CDC SVI 2016 Documentation - 2/13/2020

Please see the data dictionary as well as the CDC 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 Centers for Disease Control and Prevention Social Vulnerability Index?

ATSDR's Geospatial Research, Analysis & Services Program (GRASP) created CDC Social Vulnerability Index (SVI, hereafter) 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.

SVI indicates the relative vulnerability of every U.S. Census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. 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 SVI help communities be better prepared for hazardous events?

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.

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

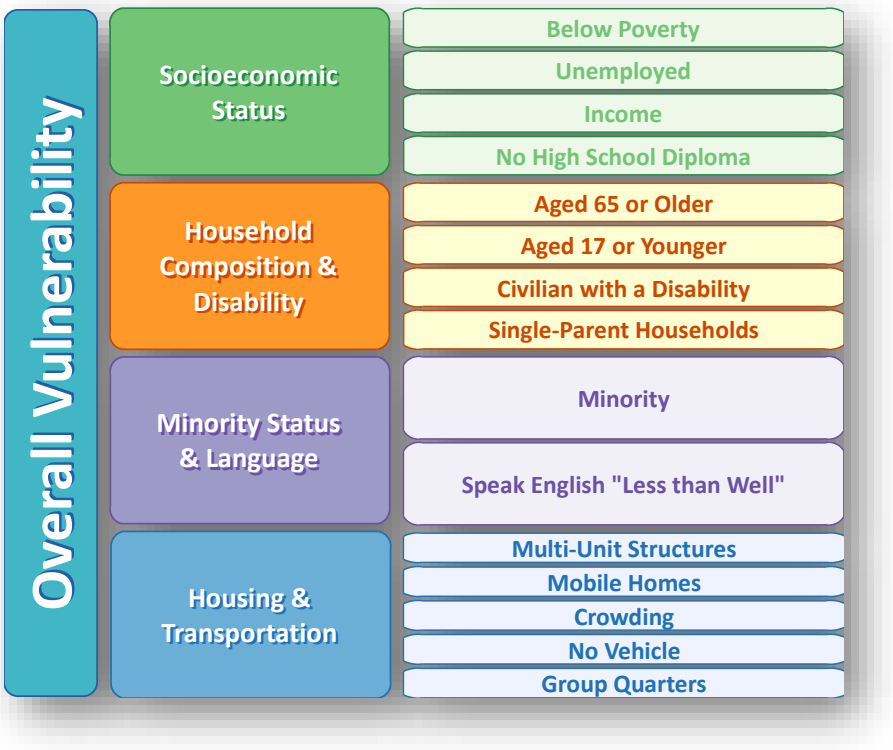
- SVI 2014 and 2016 are available for download in shapefile format from https://svi.cdc.gov/SVIDataToolsDownload.html. SVI 2014 and 2016 are also available via ArcGIS Online. Search on "CDC's Social Vulnerability Index."
- For SVI 2000 and 2010, keep the data in geodatabase format when downloading from 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 SVI 2014 documentation (https://svi.cdc.gov/Documents/Data/2014_SVI_Data/SVI2014Documentation.pdf) for the 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 Tribal Census Tracts (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
    - In the Text Import Wizard, choose the Delimited data type, then Next
    - 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 website 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:



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 - RPL_THEME1**

- **Household Composition & 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 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.

For a detailed description of SVI variable selection rationale and methods, see A Social Vulnerability Index for Disaster Management (https://svi.cdc.gov/A%20Social%20Vulnerability%20Index%20for%20Disaster%20Management.pdf).

Reproducibility Caveat

When replicating CDC SVI using Microsoft Excel or similar software, results may differ slightly from databases on the CDC SVI website or ArcGIS Online. This is due to variation in the number of decimal places used by the different software programs. For purposes of automation, we developed CDC SVI using SQL programming language. Because the SQL programming language uses a different level of precision compared to Excel and similar software, reproducing CDC SVI in Excel may marginally differ from CDC SVI databases downloaded from the CDC SVI website. For future iterations of CDC SVI, beginning with CDC SVI 2018; we plan to modify the SQL automation process for constructing CDC SVI to align with that of Microsoft Excel. If there are any questions, please email the CDC SVI Coordinator at svi_coordinator@cdc.gov.

