TVA **TENNESSEE VALLEY AUTHORITY**

Mapping Key Data

for Connected Communities Focus Areas

Table of Contents

Introduction

The Connected Communities team put together this high-level resource to demonstrate the current conditions across TVA's service region. The data presented in the maps are from publicly available datasets.

FEATURED CONTENT

- ✓ What are Connected Communities?
- ✓ Helping Communities Pursue Opportunities
- ✓ Guide for Using this Document

What are Connected Communities?

Connected Communities are towns, main streets, neighborhoods and cities using technology- and data-related solutions to address community challenges while preparing for a modern energy system.

FOCUS AREAS

Equitable Access to Services

Everyone in the TVA service region has access to services through broadband, modern technology and the knowledge and empowerment to use it.

Economic Empowerment

Everyone in the TVA service region is economically secure and can contribute to a modern, 21st century economy to the best of their ability.

Energy and Environmental Justice

Everyone in the TVA service region has access to a healthy environment (natural and built) and reliable, affordable and clean energy.

Enhanced Community Resiliency

Communities in the TVA service region have plans and resources to minimize the impacts of events like natural disasters and cyberthreats, to endure them safely and to recover quickly.

EXAMPLE OF CURRENT CONDITIONS

44%
of households
with incomes less than $20K in the TVA service area do not have a broadband subscription.

$50K
median income
in the TVA service area compared to national average of $65K.

3.73%
energy burden
in the TVA service area, which is a 19% increase from the national average energy burden of 3.1%.

59th
percentile
is the average flood risk across census tracts in the TVA service area.

COMMUNITY RESOURCES

Research Database

Funding Opportunities Database

Funding Opportunities Search Tool

Implementation Guides

Connected Communities Guidebook

Tailored Support and Success Coaching

Helping Communities Pursue Opportunities

Community Energy

- Virtual Power Plant
- Community Solar
- Microgrids
- Smart Energy Community
- Distributed Solar

Building Energy

- Grid-Interactive Efficient Buildings
- BTM Battery Storage
- Connected Lighting
- Smart Heating
- Building Thermal Storage
- Smart Ventilation
- Smart Windows and Glass

Agriculture

- Agrivoltaics
- IoT for Farming

Economic Development

- Virtual Reality for Workforce Development

Connectivity

- 5G
- Wi-Fi 6
- Public Wi-Fi Kiosks
- Smart Poles
- Edge Computing

Transportation

- EV Charging
- EV Public Transit
- Roadway Electrification
- Advanced Shared Mobility

Resiliency*

- Plans and Training for Natural Disasters and Cybersecurity
- Communication and Emergency Response Systems
- Emission-Free Generation with Storage
- Resilience Hubs

Analytics

Water
- Smart Water Management
- Smart Wastewater Management

Energy
- Energy Load Disaggregation
- Building Energy Modeling

Municipal
- Digital Twin Modeling

*Projects in most areas shown here will help create a more resilient energy system

Guide for Using this Document

PURPOSE

This document is a tool designed to provide community-level insights on current conditions in the TVA service area across Connected Communities' four focus areas. This resource is intended to serve as a high-level reference to help communities identify where opportunities and gaps may exist.

COMMUNITY MAPS

The maps in the following sections visualize various datasets related to the four Connected Communities focus areas. These maps are shown by county, census block, census tract or hydro-basin levels across the TVA service area.

To explore this data in greater detail, source websites are listed on each map. Using the interactive maps from these sources can provide more insight into your community and surrounding area.

USES

Assess Current State

Gain a better understanding of the current state of the four focus areas across the TVA service region.

Benchmark Communities

Assess how different communities within the TVA region compare with one another across the four focus areas.

Inform Resource Planning and Project Siting

Identify areas of need and opportunity based on challenges highlighted by the data.

Equitable Access to Services

GOAL

Everyone in the TVA service region has access to services through broadband, modern technology and the knowledge and empowerment to use it.

FEATURED MAPS

- ✓ Broadband Subscriptions
- ✓ Advertised FCC Service Offerings
- ✓ Smartphone Only Ownership
- ✓ Computer Ownership
- ✓ Device Ownership (Any Kind)

# Percentage of Households with Broadband Subscriptions
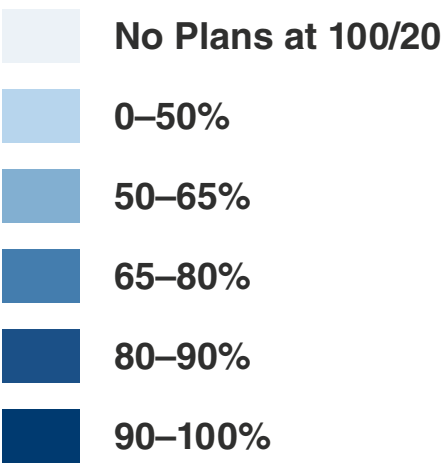
Legend:

- No Plans at 100/20
- 0–50%
- 50–65%
- 65–80%
- 80–90%
- 90–100%

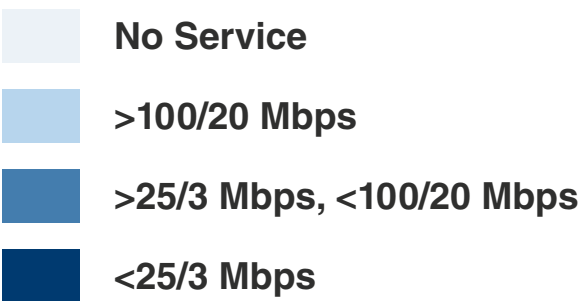Census tract level data, 2020

Details and Findings

This map shows the percentage of households with broadband subscriptions at 100/20 Mbps, the speed considered necessary for online uses like video conferencing and video streaming. Darker colors represent census tracts with a higher percentage of households with broadband subscriptions.

Across the TVA service territory, 15% of households do not have a broadband subscription.

Sources: Census | Federal Communications Commission

Advertised FCC Service Offerings by Speed
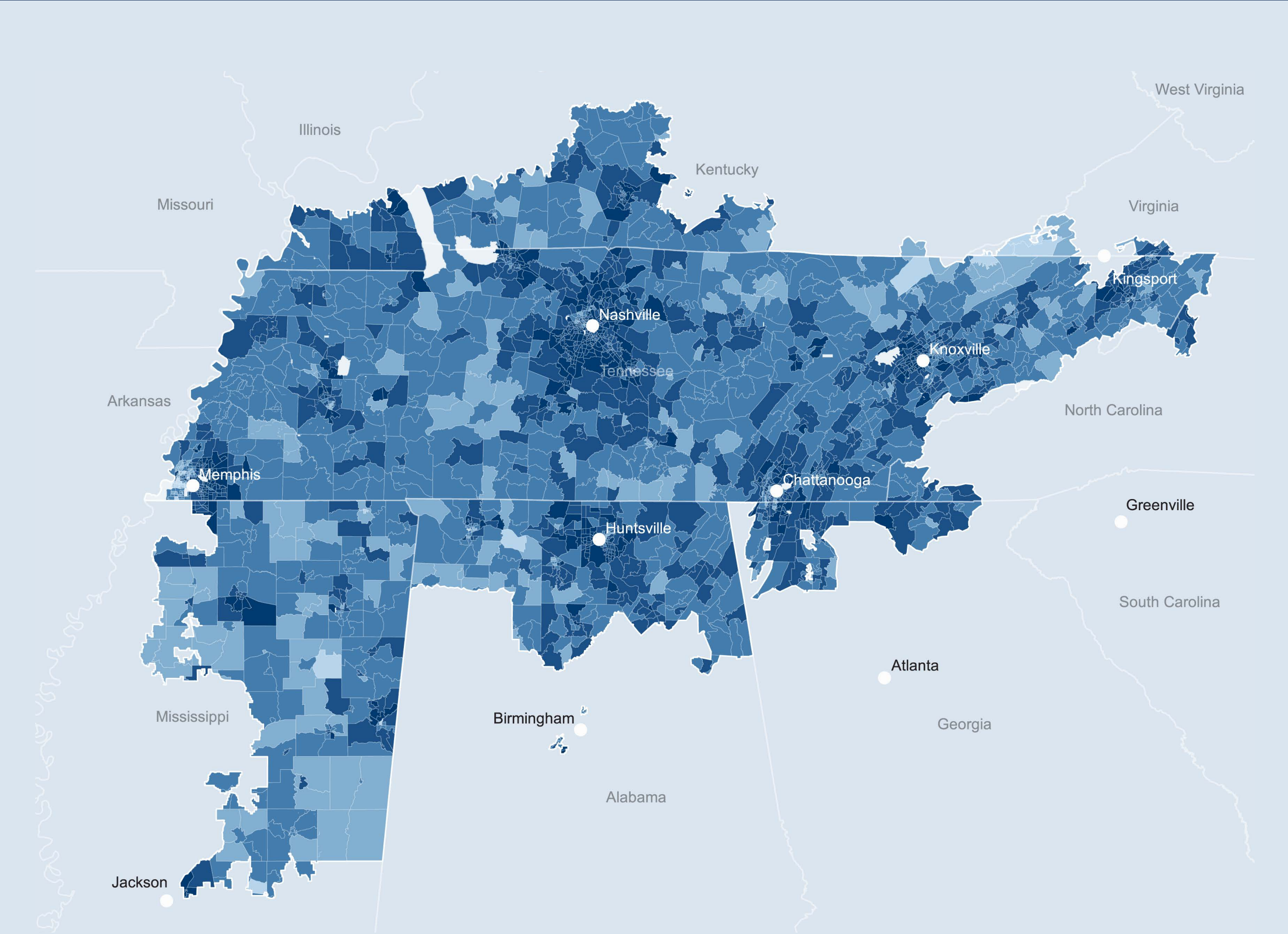
- No Service
- >100/20 Mbps
- >25/3 Mbps, <100/20 Mbps
- <25/3 Mbps

Census block level data, 2020
(County lines shown for reference)

Details and Findings

This map shows advertised broadband service offerings by speed in each census block. Dark blue indicates broadband speeds lower than 25/3 Mbps, medium blue indicates broadband speeds between 25/3 and 100/20 Mbps and light blue indicates broadband speeds greater than 100/20 Mbps.

Source: Federal Communications Commission
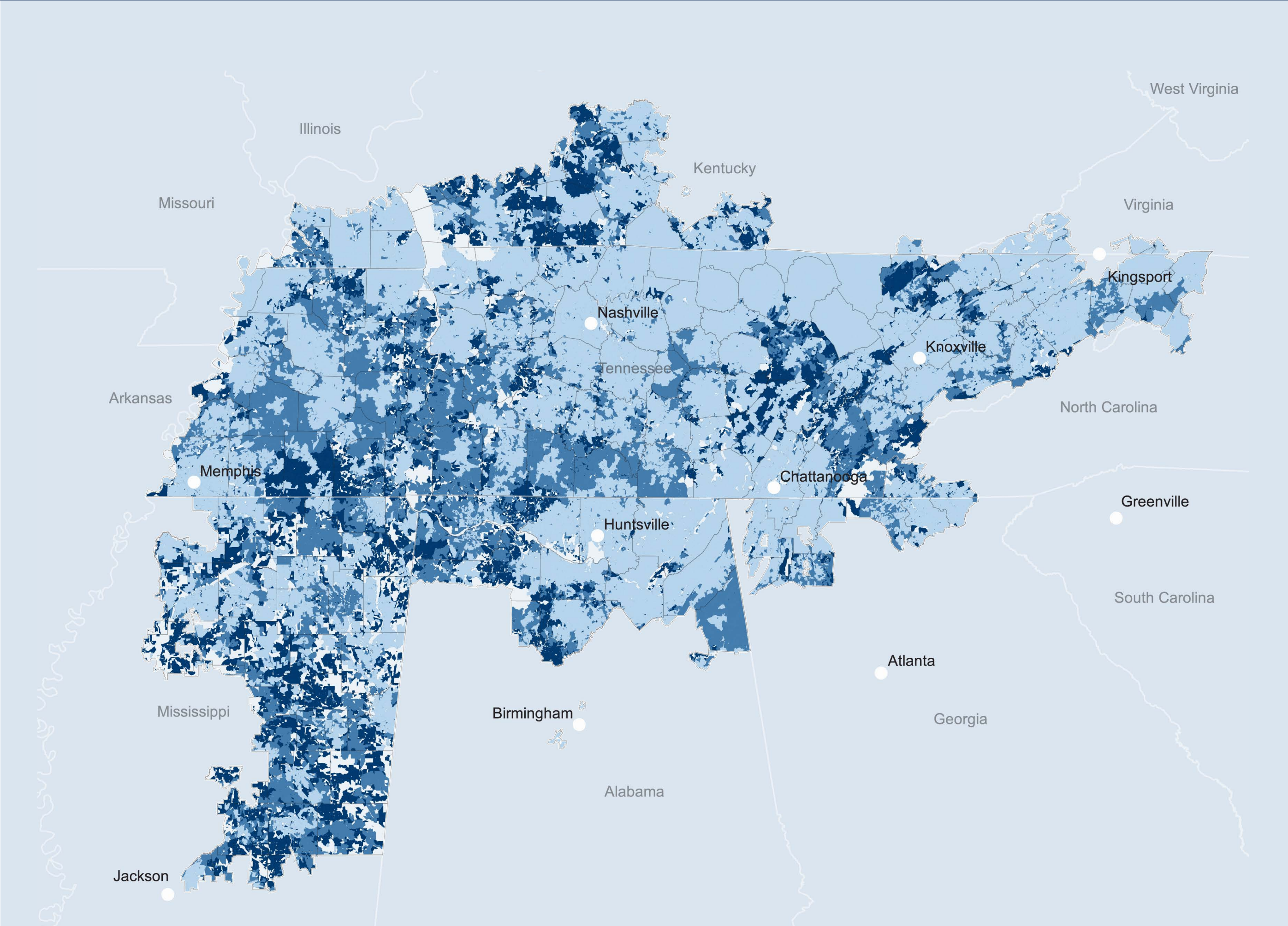
Percentage of Households Owning Smartphones Only
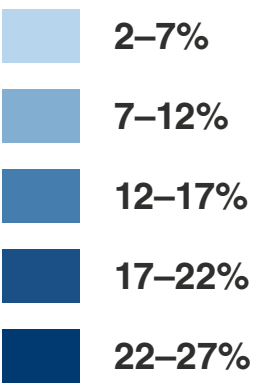
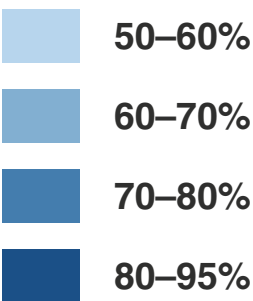|	
▢	2–7%
▢	7–12%
▢	12–17%
▢	17–22%
▢	22–27%

