Micromobility Regulations and Permitting Equity Synthesis

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Contents

Introduction

Equity in Shared Micromobility Systems

Shared micromobility systems are fleets of micromobility devices (small, low-speed, human- or electric-powered transportation devices) available to the public for shared use. Devices may be located at fixed docking stations or distributed within the operation area as part of dockless systems. Shared systems typically require a smartphone application to access and pay for devices.

Shared micromobility can help advance equity in transportation systems by providing safe, healthy, affordable, and reliable transportation options for local trips, potentially filling unmet travel demands. It can also help connect users to other transportation options (such as public transportation) that may otherwise be challenging to access, such as in areas where public transportation is not within a walkable distance.

To ensure shared micromobility contributes to a more equitable transportation system, it is critical to actively address potential barriers for underserved and disadvantaged populations. These barriers may include, but are not limited to:

- Lack of outreach to and engagement with underserved and disadvantaged populations in planning shared mobility systems;
- Lack of safe, micromobility-friendly infrastructure throughout operation area;
- Lack of safe, accessible infrastructure and/or transit accessibility at and beyond the operation area boundary to further extend network reach;
- Lack of pricing structure affordability;
- Lack of access to payment and trip options for unbanked individuals and individuals without a smartphone;
- Lack of availability of adaptive devices for people with disabilities;
- Inequitable distribution of devices across the network; and
- Inequitable enforcement.

Executive Order 13985 defines equity as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved and disadvantaged communities that have been denied such treatment.

Transportation equity aims to facilitate social and economic opportunities for underserved and disadvantaged communities and populations by removing barriers and increasing access to safe, affordable, and reliable transportation options.

One method to address some of these potential barriers is through regulations and permitting of shared micromobility systems, which is the focus of this synthesis.

Role of Regulations and Permitting in Equitable Micromobility Systems

The U.S. Department of Transportation (USDOT), and particularly the Federal Highway Administration (FHWA), plays a role in compiling, coordinating, and sharing information related to micromobility, but it also regulates some aspects of its use. For example, 23 U.S.C. 217(h) limits most micromobility devices (other than e-bikes) from using sidewalks and nonmotorized shared use paths and trails and 23 U.S.C. 206(a) prohibits electric vehicles from using nonmotorized trails funded under the Recreational Trails Program even if regular bicycles may be permitted. Federal land management agencies also regulate the classes of e-bikes allowed on Federal lands.

State governments play a role in regulating some high-level aspects of micromobility (e.g., defining micromobility vehicle types, maximum speeds, age requirements, and license and registration requirements). For example, there is a bill currently under consideration in the California Legislature that would prohibit riders under 12 years of age from using e-bikes and set an intention to create an e-bike license program that would require an exam and State-issued identification for anyone without a valid driver's license. However, only 7.3 percent of 44 State DOTs surveyed in 2021 reported having any shared micromobility equity policies at the State level, 65 percent do not collect micromobility data, and 95 percent are not involved in regulating operations of shared micromobility systems. According to the same study, 23 percent of surveyed State DOTs required micromobility users to wear helmets and 28 percent have minimum age requirements (National Academies of Sciences, Engineering, and Medicine (NASEM), 2022c). Given this information, it is clear that local jurisdictions play the most prominent role in defining and implementing shared micromobility regulations and permitting practices that can help advance equity in transportation.

The Shared-Use Mobility Center's Micromobility Policy Atlas reports on micromobility regulations and policies from across the globe, including in U.S. cities. Table 1 (below) summarizes the Micromobility Policy Atlas's findings on U.S. cities that include equity considerations in their regulations and permitting. This list has not been verified as comprehensive nor current as of 2023; however, it provides an interesting snapshot of the different approaches that jurisdictions are using to advance micromobility equity through regulations. Visit the Micromobility Policy Atlas to learn more about each of these cities' equity requirements. Similarly, the University of Oregon's U.S. Micromobility Equity Requirements Dashboard, funded through the National Institute for Transportation and Communities, summarizes and visualizes seven micromobility equity requirements for micromobility programs in the U.S., including reduced rates, cash and smartphone alternative options, adaptive vehicle options, multiple languages, geographic distribution, and targeted outreach and marketing. The dashboard (as of October 2023) lists 237 micromobility programs in the U.S., of which 71 programs (around 30 percent) are required to deploy, operate, and rebalance devices in underserved communities while only 12 (about 5 percent) are required to have adaptive vehicle options. Visit the Dashboard to learn more about these equity requirements and to view more data about local regulations across the U.S.

Table 1. Snapshot of City-level Micromobility Equity Requirements from the Micromobility Policy Atlas

City	Regulated Mode	Regulation Year and Type	Summary of Requirements
Atlanta, GA	Scooter	Local ordinance or statute (2018)	• Vehicle distribution (Equity Zones) • Unbanked and non-smartphone access options
Austin, TX	Bike	Departmental guidelines, checklists, or administrative rules without force of law (2018)	• Outreach to underserved neighborhoods • Low-income payment options • Non-smartphone access option
Chicago, IL	Bike / scooter	Permit requirements for pilot program (2018)	Bike: • Rebalancing requirement • Monthly reporting on impacts to people with disabilities • Unbanked and non-smartphone access options • Community education and outreach

