

Vulnerable Population Index (VPI)

Houston-Galveston Area Council

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I. Vulnerable Population

Title VI of the Civil Rights Act of 1964 and the 1994 President's Executive Order on Environmental Justice (#12898) state that no person or group shall be excluded from participation in, or denied the benefits of, any program or activity utilizing federal funds. Each federal agency is required to identify any disproportionately high and adverse health or environmental effects of its programs on minority and low-income populations. In turn, Metropolitan Planning Organizations (MPOs) are charged with evaluating their plans and programs for environmental justice (EJ) sensitivity, and expanding their outreach efforts to low-income, minority, and other disadvantaged populations, as part of the United States Department of Transportation's certification requirements.

H-GAC uses data from the US Census Bureau to determine the concentrations of eight sensitive populations for the region and for each census block group. A block group with a concentration of a sensitive population greater than the concentration of the H-GAC region as a whole is considered to be "vulnerable" for the sensitive population. The Vulnerable Population Index (VPI) indicated the number of vulnerable populations for each block group, and thus provides a general indication of the extent to which each block group is vulnerable.

The following eight populations were determined to be sensitive based on understanding of both federal requirements and regional demographics:

- Poverty
- Non-Hispanic, non-white
- Hispanic
- Limited English proficiency
- Disabled family
- Elderly
- Car-less
- Single female householder with child/children in the household.

1. Poverty

The Census Bureau uses a set of income thresholds that vary by household size and composition to determine poverty. If a household's total income is less than the threshold, then that household and every individual in it is considered in poverty. For example, the threshold for 2015 for a four-person household with two dependents is \$24,036. While the thresholds do not vary by place, they are updated for inflation using the Consumer Price Index (CPI-U).

2. Non-Hispanic, non-white

The U.S. Department of Transportation (DOT) Order (5610.2) on EJ defines “Minority” as:

- Black: a person having origins in any of the black racial groups of Africa
- Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia,
- the Indian subcontinent
- Native Hawaiian or Pacific Islander
- American Indian and Alaskan Native: a person having origins in any of the original people of North America who maintain cultural identification through tribal affiliation or community recognition

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

- Some other race alone and
- Two or more races

2. Hispanic

The U.S. Census Bureau defines Hispanic as person(s) of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

3. Limited English proficiency

The Limited English Proficiency(LEP) population is defined as households in which no one (14 and over) speaks English only; or speaks a language other than English at home, and speaks English “not well” or “not at all.”

4. Disabled Family

The U.S. Census Bureau classifies individuals as disabled if they report difficulties working at a job, leaving home, or report long-lasting sensory, physical, mental, emotional, or self-care disabilities. A disabled family is a family whose head, spouse, or sole member is a person with disabilities. It may include two or more persons with disabilities living together, or one or more persons with disabilities living with one or more live-in aides.

5. Elderly

Elderly is defined as age 75 and above.

6. Car-less

The U.S. Census Bureau defines car-less as a household with no vehicle access.

7. Single female householder with child/children in the household

The number and percent of single mothers with own children under 18 years of age.

II. Calculation of Vulnerable Population Index

The Vulnerable Population Index (VPI) represents the relative degree of vulnerability of population in one area compared to that of the entire region (or County).

The calculation methods are explained as following:

Step 1: Extract the demographic and social-economic data from the 2022 American Community Survey and obtain the concentration of vulnerable population in each category for both target regions (block group) and background regions (county or H-GAC area).

$$BG_Var\% = BG_Population_Var / BG_Total_Population$$

$$Region_Var\% = Region_Population_Var / Region_Total_Population$$

Step 2: For each vulnerable population category, calculate the vulnerability quotient.

$$Quotient_Var = (BG_Var\%) / (Region_Var\%)$$

Step 3: Sum up the vulnerability quotient for all categories and the VPI for each block group is generated.

$$VPI = Sum(VP_all_vars)$$

Step 4: Rank all block groups in ascending order of Quotient_Sum. Sum up the Quotient_Sum for all block groups in the background region (H-GAC Area) as Quotient_Total.

