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Connecting Low-Income People to Opportunity with Shared Mobility

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Introduction

In the last decade, shared mobility services have taken off across the United States as a complement to local public transit and an alternate to private car ownership.

These services, which include car-share, bike-share and ride-share, maximize the use of vehicles by sharing them among multiple users, encourage more transport options, and aim to reduce transportation costs for users. While mass rapid transit moves the most people most efficiently and is the backbone for urban development, this paper is concerned mostly with recent advances in low-volume passenger carrier models in the United States. The purpose of this report is to highlight the potential for shared mobility systems such as bike-share and car-share to benefit low-income individuals.

As these models have developed, advocates, policymakers and shared mobility operators have explored how the emerging field can more directly benefit low-income individuals, who often face longer and more costly commute times, through pilot programs, research, and other strategies. However, current usage of shared mobility systems among low-income communities remains lower than usage by the general population.

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This report is a survey of existing shared mobility strategies and their attempt to expand services to low-income individuals. It is our hope that the findings can inform operators, government agencies, funders, non-profit organizations and others as they try to tap into the potential of shared mobility strategies to improve the lives of low-income individuals.

The Rise of Shared Mobility

Shared mobility has helped expand transportation options for several decades in the United States, but only recently gained attention as a result of operational and service maturity. Today, shared mobility systems play a growing role in helping Americans navigate cities and regions to access housing, jobs, education opportunities, and other critical services. This momentum can be explained, in

part, by a cultural shift in the United States in which access to assets is valued over ownership. Owning a car is no longer a critical need among many city dwellers that prefer paying for and using vehicles only when needed (Earley, 2014).

Shared mobility is also emerging as a complement to the historically under-resourced U.S. public transit system. Investment in high-quality mass transit in America lags far behind many other developed countries. France, for example, has 18.8 miles of mass rapid transit per million urban residents, while the U.S. has just 5.5 miles (Hook, 2014).

Co-location of shared mobility with conventional transit service holds great promise for expansion of both systems. While investing in mass rapid transit is central to long-term sustainability, shared mobility can help fill in the gaps as well as extend the reach of existing public transit networks.

Connecting Low-Income People to Opportunity

Given the recent growth of this industry, many believe the potential exists to accelerate shared mobility strategies that address the specific mobility issues of low-income communities. Historically, public transit, land use policy and planning have often resulted in significant mobility obstacles for low-income people in US cities. Indeed, low-income communities typically face longer commute times and higher fares than their middle and upper income counterparts (Surface Transportation Policy Project—Transportation and Social Equity Factsheet, 2000).

Research has found a spatial mismatch between where low-income people live and whether jobs are located at their skill level within a 90 minute commute (Brookings, 2011). Employment in metropolitan regions has been decentralizing for decades - over 70% of regional jobs are now more than 3 miles away from central business districts (Glaeser, 2001) - while most low-income people continue to live within the central city (Glaeser, 2006). While evidence shows that low-income individuals are also moving to suburbs, low-income groups still make up the smallest contingent of suburban residents (Ward, 2000). Since the location of housing, jobs, and services for low-income people vary greatly by city, this spatial mismatch will need to be assessed on a region-by-region basis.

Over 70% of regional jobs are now more than 3 miles away from central business districts.

Improving the ability of low-income individuals to access jobs and essential services needs to begin with an understanding of their actual needs. Yet

literature and research surrounding the mobility of low-income people is largely focused on access to 9-5 jobs—a bias that is also reflected in federal funding for transport infrastructure. Today, many low-income people increasingly hold jobs during off-peak hours (such as nights and weekends) when transit routes are poorly served (King, 2014). Attention is also rarely given in the literature to transit needs beyond reaching jobs, such as access to essential services including education, childcare, and healthcare (Criden, 2008). More research can help better understand the range of actual access needs faced by low-income individuals.

Capital Bikeshare riders in Washington, DC. Image Source: Flickr user DDOT DC.

Purpose of Research

While shared mobility systems have potential to bring benefits to low-income people, from reducing ownership costs to increasing travel choices, a variety of structural and financial barriers have prevented low-income communities from fully accessing these systems. The report begins with an overview of the different shared mobility models, highlighting their benefits. It then provides an overview of the potential for and challenges of extending shared mobility strategies to low-income communities, from the perspectives of both potential users and system operators. The report then concludes with key findings and recommendations for the field.

Information in this report is based on a review of over 60 articles and on interviews with more than 15 academics, government officials, and industry professionals.

Shared Mobility Typology and Definitions

Shared mobility is an umbrella term that includes car-share, bike-share, ride-share (including vanpool, minibuses, demand responsive transit and carpool) and on-demand taxis.

Though rooted in similar concepts, these systems span a variety of vehicle types, ownership structures and financial models. An overview of the mobility types is given below for context purposes. We encourage you to consult the bibliography and case studies for more details on the different mobility types.

Bike-share

Bike-share systems, though first developed in the 1960s, have spread rapidly across the US and the world in the past 10 years. Strong systems have been established in Boston, New York City, Washington D.C, Chicago and many other cities around the country (ITDP, 2013).

Bike-share is a short term rental system, with bikes usually rented for less than an hour. This system offers a point-to-point transit option (i.e., direct connections between multiple points). This service is best used for trips that could connect to/from transit and/or are local trips up to 5 miles. Operators can be either non-profit or for-profit, but will always need to closely coordinate with the local government (which may have partial or full ownership of assets) for system implementation, maintenance and expansion.

Bike-share programs typically charge a range of fees to users. These include:

- Membership fees to gain unlimited access to bike-share systems over a defined period of time.

- Usage fees based on the length of time each individual trip takes. The first 30-45 minutes are usually free for subscribed members, but additional time results in additional fees.

As of January 1, 2013, there were 1,153,472 total bike-share users in North America. Of that number, 167,013 were long-term members (31 days to annual

passes) and 986,059 were short-term users (1-30 day passes) (Shaheen, 2014). A previous survey of bike-share members in the US and Canada showed that the greatest number used the systems to reach work or school (Shaheen, 2012).

