# SecDev Urban Pandemic Preparedness Index: Methodology for Cities in the United States

The COVID-19 global pandemic has hit most cities of the world with the same force, however, some areas became worst affected whilst others were able to fend more effectively than others. The SecDev Urban Pandemic Preparedness Index (the "SecDev Index" or "Index") looks at the resilience at a city level to understand the hazard characteristics in comparison to its environment across seven (7) dimensions: economic, social, demographic, quality of life, burden of chronic disease, clinical care capability and digital preparedness. Thus, quantifying risks helps better manage them.

A 'Resilience Map' of a city helps emergency planners and community executives to quickly (visually) identify the specific communities (or geographic areas) that are most vulnerable and hence need support before, during and after a pandemic outbreak. Moreover, the resilience map could help city executives to allocate (scarce) resources to prepare for, put forth mitigation plans, respond to and/or use it to help in the recovery phase of an epidemic.

# Index Composition

The SecDev Index is composed of a total of **42 factors**. Parsimony and practicality (of both data collection and relevance) have been kept in mind while choosing these factors. In the event, a specific factor is not available for a census tract, then the ZCTA level data would be used; however, in the event even that information is not available or not accessible, then an appropriate proxy would be chosen to capture that specific indicator. Lastly, for the factors below, if data from public sources or a suitable proxy are not available, only then a factor is 'temporarily' dropped with an understanding that it could always be reinstated upon discussing with city officials on suitable measures or obtaining relevant data for the same.

These factors are chosen taking into account are classified under the following **7 themes**:

1. Economic factors (4)
    a. Below poverty
    b. Unemployment
    c. Income
    d. No high-school diploma
2. Demographic factors (4)
    a. 65 years or older
    b. 17 years or younger
    c. Disability population (older than 5 years)

    d. Vulnerable households (single parent households with children less than 18 years old and single households with 65+ years living alone)
3. Social Factors (5)
    a. Minority (Immigrants)
    b. Non-native language speakers
    c. No Vehicle
    d. Crowding
    e. Multi-unit structures, mobile homes, group quarters
4. Quality of Life (4)
    a. Air quality (coarse particle pollution, fine particle pollution, nitrogen dioxide
    b. Life expectancy at birth
    c. Infant mortality
    d. Suicides
5. Burden of (Chronic) Disease (10)
    a. Arthritis
    b. High BP (Hypertension)
    c. Cancer
    d. Asthma
    e. CHD (Coronary Heart Disease)
    f. COPD (Chronic Obstructive Pulmonary Disease)
    g. Diabetes
    h. High Cholesterol
    i. Kidney Disease
    j. Stroke
6. Clinical Care and Lifestyle Choices (Note: Data for 2016, unless otherwise noted) (16)
    a. Health Insurance among adults
    b. Binge Drinking
    c. Checkup for adults
    d. Cholesterol Screen
    e. Colon Screen
    f. Core Clinical Services for adults above 65 (Male)
    g. Core Clinical Services for adults above 65 (Female)
    h. Current smoking
    i. Dental checkups
    j. Mental health
    k. Physical health
    l. Leisure Time and Physical Activity
    m. Mammography using women aged above 50 years
    n. Obesity
    o. Pap test usage among women

    p. Sleep Deprivation among adults
    q. Number of hospital beds
    r. Number of ICU beds
7. Digital Preparedness (3)
    a. Households that have no computer or computing device
    b. Households that have a cellular (mobile) data plan
    c. No access to the Internet at this house, apartment, or mobile home

An attempt is made to find data (from publicly available sources) for each factor; however, if a factor data is unavailable, then either a proxy variable is used or in the extreme event it is removed with appropriate justification.