City	Regulated Mode	Regulation Year and Type	Summary of Requirements
			Scooter: • Unbanked access options • Community education and outreach • Hiring plan to employ historically disadvantaged residents *(optional)* • Goals to contract with minority and women-owned businesses *(optional)* • Local hiring and hiring from local job placement programs *(optional)*
Denver, CO	Bike / scooter	Permit requirements for pilot program (2018)	Bike and scooter • Unbanked and non-smartphone access options • Discount programs • "(High) Opportunity Area" distribution
Indianapolis, IN	Bike	Local ordinance or statute (2018)	• Fleet distribution in "Access Zones"
Los Angeles, CA	Bike / scooter	Permit requirements for permanent program (2019)	Bike and scooter • Unbanked and non-smartphone access options • Low-income payment options • Reservation options • Reporting on outreach and education activities • Increased fleet cap for operation in disadvantaged communities
Milwaukee, WI	Bike / scooter	Permit requirements for pilot program (2018)	Bike and scooter • Vehicle distribution
Minneapolis, MN	Scooter	Local ordinance or statute (2018)	• Vehicle distribution
Portland, OR	Scooter	Departmental guidelines, checklists, or administrative rules without force of law (2019)	• Rebalancing requirements • Fee structure based on vehicle distribution
Raleigh, NC	Scooter	Permit requirements for pilot program (2019)	• Vehicle distribution (communities of concern) • Unbanked and non-smartphone access options • Low-income payment options
San Diego, CA	Bike / scooter	Local ordinance or statute (2019)	Bike and scooter • Reduced fees for operators with low-income programs (including discounts, distribution, and/or unbanked and non-smartphone access options)
San Francisco, CA	Bike / scooter	Permit requirements for permanent program (2019)	Bike • Low-income payment options • Multilingual website, call center, and mobile app • Vehicle distribution (low-income communities) • Unbanked access options Scooter • Low-income payment options

City	Regulated Mode	Regulation Year and Type	Summary of Requirements
			• Accessible mobile apps and customer-facing technology • Adaptive scooter plan (including demonstration of community input)
Santa Monica, CA	Bike / scooter	Permit requirements for pilot program (2019)	Bike and scooter • Low-income payment options • Incentives for low-income or disadvantaged users *(optional)* • Unbanked and non-smartphone access options *(optional)*
Seattle, WA	Bike	Permit requirements for permanent program (2018)	• Community outreach and education • Vehicle distribution (Equity Focus Areas) • Equity Plan • Fleet cap increase for adaptive devices for people with disabilities
Washington, DC	Bike / scooter	Permit requirements for permanent program (2019)	Bike and scooter • Low-income payment option • Unbanked access option • Marketing in Equity Emphasis Areas

Purpose and Scope

This synthesis summarizes current literature and examples related to regulations and permitting approaches intended to advance a more equitable transportation system through the availability of shared micromobility options in communities. It also seeks to identify through literature review potential unintended impacts of regulations and permitting and the evaluation tools and methodologies in use to define and measure the equity impacts of regulations and permitting practices. In addition to summarizing research findings, this synthesis identifies current gaps in research and knowledge around the role of regulations and permitting in creating equitable transportation systems through shared micromobility.

FHWA plays a leading role in assisting localities in advancing equitable bicycle and pedestrian networks through research and publications; outreach to stakeholders; and through facilitation, coordination, and information-sharing across USDOT. Local jurisdictions may use this synthesis to learn more about the recommended and existing strategies to advance equity through shared micromobility regulations and permitting in order to implement similar strategies in their communities. Researchers and research funding agencies may also use this synthesis to guide further research into how local regulations and permitting can create and advance shared micromobility systems that effectively advance equity in communities.

The literature review presented below is not intended to be a comprehensive look at all existing research and literature on the topic. Rather, it provides an initial look at major recent publications and identifies trends and gaps in these publications. Additional literature likely exists on the topic that is not captured here.

A Glossary of Key Terms is included for your reference in Appendix A of this synthesis.

Literature Review

Research Questions

FHWA set out to identify literature that answers the following questions through this synthesis:

1. What types of regulations and permitting standards are in place at the local level that are intended to advance equity in shared micromobility systems? (consider regulations on users vs. regulations on shared micromobility providers)
2. What types of regulations and permitting standards are in place at the local level that may have unintended consequences for disadvantaged populations? (consider regulations on users vs. regulations on shared micromobility providers)
    a. Consider consequences of inequitable enforcement
3. Does equitable availability of micromobility options further opportunities for walking, biking/micromobility trips?
    a. Does integrating shared micromobility systems and other shared modes reduce transportation cost burdens for lower income households?
4. How are local jurisdictions and/or shared micromobility operators evaluating the equity-related outcomes of regulations and permitting standards (if at all)?
    a. What data sources and metrics are being used?
    b. How are equity targets/outcomes determined? What are the equity targets/outcomes? (i.e., how is "success" being defined?)
    c. How are underserved and disadvantaged populations engaged in developing and evaluating the equity of shared micromobility systems? (i.e., is the system "successful"/responsive to the needs of target populations, does the system meet defined access measures defined by the target populations?)

