REPORT

Vulnerable Population Index (VPI)

Considering the Transportation Needs of Vulnerable Populations

September 2022

BALTIMORE METROPOLITAN COUNCIL

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BRTB Baltimore Regional Transportation Board

"We have a responsibility as a state to protect our most vulnerable citizens: our children, seniors, people with disabilities. That is our moral obligation. But there is an economic justification too. We all pay when the basic needs of our citizens are unmet."

— John Lynch, Governor of New Hampshire, 2005-2013

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Vulnerable Populations and Transportation Decisions

As the council of governments for the Baltimore region, the Baltimore Metropolitan Council (BMC) has many functions and responsibilities. One of the most important of BMC's functions is to provide technical staff to support the Baltimore Regional Transportation Board (BRTB).

As the federally designated Metropolitan Planning Organization (MPO) for the region, the BRTB works with partners in the region to set transportation policies and make decisions about how and when to invest federal transportation funds to address regional needs.

Analyzing how these transportation policies and investment decisions could affect the region's traveling public is critical. On a broad, regional level, this involves analyzing data related to existing and proposed transportation systems and facilities. How effective are these systems and facilities in moving people and goods? Do these systems and facilities operate in an environmentally responsible way? Do they help to advance the overall prosperity of the region?

On a personal, community-based level, analyses consider how policies and investments could affect the region's most vulnerable people. This involves analyzing data on the conditions or circumstances that can limit the ability of some people to share in the benefits of transportation investments or to access specific destinations and opportunities. Another important consideration is whether people have the opportunity and means to voice their opinions about proposed investments.

COMPLYING WITH TITLE VI AND ENVIRONMENTAL JUSTICE REQUIREMENTS

A fundamental part of these analyses is making sure the BRTB complies with the requirements of Title VI of the Civil Rights Act of 1964 and of Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low Income Populations."

Title VI states that no person in the U.S. shall, on the basis of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. Because the BRTB receives federal funding to carry out its transportation planning function, its programs and products must comply with Title VI.

Executive Order 12898 centers on the concept of Environmental Justice. Environmental Justice seeks to ensure that the benefits and burdens of transportation investments are shared as equitably as possible among all affected communities. Executive Order 12898 and its accompanying memorandum reinforce the requirements of Title VI that focus federal attention on environmental and public health conditions in minority and low-income communities.

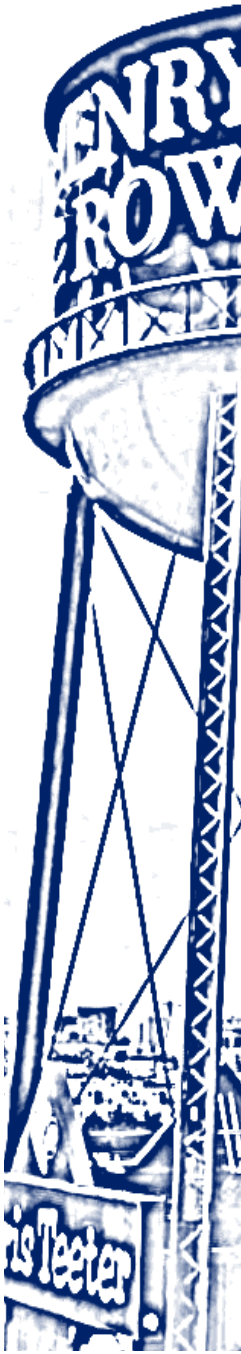
Executive Order 13985 was signed in 2021. EO 13985 outlines a definition of equity and expands the populations that are included as "underserved communities." The term "underserved communities" refers to populations sharing a particular characteristic, as well as geographic communities, which have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. Specifically, EO 13985 protects underserved communities such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color. It also offers protections for members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

CONSIDERING THE NEEDS OF UNDERSERVED POPULATIONS

Federal law and regulations require the BRTB to consult with the public when conducting transportation planning. Part of this process involves "seeking out and considering the needs of those traditionally underserved by existing transportation systems, such as low-income and minority households, who may face challenges accessing employment and other services" [23 Code of Federal Regulations, §450.316(a) (1)(vii)]. This is an important part of the BRTB's public outreach efforts. These efforts depend on data on underserved populations to let policy makers know where and how to engage people most effectively.

HELPING DISADVANTAGED PEOPLE GET WHERE THEY NEED TO GO

Another important part of these analyses is to determine how transportation facilities can better serve the travel needs of vulnerable groups, including people who either do not or cannot drive. Do transportation facilities help people get where they need to go — jobs, school, medical care, shopping? Which investments could improve the ability of disadvantaged people to reach specific destinations and opportunities?



Identifying Vulnerable Populations – Data and Maps

This document describes the data and the analyses undertaken by BMC staff to identify the region's vulnerable people and groups. It also includes maps showing concentrations of vulnerable groups. The following seven populations were determined to be vulnerable based on an understanding of both federal requirements and regional demographics:

GROUPS INCLUDE:

1. Low-Income Population (below 200% of poverty level)
2. Non-Hispanic Minority Population
3. Hispanic or Latino Population (all races)
4. Population with Limited English Proficiency (LEP)
5. Population with Disabilities
6. Elderly Population (age 75 and up)
7. Households with No Car

This document presents data on these groups as a composite score. The regional mean is used as the threshold for determining vulnerable populations. The composite score can aid in determining where the interaction of multiple factors might increase the vulnerability of populations.

This report also displays data for each vulnerable population individually, enabling a focus on particular vulnerable groups. For example, project sponsors who wish to find opportunities to improve outreach to underserved groups can look at the LEP group data and map. These could help them to identify potential locations for public meetings in the community. These meetings could be conducted with specific translators on hand to help with communication.

As another example, transit operators who wish to improve access to an employment center can look at the data and maps showing concentrations of persons with disabilities or carless households. These resources could help them to identify new bus routes and service hours to help people get to and from jobs.

This report also provides charts showing the distribution of the tract-level data for each vulnerable population. These charts allow us to better visualize the distribution of data by dividing the range of values for a variable into intervals and counting how many values fall within these intervals. They provide a visual representation of the distribution for each of the seven vulnerable populations across all Census tracts in the Baltimore region.

This report is accompanied by a **web mapping application** that allows interested parties to view the data online. Researchers can take advantage of the ability to mix and match different data layers to look at communities that have concentrations of multiple vulnerable groups. This could help with extending outreach efforts and with making decisions on potential transportation investments.

METHODS

NCHRP Report 532, Effective Methods for Environmental Justice Assessment (2004), lists threshold analysis as one of the possible methods of identifying protected populations. The U.S. EPA report Technical Guidance for Assessing Environmental Justice in Regulatory Analysis (2016) suggests incorporating poverty thresholds and other demographic factors in analyzing the impacts of "industrial, governmental, and commercial operations." In recent years, threshold analysis has been applied to support Title VI and EJ planning activities at MPOs such as the Delaware Valley Regional Planning Commission (DVRPC) and the Des Moines Area Metropolitan Planning Organization.

The BRTB uses data from the U.S. Census Bureau to determine the concentrations of seven vulnerable populations for the region and for each Census tract. A tract with a concentration of a vulnerable population greater than the concentration of the Baltimore region as a whole is considered to be "vulnerable" for that population. Tracts that exceed the regional concentration are assigned a value of 1 or 2 for each of the seven populations based on the degree to which the concentration of that population exceeds the regional concentration. The assigned values are then summed to yield the composite Vulnerable Population Index (VPI). The VPI thus provides a general indication of the extent to which each tract is vulnerable.

COMPARABILITY BETWEEN 2020 AND PREVIOUS VULNERABLE POPULATION INDICES

The 2020 VPI is named for the most recent data year it includes from the American Community Survey (ACS). This iteration of the VPI uses the 2016-2020 5-year data from the ACS. A brief summary of methodological changes in the VPI follows:

- **Addition of Queen Anne's County:** The 2017 VPI was the first to include Queen Anne's County and the 2020 VPI continues to include Queen Anne's County. Since versions of the VPI prior to 2017 did not include Queen Anne's County, this creates a small difference in the regional mean of most factors as well as an increase in regional population counts for each factor.
- **Composite Index Methodology:** Under versions of the VPI prior to 2017, all tracts with a concentration exceeding the regional concentration received the same value of 1. A tract was assigned a 0 otherwise. The index for each tract was created by summing the assigned values for each of the seven vulnerable populations. Thus, a tract would have a maximum VPI score of 7 if each of the seven vulnerable populations in that tract were present at concentrations greater than the regional concentration.

  The 2017 and 2020 VPI retain the methodology from previous versions of the VPI while expanding the values assigned to a tract to include 1 and 2. Tracts have a maximum VPI score of 14. The new scoring method allows for analysis at a finer level of detail and helps to differentiate between tracts that have extreme values and those that have values above but close to the regional concentration.
- **Definition of Low-income:** The BRTB previously used the poverty level as its definition of low-income. However, the former Public Advisory Committee critiqued this definition as too low and recommended increasing it due to the region's cost of living. For example, the 2020 poverty threshold for a four-person family with two children is just $26,246. BMC staff agreed with this recommendation and conducted a review of low-income definitions used by other MPOs as well as an analysis of ACS data. BMC staff recommended 200% of the poverty level as the new definition for low-income populations. This increases the upper limit of low-income to approximately $26,000 for a one-adult family and to about $53,000 for a four-person family based on 2020 poverty thresholds. In December 2021, the Technical Committee agreed to move forward with 200% of the poverty level as the definition of low-income populations for use in the VPI and other BRTB analyses.

Because of the changes explained above, BMC does not recommend directly comparing the 2020 VPI to previous versions, especially looking at change over time.

VULNERABLE POPULATION INDEX – METHODOLOGY

The following section details the methods used to calculate the composite VPI index and to map individual vulnerable populations.

Composite Index

As with individual variables, the regional mean remains the threshold for determining vulnerable populations. Tracts that do not exceed the regional concentration for a population are assigned a value of 0. For tracts that exceed the regional concentration, the VPI assigns each tract a value of 1 or 2 for each of the seven populations based on the degree to which the concentration of that population exceeds the regional concentration. The assigned values are then summed to yield the composite VPI score. This yields a maximum VPI of 14 for a Census tract. A brief description of the methods used follows:

Step 1
Obtain the most recent data for each vulnerable population in raw form from the ACS to determine the regional concentration for each of the vulnerable populations. Data used for this analysis are from the 2016-2020 ACS.

For example:

$$\text{Regional Concentration \%} = \frac{\text{Regional Vulnerable Population}}{\text{Regional Population Total}^{1}}$$

1 ***Note:*** The Regional Population Total is the universe for which the Census Bureau calculates a given demographic variable. This may be less than the full regional population based on the universe for the Census Bureau's calculations. For example, the total population for low-income data is the population for whom poverty status is determined. This excludes institutionalized group quarters populations such as residents of college dormitories and military housing.

