

The Environmental Burden Index

Estimating Environmental Quality by Peer Group

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What is the EBI?

"24% of the global disease burden and 23% of all deaths can be attributed to environmental factors"¹

The environment is important to human health but environmental data can be difficult to use and access. The Environmental Burden Index (EBI) was created to facilitate environmental health and justice research by making environmental data easier to use and visualize. The EBI aggregates multiple datasets to estimate relative environmental quality at the census-tract level.

EBI estimates can be used by researchers and decision makers to identify environmentally disadvantaged communities (communities disproportionately burdened by multiple environmental stressors). When used in conjunction with additional data sources on vulnerable populations (such as the CDC's Social Vulnerability Index) EBI data will help identify communities across the US most at risk for environmental injustice. EBI estimates are not proxies for exposure and are not related to specific health risks. Data should not be used to support cumulative risk assessment or other analyses requiring specific exposure estimates.

EBI Indicators

Industrial Sites²

- Brownfields
- Superfund sites
- Major air polluters
- Pesticide producers
- Major water polluters
- Power generation stations
- Hazardous waste facilities
- Toxic release site reporters
- Oil, gas, and diesel facilities
- Greenhouse gas site reporters

Transportation Infrastructure³

- Major high density roadways
- Railroads (proxy for diesel particulates)

Air Quality⁴

- PM 2.5
- Ozone

Parks⁵

The Need for Peer Groups

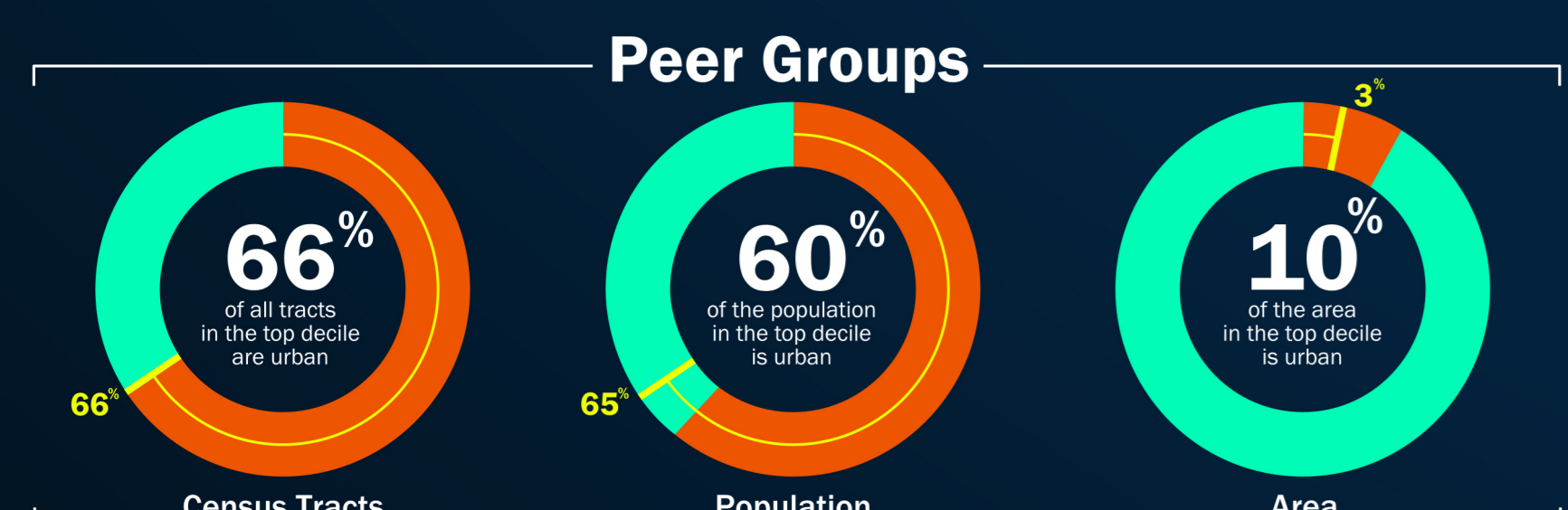
An **Environmental Peer Group** is a group of census tracts with the same land cover type. Environmental peer groups include 10 different National Land Cover Database⁶ (NLCD) classes (see legend at far right). Using NLCD data we calculated the percent of each land cover class for each tract; tracts were placed into the environmental peer group of the predominate land cover class.