Research Summary[1]

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question
Arnell, Bernard. (2019). Shared Electric Scooters and Transportation Equity: A Multivariate Spatial Regression Analysis of Environmental Factors on Revealed Travel Behavior and Mode Shift Potential. Massachusetts Institute of Technology.	Using shared e-scooter data from three cities (Nashville, TN; San Diego, CA; Portland, OR), this master's thesis conducted modeling to identify explanatory environmental and demographic variables for trip characteristics. The Association of Bay Area Governments' Communities of Concern framework was used to interpret the findings.	• Nashville and San Diego, areas higher on the Communities of Concern Index (CoCI), were less likely to see rebalancing activity, but Portland, which has a policy requiring scooter placement in East Portland, a community of concern, showed the opposite trend. • Areas higher on the CoCI in San Diego and Nashville were more often the origin location of more expensive and longer trips.	1; 3a
International Transport Forum. (2021). Micromobility, Equity and Sustainability.	This report examines how micromobility can address congestion and air quality in cities and benefit users. Recommendations for micromobility development are considered through the lenses of sustainability and accessibility and with the goal of minimizing negative effects.	The report recommends that cities incorporate incentives into regulations to promote shared micromobility operations in underserved neighborhoods, including: • Dynamic caps, which allow micromobility devices used in targeted, underserved areas to be excluded from fleet limit calculations (incentivizing operation in these areas). ○ During the pandemic, Portland, OR waived fees and raised vehicle caps for their shared micromobility operator which led to a large increase in activity in a priority underserved area. • Bonus structures that grant operators a higher vehicle cap when rides in equity zones increase.	1

[1] FHWA published an Electric Bicycle (E-bike) Trends, Impacts, and Opportunities: Literature Review Summary in May 2023, which examines literature related to eight e-bike topics, one of which is equity. Due to the timing of publication and the scope of the present document, the e-bike literature review is not included in this equity synthesis; however, it does provide a useful look at the landscape of equity research and gaps related to e-bikes and acts as a complement to this synthesis. Readers are encouraged to view the e-bike literature review to gain a broader understanding of the current research and gaps related to e-bike ridership trends, safety, physical activity and health, accessibility, equity, trail infrastructure and environment, energy and emissions, and freight use cases.

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question
MacArthur, J. (2020). National Scan of Bike Share Equity Programs. Transportation Research and Education Center at Portland State University.	This equity-focused research project surveyed bike share programs in 70 cities across 34 States about their approaches, metrics, and outcomes of equity programs.	• Small cities were found to be much less likely to be actively working to address equity; less than half of the systems with fewer than 150 bikes had implemented any sort of equity effort. • 71 to 79 percent of systems with over 150 bikes were found to be actively working to address equity through specific equity programs, some of which may be required by regulations. • Some cities are placing equity-focused pricing and access requirements in permits and regulations, including requiring cash payment options or requiring certain levels of fleet deployment in underserved areas.	1
National Academies of Sciences, Engineering, and Medicine (2022a). E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press.	This study provides a comprehensive review of the current literature on e-scooter safety with a focus on the results of policies and on the equitable use of e-scooters.	• Researchers found a growing body of evidence that helmet laws can result in biased enforcement and lead to police-initiated violence. • A Seattle, WA study on bicycle infraction data found that police issued 3.8 times as many helmet citations to Black cyclists compared to White cyclists even though Black cyclists make up less than 5 percent of the cycling population.	2a; 3

National Academies of Sciences, Engineering, and Medicine (2022b). Legal Issues and Emerging Technologies. Washington, DC: The National Academies Press.	This report considers the legal concerns around emerging technologies for transit agencies, but the suggestions and concerns raised, particularly around equity, would be useful for local governments to consider when creating regulations for shared micromobility operators.	• Policies and strategies should be considered to ensure that emerging transportation technologies are accessible to and don't have disproportionately adverse impacts on marginalized and/or underserved groups. Key considerations include:
		  ○ Access for individuals with disabilities;
		  ○ Access for unbanked and underbanked individuals; and
		  ○ Access for individuals without smartphones or consistent mobile internet access.
		• Transportation equity should be considered and accounted for during emergencies, particularly when considering accessibility for individuals with disabilities and the unique needs of minority, low-income, and low-English-proficiency populations and households without vehicles.
			1; 3

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

National Academies of Sciences, Engineering, and Medicine. (2022c). Micromobility Policies, Permits, and Practices. Washington, DC: The National Academies Press.	This research documents policies, permits, and practices regarding micromobility at the State DOT level. 44 State DOTs were surveyed in 2021 about their enacted policies and approaches to micromobility. The researchers did not document local policies or approaches.	• Few State DOTs (7.3 percent of study respondents) have any shared micromobility equity policies at the State level.
		• Most responding State DOTs do not collect micromobility data (65 percent) and are not involved in regulating the operations aspects of shared micromobility (95.1 percent).
		• Over half of responding State DOTs are not involved in establishing safety requirements for micromobility devices, but:
		  ○ 23.1 percent require micromobility users to wear helmets; and
		  ○ 28.2 percent have minimum age requirements to ride micromobility devices.
		• When developing micromobility policies, only 14.6 percent of responding State DOTs seek input from micromobility companies, 64.9 percent seek input from city/county governments, 64.9 percent seek input from metropolitan and transportation planning organizations, and 45.9 percent seek input from transit agencies.
			2a; 4

National Association of City Transportation Officials. (2019a). Guidelines for Regulating Shared Micromobility, Version 2.	This guide is intended to help cities manage micromobility with a focus on permits, pilots, and demonstration programs. Includes best practice recommendations and current state of the practice.	The guide suggests implementing policies that advance equity within permitting processes, including: • Rebalancing devices to maintain service in underserved neighborhoods; • Incentivizing rides originating or ending in city-identified, targeted service areas through dynamic fleet caps; • Requiring certain levels of community outreach; and • Requiring discount fare programs.	1