Step 2
Determine the concentration of each vulnerable population for each Census tract.

For example:

$$\text{Tract Concentration \%} = \frac{\text{Tract Vulnerable Population}}{\text{Tract Population Total}}$$

Step 3
Determine the range above the regional concentration for each vulnerable population by identifying the tract with the maximum value.

For example:

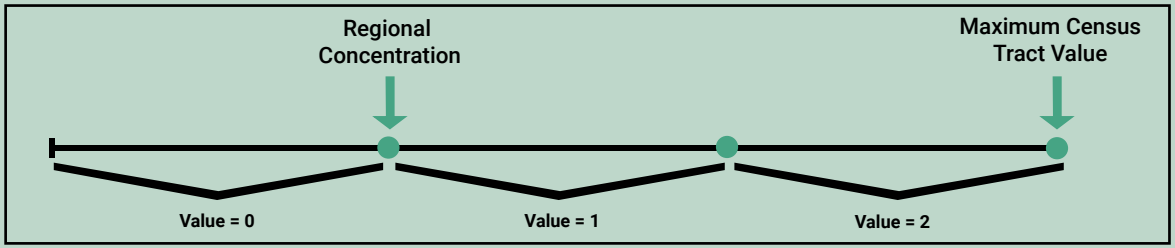
Range above Regional Concentration% =
Maximum Tract Concentration% – Regional Concentration%

Step 4

Calculate two equally sized intervals above the regional concentration.

For example:

$$\text{Interval Size} = \frac{\text{Range above Regional Concentration \%}}{2}$$



Step 5

Assign each tract the appropriate value based on which interval it falls in. For example, if the regional concentration is 20% and the tract with the highest value has a concentration of 60%, equally sized intervals would extend from 20.1%-40% and from 40.1%-60%. Tracts whose values fall below the regional concentration of 20% are assigned a value of 0. Tracts with a concentration between 20.1% and 40% are assigned a value of 1. Tracts with a concentration between 40.1% and 60% are assigned a value of 2.

Step 6

For each tract, sum the value for all seven vulnerable populations to determine the VPI for that tract. Thus, the VPI can range from from 0 to 14.

In general, a lower VPI indicates a less vulnerable population, while a higher VPI indicates a more vulnerable population. However, it is important that users understand that the VPI is a starting point for understanding where vulnerable populations live in the region. Scores in one tract should not be directly compared to scores in other tracts because there are multiple ways to arrive at each score. For example, a score of 6 could indicate the presence of six different vulnerable populations in the first interval above the regional concentration (i.e., six scores of one each) or more extreme concentrations of three vulnerable populations (i.e., three scores of two each).

Tracts with no population or no households were excluded from the data set as “No data or no population.” These tracts are composed of water, parks, industrialized areas, or correctional facilities. Tracts with population but no households are excluded because it is not possible to calculate all of the index components, since some are based on household-level data, and the resulting partial VPI score would not be accurate compared to other tracts.

Mapping Individual Vulnerable Populations data

Individual demographic variables are mapped with three categories above the mean to better visualize the distribution of the variables. These categories are calculated by dividing the range of values between the regional mean and the regional maximum into three equally sized intervals. The following method is used:

Step 1
Obtain the most recent data for each vulnerable population in raw form from the ACS to determine the regional concentration for each of the vulnerable populations.

For example:

$$\text{Regional Concentration \%} = \frac{\text{Regional Vulnerable Population}}{\text{Regional Population Total}^2}$$

2 ***Note:*** The Regional Population Total is the universe for which the Census Bureau calulates a given demographic variable. This may be less than the full regional population based on the universe for the Census Bureau's calculations. For example, the total population for low-income data is the population for whom poverty status is determined. This excludes institutionalized group quarters populations such as residents of college dormitories and military housing.

Step 2
Determine the concentration of each vulnerable population for each Census tract.

For example:

$$\text{Tract Concentration \%} = \frac{\text{Tract Vulnerable Population}}{\text{Tract Population Total}}$$

Step 3
Determine the range above the regional concentration for each vulnerable population by identifying the tract with the maximum value.
For example:
Range above Regional Concentration% =
Maximum Tract Concentration% – Regional Concentration%

Step 4
Calculate three equally sized intervals above the regional concentration.
For example:

$$\text{Interval Size} = \frac{\text{Range above Regional Concentration \%}}{3}$$

Step 5
Assign each tract to a map classification at the appropriate interval above the regional concentration. For example, if the regional concentration is 20% and the tract with the highest value has a concentration of 50%, equally sized intervals would extend from 20.1%-30%, 30.1%-40%, and 40.1%-50%. All tracts with a value at or below the regional mean, in this case 20%, would be in the lowest class.

Each tract is then displayed according to the interval it falls within. This method is applied to the data for each of the seven vulnerable population groups.

Maps and Definitions

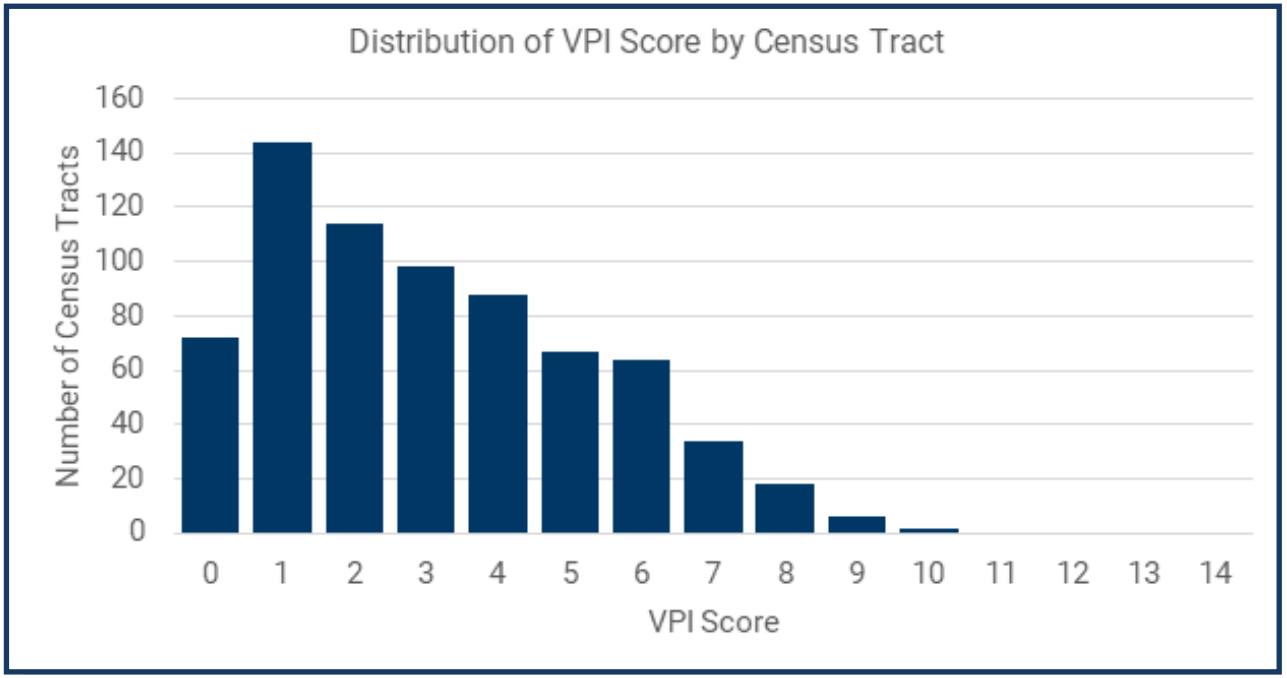
The paragraphs below define and describe the data used for the VPI and for each of the seven vulnerable populations. This section includes charts showing the distribution of the tract-level data for the VPI and for each vulnerable population. These charts allow us to better visualize the distribution of data by dividing the range of values for a variable into intervals and counting how many values fall within these intervals. This section also includes maps summarizing the data for the VPI and for each of the seven vulnerable populations.

