

Introduction

Every day, millions of Americans use the transportation system to reach jobs, schools, healthcare, and retail shopping. How long it takes and how much it costs them to accomplish these daily tasks is what defines their level of connectivity. Unfortunately, far too many communities in America possess inadequate transportation options, resulting in an inability to easily access these critical services. This paper addresses various ways to measure these levels of connectivity, and some positive steps that communities can take moving forward.

Equality of Opportunity

Connectivity is particularly important for people who don't always have mobility, particularly low-income and economically disadvantaged populations. Research shows that environmental justice (EJ) communities have longer, more unreliable commutes. One study found that African Americans spend more time than any other group getting to work. On average, African American commute times are 15 more minutes than Caucasians. The author noted that in cities, African Americans continue to live significantly further from jobs centers as a result of historic racial residential segregation.¹ This mismatch between where the jobs are and where people live results in longer commute and more costly commutes, if there is a way to get there at all.

Transportation and economic opportunity are deeply interconnected. Transportation is second to housing as the largest expense for American households, costing more than food, clothing, and health care. Costs by mode of transportation also vary widely. Public transit costs typically run from \$800 to \$1500 per worker, per year, while average car costs exceed \$6000 per year. These costs can impact low-income families disproportionately. While the average American household spends 18% of its income on transportation, this share is as high as 33% for low-income households.² Costs are higher for families living in areas with sprawling land-use patterns and high automobile mode shares.

Low-income communities have lower car ownership rates than higher income areas. Households with annual incomes of less than \$25,000 are seven times less likely to have a car than those with higher incomes in a typical community, 20-40% of the population cannot drive due to age, poverty or physical impairment and so depend significantly on walking, cycling and public transport.³

While low-income families rely more heavily on transit and non-motorized travel, low-income areas have less access to infrastructure to support these modes. For instance, 89 percent of high income neighborhoods have sidewalks while only 49 percent of low-income neighborhoods do. These disadvantaged areas also have less street lighting, fewer cross walks and much less traffic calming measures.⁴ This disparity has major safety implications. Low-income census tracts have more than

¹ Parks, Virginia. *Density for All: Linking Urban Form to Social Equity*. 2014.

² FTA Report No. 0030 Transportation Needs of Disadvantaged Populations

³ <http://www.vtpi.org/compstr.pdf>

⁴ Gibbs K, Slater SJ, Nicholson N, Barker DC, and Chaloupka FJ. *Income Disparities in Street Features that Encourage Walking* – A BTG Research Brief. Chicago, IL: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, 2012. http://www.bridgingthegapresearch.org/_asset/02fpi3/btg_street_walkability_FINAL_03-09-12.pdf

double the fatality rate (10.4 per 100,000) from traffic collisions as high income areas (5 per 100,000).⁵ Likewise, areas where more than 30% of the population live in poverty rate above 30% experience 12.6 traffic deaths per 100,000, compared with to 3.8 deaths per 100,000 in areas with less than 5% poverty.

And while low-income communities often have access to transit, in many cases only small portion of jobs in the region are accessible by it. A study by the Brookings Institution found that the average job is accessible by transit in less than 90 minutes to only 27 percent of American workers. The results vary from 64 percent of the population possessing job accessibility via transit in Salt Lake City to a mere 6 percent of the population in Palm Bay, Florida. In these communities where transportation options are limited, employment may be difficult to maintain or access.

Defining Connectivity

Connectivity, or accessibility, is the degree to which the transportation system provides access to essential services and other destinations. In other words, how well the transportation network connects people to the places they need to go. A number of factors affect accessibility including mobility (physical travel), land use patterns (the geographic distribution of services and activities), and mobility substitutes such as telecommunications and delivery services.

The discussion of connectivity is framed by who you are trying to provide access to, what they need access to and by what mode of transportation they seek to use. With this in mind, we can conclude that every community is different because each has different target demographics, different services those people seek and different modes of transportation they wish to use. The needs of young men of color in urban America are different than the needs of elderly retirees in a rural community. The former may be seeking additional access to jobs via rail, while the latter may be seeking additional access to health care services via car. These two scenarios require different approaches in order to achieve optimal results.

For example, in Washington D.C., the District Department of Transportation (DDOT) wanted to improve the number of transportation options available in the city. To do so, they created a Mobility Index⁶ to identify existing neighborhoods' accessibility and connectivity. To construct this index, DDOT measured the availability of bike lanes, fixed rail transit, and high frequency bus routes across the entire city. This allowed DDOT to measure the level of connectivity across multiple high capacity nodes, and create a multi-modal index to help target investments where they might be most needed. Similarly, the Delaware Valley Regional Planning Commission (DVRPC) created a tool and methodology to assess the appropriateness of various modes and intensities of transit service throughout their region called the DVRPC Transit Score Tool.

Gathering Data & Measurement Tools

There is an old adage that "what gets measured, gets done" and this can certainly be applied to the evaluating the performance of the transportation sector. Connectivity is an important component to assess how well the transportation system is functioning and serving the people using it. This is an especially important gap to fill as we transition to a performance-driven transportation planning process.

