 2016).

An issue that arose through the analysis was the lack of walkable sidewalks and feeling unsafe - citing threats such as: dogs, shootings and drug sales. Another theme that arose was the ability for walkers to relate to one another, in this case - assuming others walking for utilitarian purposes also lacked the financial resources to own and travel through use of a private vehicle. It is noted in the research that walking by obligation can also undermine women's well being. The authors note that women's demeanor in walking when no other form of transportation was accessible to them, serves as a form of bridging the gap between the resources a mother has and the responsibilities she must endure (Segar et al., 2016).

With this regard, walking is considered by far one of the most accessible forms of transportation. It is imperative for transportation planners and agencies to recognize the impacts that the decisions they make when designing or arranging transportation within communities can have on enabling and promoting walking. By analyzing the various limitations and factors faced by compulsory walkers, transit planners can help bridge the gap between individuals and opportunities while simultaneously encouraging the practice of walking as a method of transportation.

Micro Transit and Shared Micro-Mobility

With the advancement of technology and the increasing needs in flexible transportation options, micro-mobility and micro-transit, especially provided by transportation network companies or TNCs, have gained more popularity. In 2019 more than 136 million trips were made on shared micro-mobility in the US, a 60% increase from the previous year (National Association of City Transportation Officials & the PeopleForBikes Foundation, 2020). Although ridership varies, many transit agencies across the U.S. have provided micro-transit services (Westervelt et al., 2018).

Increasingly Important Role to Fill in the Gaps of Overall Mobility Network

On the one hand, the existing fixed-schedule and fixed-route transit networks have their limits in covering a whole range of service areas, which, in turn, makes car travel more necessary in those transit deserts. On the other hand, riders are constantly looking for affordable but flexible transportation options. Micro-transits and shared micro-mobility that provide services over shorter distances and through flexible routes and times are becoming more vital in completing existing transit networks. The shared transportation options are able to complete existing transit services by providing services outside the operation hours of public transits (Westervelt et al., 2018). As a result, the travel times may be saved, while the overall travel costs remain affordable. In Dallas County, TX, the trips with under 20-minute travel times made up 91% of all trips in 2019, increased from 85% in 2014, which was associated with the increased number of people taking GoLink micro-transit services provided by Dallas Area Rapid Transit (Kang & Hamidi, 2019). Increased mobility is undoubtedly helpful in promoting greater accessibility to key destinations that current networks have already supported. Mobike, a dockless bike-sharing platform

in China, doubled accessibility to key destinations such as workplaces, health centers, and schools by providing such services within 500 meters of exiting public transits (Zarif et al., 2019).

In addition to the expanded service coverage of existing transit networks, the nature of micro-transits and, especially, shared micro-mobility is being flexible, which is enabled by technology (app-based). So, they usually require less financial and operational commitments from the transit agencies and TNCs. There was a higher rate of support from lower-income groups for dockless micro-mobility (i.e., e-scooters), as they think the existing dock-based mobility infrastructure is more likely to be placed disproportionately in wealthier communities (Populus Technologies, Inc., 2018). The equity implication of such new mobility options is important and reinforces its potential in addressing the fair distribution of accessibility to opportunities for all individuals.

Barriers to Expand and Access Such Networks

While the promising benefits of shared micro-mobility and micro-transits encourage the agencies and the TNCs to develop such networks, there are many barriers for such networks to be accessed as well. The very first barrier is the “requirement” to use those mobility options. Many of those services require the riders to have access to digital platforms via mobile phones and data connectivity, which is potentially challenging for some groups of people without such capabilities (Westervelt et al., 2018). The second challenge is the even distribution of such services. Both shared micro-mobility and micro-transits are demand-based service models, meaning the areas with higher demands are more likely to receive those options. Existing dockless micro-mobility infrastructure is disproportionately concentrated in downtown LA and the westside communities, and approximately 64% of such riders are identified as male (LADOT et al., 2021). Another challenge is the pricing mechanism of those services. The prices are not fixed and fluctuate according to real-time demands. Demand-driven mobility options such as bike-share or ride-share are more likely a barrier for mothers because of their pricing (LADOT et al., 2021). The last challenge is to consider the “audience” of those services. Like all other transportation options, the micro-transits and shared micro-mobility may not lay within the interests of particular groups of riders, thus limiting its ability to provide mobility supports. In the case of the Utah Transit Authority’s micro-transit services, the survey concluded that the majority of the riders are younger adults and large-size households, while other groups of people, especially older riders, have less interest in riding micro-transits (Macfarlane et al., 2021).