# Ranking

The SecDev Urban Resilience Index would rank (and calculate an index) each census tract within a city on three (3) levels:

- First level, would be on each of these 42 individual factors
- Second level, it would provide an index for each census tract on each of the 7 themes
- Third (final) level, it would provide an aggregated single index for each census tract

In other words, the methodology generated percentile rank among all tracts within a city for each of the: (1) 42 individual factors, (2) 7 themes and (3) its overall position within a city. The theme rankings, for each of the 7 themes, are obtained by calculating a percentile ranking of the average (equally weighted sum) of the percentile rankings of the individual factors within that specific theme. Lastly, the overall tract urban preparedness ranking is obtained by calculating a percentile ranking of the sums of each theme.

Tract rankings are based on percentile ranking. Percentile ranking values range between 0 and 100, with higher values indicating greater resilience and lower values implying vulnerability.

Percentile rank (PR) refers to the percentage of scores that is equal to or less than a given score and is calculated based on the total number of ranks, number of ranks below and above percentile. PR is useful to understand quickly as to how a particular score will compare to the other values or observations or scores in a given dataset or in a given distribution of scores. For example, the PR method is used to calculate student rankings within a specific grade and within a specific curriculum. This gives a measure to meaningfully and relatively compare performance of a specific cohort of students. For avoidance of doubt,

the percentile rank of a class of students in grade 9 in Ontario cannot be compared to another student in grade 9 in Dallas, unless the data is standardized across both places.

Moreover, for ease of identification, the census tracts in the bottom 10% (i.e, tracts in the 10th percentile) and top 10% (i.e, tracts at the 90th percentile values) are highlighted using two independent 'flags'. In other words, the bottom 10% were assigned the *vulnerability flag* and the top 10% of the census tracts were assigned the *resilience flag*. These flags are calculated for each of the 42 factors and for the 7 themes and also at the unified overall index level.

# Area Measure

In the United States, there are different measures of area that are available for the purpose of divvying up a city. Each has their pros and cons. The various options are:

I. **ZIP (Zone Improvement Plan) Codes**. These are developed by USPS in the US for the purpose of delivering mail to designated delivery points within the country. However, this is a very broad area and sometimes the ZIP codes are known to cross state lines or city boundaries. For example, Zip Code 85254 is assigned to Scottsdale, AZ; however, 85% of its territory is inside the city limits of Phoenix.

II. **ZCTA (Zip Code Tabulation Area)**. The US Census Bureau developed ZCTA as statistical geographic entities (redrawn ZIP codes) to help better tabulate summary statistics within a specific area. This therefore does away with problems with ZIP codes. However, this area measure is still very wide.

III. **Community Areas**. This is a much more narrowed down area measure. However, data as per community area does not seem to be uniformly and readily available across all cities.

IV. **Census Tracts**. This area measure divides the city into viable and meaningful areas and gives accurate insight into the conditions within a 'micro' area of a city. Moreover, because the US Census Department collects data according to this unit of measure, statistics for various socio-economic indicators are uniformly available across all US cities.

The SecDev Index uses the '*Census Tract*' as the measure of area. For example, the City of Los Angeles has only 155 ZCTAs whilst it has 1012 Census Tracts, and studying the city at the census tract level would only help the city administrators plan and respond at a more micro-level.

# Other Notes

- The SecDev Index pertains to specific US Cities and the mapping and analysis cannot be used to compare with performance against other US Cities or with other cities across the globe, for which this index is calculated.
- All name changes of ACS field names from previous versions have been documented in detail below.
- There are some census tracts that have either zero estimates or blank values. These tracts were removed during the ranking process. However, these were kept in the database for further investigation.

