SVI 2016 Documentation - 1/24/2018

Please see data dictionary as well as SVI 2016-2014 crosswalk below.

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 high poverty, low percentage of vehicle access, or crowded 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) created the Social Vulnerability Index (SVI) 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.

CDC's 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 15 social factors, including unemployment, minority status, and disability, 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. In addition to tract-level rankings, SVI 2010, 2014, and 2016 also have corresponding rankings at the county level. Notes below that describe "tract" methods also refer to county methods.

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.
- Decide how many emergency personnel are required to assist people.
- Identify areas in need of emergency shelters.
- Create a plan 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

- SVI 2014 and 2016 are available for download in shapefile format from https://svi.cdc.gov/SVIDataToolsDownload.html. SVI 2014 and 2016 are also available via ArcGIS Online. Search on "CDC's Social Vulnerability Index."
- For SVI 2000 and 2010, keep the data in geodatabase format when downloading from https://svi.cdc.gov/SVIDataToolsDownload.html. Converting to shapefile changes the field names.
- A SVI 2016 to 2014 "crosswalk" is included in this documentation. See <u>SVI 2014 documentation</u> (https://svi.cdc.gov/Documents/Data/2014_SVI_Data/SVI2014Documentation.pdf) for SVI 2014 to 2010 crosswalk.

- For US-wide or multi-state mapping and analysis, use the US database, in which all tracts are ranked against one another. For individual state mapping and analysis, use the state-specific database, in which tracts are ranked only against other tracts in the specified state.
- Starting with SVI 2014, we've added a stand-alone, state-specific Commonwealth of Puerto Rico database. Puerto Rico is not included in the US-wide ranking.
- Starting with SVI 2014, we've added a database of <u>Tribal Census Tracts</u> (http://factfinder.census.gov/help/en/tribal census tract.htm). Tribal tracts are defined independently of, and in addition to, standard county-based tracts. The tribal tract database contains only estimates, percentages, and their respective MOEs, along with the adjunct variables described in the data dictionary below. Because of geographic separation and cultural diversity, tribal tracts are not ranked against each other nor against standard census tracts.
- Tracts with zero estimates for total population (N = 417 for the U.S.) were removed during the ranking process. These tracts were added back to the SVI databases after ranking. The TOTPOP field value is 0, but the percentile ranking fields (RPL_THEME1, RPL_THEME2, RPL_THEME3, RPL_THEME4, and RPL_THEMES) 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 derived value because of unavailable census data.
- Any cells with a -999 were not used for further calculations. For example, total flags do not include fields with a -999 value.
- ArcGIS preserves leading 0s in the FIPS code fields of csv files. To preserve leading 0s in Excel, follow these steps:
 - Open a blank worksheet in Excel.
 - Click the DATA tab and choose to open a file from Text
 - Navigate to the csv file and choose to Import
 - o In the Text Import Wizard, choose the Delimited data type, then Next
 - o Choose the Comma delimiter, then Next
 - One by one, select fields based on FIPS codes (TRACTCE, ST, STCNTY, FIPS), set the Column data format to Text, then click Finish to open the csv with leading 0s preserved.
- See the *Methods* section below for further details.
- Questions? Please visit the SVI web site at http://svi.cdc.gov for additional information or email the SVI Coordinator at svi coordinator@cdc.gov.

Methods

Variables Used

American Community Survey (ACS), 2012-2016 (5-year) data for the following estimates:

		Below Poverty	
	Socioeconomic	Unemployed	
	Status	Income	
		No High School Diploma	
		Aged 65 or Older	
ल	Household	Aged 17 or Younger	
<u>a</u>	Composition & Disability	Civilian with a Disability	
	Jisasiiniy	Single-Parent Households	
n/	Minority Status	Minority	
Overall Vulnerability	& Language	Speak English "Less than Well"	
		Multi-Unit Structures	
	Housing &	Mobile Homes	
	Transportation	Crowding	
	II aliapoi tatioli	No Vehicle	
		Group Quarters	

For SVI 2016, we included two adjunct variables, 1) 2012-2016 ACS estimates for persons without health insurance, and 2) an estimate of daytime population derived from LandScan 2016 estimates. These adjunct variables are excluded from the SVI rankings.

Raw data estimates and percentages for each variable, for each tract, are included in the database. In addition, the margins of error (MOEs) for each estimate, at the Census Bureau standard of 90%, are also included. Confidence intervals can be calculated by subtracting the MOE from the estimate (lower limit) and adding the MOE to the estimate (upper limit). Because of relatively small sample sizes, some of the MOEs are high. It's important to identify the amount of error acceptable in any analysis.

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. Percentile ranking values range from 0 to 1, with higher values indicating greater vulnerability.

For each tract, we generated its percentile rank among all tracts for 1) the fifteen individual variables, 2) the four themes, and 3) its overall position.

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.

The four summary theme ranking variables, detailed in the Data Dictionary below, are:

- Socioeconomic theme RPL THEME1
- Household Composition and Disability RPL_THEME2
- Minority Status & Language RPL_THEME3
- Housing & Transportation RPL_THEME4

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. The overall tract summary ranking variable is RPL_THEMES.

Flags

Tracts in the top 10%, i.e., at the 90^{th} percentile of values, are given a value of 1 to indicate high vulnerability. Tracts below the 90^{th} 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.

For a detailed description of SVI variable selection rationale and methods, see <u>A Social Vulnerability Index for Disaster Management</u>

(http://gis.cdc.gov/grasp/svi/A%20Social%20Vulnerability%20Index%20for%20Disaster%20Management.pdf).