VULNERABLE POPULATION INDEX

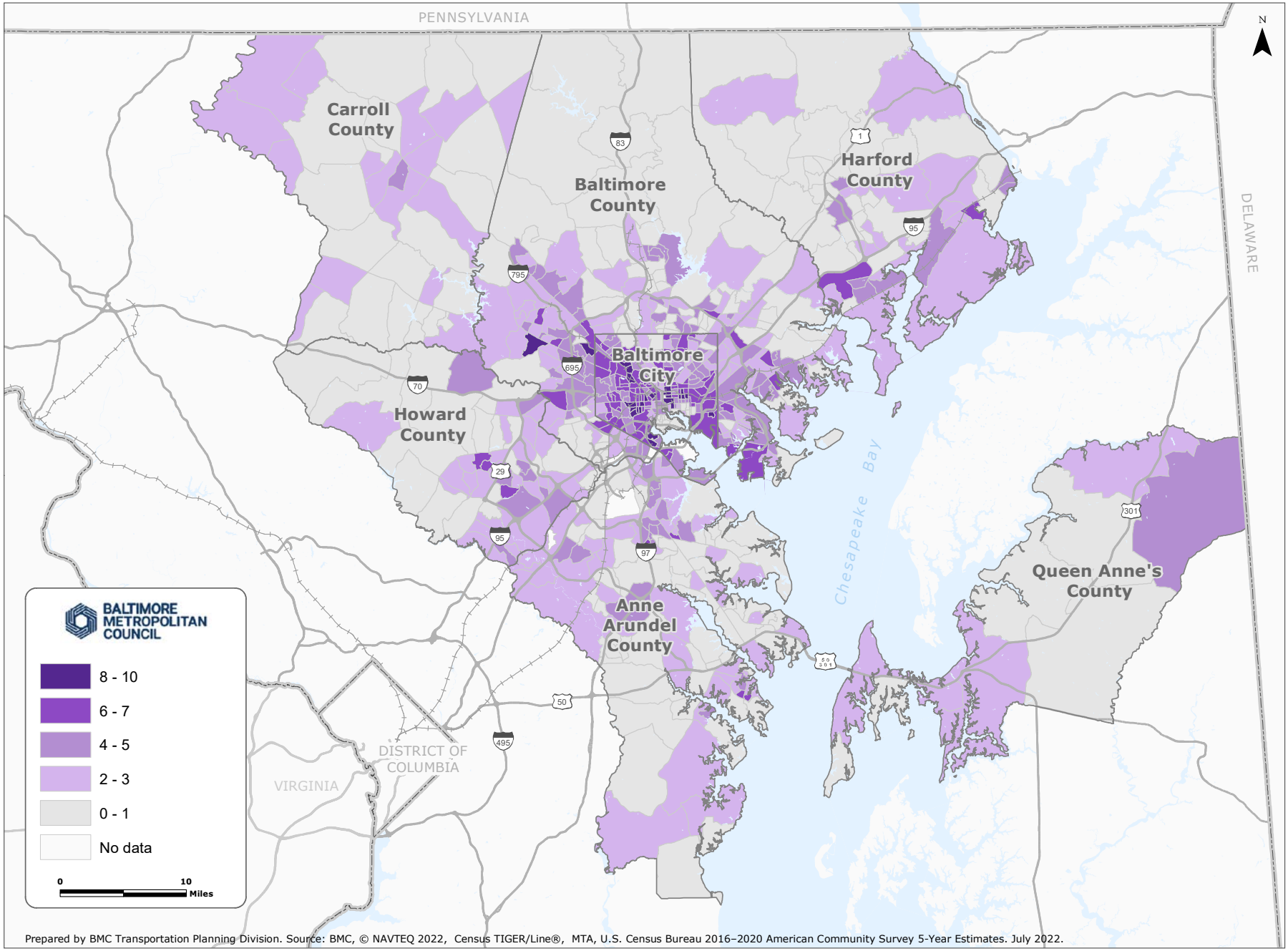
Definition

Each Census tract can contain a concentration greater than the regional concentration for each of the seven individual population groups considered vulnerable. For each of these populations, Census tracts with concentrations above the regional mean concentration are divided into two categories above the regional mean. These categories are calculated by dividing the range of values between the regional mean and the regional maximum into two equally sized intervals. Tracts in the lower interval are given a score of 1 and tracts in the upper interval are given a score of 2 for that demographic variable. The scores are totaled from the seven individual demographic variables to yield the VPI.

As a result, each Census tract is considered vulnerable for between zero and seven of the populations with a total VPI score between zero and fourteen. The chart to the right summarizes the distribution of the VPI score for all Census tracts in the Baltimore region. For example, the chart shows that 144 tracts have a VPI of 1, 114 have a VPI of 2, and 98 have a VPI of 3. A lower VPI indicates a less vulnerable area, while a higher VPI indicates a more vulnerable area. The map on the following page shows the VPI for all tracts in the region.



Vulnerable Population Index



LOW-INCOME (BELOW 200% OF POVERTY LEVEL)

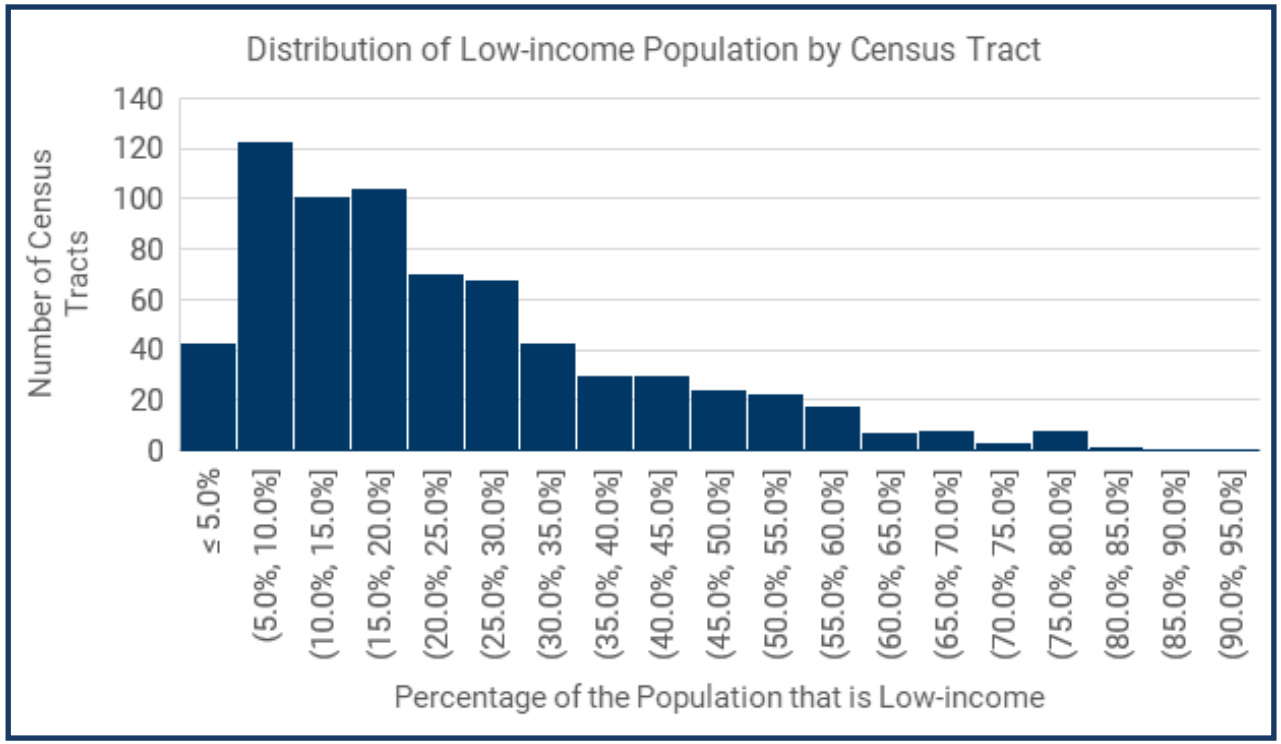
Low-income population (below 200% of poverty level), Baltimore region: 585,777
[Note: The regional population for whom poverty status is determined is 2,732,102.]

Concentration of Low-income population (below 200% of poverty level), Baltimore region: 21.4%

Definition

The U.S. Census Bureau presents single and multi-year estimates of median income for small areas in the ACS. The Census Bureau uses a set of income thresholds that vary by family size and composition to determine the poverty status of individuals. The Census Bureau also uses estimates of median income and the thresholds to estimate the number of individuals with income below various percentages of the poverty level, including 200% of the poverty level. If a family's total income is less than the threshold for 200% of the poverty level, then that family and every individual in it is considered to have an income less than 200% of the poverty level. For example, the 2020 poverty threshold for a four-person family with two children is $26,246. This means that the 200% poverty threshold for a four-person family with two children is $52,492. While the thresholds do not vary by place, they are updated for inflation using the Consumer Price Index (CPI-U).

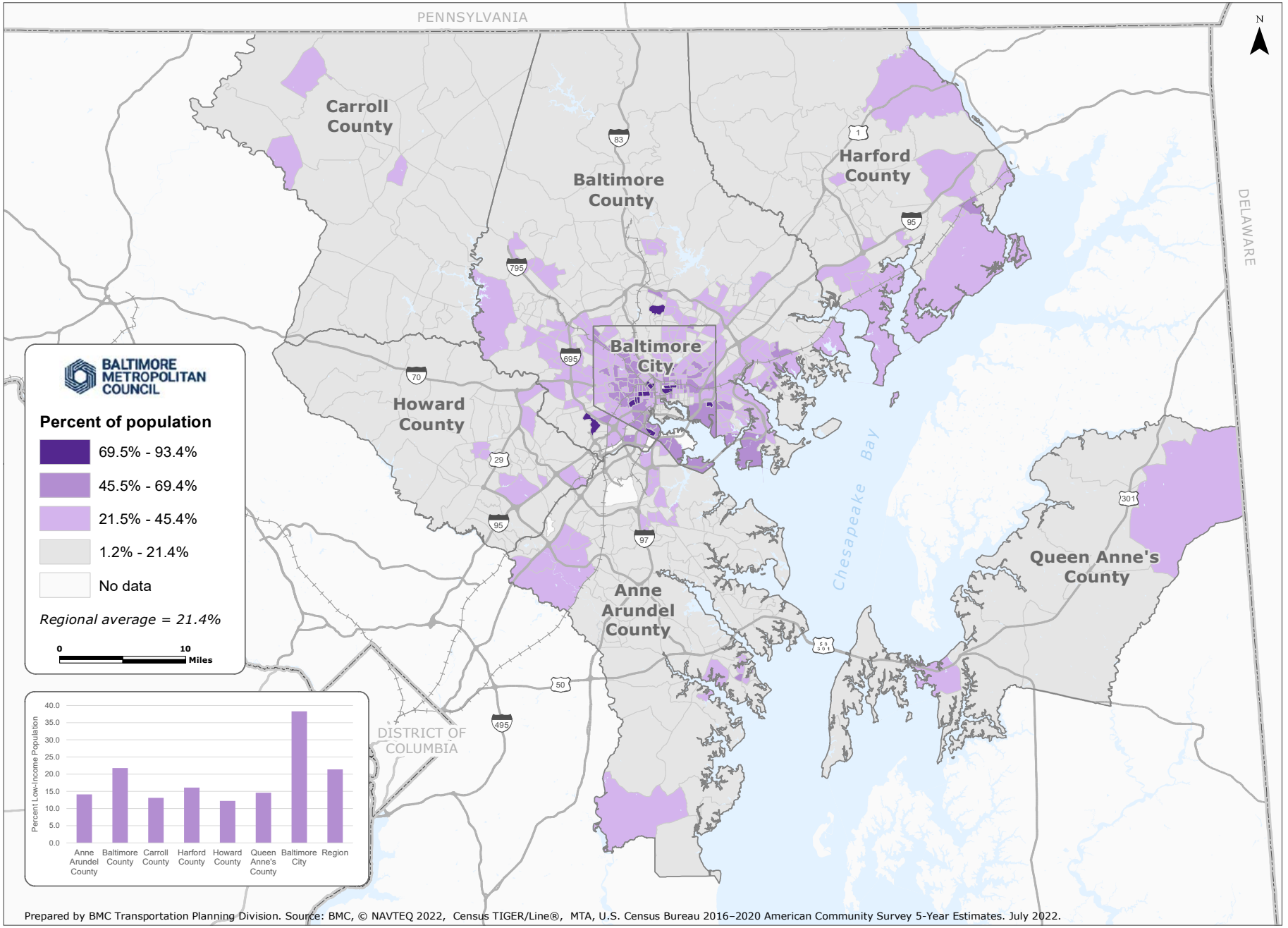
The concentration (or percentage) of the low-income population below 200% of the poverty level in the Baltimore region is 21.4%; so Census tracts with a concentration of low-income population greater than 21.4% are considered vulnerable. The chart to the right summarizes the distribution of low-income population for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population that is low-income is between 5 and 10 percent in 123 Census tracts. The map on the following page shows the percentage of the population that is low-income for all tracts in the region.