Car-share

Car-share is transitioning from a new concept to an established transportation option and now has a strong presence in cities large and small. Car-sharing plays a growing role in transportation with programs operators ranging from small, local, nonprofits (such as Buffalo Carshare in Buffalo, NY and eGo Carshare in Denver, CO) to large for-profit companies with cars in multiple cities (such as Zipcar or Enterprise Carshare). As of January 1, 2014, there were 1,228,573 car share members in the US sharing 17,179 vehicles and 24 operators. (Shaheen, 2014)

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In car-share, users rent cars for a short period of time, usually for short or medium distance special purpose trips, such as to doctor's appointments or for transporting materials. The average trip time in a round-trip car-share use is 4 hours (Woodland, 2014). Members usually pay an annual fee, as well as a fee for hours and/or distance traveled. These fees cover insurance and fuel, as well as basic maintenance. Operators can be non-profit or for-profit organizations, with government often playing a strong role in planning, providing permits, and establishing industry regulations.

There are three main types of car-share business models:

- **Round-trip**: Vehicles are parked in reserved spaces either on-street or in an off-street facility. The vehicle must be returned to the same location after use. In this type of car-share there is a choice of different vehicle types (e.g., small passenger car or a minivan). One example of a round-trip car-share model is Zipcar, which operates internationally.

- **One-way:** This car-share model emerged in Europe and eventually expanded to Washington DC, Austin, and other U.S. cities. One-way models operate in a centralized catchment area, such as a city center, where shared vehicles can be picked up and dropped off in any open parking space as opposed to fixed access points. An example of a one-way car-share model is Car2Go in Washington D.C.

- **Peer-to-peer:** Private residents can rent out their own cars for a period of time to complete strangers. The car must be returned to the same location as in the round-trip scheme. In this model, the coordinating organization largely serves to validate drivers and vehicles, and facilitate connections. One example of a peer-to-peer car-share model is Getaround, which operates in San Francisco, Chicago, and 3 other U.S. cities.

A car-share lot in Denver, CO. Image source: carshare.org.

Ride-share

Ride-share enables a group of people with a shared origin and/or destination to travel together. Ride-share services are generally used for re-occurring trips in the 5-20 miles range on average, such as those to work or education centers. Ride-share programs are most useful in connecting areas that are not well served by public transit, or in bringing users to concentrated activity areas like employment centers or healthcare institutions (Pointer, 2013; Margonelli, 2011; Chan, 2011). It can also serve as an indicator of the potential for fixed-route services based on ridership demand and be useful to commuters with alternative work schedules (Higgins, 2002). Ride-share covers at least 4 types of mobility programs: vanpool, microbus, demand responsive transit, and carpool.

- **Vanpool systems** typically have a volunteer driver bring additional commuters to a common destination in a third-party owned medium-capacity vehicle. Vanpools can be economically viable options for low-

income residents to access areas not well served by public transit, such as a business park (National Capital Region Transport Planning Board, 2013). The need for a volunteer driver distinguishes vanpools from ride-share microbus services. Convincing potential users to serve as volunteer driver is also one of the most significant challenges of organizing a vanpool service. Vanpool services often target employers (rather than individual communities) who arrange for clusters of employees traveling between similar destinations to use the services.

Vanpools carry nearly 200,000 daily users across the US (not to be confused with informal microbus systems like dollar vans or *camionetas).* One-third of all vanpools are provided directly by a public entity (such as a transit agency or regional body) that owns, maintains and operates the vehicles. Another model and amongst the most common involves intermediaries between the users and the van leasing company which supply the vehicles. These vanpool programs often help bring city residents to suburban business parks and also provide direct connections between suburban communities. The for-profit sector also provides vanpool services. Two companies currently operate a large share of the vanpools in the US: Enterprise and vRide (Pavluchuk, 2014).

Washington State offers one example of a leading vanpool ride-share program. The state has incorporated vanpool into its long-term transportation plans, which include the Vanpool Investment Program, with $30 million to support new ride-share programs. The vanpool program incentivizes employers to organize vanpool services by offering them tax deductions (Innovative Vanpool Programs, 2012).

Without federal subsidy, vanpools are less able to target low-income users as they will need to recover operating costs through full payment for the service by users themselves.

- **Microbus** services, which can be both formal and informal, pick up a dynamic mix of riders who may vary significantly from day-to-day along a generally fixed route. Two examples of microbus ride-share services include dollar vans in New York City and *camionetas* that can be found in Latino communities around the country.

While similar to vanpool services, microbuses differ in that they don't rely on volunteer drivers and follow fixed routes. Many unknowns remain today about microbus operating conditions, business models, and scalability potential. Microbus services also often exist in loosely regulated environments, resulting in the emergence of several competing operators.
In NYC, about 120,000 daily riders take microbus services known as "dollar vans" that today cost between $2 and $3 dollars. These dollar vans often operate between different ethnic and working class neighborhoods of the city

that are not well served by public transit. The location of operations, indicates that these microbus services fulfill a significant transportation need (King, 2014).

C*amionetas,* or microbuses operating in low-income Latino communities, similarly address unmet transportation needs. One example is the unofficial transit network that runs between Manhattan and Latino working-class communities in New Jersey such as North Bergen and West New York. However, a large portion of the services are still believed to operate outside of formal public transport catchment areas.

- **Demand Responsive Transit** is a more expensive service and usually serves a niche market. This ride-share service differs from others in that it usually has a flexible route and requires advanced booking for a pick-up and drop-off, where users often have special needs (e.g., aging communities or late night safety escorts). Demand-responsive transit also usually carries more passengers than a traditional taxicab service. Dial-a-Ride and Access-a-Ride programs are examples of Demand Responsive Transit models that have responded to gaps in government mandated transportation requirements; local transit authorities are required to provide transportation services to senior citizens and disabled individuals as part of the American Disabilities Act. Taxis may eventually replace these services as local agencies like the Taxi and Limousine Commission in NYC partner with transit authorities to extend rides to these specific user groups.

- **Carpool programs,** both formal and informal, enable empty seats in a user-owned vehicle to be filled with additional riders. In formal systems, an intermediary organization, such as NuRide (a non-mode specific ride-share organizer), often helps facilitate connections between users to coordinate ride-share trips. Informal systems, such as hacking in Baltimore or slugging in several other major cities, often emerge in response to existing incentives, such as multiple vehicle occupancy lanes, which lead drivers to offer rides between semi-regular pick-up and drop-off locations.