# Factors, their Sources & Calculations

| Variable Name | Description | Census or SVI Table | Table Field Calculation | Calculation Notes | Source |
|---|---|---|---|---|---|
| **GENERIC DATA (Example Sources are of the City of Los Angeles)** | | | | | |
| ST | State Name | S0601 | In Excel, use DATA - Text to Columns to extract the state name and the county name | | https://data.census.gov/cedsci/table?q=80510&g=0500000US06037.140000&tid=ACSST5Y2018.S0601&hidePreview=true |
| COUNTY | County Name | | | | |
| TRACTCE | Census Tract Number | Census Cartographic Boundary File - U.S. Tracts 2018 500K | TRACTCE | ALAND measures current land area in square meter and is converted to square miles; The source file accessed on 01 Jan 2021. The LA County FIPS code is **06037** (06 is state code and 037 is LA county). There are 1012 Census tracts in the | https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html (In this website, choose the Census Tract based Files; choose California and then filter out appropriately) **LA City Census Tracts 2010:** https://geohub.lacity.org/datasets/1cdac8ba72ef4b84a468ac29 |

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| Area_SqML (Original data is in Square Meters, this is converted to Square Miles) | Census tract area in square miles | | ALAND * 3.86102e-7 | City of Los Angeles. This is according to LA Census data 2010 | 5629a2e0_1?geometry=-120.221%2C33.621%2C-116.603%2C34.418&selectedAttribute=AMIPOP_D |
| TOTPOP_E | Population est, 2015-19 ACS | S0601 | S0601_C01_001E | | https://data.census.gov/cedsci/table?q=80510&g=0500000US06037.140000&tid=ACSST5Y2018.S060 |
| TOTPOP_M | Population est 2015-19 ACS MOE | | S0601_C01_001M | | |
| MEDNAGE_E (Years) | Median Age of populat-ion est, 2015-19 ACS | | S0601_C01_010E | | |
| MEDNAGE_M (Years) | Median Age of Populat-ion est 2015-19 ACS MOE | | S0601_C01_010M | | |
| POP_ML_E | Male population as % of total population estimate 2015-19 ACS | | S0601_C01_011E | | |

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| POP_ML_M | Male population as % of total population estimate 2015-19 ACS MOE | | S0601_C01_011M | | |
| POP_FML_E | Female population as % of total population estimate 2015-19 ACS | | S0601_C01_012E | | |
| POP_FML_M | Female population as % of total population estimate 2015-19 ACS MOE | | S0601_C01_012M | | |
| POP_DENSITY | The density of population per square mile of a census tract | CALC-ULATED | | = [Total population estimate of the census tract (TOTPOP_E)] / [Area of the census tract in square miles] | |
| Population Ethnicity | The percentage estimates of population by ethnicity | DP05 | DP05_0037PE (White); DP05_0038PE (African American); DP05_0039PE (American Indians/Alaska Natives); DP05_0044PE (Asian);DP05_0052PE (Native Hawaiian Other Pacific Islanders) DP05_0071PE (Hispanic or Latino) | | https://data.census.gov/cedsci/table?q=DP05&g=0500000US06037.140000&tid=ACSDP5Y2018.DP05&hidePreview=true |
| HHD_E | Number of households in a census tract, stimate | DP02 | DP02_0001E | | https://data.census.gov/cedsci/table?q=DP02&g=0500000US06037.140000&tid=ACSDP5Y2019.DP02&hideP |

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| HHD_M | Number of households in a census tract, estimate, MOE | | DP002_0001M | | review=false |
| **ECONOMIC FACTORS (4)** | | | | | |
| PVRTY_E | Persons below poverty in last 12 months, estimate 2015-19 ACS | B17001 | B17001_002E | | https://data.census.gov/cedsci/table?t=Age%20and%20Sex%3APoverty&g=0500000US06037.140000&tid=ACSDT5Y2019.B17001&moe=false&tp=false&hidePreview=true |
| PVRTY_M | Persons below poverty in the last 12 months, estimate MOE (Margin of Error) 2015-19, ACS | | B17001_002M | | |
| PVRTY_PE | Percentage of persons below poverty, estimate | S0601 | S0601_C01_049E | An estimate of % of people below the poverty line in each census tract | https://data.census.gov/cedsci/table?q=80510&g=0500000US06037.140000&tid=ACSST5Y2018.S0601&hidePreview=true |