IN PRACTICE: HOW IS ACCESSIBILITY DEFINED AND MEASURED IN TRANSPORTATION PLANS?

This section moves from academic research into practice, and reviews what access to opportunity indicators look like in various transportation plans. The importance of looking at the plans is to understand 1.) How is the organization defining access to opportunity: What access barriers have transportation agencies identified in their respective regions? Do specific populations disproportionately experience greater access to opportunity barriers? What is being done to address these barriers?, 2). How are they measuring the defined access to opportunity goals?, and 3) What implementation measures are they taking to improve access to opportunity?

DEFINING AND MEASURING ACCESS TO OPPORTUNITY

How are agencies talking about access to opportunity?

A review of 32 transportation agency plans by Boisjoly and El-Geneidy revealed that the majority of agencies use location-based measures focusing on entire populations and regions. Such a broad approach ignores differences in accessibility among particular demographic groups, neighborhoods, and walking or biking (Boisjoly & El-Geneidy, 2017b). In addition, a Brookings Institution report authored by (Boisjoly & El-Geneidy, 2017a) found that agencies cite accessibility as a vision, goal, or objective in their

plans but do not specify how they are defining ‘accessibility’. In our own review of various transportation plans, we also observed that many agencies mention improving accessibility and access to opportunities as broader visions of their work, but do not provide a working definition or measurement for what they are talking about.

Measures by Mode: A survey conducted by Boisjoly and El-Geneidy found that of 343 practitioners in North America and Europe, measures of access by public transit were common practice in agencies that used access to opportunity indicators, perhaps due to the availability of data such as General Transit Feed Specification data. Few practitioners, on the other hand, incorporated accessibility measures for walking and cycling (Boisjoly & El-Geneidy, 2017a). This is a particularly important finding because improvements to biking and walking infrastructure may provide low-income travelers with greater utility. A Bay Area study by (Bills & Walker, 2017) found that high income travelers received greater utility from improvements to auto and transit travel modes, while improvements to active transportation provided low income travelers with greater utility relative to high income travelers.

Access to Destinations: In order to holistically measure access to jobs, agencies should evaluate segmentation by socioeconomic group or job type. The Atlanta Regional Commission measures accessibility of low-income jobs, while the Boston Region MPO includes access to industrial, retail, and service jobs. This level of segmentation provides a more accurate evaluation of accessibility (Boisjoly & El-Geneidy, 2017b). While most agencies with access to opportunity indicators evaluated access to jobs, few included other destinations such as access to parks, healthcare, schools, and fresh food (Boisjoly & El-Geneidy, 2017a).

Travel Cost Measures: None of the agencies assessed in Boisjoly and El-Geneidy’s 2017 study used financial costs of transportation as an indicator. Yet, measures that account for both financial costs and travel time more accurately capture accessibility (Boisjoly & El-Geneidy, 2017a).

Mobility vs. Accessibility Measures: Many transportation agencies use mobility-related indicators, such as travel time for different modes, as a proxy for accessibility (Boisjoly & El-Geneidy, 2017a). However, it is important to underscore that mobility, although a component of access, does not equal accessibility. In fact, focusing on improving mobility alone can lead to reduced accessibility over time. For example, roadway expansions may improve both mobility and accessibility in the short term, while induced demand leads to sprawling development and lower accessibility in the long term (Boisjoly & El-Geneidy, 2017b).

Examples

While numerous plans are missing fleshed out definitions of accessibility, many have well-thought out goals and objectives that are rooted in improving accessibility to jobs, healthcare, recreation, greenspace, and other resources. Moreover, accessibility analyses conducted by transportation agencies differ depending on their goals and objectives. Analyses can take the form of project assessment, scenario assessment, regional evaluation, and equity analysis.

Transport for London (2006) presents seven performance indicators with accompanying metrics that are used to evaluate models and potential projects. Out of the seven performance indicators listed, only two indicators directly address improving accessibility: (1) “Improvement in employment accessibility” (2) “Improved access to employment from deprived areas” (Transport for London, 2006). This first indicator is measured by the change in the number of jobs that can be accessed within 45 minutes on public transportation while the latter is measured by percentage of residents in the city’s top 10% under resourced areas who can access “international and metropolitan centers” within 45 minutes on public transportation (Transport for London, 2006). Despite these well-thought out indicators and metrics, Transport for London (2006) does not specify what constitutes a ‘deprived area’ which would help situate what populations of people have historically been overlooked by policymakers and planners.