Transportation Network Companies (TNCs)

A California Public Utilities Commission ruling decided that app-enabled chauffer services that match drivers to passengers are 'transportation network companies' (TNCs), which distinguishes these services from de facto ride-share programs, such as vanpooling and carpooling, that receive federal funding and are often run by transit agencies. Since TNCs are often app-based tech companies, they have access to innovative financing, such as angel funds from venture capitalists,

which has conventionally been unavailable to other shared mobility models. Given these differences in nature between TNCs and the shared mobility services of bike-share, car-share and ride-share, this paper focuses on the latter. These companies, which include service providers such as Uber, Lyft and SideCar, have attracted a lot of attention recently. While they provide mobile on-demand services that have been marketed as ride-share, they are actually mobile enabled taxi hails in which customers are chauffeured. In true rideshare, a driver fills empty car seats with individuals making a trip that would occur anyway. Drivers operating under the auspices of the TNCs, however, are dispatched to pick-up passengers and make special trips that would otherwise not occur.

A car-share user unlocks his designated vehicle. Image source: SFGate.com.

Low-income individuals use taxi services as much as the highest income households, but much more than middle income groups. Compared to any other income group, these costs consume a greater portion of their household income (Pucher, 2003). While the TNCs offer options like seamlessly splitting costs between multiple passengers for rides, their potential to improve access for low-income individuals remains unclear. TNC services function to support special purpose journeys and merit a separate analysis related to the taxi sector.

Barriers and Advances

While shared mobility innovations offer low-income communities several potential advantages (such as reduced cost, increased choice, and increased flexibility in use and route) actual usage of bike-share, car-share and ride-share systems by low-income individuals has been minimal (Berman, 2013; DDOT, 2007; Golub, 2007). Low-income people usually make up a small proportion of all shared mobility users, and those that do take advantage of the programs are a small share of their overall community.

Bike-share has emerged as a popular mode of transportation. Image source: Flickr user Madeline Ball.

This low usage by low-income communities is in part due to the fact that most of these systems, particularly bike-share and car-share, are operated by companies, whether non-profit or for-profit, that have to cover costs and be financially viable. As such, many companies, do not have stated goals of high usage by low-income individuals per se. Moreover, many barriers exist that inhibit low-income usage of shared mobility systems. Overall, these barriers exist on two fronts: those that deter *users* from accessing the systems and those that deter *operators* from adequately expanding systems into low-income communities. Typically, for other emerging sectors, the government or intermediaries have played roles in overcoming these barriers.

This section explores the specific barriers to greater usage of shared mobility by low-income people as well as some of the strategies currently being tested to overcome them. Some of the more successful systems, as the findings will show, address multiple barriers.

Barriers that Deter Low-Income People from Accessing Shared Mobility Systems

Though bike-share, car-share and ride-share systems each have differing qualities, the barriers that keep low-income individuals from using the systems are generally similar. These barriers range from the way shared mobility systems are physically and operationally designed (*structural*) to the way users are required to pay for system usage (*financial*) to the way low-income communities perceive and understand the systems themselves (*informational/cultural*). Below is a summary of barriers facing low-income users with examples of strategies currently being tested to address them.

Structural Issues

Physical Access

BARRIER: The lack of stations in low-income communities is a key barrier to low-income usage of shared mobility systems. Close, safe, and convenient access to transport is a fundamental requirement for users to actually use the system. Bike- and car-share systems are rarely placed within a walkable or otherwise reasonably accessible distance from the places where most low-income individuals live (Bergman, 2013). See the case studies in Appendix A for sample maps comparing the locations of low-income communities and shared mobility systems in select cities.

Siting decisions are often based on considerations such as the operational model, political context and/or the system business model, depending on which entity is making these decisions. Governments might make siting decisions based the expected higher usage rates that often come from locating stations in neighborhoods with high density, mixed-use development (Shaheen, 1998). Operators, on the other hand, might make decisions from the perspective of profitability and risk reduction. Since low-income people usually don't reside in neighborhoods that seem conducive to successful shared mobility implementation, systems may often skip over these communities.

ADVANCES: The expansion of shared mobility systems into low-income neighborhoods is a critical step toward making them more easily accessible to low-income individuals.

Several efforts exist to directly place (or incentivize the placement of) shared use systems in these neighborhoods. These efforts often come from either the government or nonprofit sector. Local government, in particular, has several avenues through which it can push for improved system siting, which range from leveraging its executive authority to the regulation of system siting. Some examples:

- In Boston, the City Council used the authorization of a grant supporting the Hubway Bikeshare as an opportunity to push for a written plan to expand the system into underserved areas.

- In Washington DC, the city only agreed to let Zipcar and Flexcar car-share vehicles park in city owned curbside spaces in return for placing at least two car-share stations and up to seven vehicles in low-income neighborhoods (Shaheen, 2010). Later, through a two-phase process, they authorized the companies to set-up vehicles in a total of 86 spaces distributed evenly between Zipcar and Flexcar.

- In Denver, the Department of Public Works passed regulation requiring car-share companies to place vehicles in "opportunity areas", where 30% or more of the population lives below the poverty line.

- In New York City, CitiBike and the NYC Department of Transportation crowd-sourced recommendations for new station placements, which resulted in several on Lower East Side and Bedford-Stuyvesant where large numbers of low-income populations live.

Logistical Access

BARRIER: Aside from lack of physical access, low-income individuals also face procedural and operational barriers to participating in shared mobility systems. Some of the requirements for system participation, such as access to internet to make a car-share reservation, are less likely to be met by low-income individuals. Unlike public transit, which logistically asks little of riders, many shared mobility schemes require users to provide information and/or to use a specific medium to access the system (e.g., smart phone or internet). These extra requirements introduce hurdles that may be difficult for many low-income individuals, limiting their use of the system.

Two of the strongest examples of logistical barriers are driver's license and internet access requirements. A valid driver's license is the top requirement for joining a car-share program, as well as some ride-share programs. As research has shown, license suspensions have an overwhelming impact of low-income people and their ability to access jobs (Cockrey, 2004). These suspensions are often for unpaid fines rather than for posing a threat to public safety. The lack of

a valid driver's license also disproportionately effects immigrant populations, especially undocumented immigrants, who must look to other forms of transit for job access. It is currently unknown to what extent low-income people within the catchment area of a car-share system are challenged by the lack of a valid driver's license.