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

National Association of City Transportation Officials. (2019b). Shared Micromobility in the U.S.	This report covers the state of shared micromobility in the U.S. in 2019, considering 2019 trends and briefly commenting on early 2020 impacts from the COVID-19 pandemic.	• Chicago's Divvy for Everyone (D4E), a program that combined targeted engagement and reduced bikeshare membership prices has been successful in building a more diverse ridership. A 2018 survey of D4E users found that 28 percent were African American/Black and 28 percent were White. A 2015 Divvy annual member survey found 79 percent of annual pass holders were White.
		• In 2019, 28 percent of all rides on Cincinnati, OH's Red Bike were from members in their discounted fare program.
		• San Francisco, CA has set scooter rebalancing requirements to ensure access for people in Communities of Concern (low-income neighborhoods). At the time of the document's publication, 52 percent of San Francisco scooter trips began or ended in Communities of Concern.
		• Some cities are exploring how to provide shared micromobility services for people with limited mobility.
		  ○ Detroit, MI's Adaptive MoGo program offers 13 different cycles, available by reservation through a partnership with a local bike rental company.
		  ○ Oakland, CA piloted its Adaptive BayWheels Bike Share program in summer 2019.
		  ○ Seattle, WA subsidizes local non-profits to provide adaptive cycling services, using revenue from shared micromobility permits.
			1; 3; 4

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

National Association of City Transportation Officials. (2022a). Breaking the Cycle: Reevaluating the Laws that Prevent Safe & Inclusive Biking	This report reviews the current literature on the impacts of biased enforcement of bicycle laws and provides best practices and recommendations for reducing those harmful impacts. While this report does not comment directly on shared micromobility, any bicycle laws that apply to shared micromobility can be assumed to have similar negative impacts.	• Research on the enforcement of people biking is limited, the data that does exist shows a pattern of disproportionate enforcement among Black and Latine/x people on bikes as well as among people in low-income neighborhoods that lack sufficient biking infrastructure.
		  ○ While Black and Latine/x cyclists account for less than half of all cyclists in New York City, they received 82 percent of all bike-related tickets in 2019, 76 percent of tickets in 2020, and 75 percent of tickets in 2021.
		  ○ A Department of Justice analysis found that 73 percent of bike stops in Tampa, FL between 2014 and 2015 involved a Black cyclist even though Black residents only make up 26 percent of the city's population.
		  ○ In Lynwood, CA, a low-income city, 16 percent of bike stops are for sidewalk riding, twice that of the national average, even though there are no bike lanes in the city.
		• Most cyclists will use quality bike infrastructure if it is present.
		  ○ Before 2010, almost half of all cyclists biking along Prospect Park West in New York City biked on the sidewalk, but, after a protected bike lane was installed in 2010, sidewalk riding dropped to 3 percent.
			2a

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

National Association of City Transportation Officials. (2022b). Shared Micromobility Permitting, Process, and Participation.	This working paper outlines project delivery concerns and policy considerations for cities to consider when creating policies for shared micromobility. The paper stresses the importance of using regulations to connect broader city goals to specific shared micromobility outcomes and thus align public benefit with private profit. It mainly focuses on recent trends in dockless micromobility systems.	• Many people who do not qualify for discounted pricing programs are still sensitive to price and can easily be priced out of shared e-micromobility. To prevent or mitigate this, cities can:
		  ○ Prohibit companies from using surge pricing;
		  ○ Require city approvals for price increases;
		  ○ Cap trip prices;
		  ○ Require the creation of monthly pass option for frequent riders; and
		  ○ Monitor costs/prices over time and work with operators to reduce trip costs.
		• Required service areas, required deployment locations, and hub zones (small zones which act as the only acceptable places to end a trip in a given area, concentrating and organizing devices in high-demand areas) can be tools to increase the reliability of service in a given area.
		• Community engagement is critical and can include engaging locals in the planning process, hiring local ambassadors, and working with operators to engage local communities.
		• Cities should use trip data to determine high-demand routes that need improved bicycle infrastructure and focus on infrastructure for all ages and abilities.
			1; 3

Portland Bureau of Transportation. (2020). 2019 E-Scooter Findings Report.	This report reflects on findings from Portland's 2019 to 2020 Shared Electric Scooter Pilot with a strong focus on equity. While impacted by the outbreak of COVID-19, there are many noteworthy equity initiatives and lessons learned.	The report summarizes the state of e-micromobility use in Portland:
		• East Portlanders and Black Portlanders reported the following barriers to using e-scooters: traffic safety, racial profiling and harassment, cost (and fear of being overcharged), lack of access to a bank account or smartphone, lack of safe bike infrastructure, the need to transport children, not having a helmet, not having a safe place to learn to ride, and age restrictions.
		• Portland Bureau of Transportation (PBOT) identified a gender gap in e-scooter riders, with men riding more.
		• Portlanders of color were more likely to ride an e-scooter because they don't have a car and were slightly more likely to replace a transit or car trip with a scooter trip but were also less likely to replace a walking trip with a scooter trip than white Portlanders.
		• People with mobility-related disabilities were more likely to be interested in low-income pricing plans, cash payment options, and renting without a smartphone, but were also less likely to know how to access these options.
		• Deeper engagement with targeted communities is needed to tailor e-scooter services to their needs.
		• The average e-scooter trip costs twice as much as a transit trip and three times as much as a bikeshare trip.
		• PBOT worked with affordable housing providers to adapt and market PBOT's preexisting affordable transportation program to their residents. This effort was the primary source of low-income e-scooters payment plan sign-ups.
		