The Southern California Association of Governments (2016) 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy measures mobility and accessibility together through person delay per capita, person delay by facility type, and travel time distribution for work and non-trips by mode. The SCAG framework considers mobility and accessibility to have improved if there is a reduction in person delay per capita (measured by daily minutes of delay), a decrease in overall travel time for people traveling in cars, and an increase in the percentage of PM peak trips that can be completed within 45 minutes for transit users and drivers.

The Los Angeles County Metropolitan Transportation Authority (2020) explains that improving access to opportunity means providing “better transit closer to jobs and homes, and supports small businesses, local economies, and families”. While the Los Angeles Regional Transportation Plan does not provide detailed accessibility indicators and metrics, it states that the investments directed to transportation will increase the percentage of activity centers and jobs within a 10-minute walk or roll to fixed guideway transportation to 60% and 50% respectively (Los Angeles County Metropolitan Transportation Authority, 2020). LA Metro is also considering different strategies that recognize affordable housing, financial accessibility, small businesses, and the regional workforce as crucial components of pursuing access to opportunities (cite Lewis center). While many plans focus on traditional ways to measure access to opportunities, LA Metro is considering how land use and income impact access.

How are plans approaching access in practice?

Although there are gaps in how plans are defining and measuring access, agencies are planning projects that pursue broader goals and visions of improving accessibility. We found it important to look at some of these goals, visions, and projects to get a better sense of how these agencies are approaching accessibility in practice. The sections below detail how some agencies are pursuing their visions and goals through strategic focuses on housing, multimodal transportation, and connectivity. One particular finding we encountered was that many agencies have yet to highlight the specific populations that encounter greater barriers when trying to access their destinations.

Housing and Multimodal Transportation: A common access to opportunity barrier noted across numerous transportation plans is the lack of housing, particularly affordable housing, within close proximity to public transit. As housing continues to become less affordable in cities, people have had to move farther away from city centers where quality public transportation options are not as accessible. The Singapore Land Transport Master Plan 2040 (LTMP 2040) details the Land Transport Authority’s (2020) goal of a ‘45-minute city’ with ‘20-minute towns’, in which walk-cycle-ride peak-hour commutes to work are no longer than 45 minutes and walk-cycle-ride trips to neighborhood centers are no longer than 20-minutes. The (Land Transport Authority, 2020) is working to locate jobs closer to homes through the development of new employment centers outside of the central business district through the expansion of its rail and transit priority corridor networks. Active transportation facilities, as noted in this model, also play an important role in facilitating access to employment opportunities, education, healthcare, parks and recreation, and transit. The Singapore Land Transport Authority (2020) has set a goal to add 700km (434.96 miles) to the city’s bicycle path network by 2030 and 1000km by 2040. Through the ‘45-minute cities’ and ‘20-minute towns’ framework, we see that in order to effectively improve access, we must think at multiple geographic scales and consider multimodal approaches.

Plan Bay Area 2050 presents three overarching goals for their strategies to encourage equitable housing development through the framework of ‘growth geographies’ - Priority Development Areas (PDAs), High-Resource Areas (HRAs), and Transit-Rich Areas (TRAs) (Metropolitan Transportation Commission & Association of Bay Area Governments, 2021). PDAs are areas with frequent transit service and employment opportunities that can accommodate more housing and job growth while HRAs are communities that have high-quality education and accessible jobs and recreational spaces (Metropolitan Transportation Commission (Metropolitan Transportation Commission & Association of Bay Area Governments, 2021), 2021). TRAs are areas in which 50% of the community is within a half-mile of transit with a 15-minute or less service frequency (Metropolitan Transportation Commission & Association of

Bay Area Governments, 2021). Through identifying these has identified target areas to connect jobs, housing, and other resources to existing high-quality transit services.