Source

American Community Survey 2016-2020,
Table S1701

Low-Income Population (below 200% of poverty level)



NON-HISPANIC MINORITY POPULATION

Non-Hispanic minority population, Baltimore region: 1,071,290

Concentration of non-Hispanic minority population, Baltimore region: 38.3%

Definition

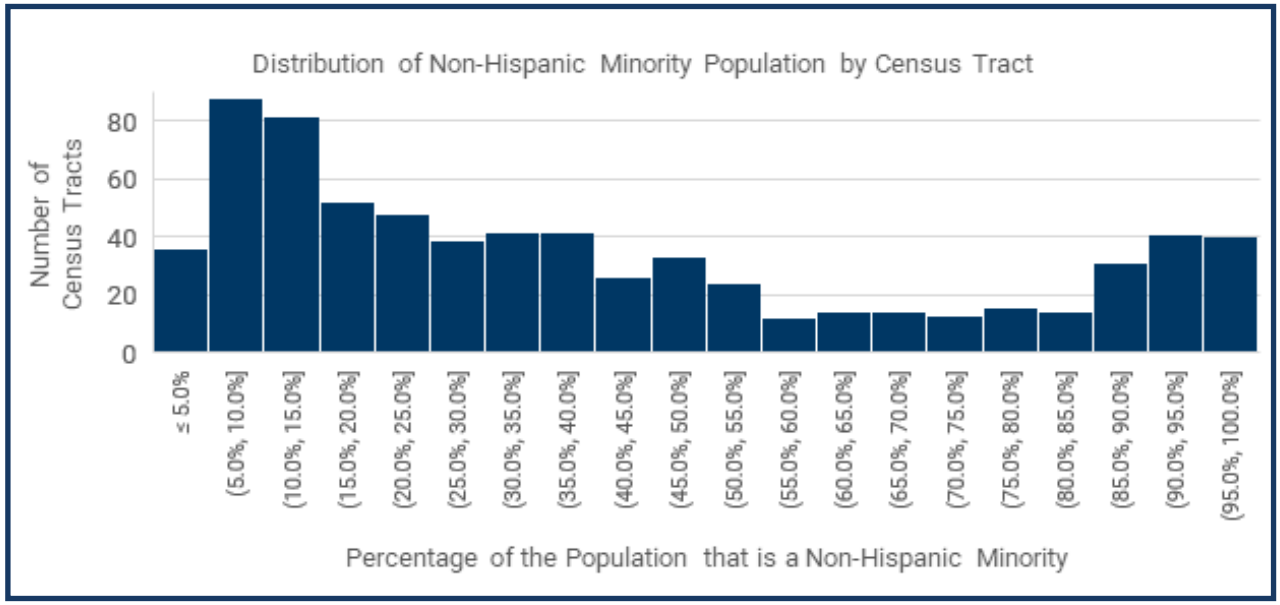
The U.S. Department of Transportation (DOT) Order (5610.2) on EJ defines minority[3] as:

1. Black: a person having origins in any of the black racial groups of Africa;
2. Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;
3. Native Hawaiian or Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands; or
4. American Indian and Alaskan Native: a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition

In addition to the groups mentioned above, the U.S. Census recognizes two additional racial categories:

1. Some other race alone and
2. Two or more races

The concentration (or percentage) of the non-Hispanic minority population in the Baltimore region is 38.3%; so Census tracts with a concentration of non-Hispanic minority population greater than 38.3% are considered vulnerable. The chart to the right summarizes the distribution of the non-Hispanic minority population for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population that is a non-Hispanic minority is between 5 and 10 percent in 88 Census tracts. The map on the following page shows the percentage of the population that is a non-Hispanic minority for all tracts in the region.

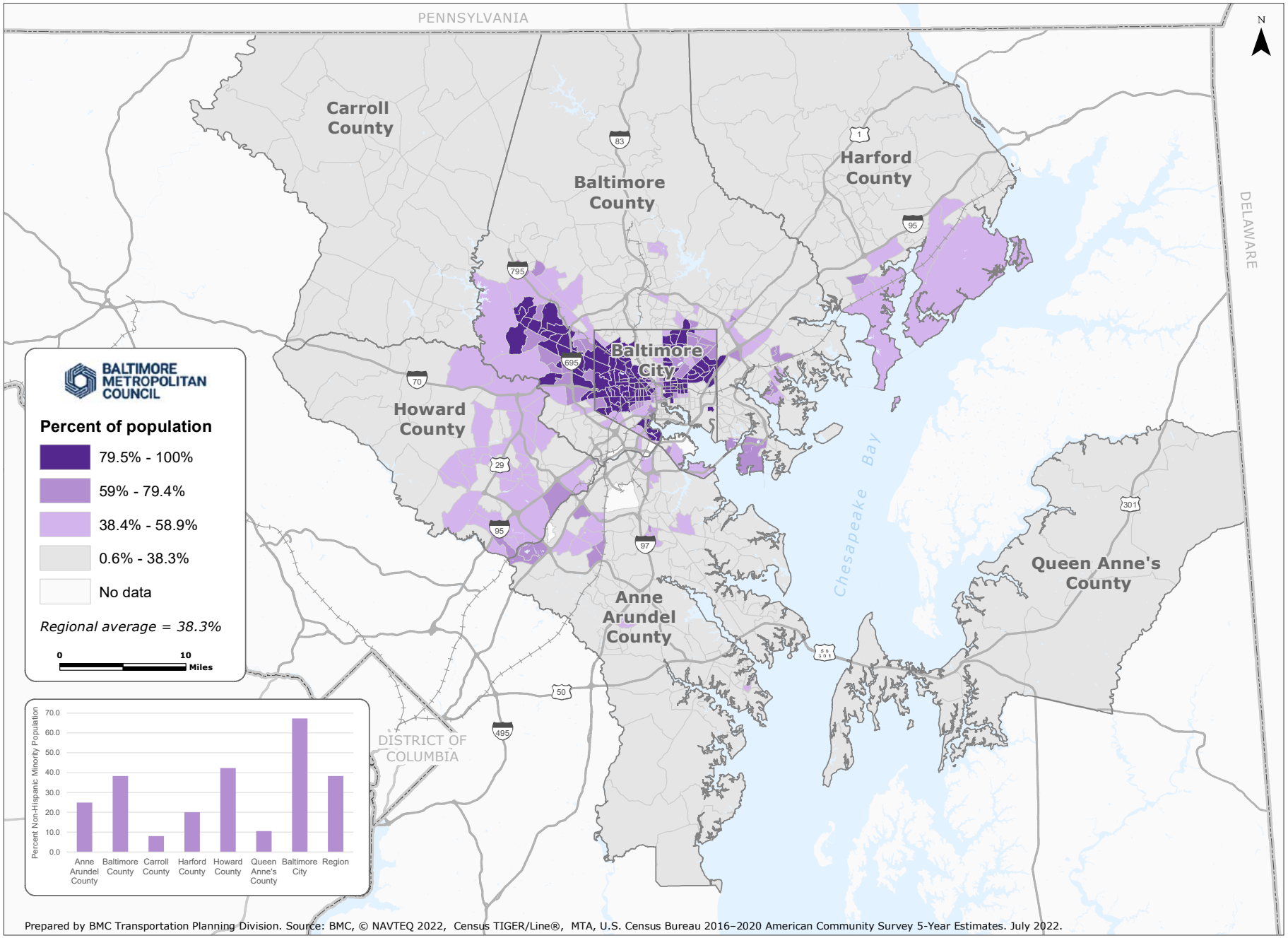


Source

American Community Survey 2016-2020, Table B03002

3 ***Note***: This definition also includes Hispanic or Latino persons, included separately in the VPI

Non-Hispanic Minority Population



HISPANIC OR LATINO POPULATION

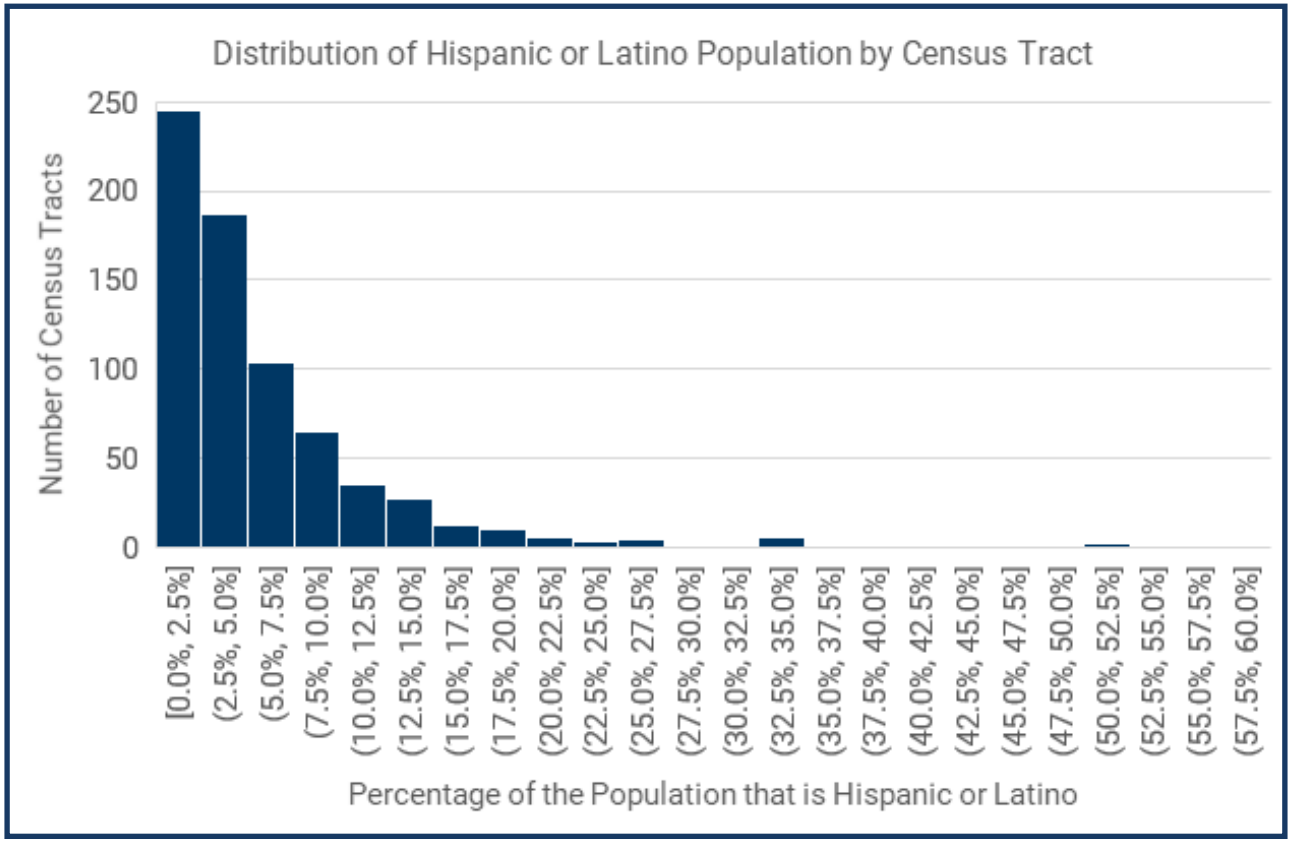
Hispanic or Latino population, Baltimore region: 167,887

Concentration of Hispanic or Latino population, Baltimore region: 6.0%

Definition

The U.S. Census Bureau defines Hispanic or Latino as person(s) of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race. Hispanic or Latino persons are included in the definition of minority from the U.S. Department of Transportation (DOT) Order (5610.2) on Environmental Justice (EJ).