County level data, 2020

Details and Findings

This map shows the percentage of households with smartphones and no other type of computing device, like a laptop or tablet. Darker colors on the map represent counties with higher rates of households in which smartphones are their only computing device.
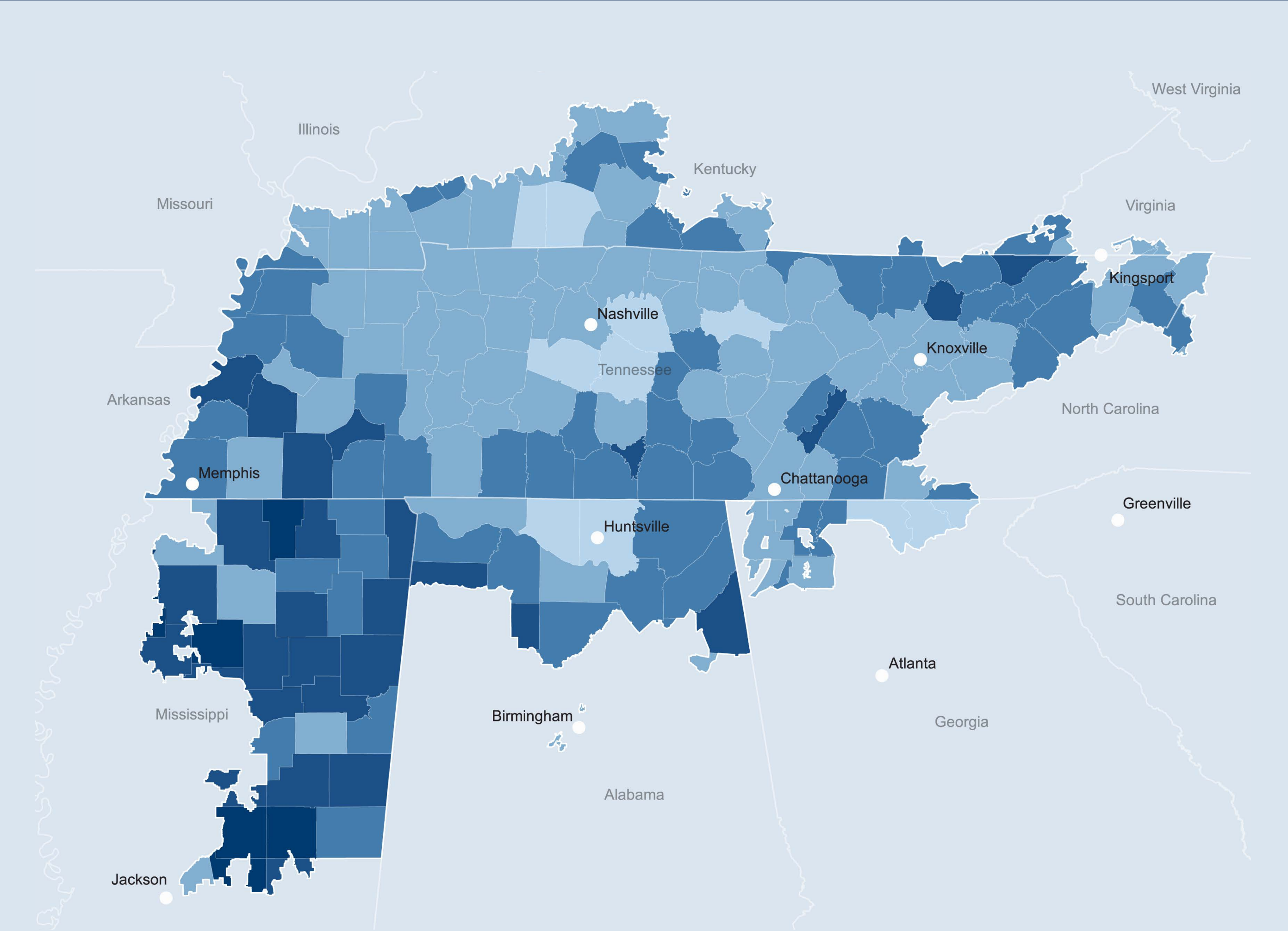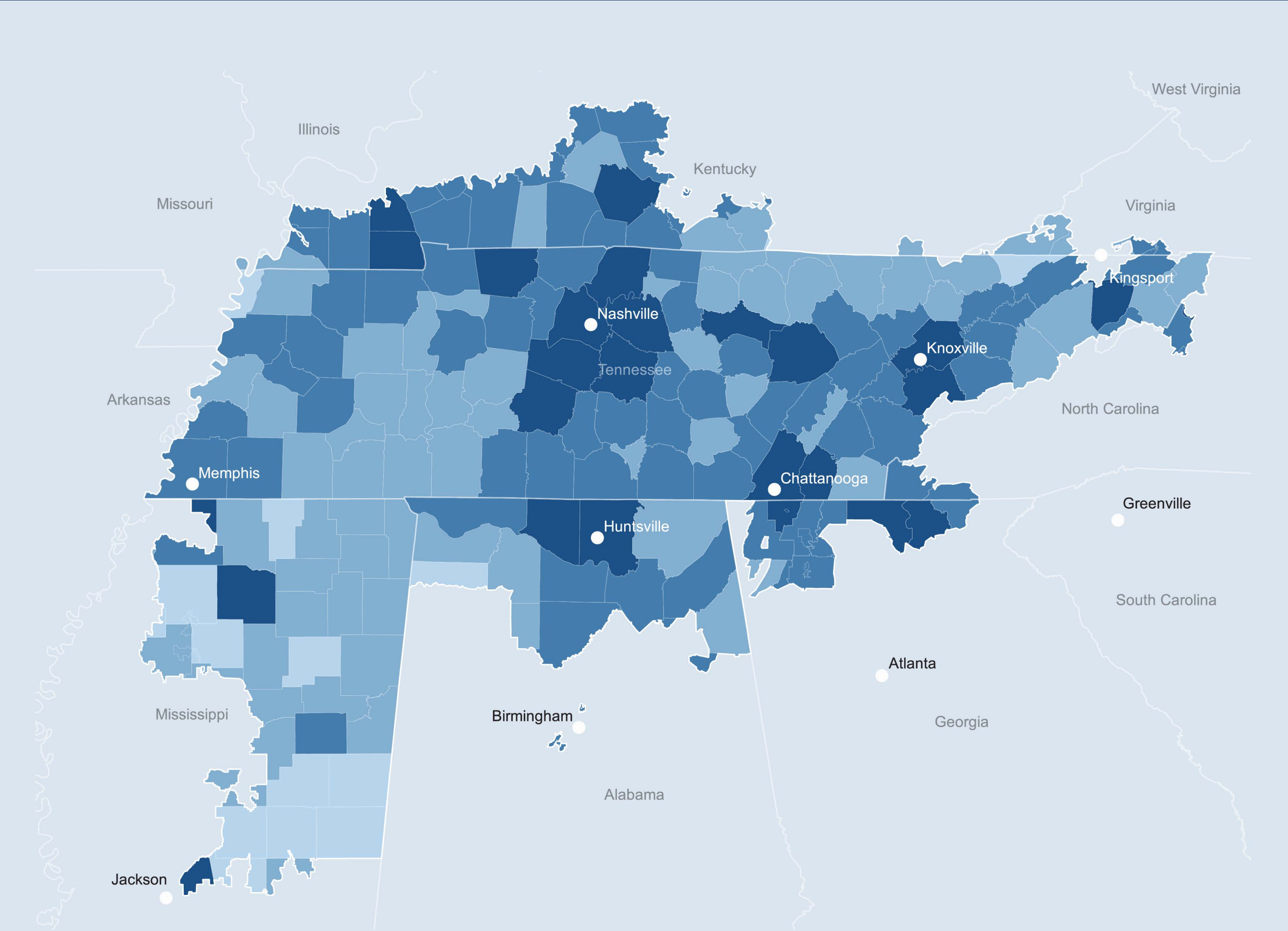
Source: Census

Percentage of Households Owning Computers

- 50–60%
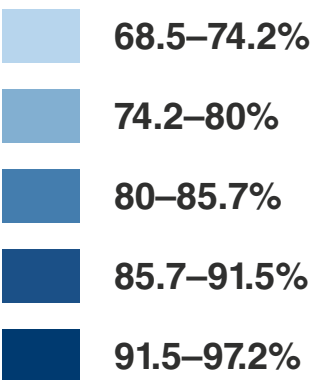- 60–70%
- 70–80%
- 80–95%

County level data, 2020

Details and Findings

This map shows the percentage of homes that have a non-smartphone computer in the house. The darker colors represent counties with higher rates of households owning computers.

Source: Census

Percentage of Households Owning Devices of Any Kind

- 68.5–74.2%
- 74.2–80%
- 80–85.7%
- 85.7–91.5%
- 91.5–97.2%

County level data, 2020

Details and Findings

This map shows the percentage of households owning a smartphone or computer. Darker colors represent counties with higher rates of households owning a computer, smartphone or both.

**Source:** Census

HIRING
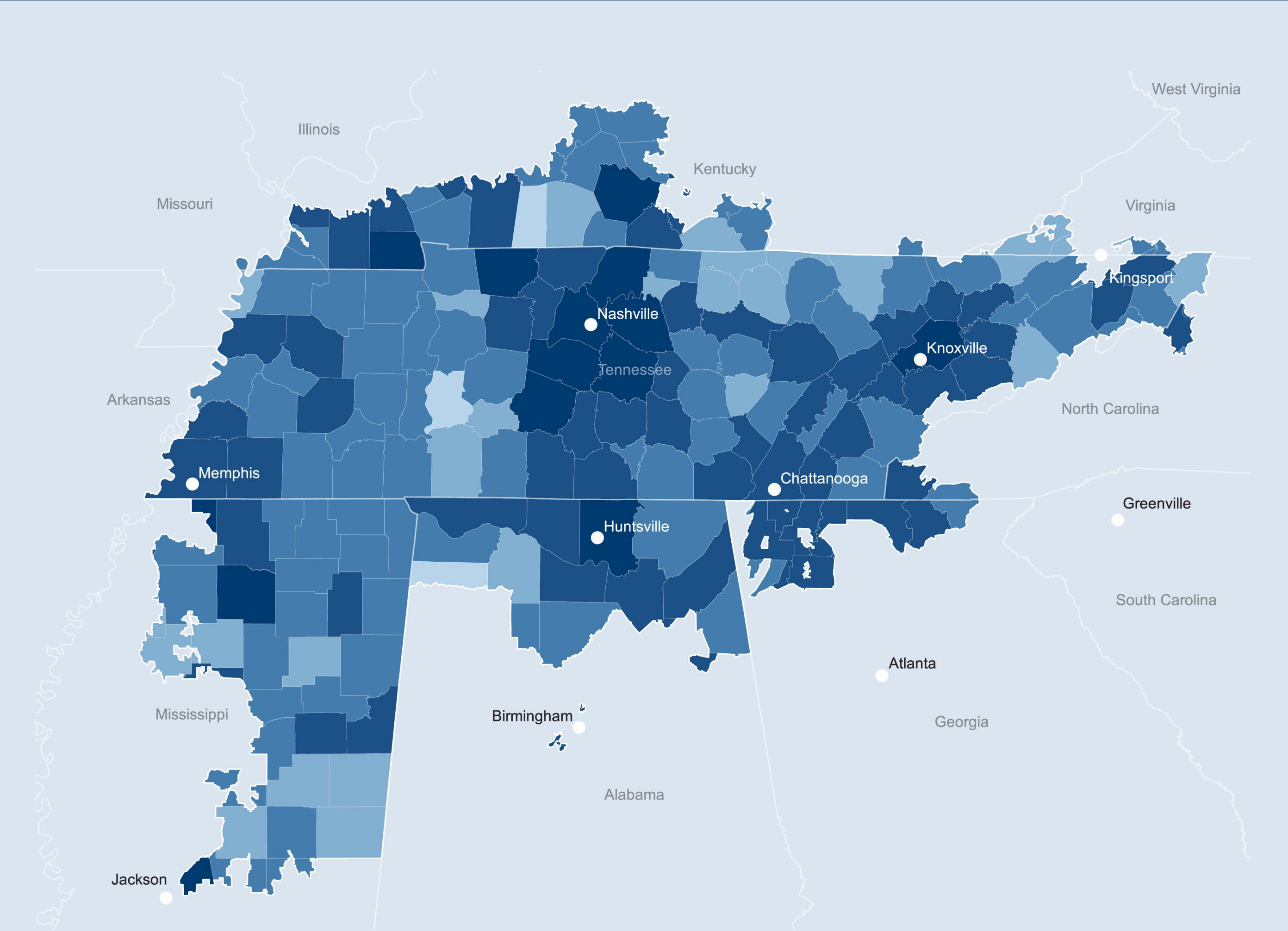
Economic Empowerment

GOAL

Everyone in the TVA service region is economically secure and can contribute to a modern, 21st century economy to the best of their ability.

