National Center for Sustainable Transportation

POLICY BRIEF

Identifying Bikeshare Station Locations to Improve Underserved Communities' Accessibility

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Issue

Bikeshare programs are increasingly popular in the United States, and they are an important part of sustainable transportation systems. They offer an alternative mode choice for many types of last-mile trips. Most of the current research on bikeshare focuses on benefits (e.g., how to replace auto trips with bike trips and reduce greenhouse gas emissions) and system management (e.g., bike repositioning between stations). Far less attention has been paid to the potential for bikeshare programs to provide greater access to jobs and essential services for underserved communities. To date, there is virtually no quantitative research aimed at designing bikeshare systems for underserved communities. To address this research gap, this study of two cities (Chicago and Philadelphia) first, examines whether bikeshare systems have targeted specific populations, and second, quantitatively assesses the potential for bikeshare systems to provide greater accessibility for underserved communities.

Key Research Findings

A well-designed bikeshare system can improve accessibility for underserved communities more than for other populations. We measured the change in accessibility under two scenarios. First, we assumed that walking is used both alone and in conjunction with transit. Second, we measured accessibility assuming the addition of access to bikeshare. Based on our quantitative analysis, bikeshare systems can produce substantial accessibility improvements for underserved communities. Average accessibility improvements for underserved or disadvantaged communities can be greater than those experienced in other areas.

Using a newly developed spatial index that combines the potential for increased access to jobs and essential services, the level of bike infrastructure, and the underserved population shares, we also find evidence that existing bikeshare systems have been specifically designed to target certain ridership. We quantitatively demonstrate that bikeshare stations in both Philadelphia and Chicago tend to be located in areas with more affluent and white populations (Figure 1). This is consistent with findings from the qualitative investigation by McNeil, Dill, MacArthur, Broach, and Howland[1] and from the demographic information analysis using

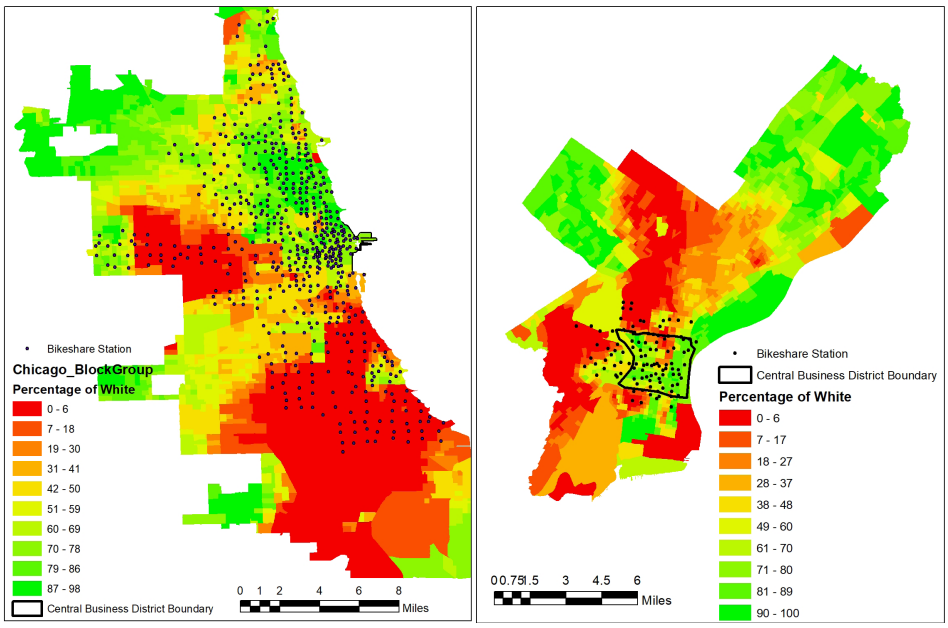

Figure 1. Distribution of bikeshare stations and white population in Chicago (left) and Philadelphia (right)

bikeshare stations' buffer areas from Ursaki and Aultman-Hall.[2]

Additionally, the overall number of bikeshare stations in every block group tends to be higher in those block groups having a higher percentage of white population. Having limited bikeshare stations in underserved areas affects the bikeshare usage there. Taking Chicgo as an example, most of the bikeshare stations with high numbers of annual origination or destination trips are located in areas with greater white population.