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 - RPL_THEME1**
- **Household Composition & Disability - RPL_THEME2**
- **Minority Status & Language - RPL_THEME3**
- **Housing & Transportation - RPL_THEME4**

The overall tract summary ranking variable is RPL_THEMES.

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
ST	State-level FIPS code	S0601	FIPS	In Excel, from Tract-level FIPS code, LEFT (FIPS, 2)	
STATE	State name	S0601	GEO.display-label	In Excel, use DATA| Text to Columns to extract state name	
ST_ABBR	State abbreviation	N/A	N/A	Joined from Esri state boundary shapefile	
STCNTY	County-level FIPS code	S0601	FIPS	In Excel, from Tract-level FIPS code, LEFT (FIPS, 5)	In the county-level SVI database, the 5-digit STCNTY field is the FIPS field, used for joins.
COUNTY	County name	S0601	GEO.display-label	In Excel, use DATA| Text to Columns to extract county name	
FIPS	Tract-level FIPS code	S0601	GEO.id	In Excel, RIGHT (GEO.id, 11)	
LOCATION	Text description of tract, county, state	S0601	GEO.display-label		
AREA_SQMI	Tract area in square miles	Census Cartographic Boundary File - U.S. Tracts 2016 500K	ALAND * 3.86102e-7	Conversion from square meters to square miles	
E_TOTPOP	Population estimate, 2012-2016 ACS	S0601	HC01_EST_VC01		
M_TOTPOP	Population estimate MOE, 2012-2016 ACS	S0601	HC01_MOE_VC01		
E_HU	Housing units estimate, 2012-2016 ACS	DP04	HC01_VC03		

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
M_HU	Housing units estimate MOE, 2012-2016 ACS	DP04	HC02_VC03		
E_HH	Households estimate, 2012-2016 ACS	DP02	HC01_VC03		
M_HH	Households estimate MOE, 2012-2016 ACS	DP02	HC02_VC03		
E_POV	Persons below poverty estimate, 2012-2016 ACS	B17001	HD01_VD02		
M_POV	Persons below poverty estimate MOE, 2012-2016 ACS	B17001	HD02_VD02		
E_UNEMP	Civilian (age 16+) unemployed estimate, 2012-2016 ACS	DP03	HC01_VC07		
M_UNEMP	Civilian (age 16+) unemployed estimate MOE, 2012-2016 ACS	DP03	HC02_VC07		
E_PCI	Per capita income estimate, 2012-2016 ACS	B19301	HD01_VD01		Fewer rows than other variables - joined to Census 2016 tracts. Contains null cells (i.e. -999).
M_PCI	Per capita income estimate MOE, 2012-2016 ACS	B19301	HD02_VD01		Fewer rows than other variables - joined to Census 2016 tracts
E_NOHSDP	Persons (age 25+) with no high school diploma estimate, 2012-2016 ACS	B06009	HD01_VD03		
M_NOHSDP	Persons (age 25+) with no high school diploma estimate MOE, 2012-2016 ACS	B06009	HD02_VD03		