		PBOT implemented the following equity-related requirements:
		• Operators were required to deploy 15 percent of their daily fleet in East Portland, a traditionally underserved community.
		• Operators were required to have low-income pricing plans and options for people without smartphones, but PBOT found that these options were difficult to find on company websites.
		  ○ PBOT incentivized companies (with higher scooter caps) to clearly list options on their websites and apps.
		  ○ PBOT created their own webpage to list these options for each company.
			1; 3; 4a/c

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question
		○ A summer 2019 survey showed that 59 percent of low-income responders didn't know about low-income payment plans, 28 percent didn't know about cash payment option, and 25 percent didn't know about non-smartphone options. PBOT implemented the following equity-related operator incentives: • Awarded additional scooters to companies with higher trip ratios in East Portland (assuming higher ratios suggest the companies are promoting scooters in East Portland). • Offered companies incentives to work with local workforce development organizations to hire traditionally underserved people. One company partnered with such an organization and several applicants reached the interview stage, but none were hired.	

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

Shaheen, S., & Cohen, A. (2019). Shared Micromobility Policy Toolkit: Docked and Dockless Bike and Scooter Sharing. UC Berkeley: Transportation Sustainability Research Center.	This report provides a toolkit of policies and practices for cities to use when planning and implementing shared micromobility systems. It covers considerations for both docked and dockless systems at the municipal level with a focus on equity, data, and other common concerns.	• The report cites the importance of enforcing regulations on service providers to ensure devices are parked properly and equitably, are safely disbursed throughout the community, and are not impeding pedestrians/accessibility. Doing so can also help ensure micromobility is equitably serving the entire community and people with special needs. Enforcement policies related to equity include:
		  ○ Right-of-way (ROW) access preservation: requiring operators to relocate devices blocking ROW within a set timeframe;
		  ○ Fleet rebalancing (either on a set cadence or as needed to maintain a predetermined system balance);
		  ○ Stagnant device rebalancing: requiring operators to relocate devices that have not been used in a given amount of time (e.g., Durham, NC requires devices to be relocated after one week at the same location); and
		  ○ Removal of unsafe or inoperable devices.
		• Some cities have developed policies requiring service providers to rebalance fleets on a particular schedule to correct parking violations within a timeframe (e.g., Santa Monica, CA requires devices blocking ROW to be relocated within one hour of being reported between 7 a.m. and 10 p.m.) This helps avoid stagnant fleets (parked in low-volume areas) and geographic imbalance.
		• Requiring operators to provide standardized and open data allows public agencies to understand micromobility impacts; identify gaps in the transportation network; monitor equitable service standards; and offer multimodal, real-time transportation information through various platforms.
			1; 4

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question
Shared Use Mobility Center. (2019). Equity and Shared Mobility Services.	This report considers how cities can work with private sector shared micromobility operators to achieve equity goals.	• Equitable distribution requirements can set minimum thresholds for how many shared vehicles must be in all neighborhoods or target specific underserved neighborhoods. ○ Equitable distribution requirements have proven difficult to enforce as app data is not always reliable. Some cities have resorted to in-person spot checks. There are, however, emerging technology-enabled models for data access and sharing. • Equitable distribution requirements can be paired with targeted public outreach and engagement requirements for permittees. • Cities seem inclined to require designated parking areas or lock-to vehicles that must be parked at a rack to avoid clutter and preserve sidewalk access. Regulations requiring designated parking areas, although not as infrastructure intensive as docked bike share stations, require formal siting processes and may cause parking enforcement issues. • Many local governments are regulating competing bikeshare and scootershare providers through annual permit processes or licenses. Equity objectives can become part of the regulations or competitive permitting process, but whether these regulatory processes can achieve similar benefits to long-term partnerships is yet to be seen.	1

Resource Citation/Link	Summary	Significance/Key Findings	Relevant Research Question

Transportation for America. (n.d.). Shared Micromobility Playbook.	A webpage covering shared micromobility policy for municipalities to consider. The equity section presents regulation and incentive policy solutions for three equity concerns: equitable distribution of devices, non-digital/credit-free access, and adaptive equipment.	• The playbook recommends requiring a percentage of vehicles in underserved areas and increasing vehicle caps for deployment in underserved areas as strategies to encourage equitable distribution of micromobility devices. Establishing these requirements in advance of device deployment can help encourage early adoption.
		  ○ The presence of micromobility should not replace or detract from provisions for transit and other mobility services.
		  ○ Incentives should be combined with other programs and opportunities to increase mobility/access to transit.
		• The playbook recommends the following strategies to address barriers for unbanked individuals and those without access to smartphones:
		  ○ Require cash payment options.
		  ○ Provide option to pay with pre-paid cards that can be refilled with cash or credit at local stores.
		  ○ Combine payment systems so users can pay with transit cards.
		  ○ Establish third-party call center to allow customers to book and pay for rides remotely.
		  ○ Cities and transit agencies should consider partnering with operators to develop a combined fare system. This could allow existing transit agency discount fare programs to apply to shared micromobility systems (streamlining fare discounts to those who need them) and allow un-banked and non-digital access to shared micromobility.
		• The playbook recommends the following strategies to ensure access for people with physical disabilities:
		  ○ Require that a portion of any micromobility fleet be equipped with adaptive devices for people with disabilities.
		  ○ Incentivize inclusion of adaptive devices with fleet size cap increases when adaptive devices are deployed.
		  ○ Cities should partner with local organizations to develop these regulations and to determine how to engage the community in decision-making for adaptive equipment to ensure community needs are met.
			1; 3

Key Findings

This section summarizes key findings related to regulations and permitting strategies to advance equity from the literature review presented above.