SVI 2016 Data Dictionary – American Community Survey field names that changed between 2014 and 2016 are noted in RED

Theme Colors
Socioeconomic
Household Composition/Disability
Minority Status/Language
Housing/Transportation

Variables beginning with "E_" are estimates. Variables beginning with "M_" are margins of error for those estimates. Values of -999 represent "null" or "no data."

The four summary theme ranking variables, detailed in the Data Dictionary below, are:

- Socioeconomic theme RPL_THEME1
- Household Composition and Disability RPL_THEME2
- Minority Status & Language RPL_THEME3
- Housing & Transportation RPL_THEME4

The overall tract summary ranking variable is RPL_THEMES.

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	State-level FIPS			In Excel, from Tract-level FIPS	
ST	code	S0601	FIPS	code, LEFT (FIPS, 2)	
				In Excel, use DATA Text to	
STATE	State name	S0601	GEO.display-label	Columns to extract state name	
				Joined from Esri state boundary	
ST_ABBR	State abbreviation	N/A	N/A	shapefile	
	County-level FIPS			In Excel, from Tract-level FIPS	In the county-level SVI database, the 5-digit
STCNTY	code	S0601	FIPS	code, LEFT (FIPS, 5)	STCNTY field is the FIPS field, used for joins.
				In Excel, use DATA Text to	
COUNTY	County name	S0601	GEO.display-label	Columns to extract county name	
	Tract-level FIPS				
FIPS	code	S0601	GEO.id	In Excel, RIGHT (GEO.id, 11)	
	Text description of				
LOCATION	tract, county, state	S0601	GEO.display-label		
		Census			
		Cartographic			
		Boundary File - U.S.			
	Tract area in	Tracts 2016		Conversion from square meters to	
AREA SQMI	square miles	500K	ALAND * 3.86102e-7	square miles	
ANLA_SQIVII	Population	300K	ALAND 5.80102e-7	square filles	
	estimate, 2012-				
Е ТОТРОР	2016 ACS	S0601	HC01 EST VC01		
	Population	33001	1.001_101_101		
	estimate MOE,				
м тотрор	2012-2016 ACS	S0601	HC01 MOE VC01		
	Housing units				
	estimate, 2012-				
E_HU	2016 ACS	DP04	HC01_VC03		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Housing units				
	estimate MOE,				
M_HU	2012-2016 ACS	DP04	HC02_VC03		
	Households				
	estimate, 2012-				
E_HH	2016 ACS	DP02	HC01_VC03		
	Households				
	estimate MOE,				
M_HH	2012-2016 ACS	DP02	HC02_VC03		
	Persons below				
	poverty estimate,				
E_POV	2012-2016 ACS	B17001	HD01_VD02		
	Persons below				
	poverty estimate				
M POV	MOE, 2012-2016	D47004	11003 11003		
M_POV	ACS (Control of the Control of the C	B17001	HD02_VD02		
	Civilian (age 16+)				
	unemployed estimate, 2012-				
E UNEMP	2016 ACS	DP03	HC01 VC07		
L_OINLIVIF	Civilian (age 16+)	DF03	11001_1001		
	unemployed				
	estimate MOE,				
M UNEMP	2012-2016 ACS	DP03	HC02 VC07		
	Per capita income				
	estimate, 2012-				Fewer rows than other variables - joined to Census
E_PCI	2016 ACS.	B19301	HD01_VD01		2016 tracts. Contains null cells (i.e999).
	Per capita income				
	estimate MOE,				Fewer rows than other variables - joined to Census
M_PCI	2012-2016 ACS	B19301	HD02_VD01		2016 tracts
	Persons (age 25+)				
	with no high				
	school diploma				
	estimate, 2012-				
E_NOHSDP	2016 ACS	B06009	HD01_VD03		
	Persons (age 25+)				
	with no high				
	school diploma				
M NOUGED	estimate MOE,	POCO00	11D03_1/D03		
M_NOHSDP	2012-2016 ACS	B06009	HD02_VD03		

		CENSUS or			
2016 VARIABLE		SVI			
NAME	2016 DESCRIPTION	TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Persons aged 65 and				
	older estimate,				
E_AGE65	2012-2016 ACS	S1501	HC01_EST_VC32		
	Persons aged 65 and				
	older estimate MOE,				
M_AGE65	2012-2016 ACS	S1501	HC01_MOE_VC32		
	Persons aged 17 and				
	younger estimate,				
E_AGE17	2012-2016 ACS	B09001	HD01_VD01		
	Persons aged 17 and				
	younger estimate				
M_AGE17	MOE, 2012-2016 ACS	B09001	HD02_VD01		
	Civilian				
	noninstitutionalized				
	population with a				
	disability estimate,				
E_DISABL	2012-2016 ACS	DP02	HC01_VC106		
	Civilian				
	noninstitutionalized				
	population with a				
	disability estimate				
M_DISABL	MOE, 2012-2016 ACS	DP02	HC02_VC106		
				Estimate male householder, no	
	Single parent			wife present, family - With own	
	household with			children under 18 years + Estimate	
	children under 18			female householder, no husband	
	estimate, 2012-2016			present, family - With own	
E_SNGPNT	ACS	DP02	HC01_VC09 + HC01_VC11	children under 18 years	
				SQRT (MOE male householder, no	
	Single parent			wife present, family - With own	
	household with			children under 18 years ^2 +	
	children under 18			Estimate female householder, no	
	estimate MOE, 2012-		SQRT(HC02_VC09^2 +	husband present, family - With	
M_SNGPNT	2016 ACS	DP02	HC02_VC11^2)	own children under 18 years ^2)	