Intra-urban Connectivity: Poor connectivity is a significant accessibility barrier. Some transportation agencies are focused on addressing gaps in connectivity and integrating transit services to facilitate easier access to destinations for transit users. The Greater Manchester Transport Strategy 2040 (Transport for Greater Manchester, 2021) focuses on passenger experience on transportation as an accessibility determinant, noting that travelers are disincentivized from taking public transportation if they cannot access their destinations in an intelligible and direct route. Transport for Greater Manchester (2021) is approaching this issue through a framework that views bus, rail, and tram services and their respective facilities as one network rather than separate modes to improve integration. Collaborating with private transportation providers such as taxis, rideshare, and micro mobility providers is another approach Transport for Greater Manchester (2021) is taking to improve network connectivity and intraurban access for passengers. Lastly, the agency presents its ‘Spatial Themes’ that consider connectivity at multiple scales (Transport for Greater Manchester, 2021). The themes include ‘a globally connected city’, ‘city-to-city links’, ‘getting into and around the regional center’, ‘travel across the wider city region’, ‘connected neighborhoods’ (Transport for Greater Manchester, 2021). Accessing Manchester’s regional center requires “specific transport needs”, as noted by the agency, that differ from other trip types (Transport for Greater Manchester, 2021). The technical approach used to plan transportation to the city’s center will differ from that used to provide access to healthcare facilities, neighborhood centers, and educational facilities (Transport for Greater Manchester, 2021).

Further Considerations

As we move forward in our study of access to opportunities, we plan to speak with transportation agencies and learn more about how they are moving from plan to practice. We’d like to learn more about the ways in which agencies are centering historically disenfranchised and overlooked populations in the way they define, measure, and implement access. Transport for London is one agency that has already begun to comprehensively consider different access needs for travelers.

The (Transport for London, 2016) Action on Equality report looks at how customer experience impacts access and highlights the experiences of underserved populations including elderly, people with disabilities, BAME (Black, Asian, and Minority Ethnic), and women travelers. Key findings from the report include:

1. Travelers with disabilities and elderly residents of London make fewer trips than those who aren’t elder or without disabilities because they do not have as much access to travel information. Disabled and elderly travelers also experience difficulty getting priority seats on transportation because many riders are unwilling to offer up their seats.
2. While 92% of travelers without disabilities in London used the bus within the past year that the report was written, only 79% of travelers with disabilities used the bus. Transport for London (2016) undertook a bus shelter modernization program to ensure that 95% of the city’s bus stops were accessible for all travelers by the end of 2016.
3. BAME (Black, Asian, Minority Ethnic) communities have less awareness of bike sharing and cycleways as transportation options because of poor outreach and promotion of active transportation infrastructure.
4. Women and people who identify as BAME (Black, Asian, Minority Ethnic) have reported that safety and security on buses and trains at night as well as “antisocial behavior” from other riders are two pressing factors that impair access. Women also experience a disproportionate amount of sexual harrasment in public spaces and on transportation.

IN PRACTICE: WHAT TOOLS ARE USED TO MEASURE ACCESS?

This section dives deeper into the actual tools used to measure access to opportunity. We find that for practical and operational reasons, available data and tools often drive agency decisions and goals, rather than the other way around. It is critical to have a solid understanding of this practical side of the equation.

THE ROLE OF ACCESSIBILITY INDICATOR TOOLS (“AIT”) IN PRACTICE

With the increasing availability of urban data and constantly changing dynamics of urban issues, effective, efficient, and equitable planning decisions related to accessibility could greatly benefit from accessibility indicator tools (AITs). An AIT is a tool that provides knowledge on accessibility to practitioners in the domains of planning and mostly consists of computer models using data to interpret and represent knowledge (Marco te Brömmelstroet et al., 2014). Transit agencies play a wide range of roles in transportation planning including planning the network, funding projects, and operating the systems. AITs are especially helpful in these endeavors because they have the ability to help facilitate the workloads of such tasks. AITs are able to support practitioners with regulatory compliances and requirements (TransitCenter, 2021), grant applications (Federal Transit Administration (FTA), 2013), measuring scenario impacts and outcomes (TransitCenter, 2021), increasing productivity (TransitCenter, 2021), and visualizing data for better communication (Carey Curtis & Jan Scheurer, 2010). On the other hand, AITs make it more possible and easier to engage with the intersection of land use and transportation planning, leading to more comprehensive decisions and practices. AITs are “highly cross-sectional” in taking many planning impacts into the functionality of the tools; with such abilities, they are able to achieve the purposes of transportation system management, social and economic equity, economic development, and many others (Angela Hull et al., 2013). In addition, the adoption of AITs facilitates the research and development of accessibility through communications between various stakeholders. AITs are available through various services in the market, including private entities, research centers and organizations, as well as agencies. They also share some common data sources such as US Census, General Transit Feed Specification (GTFS), Census Transportation Planning Products Program (CTPP) (TransitCenter, 2021). The tools are generally very customized to the specific needs of the agencies and other users. To achieve this goal, the developers of the tools (the “scientists”) and the users (the planners) work collaboratively to expand accessibility research and development.