Methods for Addressing Barriers

Much of the reviewed literature agrees on the key barriers and recommended strategies for addressing barriers and advancing equity through regulations and permitting, which include:

- Requiring a percentage of vehicles to be deployed in underserved areas and requiring regular rebalancing of those vehicles to maintain service in underserved areas (National Association of City Transportation Officials (NACTO), 2019a; Transportation for America, n.d.; MacArthur, 2020). Similarly, requiring service in certain areas and establishing hub zones to increase the reliability of service in an underserved or disadvantaged area (NACTO, 2022b);
- Increasing vehicle caps for deployment in underserved areas (Transportation for America, n.d.);
- Requiring that operators undertake certain levels of community outreach, including ongoing communication about the service, how to use it, and any special programs (e.g., discount programs and non-smartphone options) (NACTO, 2019a);
- Requiring fare discount programs for low-income individuals (NACTO, 2019a);
- Requiring cash payment options for unbanked individuals and individuals without smartphones or consistent access to mobile internet service, including options to pay with pre-paid cards that can be refilled with cash or credit at local stores (Transportation for America, n.d.; MacArthur, 2020); and
- Requiring that a certain portion of any shared micromobility fleet be equipped with adaptive devices for people with disabilities (Transportation for America, n.d.).

The literature includes examples of local jurisdictions who have implemented these strategies. For example, the San Francisco Municipal Transportation Agency (SMFTA) 2021-2022 Powered Scooter Share Permit requires operators to have at least five percent of its fleet made up of adaptive scooters, implement a targeted community outreach plan, maintain a multilingual website, and offer a one-year low-income customer plan. It also includes service distribution requirements for its Communities of Concern (see Appendix 5 of the permit). Through its pilot permit program, Portland Bureau of Transportation (PBOT) required e-scooter operators to deploy 15 percent of their daily fleet in the underserved community of East Portland and to have low-income pricing plans and options for people without smartphones (PBOT, 2020).

There is a discrepancy between smaller and larger cities' efforts to address equity in their shared micromobility systems. One study found that less than half of the bikeshare systems with fewer than 150 bikes had implemented any equity efforts, while 71-79 percent of systems with more than 150 bikes were actively working to address equity (MacArthur, 2020).

Incentives and Enforcement as Companions to Regulations

Regulations and permitting requirements exist as part of a system of related efforts to advance equity. While regulations and permits establish baseline expectations for operators, incentive structures can push operators to do more to advance equity, and enforcement ensures that requirements are being implemented effectively.

Incentives for operators may include dynamic device caps that exclude devices used in targeted, underserved areas from fleet limit calculations or increase caps when adaptive devices for people with disabilities are deployed, or bonus structures allowing operators a higher cap when rides in equity zones increase (International Transport Forum, 2021; Transportation for America, n.d.; PBOT, 2020; NACTO, 2019a). In its e-scooter pilot program, PBOT offered incentives to companies that engaged with local workforce development organizations to hire traditionally underserved people (which included people of color, low-income people, immigrants and refugees, veterans, people with disabilities, women, LGBTQIA+ people, and formerly incarcerated people) (PBOT, 2020). Incentive programs may also be combined with other programs and opportunities that increase mobility and access to transit (Transportation for America, n.d.).

Enforcement practices are important for ensuring that devices are parked safely and are not impeding accessibility, particularly for people with disabilities, and ensuring that devices are equitably distributed throughout the community (or distributed in a way that meets requirement or incentive structures). Enforcement policies may also require micromobility operators to rebalance devices on a set schedule to ensure any violations or imbalances are corrected within a given timeframe and that fleets are not stagnant in low-volume areas. In Santa Monica, CA, for example, operators must relocate any device reported to be blocking the right-of-way within one hour of being reported between 7:00-10:00 a.m., and in Durham, NC, devices must be relocated after one week in the same location (Shaheen and Cohen, 2019).

While enforcement is an important companion to regulations and permitting requirements, it can be challenging. App-based data on device locations can be unreliable, causing some cities to do in-person spot checks (Shared Use Mobility Center, 2019). Cities may designate parking areas for devices to avoid sidewalk clutter (such as an existing bike rack), but enforcement of these parking requirements entail formal siting processes, which can cause enforcement issues (Shared Use Mobility Center, 2019). Smaller and lower-resourced cities may have less capacity to enforce the regulations and requirements in place, which could lead to lower effectiveness. Cities can, however, require that operators provide standard, open data so that the city can monitor equitable service standards and better understand impacts and gaps in the system (Shaheen and Cohen, 2019).