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

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
E_MINRTY	Minority (all persons except white, non-Hispanic) estimate, 2012-2016 ACS	B01001H	E_TOTPOP - HD01_VD01		
M_MINRTY	Minority (all persons except white, non-Hispanic) estimate MOE, 2012-2016 ACS	B01001H	SQRT(M_TOTPOP^2 + HD02_VD01^2)	SQRT (MOE total population^2 + MOE white, non-Hispanic^2)	
E_LIMENG	Persons (age 5+) who speak English "less than well" estimate, 2012-2016 ACS	B16005	HD01_VD07 + HD01_VD08 + HD01_VD12 + HD01_VD13 + HD01_VD17 + HD01_VD18 + HD01_VD22 + HD01_VD23 + HD01_VD29 + HD01_VD30 + HD01_VD34 + HD01_VD35 + HD01_VD39 + HD01_VD40 + HD01_VD44 + HD01_VD45	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" + Estimate; Foreign born: - Speak other Indo-European languages: - Speak English "not at all" + Estimate; Foreign born: - Speak Asian and Pacific Island languages: - Speak English "not well" + Estimate; Foreign born: - Speak Asian and Pacific Island languages: - Speak English "not at all" + Estimate; Foreign born: - Speak other languages: - Speak English "not well" + Estimate; Foreign born: - Speak other languages: - Speak English "not at all"	

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

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

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
M_GROUPQ	Persons in institutionalized group quarters estimate MOE, 2012-2016 ACS	B26001	HD02_VD01		
EP_POV	Percentage of persons below poverty estimate	S0601	HC01_EST_VC67		
MP_POV	Percentage of persons below poverty estimate MOE	S0601	HC01_MOE_VC67		
EP_UNEMP	Percentage of civilian (age 16+) unemployed estimate	DP03	HC03_VC12		
MP_UNEMP	Percentage of civilian (age 16+) unemployed estimate MOE	DP03	HC04_VC12		
EP_PCI	Per capita income estimate, 2012-2016 ACS	B19301	HD01_VD01		Value is the same as E_PCI
MP_PCI	Per capita income estimate MOE, 2012-2016 ACS	B19301	HD02_VD01		Value is the same as M_PCI
EP_NOHSDP	Percentage of persons with no high school diploma (age 25+) estimate	S0601	HC01_EST_VC46		
MP_NOHSDP	Percentage of persons with no high school diploma (25+) estimate MOE	S0601	HC01_MOE_VC46		
EP_AGE65	Percentage of persons aged 65 and older estimate, 2012-2016 ACS	S0101	HC01_EST_VC31		

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
MP_AGE65	Percentage of persons aged 65 and older estimate MOE, 2012-2016 ACS	S0101	HC01_MOE_VC31		
EP_AGE17	Percentage of persons aged 17 and younger estimate, 2012-2016 ACS	SVI	(E_AGE17 / E_TOTPOP)*100	(Persons aged 17 and younger 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_AGE17	Percentage of persons aged 17 and younger estimate MOE, 2012-2016 ACS	SVI	((SQRT(M_AGE17^2-((EP_AGE17/100)^2*M_TOTPOP^2)))/E_TOTPOP)*100	((SQRT(MOE Population under 18 years^2 - (Estimated proportion of persons aged 17 and younger^2 * MOE Total Population^2))) / Total population 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/library/publications/2008/acs/ACSGeneralHandbook.pdf).
EP_DISABL	Percentage of civilian noninstitutionalized population with a disability estimate, 2012-2016 ACS	DP02	HC03_VC106		
MP_DISABL	Percentage of civilian noninstitutionalized population with a disability estimate MOE, 2012-2016 ACS	DP02	HC04_VC106		
EP_SNGPNT	Percentage of single parent households with children under 18 estimate, 2012-2016 ACS	SVI	(E_SNGPNT / E_HH) * 100	(Single parent household with children under 18 estimate / Households estimate) * 100	This calculation resulted in some division by 0 errors in cases where E_HH equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
MP_SNGPNT	Percentage of single parent households with children under 18 estimate MOE, 2012-2016 ACS	SVI	((SQRT(M_SNGPNT^2-((EP_SNGPNT/100)^2*M_HH^2)))/E_HH)*100	((SQRT(MOE Single parent households^2 - (Estimated proportion single parent households^2 * MOE Households^2))) / Households 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/library/publications/2008/acs/ACSGeneralHandbook.pdf).
EP_MINRTY	Percentage minority (all persons except white, non-Hispanic) estimate, 2012-2016 ACS	SVI	(E_MINRTY/E_TOTPOP)*100	(Minority estimate / Total population estimate) * 100	This calculation resulted in some division by 0 errors in cases where E_HH equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.
MP_MINRTY	Percentage minority (all persons except white, non-Hispanic) estimate MOE, 2012-2016 ACS	SVI	((SQRT(M_MINRTY^2-((EP_MINRTY/100)^2*M_TOTPOP^2)))/E_TOTPOP)*100	((SQRT(MOE Minority^2 - (Estimated proportion minority^2 * MOE Total population^2))) / Total population estimate) * 100	
EP_LIMENG	Percentage of persons (age 5+) who speak English "less than well" estimate, 2012-2016 ACS	SVI and B16005	(E_LIMENG/HD01_VD01)*100	(Persons who speak English "less than well" estimate / Population age 5 and over estimate) * 100	This calculation resulted in some division by 0 errors in cases where total population age 5 and over equals 0. These rows were revised with the estimated proportions set to 0 and their corresponding MOEs set to -999.