Similarly, access to internet or to a smartphone is required to use most car-share programs. Not only are vehicle reservations often made online, but so are membership applications. Since a significant proportion of low-income communities are unable to afford internet access at home, this barrier makes it difficult and inconvenient to participate in car-share systems. However, there is a growing trend of low-income people accessing the internet on their smartphones. Many systems also allow users to register or reserve vehicles by smartphone, which can often be out of reach for low-income individuals.

ADVANCES: Logistical fixes can address the procedural and operational hurdles that challenge low-income usage of shared mobility systems. Streamlining paper membership applications for those without reliable internet access or offering advanced booking systems for those without smart phones can help interested users access the systems. Organizations that actively reach out to low-income communities by creating simple, user friendly processes can also significantly reduce these logistical barriers and send the message that these communities are welcome.

For example: Ithaca CarShare streamlined their paper application processing through its Easy Access plan to specifically 'attract, retain, and better serve' applicants without internet access. 44 members of Ithaca CarShare (about 3%) take advantage of the Easy Access service, which itself is limited to 55 spots due to current level of funding and subsidies.

Financial barriers

User Costs

BARRIER: The costs of using shared mobility systems also limit low-income populations from accessing the systems. Potential low-income users are often priced out of using shared mobility systems by a range of both recurring and one-time costs that include application fees, membership and user fees, and overuse fines.

The pricing structure of many systems can also exacerbate the financial burdens of participation. Most systems require an initial lump sum membership payment, which is unlikely to be a priority for cash-strapped households.

ADVANCES: To decrease these financial barriers, systems need to lower costs for low-income users, either in the form of discounts or subsidies.
To make a discount or subsidy program useful, a simple process for low-income users to demonstrate eligibility for these discounts or subsidies is also critical. To streamline eligibility verification, several regions are using proof of public assistance or residency in public housing as proxies for eligibility. Once low-income individuals have been verified, options for lowering costs themselves include reducing or eliminating membership fees as well as reducing usage fees and waiving overtime fees.

Several systems have attempted to reduce costs for low-income users. While more steps are still needed to expand participation, some successful examples include:

- Boston Hubway bike-share charges low-income users a $5 membership fee (which includes a helmet) versus $85 for a regular annual membership. Hubway has also seen low-income ridership grow to 11% of its overall riders, compared to most other American bike-share systems which, based on available data, typically have less than 5% of low-income users. (*See the Case Studies for more information*).

- San Francisco and Oakland recipients of CalWorks, a welfare program run by the California Department of Social Services, pay no application fee, no deposit, or no monthly fee and also receive half-off of usage rates (Ortega, 2005).

Lack of Access to Bank Accounts

*BARRIER***:** Many shared mobility services require the usage of a debit or credit card. This requirement exists so that shared mobility systems can associate a bank account with each user in case of property loss or overage fees, which come from keeping a bike or vehicle past the allotted time. The end result is that individuals who lack access to debit or credit cards are unable to sign up for many systems. This "unbanked" population accounts for roughly 17 million people across the US – or 1 in every 12 households (Schmitt, 2012) and largely consists of low-income individuals.

ADVANCE: Expanding access to financial services is one concrete strategy for improving low-income communities' ability to sign up for and use shared mobility systems. A common approach to do this is to explicitly partner with a local credit union or bank. Credit unions, who have taken the lead in helping low-income people with financial services, are able to guarantee approval for an account for unbanked individuals. This then gives them access to a debit or credit card and the ability to register for shared mobility systems.

While this addresses the logistical concern, low-income individuals may still be concerned about overuse fees being charged to their accounts without sufficient funds. For additional support to address this concern, some shared mobility operators work with the bank or credit union to limit, forgive or shoulder the extra charges and to prevent account overdrafts.

For example: Washington DC's Capital BikeShare, New York City's CitiBike, Ithaca CarShare, and Chicago's iGO all implemented similar partnerships with banks or credit unions to reach the unbanked populations in their cities. Despite some success, significant potential remains to serve greater numbers of low-income users who have yet to try the services even once.

A second option for addressing the barriers facing unbanked individuals is to offer alternative payment options aside from a credit or debit card. Several places have explored ways to offer different payment options:

- A founding member of Philadelphia BikeShare suggested that linking payments to cell phones, which many low-income people do have, may allow them to pay for membership and usage with their phone bill (Schmitt, 2012). While Philadelphia BikeShare is due to launch in 2015, it's unclear whether this payment alternative will also be implemented.

- Buffalo CarShare allows users of the system to pay by MoneyOrder, although this is no longer common now that the system has been in operation for several years (Randall, 2014).

Informational & Cultural barriers

Informational barriers

BARRIER: Lack of information or education about the benefits and logistics of shared use systems also contributes to low usage rates in low-income communities. Without a solid understanding of *why* shared mobility offers people unique benefits or *how* to use a shared mobility system, low-income people are less likely to take advantage of the systems. Language barriers in particular pose a significant challenge for encouraging the use of shared mobility systems among non-English speaking communities.

ADVANCES: Explicit outreach programs are necessary to reduce this barrier. These programs should address the lack of information that keeps low-income individuals from wanting to partake in shared mobility systems.
Often times, partnering with an intermediary, such as a local community organization, can help guide these programs. Some examples include:

- In Upstate New York, Ithaca CarShare partnered with a local community organization, Greater Ithaca Activities Center (GIAC), to promote the launch of their program for low-income members.

- In Minneapolis, the city conducted outreach to communities to promote the NiceRide bike-share system, with targeted efforts towards low-income people.

Targeted efforts for non-English speakers can also help bridge informational gaps. Instructions and outreach in other languages promotes usage of shared mobility among communities that previously found share mobility systems inaccessible.

For example: In Arlington, VA, Capital Bikeshare has a Spanish language marketing campaign aimed at the county's Latino community (Buck, 2012) that promotes the system's ease of use.

Cultural Barriers

*BARRIER***:** Cultural factors can also influence use of shared mobility by low-income communities. In particular, distrust of authority, discomfort with shared mobility systems, or preference for the comfort of another culturally congruent system may deter shared mobility usage by low-income people.

