Accessibility Sufficiency Index Dashboard

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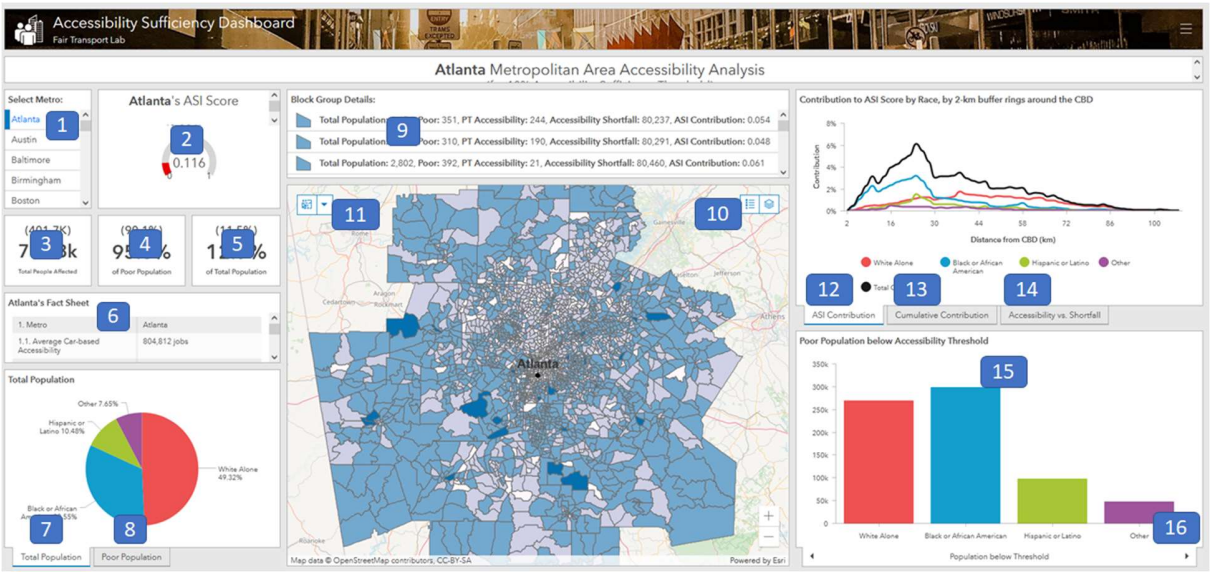
Using the Glossary and Dashboard

This glossary includes the definitions of the terms and variables the dashboard displays. The definitions in the glossary appear in the same order in which data are presented in the dashboard (starting from the top-left corner to the bottom-right corner).
Next to each term is a number that relates to a specific location on the dashboard. The location of the terms and numbers on the dashboard can be viewed in the related Snapshot.

The dashboard includes data on 49 metropolitan areas in the United States. Selecting the metropolitan area for which to display data is done via the **Select Metro** [1] scroll-down menu. Once a metropolitan area is selected, data for that region will be displayed.
Several sections in the dashboard include data tables or multiple tabs. One can scroll-down the tables or select a different tab to display different data.
At the top-right corner of each section there is a small icon allowing to expand the window. This is especially useful to expand plots or maps to full screen.

Wherever values in the dashboard appear in parentheses, they report the average value across all 49 metropolitan areas.

Dashboard Navigation Snapshot



Glossary of Terms

Accessibility Sufficiency Index (ASI Score) [2]
The Accessibility Sufficiency Index (ASI), adopted from the Accessibility Fairness Index (Martens, 2017), measures whether each person in an area of interest (city, region) enjoys a sufficient level of accessibility (to employment). Each person from the target population that is below a predefined sufficiency threshold (i.e., receives insufficient accessibility) contributes to the total ASI score. The ASI ranges from 0 to 1, with 0 reflecting a situation in which the entire reference group receives accessibility above the sufficiency threshold and 1 indicating that the entire reference group receives accessibility below the sufficiency threshold.

The ASI combines two dimensions of insufficient accessibility: 1) The number of people experiencing an accessibility level below an agreed-upon sufficiency threshold. The more people below this threshold, the higher the ASI score; 2) The difference between the accessibility level that people positioned below the sufficiency threshold experience and the sufficiency threshold for accessibility (i.e., 'accessibility shortfall'). The lower the level of accessibility experienced by people below the sufficiency threshold, the higher the ASI score.

