TECHSUMMARY February 2024

State Project No. DOTLT1000376 | LTRC Project No. 22-5SS

Analyzing Human Mobility for Active Transportation Planning in Louisiana

INTRODUCTION

Active transportation refers to any human-powered mode of transportation, such as walking and biking. Complete Streets is a concept to improve transportation infrastructure for promoting active transportation and balancing multi-modal transportation modes. The Louisiana Department of Transportation and Development (DOTD) adopted a Complete Streets Policy in 2010 to "balance access, mobility, and safety needs" of all road users. However, justifying walking and biking demand has been recognized as a challenge in practice. This challenge leaves the DOTD, Metropolitan Planning Organizations (MPOs), and local authorities without strong data support when a bike/pedestrian infrastructure investment decision needs to be made. When the amount of funding is limited, projects serving biking/walking activities may lose their competitiveness easily due to a lack of evidence justifying existing or potential demand.

OBJECTIVE

The main objective of the research is to identify areas in Louisiana that require active transportation infrastructure (such as sidewalks and crosswalks) the most. The needs were determined based on continuously collected anonymous human mobility data from mobile devices. An active transportation mobility index was developed based on the human mobility data, which is expected to illuminate areas where significant demand exists to access a given location, and a high proportion of trips could potentially be captured by active modes. Connectivity, safety, and equity-related factors were then integrated into the index and helped derive an active transportation infrastructure investment potential score, offering comprehensive decision-making support.

SCOPE

The main purpose of this project is to provide statewide planning support to Louisiana with safety, mobility, and accessibility needs (which are the three most common goals of Complete Streets policies) in mind. This research focuses on serving home-based trips to improve residents' access to jobs, recreational activities, health services, etc.

METHODOLOGY

Figure 1 shows the overall workflow of this research, which includes feedback loops to incorporate changes to improve research output. First, a preliminary version of safety, mobility, and accessibility/connectivity measures were proposed based on past research and data availability. Then all the indices, scores, and indicators were calculated and incorporated into an online dashboard (Version 1.0) to engage stakeholders for testing to leverage their knowledge and experience. The measures and the dashboard were then updated to address major concerns expressed in the survey (Version 2.0).

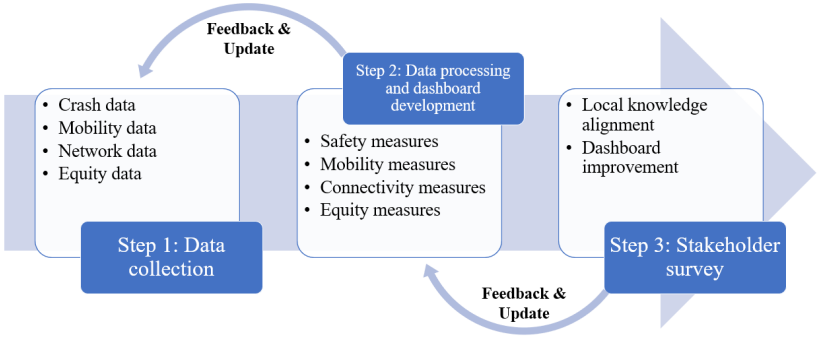

Figure 1. Study workflow with stakeholder engagement feedback loop

LTRC Report 693

Read online summary or final report:
www.ltrc.lsu.edu/publications.html

PRINCIPAL INVESTIGATOR:
Ruijie "Rebecca" Bian, Ph.D., P.E.

LTRC CONTACT:
Elisabeta Mitran, Ph.D.