One possible explanation is while the sharing economy has gained prominence in recent years, it is unclear to what extent asset ownership is still a status symbol, both across socioeconomic groups as well as for lower income communities in particular. In this case, the added value placed on ownership of car, for example, might outweigh the benefits of participating in a car-share program.

Overall, different low-income communities may have different sets of cultural values that influence their receptiveness to shared mobility programs, making them skeptical or distrusting of the programs. For example, vanpool ride-share operated by local government may face barriers in encouraging participation from communities that have a historic distrust of government authority.

*ADVANCES***:** Efforts to address cultural barriers include navigating around government distrust and ensuring communities feel comfortable within the shared mobility system. One particular strategy is to market and conduct outreach in a tailored way to the community.

For example: In Denver, when B-cycle program operators realized promotional materials that were used to target Denver Housing Authority tenants appeared too much like letters from the government, banks and the Housing Authority, they shifted to a more approachable marketing plan (Carney, 2012).

Another approach to overcoming cultural barriers is to ensure comfort within the shared mobility system. The importance of comfort via cultural affinity can be seen in the success of several ride-share systems that cater to immigrant, religious or ethnic groups. Some examples:

- In New York City, dollar vans operate between certain Asian, Caribbean and Hasidic neighborhoods and carry 120,000 riders a day. These ride-share vans largely serve individuals of the same community, allowing them to cater to cultural preferences, such as playing music in Spanish or Mandarin (Margonellie, 2011).

- An estimated 8 million Latinos in the US use *camionetas*, or informal ride-share minibus companies, to get around metropolitan areas. Collectively, they spend more than $200 million on these minibuses. Riders reported the comfort of having Spanish language radio and a distrust of authority as contributing to their decision to use this form of transit (Valenzuela, 2005). States have also increasingly begun to market regulated vanpool services as *camionetas* to appeal to Spanish-speaking communities.

Barriers that Deter Operators from Serving Low-Income Communities

Shared mobility systems can be set-up through efforts that are government-driven (e.g., bike-share in New York City or vanpools in King County) or private operator-driven (e.g., Buffalo CarShare or *camionetas* in Los Angeles). In either case, a business plan is needed that balances demand projections with the cost of providing service, including risk appraisal. Unless the operator is a social enterprise or unless the government mandates a focus on low-income communities, operators are unlikely to target potential low-income users, given their need for a financially viable business model. This dynamic has played out in Chicago and Philadelphia, where non-profits car-share companies were acquired by for-profit businesses that subsequently dropped some of the benefits to low-income users.

In order to increase access to these systems by low-income communities, it is important to understand the profitability challenges facing system operators from more directly expanding into these neighborhoods. This challenge is made up primarily by two components: lack of demand (*revenue*) and increased liability and other associated costs (*expenses*). While we don't fully know whether these challenges are real or perceived, they are worth understanding since they may be preventing system expansion into low-income communities.

Profitability

Lack of Demand

BARRIER: As stated earlier, the core goal for most shared mobility systems is financial viability. Indeed, even when shared mobility systems do have an explicit focus on improving mobility for low-income people, they must remain financially viable.

All systems rely on partial, if not full, recovery of costs through user fees. If demand is too low to support the services, then either interventions to increase demand or subsidies to support operations will be necessary. To avoid facing the challenge of low demand, shared mobility systems tend to start in places likely to support highest usage – those with a sufficient density of people and uses. The risk of decreased revenue rises as the system expands to areas that are single-use (such as primarily residential) or less dense – which are often also low-income communities. This perceived risk of financial sustainability questions the shared mobility system's profitability and can deter operators from choosing to expand services into low-income communities. Even when systems locate stations or vehicles in those areas, demand may still be low because of the structural, financial and informational barriers outlined earlier.

When taken into consideration together, these real and/or perceived barriers pose a significant challenge for operators. Operators have little incentive to take on the additional risks associated with service expansion into low-income communities until after they reach market saturation.

ADVANCE: Two main approaches can help address the risk of reduced revenue: increasing demand and subsidizing system operations through financial incentives. Intermediaries and government agencies in particular can help mitigate the risk of expanding shared mobility systems into areas where demand, and therefore profitability, may be low. Helping users overcome barriers to system usage will also increase demand, but may not be sufficient to assuage operators on their judgment of risk. Some examples:

- In Washington DC, to convince officials and the Capital BikeShare operator to locate stations in low-income neighborhoods, the Washington Area Bicycle Association targeted outreach and surveyed low-income residents in the neighborhoods east of the Anacostia River, which showed existing demand for bike-share services. In response, up to 20 stations are now located in that area. Yet usage by low-income people remains low. While the operator could attribute low usage to low demand, a more likely reason might be insufficient station density. The stations are far apart, spanning distances that are probably easier taken by bus.

- Zipcar and other car-share enterprises often set up pilots in new neighborhoods but then retract if usage is not high enough to sustain operations. This has been the case with low-income neighborhoods, but the extent of the pilot failure is unknown. Still, it is not exclusively the private sector that takes on the risk of gauging market interest. For example, non-profit services providers such as eGO in Denver and iGO in Chicago have also conducted similar pilots.

Since efforts to drive demand and lower barriers to low-income users may not be enough to assuage both real and perceived concerns about system profitability, financial incentives are also currently needed. To help address issues of system profitability, various federal, state, local and private subsidies can be accessed. In past years, funds have subsidized capital investment in shared mobility systems (which help lower start-up costs) as well as long-term maintenance. In turn, user subsidies, such as discounted membership, can also help shared mobility systems have greater flexibility in locating stations by providing a steady subsidy stream. As is the case with subsidized housing vouchers, user subsidies help reduce the perceived risk of locating in low-income communities. To compare, public transit agencies are subsidized in recognition of the value they provide to the public, and are thus expected to only partially recover costs from fares. However, shared mobility programs that similarly extend mobility services have yet to receive consistent subsidies that recognize their value to the same extent (Feigon, 2014).

A San Francisco, CA resident accesses a car-share vehicle. Image source: SFGate.com.