Biased enforcement practices can also hinder equity in the micromobility system, punish individuals for living in communities with poor infrastructure, or cause certain groups to avoid using micromobility altogether. There is evidence that helmet laws, for example, are not always equitably enforced and can lead to police-initiated violence. In Seattle, WA, it was found that police issued 3.8 times as many helmet citations to Black cyclists compared to white cyclists, while Black cyclists only make up less than five percent of the cycling population (NASEM, 2022a). Similarly, while Black and Latin/x cyclists account for less than half of all cyclists in New York City, they received 82 percent of all bike-related tickets in 2019, 76 percent of tickets in 2020, and 75 percent of tickets in 2021 (NACTO, 2022a). In Portland, Black residents and residents of the underserved East Portland reported that racial profiling and harassment were among barriers to e-scooter use (PBOT, 2020).

Studies have found that most cyclists will use bike infrastructure if adequate bike infrastructure is present; in the case of Prospect Park West in New York City, almost half of all cyclists were biking on the adjacent sidewalk until 2010, when a protected bike lane was installed and sidewalk riding dropped to three percent (NACTO, 2022a). Underserved communities are less likely to have adequate bike

infrastructure and thus residents are more likely to bike in violation of motor vehicle codes and experience higher levels of enforcement (NACTO, 2022a).

Community Outreach and Engagement

Establishing regulations and permitting requirements in advance of micromobility system deployment is critical to encourage early adoption of equitable practices (Transportation for America, n.d.). Robust, early community outreach and engagement is important both for formulating regulations and permitting requirements that will meet underserved and disadvantaged groups' needs, and for ensuring that the community is aware of the policies and programs that may make micromobility a more accessible transportation option. Community engagement may include involving the community in the planning process, hiring local ambassadors, and working with or requiring operators to engage with communities in which their devices will be deployed (NACTO, 2022b; Shared Use Mobility Center, 2019).

Cities can also partner with local organizations in developing regulations and to help determine the most effective ways to engage with community groups in decision-making. For example, cities could partner with disability rights advocacy groups to determine appropriate regulations and outreach for adaptive devices (Transportation for America, n.d.). Seattle, WA subsidizes local non-profits to provide adaptive cycling services, using revenue from shared micromobility permits (NACTO, 2019a; NACTO 2019b). PBOT coordinated with affordable housing providers to adapt and market its affordable transportation programs; this partnership was the primary source of low-income e-scooter plan sign-ups (PBOT, 2020). Community engagement should be a regular, ongoing practice for both cities and micromobility operators to ensure community awareness and to monitor the effectiveness of the programs. In Portland, for example, PBOT found that although operators were required to offer low-income pricing plans and options for people who do not have access to smartphones, information about these options was difficult to find on operator websites. A 2019 survey found that 59 percent of low-income responders didn't know about low-income payment plans, 28 percent didn't know about cash payment options, and 25 percent didn't know about non-smartphone options. In response, PBOT provided a higher scooter cap incentive for operators to clearly display information about these programs on their websites, and PBOT created its own website to provide information about each operator's options (PBOT, 2020). PBOT concluded in its 2019 E-Scooter Findings Report that more engagement with the communities is needed to tailor e-scooter programs to their needs.

Some individuals who do not qualify for low-income pricing plans may still face cost barriers that deter them from using shared micromobility services. Community engagement can help cities understand these different levels of need and put in place regulations or permitting requirements to address barriers; for example, they may prohibit operators from using surge pricing, require city approvals for price increases, cap trip prices, require the creation of a monthly pass option for frequent riders, and/or monitor costs over time and work with operators to reduce costs (NACTO, 2022b). Regularly engaging with the community will help cities and operators understand if their regulations and programs are advancing equity and meeting community needs and, if not, what can be changed to better advance equity.

Areas for Further Research

Research Gap Analysis

The available literature reviewed for this synthesis provides an overview of the landscape of equity barriers and recommended strategies for addressing these barriers through regulations and permit requirements. The literature provides numerous examples of the implementation of these regulations and permitting strategies at the local level, with some information on outcomes. For example, Chicago's D4E program reported success in building more diverse ridership between 2015-2018, and Cincinnati's Red Bike program found that 28 percent of riders were from their discounted fare program (NACTO, 2019b). However, less information is available related to ongoing review and analysis of programs and how changes to programs have resulted in behavior change among users and/or mode shift among non-users. Additional research into the methods and approaches for evaluating and adapting programs for greater equity outcomes is needed. Key questions related to this additional research include:

- How are cities defining the "success" of their shared micromobility programs in advancing transportation equity?
- To what extent and through what methods are cities engaging communities in the planning, development, and ongoing evaluation of micromobility programs and regulations? What are the most effective methods for engaging communities in micromobility system planning and development?
- Which regulations and permitting requirements are most effective in advancing equity? Do certain regulations and permitting requirements have unintended consequences for equity?
- How are cities using the data they collect to measure equity outcomes? What are key strategies for overcoming barriers to data availability and analysis?

Portland stands out as an example of an effective review of its e-scooter pilot program, including specific improvements and changes that need to be made to better meet community needs and preferences (see Chapter 5 of the E-Scooter Findings Report). To move toward an understanding of best practices for regulations and permitting, additional studies such as this should be undertaken to highlight data sources and collection and analysis methods and the effectiveness of different approaches, particularly how certain approaches work together or in isolation (e.g., are certain regulations more or less effective than incentive structures?), and how programs can respond and adapt to community needs identified through analysis.