FUNDING:
SPR: TT-Fed/TT-Reg - 5

Louisiana Transportation Research Center

4101 Gourrier Ave
Baton Rouge, LA 70808-4443

www.ltrc.lsu.edu

This research used an emerging large-scale human mobility dataset to identify places where there are a higher number of short-distance trips to public places (expressed by a mobility index) in Louisiana. Those places with higher mobility index values are more likely to be potentially served by active modes, given adequate infrastructure and network connectivity. Demographic variables were integrated into the mobility index design to prioritize access for more people and address equity concerns. In addition, a safety index (reflecting crash injuries/fatalities involving pedestrians/bicyclists) and a connectivity index (reflecting the density of existing active transportation infrastructure) were also calculated and considered together with the mobility index to generate an active transportation investment potential score. The scores are statewide standardized values, for which a higher score reflects greater safety improvement needs (i.e., more injuries/fatalities), greater mobility needs (i.e., more short-distance trips), and lower network density (i.e., inhibiting current demand). All the indices/scores were generated at both hexagon (in 0.1 km^2) and segment (in 0.1-mile) level, then mapped and published on an online dashboard for public access (as shown in Figure 2). The developed dashboard is expected to support statewide active transportation planning and project selection/ prioritization decision-making activities. The proposed methodology is based on data sources that are available to public agencies and should be replicable in any places that have few active transportation facilities and where pedestrian/bicyclist count data are not sufficient to directly measure or model demand.

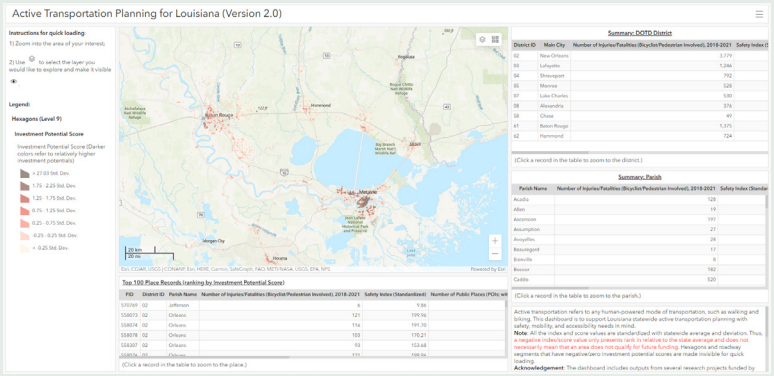

Figure 2. Dashboard appearance on desktops (left) and QR code for mobile access (right)

CONCLUSIONS

This study focuses on identifying locations where, relative to other areas in a state, there are a high number of short-distance trips to non-residential locations. In theory, this reflects a higher number of trips which could, if facilities are in place to encourage it, be completed by active modes. Combining trip data with best-available network data and demographic variables provides an improved means of predicting observable and latent demand than evaluation of safety data alone. Results are calculated at both the area (i.e., hexagonal) level and at the segment level. The dashboard only presents areas/segments with positive investment potential scores to enable quick webpage loading. Advanced users can download the shared map package and import all the map layers into the user's own GIS platform to unlock many other analytic possibilities, such as querying by corridor, neighborhood, roadway ownership, or functional class. The investment score represents the potential for new or improved facilities to support more trips and encourage mode shift, rather than a direct measurement of investment need based on existing demand. It is important to balance this with measures of equity and need, to avoid reinforcing historic patterns of disinvestment. For example, over 100 equity and contextual indicators from official sources (e.g., the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Transportation (USDOT)) were included in the developed dashboard to assist practitioners.

As indicated in the stakeholder feedback results, there are a variety of use cases for the tool and underlying indices. Some applications may be more suitable for certain types of stakeholder/agencies, and/or specific levels of geography. This study was principally intended to provide a resource for statewide evaluation of active transportation opportunities. Use cases for this data include statewide screening, long-range planning, grant proposal development, project prioritization, and demand estimation. The ability to quickly compare either the composite investment score, or an individual safety/mobility/connectivity index, against either the statewide average, or a set of peer geographies allows for efficient identification of areas which may particularly benefit from investments in network planning, safety enhancement, or new facility development.

RECOMMENDATIONS

The research team has developed a post-project survey to continue collecting stakeholder knowledge for future improvements. Continuous outreach activities are needed to engage a broader audience to build awareness of the online dashboard and encourage stakeholders to share their user experience. This includes defining shared priorities, standards, and classification schema for transportation infrastructure data. Stakeholders are also encouraged to share their data for consolidation, which will facilitate future dashboard updates and benefit other activities as well (e.g., non-motorized user or site visit counts). As attention towards non-motorized road users increases and data availability expands, opportunities to build on, update, and improve this tool for scalable analysis are anticipated. Collaboration in terms of methodology, data, and public communication are key to development of safe, accessible, well-utilized multimodal facilities and networks.