Population Demographics

Indicator Names

- *% Low-Income Population in Watershed (WS)*
- *% Minority Population in Watershed (WS)*
- *% < High School Educated Population in Watershed (WS)*
- *% Linguistically Isolated Population in Watershed (WS)*
- *% Vulnerable Age Group Population in Watershed (WS)*

Indicator Category | **Social**

Subcategory | *Community Context*

Available in RPS Tool files for all lower 48 states

Indicator Description

Background

Demographics describe the socioeconomic characteristics of a group of people. Demographics are used by researchers and practitioners to help understand the vulnerability of a population to pollution and environmental degradation.[1]

What the Indicators Measure

These indicators describe five demographic characteristics of the population that resides in a HUC12 subwatershed:[*]

- ***% Low-Income Population in Watershed (WS)*** – population living in a household with low-income. Low-income is defined as a household income that is less than or equal to twice the federal poverty level.[1] Reported as a percentage of the total population in the HUC12 with known household income (Figure 1).

- ***% Minority Population in WS*** – population in a minority group. Minority groups include individuals who define their race as other than white alone and/or list their ethnicity as Hispanic or Latino.[1] In other words, all people other than non-Hispanic white-alone individuals. [1] Reported as a percentage of the total population in the HUC12.

- ***% < High School Educated Population in WS*** – population that is age 25 or older with less than a high school degree. Reported as a percentage of the age 25 or older population in the HUC12.

- ***% Linguistically Isolated Population in WS*** – population living in a household that is linguistically isolated. Households in which all members age 14 years and over speak a non-English language and also speak English less than 'very well' are considered linguistically isolated. [1] Reported as a percentage of total households in the HUC12.

- ***% Vulnerable Age Group Population WS*** – population that is under age 5 or over age 65. Reported as a percentage of the total population in the HUC12.

Relevance to Water Quality Restoration and Protection

These indicators measure the same demographic characteristics selected for use in the EPA Environmental Justice Mapping and Screening Tool (EJSCREEN).[1] Demographic characteristics serve as very general
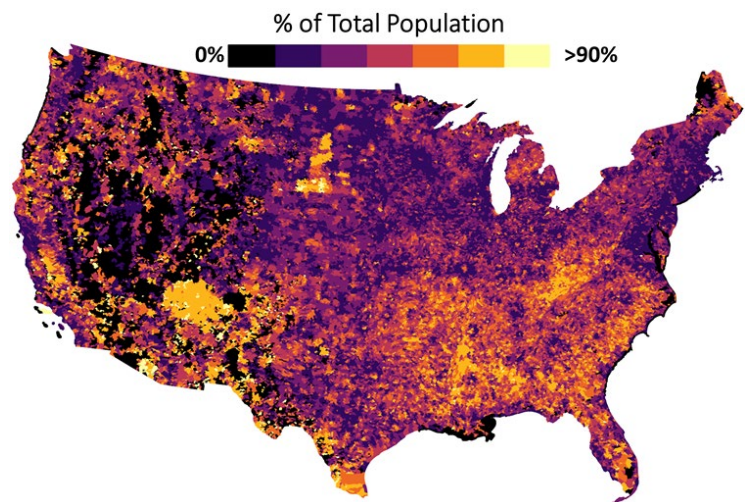

*Figure 1. Map of **% Low-Income Population in Watershed** for HUC12s in the contiguous US.*

indicators of a community's potential vulnerability to be impacted by pollution and environmental degradation.[1] Other environmental justice tools and studies have also used these demographic characteristics to estimate the vulnerability of human populations to pollution and hazardous materials.[3,4]

Individuals may be more vulnerable to health issues when they lack financial resources, language skills, or education that would help them avoid exposure to pollutants or obtain treatment.[1] Certain demographic groups like minority or low-income populations may also be more likely to live near rivers and lakes with poor water quality[5] or lack access to clean drinking water.[6,7] Such inequalities can be considered when selecting priority areas for water quality and restoration efforts.

These indicators can be included in screenings to identify priority HUC12s for restoration and protection where disadvantaged or underserved communities may be affected by degraded water quality. The demographic indicators can be used with additional indicators to understand the environmental conditions that surround potentially disadvantaged or underserved communities. For example, indicators of impaired waters can be reviewed with the demographic indicators to identify

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[*] HUC12s are subwatershed delineations in the National Watershed Boundary Dataset. HUC12s are referenced by their 12-digit Hydrologic Unit Code.

HUC12s where waters with known water quality issues and demographic groups of interest both occur.