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| PVRTY_ME | Percentage of persons below poverty estimate, MOE | | S0601_C01_049M | | |
| PVRTY_PLR | Percentile percentage of persons below poverty estimate (Poverty Index) | CALC-ULATED | Formula used is: PERCENTRANK.I NC on PVRTY_PE array with 4 significant digits | In this case, the initial percentile rank that was based on % of population below poverty line, i.e, high poverty percentage would give a high percentile rank; however, to make this consistent with the SecDev scale, this initial percentile rank is inverted to the final percentile rank (PVRTY_PLR).<br><br>In summary, high poverty rate, means low percentile rank (after inversion) and means highly vulnerable. | |
| PVRTY_FLAG_ VLNRBL | A binary variable (Flag) that takes 1, if the % of persons in poverty is in the 10th percentile (1 = yes, 0 = no) | | PVRTY_PLR < = 0.10 | This binary variable is 1 for all the most vulnerable census tracts | |
| PVRTY_FLAG_ RSLNC | A binary variable (Flag) that takes 1, if the % of persons in poverty is in the 90th percentile (1 = yes, 0 = no | | PVRTY_PLR > = 0.90 | This binary variable is 1 for all the most resilient tracts | |

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| UNEMP_E | Unemployed civilians (age 16+ years), estimate 2015-19 ACS | DP03 | DP03_0005E | | https://data.census.gov/cedsci/table?q=unemployment&g=0500000US06037.140000&tid=ACSDP5Y2017.DP03&hidePreview=true |
| UNEMP_M | Unemployed civilians (age 16+ years), estimate MOE 2015-19 ACS | | DP03_0005M | | |
| UNEMP_PE | Percentage Unemployed civilians (age 16+), estimate | | DP03_0005PE | The denominator is population that is above 16+ (not the total population) | |
| UNEMP_PM | Percentage Unemployed civilians (age 16+) MOE, estimate | | DP03_0005PM | | |
| UNEMP_PLR | Percentile Percentage of civilian (age 16+) unemployed estimate (Unemployment Index) | CALC-ULATED | Formula used is: PERCENTRANK.INC on UNEMP_PE array with 4 significant digits | In this case, the initial percentile rank that was based on % of population that is aged 16+ and unemployed, i.e, high unemployment rate would mean a high percentile rank; however, to make this consistent with our scale, this initial percentile rank is inverted to the final percentile rank (UNEMP_PLR).<br><br>In summary, a high unemployment rate, means low percentile rank (after inversion) and this means high vulnerability. And, vice versa. | |

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| UNEMP_FLAG_VLNRBL | A binary variable (Flag) that takes 1, if the % of persons in poverty is in the 10th percentile (1 = yes, 0 = no) | | UNEMP_PLR <= 0.10 | This binary variable is 1 for all the most vulnerable census tracts | |
| UNEMP_FLAG_RSLNC | A binary variable (Flag) that takes 1, if the % of persons in poverty is in the 90th percentile (1 = yes, 0 = no | | UNEMP_PLR >= 0.90 | This binary variable is 1 for all the most resilient census tracts | |
| PCI_E | Per Capita Income Estimate, 2015-19 ACS | DP03 | DP03_0088E | INCOME AND BENEFITS (IN 2019 INFLATION-ADJUSTED DOLLARS) | https://data.census.gov/cedsci/table?q=unemployment&g=0500000US06037.140000&tid=ACSDP5Y2017.DP03&hidePreview=true |
| PCI_M | Per Capita Income Estimate MOE, 2015-19 ACS | | DP03_0088M | | |