⁵ Maciag, Mike. "Pedestrians Dying at Disproportionate Rates in America's Poorer Neighborhoods." *Governing*. August 2014. <http://www.governing.com/topics/public-justice-safety/gov-pedestrian-deaths-analysis.html>

⁶ The Mobility Index is defined by the number of future transportation options available in a given place (pg. 88)

MAP-21 introduced performance measures into the transportation system, requiring State and local transportation authorities to set standards for continuous improvement in the safety, maintenance, and operations of transportation facilities. In line with this approach, the Administration included funding for a Connectivity Pilot Study in the GROW AMERICA Act, the results of which could eventually be used to inform a possible national connectivity in transportation measure. Such a national measure would allow investment in the areas and projects that are doing the most to promote economic mobility by improving access to jobs, education, and essential services through transportation infrastructure.

This effort builds on work in the academic community, which has developed connectivity measures that can be of use to state and local governments. For example, the Accessibility Observatory⁷ at the University of Minnesota has developed an integrated, multi-modal accessibility evaluation system that can be applied nationwide. The Observatory creates a weighted average of accessibility, giving a higher weight to closer jobs. Jobs reachable within 10 minutes are weighted most heavily, and then jobs are given decreasing weight as travel time increases up to 60 minutes. Additionally,

Putting Information to Work

Merely collecting these metrics for informative purposes is not the primary goal for this exercise. The connectivity data can also be used in regional plans as metrics by which localities can make infrastructure investment decisions. Atlanta has demonstrated that these metrics can be useful in helping to plan for its long-term future. In 2011, they developed the Equitable Target Areas (ETA) Index to identify potential environmental justice (EJ) locations in the Atlanta region. ETAs were developed based age, education, median housing Value, poverty and race. The parameters from the Index were then used to measure the impacts of Plan 2040⁸ investments and programs in ETA communities. By combining Plan 2040 with the ETA Index, in particular the GIS⁹ tools incorporated from the Index, researchers were able to identify transportation and socioeconomic relationships with the goal of addressing future connectivity issues in the Greater Atlanta area. Additionally, the Southeast Michigan Council of Governments has used connectivity measures to inform a connectivity task force which was established to help ensure that access to core services such as health care facilities, employment centers, parks and recreation opportunities, and education and social support facilities are part of the transportation planning and community engagement process.

Communicating Connectivity

Connectivity is not just a conversation to be had behind closed doors, but can generate metrics and data to deepen engagement with the public. These concepts can provide an analytical framework that transportation agencies can use to have a meaningful conversation with disadvantaged communities about what transportation services are working and what isn't working in their daily lives. Connectivity measures can also be an important tool to make the public engagement process more meaningful and strengthen the connection average Americans feel between their tax dollars and improvements in local infrastructure. When people realize that their tax dollars are allowing an individual to access 50% more regional destinations, it will affect their attitudes towards transportation policy and may make him or her amenable to future expansion of funding. Additionally, this information can help make the case for improved connectivity to legislators, as elected officials can be swayed both by the statistics as well as the changing opinions of their constituents.

⁷ <http://access.umn.edu/>

⁸ Plan 2040 is a combination of Atlanta's regional transportation plan and regional plan incorporated into one document

⁹ Geographic Information Systems (GIS)

Los Angeles has demonstrated that public education can increase support for infrastructure initiatives and improved connectivity. In 2013, Reconnecting America and the California Community Foundation released the Los Angeles Equity Atlas¹⁰. The Equity Atlas is an online interactive tool whose main component is a “frequent transit” tool, which overlays the transit network on different measures, such as education, food, and jobs and the workforce. This provides to the public a current image of performance within Los Angeles County and identifies areas with gaps and assets in individual communities, along corridors, or in station areas along the frequent transit lines. This has helped to build increased support for public transit in Los Angeles.

Building on Progress

DOT is committed to making significant investments to improve the research and state of practice in measuring connectivity. In addition to hosting a summit of stakeholders, practitioners, and researchers to share institutional and analytical best practices, we will be compiling a Summary of the Proceedings report to advance the state of practice around connectivity. Over the next year, the Department will continue our on-going efforts to support and develop analytical methods for transportation agencies to improve access to opportunity and continue to offer technical assistance and capacity building to States, MPOs, and transit agencies interested in developing and deploying approaches to measure the degree to which disadvantaged populations have access to jobs, essential services, and other opportunities and identify policies and projects to increase access.

Conclusion

One common theme across all of the literature on connectivity is that transportation projects must help to erase barriers to economic inclusion. To this end, DOT is proposing a few potential next steps to advance the state of practice around connectivity. We are convening this summit of stakeholders to share institutional and analytical best practices. We are also seeking to identify the state of the practice to better understand the institutional and analytical challenges transportation agencies face as they work to improve access to opportunity. Finally, we wish to develop and share analytical techniques so that State DOT's, MPOs, providers of public transportation and local transportation agencies can more easily measure the degree to which disadvantaged populations have access to jobs, essential services, and other opportunities and identify policies and projects to increase access. Hopefully, these steps will improve access for Americans to the critical services and jobs that will improve their lives in significant ways.

¹⁰ <http://reconnectingamerica.org/laequityatlas/index.php>