FEATURED MAPS

- ✓ Housing Burden
- ✓ Low Income Population
- ✓ Unemployment Rate
- ✓ Job Access Score
- ✓ High School Education Attainment
- ✓ Linguistic Isolation

Housing Burden

- ☐ 14–20%
- ☐ 20–25%
- ☐ 25–30%
- ☐ 30–37%
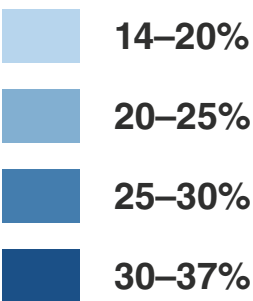
County level data, 2020

Details and Findings

This map shows the percentage of residents who are housing burdened (those who pay 30% or more of their income on housing). This data includes housing burden among all occupied housing units, including owners and renters. Darker colors represent counties with higher rates of residents who are housing burdened.
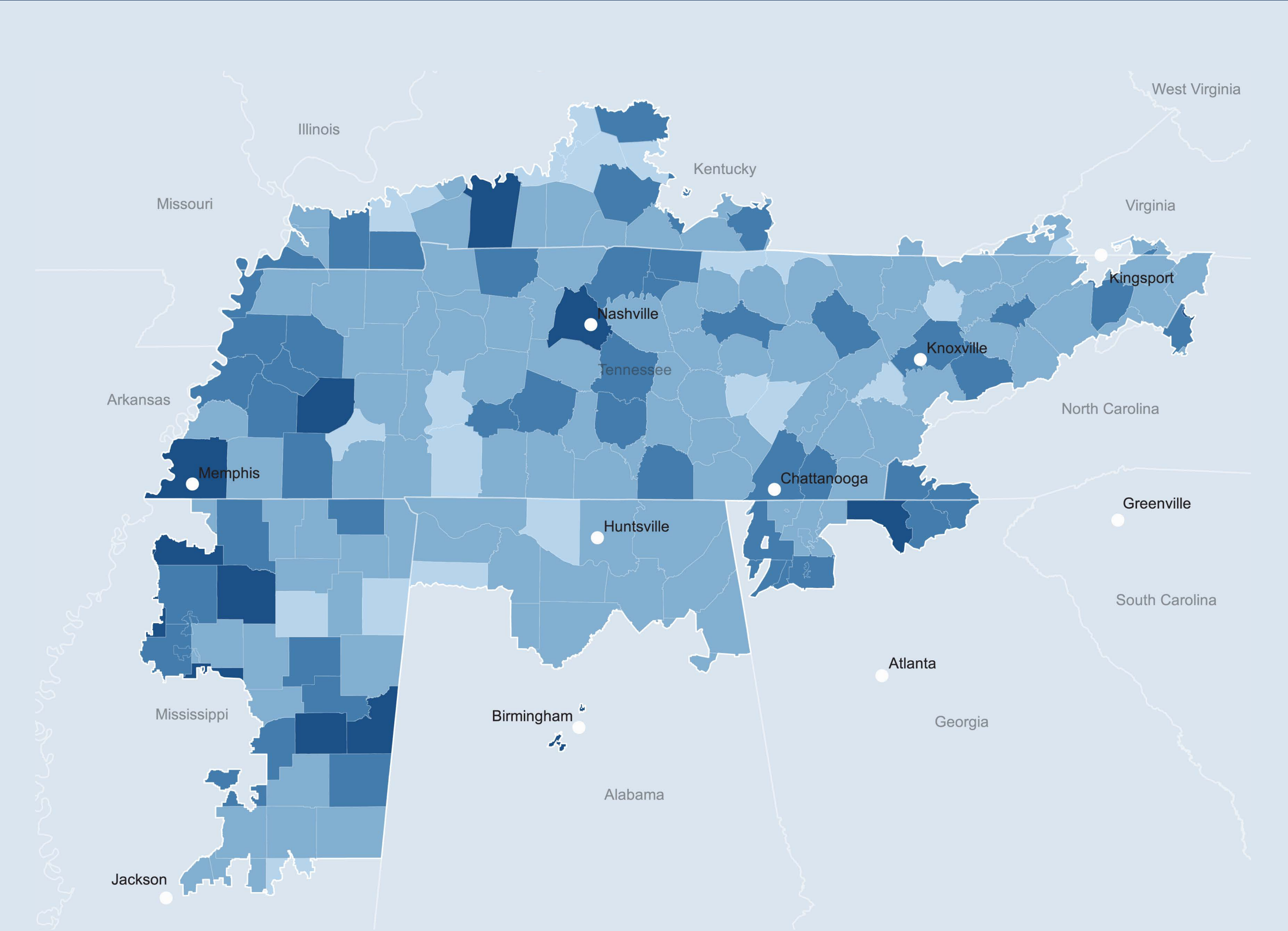
Source: Census

Low Income Population

- 0–20%
- 20–40%
- 40–60%
- 60–80%
- 80–100%
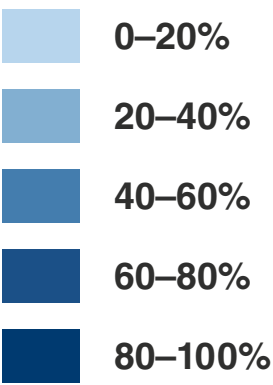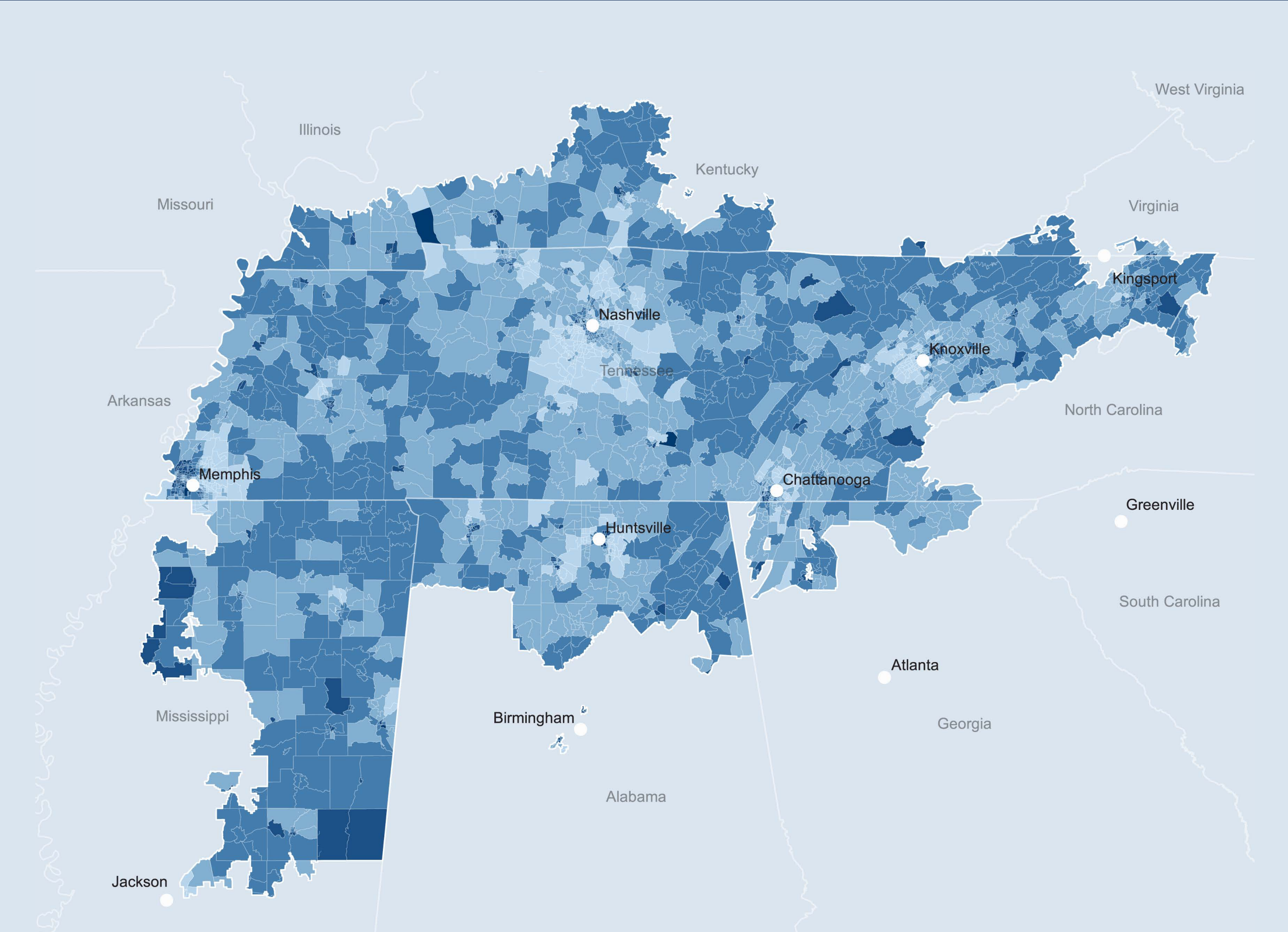
Census tract level data, 2022

Details and Findings

This map shows the percentage of total population in each census tract reported to be at or below 200% of the Federal Poverty Level. Darker colors represent areas with higher poverty.

Source: Department of Energy

Unemployment Rate

- 1.6–4%
- 4–6%
- 6–8%
- 8–10%
- 10–15.7%
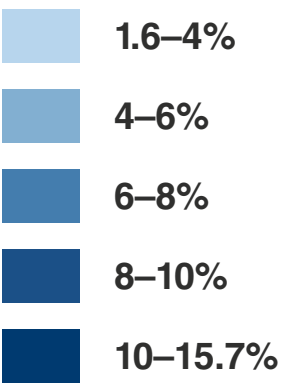
County level data, 2020

Details and Findings

This map shows the unemployment rate in 2020 by county. Darker colors represent counties with higher unemployment rates.

Job Access Score

	-9.9 to -6.5
	-6.5 to -3.8
	-3.8 to -2.16
	-2.16 to -1.4
	-1.4 to 0
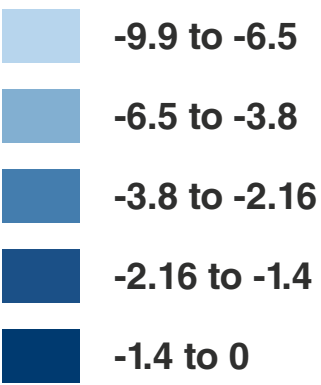
Census tract level data, 2022

Details and Findings

This map shows the Job Access Score, as calculated by the Department of Energy's Justice40 Initiative. Darker colors on the map represent census tracts with poorer job access.