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| PCI_PLR | Percentile per capita income estimate (Income Index) | CALC-ULATED | Formula used is: PERCENTRANK.INC on PCI_E array with 4 significant digits | This index is straightforward as high index means resilient tract and vice versa, hence there is no need for inversion for this index | |
| PCI_FLAG_VLNRBL | A binary variable that takes 1, if the PCI index is less than 0.10, else 0 | | PCI_PLR < = 0.10 | This is a binary variable that indicates all the most vulnerable tracts | |
| PCI_FLAG_RSLNC | A binary variable that takes 1, if the PCI index is greater than 0.90, else 0 | | PCI_PLR >= 0.90 | This is a binary variable that indicates all the most resilient tracts | |
| NOHSDP_E | Persons aged 25+ with no high school diploma, estimate, 2015-19, ACS | B06009 | B06009_002E | In 2018, CDC SVI, they used S0601. However, in 2019 this variable was not available at a census tract level | https://data.census.gov/cedsci/table?q=B06009&g=0500000US06037.140000&tid=ACSDT5Y2019.B06009&hidePreview=false |
| NOHSDP_M | Persons aged 25+ with no high school diploma, estimate, MOE, 2015-19, ACS | | B06009_002M | | |

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| NOHSDP_PE | Percentage of persons aged 25+ with no high school diploma, estimate | | = B06009_002E/B06009_001E ( the percentage is calculated by dividing total person above 25+ with no high school diploma by total persons above 25+) | | |
| NOHSDP_PM | Percentage of persons aged 25+ with no high school diploma, MOE estimate | | = '=((SQRT(B06009_002M^2 - (NOHSDP_PE^2 * B06009_001M^2)/B06009_001E)*100 | | |
| NOHSDP_PLR | Percentile Percentage of civilian (aged 25+) that did not have a high school diploma (Education Index) | CALC-ULATED | Formula used is: PERCENTRANK.INC on NOHSDP_PE array with 4 significant digits | The original percentile is inverted to make it consistent with SecDev Scale. So, a high NOHSDP_PE means a low percentile rank meaning high vulnerability, and vice versa | |
| NOHSDP_FLAG_VLNRBL | A binary variable that takes 1 for all the tracts that have a NOHSDP_PLR <= 0.10 | | NOHSDP_PLR <= 0.10 | This binary variable indicates the most vulnerable tracts | |
| NOHSDP_FLAG_RSLNC | A binary variable that takes 1 for all the tracts that have a NOHSDP_PLR >= 0.90 | | NOHSDP_PLR >= 0.90 | This binary variable indicates the most resilient tracts | |
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| DEMOGRAPHIC FACTORS (4) | | | | | |
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| AGE65+_E | Persons aged 65 and over, estimate, 2015-19, ACS | S0601 | (S0601_C01_008E + S0601_C01_009E*)*S0601_C01_001E<br>= (% of people between 65-74 in the tract + % of people above 75 in the tract)*Total population of the tract | Added the two variables for age between 65 and 74 plus ages above 75 years. These numbers were in percentages. Then this was converted into actual persons by multiplying with the total population in the census tract.<br>In the SVI database, they have taken this data from the S0101 census table, however, this table in 2019 does not have information at a census tract level, hence I took S0601 data that is available on a tract level. | https://data.census.gov/cedsci/table?q=80510&g=0500000US06037.140000&tid=ACSST5Y2018.S060 |
| AGE65+_M | Persons aged 65 and over, estimate MOE 2015-19 ACS | | SQRT(S0601_C01_008M^2 + S0601_C01_009M^2)*S0601_C01_001E<br>=<br>Margin of Error % * Total Population in the census tract | | |
| AGE65+_PE | Persons aged 65 and over, estimate as % of total population | | (S0601_C01_008E + S0601_C01_009E*) | | |
| AGE65+_PM | Persons aged 65 and over, estimate of Margin Error | | SQRT(S0601_C01_008M^2 + S0601_C01_009M^2) | | |
| AGE65+_PLR | Percentile Percentage of population above 65 years. | CALC-ULATED | Formula used is: PERCENTRANK.INC on AGE65+_PE array with 4 significant digits | The original percentile is inverted to make it consistent with SecDev Scale.<br>A high percentage of older population (AGE65+_PE) means a low percentile rank after inversion and it means high vulnerability; and vice versa | |