2016 VARIARI F		CENSUS or SVI			
2016 VARIABLE NAME	2016 DESCRIPTION	TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Minority (all persons				
	except white, non-				
	Hispanic) estimate,				
E_MINRTY	2012-2016 ACS	B01001H	E_TOTPOP - HD01_VD01		
	Minority (all persons				
	except white, non-				
A	Hispanic) estimate	D0400411	SQRT(M_TOTPOP^2 +	SQRT (MOE total population ^2 - MOE white, non-	
M_MINRTY	MOE, 2012-2016 ACS	B01001H	HD02_VD01^2)	Hispanic ^2)	
				Estimate; Native: - Speak Spanish: - Speak English "not well" + Estimate; Native: - Speak Spanish: - Speak English	
				"not at all" + Estimate; Native: - Speak other Indo-	
				European languages: - Speak English "not well" +	
				Estimate; Native: - Speak other Indo-European	
				languages: - Speak English "not at all" + Estimate; Native:	
				- Speak Asian and Pacific Island languages: - Speak	
				English "not well" + Estimate; Native: - Speak Asian and	
				Pacific Island languages: - Speak English "not at all" +	
				Estimate; Native: - Speak other languages: - Speak English "not well" + Estimate; Native: - Speak other	
				languages: - Speak English "not at all" + Estimate; Foreign	
				born: - Speak Spanish: - Speak English "not well" +	
				Estimate; Foreign born: - Speak Spanish: - Speak English	
				"not at all" + Estimate; Foreign born: - Speak other Indo-	
				European languages: - Speak English "not well" +	
			HD01_VD07 + HD01_VD08 +	Estimate; Foreign born: - Speak other Indo-European	
			HD01_VD12 + HD01_VD13 +	languages: - Speak English "not at all" + Estimate; Foreign	
			HD01_VD17 + HD01_VD18 + HD01_VD22 + HD01_VD23 +	born: - Speak Asian and Pacific Island languages: - Speak English "not well" + Estimate; Foreign born: - Speak Asian	
	Persons (age 5+) who		HD01_VD29 + HD01_VD30 +	and Pacific Island languages: - Speak English "not at all" +	
	speak English "less		HD01 VD34 + HD01 VD35 +	Estimate; Foreign born: - Speak other languages: - Speak	
	than well" estimate,		HD01_VD39 + HD01_VD40 +	English "not well" + Estimate; Foreign born: - Speak other	
E_LIMENG	2012-2016 ACS	B16005	HD01_VD44 + HD01_VD45	languages: - Speak English "not at all"	

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
				SQRT (MOE Native: - Speak Spanish: - Speak English "not	
				well"^2 + MOE Native: - Speak Spanish: - Speak English	
				"not at all"^2 + MOE Native: - Speak other Indo-	
				European languages: - Speak English "not well"^2 + MOE	
				Native: - Speak other Indo-European languages: - Speak	
				English "not at all"^2 + MOE Native: - Speak Asian and	
				Pacific Island languages: - Speak English "not well"^2 +	
				MOE Native: - Speak Asian and Pacific Island languages: -	
				Speak English "not at all"^2 + MOE Native: - Speak other	
				languages: - Speak English "not well"^2 + MOE Native: -	
				Speak other languages: - Speak English "not at all"^2 +	
				MOE Foreign born: - Speak Spanish: - Speak English "not	
			SQRT(HD02_VD07^2 +	well"^2 + MOE Foreign born: - Speak Spanish: - Speak	
			HD02_VD08^2 + HD02_VD12^2	English "not at all"^2 + MOE Foreign born: - Speak other	
			+ HD02_VD13^2 +	Indo-European languages: - Speak English "not well"^2 +	
			HD02_VD17^2 + HD02_VD18^2	MOE Foreign born: - Speak other Indo-European	
			+ HD02_VD22^2 +	languages: - Speak English "not at all"^2 + MOE Foreign	
			HD02_VD23^2 + HD02_VD29^2	born: - Speak Asian and Pacific Island languages: - Speak	
	Persons (age 5+)		+ HD02_VD30^2 +	English "not well"^2 + MOE Foreign born: - Speak Asian	
	who speak English		HD02_VD34^2 + HD02_VD35^2	and Pacific Island languages: - Speak English "not at	
	"less than well"		+ HD02_VD39^2 +	all"^2 + MOE Foreign born: - Speak other languages: -	
	estimate MOE,		HD02_VD40^2 + HD02_VD44^2	Speak English "not well"^2 + MOE Foreign born: - Speak	
M_LIMENG	2012-2016 ACS	B16005	+ HD02_VD45^2)	other languages: - Speak English "not at all"^2)	

