Working Age Population within a 45-Minute Drive (Weighted)

This EnviroAtlas Smart Locations map estimates the relative accessibility to working age populations (residences) from employment locations via auto commute (in terms of street-network travel time) for each U.S. Census block group. People in nearby block groups (based on travel time) are weighted more heavily than those further away.

Why is accessibility to working age populations important?

Locating workplaces and commercial development in development centers that are near a working age population helps reduce driving time and the costs associated with it. Workplaces that are centrally located and accessible to more households can reduce vehicle miles traveled, energy use, and greenhouse gas emissions (GHGs) associated with employee commuting trips. Three out of 4 people in the U.S. drive to work. Between 1950 and 2011, while the population of the U.S. doubled, vehicle miles traveled increased sixfold.[1]

From a city planning perspective, it is most efficient to have concentrations of jobs near a large working age population. A regional balance of jobs and housing not only reduces fuel consumption and congestion but it also benefits the local economy and standard of living. Researchers in Britain found that earnings and productivity increased in neighborhoods with concentrations of working age people living within an optimal range of driving time to jobs. They demonstrated that the positive influence of worker proximity to jobs extended as far as 80 minutes driving time, though the influence was stronger for shorter time periods.[2] A similar study in the U.S. found that doubling the number of jobs accessible to workers within 20 minutes driving time led to a 6.5% increase in real average wages.[3]

Many communities across the U.S. have experienced a decline in traditional downtown employment centers in favor of office parks and retail in outer suburbs. Such dispersion of employment to the suburbs can result in reduced accessibility by workers from longer average trip distances, increased traffic, and lack of public transit. Unfortunately, the movement of jobs to the suburbs away from urban residential core areas has been most pronounced in industries that offer low- and middle-skill jobs. The National Research Council reported that while half of people on welfare live in the core city, 70% of jobs available to them are located in the suburbs.[4] Job dispersion can result in additional hardships for

Photo: Castro District, San Francisco, J. Gaither

low-income urban residents in the form of increased transportation costs (automobile ownership, maintenance, and fuel).

Besides being an indicator of drive-time accessibility from jobs to residential neighborhoods, this metric also suggests the presence or absence of land use diversity. Communities that pursue compact growth patterns and mixed use development facilitate workplace accessibility by automobile, transit, biking, and walking. Research indicates that people who live in compact neighborhoods walk more, use transit more, and drive less than people living in lower density neighborhoods.[1] The relative size of the population and available employment in the area are important elements in reducing vehicle traffic near mixed-use developments.[5]

How can I use this information?

This map, Working Age Population within a 45-Minute Drive, allows users to evaluate various workplace locations in terms of their accessibility to working age populations via auto commute. Comparing this map to areas of relatively high employment density may indicate the effectiveness of community design and road networks to link potential workers with job opportunities. Communities seeking to decrease vehicle miles traveled may encourage new employment in areas already supporting a large working age population. Economic development agencies in regions with limited transit service may use this map to encourage the siting of new workplaces and housing.

This information may also be useful when marketing the availability of these areas for development. Planners can use

the information to help evaluate whether proposed commercial development may improve or exacerbate regional imbalances between the location of job centers and residential areas. New residences in areas of high accessibility to jobs can provide more residents with opportunities to live closer to jobs, shopping, and services.

This map may be compared with any of the other Smart Location or EnviroAtlas community data layers relative to demographics, jobs, or road networks. The aerial-image base map (seen by increasing the transparency of the map layers) can be used to show the spatial distribution of the built environment within the census block groups. For select communities, users can overlay EnviroAtlas community land cover maps that show impervious surfaces, street trees, and other common land cover at 1-meter resolution.

How were the data for this map created?

The metric, Working Age Population within a 45-Minute Drive (D5ae in the Smart Location Database) represents accessibility from employment locations to working age populations (residences). Auto accessibility metrics were developed using NAVSTREETS (2011), a NAVTEQ data layer. NAVSTREETS includes attributes like functional class, speed categories, and vehicular and pedestrian restrictions. Working age population values came from the 2010 Census demographics tables. For each census block group, EPA calculated drive times to all other census block groups within 45 miles. Drive time was calculated by network travel on roadways using assumptions about travel speed based on the roadway speed class. A time decay formula was used to give more weight to members of the working age population who were closer to the origin block group than those who were further away in travel time. For more information on this metric, D5ae, see the Smart Location Database User Guide.

What are the limitations of these data?

Travel times do not reflect traffic congestion. Drive times may not be accurate in areas with high traffic congestion. The accessibility statistics calculated for this indicator rely on network travel distance to and from the population-weighted centroids of block groups. Accessibility values for larger block groups should be interpreted with caution.

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 worker productivity, travel mode choice, and environmental quality is listed below. EPA's Smart Growth Program provides tools, resources, and technical assistance to communities seeking to pursue vibrant compact, mixed-use, walkable, and transit-oriented development strategies to reduce trip distances and vehicle miles traveled. For additional information on data creation, 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

Selected Publications

1. Kramer, M. 2013. Our built and natural environments: A technical review of the interactions among land use, transportation, and environmental quality, Second edition. Environmental Protection Agency, Washington, D.C. 139 p.

2. Rice, P., and A.J. Venables. 2004. Spatial determinants of productivity: Analysis for the regions of Great Britain. Discussion Paper No. 4527, Centre for Economic Policy Research, London, United Kingdom. 32 p.

3. Melo, P.C., D.J. Graham, D. Levinson, and S. Aarabi. 2012. Agglomeration, accessibility, and productivity: Evidence for urbanized areas in the U.S. Paper submitted to the Transportation Research Board 92nd Annual Meeting, January 13–17, 2013, Washington, D.C. 20 p.

4. National Research Council. 2009. Driving and the built environment: The effects of compact development on motorized travel, energy use, and CO_2 emissions. Special Report 298, The National Academies Press, Washington, D.C. 240 p.

5. Ewing, R., M. Greenwald, M. Zhang, J. Walters, M. Feldman, R. Cervero, L. Frank, and J. Thomas. 2011. Traffic generated by mixed-use developments: Six-region study using consistent built environmental measures. *Journal of Urban Planning and Development* (September): 248–261.