THE ISSUES BROUGHT BY ADOPTING ACCESSIBILITY INDICATOR TOOLS (“AIT”) IN THE PRACTICE

Working with AITs also helps planners gain a better understanding of accessibility and its metrics and indicators. First, equity is one of the most fundamental elements when evaluating accessibility. Fair access to various opportunities across geographic regions and demographic groups embodies the concept of equity (TransitCenter, 2021). Second, there is no single and most appropriate model to measure accessibility, and the diversity of factors being used by various AITs inform the planners what to consider. AITs adopt a variety of parameters, including transportation modes (e.g., car travel, public transit, walking, etc.), trip destination (e.g., work, education, shopping, etc.), users (e.g., urban planners, transportation planners, developers, etc.), and they are modeled according to a different understanding of accessibility (e.g., spatial separation, gravity-based, utility-based, etc.) (Angela Hull et al., 2013). Third, human-centric data are essential to the evaluation. Most accessibility metrics are evaluated based on objective and quantitative data (e.g. GIS data), but the expectation and experiences of people are missed from such data (Angela Curl et al., 2015). Fourth, accessibility is a result of land use and transportation, which requires an integrated evaluation of those two dimensions. The concept of accessibility is actually about “the efficacy of the system in getting to and from the destinations”

(TransitCenter, 2021). Lastly, planners should consider the accessibility impacts across the spectrum of time depending on what elements of accessibility are addressed. In addressing equity goals, accessibility metrics and indicators are better in the short term because most advocacy groups expect equitable outcomes in the near future (TransitCenter, 2021).

FINDINGS FROM LITERATURE AND PLAN REVIEW

STATE OF INDICATOR AND TOOLS BEST PRACTICES

While exploring the extensive body of literature regarding the current state of indicators in relation to the concept of access to opportunities, the literature provided a thorough understanding of the lack of accessibility indicators. Through our analysis, we conclude that accessibility indicators should have the capacity to comprehensively capture, measure, and direct transportation planning practices encompassing the equity aspect of accessibility to opportunities. Concurrently, the literature notes an emphasis on the application of both spatial and temporal measurements to accessibility while often overlooking experiences of transit riders and the decision making processes influencing the manner through which they access certain opportunities.

Access to what?

When looking at access to opportunity through the lens of access to specific destinations, we found that while job access is a commonly used metric, both for its importance and for relative ease of access of information, more nuanced measures beyond distance to job centers is required in order to accurately understand job access for the heterogeneous nature of populations. For example, what mode of transportation they have access to or their level of education will also impact their access to jobs. Similarly to jobs, research about evaluating park accessibility reveals that it is difficult to measure by just one metric, and instead consideration of things like transportation mode, as well as things like gendered and racialized barriers to access is critical. School access, while also highly dependent on distance, transportation mode, and economic status, has additional complications relating to perceptions around youth safety, school schedules, childcare, and school choice factors that impact distance. The research related to healthcare access revealed similar trends about the importance of both distance and mode, but presents itself with particular importance because of the vast disproportionate barriers historically disenfranchised groups face, and because of the compounding negative health impacts of facing transportation barriers to necessary appointments.

Overall, when focusing on access to specific destinations, most research points to the complexity of evaluating this given so many compounding factors, the importance of accounting for a variety of modes, and an understanding of social, economic, and demographic factors that may need to be considered in order to be able to disaggregate the impact or access provided for particular communities.

Access for who?

When looking at literature that focuses on who has access to opportunity, the impact of both historic disinvestment in both transportation, racialized land use/location barriers, and access to wealth all continue to play a strong role in access to opportunity today. We see that taking a more people centric approach reveals vast disparities in access to specific destinations based on things like race, gender, and age, and that a nuanced approach that includes the role of perception is important.