Ranking data by environmental peer groups allows the index to identify tracts with the highest environmental burden relative to other tracts within the same land cover category rather than just those with the highest level of development. The use of peer groups controls for correlations between urbanicity and environmental data and provides a more accurate estimate of relative environmental quality.

How Peer Groups Affect Urban and Rural Tracts Ranked in the Top 10%



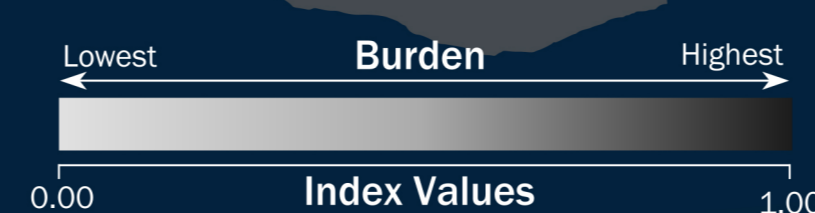
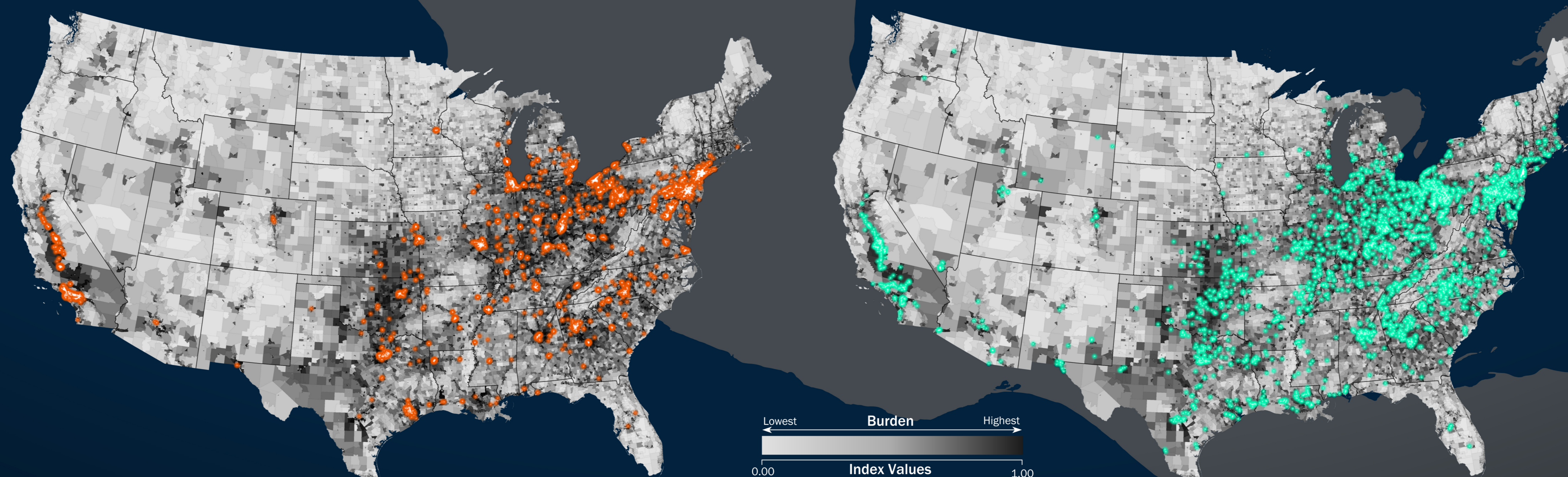
When EBI data were ranked nationally (**no peer groups**), 94% of the tracts, 93% of the population, and 39% of the land area were ranked in the Top 10%. These percentages are far higher than the **national averages for the contiguous U.S.**, indicating significant bias due to urbanicity.



When EBI data were ranked using **peer groups**, 66% of the tracts, 60% of the population, and 10% of the land area were ranked in the Top 10%. These percentages are much closer to the **national averages for the contiguous U.S.**, indicating peer groups control for bias due to urbanicity.