The index can be applied to different geographic units (e.g., census block groups, census tracts, grid cells), target populations (e.g., people in poverty, carless, racial/ethnic groups, age cohorts) and different reference groups (e.g., total metropolitan population, people in poverty). The index has two important technical properties: it is totally decomposable and subgroup consistent. This means that the contribution of each population group to the overall accessibility insufficiency in a region can be expressed as a percentage, with the contributions of all subgroups together adding up to exactly 100%. The characteristics of the ASI allow comparing regions and analyzing change over time.

The Dashboard displays two separate ASI scores for people below the national poverty line (target population) using the 10% sufficiency threshold, corresponding to two reference groups: (1) *Total metropolitan population* – The ASI assesses the performance of the transport system as a whole. ASI scores based on the total metropolitan population will generally be relatively low, as it assumed in the calculation that all non-poor people enjoy sufficient car-based accessibility. (2) *Total metropolitan poor population* – The ASI score assess the performance of the public transport system only. ASI scores will generally be higher.

Sufficiency Threshold [6]
A predefined and agreed-upon level of accessibility that is deemed sufficient for conducting daily activities. The sufficiency threshold is defined as a percentage of average car-based accessibility in a region. In the dashboard, a 10% sufficiency threshold is employed. This means that 10% of average car-based accessibility in a region is assumed to be sufficient for conducting daily activities.

Accessibility Shortfall
The difference between the accessibility level that a person positioned below the sufficiency threshold experiences and the agreed-upon sufficiency threshold for accessibility. The larger the shortfall (i.e., accessibility gap), the more a person contributes to a region's ASI score.

Average Car-Based Accessibility [6]
The population-weighted average number of jobs in a metropolitan area reachable within 30-minutes travel time by car in peak hours (between 7:00-9:00 am). This figure is used for calculating accessibility sufficiency thresholds.

Public Transport Accessibility
Block group population-weighted average number of jobs in a metropolitan area reachable within 30-minutes travel time by public transport in peak hours (between 7:00-9:00 am). Travel times include all components of a transit journey, including "first and last mile" access and egress walking segments and transfers, and account for minute-by-minute variations in service frequency for the 7:00 – 9:00 a.m. period.

Target Population
The population group for which the ASI is calculated. ASI can be calculated for the entire population in a region as well as for a subset of the total population (e.g., people below the income poverty line, people without access to a car, members of a racial or ethnic group). The calculations presented in the dashboard are for people below the income poverty line and for four racial or ethnic group (White, Black, Hispanic, All Others).

Benchmark Population
The total population taken into account when calculating the ASI score. In the dashboard, the total population is used as the benchmark population, including poor and non-poor persons. Since it is assumed that non-poor receive sufficient car-based accessibility, this leads to relatively low ASI scores (ASI scores for all regions are below 0.2).

Total People Affected [3]
The total number of individuals from the target population that experience accessibility below the agreed-upon sufficiency threshold.

% of Poor Population [4]
Number of People Affected expressed as a percentage of the Total Poor Population in a region.

% of Total Population [5]
Number of People Affected expressed as a percentage of the Total Population of a region.

Poor below 10% sufficiency threshold; Poor Population below Accessibility Threshold [6]
The total poor population in a region experiencing accessibility below the agreed-upon sufficiency threshold.

[Racial/Ethnic group] Alone [6]
The total number of people associated with the racial/ethnic group (i.e., White, Black, Hispanic, All Others) in a metropolitan area.

Poor [Racial/Ethnic group] [6]
The total number of people below the national poverty line that are associated with the racial/ethnic group (i.e., White, Black, Hispanic, All Others) in a metropolitan area.

Poor [Racial/Ethnic group] below 10% sufficiency threshold [6]
The total number of people below the national poverty line experiencing accessibility below the agreed-upon sufficiency threshold, for the relevant racial/ethnic group (i.e., White, Black, Hispanic, All Others) in a metropolitan area.

Total Population [6; 7]
The total population in a metropolitan area.

Poor Population [6; 8]
The total population in a metropolitan area with income below the US national poverty line.

Block Group Details [9]
For each block group, the following information is presented:

Total Population. The number of people in a block group.
Poor. The number of people in a block group experiencing income below the national poverty line.
PT Accessibility. Number of jobs that can be reached by public transport within a 30-minutes travel time threshold.
Accessibility shortfall. The difference between the accessibility level that people positioned below the sufficiency threshold in a block group experience and the agreed-upon sufficiency threshold for accessibility. Calculated using a 10% accessibility sufficiency threshold.
ASI contribution. The percent of the total regional ASI score that a census block group contributes. Calculated using a 10% accessibility sufficiency threshold.