Source: Department of Energy

Population with Less than High School Education

	0–11%
	11–22%
	22–33%
	33–44%
	44–55%

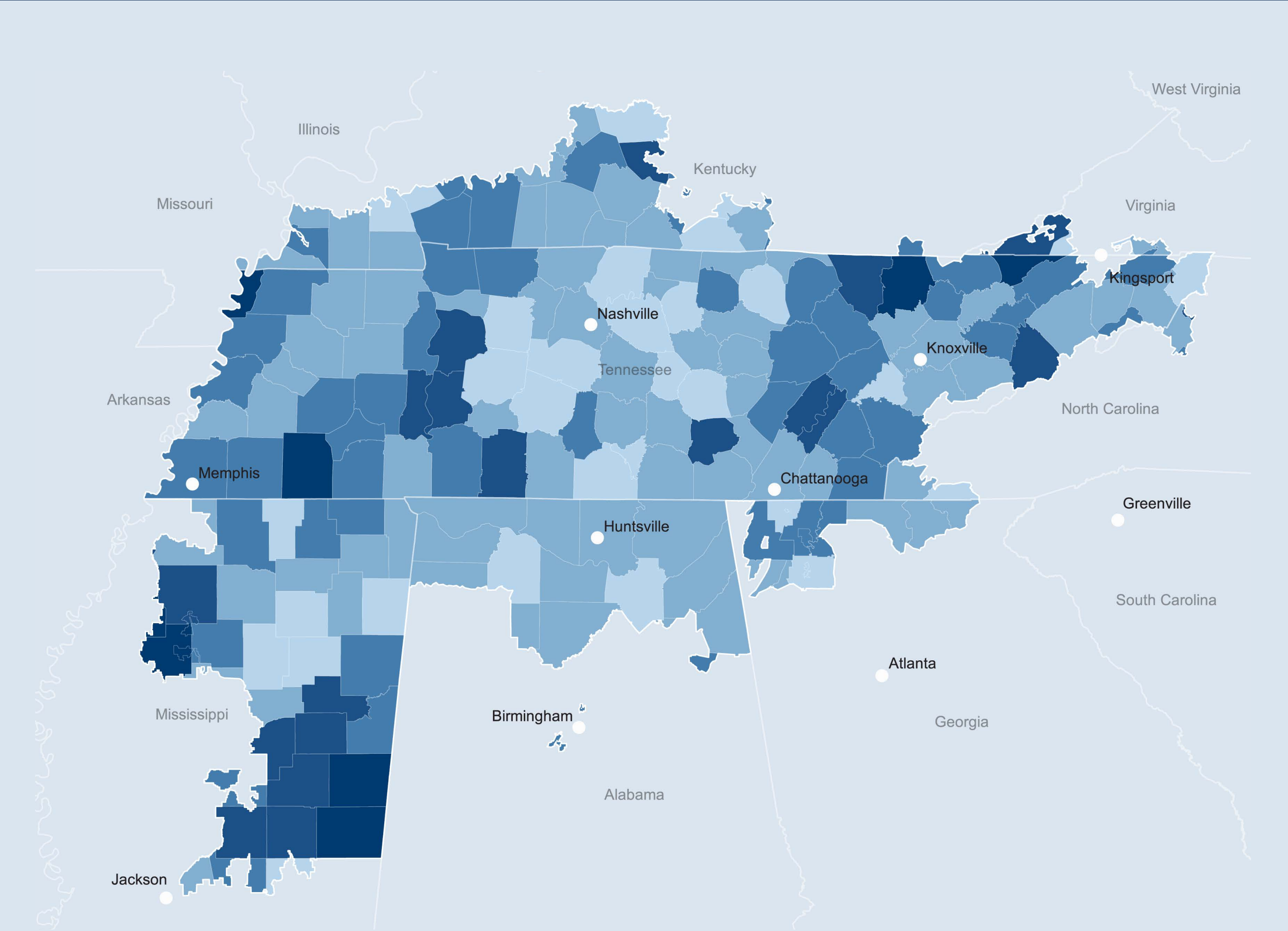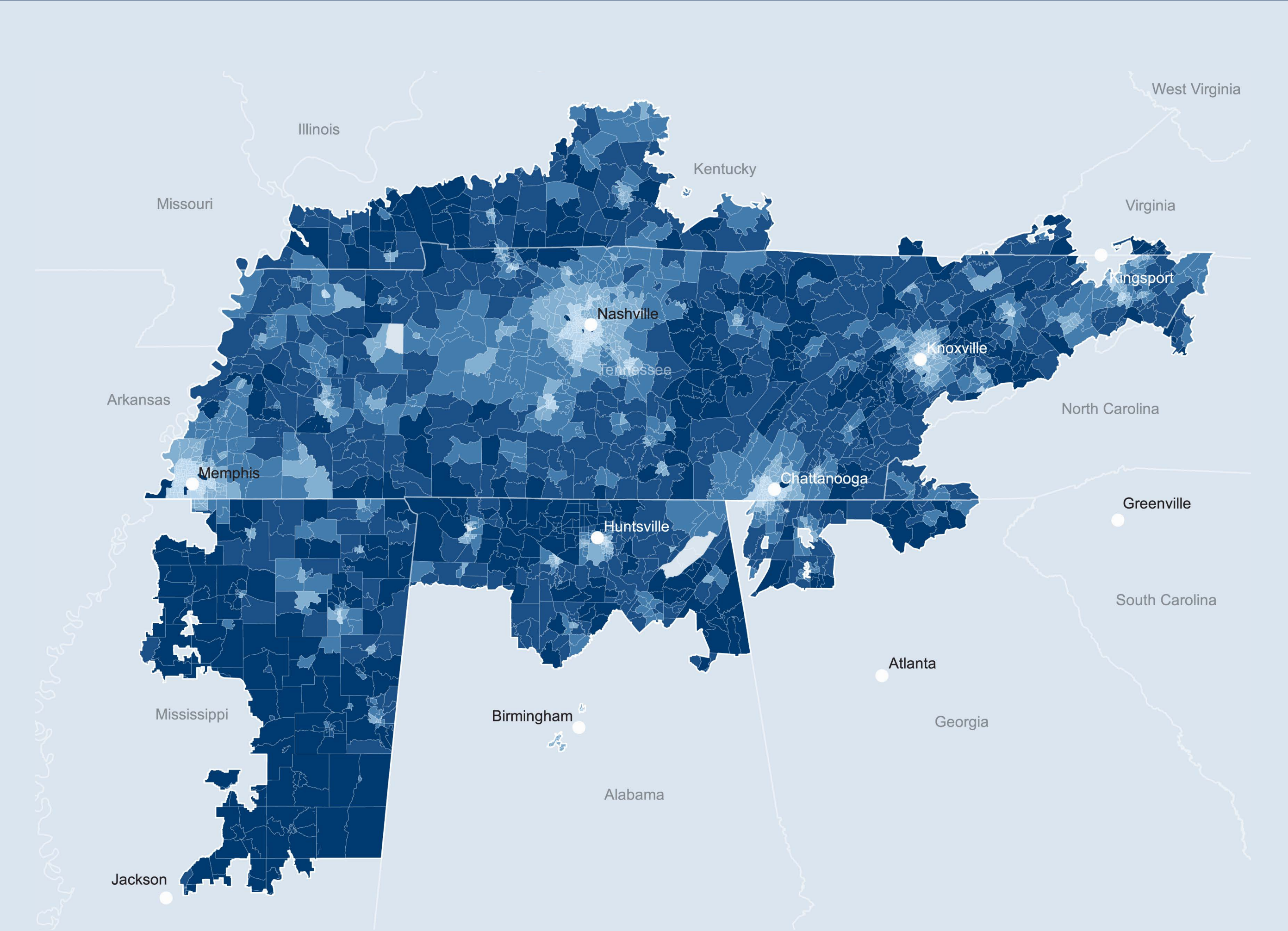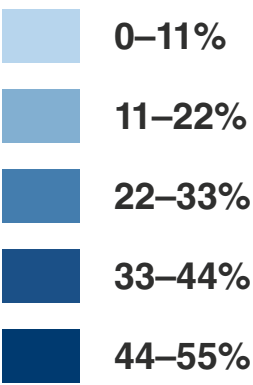Census tract level data, 2022

Details and Findings

This map shows the percentage of the total population age 25 and above whose reported education is less than a high school diploma. Darker colors represent census tracts with higher rates of populations with less than a high school education.

13% of residents in the TVA service region over the age of 25 do not have a high school degree, compared to the national average of 11.5%.
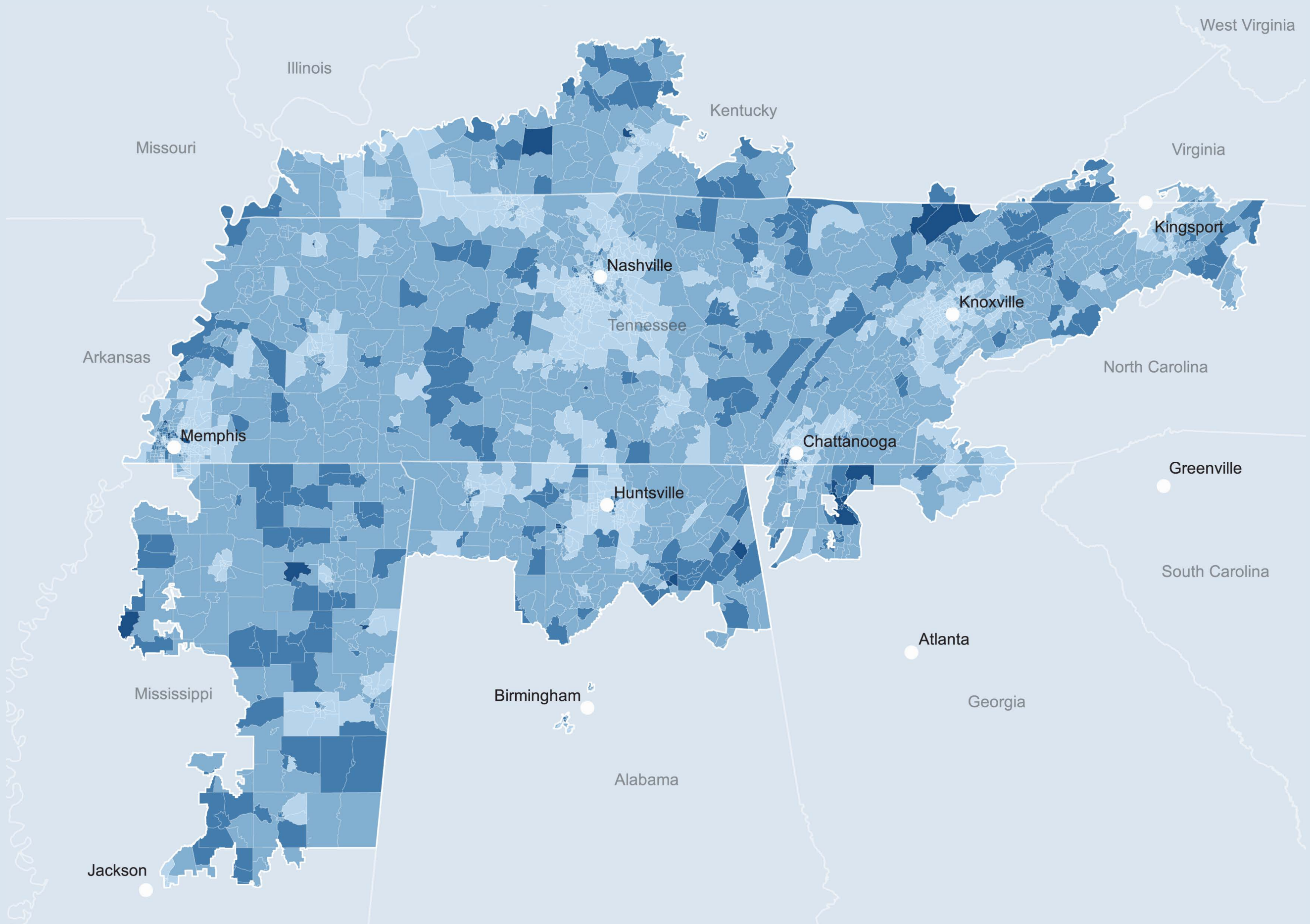
Source: Department of Energy

Linguistic Isolation

▢	12–29%
▢	29–46%
▢	46–64%
▢	64–81%
▢	81–98%
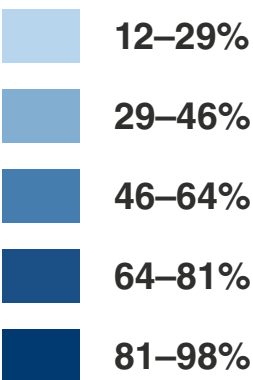
Census tract level data, 2022

Details and Findings

This map shows the share of households that do not have anyone over the age of 14 who speaks English very well. Darker colors represent census tracts with less English-speaking ability.

Source: Council on Environmental Quality
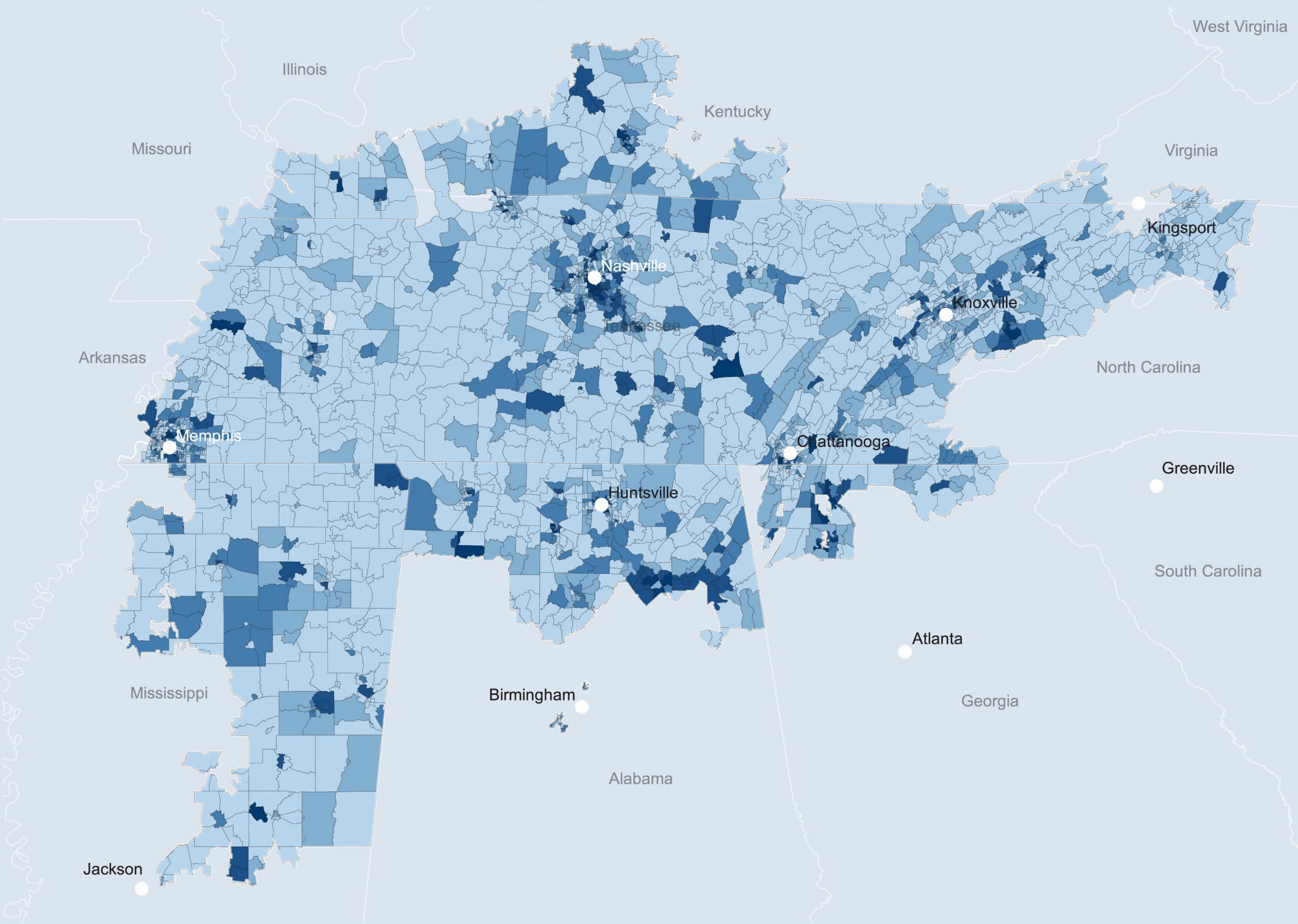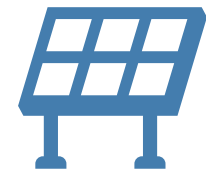
Energy and Environmental Justice

GOAL

Everyone in the TVA service region has access to a healthy environment (natural and built) and reliable, affordable and clean energy.