One example of a federal program that subsidized several shared mobility systems in their attempts to benefit low-income communities is the U.S. Department of Transportation's Job Access and Reverse Commute (JARC) program. Many JARC funds subsidized capital projects and operating costs for

equipment, facilities and maintenance of different transportation modes. While a good percentage of funds have gone to extending public transit schedules and routes, a significant amount has also supported van-based ride-shares that can reach clusters of poor and low-income residents. In addition many federally funded transport initiatives must complete equity analyses. However, new criteria for the distribution of federal transportation funding have changed the equation in recent years, folding JARC into the larger MAP21 (Moving Ahead for Progress in the 21st Century Act) federal program focused on urban mobility. Unfortunately, this change removed any emphasis on low-income communities, which may exacerbate the perceived financial risk of serving low-income communities (Williams, 2014).

The regulation of different shared mobility systems can also influence their likelihood of profitability. For example, car-share companies in particular face an additional challenge in reducing prices. Members of car-share programs across the US are charged "rental car taxes" on top of their membership and usage fees, since most states do not distinguish between traditional car rental and car-share. This increase is incorporated into the pricing scheme, and thus affects the cost burden on the user and may be prohibitive for low-income users. For car-share members taking simple one or two hour trips, the tax can be as high as 60% (Bieszczat, 2011; Badger, 2012). In New York, for example, the rental car tax is at least 19% (Badger, 2012). Local government thus needs to consider how the regulation of shared mobility affects the profitability of different systems and thereby influences their ability (or perceived ability) to expand into low-income neighborhoods.

Increased Costs due to Liability Issues

BARRIER: Perceptions of risk and related questions of liability can also keep system operators from expanding into low-income neighborhoods. Operators, and those who insure them, may perceive a higher level of risk in low-income communities in the form of damage to their assets. Although there is little evidence of increased risk, the mere perception of it may limit enthusiasm for system expansion. For profit operators in particular are less likely to venture into low-income areas where the implications to system profitability seem unfavorable due to the aforementioned perceived or real risk of damage to assets or end users.

ADVANCE: To address this potential hurdle, some insurance networks, such as the Alliance of Non-Profits for Insurance (ANI), specialize in covering shared mobility systems. Non-profit systems such as Denver's eGo and San Francisco's City CarShare are both covered by ANI, which is a non-profit itself and has a board of directors comprised of non-profit members. Buffalo CarShare and Ithaca CarShare, on the other hand, are covered by Porter and Curtis LLC, a private insurer specializing in risk management coverage related to collaborative consumption.

Findings

1. Different shared mobility types address different trip needs

Though linked together by concepts of shared use, efficiency, and third party ownership, each type of shared mobility presents different opportunities and addresses different needs. In general, regular daily trips (such as access to employment or education) require the reliable access and direct route of bike-share and ride-share programs, whereas special purpose trips (such as doctor's appointments or errands) require the flexible routes of bike- or car-share. Depending on the availability of options, a roundtrip may even be made using a different mode for each direction. The distance of a trip and whether a potential user needs to carry materials or packages can also influence which shared mobility type is most appropriate.

The chart below provides a general overview of how the different types of shared mobility can address different trip types. The relationship between both is classified based on how the different schemes are typically used.

Table: What types of trips are different shared mobility types useful for?

	BIKE-SHARE	CAR-SHARE	RIDE-SHARE	TNCs
Trip type (Distance Guideline)	*Local trips, trips to/from transit (1-5 miles)*	*Special trips, round trips (over 5 miles)*	*Reoccurring, medium to long distance trips (5-20 miles)*	*Special trips, medium distance (over 5 miles)*
Jobs	X		X	
Education	X		X	
Healthcare	X	X	X	X
Groceries		X	X	X
Childcare		X	X	

2. Shared mobility is best used as a complement to local mass transit

The advantages of shared mobility suggest that it can help improve the ability of low-income people to travel across geographies by filling the gaps in both traditional mass transit coverage and in the transport network as a whole. Still, shared mobility systems are low-volume transportation alternatives that cannot ultimately compete with the efficiency of high-volume mass transit such as heavy rail and Bus Rapid Transit. While increased investment in mass rapid transit, paired with careful land use planning, holds the best promise for sustainable growth of transportation networks, shared mobility can extend the reach of public transit and provide alternate routes.

In particular, shared mobility can be used to provide direct access from origin to destination or to address "last mile" problems (the potentially long distance from a transit station to a final destination). Indeed, many bike- and car-share users report using shared mobility to extend their public transit trip when their origin or destination is underserved by public transit. In other cases, shared mobility systems offer new routes, both providing connections between less common destinations and bringing new transit options to underserved areas (King, 2014). Some examples:

- Buffalo CarShare noted that 59% of its members at times extend their public transit trip with car-share and that 17% use public transit every time they use a vehicle.

- Up to 75% of NYC Dollar Van users report having a MetroCard to use on the formal public transit system. (King, 2014)

- Communauto carshare in Montreal, Canada gives members who have public transit passes discounts to bike-share, taxis and the car-share itself (Shaheen, 2012).

3. There is no silver bullet for solving the transportation needs of low-income communities through shared mobility.

As we discussed in the barriers section, the reasons why low-income communities aren't participating in shared mobility systems are complex and systemic. Accordingly, no single program will be enough to facilitate greater usage by low-income people of shared mobility. Indeed, efforts to ensure low-income individuals benefit from shared mobility systems have been more

successful when addressing at least three barriers, such as Boston's Hubway efforts (see Appendix A for more detail). Systems that attempted singular solutions, such as offering subsidies without adequate station siting or community outreach, saw little increase in low-income participation through their programs.

For example, while reducing costs through direct financial assistance does help increase system accessibility, it is not sufficient on its own. This can be seen in the case of Citibike's outreach efforts with New York City's Housing Authority (NYCHA). In that case, NYCHA residents received a discounted annual Citibike bike-share membership fee of $60 ($35 less than the general public's annual charge). Still, out of 400,000 residents in NYCHA housing, including over 15,000 residents that live within the Bikeshare system's catchment area in the Lower East Side, only 285 NYCHA housing residents became system subscribers (See Appendix C for full case study).

Similarly, Denver Housing Authority residents were offered a discounted $15 membership for B-Cycle bike-share. Still, community members claimed that membership costs remained too expensive. When a local organization donated 100 B-Cycle memberships to Denver Housing Authority residents, only 32 people signed up and only 23 of those used the bikes more than once.
These cases suggest that programmatic interventions alone will not substantially address the transportation needs of low-income individuals. Instead, efforts need to look at the entire system that shapes low-income participation in shared mobility to address multiple intervention points.