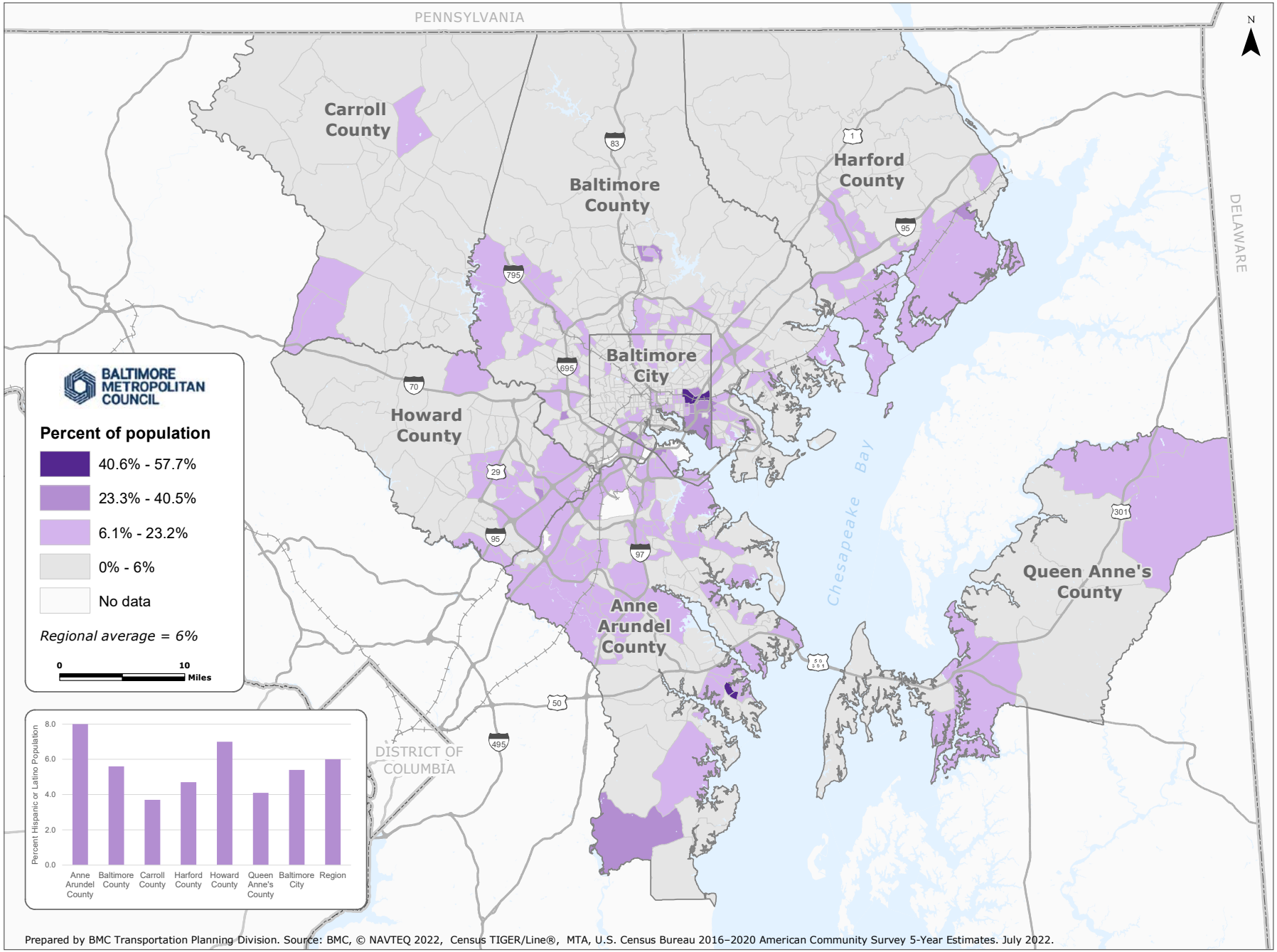
The concentration (or percentage) of the Hispanic or Latino population in the Baltimore region is 6.0%; so Census tracts with a concentration of Hispanic or Latino population greater than 6.0% are considered vulnerable. The chart to the right summarizes the distribution of Hispanic or Latino population for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population that is Hispanic or Latino is between 2.5 and 5 percent in 187 Census tracts. The map on the following page shows the percentage of the population that is Hispanic or Latino for all tracts in the region.



Source

American Community Survey 2016-2020, Table B03002

Hispanic or Latino Population (all races)



POPULATION WITH LIMITED ENGLISH PROFICIENCY (LEP)

LEP Population, Baltimore Region: 46,345

Concentration of LEP population, Baltimore region: 1.8%

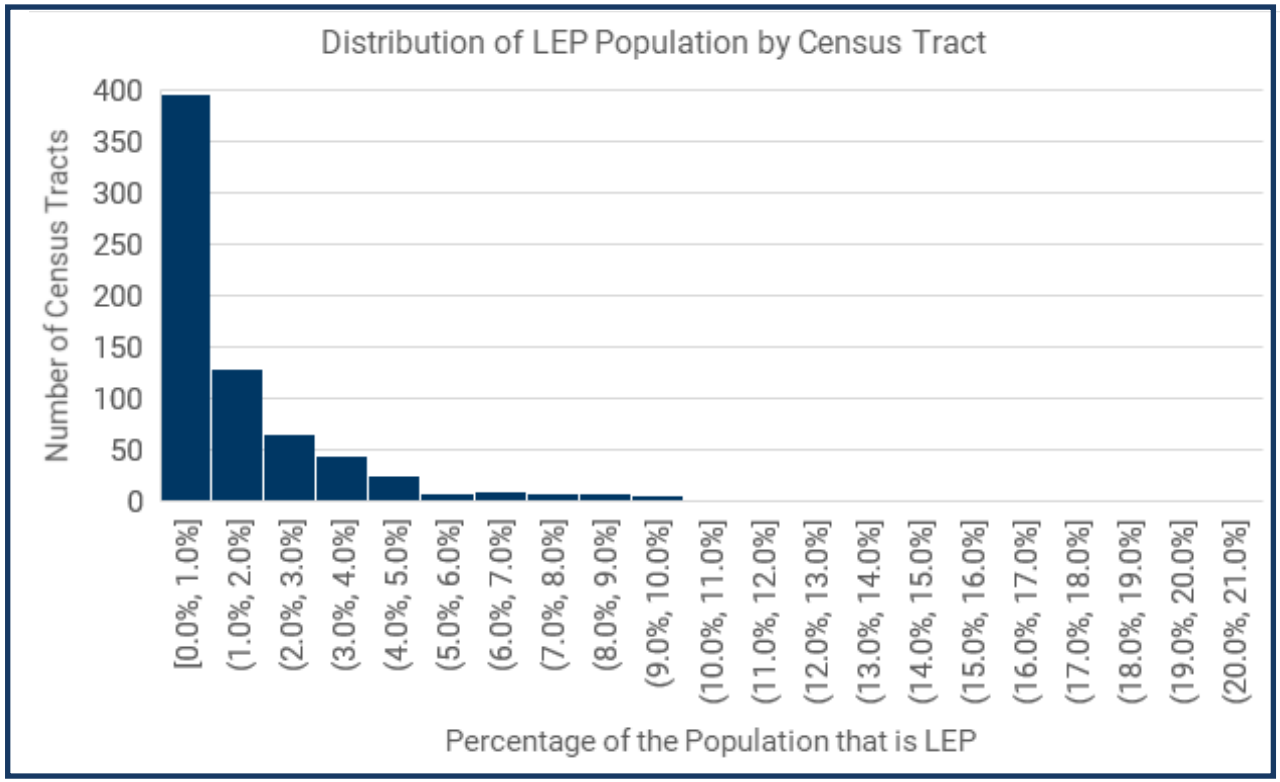
Definition

The LEP population is defined as people aged 5 and over who speak a foreign language at home and either speak no English or speak English "not well."