FEATURED MAPS

- ✓ Low Life Expectancy Percentile
- ✓ Climate Hazards Loss of Life Estimates
- ✓ Energy Burden
- ✓ Air Toxins Index Rating
- ✓ $PM_{2.5}$ Level in Air

Low Life Expectancy Percentile

- 0th to 39th
- 39th to 67th
- 67th to 79th
- 79th to 90th
- 90th to 99th
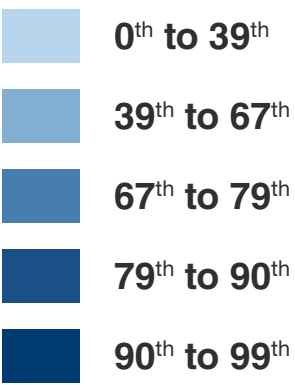
Census tract level data, 2022

Details and Findings

The Low Life Expectancy Percentile is based on the average number of years a person can expect to live compared to the national average. Darker colors on the map represent census tracts where the average life expectancy is shorter than the national average.

Source: Council on Environmental Quality

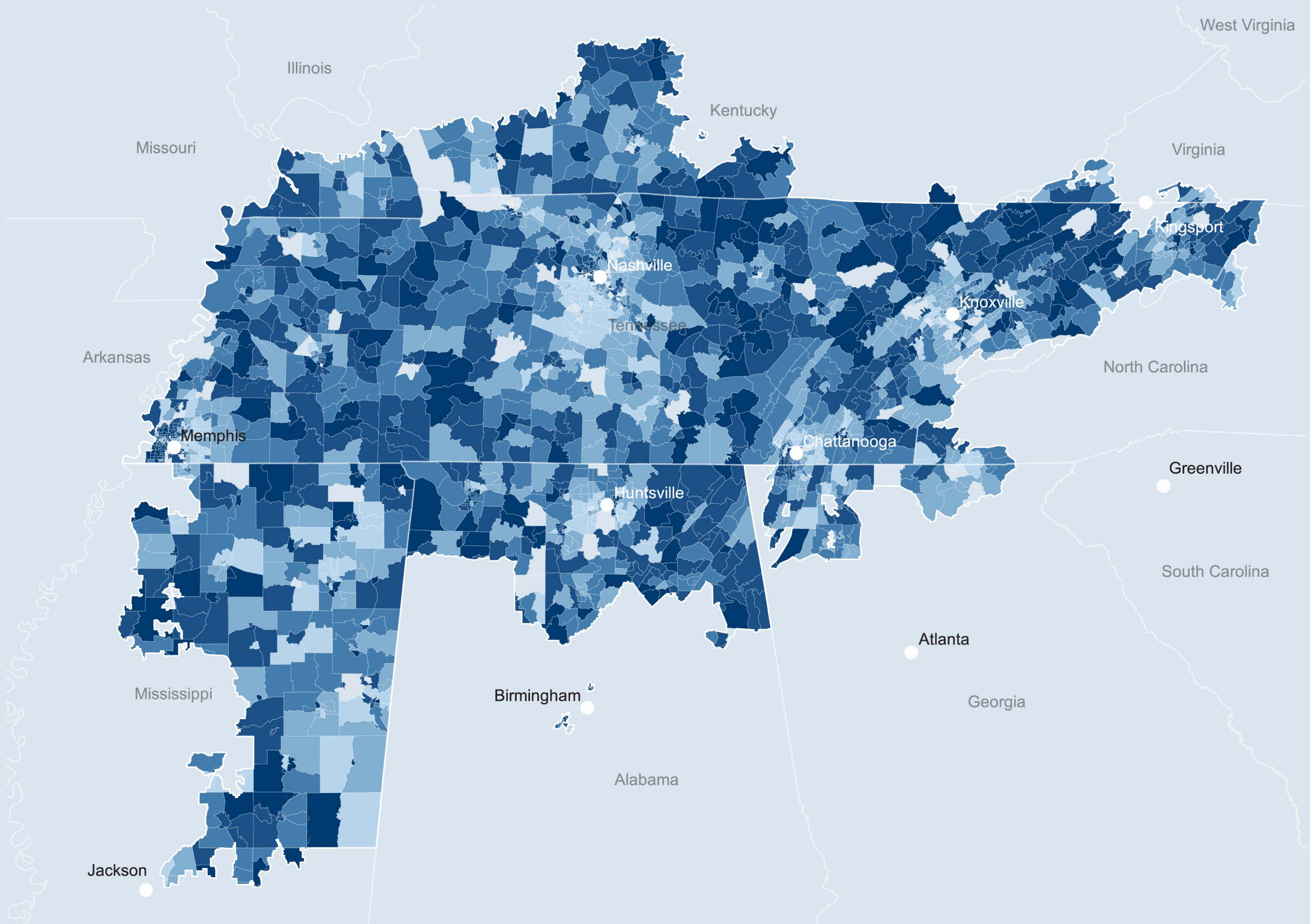# Climate Hazards Loss of Life Estimates

▢	**0.1 to 48.9**
▢	**48.9 to 62.6**
▢	**62.6 to 73.9**
▢	**73.9 to 83.7**
▢	**83.7 to 99.8**
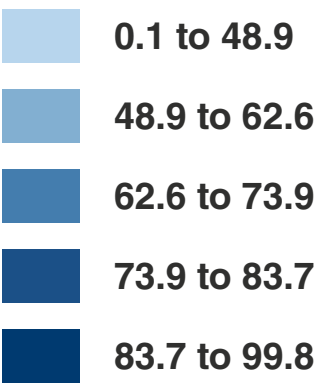
Census tract level data, 2022

Details and Findings

This map shows the expected annual loss of life, including fatalities and injuries, from 18 different climate hazards. Darker colors represent census tracts with higher expected fatalities and injuries from climate hazards.

Source: Department of Energy

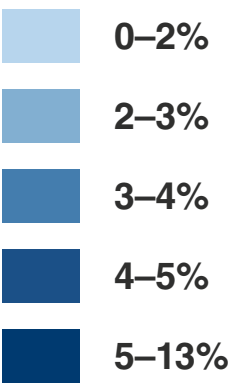# Energy Burden

▪	0–2%
▪	2–3%
▪	3–4%
▪	4–5%
▪	5–13%
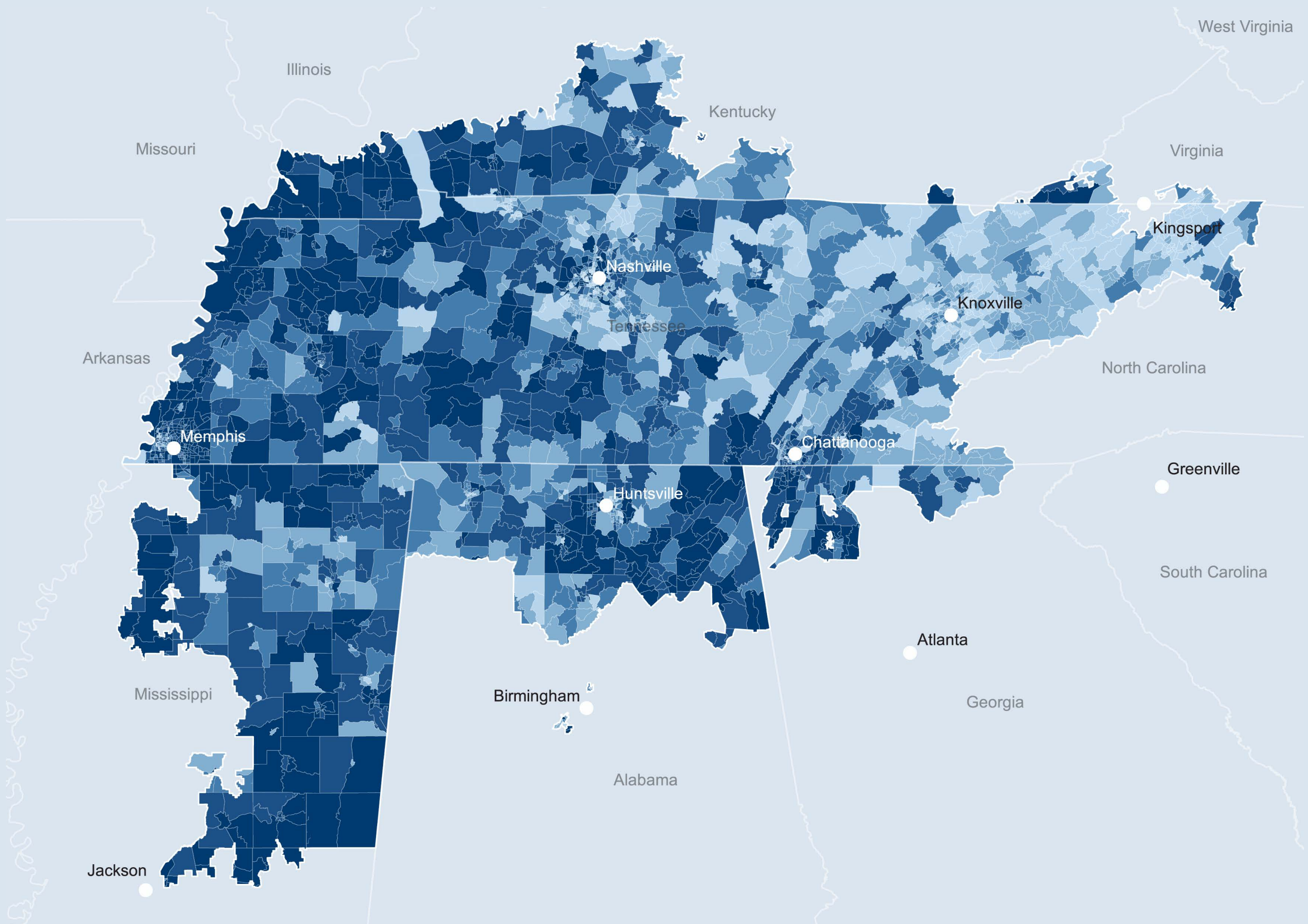
Census tract level data, 2022
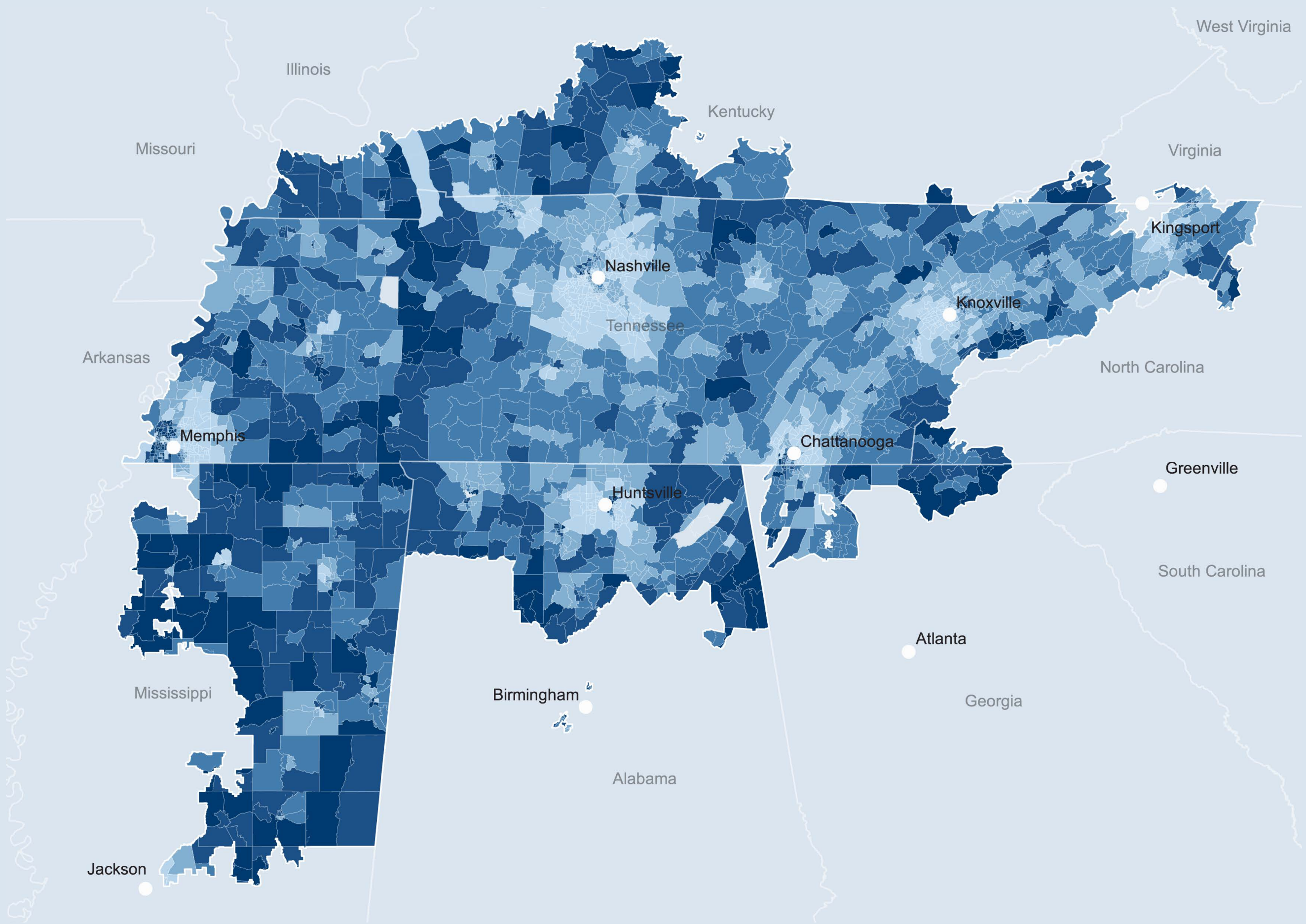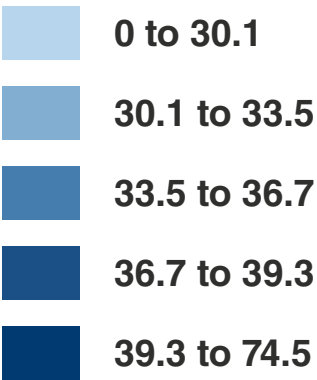
Details and Findings

Energy burden is the percentage of annual household income spent on energy bills. Census tract energy burden percentages are calculated as average annual household income divided by the average annual household energy costs. Darker colors represent census tracts where households pay a higher percentage of their income on energy.

