SVI 2010 Documentation - 3/31/2015

Introduction

What is Social Vulnerability?

Every community must prepare for and respond to hazardous events, whether a natural disaster like a tornado or a disease outbreak, or an anthropogenic event such as a harmful chemical spill. The degree to which a community exhibits certain social conditions, including poverty, car ownership, or number of persons in households, may affect that community's ability to prevent human suffering and financial loss in the event of disaster. These factors describe a community's social vulnerability.

What is the Social Vulnerability Index?

ATSDR's Geospatial Research, Analysis & Services Program (GRASP) has created a tool to help public health officials and emergency response planners identify and map the communities that will most likely need support before, during, and after a hazardous event.

The Social Vulnerability Index (SVI) indicates the relative vulnerability of every U.S. Census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The SVI ranks the tracts on 14 social factors, including unemployment, lack of vehicle access, and crowded housing, and further groups them into four related themes. Thus, each tract receives a ranking for each Census variable and for each of the four themes, as well as an overall ranking.

How can the SVI help communities be better prepared for hazardous events?

The SVI provides specific socially and spatially relevant information to help public health officials and local planners better prepare communities to respond to emergency events such as severe weather, floods, disease outbreaks, or chemical exposure.

The SVI can be used to:

- Allocate emergency preparedness funding by community need.
- Estimate the amount and type of needed supplies like food, water, medicine, and bedding.
- Help decide how many emergency personnel are required to assist people.
- Identify areas in need of emergency shelters.
- Plan the best way to evacuate people, accounting for those who have special needs, such as those without vehicles, the elderly, or people who do not understand English well.
- Identify communities that will need continued support to recover following an emergency or natural disaster.

Important Notes on the SVI Database

- Keep the data in geodatabase format. Converting to shapefile changes the field names.
- Tracts with zero population for 100% counts were removed during the calculation process. These tracts were added back to mapped data and are shown with a TOTPOP field value of 0. All other numeric fields for zero population tracts were set to -999.
- For tracts with > 0 TOTPOP, a value of -999 in any field either means the value was unavailable from the original census data or we could not calculate a value because of unavailable data.
- Any cells with a -999 were not used for further calculations. For example, total flags do not include fields with a -999 value.
- See the ***Methods*** section below for further details.
- Questions? Please visit the SVI web site at http://svi.cdc.gov for additional information

SVI Data Dictionary

Themes
1. Socioeconomic
2. Household Composition/Disability
3. Minority Status/Language
4. Housing Type/Transportation

*Variables beginning with "E_" are estimates. Variables beginning with "M_" are margins of error for those estimates. Some variables in the database are not listed here; these are generally locational information.

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
STATE_ABBR		State Abbreviation		
STATE_NAME		State Name		
FIPS		FIPS Code		
LOCATION		Text description of tract, county, state		
TOTPOP		Total population, 2010 SF1		
E_TOTPOP		Population estimate, 2006-2010 ACS		
M_TOTPOP		Population estimate MOE, 2006-2010 ACS		
HU		Housing units, 2010 SF1		
E_HU		Housing units estimate, 2006-2010 ACS		
M_HU		Housing units estimate MOE, 2006-2010 ACS		
HH		Number of households, 2010 SF1		
E_POV	1	Persons below poverty estimate, 2006-2010 ACS		
M_POV	1	Persons below poverty estimate MOE, 2006-2010 ACS		
E_UNEMP	1	Civilian (age 16+) unemployed estimate, 2006-2010 ACS		
M_UNEMP	1	Civilian (age 16+) unemployed estimate MOE, 2006-2010 ACS		
E_PCI	1	Per capita income estimate, 2006-2010 ACS		
M_PCI	1	Per capita income estimate MOE, 2006-2010 ACS		