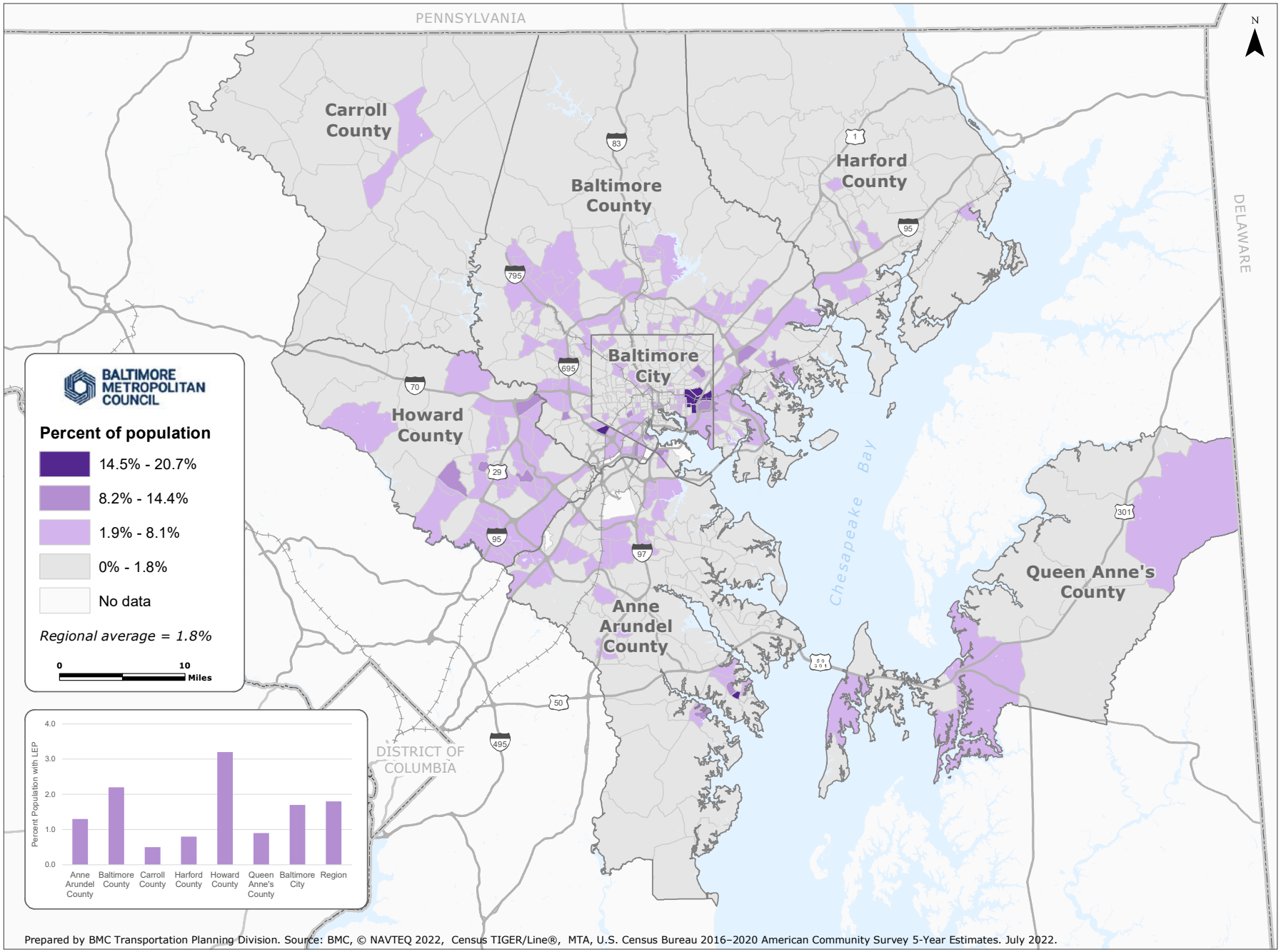
The concentration (or percentage) of the LEP population in the Baltimore region is 1.8%; so Census tracts with a concentration of LEP population greater than 1.8% are considered vulnerable. The chart to the right summarizes the distribution of the LEP population for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population that is LEP is between 1 and 2 percent in 128 Census tracts. The map on the following page shows the percentage of the population that is LEP for all tracts in the region.

Source

American Community Survey 2016-2020, Table B16005



Population with Limited English Proficiency (LEP)



POPULATION WITH DISABILITIES

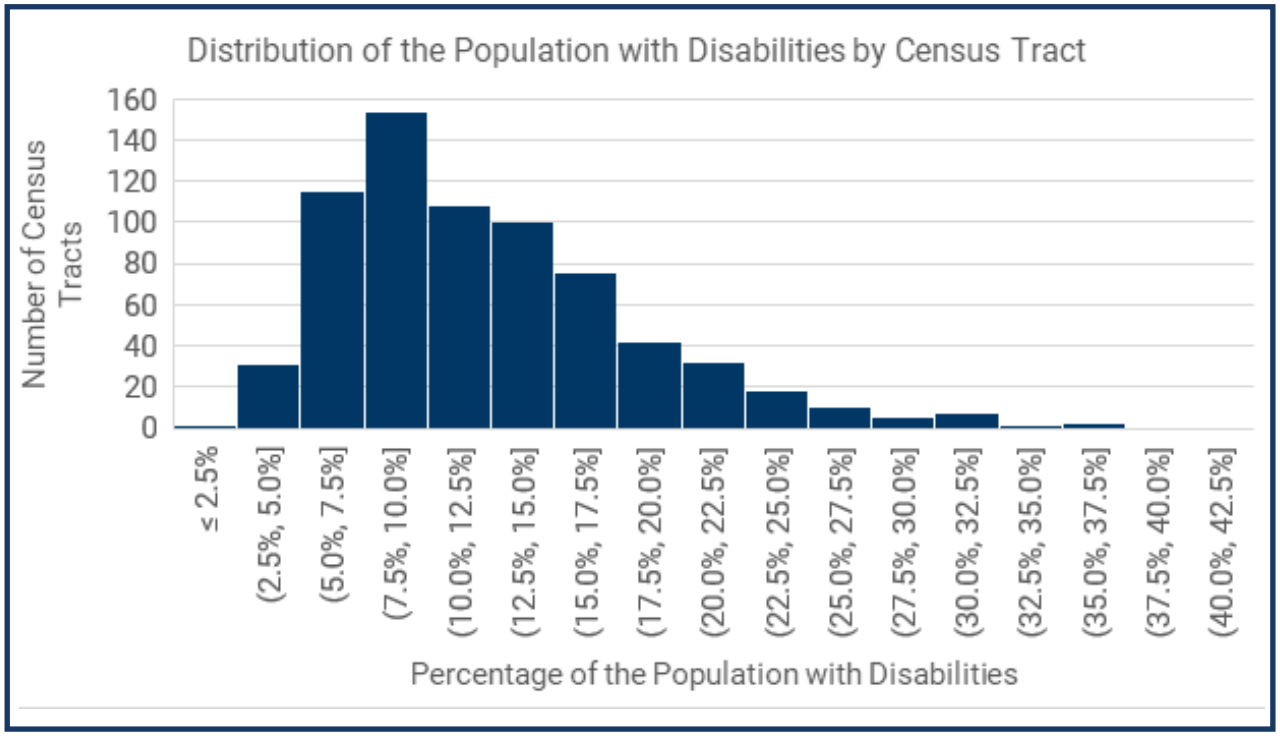
Population with disabilities, Baltimore region: 324,176

Concentration of population with disabilities, Baltimore region: 11.8%

Definition

The U.S. Census Bureau classifies persons with disabilities as someone (of any age) whose hearing, vision, cognition, ambulation, self-care, or independent living difficulties result in limitations of activities and restrictions to full participation at school, work, home, or in the community.

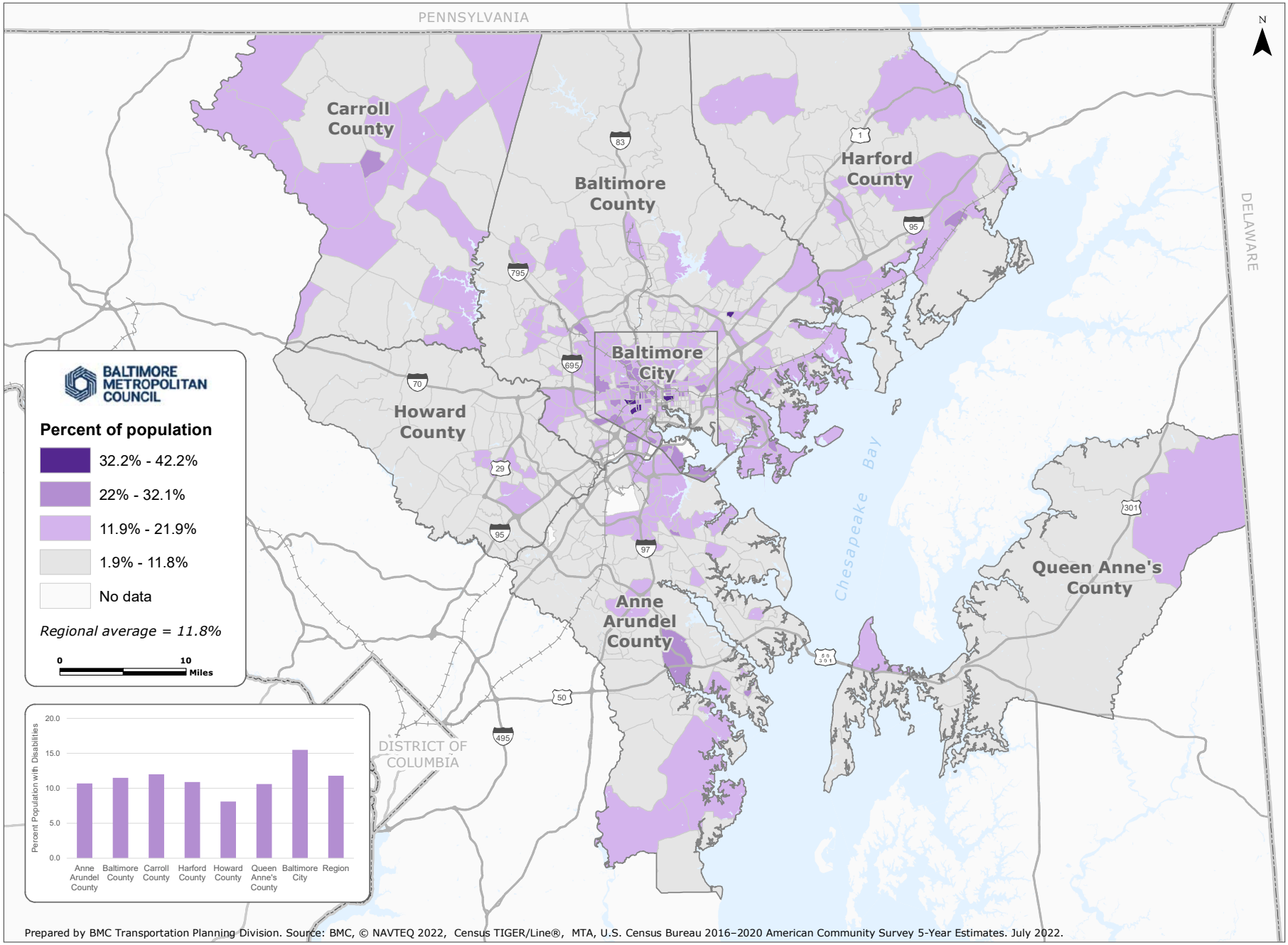
The concentration (or percentage) of the population with disabilities in the Baltimore region is 11.8%; so Census tracts with a concentration of population with disabilities greater than 11.8% are considered vulnerable. The chart to the right summarizes the distribution of the population with disabilities for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population with disabilities is between 2.5 and 5 percent in 31 Census tracts. The map on the following page shows the percentage of the population that has a disability for all tracts in the region.