Where Are the "Worst" Tracts?

Spatial Distribution of **Urban** and **Rural** Tracts Ranked in the Top 10%

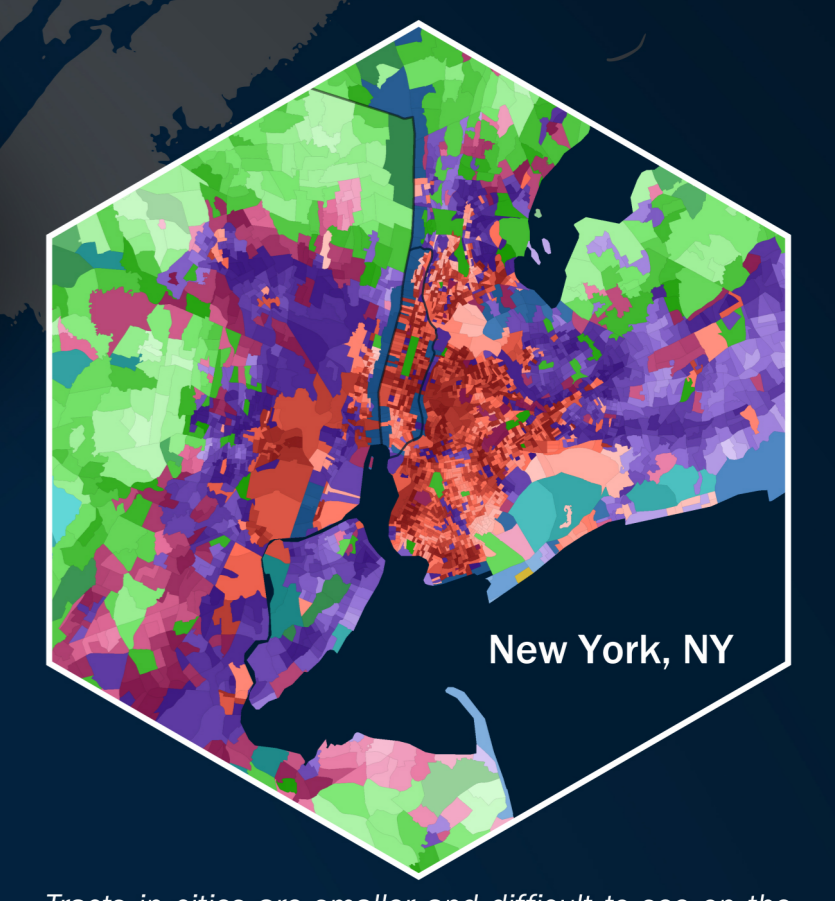


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Data Sources
 1. Ustun, A. P., & Corvalan, C. (2006). Preventing disease through healthy environments: Towards an estimate of the environmental burden of diseases, injuries, and disabilities. WHO, U.S. Environmental Protection Agency, Faculty Respiratory Services, 2015
 2. TomTom, 2015
 3. Centers for Disease Control and Prevention Environmental Health Tracking Program
 4. U.S. Multi-Resolution Land Characteristics Consortium, National Land Cover Database, 2011
 5. U.S. Census Bureau, Geography Division, 2010