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Housing in			Estimate; UNITS IN STRUCTURE -	
	structures with 10			Total housing units - 10 to 19 units	
	or more units			+ Estimate; UNITS IN STRUCTURE -	
	estimate, 2012-			Total housing units - 20 or more	
E_MUNIT	2016 ACS	DP04	HC01_VC19 + HC01_VC20	units	
	Housing in			SQRT (MOE UNITS IN STRUCTURE -	
	structures with 10			Total housing units - 10 to 19	
	or more units			units^2 + MOE; UNITS IN	
	estimate MOE,		SQRT(HC02_VC19^2 +	STRUCTURE - Total housing units -	
M_MUNIT	2012-2016 ACS	DP04	HC02_VC20^2)	20 or more units^2)	
	Mobile homes				
	estimate, 2012-				
E_MOBILE	2016 ACS	DP04	HC01_VC21		
	Mobile homes				
	estimate MOE,				
M_MOBILE	2012-2016 ACS	DP04	HC02_VC21		
	At household level				
	(occupied housing			Estimate; OCCUPANTS PER ROOM	
	units), more			- Occupied housing units - 1.01 to	
	people than rooms			1.50 + Estimate; OCCUPANTS PER	
	estimate, 2012-			ROOM - Occupied housing units -	
E_CROWD	2016 ACS	DP04	HC01_VC114 + HC01_VC115	1.51 or more	
	At household level				
	(occupied housing			SQRT(MOE OCCUPANTS PER	
	units), more			ROOM - Occupied housing units -	
	people than rooms			1.01 to 1.50^2+ MOE OCCUPANTS	
	estimate MOE,		SQRT(HC02_VC114^2 +	PER ROOM - Occupied housing	
M_CROWD	2012-2016 ACS	DP04	HC02_VC115^2)	units - 1.51 or more^2)	
	Households with				
	no vehicle				
	available estimate,				
E_NOVEH	2012-2016 ACS	DP04	HC01_VC85		
	Households with				
	no vehicle				
	available estimate				
NA NOVE::	MOE, 2012-2016	5504	11000 11005		
M_NOVEH	ACS	DP04	HC02_VC85		
	Persons in				
	institutionalized				
	group quarters				
E CDOUSO	estimate, 2012-	P2C004	LIDO4 VIDO4		
E_GROUPQ	2016 ACS	B26001	HD01_VD01		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Persons in				
	institutionalized				
	group quarters				
	estimate MOE,				
M_GROUPQ	2012-2016 ACS	B26001	HD02_VD01		
	Percentage of				
5D DOV	persons below	50504	11004 557 11057		
EP_POV	poverty estimate	S0601	HC01_EST_VC67		
	Percentage of				
	persons below poverty estimate				
MP POV	MOE MOE	S0601	HC01 MOE VC67		
IVIF_FOV	Percentage of	30001	TIEGI_WOL_VEO7		
	civilian (age 16+)				
	unemployed				
EP_UNEMP	estimate	DP03	HC03_VC12		
	Percentage of	2.00			
	civilian (age 16+)				
	unemployed				
MP_UNEMP	estimate MOE	DP03	HC04_VC12		
	Per capita income				
	estimate, 2012-				
EP_PCI	2016 ACS	B19301	HD01_VD01		Value is the same as E_PCI
	Per capita income				
	estimate MOE,				
MP_PCI	2012-2016 ACS	B19301	HD02_VD01		Value is the same as M_PCI
	Percentage of				
	persons with no high school				
	diploma (age 25+)				
EP NOHSDP	estimate	S0601	HC01 EST VC46		
LI _NOTISDI	Percentage of	30001	11001_131_4040		
	persons with no				
	high school				
	diploma (25+)				
MP_NOHSDP	estimate MOE	S0601	HC01_MOE_VC46		
	Percentage of		_		
	persons aged 65				
	and older				
	estimate, 2012-				
EP_AGE65	2016 ACS	S0101	HC01_EST_VC31		

2016		CENSUS or			
VARIABLE	2016	SVI	TABLE FIELD		
NAME	DESCRIPTION	TABLE(S)	CALCULATION	CALCULATION DESCRIPTION	NOTES
	Percentage of				
	persons aged				
	65 and older				
	estimate MOE,				
MP_AGE65	2012-2016 ACS	S0101	HC01_MOE_VC31		
	Percentage of				
	persons aged				This calculation resulted in some division by 0 errors in
	17 and younger		/F ACE17 /	/Davage and 17 and various actions to /	cases where E_TOTPOP equals 0. These rows were
ED ACE17	estimate, 2012-	SVI	(E_AGE17 / E TOTPOP)*100	(Persons aged 17 and younger estimate / Total population estimate) * 100	revised with the estimated proportions set to 0 and their
EP_AGE17	2016 ACS	301	E_101P0P)*100	Total population estimate) * 100	corresponding MOEs set to -999. Two MOE calculations resulted in errors because the
					value under the square root was negative. For these
					rows, as the Census Bureau suggests, we used the
					formula for derived ratios, as opposed to that for derived
	Percentage of			((SQRT(MOE Population under 18 years^2 -	proportions. Instead of the subtraction in the standard
	persons aged		((SQRT(M_AGE17^2-	(Estimated proportion of persons aged 17	formula, we add. See A Compass for Understanding and
	17 and younger		((EP_AGE17/100)^2*M_T	and younger^2 * MOE Total	Using American Community Survey Data, page A-15
	estimate MOE,		OTPOP^2)))/E_TOTPOP)*	Population^2))) / Total population	(https://www.census.gov/content/dam/Census/library/p
MP_AGE17	2012-2016 ACS	SVI	100	estimate) * 100	ublications/2008/acs/ACSGeneralHandbook.pdf).
	Percentage of				
	civilian				
	noninstitutiona lized				
	population with				
	a disability				
	estimate, 2012-				
EP DISABL	2016 ACS	DP02	HC03_VC106		
	Percentage of		_		
	civilian				
	noninstitutiona				
	lized				
	population with				
	a disability				
MAD DICARI	estimate MOE,	DD03	UC04 VC106		
MP_DISABL	2012-2016 ACS Percentage of	DP02	HC04_VC106		
	single parent				
	households				
	with children				This calculation resulted in some division by 0 errors in
	under 18			(Single parent household with children	cases where E_HH equals 0. These rows were revised
	estimate, 2012-			under 18 estimate / Households estimate)	with the estimated proportions set to 0 and their
EP_SNGPNT	2016 ACS	SVI	(E_SNGPNT / E_HH) * 100	* 100	corresponding MOEs set to -999.