Source

American Community Survey 2016-2020, Table B18101

Population with Disabilities



ELDERLY POPULATION

Elderly population, Baltimore region: 180,315

Concentration of elderly population, Baltimore region: 6.4%

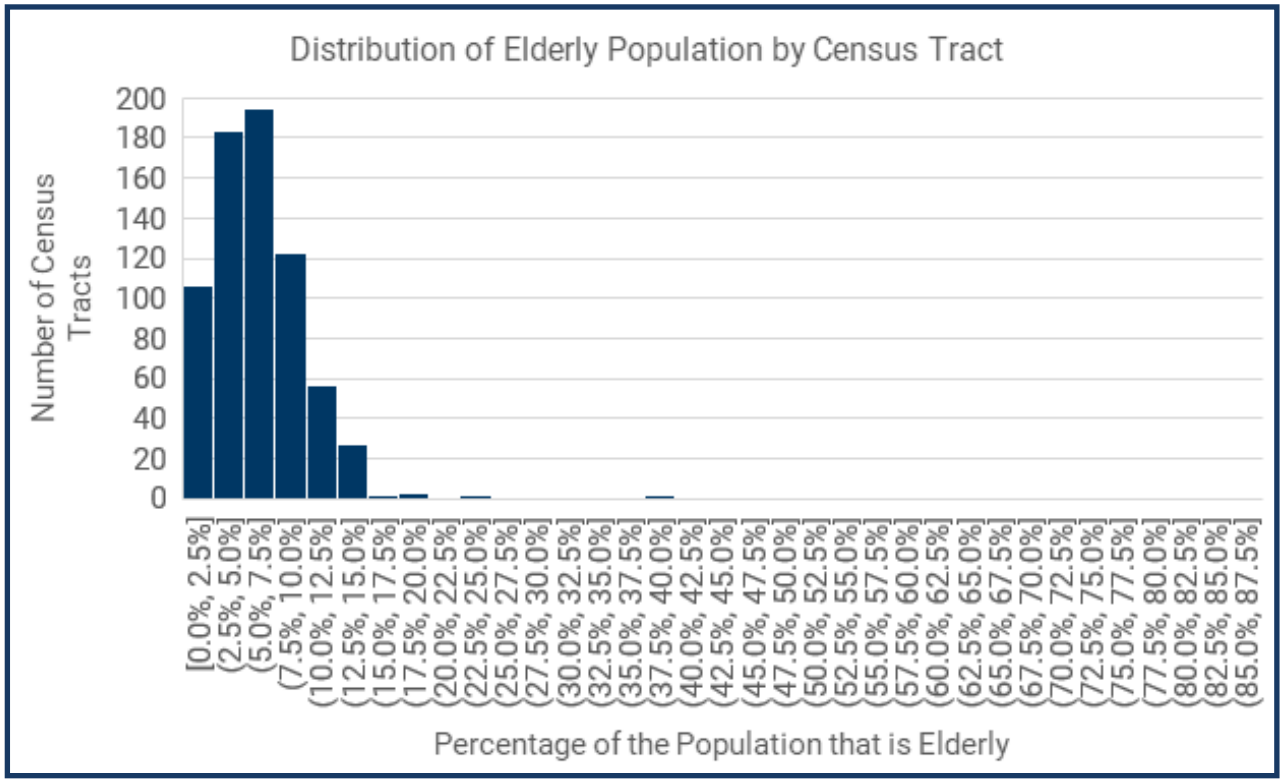
Definition

Elderly is defined as age 75 and above.

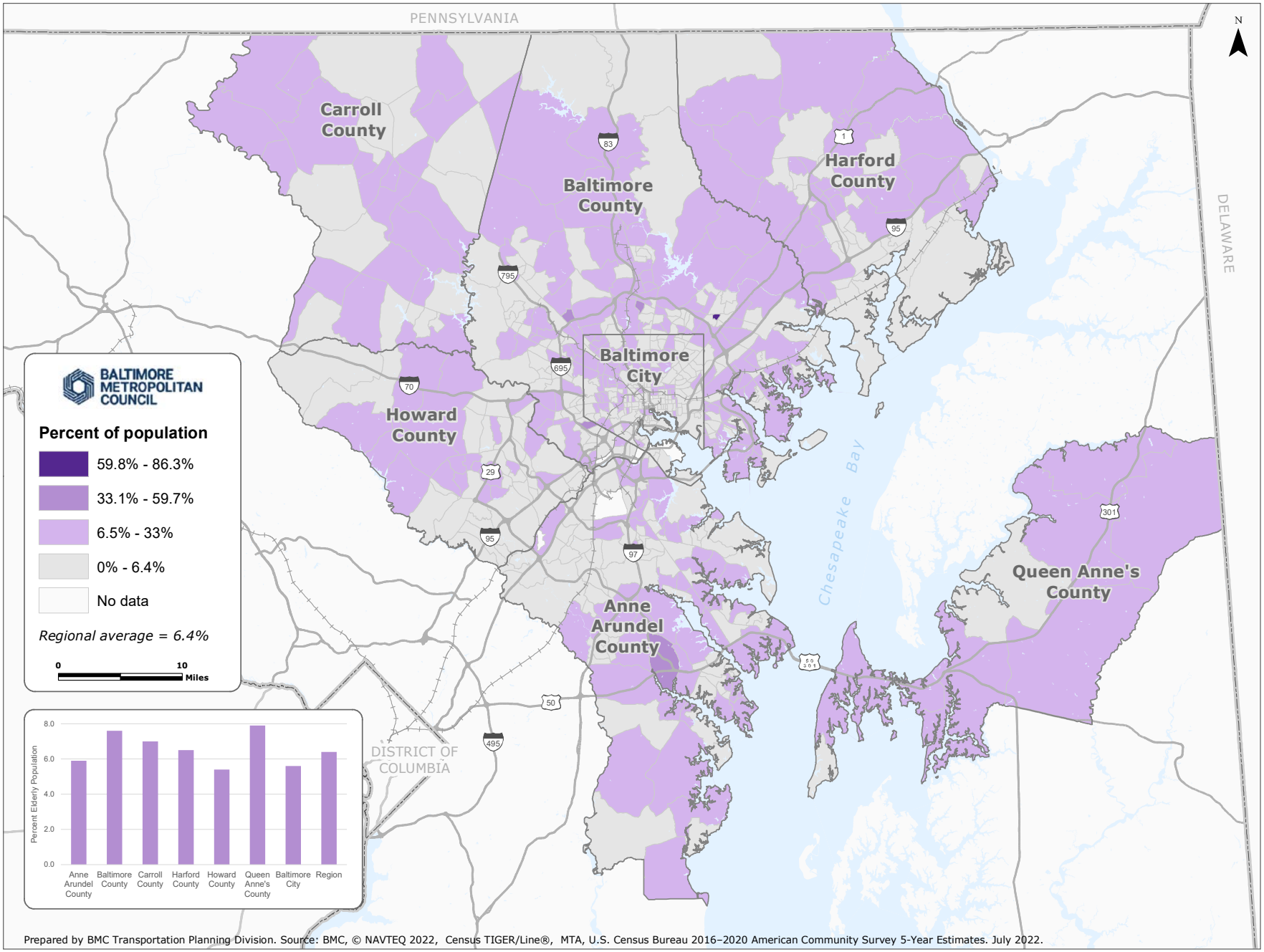
The concentration (or percentage) of the elderly population in the Baltimore region is 6.4%; so Census tracts with a concentration of elderly population greater than 6.4% are considered vulnerable. The chart to the right summarizes the distribution of the elderly population for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of the population that is elderly is between 2.5 and 5 percent in 184 Census tracts. The map on the following page shows the percentage of the population that is elderly for all tracts in the region.

Source

American Community Survey 2016-2020, Table B01001



Elderly Population (age 75 and up)



HOUSEHOLDS WITH NO CAR

Households with no car, Baltimore region: 111,407

Concentration of households with no car, Baltimore region: 10.5%

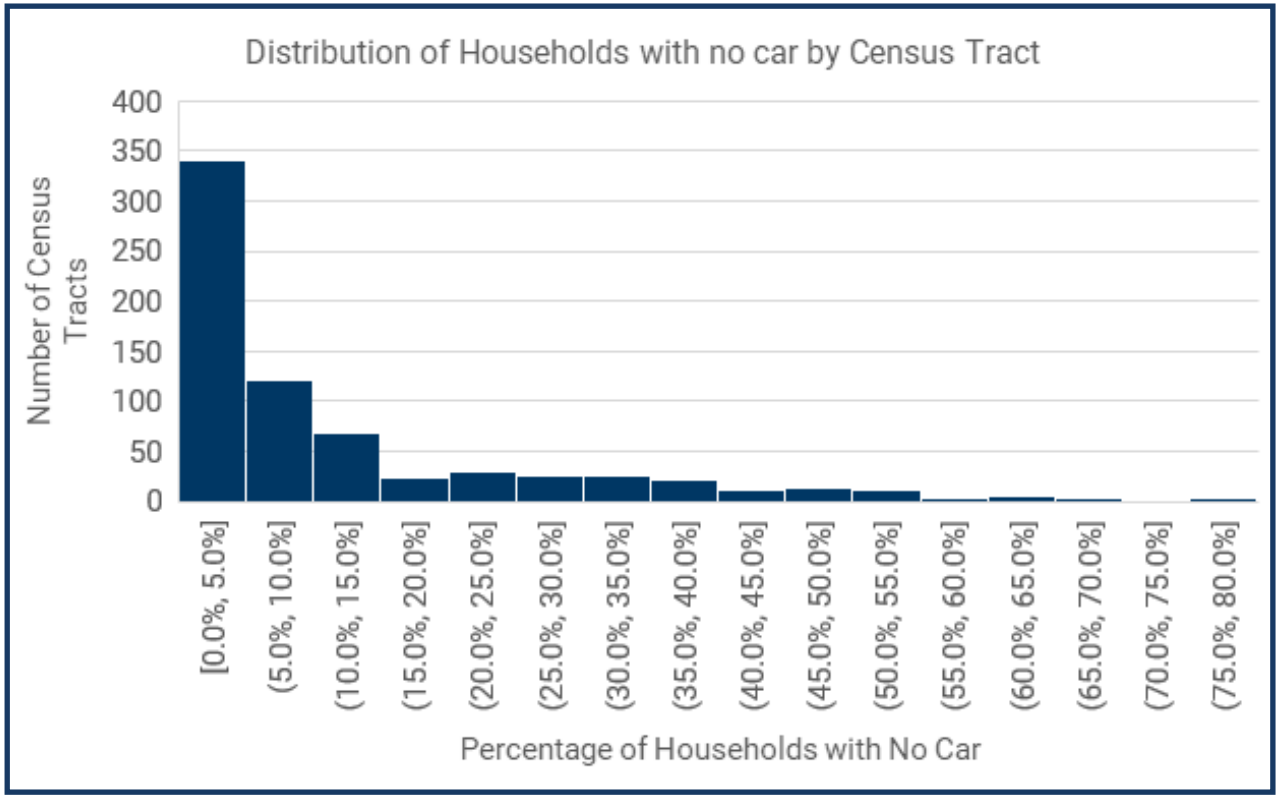
Definition

The U.S. Census Bureau defines households with no car as a household with no vehicles available.