Source: Department of Energy

Air Toxins Index Rating

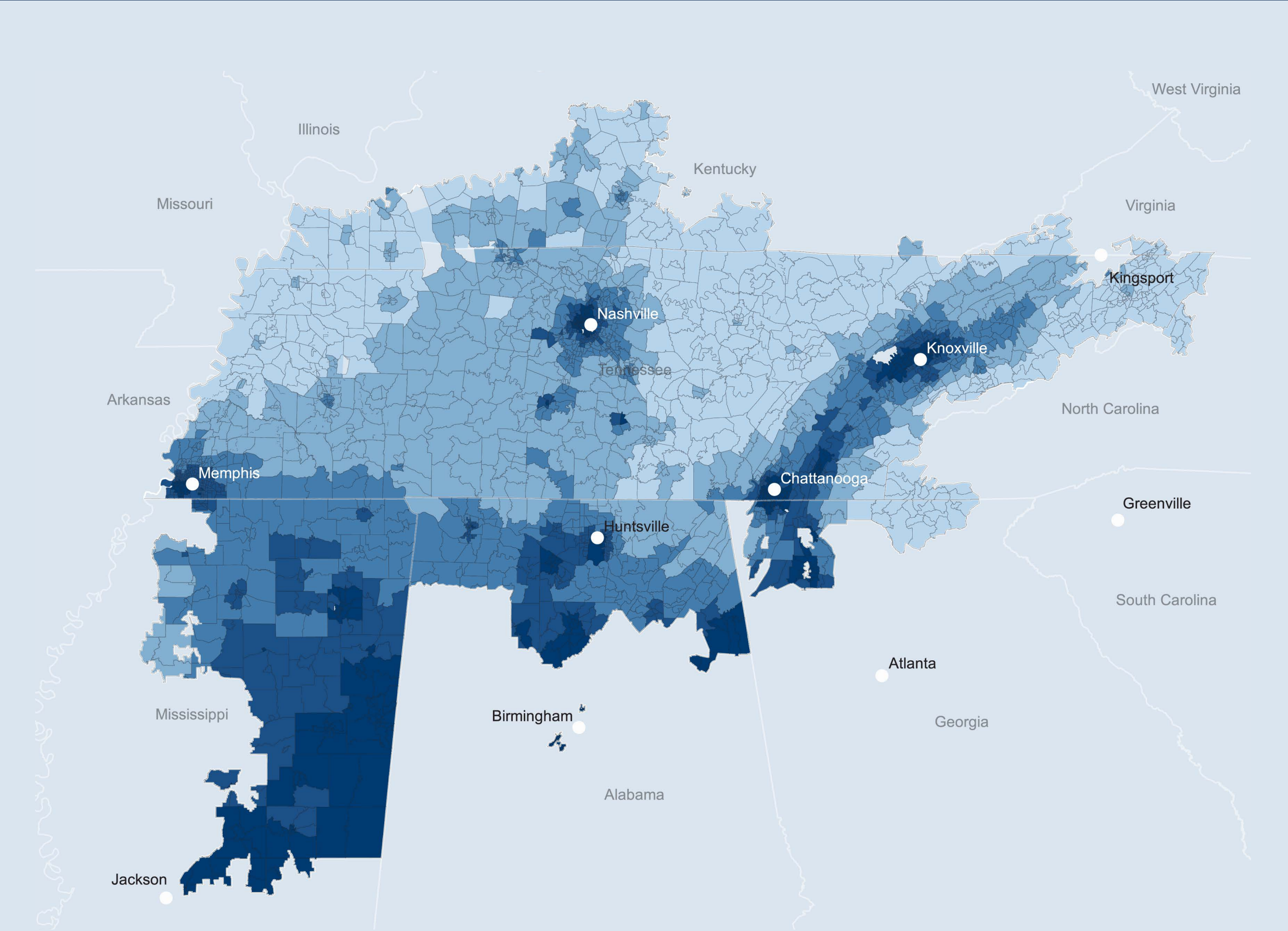|	
☐	0 to 30.1
☐	30.1 to 33.5
☐	33.5 to 36.7
☐	36.7 to 39.3
☐	39.3 to 74.5

Census tract level data, 2020

Details and Findings

This map shows the Environmental Justice Index for air toxins cancer risk, which is defined as the lifetime cancer risk from inhalation of air toxins. Darker colors represent census tracts with higher risk of cancer from the inhalation of air toxins.
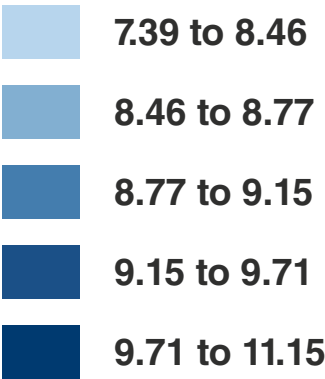
Source: Department of Energy

PM$_{2.5}$ Level in Air

■	**7.39 to 8.46**
■	**8.46 to 8.77**
■	**8.77 to 9.15**
■	**9.15 to 9.71**
■	**9.71 to 11.15**

Census tract level data, 2020

Details and Findings

This map shows the Environmental Justice Index for the annual average of particulate matter 2.5 (PM$_{2.5}$) levels in the air (µg/m3). Darker colors represent census tracts with higher concentrations of particulate matter in the air.

Source: Department of Energy
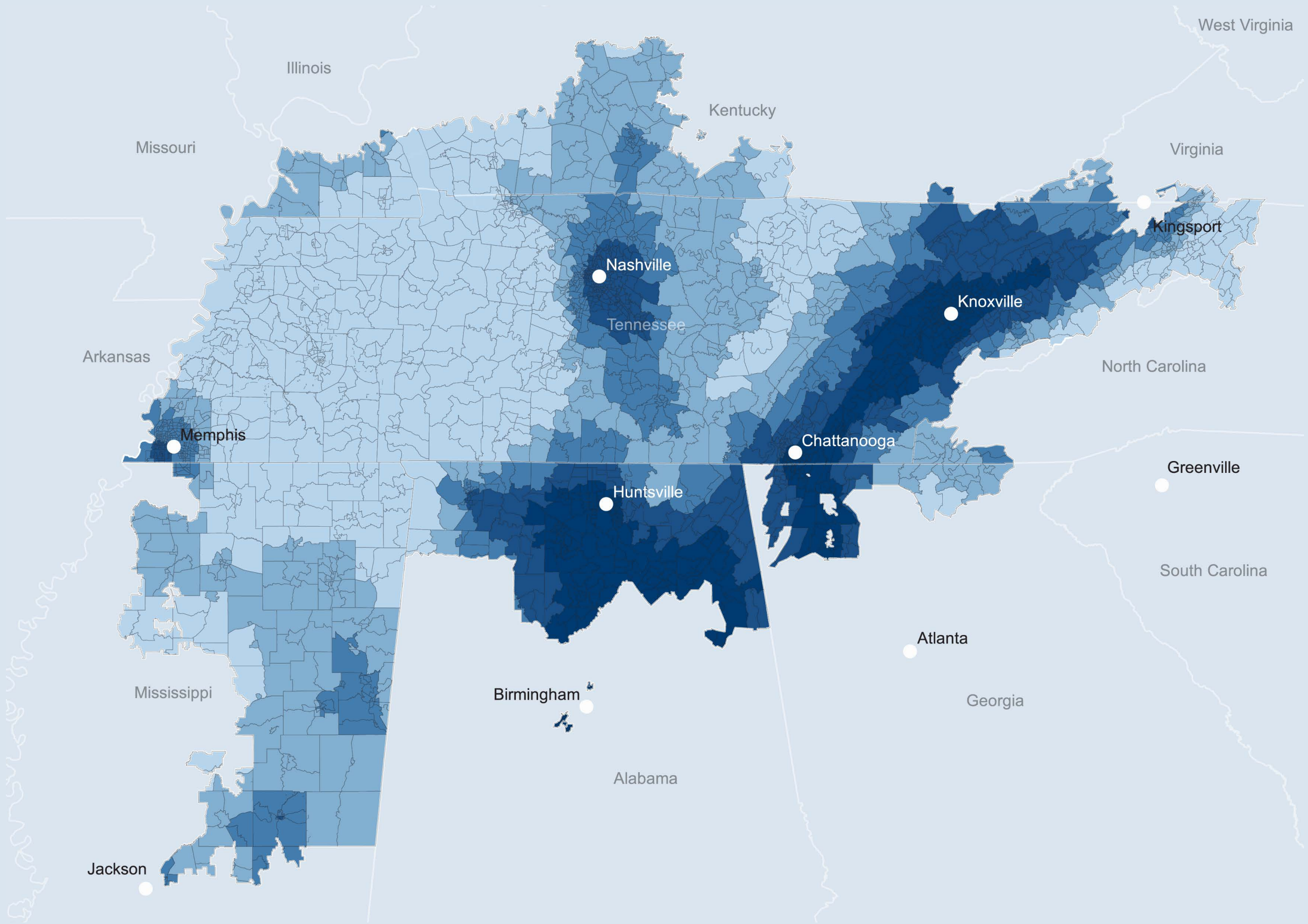
Enhanced Community Resiliency

GOAL

Communities in the TVA service region have plans and resources to minimize the impacts of events like natural disasters and cyberthreats, to endure them safely and to recover quickly.

FEATURED MAPS

✓ Water Risk Score

✓ Outage Duration in Minutes

✓ Flood Risk Percentile

✓ Wildfire Risk Percentile

Water Risk Score

- 0 to 0.4 (Low)
- 0.4 to 0.8 (Low)
- 0.8 to 1.2 (Low-Medium)
- 1.2 to 1.6 (Low-Medium)
- 1.6 to 2 (Low-Medium)

Hydro-basin level data, 2019
(County lines shown for reference)

Details and Findings

Water risk, as displayed in this map, is a composite overall score calculated with 13 water risk indicators, such as drought risk, seasonal variability and unimproved or no drinking water. Higher values, shown with darker colors on this map, indicate increased water risk for people in those hydro-basins.

Source: World Resource Institute
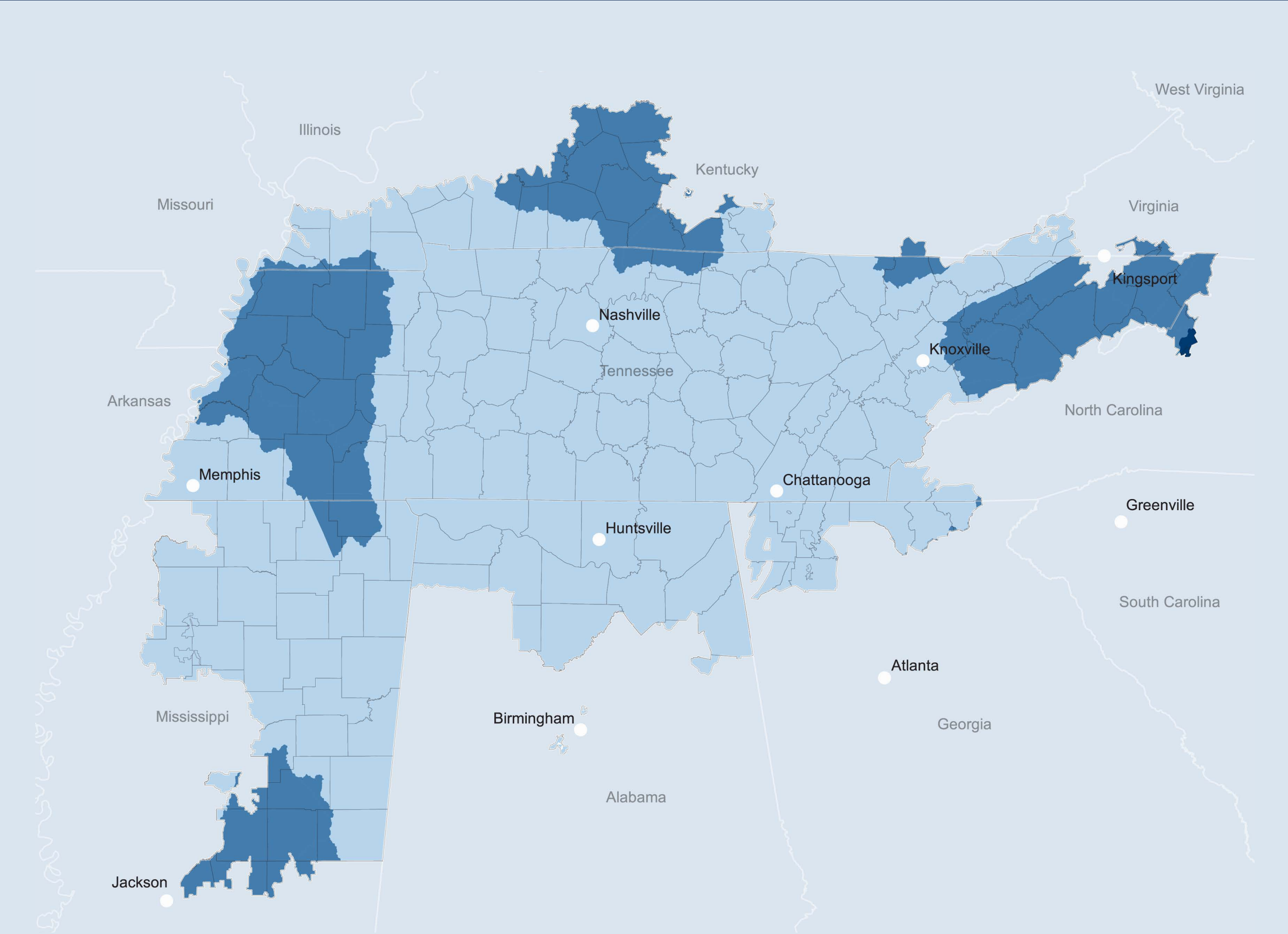
Outage Duration in Minutes

	No Data
	0 to 135
	135 to 620
	620 to 1114
	1114 to 4801

Census tract level data, 2022

Details and Findings

This map shows the average duration of power outage events in minutes that occurred from 2017-2020 by census tract, also known as the system average interruption duration index (SAIDI).