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
E_NOHSDIP	1	Persons (age 25+) with no high school diploma estimate, 2006-2010 ACS		
M_NOHSDIP	1	Persons (age 25+) with no high school diploma estimate MOE, 2006-2010 ACS		
AGE65	2	Persons aged 65 and older, 2010 SF1		
AGE17	2	Persons aged 17 and younger, 2010 SF1		
SNGPRNT	2	Single parent household with children under 18, 2010 SF1		
MINORITY	3	Minority (all persons except white, non-Hispanic), 2010 SF1		
E_LIMENG	3	Persons (age 5+) who speak English "less than well" estimate, 2006-2010 ACS		
M_LIMENG	3	Persons (age 5+) who speak English "less than well" estimate MOE, 2006-2010 ACS		
E_MUNIT	4	Housing in structures with 10 or more units estimate, 2006-2010 ACS		
M_MUNIT	4	Housing in structures with 10 or more units estimate MOE, 2006-2010 ACS		
E_MOBILE	4	Mobile homes estimate, 2006-2010 ACS		
M_MOBILE	4	Mobile homes estimate MOE, 2006-2010 ACS		
E_CROWD	4	At household level, more people than rooms estimate, 2006-2010 ACS		
M_CROWD	4	At household level, more people than rooms estimate MOE, 2006-2010 ACS		
E_NOVEH	4	Households with no vehicle available estimate, 2006-2010 ACS		
M_NOVEH	4	Households with no vehicle available estimate MOE, 2006-2010 ACS		
GROUPQ	4	Persons in institutionalized and non-institutionalized group quarters, 2010 SF1		
E_P_POV	1	Proportion of persons below poverty estimate	E_POV/Persons for whom poverty is determined estimate	Multiply by 100 to get a percentage
M_P_POV	1	Proportion of persons below poverty estimate MOE		
E_P_UNEMP	1	Proportion of civilian (age 16+) unemployed estimate	E_UNEMP/Civilians estimate	Multiply by 100 to get a percentage

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
M_P_UNEMP	1	Proportion of civilian (age 16+) unemployed estimate MOE		
E_P_PCI	1	Per capita income estimate, 2006-2010 ACS	Same as E_PCI	Multiply by 100 to get a percentage
M_P_PCI	1	Per capita income estimate MOE, 2006-2010 ACS	Same as M_PCI	
E_P_NOHSDIP	1	Proportion of persons with no high school diploma (age 25+) estimate	E_NODIPL/Persons aged 25+ estimate	Multiply by 100 to get a percentage
M_P_NOHSDIP	1	Proportion of persons with no high school diploma (25+) estimate MOE		
P_AGE65	2	Proportion of persons aged 65 and older	AGE65/TOTPOP	Multiply by 100 to get a percentage
P_AGE17	2	Proportion of persons aged 17 and younger	AGE17/TOTPOP	Multiply by 100 to get a percentage
P_SNGPRNT	2	Proportion of single parent households with children under 18	SNGPRNT/HH	Multiply by 100 to get a percentage
P_MINORITY	3	Proportion minority (all persons except white, non-Hispanic)	MINORITY/TOTPOP	Multiply by 100 to get a percentage
E_P_LIMENG	3	Proportion of persons (age 5+) who speak English "less than well" estimate	E_LIMENG/Persons aged 5+ estimate	Multiply by 100 to get a percentage
M_P_LIMENG	3	Proportion of persons (age 5+) who speak English "less than well" estimate MOE		
E_P_MUNIT	4	Proportion of housing in structures with 10 or more units estimate	E_MUNIT/E_HU	Multiply by 100 to get a percentage
M_P_MUNIT	4	Proportion of housing in structures with 10 or more units estimate MOE		
E_P_MOBILE	4	Proportion of mobile homes estimate	E_MOBILE/E_HU	Multiply by 100 to get a percentage
M_P_MOBILE	4	Proportion of mobile homes estimate MOE		
E_P_CROWD	4	Proportion of households with more people than rooms estimate	E_CROWD/Occupied housing units estimate	Multiply by 100 to get a percentage
M_P_CROWD	4	Proportion of households with more people than rooms estimate MOE		
E_P_NOVEH	4	Proportion of households with no vehicle available estimate	E_NOVEH/Occupied housing units estimate	Multiply by 100 to get a percentage
M_P_NOVEH	4	Proportion of households with no vehicle available estimate MOE		
P_GROUPQ	4	Proportion of persons in institutionalized and non-institutionalized group quarters	GROUPQ/TOTPOP	Multiply by 100 to get a percentage