Implications and Priorities for FHWA

This Equity Synthesis represents FHWA's continuing commitment to advancing equity in micromobility as part of the larger Departmental focus on advancing equity across USDOT programs and policies. In January 2022, USDOT published its Equity Action Plan[2] outlining the actions that the Department will take to expand access and opportunity for all communities, particularly those that are underserved, overburdened, and disadvantaged. Many new USDOT discretionary and formula funding programs established in the Bipartisan Infrastructure Law, the Inflation Reduction Act, and elsewhere center equity as a core component and goal, and several of these programs provide opportunities for micromobility funding. USDOT has developed many resources and tools to help communities advance equity, including Promising Practices for Meaningful Public Involvement in Transportation Decision-

[2] At the time of the publication of this synthesis, the Equity Action Plan is undergoing update.

Making, the Equitable Transportation Community Explorer Tool, the USDOT Navigator, and FHWA's Planning and Equity Tool and Screening Tool for Equity Analysis of Projects (STEAP).

FHWA will continue to play a role in advancing micromobility equity by leading efforts to further the state of the practice through new research and promoting collaboration with internal and external stakeholders. As communities take advantage of the historic Federal transportation investments available to fund their micromobility programs and projects, FHWA may undertake research to understand how communities are evaluating the equity impacts of these programs and projects and what those impacts look like. This research could be used to facilitate the dialogue around micromobility funding and to collect and share best practices and lessons learned from across the country to contribute to a system of shared learning and advancement.

FHWA may also undertake the following activities to fill current gaps in research and knowledge related specifically to regulations and permitting:

- Convene peer exchanges for local jurisdictions to share best practices, challenges, and lessons learned related to shared micromobility regulations and permitting strategies to advance equity. Peer exchanges could connect large and small, urban and rural, and other types of communities to one another and provide forums where they can learn from each other and create networks and common understanding through which to advance equity.
- Conduct, or fund Federal or non-Federal partners (such as University Transportation Centers) to conduct, larger, more comprehensive studies to gain more understanding of the landscape of equity policy and regulations at the local level and fill research gaps. In particular, this research could examine the effectiveness of current laws and regulations and how effectiveness is being measured.
- Develop guidance or best practices related to research findings in coordination with local jurisdictions, other USDOT Operating Administrations, and other partner organizations such as the Shared Use Mobility Center, Transportation Research Board's Mobility Management Committee, the National Science Foundation's Smart and Connected Communities program, and the North American Bikeshare & Scootershare Association.

Conclusion

States and local jurisdictions across the U.S. are making strides in advancing equitable transportation systems through, among other efforts, strategic regulation of their micromobility systems. These systems have the potential to provide underserved and disadvantaged communities with safe, healthy, affordable, and reliable transportation options and connect users to previously inaccessible destinations. However, effective regulation is needed to ensure that micromobility systems are meaningfully improving equity and quality of life for underserved and disadvantaged communities. FHWA plays a critical role in collecting and sharing information related to equity in micromobility and will continue to advance equity goals through further research, information and resource sharing, and peer convenings.

Appendix A. Glossary of Key Terms

Device Cap	The number of devices an operator is allowed to have deployed in the entire service area at once. The device cap might include limits on how many devices are allowed in certain parts of the service area, which can be used to promote equitable deployment in underserved or disadvantaged communities (NACTO, 2019a; Portland Bureau of Transportation, 2020; Transportation for American, n.d.).
Dynamic Cap	A device cap that changes based on specific performance indicators (e.g., device utilization rate). Dynamic device caps create an incentive system that rewards operators for aligning operations to municipal goals. To promote equity, dynamic caps can be used to incentivize operations in underserved or disadvantaged communities by excluding devices deployed in these communities from the device limits calculation or increasing the cap when a certain threshold of device utilization is achieved in underserved or disadvantaged communities (International Transport Forum, 2021; Portland Bureau of Transportation, 2020).
Disadvantaged Community	A community that experiences disproportionately high and adverse health, environmental, climate related, economic, and other cumulative impacts (USDOT, 2022).
Docked System	A shared micromobility system where riders must start and end their trips at a pre-established station or hub (NACTO, 2022b).
Dockless System	A shared micromobility system where riders can pick up and drop off devices from within the public right-of-way. Such systems usually prohibit users from blocking pedestrian access and other infrastructure with devices (NACTO, 2022b).
Hub Zone	A parking zone established in the dockless system which acts as the only acceptable place to end a trip in a given area, concentrating and organizing devices in high-demand areas. Hub zones can be permanent, which requires a dense network of walkable hubs, or temporary for special events (NACTO, 2022b).
Lock-to System	A subtype of dockless shared micromobility systems where operators and users are required to lock devices to bike racks when not in use (NACTO, 2022b).
Rebalancing	The act of relocating devices within the service area to align with device distribution requirements (equity related or not), to relocate stagnant devices, and/or to correct parking violations. Service providers may be required to rebalance devices on a certain established cadence or within a certain timeframe after issues have been reported (Arnell, 2019; NACTO, 2019a; Shaheen & Cohen, 2019).
Required Service Areas	Areas where service providers are required to provide a certain level of deployment in equity focus areas (communities of concerns) or outside of high demand areas (NACTO, 2022b).
Unbanked Individuals	An adult who does not have a checking, savings, or money market account at a bank or other financial institution (NASEM, 2022b).
Underbanked Individuals	An adult who has a bank account but who also uses financial products and services – e.g., money orders, check cashing, payday loans, rent-to-own services, pawn shop

	loans, auto title loans, etc. – from an alternative financial service (FDIC, 2017; NASEM, 2022b).
Underserved Communities	Populations that share a particular characteristic or identity, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life (USDOT, 2022).