Customers in the seven states served by TVA experienced an average of three hours of power outages in 2021.
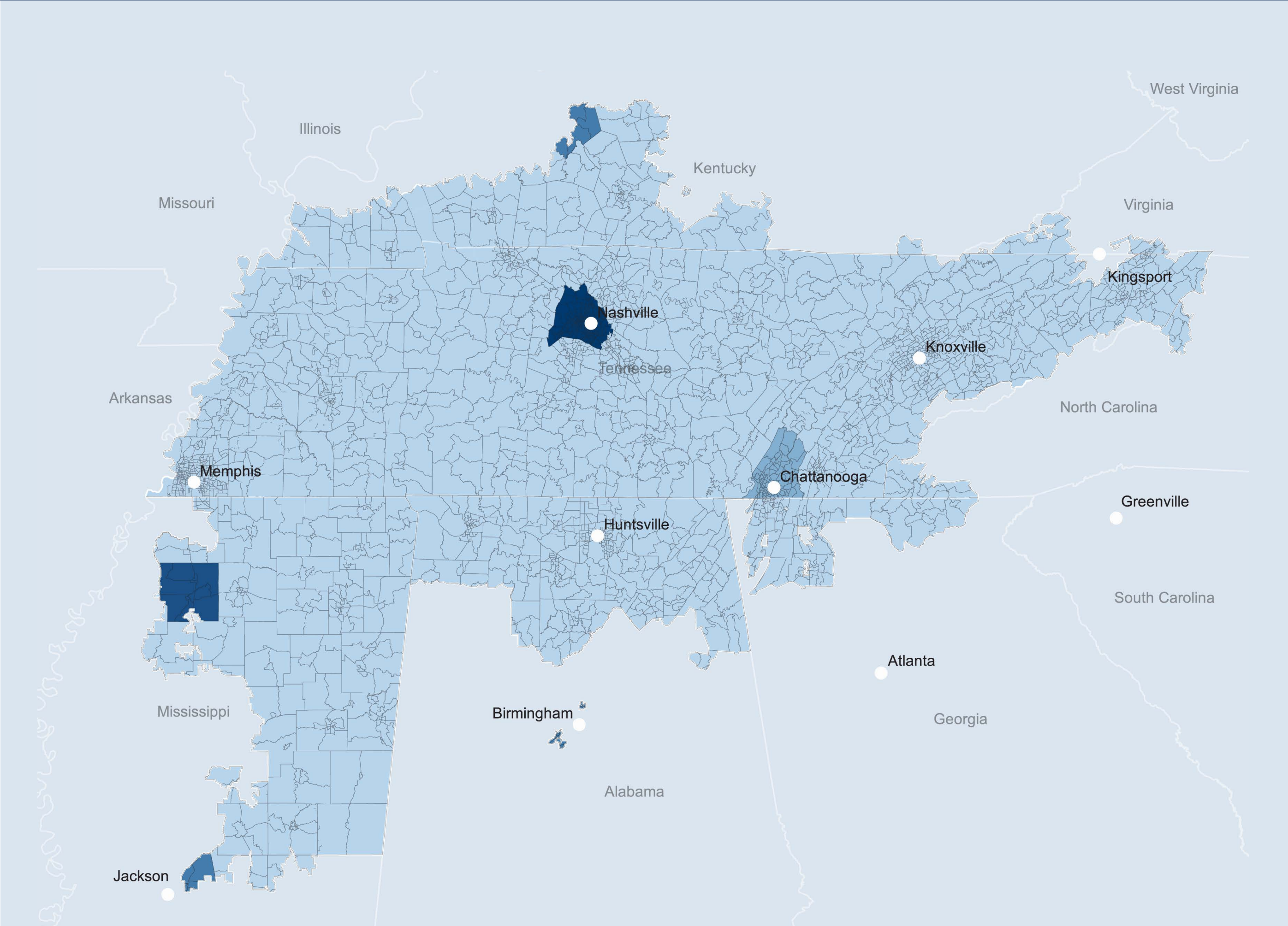
TVA

Source: Department of Energy

Flood Risk Percentile

■	0th to 41st
■	41st to 55th
■	55th to 67th
■	67th to 79th
■	79th to 97th

Census tract level data, 2022

Details and Findings

This map shows the percentile of properties projected to be at risk of floods from tides, rain, riverine and storm surges within 30 years. Percentiles are based on national values, and darker colors represent census tracts with increased flood risk.

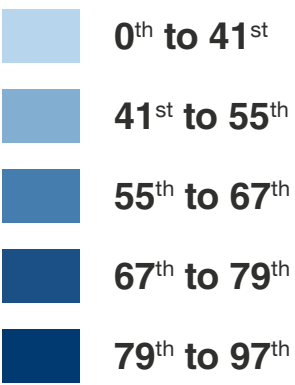**Source:** Council on Environmental Quality

Wildfire Risk Percentile
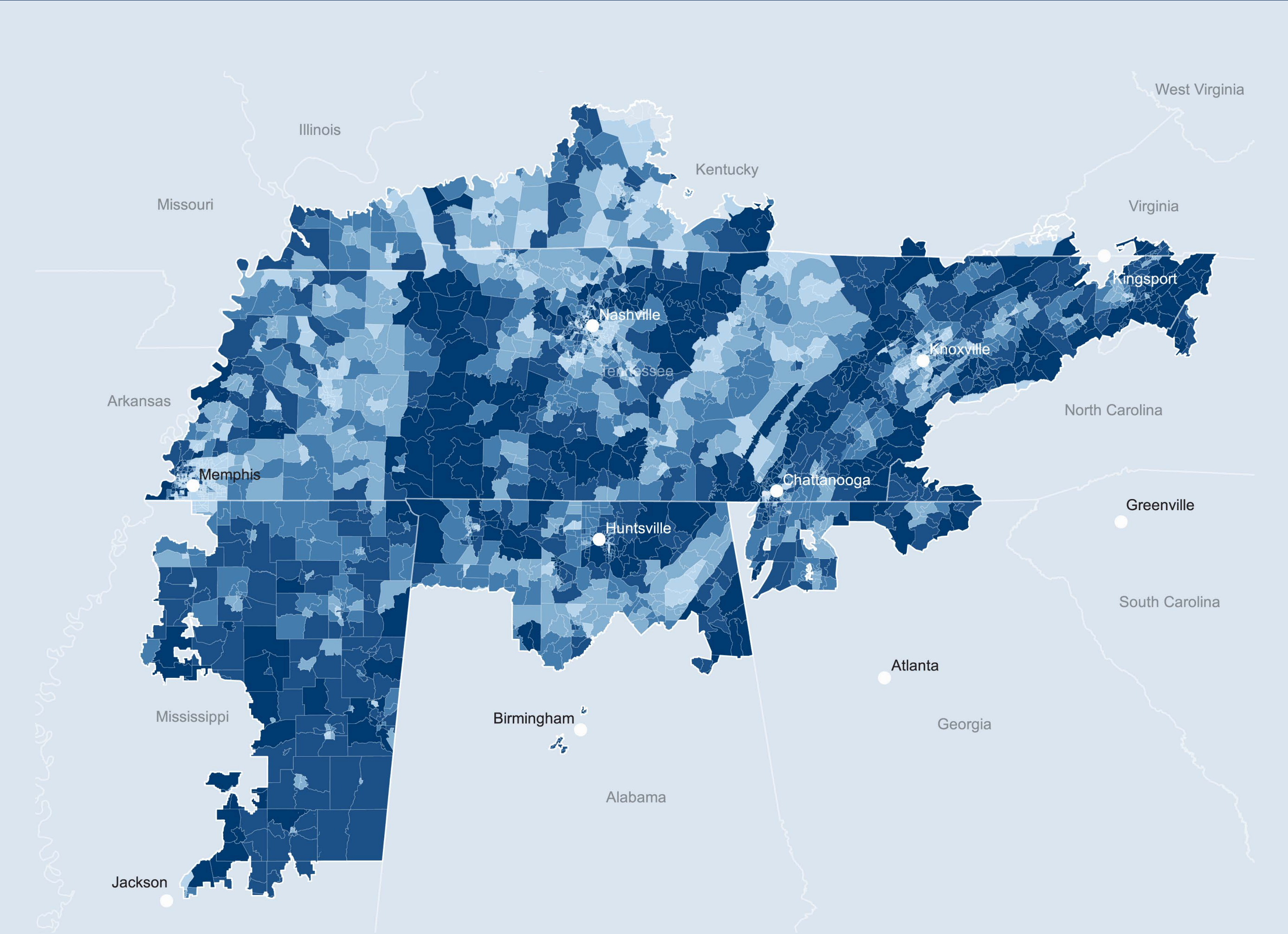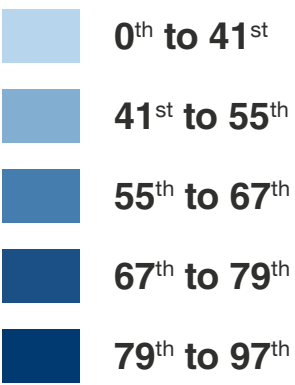
- 0th to 41st
- 41st to 55th
- 55th to 67th
- 67th to 79th
- 79th to 97th

Census tract level data, 2022

Details and Findings

This map shows the percentiles of properties projected to be at risk of wildfire from fire fuels, weather, human influence and fire movement within 30 years. Percentiles are based on national values, and darker colors represent census tracts with increased wildfire risk.

Source: Council on Environmental Quality
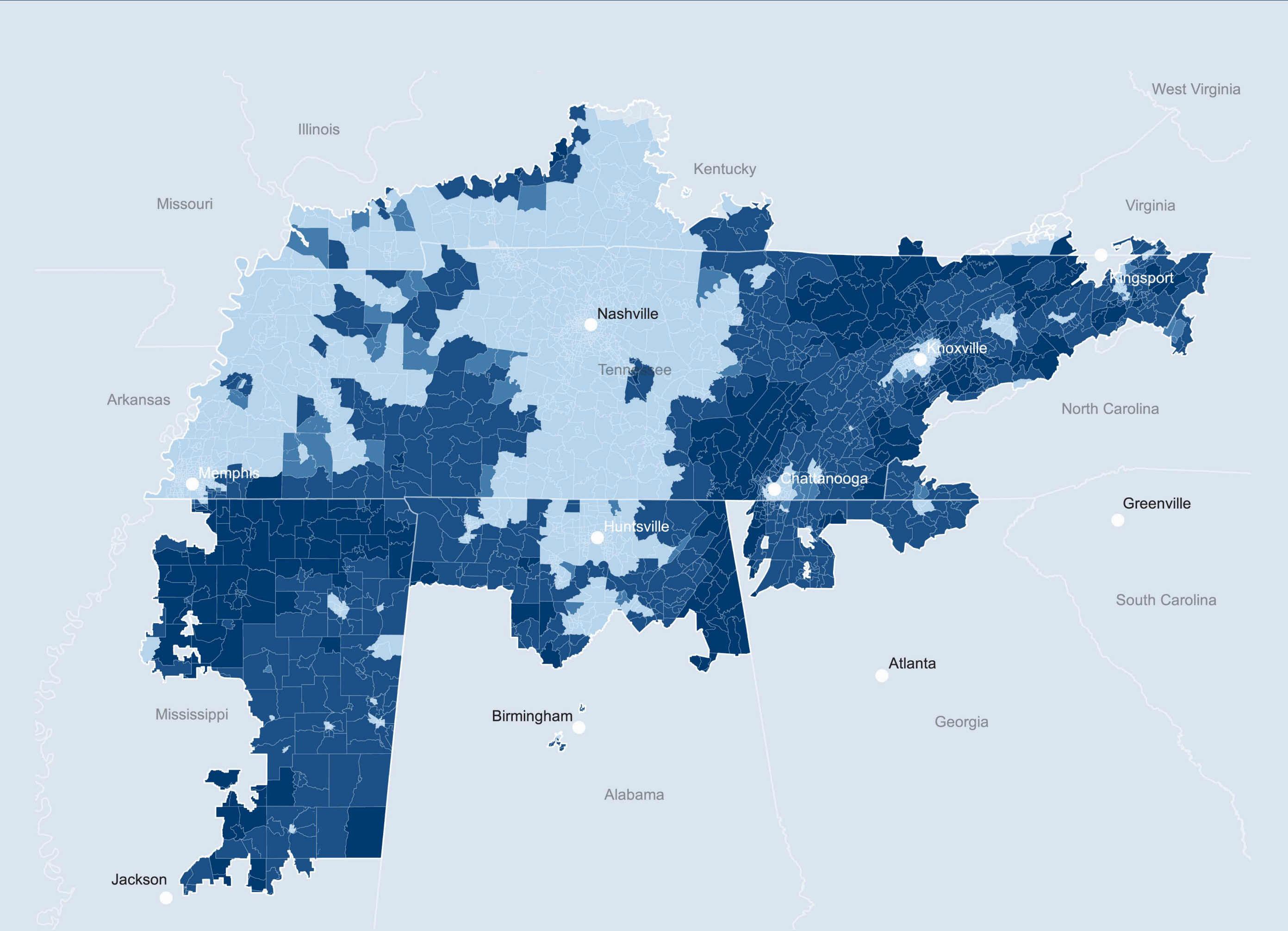
Cross-Cutting

The following maps cover topics that touch on multiple focus areas within Connected Communities.