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| AGE65+_FLAG_VLNRBL | A binary variable that takes 1 for all the tracts that have a AGE65+_PLR <= 0.10 | | AGE65+_PLR <= 0.10 | This binary variable indicates the most vulnerable tracts, i.e., tracts with higher number of older population. | |
| AGE65+_FLAG_RSLNC | A binary variable that takes 1 for all the tracts that have a AGE65+_PLR >= 0.90 | | AGE65+_PLR >= 0.90 | This binary variable indicates the most resilient tracts, i.e., tracts with a lesser number of older population. | |
| AGE18U_E | Persons aged below 18 years, estimate 2015-19, ACS | B09001 | B09001_001E | | https://data.census.gov/cedsci/table?q=B09001&g=0500000US06037.140000&tid=ACSDT5Y2019.B09001&hidePreview=false |
| Age18U_M | Persons aged below 18 years, estimate MOE 2015-19, ACS | | B09001_001M | | |
| AGE18U_PE | Persons aged below 18 years as % of total Population , estimate | S0601 | S0601_C01_002E + S0601_C01_003E | The percentages were available from the S0601 table. | |

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| AGE18U_PM | Persons aged below 18 as % of total population, estimate MOE | | SQRT(S0601_C01_002M^2 + S0601_C01_003M^2) | | |
| AGE18U_PLR | Percentile Percentage of population below 18 years. | CALC-ULATED | Formula used is: PERCENTRANK.INC on AGE18U_PE array with 4 significant digits | The original percentile is inverted to make it consistent with SecDev Scale.<br><br>So, a high percentage of the younger population (AGE18U_PE) means a low percentile rank after inversion and it means high vulnerability; and vice versa. | |
| AGE18U_FLAG_VLNRBL | A binary variable that takes 1 for all the tracts that have a AGE18U_PLR <= 0.10 | | AGE18U_PLR <= 0.10 | This binary variable indicates the most vulnerable tracts, i.e., a higher number of younger population, means higher dependents. | |
| AGE18U_FLAG_RSLNC | A binary variable that takes 1 for all the tracts that have a AGE18U_PLR >= 0.90 | | AGE18U_PLR >= 0.90 | This binary variable indicates the most resilient tracts, i.e., lower number of younger population, means lower dependents. | |

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| DISABL_E | Civilian noninstitutionalized population with a disability, estimate 2015-19, ACS | DP02 | DP02_0072E | In 2019, this estimate was DP02_0071E | https://data.census.gov/cedsci/table?q=DP02&g=0500000US06037.140000&tid=ACSDP5Y2019.DP02&hidePreview=false |
| DISABL_M | Civilian noninstitutionalized population with a disability, estimate MOE 2015-19, ACS | | DP02_0072M | In 2019, this estimate was DP02_0071M | |
| DISABLE_PE | Civilian Noninstitutionalized population with disability estimate Percentage | | DP02_0072PE | In the CDC SVI DP02_0071PE | |
| DISABLE_PM | Civilian noninstitutionalized population with disability estimate percentage MOE | | DP02_0072PM | In the CDC SVI DP02_0071PM | |
| DISABLE_PLR | Percentile rank of DISABLE_PE (Disability Index). | CALC-ULATED | Formula used is: PERCENTRANK.INC on DISABLE_PE array with 4 significant digits | The original percentile is inverted to make it consistent with SecDev Scale.<br>A high percentage of Disabled population (DISABLE_PE) means a low percentile rank after inversion and it means high vulnerability; and vice versa. | |