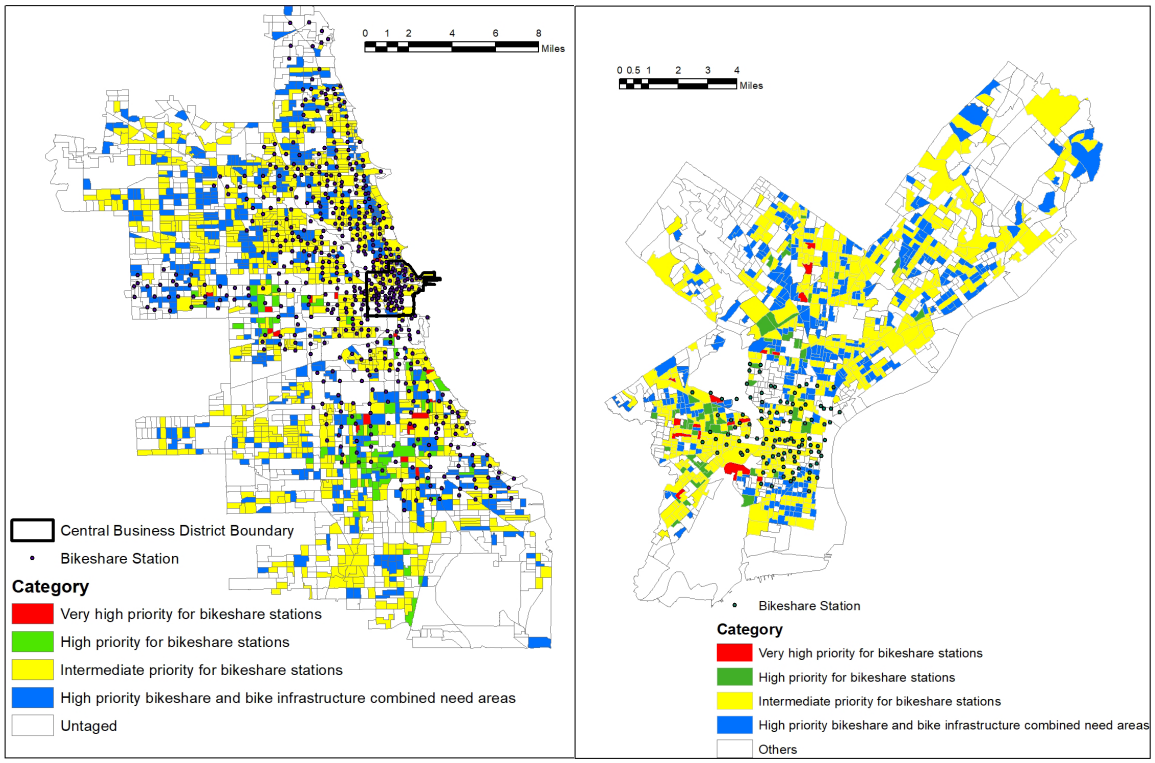

Figure 2. Map of current bikeshare stations and block group classifications in Chicago (left) and Philadelphia (right)

The spatial index can be applied to identify potential locations for bikeshare stations (dock-based bikeshare systems) or to rebalance bikes (dockless bikeshare systems) to address bikeshare equity issues. The new index can: 1) facilitate the identification of priority areas for bikeshare investment based on current infrastructure and the potential for increased job or essential service access; 2) inform the siting of bikeshare stations and investment in bike infrastructure to better assist underserved populations; and 3) provide an estimate of the potential for improved job and social services access via bike-to-transit. Figure 2 shows how the index we developed is applied in our case study of Chicago and Philadelphia.

More Information

This policy brief is drawn from the research report, "High Impact Prioritization of Bikeshare Program Investment to Improve Underserved Communities' Access to Jobs and Essential Services," from the National Center for Sustainable Transportation (NCST), authored by Xiaodong Qian and Deb Niemeier of the University of California, Davis. The full report can be found on the NCST website at https://ncst.ucdavis.edu/project/high-impact-prioritization-of-bike-share-program-investment-to-improve-underserved-communities-access-to-jobs-and-essential-services/.

For more information about the findings presented in this brief, please contact Xiaodong Qian at xdqian@ucdavis.edu.

[1] *McNeil, N., Dill, J., MacArthur, J., Broach, J., & Howland, S. (2017). Breaking Barriers to Bike Share: Insights from Residents of Traditionally Underserved Neighborhoods. NITC-RR-884b. Portland, OR: Transportation Research and Education Center (TREC), 2017. https://doi.org/10.15760/trec.176*

[2] *Ursaki, J., & Aultman-Hall, L. (2016). Quantifying the equity of bikeshare access in US cities. Paper presented at the Transportation Research Board 95th Annual Meeting, Washington, DC.*

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