FEATURED MAPS

- ✓ Social Vulnerability Index
- ✓ Disadvantaged Community Score
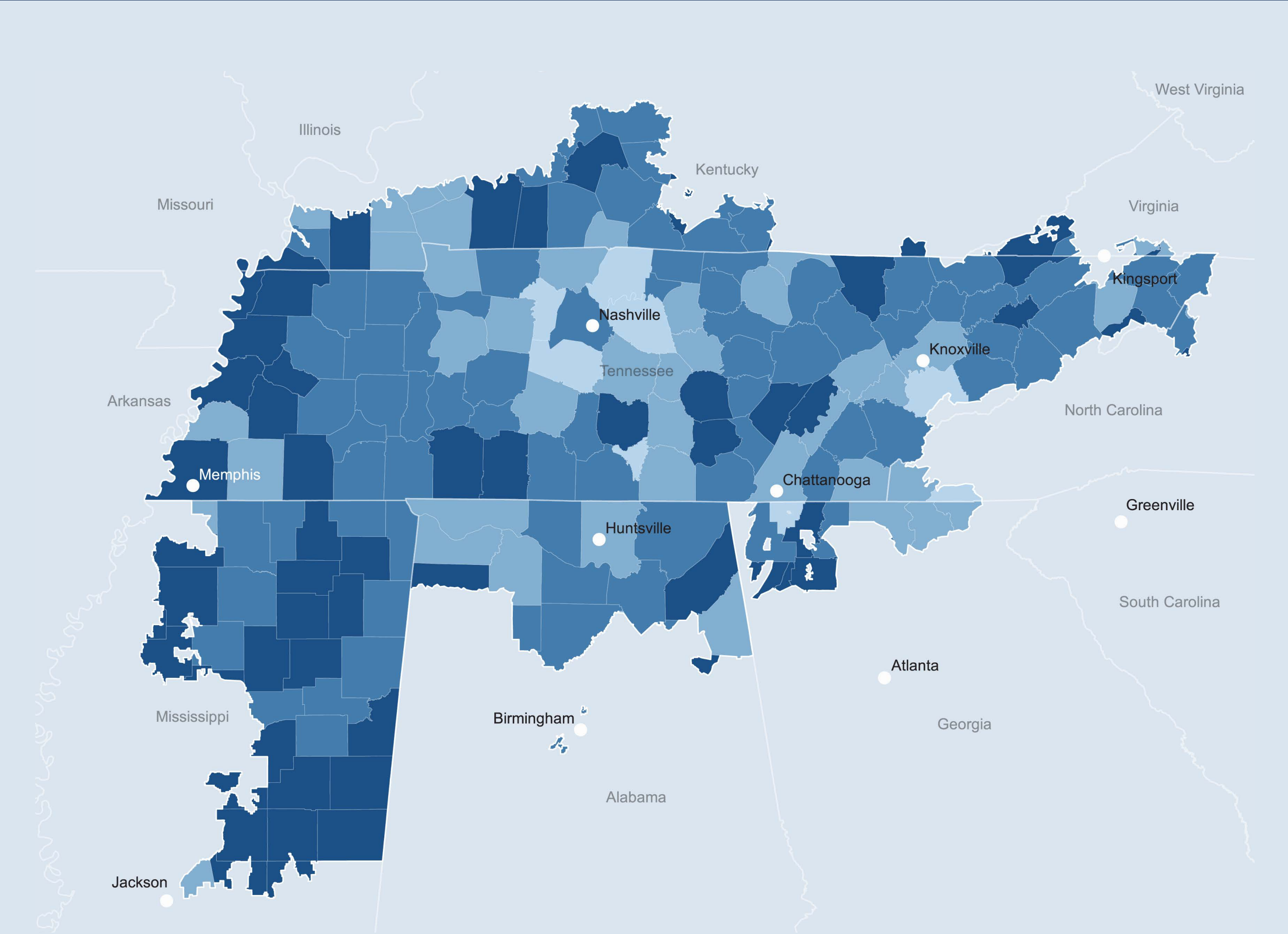- ✓ Disadvantaged Community Status

Social Vulnerability Index

Legend:
- 0 to 0.25 (Low)
- 0.25 to 0.5 (Low-Medium)
- 0.5 to 0.75 (Medium-High)
- 0.75 to 1 (High)

County level data, 2020

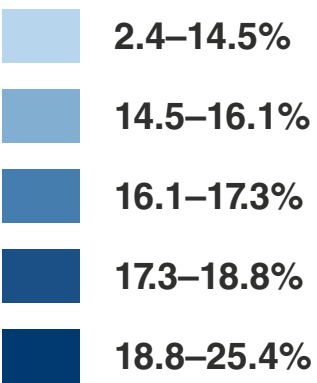### Details and Findings

The Social Vulnerability Index ranks areas based on 16 social factors including unemployment, racial and ethnic minority status and disability. A higher value represents counties with higher social vulnerability, which is represented with darker colors on this map.

Source: Center for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry

Disadvantaged Community Score

- **2.4–14.5%**
- **14.5–16.1%**
- **16.1–17.3%**
- **17.3–18.8%**
- **18.8–25.4%**

Census tract level data, 2022

Details and Findings

Disadvantaged Community (DAC) Score is the cumulative burden based on the sum of percentiles across 36 indicators. DAC Score is calculated as part of the Department of Energy's Justice40 Initiative. These 36 indicators are categorized into those related to energy burden, environmental and climate hazards, socio-economic vulnerabilities and fossil dependence. Higher values indicate more disadvantaged census tracts, represented with darker colors on the map.

Source: Department of Energy
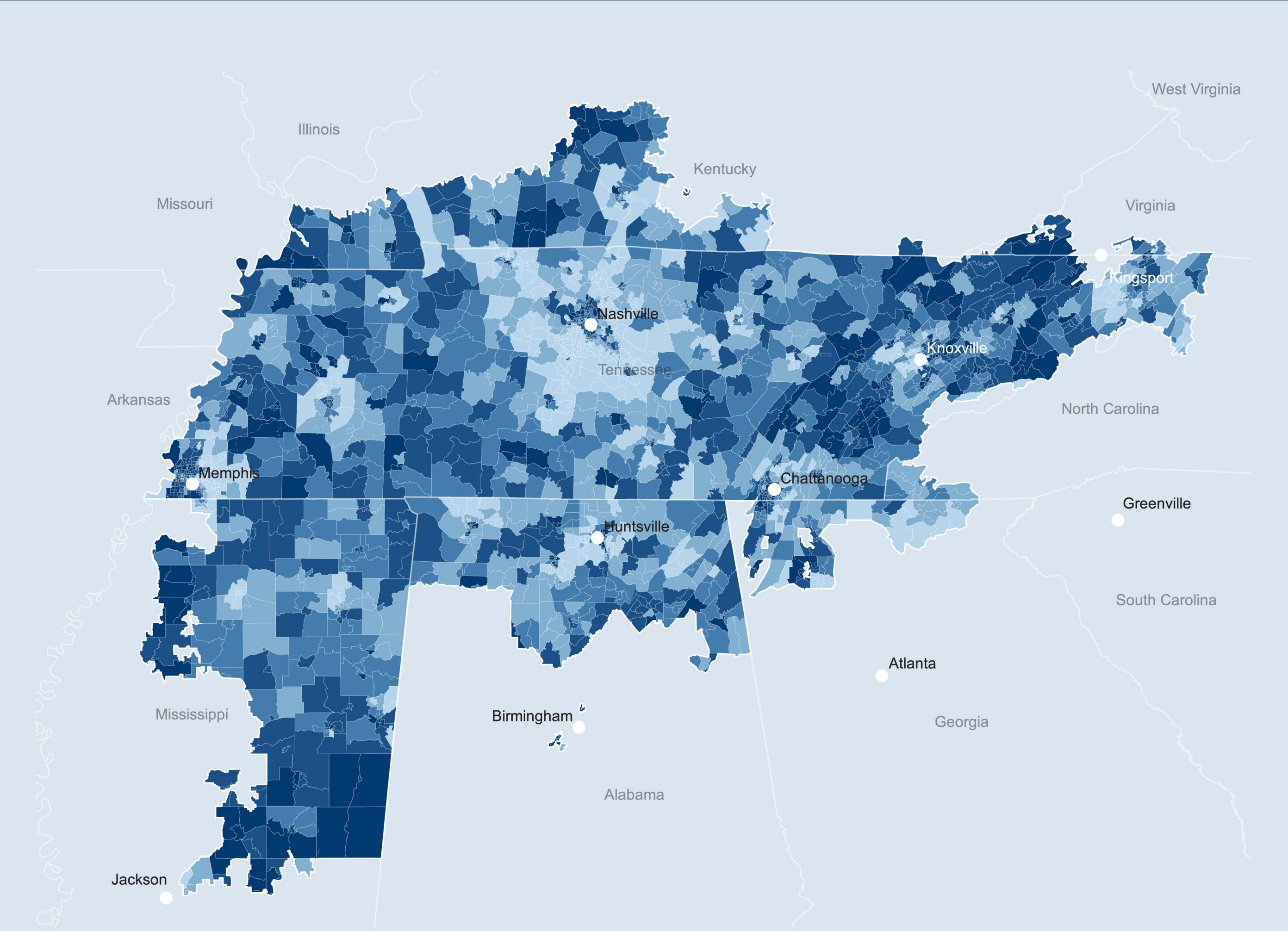
Disadvantaged Community Status

Not Disadvantaged

Disadvantaged (according to the CEQ)

Disadvantaged (according to the DOE)

Disadvantaged (according to both sources)

Census tract level data, 2022

Details and Findings

This map shows whether a census tract is considered disadvantaged by the Department of Energy (DOE) Justice40 Initiative or the Council on Environmental Quality (CEQ) Climate and Economic Screening Tool. In this map, orange tracts are considered disadvantaged by the DOE only, light blue tracts by the CEQ only, and dark blue tracts are considered disadvantaged by both organizations.

Sources: Department of Energy | Council on Environmental Quality
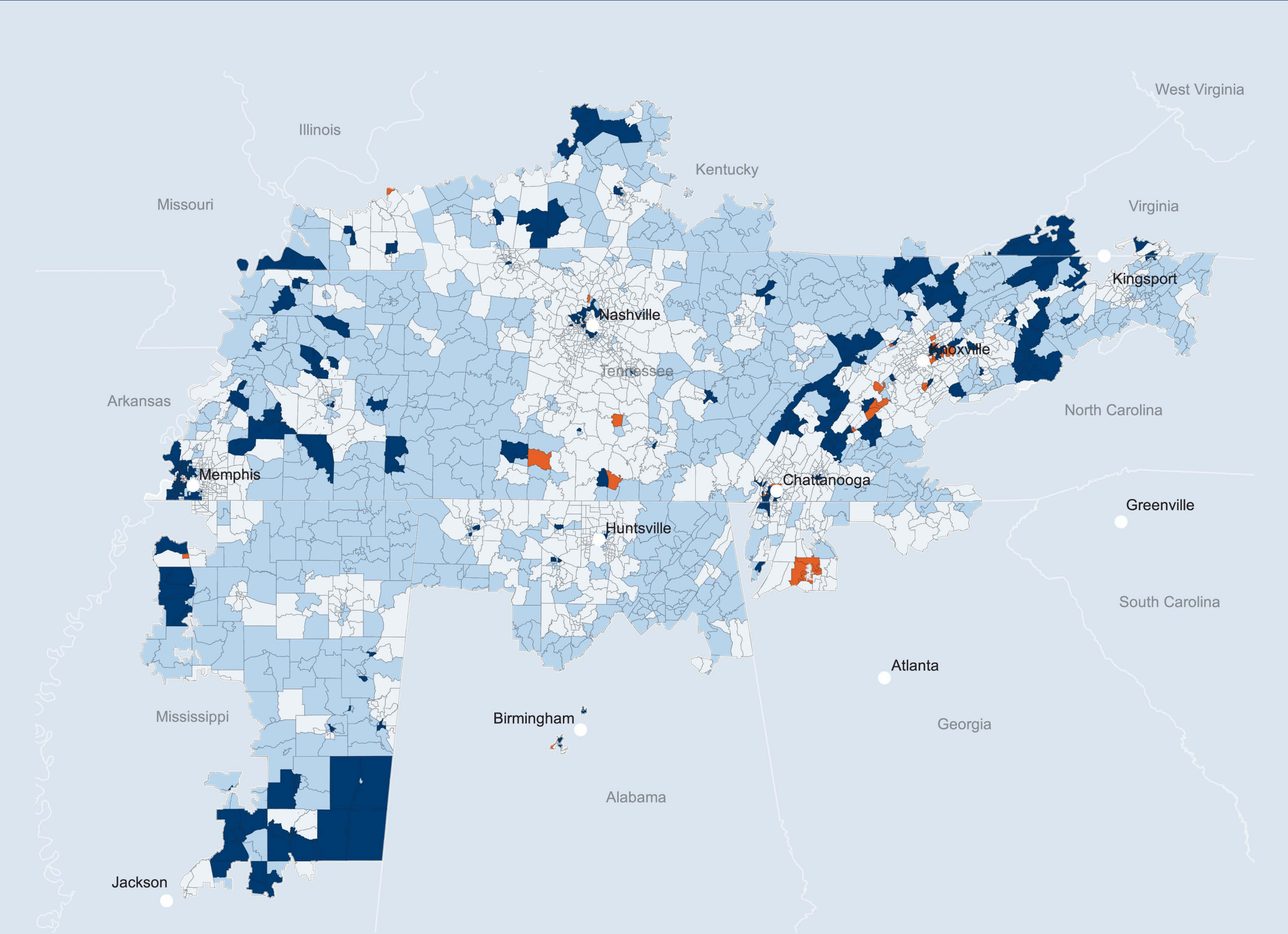
Sources

Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry, and Geospatial Research, Analysis, and Services Program

CDC/ATSDR Social Vulnerability Index (SVI). 2020.

Council on Environmental Quality

Climate and Economic Screening Tool. 2022.

Federal Communications Commission

Form 477 Fixed Data. 2020.

U.S. Census Bureau

American Community Survey 1-Year Estimates. 2020.

U.S. Census Bureau

Income and Poverty in the United States: 2020. 2021.

U.S. Department of Energy Office of Economic Impact and Diversity

DOE Working Justice40 Disadvantaged Communities (DACs) 2022. 2022.

World Resource Institute

Aqueduct Water Risk Atlas. 2019.

Mapping
Key Data

for Connected Communities
Focus Areas