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Fact Sheet
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Transit Service per Hour during Evening Peak

This EnviroAtlas Smart Locations map estimates the aggregate frequency of public transit service (trips per hour) in each U.S. Census block group. The data measures combined hourly frequency of service for all transit routes that stop within 0.4 km (0.25 miles) of the block group. Frequency reflects service during weekday afternoon peak commute period (4:00–7:00 pm). Data availability is limited to communities served by transit agencies that share their data in GTFS format.

Why is transit service frequency important?

When transit service is more frequent, public transit is a more convenient and viable transportation option for commuters who can depend on transit when they need it. Frequent service means less wait time for a bus or train, giving riders more convenience and mobility, and increasing the likelihood that mass transit will be used. Frequency is often increased for shorter routes typically to wait times of 15 minutes or less. However, planners must weigh shortened wait times against demand because increased transit service frequency tends to increase operating costs.[1,7]

When people can rely on transit service, they are more likely to choose transit as a preferred travel option and drive personal cars less frequently. This reduces household costs devoted to owning and maintaining one or more vehicles. Frequent transit service makes it easier for households to manage with a single car or no car at all (see the Smart Locations metric Number of Zero Car Households).

Transit also has public health benefits. Transit users spend a median 19 minutes per day walking to and from transit stations. This is more than half of the 30 minutes of physical activity per day recommended by the U.S. Surgeon General.[2] People who drive to work, in contrast, spend much less time in physical activity. A recent study showed that light rail transit users (compared to a control group) had a significant decrease in body mass index and an 81% reduced chance of becoming obese from the regular daily walk to the transit stop.[3] Another study developed to assess the potential public health cost savings created by a new light rail transit system in Charlotte, North Carolina found a 9-year cumulative cost savings of $12.6 million.[4]

Transit availability has been associated with lower population-weighted concentrations of some air pollutants.[5] Though a number of studies have linked air pollutants and negative human respiratory health outcomes, fewer have made associations among increased use of mass transit, subsequent decreased auto emissions, and improved respiratory health. One such study, using data from the 17 day period of the Atlanta, Georgia, Olympic Games in July 1996, found that the traffic restrictions implemented during the Games resulted in a 217% increase in mass transit use, a 28% decrease in peak daily ozone levels, and a 42% decrease in Medicaid child asthma acute-care events.[6]

Photo: San Francisco Streetcar

How can I use this information?

Communities may wish to consider frequency of transit service when siting public facilities such as schools, libraries, or social services. Locating these facilities in areas with poor transit service can greatly hinder access, particularly by community members who rely on transit. By proactively siting public facilities in neighborhoods with frequent transit service, communities can enhance accessibility. They can also reduce the need to extend new transit service (e.g., new school bus routes) at public cost. This same concept extends to private development. Communities seeking to increase transit use and avoid the costs of extending new transit service to new locations may wish to encourage new housing and employment growth in areas already well-served by transit.

Another use of this indicator is identifying areas that could support more transit service. For instance, an analyst could overlay transit service frequency with other built environment metrics associated with transit supportive land use (e.g., housing and employment density, land use

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diversity, and street intersection density) to highlight areas that do not provide enough service relative to the density of land use development. Finally, Transit Service Frequency is sometimes used as an input variable in transportation models that estimate trip generation, vehicle miles traveled, transit mode share, walking, and bicycle trips.

How were the data for this map created?

EPA obtained General Transit Feed Specification (GTFS) transit service data from over 200 transit agencies across the United States in December 2012. These data include the geographic location of all transit stops as well as transit service schedules for all routes that serve the stops. EPA analyzed these data to calculate the frequency of service for each transit route between 4:00 and 7:00 PM on a weekday. Then, for each block group, EPA identified the number of transit stops, including those within a buffer of 0.4 km (0.25 miles) surrounding the block group. Finally, total aggregate service frequency was summed by block group. Values for this metric are expressed as service frequency per hour of service. For more information on this metric (D4c) and to see a list of all communities with data contributing to this metric, please see the Smart Location Database User Guide.

What are the limitations of these data?

Transit service may not be distributed evenly through a census block group. As a result, proximity to transit service may vary considerably within larger block groups. Therefore, the benefits of frequent transit service may not be as pronounced for some block group residents as for others.

By focusing on afternoon peak service, this indicator is most suited to evaluating the convenience of transit as a mode choice for those with standard peak period commutes. Many transit agencies provide additional service during peak periods. This metric does not cover non-peak periods.

GTFS transit service data is not available in all areas of the U.S. Any transit routes developed after 2012 are not available in the database. This could result in lower transit accessibility scores in some areas.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. This data layer is incorporated into a larger EPA data product called the Smart Location Database. The Smart Location Database is a nationwide geographic data resource for measuring location efficiency. Most attributes are available for every census block group in the United States.

Where can I get more information?

A selection of resources on the relationships among public transit, city planning, and environmental quality is listed below. More details about this metric are available in the Smart Location Database User Guide. In addition, EPA's Smart Growth Program provides tools, resources, and technical assistance to communities seeking to pursue compact, mixed-use, walkable, and transit-oriented development strategies to protect public health and the environment. For additional information on the data creation process, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this data layer, please contact the EnviroAtlas Team.

Acknowledgments

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Selected Publications

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3. MacDonald, J.M., R.J. Stokes, D.A. Cohen, A. Kofner, and G.K. Ridgeway. 2010. The effect of light rail transit on body mass index and physical activity. *American Journal of Preventive Medicine* 39:105–112.

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6. Friedman, M.S., K.E. Powell, L. Hutwagner, L.M. Graham, and W.G. Teague. 2001. Impact of changes in transportation and commuting behaviors during the 1996 Summer Olympic Games in Atlanta on air quality and childhood asthma. *Journal of the American Medical Association* 285(7):897–905.

7. Murray, A.T., and X. Wu. 2003. Accessibility tradeoffs in public transit planning. *Journal of Geographic Systems* 5:93–107.