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
IVAIVIE	2010 DESCRIPTION	SVI IADEL(S)	TABLE FIELD CALCOLATION	CALCOLATION DESCRIPTION	Two MOE calculations resulted in errors because
					the value under the square root was negative. For
					these rows, as the Census Bureau suggests, we
					used the formula for derived ratios, as opposed to that for derived proportions. Instead of the
	Percentage of			((SQRT(MOE Single parent	subtraction in the standard formula, we add. See A
	single parent			households^2 - (Estimated	Compass for Understanding and Using American
	households with			proportion single parent	Community Survey Data, page A-15
	children under 18		((SQRT(M_SNGPNT^2-	households^2 * MOE	(https://www.census.gov/content/dam/Census/lib
MD CNCDNT	estimate MOE,	6.4	((EP_SNGPNT/100)^2*M_HH^2	Households^2))) / Households	rary/publications/2008/acs/ACSGeneralHandbook.
MP_SNGPNT	2012-2016 ACS Percentage	SVI)))/E_HH)*100	estimate) * 100	pdf).
	minority (all				
	persons except				This calculation resulted in some division by 0
	white, non-				errors in cases where E_HH equals 0. These rows
	Hispanic) estimate,			(Minority estimate / Total	were revised with the estimated proportions set to
EP_MINRTY	2012-2016 ACS	SVI	(E_MINRTY/E_TOTPOP)*100	population estimate) * 100	0 and their corresponding MOEs set to -999.
	Percentage minority (all				
	persons except				
	white, non-			((SQRT(MOE Minority^2 -	
	Hispanic) estimate		((SQRT(M_MINRTY^2-	(Estimated proportion minority^2	
	MOE, 2012-2016		((EP_MINRTY/100)^2*M_TOTP	* MOE Total population^2))) /	
MP_MINRTY	ACS	SVI	OP^2)))/E_TOTPOP)*100	Total population estimate) * 100	
	Percentage of persons (age 5+)				This calculation resulted in some division by 0
	who speak English				errors in cases where total population age 5 and
	"less than well"			(Persons who speak English "less	over equals 0. These rows were revised with the
	estimate, 2012-	SVI and		than well" estimate / Population	estimated proportions set to 0 and their
EP_LIMENG	2016 ACS	B16005	(E_LIMENG/HD01_VD01)*100	age 5 and over estimate) * 100	corresponding MOEs set to -999.

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
MP_LIIMENG	Percentage of persons (age 5+) who speak English "less than well" estimate MOE, 2012-2016 ACS	SVI and B16005	((SQRT(M_LIMENG^2- ((EP_LIMENG/100)^2*HD02_V D01^2)))/HD01_VD01)*100	((SQRT(MOE Persons who speak English less than well^2 - (Estimated proportion persons who speak English less than well^2 * MOE population age 5 and over^2))) / Population age 5 and over estimate) * 100	Two MOE calculations resulted in errors because the value under the square root was negative. For these rows, as the Census Bureau suggests, we used the formula for derived ratios, as opposed to that for derived proportions. Instead of the subtraction in the standard formula, we add. See <i>A Compass for Understanding and Using American Community Survey Data</i> , page A-15 (https://www.census.gov/content/dam/Census/lib rary/publications/2008/acs/ACSGeneralHandbook.pdf).
EP MUNIT	Percentage of housing in structures with 10 or more units estimate	SVI	(E MUNIT/E HU)*100	(Housing in structures with 10 or more units estimate / Housing units estimate)*100	This calculation resulted in some division by 0 errors in cases where E_HU equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.
	Percentage of housing in structures with 10 or more units estimate MOE	SVI	((SQRT(M_MUNIT^2- ((EP_MUNIT/100)^2*M_HU^2)))/E_HU)*100	((SQRT(MOE Housing in structures with 10 or more units^2 - (Estimated proportion housing in structures with 10 or more units^2 * MOE Housing units^2))) / Housing units estimate) * 100	Two MOE calculations resulted in errors because the value under the square root was negative. For these rows, as the Census Bureau suggests, we used the formula for derived ratios, as opposed to that for derived proportions. Instead of the subtraction in the standard formula, we add. See A Compass for Understanding and Using American Community Survey Data, page A-15 (https://www.census.gov/content/dam/Census/lib rary/publications/2008/acs/ACSGeneralHandbook.pdf).
EP_MOBILE	Percentage of mobile homes estimate	DP04	HC03_VC21		
MP_MOBILE	Percentage of mobile homes estimate MOE	DP04	HC04_VC21		