Current state of access to opportunity in planning practice

When looking at metropolitan transportation plans and reports, we found that transportation agencies use location-based measures to assess accessibility. We also found that many agencies use the terms ‘access’ and ‘accessibility’ vaguely when discussing their visions, goals, and objectives for their regions but do not take further steps to define and measure access and accessibility. The literature notes that

when access is measured by mode, researchers found that the utility provided by each mode differs by one's income level. Similarly to measures by mode, when measuring access to jobs, we must consider income as well as job type to get a more holistic view of where people are traveling.

The financial cost of transportation is an indicator that is widely underused by agencies, while travel time is used commonly although it is more reflective of mobility rather than access. Mobility and access are frequently conflated in transportation plans and although mobility is an element of access, increased mobility does not signify increased access. Out of the plans that we reviewed, employment accessibility, person delay per capita, distance from fixed guideway transit, and travel time were common indicators used to measure access.

In practice, agencies are focusing their efforts on increasing the supply of housing in close proximity to quality public transportation and active transportation facilities. Improving intra-urban connectivity through a more integrated network is another area of accessibility in practice. By viewing the transportation system as one large network composed of multiple modes, planners can implement strategies to integrate different modes at different spatial scales.

Lastly, we found that transportation plans do not go into depth about the access challenges and barriers that underserved and historically excluded populations face. Such barriers further reinforce the inequities in our transit systems while placing constraints on mobility and opportunity for many.

Accessibility Indicator Tools (AITs)

Accessibility indicator tools (AITs) are computer models that help planners make informed decisions regarding issues of accessibility and equity. They assist planners with regulatory compliances and requirements, grant applications, decision making, and visualizing data by providing data from various sources including the US Census, the General Transit Feed Specification (GTFS), and the Census Transportation Planning Products Program (CTPP). AITs can be accessed through private firms, research centers and organizations, and transportation agencies and are usually tailored to the specific needs of the user. In practice, AITs provide planners with data that help them better understand accessibility through metrics and indicators. AITs consider transportation mode, trip destination, and users to assess accessibility within the respective geographic context that planners are working in. These tools are informative resources that assess the effectiveness of transportation systems by considering outcomes produced by land use and transportation and can help the access to opportunities team's evaluation of what accessibility means and looks like in Los Angeles County.

THEMES AND IMPLICATIONS

What this means moving forward for our project, defining our scope, key themes we learned:

Destination versus people approach

In looking at the literature through both a destination and people approach, we noticed that while interrelated, it is important to acknowledge that each approach has distinct strengths and weaknesses influencing the capacity of analysis. When trying to understand access to a destination, the approaches tend to focus on spatially where the destinations are located relative to transportation networks. When analyzing access to opportunities through a more people-first perspective, themes of unique and particular experiences come about depending on the demographic being analyzed. This is a crucial element of analysis since people are not able to be divorced from their personal identities and the various facets that contribute to that composition. In a highly racialized society interactions between people, and between people and places are highly related to the perceptions they have of themselves and the perceptions others have of them. The historical context of racism, classism, and sexism within US society generally, and within land use and transportation more specifically, further contributes to the need to analyze access to opportunities with a nuanced understanding. Overall, simply looking at destinations or particular demographics will not provide a complete picture of access to opportunity.

Importance of mode in determining access

Another theme that was recurrent throughout the literature was transportation vulnerability (Patel et al., 2020) which denotes one's lack of access to transportation. Transportation vulnerability has a profound impact on quality of life as it affects an individual's social life, educational outcomes, finances, and health. Specific populations of people disproportionately experience transportation vulnerabilities because of income, age, gender identity, documentation status, and physical ability. As we move forward with our project, we find it important to focus on populations who experience greater access barriers with transportation modes.

Limited mobility: Improving public transportation and micro mobility options can expand access for those who may not be able to drive because of mobility disabilities, blindness or low vision, speech or communication disabilities, psychiatric disabilities or chronic health conditions. People with limited mobility and physical disabilities have reported experiencing challenges on transit systems, so we must think about how we can provide alternative services like micro mobility as well as retrofit existing transit to make it more accessible.