$$Quotient_Total = sum(Quotient_Sum) \text{ (for all block groups)}$$

Step 5: Calculate the cumulative percentage of Quotient_Sum (for each block group, in ascending order of Quotient_Sum) to the background region (Each block group's respective county or entire H-GAC region) as the VQI. The VQI should be distributed from 0 to 1. The block group that has the greatest Quotient_Sum in the background region has a VQI of 1.

$$VQI = (Cumulative_Quotient_Sum) / Quotient_Total$$

Vulnerable Population

	H-GAC Region	Austin	Brazoria	Chambers	Colorado	Fort Bend	Galveston	Harris	Liberty	Matagorda	Montgomery	Walker	Waller	Wharton
Total population (2022)	7,318,232	30,406	374,600	47,037	20,582	832,607	350,801	4,726,177	93,523	36,251	629,989	77,182	57,463	41,614
Total household population (2022)	7,216,566	30,105	362,186	46,787	20,225	826,717	344,782	4,681,090	87,381	35,897	627,117	60,634	52,690	40,955
Total households (2022)	2,585,592	11,913	127,264	15,744	7,376	270,136	135,275	1,692,896	28,921	14,073	224,474	24,592	17,780	15,148
1. Population in Poverty	974,755	3,593	27,271	6,406	1,490	57,188	37,987	737,681	15,410	7,798	55,202	11,841	6,890	5,998
% of Total household population	13.5%	11.9%	7.5%	13.7%	7.4%	6.9%	11.0%	15.8%	17.6%	21.7%	8.8%	19.5%	13.1%	14.6%
2. Non-Hispanic Minorities	2,018,250	3,552	91,821	5,231	2,890	371,607	66,541	1,343,593	10,852	5,234	74,660	19,998	16,441	5,830
% of Total population	27.6%	11.7%	24.5%	11.1%	14.0%	44.6%	19.0%	28.4%	11.6%	14.4%	11.9%	25.9%	28.6%	14.0%
3. Hispanic Minorities	2,780,937	8,572	119,553	11,860	6,463	209,110	90,909	2,076,103	29,709	16,025	162,783	14,226	17,732	17,892
% of Total population	38.0%	28.2%	31.9%	25.2%	31.4%	25.1%	25.9%	43.9%	31.8%	44.2%	25.8%	18.4%	30.9%	43.0%
4. Limited English Proficiency	591,949	995	12,784	1,177	537	39,121	9,985	491,027	4,896	1,186	23,891	1,738	2,626	1,986
% of Total population	8.1%	3.3%	3.4%	2.5%	2.6%	4.7%	2.8%	10.4%	5.2%	3.3%	3.8%	2.3%	4.6%	4.8%
5. Disable Family	570,299	3,076	27,400	4,095	2,243	48,316	36,883	366,922	10,262	4,926	51,637	5,175	4,339	5,025
% of Total households	22.1%	25.8%	21.5%	26.0%	30.4%	17.9%	27.3%	21.7%	35.5%	35.0%	23.0%	21.0%	24.4%	33.2%
6. Elderly	316,332	2,426	17,144	1,852	1,969	32,759	19,480	192,771	4,390	2,566	31,459	4,152	2,367	2,997
% of Total population	4.3%	8.0%	4.6%	3.9%	9.6%	3.9%	5.6%	4.1%	4.7%	7.1%	5.0%	5.4%	4.1%	7.2%
7. Car-less	145,287	419	3,436	401	416	7,677	7,321	112,614	1,330	935	7,499	1,643	632	964
% of Total Households	5.6%	3.5%	2.7%	2.5%	5.6%	2.8%	5.4%	6.7%	4.6%	6.6%	3.3%	6.7%	3.6%	6.4%
8. Single Female Householder with Child/children in the household	232,408	864	9,467	1,270	254	19,753	9,591	170,082	2,269	1,307	13,261	1,652	1,406	1,232
% of Total Households	9.0%	7.3%	7.4%	8.1%	3.4%	7.3%	7.1%	10.0%	7.8%	9.3%	5.9%	6.7%	7.9%	8.1%

Source: American Community Survey (ACS) 2018-2022