Map Options [10]
The dashboard includes five maps, which can be chosen using the layer icon at the top-right corner of the map section [10]. The map legend can be viewed by clicking the icon to the left of the layer-selection icon.

CBD. Central business district. The location of the CBD was defined based on the location of the city hall in the core city in a metropolitan area.

The five maps include:
ASI Contribution by Block Group
Map showing the percent of the total regional ASI score that a census block group contributes. Calculated using a 10% accessibility sufficiency threshold.

Accessibility by Equal Distance Buffers
Map showing mean population-weighted average public transport accessibility as a percentage of regional average car accessibility for 2-km equal distance buffer rings, starting from the CBD.

*Equal Distance Buffer Rings***.** A set of 2-km buffer rings was created for each region by splitting block groups based on distance from the CBD. Each ring was assigned the proportionate demographic data, accessibility data, and ASI contribution based on the new block group polygons resulting from the intersection of the original block groups and the

buffer rings. All block groups within each buffer ring were dissolved and the total, average and additional statistics for each 2-km buffer were calculated.

Hot Spots of High ASI Contribution
Map showing locations in a metropolitan area with clusters of high ASI contribution and the statistical significance of each cluster. Clusters of high ASI contribution indicate a concentration of neighboring grid cells with ASI contribution significantly higher than the contribution of surrounding grid cells. Clusters of high ASI contribution were calculated using the Getis-Ord General G and Gi* tools in ArcGIS for 1x1 km grid cells. The analysis also has the potential to identify clusters of low ASI contribution, yet none were identified in any of the 49 metropolitan areas.

Grid Cell. The original block group polygons were transformed into uniform grid cells by: 1) generating a rectangular grid of 1x1 km cells for each metropolitan area; 2) executing a location-based intersect analysis to find all grid cells that are within a given block group polygon; 3) assigning data to each grid cell based on its proportionate areal overlay congruence with the original block group.

Accessibility Shortfall by Grid Cell
Map showing the accessibility shortfall associated with a grid cell as a percentage of the accessibility sufficiency threshold. A larger shortfall as percentage of sufficiency threshold indicates that a grid cell experiences lower levels of population-weighted average public transport accessibility.

Poor Population by Grid Cell
Map showing the number of people in a grid cell experiencing income below the national poverty line.

Linking Maps to Block Group Information [11]
There are two ways of selecting data on a specific census block group or a set of block groups:
1) By selecting (clicking on) a block group from the table above the map: the map will zoom-in to the selected block group. Clicking on another block group will add this block group to the selected block group and will display all selected block groups in the map. One can clear a selection by re-clicking on the selected block group.
2) By using the icon on the top left-hand side of the map. This allows selecting block groups directly from the map. One can select a single block group or choose to select a group of block groups within a defined rectangle, circle, or along a line. The selected block groups will be highlighted in the table above the map. One can clear a selection by clicking the now-highlighted icon on the top right-hand side of the map. Once one or more block groups are selected, additional block groups can be added by using the shift + click key combination.

ASI Contribution [12]
The plot shows the contribution to the total regional ASI score by race/ethnicity based on 2-km equal distance buffer rings around the CBD.

Cumulative ASI Contribution [13]
The plot shows the cumulative contribution to the total regional ASI score by race/ethnicity based on 2-km equal distance buffer rings around the CBD.

Accessibility vs. Shortfall [14]
The plot shows the levels of population-weighted average public transport accessibility and accessibility shortfall based on 2-km equal distance buffer rings around the CBD. Accessibility and shortfall are described in number of jobs.

Population below Threshold [15]
The total number of individuals with income below the poverty line in each racial group that experience accessibility below the agreed-upon sufficiency threshold.

Weighted Average Accessibility for People below Sufficiency Threshold [16]
The population-weighted average accessibility for only those individuals from the target population who experience insufficient accessibility, per racial group. Accessibility is expressed as the average number of jobs that can be reached within 30-minutes travel time by public transport in peak hours (between 7:00-9:00 am).

Weighted Average Shortfall for People below Sufficiency Threshold [16]
The difference between the experienced accessibility level and the accessibility sufficiency threshold for individuals from the target population positioned below the sufficiency threshold only, per racial group.

ASI Contribution by Race [16]
Percent contribution of each racial/ethnic group to total metropolitan ASI score. The ASI score automatically takes into account only the situation of individuals with accessibility levels below the sufficiency threshold.

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For more information about the project and other research output, please visit the Fair Transport Lab's website at the Technion's Faculty of Architecture and Town Planning.