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
MP_LIMENG	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_VD01^2)))/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 *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_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.
MP_MUNIT	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/library/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_VC04^2)))/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_TOTPOP^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 NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
EPL_POV	Percentile Percentage of persons below poverty estimate	SVI	In Excel: PERCENTRANK.INC on EP_POV array with 4 significant digits		
EPL_UNEMP	Percentile Percentage of civilian (age 16+) unemployed estimate	SVI	In Excel: PERCENTRANK.INC on EP_UNEMP array with 4 significant digits		
EPL_PCI	Percentile per capita income estimate	SVI	In Excel: 1-(PERCENTRANK.INC on EP_PCI array with 4 significant digits)		Per capita income necessarily reversed as high income equates with low vulnerability and vice versa. Null values (-999) removed from the array before calculating output percentile ranks. Output for -999 input cells set to -999.
EPL_NOHSDP	Percentile Percentage of persons with no high school diploma (age 25+) estimate	SVI	In Excel: PERCENTRANK.INC on EP_NOHSDP array with 4 significant digits		
SPL_THEME1	Sum of series for Socioeconomic theme	SVI	EPL_POV + EPL_UNEMP + EPL_PCI + EPL_NOHSDP		Null values (-999) removed before calculating output sum. Output for sums with null values in the same row set to -999.
RPL_THEME1	Percentile ranking for Socioeconomic theme summary	SVI	In Excel: PERCENTRANK.INC on SPL_THEME1 array with 4 significant digits		Null values (-999) removed from the array before calculating output percentile ranks. Output for -999 input cells set to -999.

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

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
SPL_THEME3	Sum of series for Minority Status/Language theme	SVI	EPL_MINRTY + EPL_LIMENG		
RPL_THEME3	Percentile ranking for Minority Status/Language theme	SVI	In Excel: PERCENTRANK.INC on SPL_THEME3 array with 4 significant digits		
EPL_MUNIT	Percentile percentage housing in structures with 10 or more units estimate	SVI	In Excel: PERCENTRANK.INC on EP_MUNIT array with 4 significant digits		
EPL_MOBILE	Percentile percentage mobile homes estimate	SVI	In Excel: PERCENTRANK.INC on EP_MOBILE array with 4 significant digits		
EPL_CROWD	Percentile percentage households with more people than rooms estimate	SVI	In Excel: PERCENTRANK.INC on EP_CROWD array with 4 significant digits		
EPL_NOVEH	Percentile percentage households with no vehicle available estimate	SVI	In Excel: PERCENTRANK.INC on EP_NOVEH array with 4 significant digits		
EPL_GROUPQ	Percentile percentage of persons in institutionalized group quarters estimate	SVI	In Excel: PERCENTRANK.INC on EP_GROUPQ array with 4 significant digits		
SPL_THEME4	Sum of series for Housing/Transportation theme	SVI	EPL_MUNIT + EPL_MOBIL + EPL_CROWD + EPL_NOVEH + EPL_GROUPQ		
RPL_THEME4	Percentile ranking for Housing/Transportation theme	SVI	In Excel: PERCENTRANK.INC on SPL_THEME4 array with 4 significant digits		