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
E_PL_POV	1	Percentile of the proportion of persons below poverty estimate, no consideration of MOE		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.** Values in the E_PLxxx series range from 0 to 1 with those values closer to 1 meaning higher probability of vulnerability.
E_PL_UNEMP	1	Percentile of the proportion of civilian (age 16+) unemployed estimate, no consideration of MOE		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
E_PL_PCI	1	Percentile of per capita income estimate, no consideration of MOE		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
E_PL_NOHSDIP	1	Percentile of the proportion of persons with no high school diploma (age 25+) estimate, no consideration of MOE		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
S_PL_THEME1	1	Sum of E_PLxxx series for Socioeconomic theme	E_PL_POV + E_PL_UNEMP + E_PL_PCI + E_PL_NOHSDIP	
R_PL_THEME1	1	Percentile ranking for Socioeconomic theme		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
PL_AGE65	2	Percentile of the proportion of persons aged 65 and older		Based on 100% counts - no sampling error.
PL_AGE17	2	Percentile of the proportion of persons aged 17 and younger		Based on 100% counts - no sampling error.
PL_SNGPRNT	2	Percentile of the proportion of single parent households with children under 18		Based on 100% counts - no sampling error.

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
S_PL_THEME2	2	Sum of PLxxx series for Household Composition theme	PL_AGE65 + PL_AGE17 + PL_SNGPRNT	
R_PL_THEME2	2	Percentile ranking for Household Composition theme		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
PL_MINORITY	3	Percentile of the proportion minority (all persons except white, non-Hispanic)		Based on 100% counts - no sampling error.
E_PL_LIMENG	3	Percentile of the proportion of persons (age 5+) who speak English "less than well" estimate, no consideration of MOE		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
S_PL_THEME3	3	Sum of PLxxx series for Minority Status/Language theme	PL_MINORITY + E_PL_LIMENG	
R_PL_THEME3	3	Percentile ranking for Minority Status/Language theme		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
E_PL_MUNIT	4	Percentile of the proportion of housing in structures with 10 or more units estimate		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
E_PL_MOBILE	4	Percentile of the proportion of mobile homes estimate		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to the SVI 2000 percentiles.
E_PL_CROWD	4	Percentile of the proportion of households with more people than rooms estimate		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
E_PL_NOVEH	4	Percentile of the proportion of households with no vehicle available estimate		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to the 2000 percentiles.
PL_GROUPQ	4	Percentile of the proportion persons in institutionalized and non-institutionalized group quarters		Based on 100% counts - no sampling error.
S_PL_THEME4	4	Sum of PLxxx series for Housing/Transportation theme	E_PL_MUNIT + E_PL_MOBILE + E_PL_CROWD + E_PL_NOVEH+ PL_GROUPQ	
R_PL_THEME4	4	Percentile ranking for Housing/Transportation theme		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
S_PL_THEMES		Sum of PLxxx series themes	S_PL_THEME1 + S_PL_THEME2 + S_PL_THEME3 + S_PL_THEME4	
R_PL_THEMES		Overall percentile ranking		The method used to calculate these percentiles (i.e. the E_PLxxx series) is comparable to SVI 2000 percentiles.
F_PL_POV	1	Flag - for poverty, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_UNEMP	1	Flag - for civilian unemployed, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_PCI	1	Flag - for per capita income, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_NOHSDIP	1	Flag - for no high school diploma, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_THEME1	1	Sum of flags for Socioeconomic Status theme	F_PL_POV + F_PL_UNEMP + F_PL_PCI + F_PL_NOHSDIP	
F_PL_AGE65	2	Flag - the proportion of persons aged 65 and older is in the 90th percentile (1 = yes, 0 = no)		
F_PL_AGE17	2	Flag - the proportion of persons aged 17 and younger is in the 90th percentile (1 = yes, 0 = no)		
F_PL_SNGPRNT	2	Flag - the proportion of single parent households is in the 90th percentile (1 = yes, 0 = no)		