2016					
VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
EP_CROWD	Percentage of occupied housing units with more people than rooms estimate	SVI and DP04	(E_CROWD/HC01_VC04)*100	(Occupied housing units with more people than rooms estimate / Occupied housing units estimate)*100	This calculation resulted in some division by 0 errors in cases where HC01_VC04 equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.
MP_CROWD	Percentage of occupied housing units with more people than rooms estimate MOE	SVI and DP04	((SQRT(M_CROWD^2- ((EP_CROWD/100)^2*HC02_V C04^2)))/HC01_VC04)*100	((SQRT(MOE Occupied housing units with more people than rooms^2 - (Estimated proportion of occupied housing units with more people than rooms^2 * MOE Occupied housing units^2))) /Occupied housing units estimate) * 100	Some MOE calculations resulted in errors because the value under the square root was negative. For these rows, as the Census Bureau suggests, we used the formula for derived ratios, as opposed to that for derived proportions. Instead of the subtraction in the standard formula, we add. See A Compass for Understanding and Using American Community Survey Data, page A-15 (https://www.census.gov/content/dam/Census/library/publications/2008/acs/ACSGeneralHandbook.pdf).
EP_NOVEH	Percentage of households with no vehicle available estimate	DP04	HC03 VC85		
MP NOVEH	Percentage of households with no vehicle available estimate MOE	DP04	HC04 VC85		
EP_GROUPQ	Percentage of persons in institutionalized group quarters estimate, 2012-2016 ACS	SVI	(E_GROUPQ/E_TOTPOP)*100	(Persons in group quarters estimate / Total population estimate) * 100	This calculation resulted in some division by 0 errors in cases where E_TOTPOP equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.
MP_GROUPQ	Percentage of persons in institutionalized group quarters estimate MOE, 2012-2016 ACS	SVI	((SQRT(M_GROUPQ^2- ((EP_GROUPQ/100)^2*M_TOT POP^2)))/E_TOTPOP)*100	((SQRT(MOE Persons in group quarters^2 - (Estimated proportion persons in group quarters^2 * MOE Total population^2))) / Total population estimate) * 100	Some MOE calculations resulted in errors because the value under the square root was negative. For these rows, as the Census Bureau suggests, we used the formula for derived ratios, as opposed to that for derived proportions. Instead of the subtraction in the standard formula, we add. See A Compass for Understanding and Using American Community Survey Data, page A-15 (https://www.census.gov/content/dam/Census/library/publications/2008/acs/ACSGeneralHandbook.pdf).

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Percentile Percentage	. ,	In Excel: PERCENTRANK.INC on		
	of persons below		EP_POV array with 4 significant		
EPL_POV	poverty estimate	SVI	digits		
	Percentile Percentage		In Excel: PERCENTRANK.INC on		
	of civilian (age 16+)		EP_UNEMP array with 4		
EPL_UNEMP	unemployed estimate	SVI	significant digits		
					Per capita income necessarily reversed as high
					income equates with low vulnerability and vice
					versa.
			In Excel: 1-(PERCENTRANK.INC		Null values (-999) removed from the array before
EDI DOI	Percentile per capita	C) //	on EP_PCI array with 4		calculating output percentile ranks. Output for -999
EPL_PCI	income estimate	SVI	significant digits)		input cells set to -999.
	Percentile Percentage		In Excel: PERCENTRANK.INC on		
	of persons with no		=		
EPL NOHSDP	high school diploma (age 25+) estimate	SVI	EP_NOHSDP array with 4 significant digits		
EPL_NORSDP	(age 25+) estimate	3VI	Significant digits		Null values (-999) removed before calculating
	Sum of series for		EPL POV + EPL UNEMP +		output sum. Output for sums with null values in the
SPL THEME1	Socioeconomic theme	SVI	EPL PCI + EPL NOHSDP		same row set to -999.
JI L_IIILIVILI	Percentile ranking for	341	In Excel: PERCENTRANK.INC on		Null values (-999) removed from the array before
	Socioeconomic theme		SPL_THEME1 array with 4		calculating output percentile ranks. Output for -999
RPL THEME1	summary	SVI	significant digits		input cells set to -999.