Income, Race, and Gender: Households without the financial resources to purchase or maintain a car rely on public transportation. We'd like to further engage with how active transportation and micro mobility can serve as affordable primary modes of transit or improve first/last mile connections to transit. Literature from LADOT and LA Metro highlighted important intersections between income, race, and gender, specifically that women experience disproportionate financial burdens from transportation and use active transportation less than men. LADOT found that BIPOC women also experience additional transportation barriers due to historic disinvestment from BIPOC communities and economic disenfranchisement (Changing Lanes: A Gender Equity Transportation Study, n.d.). Transgender and gender nonconforming people experience gender based harassment and discrimination on transit and public spaces, thus agencies need to identify strategies to combat transphobia. We must further consider how to address the financial burdens, racialization, and violent gendering of transportation spaces regardless of mode.

Immigration status: The literature noted that many migrants living in large urban areas have less access to vehicles because of financial constraints and less access to driver's licenses because of documentation status. Furthermore, many individuals prefer not to drive to limit interactions with law enforcement. Other literature found that carpooling is a common form of transportation used within migrant worker communities because it is a more cost effective way to access destinations.

Land Use

Land use laws and zoning regulations are an essential component to understanding access to opportunities for communities across Los Angeles County. Land use is defined as the "general location and density of housing, business, industry, open space, public buildings... and other facilities within a community" (Strategic Opportunities to Create a Healthy, Equitable Land Use System in Los Angeles, n.d). Land use is a critical component to determining one's access and proximity to housing, jobs, schools, parks, and social services. Inadequate and inequitable land use decisions perpetuate inequities in access and mobility. Much of the research we reviewed pointed out how differences in density and destinations within neighborhoods impact access to opportunity for community members. Historically underfunded and under-resourced communities are disproportionately impacted by land use decisions, often resulting in inadequate access to basic needs services and resources, poor air/environmental quality, and limited mobility options. In their report, the Healthy, Equitable, Active Land Use (HEALU) network details the impacts of not engaging community members and those with lived experiences in navigating Los Angeles' landscape in land use and development processes. (Strategic Opportunities to Create a Healthy, Equitable Land Use System in Los Angeles, n.d). As it relates to our research, land use intersects with and shapes community access to jobs, transportation, and other health-promoting resources.

Data

Another key theme identified throughout our literature review was the importance of data, including these key points:

Importance of collecting demographic data and disaggregating data: We found that while transportation barriers to accessing destination in many cases disproportionately fell on populations based on demographics like race, gender, age, or income, when data is collected by transit agencies the associated demographic data is not always also collected. In cases where it is also collected, it is not always analyzed in a disaggregated way. Because it is well established that transportation barriers disproportionately impact different demographics, disaggregating the data provides a much more accurate picture of access.

Limitations to existing data and tools: Agencies often rely on what's available to lead decision making rather than ask what data they need to answer desired questions. Even if access is defined and goals are set, there are often limitations in both the data already available to the agency and the tools used to measure and model impact over time.

Qualitative vs quantitative data collection: Reviewing studies that took both quantitative and qualitative approaches, revealed differences in findings between more quantitative metrics like multiple choice surveys in comparison to more qualitative tools like focus groups. For example, when looking at how women would feel safer on transit, surveys pointed to increased security presence, but focus groups provided more nuanced insight into the limitations and cautions around increased policing. It is therefore critical to think through what level of nuance and context our recommended metrics are able to provide, and to be realistic about the meaning of the findings.

Safety

Considerations regarding safety as it relates to accessing opportunities was present within the literature. Our review of the available research and transportation plans noted the ways in which particular demographics have significant distinct concerns regarding the issue of safety.

For example, the Metro "How Women Travel Report" highlights the various safety concerns women experience and consider when traveling such that only 20% of female riders feel safe commuting at night, with an even smaller portion of that feeling safe waiting at stops and stations (Understanding How Women Travel, 2019). Immigrants also consider safety in terms of traveling in ways that limit the experience of discrimination on public transportation (Chatman & Klein, 2009). Although these are only two instances, it is imperative that safety be at the forefront of advancing access to opportunities for the most vulnerable populations.

Perception

The notion of perception as it relates to accessing opportunities and deciding what transportation mechanism to use came about early on in the literature review. In this regard, the perception of how users might experience transportation to certain destinations influenced their decision of traveling using a certain type of mode. Although considerations do occur at a very personal level, it is important to understand how those decisions and perceptions are formulated in the context of the consumer experience. One of the most prominent issues within perception was the disconnect between the services being offered by transit providers and the consistency and frequency that riders perceived to be able to access (Pot et al, 2021).

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