VARIABLE NAME *	THEME	DESCRIPTION	CALCULATION	NOTES
F_PL_THEME2	2	Sum of flags for Household Composition theme	F_PL_AGE65 + F_PL_AGE17 + F_PL_SNGPRNT	
F_PL_MINORITY	3	Flag - the proportion of minority is in the 90th percentile (1 = yes, 0 = no)		
F_PL_LIMENG	3	Flag - for limited English, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_THEME3	3	Sum of flags for Minority Status/Language theme	F_PL_MINORITY + F_PL_LIMENG	
F_PL_MUNIT	4	Flag - for multi-unit housing, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_MOBILE	4	Flag - for mobile homes, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_CROWD	4	Flag - for crowded housing, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_NOVEH	4	Flag - for no vehicle access, the proportion is in the 90th percentile (1 = yes, 0 = no)		
F_PL_GROUPQ	4	Flag - the proportion of persons in institutionalized and non-institutionalized group quarters is in the 90th percentile (1 = yes, 0 = no)		
F_PL_THEME4	4	Sum of flags for Housing/Transportation theme	F_PL_MUNIT + F_PL_MOBILE + F_PL_CROWD + F_PL_NOVEH + F_PL_GROUPQ	
F_PL_TOTAL		Sum of flags for the four themes	F_PL_THEME1 + F_PL_THEME2 + F_PL_THEME3 + FTHEME4	

**For a detailed description of SVI 2000 methods, see A Social Vulnerability Index for Disaster Management.

Methods

Variables Used

2010 tract level data

Census 2010 100% count data (SF1) for the following variables:

- Persons aged 65 and older
- Persons aged 17 and younger
- Single parent households with children under 18
- Minority status (i.e. Total population minus white, non-Hispanic population)
- Persons living in Group Quarters

Raw data values for each variable, for each tract, are included in the database.

American Community Survey (ACS), 2006-2010 (5-year) data for the following variables/estimates:

- Persons below the poverty level
- Civilian unemployed
- Per capita income
- No high school diploma for persons aged 25 and older
- Persons who speak English "less than well"
- Housing units with 10 or more units in the structure
- At the household level, more people than rooms
- Mobile homes
- No vehicle access

Raw data estimates for each variable, for each tract, are included in the database. In addition, the margins of error (MOEs) for each estimate are also included.

The US Census Bureau did not collect tract level disability data, included in SVI 2000, for either the 2010 Census or the 2006-2010 ACS. Therefore, a disability variable is not included in SVI 2010.

Proportion calculations

We processed SF1 data using the same method as SVI 2000.**

- We calculated the proportion for each variable for each tract (e.g. proportion of persons aged 65 and older) and included these proportions in the database.
- We used appropriate SF1 variables as denominators (e.g. total population to calculate proportion of persons aged 17 and younger).

Because of estimate error, the ACS data include additional data fields.

- Margins of error (MOEs) are included for each estimate, including derived estimates. We calculated MOEs for derived estimates using Census specifications.*** (See A Compass for Understanding and Using. American Community Survey Data. What General Data Users Need to Know.) The confidence level is at the Census standard of 90%.
- We used appropriate ACS estimates as denominators (e.g. total population estimate to calculate the proportion of persons who speak English "less than well").
- Note: Confidence intervals can be calculated by subtracting the MOE from the estimate (lower limit) and adding the MOE to the estimate (upper limit).

** For a detailed description of SVI 2000 methods, see A Social Vulnerability Index for Disaster Management.

***The ACS Toolbox can be used to calculate MOEs for derived values. Please visit the SVI web site at http://svi.cdc.gov for additional information.

Rankings

We ranked Census tracts within each state and the District of Columbia, to enable mapping and analysis of relative vulnerability in individual states. We also ranked tracts for the entire United States against one another, for mapping and analysis of relative vulnerability in multiple states, or across the U.S. as a whole. Tract rankings are based on percentiles, as for SVI 2000. Percentile ranking values range from 0 to 1, with higher values indicating greater vulnerability.

For each tract, we generated percentile rankings for 1) the fourteen individual variables, 2) the four themes, and 3) an overall ranking.

Theme rankings: For each of the four themes, we summed the percentiles for the variables comprising each theme. We ordered the summed percentiles for each theme to determine theme-specific percentile rankings.

Overall tract rankings: We summed the sums for each theme, ordered the tracts, and then calculated overall percentile rankings. Please note; taking the sum of the sums for each theme is the same as summing individual variable rankings.

Flags

We processed data using the same method as SVI 2000. Tracts in the top 10%, i.e. at the 90th percentile of values, are given a value of 1 to indicate high vulnerability. Tracts below the 90th percentile are given a value of 0.

For a theme, the flag value is the number of flags for variables comprising the theme. We calculated the overall flag value for each tract as the number of all variable flags.