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Percentile	,			
	percentage of		In Excel: PERCENTRANK.INC on		
	persons aged 65		EP_AGE65 array with 4		
EPL AGE65	and older estimate	SVI	significant digits		
	Percentile				
	percentage of				
	persons aged 17		In Excel: PERCENTRANK.INC on		
	and younger		EP_AGE17 array with 4		
EPL AGE17	estimate	SVI	significant digits		
_	Percentile				
	percentage of				
	civilian				
	noninstitutionalize				
	d population with		In Excel: PERCENTRANK.INC on		
	a disability		EP_DISABL array with 4		
EPL_DISABL	estimate	SVI	significant digits		
	Percentile				
	percentage of				
	single parent				
	households with		In Excel: PERCENTRANK.INC on		
	children under 18		EP_SNGPNT array with 4		
EPL_SNGPNT	estimate	SVI	significant digits		
	Sum of series for				
	Household				
	Composition		EPL_AGE65 + EPL_AGE17 +		
SPL_THEME2	theme	SVI	EPL_DISABL + EPL_SNGPNT		
	Percentile ranking				
	for Household		In Excel: PERCENTRANK.INC on		
	Composition		SPL_THEME2 array with 4		
RPL_THEME2	theme summary	SVI	significant digits		
	Percentile				
	percentage				
	minority (all				
	persons except		In Excel: PERCENTRANK.INC on		
	white, non-	l	EP_MINRTY array with 4		
EPL_MINRTY	Hispanic) estimate	SVI	significant digits		
	Percentile				
	percentage of				
	persons (age 5+)				
	who speak English		In Excel: PERCENTRANK.INC on		
EDI 11145110	"less than well"		EP_LIMENG array with 4		
EPL_LIMENG	estimate	SVI	significant digits		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Sum of series for	(2)			
	Minority				
	Status/Language				
SPL THEME3	theme	SVI	EPL MINRTY + EPL LIMENG		
	Percentile ranking				
	for Minority		In Excel: PERCENTRANK.INC on		
	Status/Language		SPL_THEME3 array with 4		
RPL_THEME3	theme	SVI	significant digits		
	Percentile	011	3.B		
	percentage				
	housing in				
	structures with 10		In Excel: PERCENTRANK.INC on		
	or more units		EP MUNIT array with 4		
EPL MUNIT	estimate	SVI	significant digits		
	Percentile	011	In Excel: PERCENTRANK.INC on		
	percentage mobile		EP MOBILE array with 4		
EPL MOBILE	homes estimate	SVI	significant digits		
1.103.11	Percentile	011	3.B		
	percentage				
	households with		In Excel: PERCENTRANK.INC on		
	more people than		EP CROWD array with 4		
EPL CROWD	rooms estimate	SVI	significant digits		
	Percentile				
	percentage				
	households with		In Excel: PERCENTRANK.INC on		
	no vehicle		EP_NOVEH array with 4		
EPL NOVEH	available estimate	SVI	significant digits		
	Percentile		5		
	percentage of				
	persons in				
	institutionalized		In Excel: PERCENTRANK.INC on		
	group quarters		EP_GROUPQ array with 4		
EPL_GROUPQ	estimate	SVI	significant digits		
_	Sum of series for		EPL MUNIT + EPL MOBIL +		
	Housing/Transport		EPL_CROWD + EPL_NOVEH +		
SPL THEME4	ation theme	SVI	EPL GROUPQ		
_	Percentile ranking				
	for		In Excel: PERCENTRANK.INC on		
	Housing/Transport		SPL_THEME4 array with 4		
RPL_THEME4	ation theme	SVI	significant digits		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
					Null values (-999) removed before calculating
	Sum of series		SPL_THEME1 + SPL_THEME2 +		output sum. Output for sums with null values in
SPL_THEMES	themes	SVI	SPL_THEME3 + SPL_THEME4		the same row set to -999.
			In Excel: PERCENTRANK.INC on		Null values (-999) removed from the array before
	Overall percentile		SPL_THEMES array with 4		calculating output percentile ranks. Output for -
RPL_THEMES	ranking	SVI	significant digits		999 input cells set to -999.
	Flag -the				
	percentage of				
	persons in poverty				
	is in the 90th				
	percentile (1 = yes,				
F_POV	0 = no)	SVI	EPL_POV >= 0.90		
	Flag -the				
	percentage of				
	civilian				
	unemployed is in				
	the 90th percentile				
F_UNEMP	(1 = yes, 0 = no)	SVI	EPL_UNEMP >= 0.90		
	Flag -per capita				
	income is in the				
	90th percentile (1				
F_PCI	= yes, 0 = no)	SVI	EPL_PCI >= 0.90		Output for -999 input cells set to -999.
	Flag -the				
	percentage of				
	persons with no				
	high school				
	diploma is in the				
	90th percentile (1				
F_NOHSDP	= yes, 0 = no)	SVI	EPL_NOHSDIP >= 0.90		
	Sum of flags for				Null values (-999) removed before calculating
	Socioeconomic		F_POV + F_UNEMP + F_PCI +		output sum. Output for sums with null values in
F_THEME1	Status theme	SVI	F_NOHSDP		the same row set to -999.
	Flag - the				
	percentage of				
	persons aged 65				
	and older is in the				
	90th percentile (1				
F AGE65	= yes, 0 = no)	SVI	EPL AGE65 >= 0.90		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Flag - the				
	percentage of				
	persons aged 17				
	and younger is in				
	the 90th percentile				
F_AGE17	(1 = yes, 0 = no)	SVI	EPL_AGE17 >= 0.90		
	Flag - the				
	percentage of				
	persons with a				
	disability is in the				
E DICARI	90th percentile (1	6) (1	EDI DICADI		
F_DISABL	= yes, 0 = no)	SVI	EPL_DISABL >= 0.90		
	Flag - the				
	percentage of single parent				
	households is in				
	the 90th percentile				
F SNGPNT	(1 = yes, 0 = no)	SVI	EPL SNGPNT >= 0.90		
1_31401141	Sum of flags for	341	E1 E_514G1 141 7 = 0.50		
	Household				
	Composition		F_AGE65 + F_AGE17 +		
F_THEME2	theme	SVI	F_DISABL + F_SNGPNT		
	Flag - the				
	percentage of				
	minority is in the				
	90th percentile (1				
F_MINRTY	= yes, 0 = no)	SVI	EPL_MINRTY >= 0.90		
	Flag - the				
	percentage those				
	with limited				
	English is in the				
E LINAENIC	90th percentile (1		EDI LIMENICA O CO		
F_LIMENG	= yes, 0 = no)	SVI	EPL_LIMENG >= 0.90		
	Sum of flags for				
	Minority				
	Status/Language	 			
F_THEME3	theme	SVI	F_MINRTY + F_LIMENG		

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Flag - the				
	percentage of				
	households in				
	multi-unit housing				
	is in the 90th				
	percentile (1 = yes,				
F_MUNIT	0 = no)	SVI	EPL_MUNIT >= 0.90		
	Flag - the				
	percentage of				
	mobile homes is in				
	the 90th percentile				
F_MOBILE	(1 = yes, 0 = no)	SVI	EPL_MOBILE >= 0.90		
	Flag - the				
	percentage of				
	crowded				
	households is in				
	the 90th percentile				
F_CROWD	(1 = yes, 0 = no)	SVI	EPL_CROWD >= 0.90		
	Flag - the				
	percentage of				
	households with				
	no vehicles is in				
	the 90th percentile				
F_NOVEH	(1 = yes, 0 = no)	SVI	EPL_NOVEH >= 0.90		
	Flag - the				
	percentage of				
	persons in				
	institutionalized				
	group quarters is				
	in the 90th				
	percentile (1 = yes,				
F_GROUPQ	0 = no)	SVI	EPL_GROUPQ >= 0.90		
	Sum of flags for		F_MUNIT + F_MOBILE +		
	Housing/Transport		F_CROWD + F_NOVEH +		
F_THEME4	ation theme	SVI	F_GROUPQ		
					Null values (-999) removed before calculating
	Sum of flags for		F_THEME1 + F_THEME2 +		output sum. Output for sums with null values in
F_TOTAL	the four themes	SVI	F_THEME3 + F_THEME4		the same row set to -999.