Software
 ArcGIS Desktop 10.3.1
 ArcGIS Pro 1.3
 InScape 9.5.1



EBI Rankings

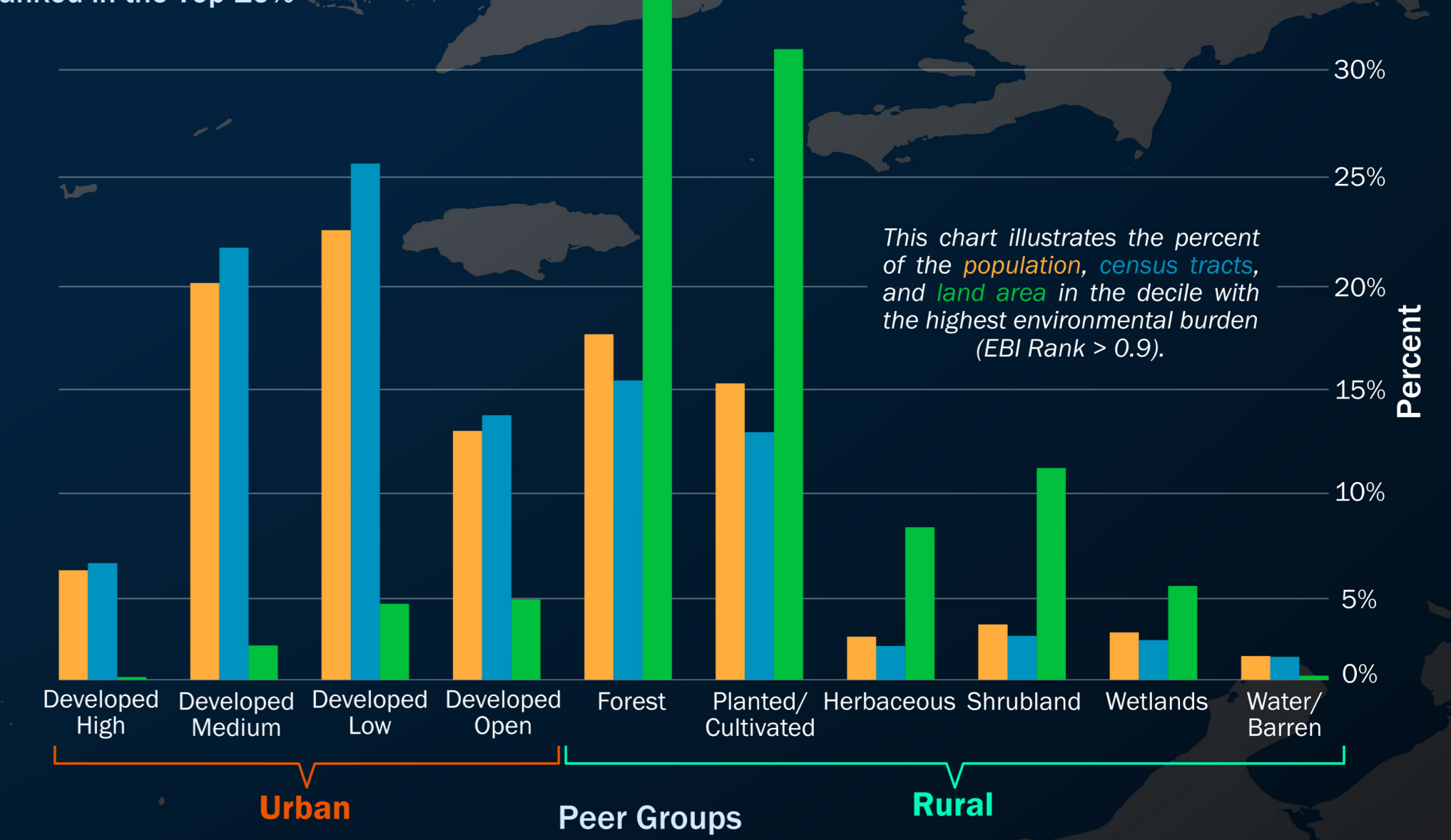


A continuous, or unclassified, color scheme was used to visualize EBI rankings. Unclassified maps don't break data into defined classes as do schemes using quantiles, equal intervals, or some other classification method. Instead, a peer group specific color ramp is evenly distributed across census tracts according to their final index value. This method better illustrates patterns that might be obscured when a classed color scheme is used.

Alaska and Hawaii

For technical reasons, the PM 2.5 and Ozone datasets do not include estimations for Alaska and Hawaii. To fill these gaps, we developed a simple approach using monitored data to estimate environmental quality in these states. Since Alaska and Hawaii EBI estimates do not include the same underlying data, they will not be comparable with the rest of the EBI. Alaska and Hawaii estimates will be produced after the EBI index validation is complete.

27.9 million people
7,200 census tracts
51,500 square miles
 Ranked in the Top 10%



This chart illustrates the percent of the population, census tracts, and land area in the decile with the highest environmental burden (EBI Rank > 0.9).



Centers for Disease Control and Prevention
 Agency for Toxic Substances and Disease Registry

Note: The findings and conclusions in the report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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