

# Do Dock-based and Dockless Bikesharing Systems Provide Equitable Access for Disadvantaged Communities?

Xiaodong Qian and Miguel Jaller  
*University of California, Davis*

March 2022

## POLICY BRIEF

### Issue

Bikeshare is an increasingly prevalent transportation option that offers users access to a bicycle without owning it. Both dock-based (requiring users to return bicycles to a fixed station) and dockless (free-floating) services have grown significantly over the past decade. Previous research has found that a well-designed bikeshare system has great potential to improve accessibility for disadvantaged communities. However, systems currently underserve these communities. Moreover, there is a lack of research about the performance and impacts of dock-based versus dockless bikeshare systems in terms of providing equitable access to disadvantaged communities.

Researchers at the University of California, Davis analyzed the difference in service levels among dock-based and dockless systems in the cities of San Francisco and Los Angeles. Before the COVID-19 pandemic, Ford GoBike (dock-based) and JUMP Bike (dockless) operated in San Francisco, and Metro Bike Share (dock-based) and JUMP Bike (dockless) operated in Los Angeles. The researchers analyzed the spatial distribution of service areas, availability of bikes and bike idle times, trip statistics, rebalancing, and other metrics to understand how well or poorly these systems serve designated “communities of concern” (CoCs). These CoCs meet certain thresholds of low-income residents, people of color, and other characteristics defined by each city. Finally, using crowdsourced suggestions from online platforms, the researchers conducted a comparative assessment of actual station locations with the users’ suggestions of potential station locations. These analyses can help planning agencies and local governments to better understand and manage these systems.

### Key Research Findings

**The dockless bikeshare system in San Francisco tended to cover more area and a larger population within CoCs than did the dock-based system (Figure 1, top panels).** In Los Angeles, the dockless bike system also included a larger geographical area but had less actual service coverage in CoCs compared to the dock-based system (Figure 1, lower panels). As the blue shaded areas in the lower panels show, the Los Angeles dockless system is mainly deployed in Santa Monica and other coastal areas, which are more affluent and tourism-oriented, whereas the dock-based system is concentrated around downtown, which has more CoCs than the coastal area.

**On average, the dockless system offered more available bikes in CoCs than in other areas in San Francisco, but the reverse was true in Los Angeles.** The average idle time of dockless bikes within CoCs was also shorter than in other areas in San Francisco. When accounting for the dockless system’s larger service area and smaller bike fleet, the dockless system had a comparable level of bike availability in CoCs to the dock-based system. In Los Angeles, the dockless service provided more available bikes outside of CoCs than within them, while dock-based bikes had similar levels of service in CoCs and other areas.

**In San Francisco, a greater proportion of rebalancing activities happened in CoCs for dockless than for dock-based bikes.** The frequent moving of dockless bikes into these communities is evidence of the high demand for dockless bikeshare service. It also highlights a potential mismatch between trip destinations and origins in CoCs. Finally,

the fact that some users started or ended their dockless trips in CoCs that were outside the service area demonstrates potential demand beyond the existing service area.

**Crowdsourced suggestions for new dock-based bikeshare stations show a gap between supply and demand that could be filled by dockless bikeshare systems.**

The leading suggestions for new stations in San Francisco CoCs were to facilitate travel to and from work and school, while the current dock-based system is more oriented toward recreation and shopping. Dockless bikeshare systems, without restrictions in service areas, could potentially meet this demand for commute transportation. While local governments could leverage this crowdsourced information to inform the planning of dockless systems to cover potential demand in CoCs, the information could be biased due to an underrepresentation of low-income or disadvantaged communities. An equitable design needs more voices from traditionally underrepresented populations.

**Policy Implications**

This quantitative analysis suggests that dockless bikeshare systems could provide more equitable access through a broadened service area and frequent rebalancing. The methodology developed through this research can assist local governments in monitoring the degree to which dockless systems are serving CoCs as the services expand. The analytic framework can be applied to any city interested in doing so. However, some research has shown different levels of resiliency during the COVID-19 pandemic among dockless vs. dock-based services. Therefore,

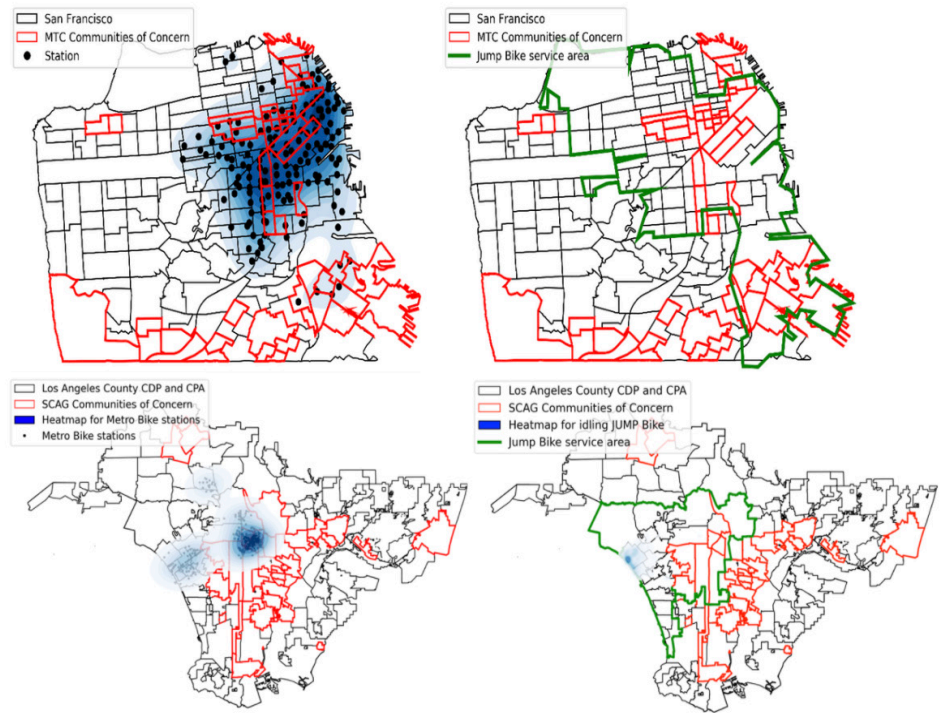


Figure 1. Service areas of dock-based system (left) and dockless system (right) in San Francisco (top) and Los Angeles (bottom). Red lines show communities of concern.

it may be important to consider services’ reliability and resiliency when making medium to long-term planning decisions.

**More Information**

This policy brief is drawn from “Dock-based and Dockless Bikesharing Systems: Analysis of Equitable Access for Disadvantaged Communities,” a report from the National Center for Sustainable Transportation, authored by Miguel Jaller, Debbie Niemeier, Xiaodong Qian, and Miao Hu of the University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/dock-based-and-dockless-bikesharing-systems-analysis-equitable-access-disadvantaged>.

For more information about the findings presented in this brief, contact Xiaodong Qian at [xdqian@ucdavis.edu](mailto:xdqian@ucdavis.edu).

<p>The National Center for Sustainable Transportation is a consortium of leading universities committed to advancing an environmentally sustainable transportation system through cutting-edge research, direct policy engagement, and education of our future leaders. Consortium members: University of California, Davis; University of California, Riverside; University of Southern California; California State University, Long Beach; Georgia Institute of Technology; and the University of Vermont.</p>	<p>Visit us at <a href="https://ncst.ucdavis.edu">ncst.ucdavis.edu</a></p> <p>Follow us:</p>  
---	--