2016 VARIABLE		CENSUS or			
NAME	2016 DESCRIPTION	SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
	Adjunct variable -				
	Uninsured in the				
	total civilian				
	noninstitutionalize				
	d population				
	estimate, 2012-				
E_UNINSUR	2016 ACS	S2701	HC04_EST_VC01		
	Adjunct variable -				
	Uninsured in the				
	total civilian				
	noninstitutionalize				
	d population				
	estimate MOE,				
M_UNINSUR	2012-2016 ACS	S2701	HC04_MOE_VC01		
	Adjunct variable -				
	Percentage				
	uninsured in the				
	total civilian				
	noninstitutionalize				
	d population				
ED LINUNGUE	estimate, 2012-	62704	11005 507 11004		
EP_UNINSUR	2016 ACS	S2701	HC05_EST_VC01		
	Adjunct variable -				
	Percentage uninsured in the				
	total civilian				
	noninstitutionalize				
	d population				
	estimate MOE,				
MP UNINSUR	2012-2016 ACS	S2701	HC05 MOE VC01		
WII _OWINSON	2012 2010 ACS	32701	11603_1002_001	Derived from LandScan 2016 -	
				http://web.ornl.gov/sci/landscan/index.shtml.	
				We followed ORNL's instructions for processing	
				in ArcGIS, loading the LandScan grid first and	
				maintaining WGS84 projection parameters.	
				Using Spatial Analyst, we ran the Zonal	
	Adjunct variable -			Statistics as Table function to sum estimated	
	Estimated daytime			daytime population for each LandScan raster	Tracts having no LandScan cells that
	population,			cell to obtain an estimated daytime population	overlay have been assigned null values
E_DAYPOP	LandScan 2016	N/A		for each SVI 2016 census tract.	(i.e999).

SVI 2016 - SVI 2014 Crosswalk (ACS Changes)

Theme Colors
Socioeconomic
Household Composition/Disability
Minority Status/Language
Housing/Transportation

Some of the American Community Survey (ACS) variable names changed from 2014 to 2016. This summary table lists only the SVI variables for which calculations are affected by these changes. The SVI 2016 Data Dictionary immediately above details all the calculations.

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	2014 TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	2016 TABLE FIELD CALCULATION
E_AGE65	Persons aged 65 and older estimate, 2012-2016 ACS	S1501	HC01_EST_VC31		HC01_EST_VC32
M_AGE65	Persons aged 65 and older estimate MOE, 2012-2016 ACS	S1501	HC01_MOE_VC31		HC01_MOE_VC32
E_CROWD	At household level (occupied housing units), more people than rooms estimate, 2012-2016 ACS	DP04	HC01_VC113 + HC01_VC114	Estimate; OCCUPANTS PER ROOM - Occupied housing units - 1.01 to 1.50 + Estimate; OCCUPANTS PER ROOM - Occupied housing units - 1.51 or more	HC01_VC114 + HC01_VC115
M_CROWD	At household level (occupied housing units), more people than rooms estimate MOE, 2012-2016 ACS	DP04	SQRT(HC02_VC113^2 + HC02_VC114^2)	SQRT(MOE OCCUPANTS PER ROOM - Occupied housing units - 1.01 to 1.50^2+ MOE OCCUPANTS PER ROOM - Occupied housing units - 1.51 or more^2)	SQRT(HC02_VC114^2 + HC02_VC115^2)
E_NOVEH	Households with no vehicle available estimate, 2012-2016 ACS	DP04	HC01_VC84		HC01_VC85
M_NOVEH	Households with no vehicle available estimate MOE, 2012-2016 ACS	DP04	HC02_VC84		HC02_VC85

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	2014 TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	2016 TABLE FIELD CALCULATION
EP_NOVEH	Percentage of households with no vehicle available estimate	DP04	HC03_VC84		HC03_VC85
MP_NOVEH	Percentage of households with no vehicle available estimate MOE	DP04	HC04_VC84		HC04_VC85
E_UNINSUR	Adjunct variable - Uninsured in the total civilian noninstitutionalized population estimate, 2012-2016 ACS	S2701	HC02_EST_VC01		HC04_EST_VC01
M_UNINSUR	Adjunct variable - Uninsured in the total civilian noninstitutionalized population estimate MOE, 2012-2016 ACS	S2701	HC02_MOE_VC01		HC04_MOE_VC01
EP_UNINSUR	Adjunct variable - Percentage uninsured in the total civilian noninstitutionalized population estimate, 2012-2016 ACS	S2701	HC03_EST_VC01		HC05_EST_VC01
MP_UNINSUR	Adjunct variable - Percentage uninsured in the total civilian noninstitutionalized population estimate MOE, 2012-2016 ACS	S2701	HC03_MOE_VC01		HC05_MOE_VC01