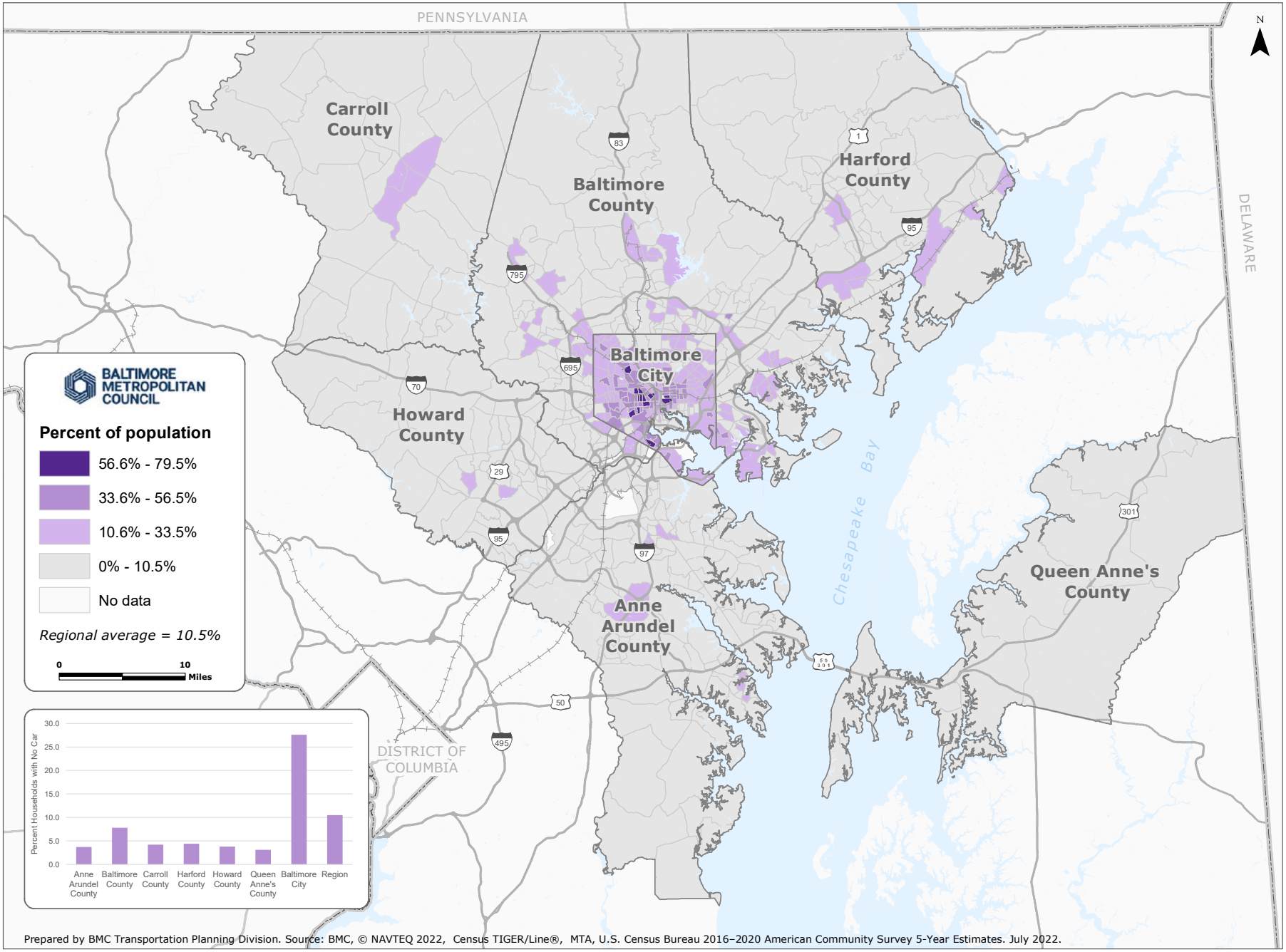
The concentration (or percentage) of households with no car in the Baltimore region is 10.5%; so Census tracts with a concentration of households with no car greater than 10.5% are considered vulnerable. The chart to the right summarizes the distribution of households with no car for all Census tracts in the Baltimore region. For example, the chart shows that the percentage of households with no car is between 5 and 10 percent in 121 Census tracts. The map on the following page shows the percentage of households with no car for all tracts in the region.

Source

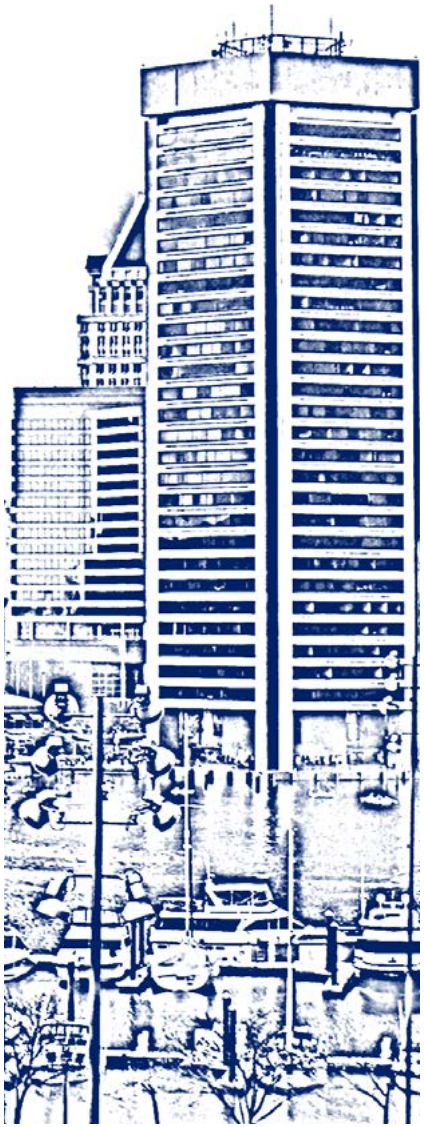
American Community Survey 2016-2020, Table B08201



Households with No Car



Vulnerable Population Index Appendix: Margins of Error



The VPI uses estimates from the American Community Survey (ACS), which is a data set that surveys three million people each year. Collecting the data continuously allows demographic data to be available more frequently than the Decennial Census. Using data over a 5-year period enables a larger sample size so that the data can be made available for small areas.

Because the estimates are based on a sample, a certain amount of variability is associated with each data point. This variability is expressed as a "margin of error." This number gives an idea of how precise an estimate is. ACS provides margins of error (MOE) for a 90% confidence interval. For example, consider an estimate for a Census tract where 20 people walk to work with a margin of error of 5. This can also be expressed as 20 +/- 5. So while the estimate for that tract is 20, the full interpretation is that the American Community Survey is 90% certain that between 15 and 25 people walk to work in that Census tract. Larger margins of error indicate data may not be reliable. In general, the smaller the population that is estimated, the larger the margin of error.

The maps and data in this report show the primary estimate and do not depict the margin of error. While BMC's analysis serves as a planning tool and a way to get a general portrait of the region, it is important to remember that the true population count in any one Census tract may vary, and the data should not be used when an exact count for a particular population is required. Alternative data sets, administrative records, field surveys, public outreach, and local knowledge are all possible methods for getting a more in-depth view when precise demographics on a neighborhood are needed.

In order to address the complications caused by margins of error, BMC takes several steps. Census tracts are used in the VPI analysis instead of block groups or transportation analysis zones. While these latter two geographies are smaller, and would give a more detailed picture of the region, the margins of error are notably higher than those for Census tracts. Lastly, the VPI is used by BMC as the starting point for public outreach wherein we reach out to disadvantaged communities during the transportation planning and programming process. These conversations allow us to get a better picture of the needs of different communities in the region. For those interested in incorporating this information into their work, the source material for the margins of error and coefficient of variation is the Understanding and Using American Community Survey Data handbook (September 2020).

DATA RELIABILITY

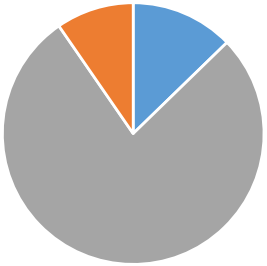
The coefficient of variation (CV) is a measure derived from the margin of error, which allows sampling error to be visualized in a standard format independent of population size. The reliability evaluation to the right was created after consultation with several sources, including the American Community Survey, ESRI, and the Housing Assistance Council.

Coefficient of Variation (%)	Reliability
0% - 15%	High
15.1% - 40%	Medium
Over 40%	Low

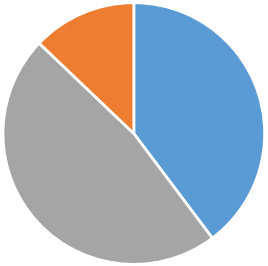
TRACT-LEVEL DATA RELIABILITY BASED ON COEFFICIENTS OF VARIATION

Charts show the proportion of Baltimore region tracts in each reliability category based on their calculated coefficients of variation (CV).

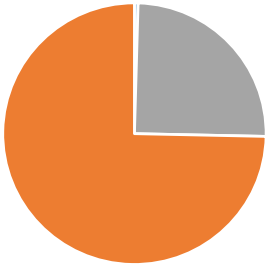
Low-Income Population



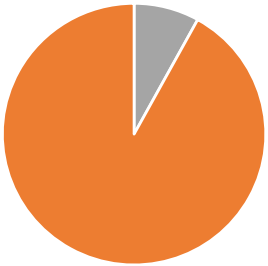
Non-Hispanic Minority Population



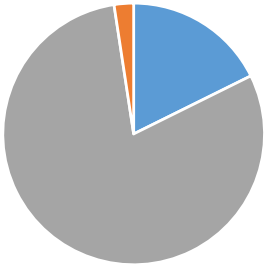
Hispanic or Latino Population



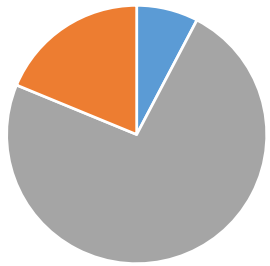
Population with Limited English Proficiency



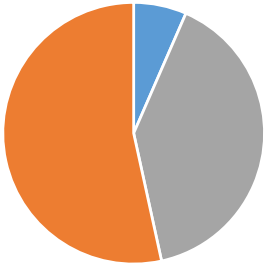
Population with Disabilities

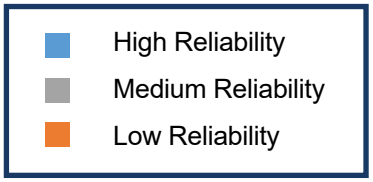


Elderly Population



Households with No Car





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