The most promising systems address at least three barriers.

Case Studies		Barriers Addressed				
Program	Location	Siting	Logistical Access	Cost of Service	Unbanked	Outreach
Hubway (*Bike-share*)	Boston, MA	X	X	X		X
Citibike (*Bike-share*)	New York City, NY		X	X	X	
Capital Bikeshare	Washington D.C.	X		X	X	X
Buffalo Carshare	Buffalo, NYC	X		X	X	X
eGo Carshare	Denver, CO	X	X	X		
City Carshare	San Francisco, CA	X	X	X		X
Heritage Community Transport Microbus (*Ride-share*)	Pittsburgh, PA	X	X	X	X	X
King County Vanpool (*Ride-share*)	King County, WA	X	X	X	x	
LA Metro Vanpool (*Ride-share*)	LA County, CA	X		X		X

4. Core strategies for improving access to shared mobility are similar across shared mobility system types.

Though bike-share, car-share, ride-share programs have diverse uses and structures, the core strategies used to reduce the barriers faced by low income communities can be adopted by any system, regardless of type. Different actors, such as the government, operators, and intermediaries, can initiate and drive these strategies. However, given the nascent nature of the sharing economy, these strategies are still being tested for effectiveness. These core strategies include:

Targeted siting requires clear demand from potential users (or efforts to overcome barriers to usage) and incentives for system operators to locate there in the first place. While the expansion of siting into low-income areas has been slow, it is a critical step toward making these systems accessible to low-income communities.

Logistical fixes address procedural steps that present challenges to using a shared mobility system. For example, streamlining paper membership applications for those without reliable internet or offering advanced booking systems for those without smart phones help interested parties access the system.

Lower costs through discounts or subsidies decrease the financial barriers low-income residents face in participating in shared mobility systems. Options for lowering costs include reducing or eliminating membership fees as well as reducing usage fees and waiving overtime fees. Some shared mobility operators work with the banks to limit or eliminate extra fees and prevent account overdrafts for low income individuals' accounts.

Improved access to financial services can also help many low-income individuals meet the requirements to participate in shared mobility systems. This improved access for the 'unbanked' can be improved through partnerships with local credit unions or banks.

Outreach programs aimed at low-income communities send the message that they are valued and welcome. Partnerships with community based organizations, assistance in multiple languages and promotional materials that speak to the concerns of target communities can all help promote comfort with and interest in the shared mobility system. Outreach efforts can also inform potential low-income users of other opportunities to overcome existing barriers, such as financial assistance programs.

5. The market for shared mobility transportation is nascent and developing.

Since shared mobility is largely a recent innovation, the market for shared mobility services is still nascent, as is the understanding of the regulatory environment. As partial evidence, cities and states across the U.S. have been involved in ongoing debates about how regulations can catch up to new industries of shared mobility. The field is still figuring out how to serve this market, with for-profit and non-profit models steadily emerging to meet the new demand.

In car-share, the nascent market is growing and changing at a relatively quick pace. Early social enterprises did target low-income communities, but that changed once they were bought out by conventional for-profit businesses. Indeed, national rental car corporations launched car-share divisions in recent years and began acquiring local non-profit enterprises, such as iGo Carshare in Chicago or Philly Carshare in Philadelphia. However, after acquisition, these for-profit companies have forgone the programs that targeted low-income communities.

In bike-share, business models are still being proven out. Three different systems with three different for-profit operators are facing substantial difficulties with their business models. The systems, which are located in London, Montreal and New York City, all faced potential bankruptcy until a Canadian furniture company purchased the troubled supplier of bicycles and technology for all three cities (Austen, 2014).

Relatedly, informal ride-share businesses, such as dollar vans or *camionetas*, have been meeting the needs of various communities, including many immigrants and low-income individuals, for many years. These businesses also successfully operate at scale (e.g., dollar vans serve 120,000 people a day in New York City), though some concerns still remain about the sustainability and feasibility of their business model, their safety and the loosely regulated nature of the informal market.

A New York City resident checks out a Citibike. Image source: Flickr user drpavloff, NYC Bikes.

Overall, these business models remain unproven and the market still faces a lot of potential changes. Given this reality, service providers are unlikely to target low-income communities until the market develops further, when operators have a better understanding of sustainable business models and when governments have a better understanding of what regulations and incentives can improve low-income communities' access to shared mobility.

6. The government has multiple levers of influence and can play multiple roles in bringing shared mobility services to low-income communities.

A critical player in overcoming both user- and operator-related barriers is government. With its significant formal authority, government can play an important role in guiding and steering the expansion of shared mobility across metropolitan areas. Through both regulation and funding, government can incentivize or simply require for-profit and nonprofit organizations to make efforts to serve low-income communities. In some cases, municipalities have considered laws requiring stations in designated zones, in return for operating rights. This has been the case with car-share in Washington DC where the local Department of Transportation requires vehicles to be placed in low-income neighborhoods. Other municipalities have offered grants that require expansion efforts as well as reporting focused on low-income users such as with Boston's Hubway system (see Appendix for full details). The public sector can also attain full control over the goals and programs of a given shared-mobility system by owning and operating the system itself.

Even within government, different departments can play very different roles influencing the inclusivity of shared mobility systems. As planners, entities such as the transportation or planning departments can identify, suggest, or require locations for station siting. As service providers, public health, social service, and transportation departments can act as brokers that connect community members such as low-income residents with existing support programs to facilitate participation in shared mobility systems.

7. Intermediaries have the opportunity to connect users to new opportunities within the shared mobility space.

Another important player in overcoming barriers, especially for users, will be intermediaries, or third party brokers who help bridge the barriers that keep low-income communities from accessing shared mobility services. Potential intermediaries often have preexisting relationships with low-income communities and are therefore well suited to connect these groups with efforts to reduce usage barriers. Intermediaries can identify specific barriers, help devise solutions to overcome them, and advise on messaging and outreach mechanisms (Philadelphia Bicycle Share Strategic Business Plan, 2013). Advocacy groups, community organizations and even city departments are some examples of entities that play this role.