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
SPL_THEMES	Sum of series themes	SVI	SPL_THEME1 + SPL_THEME2 + SPL_THEME3 + SPL_THEME4		Null values (-999) removed before calculating output sum. Output for sums with null values in the same row set to -999.
RPL_THEMES	Overall percentile ranking	SVI	In Excel: PERCENTRANK.INC on SPL_THEMES array with 4 significant digits		Null values (-999) removed from the array before calculating output percentile ranks. Output for -999 input cells set to -999.
F_POV	Flag - the percentage of persons in poverty is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_POV >= 0.90		
F_UNEMP	Flag - the percentage of civilian unemployed is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_UNEMP >= 0.90		
F_PCI	Flag - per capita income is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_PCI >= 0.90		Output for -999 input cells set to -999.
F_NOHSDP	Flag - the percentage of persons with no high school diploma is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_NOHSDIP >= 0.90		
F_THEME1	Sum of flags for Socioeconomic Status theme	SVI	F_POV + F_UNEMP + F_PCI + F_NOHSDP		Null values (-999) removed before calculating output sum. Output for sums with null values in the same row set to -999.
F_AGE65	Flag - the percentage of persons aged 65 and older is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_AGE65 >= 0.90		

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
F_AGE17	Flag - the percentage of persons aged 17 and younger is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_AGE17 >= 0.90		
F_DISABL	Flag - the percentage of persons with a disability is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_DISABL >= 0.90		
F_SNGPNT	Flag - the percentage of single parent households is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_SNGPNT >= 0.90		
F_THEME2	Sum of flags for Household Composition theme	SVI	F_AGE65 + F_AGE17 + F_DISABL + F_SNGPNT		
F_MINRTY	Flag - the percentage of minority is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_MINRTY >= 0.90		
F_LIMENG	Flag - the percentage those with limited English is in the 90th percentile (1 = yes, 0 = no)	SVI	EPL_LIMENG >= 0.90		
F_THEME3	Sum of flags for Minority Status/Language theme	SVI	F_MINRTY + F_LIMENG		

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

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
E_UNINSUR	Adjunct variable - Uninsured in the total civilian noninstitutionalized population estimate, 2012-2016 ACS	S2701	HC04_EST_VC01		
M_UNINSUR	Adjunct variable - Uninsured in the total civilian noninstitutionalized population estimate MOE, 2012-2016 ACS	S2701	HC04_MOE_VC01		
EP_UNINSUR	Adjunct variable - Percentage uninsured in the total civilian noninstitutionalized population estimate, 2012-2016 ACS	S2701	HC05_EST_VC01		
MP_UNINSUR	Adjunct variable - Percentage uninsured in the total civilian noninstitutionalized population estimate MOE, 2012-2016 ACS	S2701	HC05_MOE_VC01		

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	NOTES
E_DAYPOP	Adjunct variable - Estimated daytime population, LandScan 2016	N/A		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 Statistics as Table function to sum estimated daytime population for each LandScan raster cell to obtain an estimated daytime population for each SVI 2016 census tract.	Tracts having no LandScan cells that overlay have been assigned null values (i.e. -999).

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)

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	2014 TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	2016 TABLE FIELD CALCULATION
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
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

2016 VARIABLE NAME	2016 DESCRIPTION	CENSUS or SVI TABLE(S)	2014 TABLE FIELD CALCULATION	CALCULATION DESCRIPTION	2016 TABLE FIELD CALCULATION
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