Employment Density

This EnviroAtlas national demographics map estimates employment density or jobs per acre within each U.S. Census block group in 2010. Block group acreage estimates developed acreage by excluding parks, water bodies, conservation easements, and other area protected from development. Transportation infrastructure and residential land uses are not removed.

Why is measuring employment density important?

Employment density is one of many measures or variables used by city planners to examine the proportions of residents, jobs, and services in urban areas and to guide development planning for efficient city plans and transit networks. Ranges in density numbers for housing and jobs are used by local governments to justify cost-effective transit investment and to promote development in areas within ½ mile of existing and potential transit stations to ensure maximum transit use.[1] Public transit becomes more efficient and cost-effective as density levels in transit corridors increase. For example, light rail transit is most cost-effective beginning at employment densities of 28–30 jobs/acre.[2]

From a city planning perspective, it is most efficient to have concentrations of jobs near a large working age population. Three out of 4 people in the U.S. drive to work.[3] Workplaces that are centrally located and accessible to more households can reduce vehicle miles traveled (VMT), fuel consumption, and greenhouse gas emissions (GHGs) associated with employee commuting trips. In addition to reducing fuel consumption and congestion, the local economy and standard of living benefit by providing easy access to available jobs. A recent study found that doubling the number of jobs accessible within 20 minutes driving time led to an increase in real average wages of 6.5%.[4]

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 due to longer average trip distances, increased traffic, and lack of public transit. Unfortunately, the movement of jobs to the suburbs 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

Photo: Houston city center, H. Han, Wikimedia Commons

available to them are located in the suburbs.[5] Suburban living can result in additional hardships for lower income residents in the form of increased transportation costs (automobile ownership, maintenance, and fuel).

Compact neighborhoods, with a mix of residences, employment opportunities, and services, offer a number of environmental benefits. 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] Research has shown that transit use and walking increase in areas with employment densities of 20–75 jobs/acre.[6] Other studies have found that increasing the number of jobs available near transit stations increases ridership even more than increasing residential populations. [2]

How can I use this information?

Identifying jobs, housing, and activity densities within an area of study can be useful in a number of different urban planning contexts. Planners may want to identify neighborhoods with optimal densities of jobs and housing that can support new or enhanced transit service. Localities may also consider employment and housing density when prioritizing neighborhood improvements such as sidewalks, street lighting, or bike lanes. Focusing improvements in compact neighborhoods can ensure that the greatest number of people benefit from services that are cost-effective.

This data layer may be used with other EnviroAtlas demographic and Smart Location data layers to compare the proportions of residents, jobs, and services among

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community block groups. 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 covers at 1-meter resolution.

How were the data for this map created?

The 2010 Census LEHD (Longitudinal Employer Household Dynamics data) provided employment data at the census block level. EPA summarized total employment by block group from the Workplace Area Characteristic tables for total number of jobs. Rather than calculate density over the entire land area of the block group, EPA instead isolated just the areas of the block group that are not protected from development. NAVTEQ data (2011) provided the location of federal, state, and local parks, zoos, cemeteries, public beaches, and water bodies. The Protected Area Database (PAD-US v1.3) provided the locations of parks and protected natural areas as well as privately-owned land area with restrictions on development (such as conservation easements). The relevant portions of each protected area dataset were intersected and dissolved into a single polygon layer that represented all areas in which development is restricted. The resulting protected areas layer was then integrated with the block group areas in GIS. This allowed for the geometric calculation of the total unprotected acreage for each block group. EPA used this block group unprotected acreage as the denominator to calculate employment density. For more information, please see metric D1c in the Smart Location Database User Guide.

What are the limitations of these data?

Some census block groups include both developed and undeveloped areas. Summarizing employment density across such block groups may create misleading results. This indicator is most useful for drawing attention to regional patterns or specific neighborhoods that would benefit from further study. Using the aerial-image base map will give an indication of the proportions of developed and undeveloped land in each census block group.

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.

Where can I get more information?

A selection of resources on the relationships among city planning, employment density, 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 and transit-oriented development strategies to protect public health and the environment. For information on how city planning strategies may affect human health, visit the Eco-Health Relationship Browser. 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.

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