Processing Method

These indicators are calculated from demographic data reported in the US Census Bureau 2014-2018 American Community Survey (ACS) five-year summary file. The ACS is a demographics survey program conducted by the US Census Bureau to more regularly gather information that was historically only collected as part of the decennial census.

EPA has cleaned and summarized ACS demographic characteristics by Block Group as part of the EJSCREEN Tool.[1] Block Groups are distinct geographic units that are used by the US Census Bureau for publishing population and demographic data. Block Group boundaries are determined by population size. Block Groups in dense, urban areas consist of a few city blocks, but in rural, sparsely populated areas, Block Groups can cover thousands of square miles.
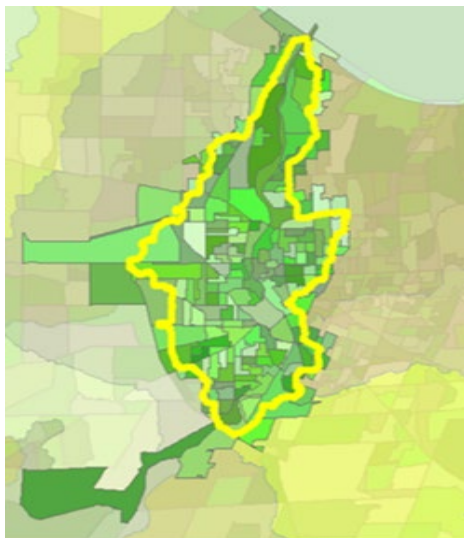

Figure 2. Overlay map of Block Groups and an example HUC12 (yellow outline) to demonstrate that a Block Group can extend across multiple HUC12s.

For Block Groups that extend across multiple HUC12s (Figure 2), a method was applied to distribute Block Group demographic counts between the intersecting HUC12s. This distribution method used the EPA EnviroAtlas *Dasymetric Population for the Conterminous United States* dataset, a gridded map layer of population density across the contiguous US at 30-meter resolution. The dasymetric population map layer was created from information on land cover and slope to map areas where humans are most likely to reside. The general process for quantifying HUC12 values of demographic indicators included the following steps:

1. Overlay Census Block Groups, HUC12s, and the dasymetric population map layer to calculate the total population of each Block Group and each Block Group-HUC12 intersection
2. Calculate a "population weight" for each Block Group-HUC12 intersection area as: total population in the intersecting area divided by total population in the Census Block Group
3. Using the population weights from the previous step, calculate demographic counts per Block Group-HUC12 intersection as: demographic count for the Block Group times population weight
4. Calculate the demographic count per HUC12 as the sum of demographic counts in each Block Group-HUC12 intersection.

Limitations

- The demographic count analysis method assumes the distribution of low income populations, minority populations, etc. within a Census Block Group follows the total population distribution within that Census Block Group.

- The demographic data generated by the ACS are based on a sample of the total population within a Block Group (i.e., the entire population in the Block Group is not surveyed). ACS sample data are analyzed by the US Census Bureau to estimate Block Group demographic counts.

- The dasymetric population map layer is based on population totals from the 2010 decennial census and 2006 land cover. Land cover and population changes that have occurred since those datasets were produced will not be reflected in the demographic indicators.

- Demographic characteristics are general indicators of the vulnerability of a community to degraded environmental conditions but do not directly measure community health or levels of exposure to pollutants and other hazardous materials.

Links to Access Data and Additional Information

HUC12 indicator data can be accessed within the EPA Restoration and Protection Screening (RPS) Tool, in downloadable data files, or as a web service. Visit the EPA RPS website for links to access the RPS Tool, HUC12 indicator database, and web service.

The demographic data used to calculate these indicators can be accessed from the EPA EJSCREEN website. The dasymetric population dataset used to spatially allocate demographic counts can be accessed from the EPA Environmental Dataset Gateway.

References

[1]EPA. 2019. EJSCREEN Technical Documentation.

[2]EPA. 2021. Environmental Justice. Accessed November 2, 2021.

[3]California Office of Environmental Health Hazard Assessment. 2017. CalEnviroScreen 3.0.

[4]Cutter, S., et al. 2003. Social Vulnerability to Environmental Hazards. Social Science Quarterly 84(2): 242-261.

[5]Hill, D., et al. 2018. The environment and environmental justice: Linking the biophysical and the social using watershed boundaries. *Applied Geography*. 95: 54-60.

[6]McDonald, Y., et al. 2018. Drinking water violations and environmental justice in the United States, 2011–2015. *American Journal of Public Health*. 108(10): 1401-1407.

[7]Schaider, L., et al. 2019. Environmental justice and drinking water quality: are there socioeconomic disparities in nitrate levels in US drinking water. *Environmental Health*. 18(1): 1-15.