Due to potential ties with a local community, an intermediary can play a key role in implementing outreach and education programs to share knowledge of the system itself, available subsidies, or logistical fixes with potential low-income users. They may also provide new avenues for financial support by tapping into non-transit funds, such as health or community focused grants. One specific example of an intermediary is the Boston Public Health Commission, which helps promote subsidized bike-share memberships to low-income users during medical visits. The intermediary's "prescribe a bike" program is largely a marketing campaign in which doctors give a bike-share application to their low-income patients. See the Case Studies for more information.

Recommendations

1. Launch pilot projects based on research of the actual transportation needs faced by low-income communities.

Academic research has in large part focused on access to jobs as the biggest transportation issue facing low-income communities. Less research exists on low-income communities' need to access other essential services and goods that are also important to household well-being and may have long-term implications on moving out of poverty, including access to education, child care and health care. Until we better understand the actual access and mobility needs of these communities, we won't know how far shared mobility can go in improving their ability to access to jobs, affordable housing, health care and other essential services.

The Dukakis Center for Urban and Regional Policy at Northeastern University offers one promising model for this level of deep research through its "Toll of Transportation" project, which set out to identify the transportation needs and behaviors of low-income Latino households in Massachusetts by actually surveying the community. Better research in this vain is a first step to identifying the correct interventions or supports needed to address transportation and mobility needs of low-income communities.

Further research should also inform the development of pilot programs which can then be evaluated against a baseline understanding of low-income mobility needs. Testing different approaches and evaluating them against such a baseline can help align resources and efforts around promising models.

2. Research shared mobility business models, especially those with cross-sector partnerships, to understand how best to reach low-income communities.

As noted in our findings, the market for shared mobility services is a nascent and developing one. While the public, for-profit and non-profit sectors may all drive the planning and development of these shared mobility services, they are still

testing out financially sustainable operating models, which are critical for ongoing service provision and potential expansion into low-income communities.

It is unlikely that the for-profit sector will voluntarily serve the low-income market without incentives or subsidies, in a similar way that most developers would not build affordable housing without incentives. A better understanding of shared mobility business models can help identify the value proposition for for-profit companies to serve low-income communities and what subsidy or incentive is needed. Currently, this value proposition is unclear, resulting in few efforts by businesses to reach low-income people.

At the same time, a mix of partners from across public, non-profit and for-profit sectors appears to hold the most promise for expanding social mobility services to low-income people (see appendices for examples). The public and non-profit sectors are important players for structuring shared mobility business models since they can increase demand through reducing user barriers, identify alternative revenue sources, and provide incentives to operators. If the public sector also takes an active role in guiding, requiring, and facilitating low-income shared mobility initiatives, this could help enable the for-profit private sector to scale-up successful programs without losing considerations for low-income individuals.

In order to successfully bring shared mobility to low-income communities at scale, we need to better understand potential business models including the promising partnerships approach, which can efficiently and effectively leverage all potential shared mobility players.

3. Incorporate shared mobility into long term transportation planning

Cultivate ride-share programs to guide growth of local mass transit
Minibus and vanpool ride-share systems, such as NYC's dollar vans, are reliable indicators of unmet travel demand. They develop in underserved areas and are more responsive to user needs than public transit. To guide future growth of mass transit, these ride-share systems should be monitored and evaluated. They can also be supported as an independent solution in low density regions that are less likely to invest in mass transit growth.

Use ride-share to connect low-income communities to jobs
Minibus and vanpool ride-share systems have also proven to be effective at addressing spatial mismatch issues between low-income workers and their jobs, as can be seen in Greater New York City where microbuses carry more people daily than many other models and offer more direct and cheaper service than a formal bus. These systems also have promising models with flexibility to scale as

needed since they can operate in low-density areas and along routes where public transit is not a competitor. Given this scalability, ride-share programs between low-income communities and employment centers are a promising strategy to further support.

Explore options for public transit and shared mobility system integration
Shared mobility and public transit planning must be coordinated to better address the needs of low-income communities. If public transit stations can also be access points for shared mobility systems, then the reach of both systems can be expanded. Shared mobility systems should also explore integrating fare payment services with existing public transit. For example, many international systems (such as Paris, France and Guangzhou, China) have an integrated smart card that enables access across shared mobility and mass transit services. Information sharing between systems, including route and ridership data, could also increase the efficiency of both shared mobility and public transit. Some smartphone apps have started to innovate in this space.

4. Focus on comprehensive, collaborative approaches to barrier reduction

Since multiple interlaced barriers exist that keep low-income individuals from participating in shared mobility systems, only comprehensive strategies that address several barriers have the potential to succeed at a larger scale. While station siting and physical access are preconditions for system use, costs considerations are also paramount, and outreach is a key component of encouraging usage among those standing to benefit the most from shared mobility's advantages. Failing to address multiple issues limits the impact of well-intentioned efforts. If done correctly, improving access for low-income communities has the potential to increase a system's usage, buoy its public image, and support regional equity goals.

5. Cultivate intermediaries to increase demand for services by addressing barriers

Intermediaries can amplify the results of efforts to reduce barriers. By playing a connector role between users and shared mobility support programs, intermediaries can serve as hubs for shared mobility knowledge and action. They can also potentially do user needs assessments since they are often closer to the community. To better leverage existing programs, intermediaries should more actively coordinate their services, including targeted outreach, with system operators.

Conclusion

Shared mobility systems, covering a range of types and uses, are exciting new players in urban transportation and offer a host of new transit options for individuals.

Although initial steps have been taken to open these systems to low-income users, these systems have not as of yet seen high usage by low-income populations. The best way forward for maximizing the potential of shared mobility strategies to benefit low-income individuals is to understand their current travel needs and patterns, streamline and expand successful strategies, and encourage new opportunities to reduce barriers.

Washington, DC residents take Capital Bikeshare for a roll. Image source: Flickr user, DDOT DC.

Still, shared mobility is only one piece of the greater transportation and mobility system that shapes how low-income people traverse cities and regions. To enduringly improve how low-income communities physically access jobs, housing and other essentials at a larger scale, we need to advocate for better aligned land use and transportation planning, such as how equitable transit-oriented development efforts are currently doing in regions across the country.

We are excited about the promise of integrating shared mobility with transportation and with trends we see of practitioners collaborating across disciplines. We believe that further exploring the recommendations in this brief will help ensure the benefits of shared mobility services are available to low-income residents, enabling them to better access jobs and essential services.

Acknowledgements

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