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| DISBLE_FLAG_VLNRBL | A binary variable that takes 1 for all the tracts that have a DISABLE_PLR <= 0.10 | | DISABLE_PLR <= 0.10 | This binary variable indicates the most vulnerable tracts, i.e., those with a high number of physically challenged population | |
| DISBLE_FLAG_RSLNC | A binary variable that takes 1 for all the tracts that have a DISABLE_PLR >= 0.90 | | DISABLE_PLR >= 0.90 | This binary variable indicates the most resilient tracts, i.e., those with a low number of physically challenged population. | |
| VLNRBL_HHD_E | Vulnerable Households, estimate 2015-19 ACS | DP02 | = DP02_0007E+DP02_0009E+DP02_0011E+DP02_0013E | The vulnerable households are defined as households with: (i) single parent and having children under 18 years PLUS (ii) households with single member over 65 years of age | |
| VLNRBL_HHD_M | Vulnerable Households, estimated MOE, 2015-19 ACS | | = Sqrt (DP02_007M^2 +DP02_009M^2+DP02_0011M^2+ DP02_0013M^2) | | |
| VLNRBL_HHD_PE | Vulnerable Households, percentage estimate | | (VLNRBL_HHD_E/HHD_E) *100 | Formulas follow the CDC-SVI calculation, refer to the CDC-SVI document | https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/pdf/SVI2018Documentation-H.pdf |

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| VLNRBL_HHD_PM | Vulnerable households, MOE Percentage estimate | | (SQRT(VLNRBL_HHD_M^2 - (VLNRBL_HHD_PE^2 * HHD_M^2)/HHD_E)*100 | | |
| VLNRBL_HHD_PLR | Percentile ranking of the vulnerable households. | CALC-ULATED | Formula used is: PERCENTRANK.INC on VLNRBL_HHD_PE array with 4 significant digits | The original percentile is inverted to make it consistent with SecDev Scale.<br><br>So, a high percentage of vulnerable households (VLNRBL_HHD) means a low percentile rank after inversion and it means high vulnerability; and vice versa. | |
| VLNRBL_HHD_FLAG_ VLNRBL | A binary variable that takes 1 for all the tracts that have a VLNRBL_HHD_PLR <= 0.10 | | VLNRBL_HHD_PLR <= 0.10 | This binary variable indicates the most vulnerable tracts, i.e., those with high number of vulnerable households | |
| VLNRBL_HHD_FLAG_RSLNC | A binary variable that takes 1 for all the tracts that have a VLNRBL_HHD_PLR >= 0.90 | | VLNRBL_HHD_PLR >= 0.90 | This binary variable indicates the most resilient tracts, i.e., those with low number of vulnerable households | |
| **SOCIAL FACTORS (5)** | | | | | |
| MNRTY_E | Minority (all persons except white, non - Hispanic) estimate, 2019 | S0601, B01001H | TOTPOP_E - B01001H_001E | | https://data.census.gov/cedsci/table?q=B01001H&g=0500000US06037,140000&tid=ACSDT5Y2019.B01001H&hidePreview=false |

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| MNRTY_M | Minority (all persons except white, non - Hispanic) estimate MOE, 2019 | | SQRT(TOTPOP_M^2 + B01001H_001M^2) | | |
| MNRTY_PE | Percentage minority (all persons except white, nonHispanic ) estimate, 2019 | | (MNRTY_E/T OTPOP_E)*100 | | |
| MNRTY_PM | Percentage minority (all persons except white, nonHispanic ) estimate MOE, 2019 | | ((SQRT(MNRTY_M^2-((MNRTY_PE/100)^2*TOT POP_M^2)))TOTPOP_E)*1 00 | | |
| MNRTY_PLR | This calculates the minority population percentile rank per census tract. | CALC-ULATED | PERCENTRANK.I NC on MNTRY_PE array with 4 significant digits | The index calculation is inverted to be inline with SecDev scale where 0 is most vulnerable and 1 is most resilient | |
| MNRTY_FLAG_ VNRBL | A binary variable that takes 1 when percentile rank of minorities in a tract is high | | MNRTY_PLR <= 0.10 | The tract takes a value of 1, if the MNRTY_PLR <=10% | |
| MNRTY_FLAG_ RSLNC | The binary variable takes 1 when a tract has a very minimal number of minorities | | MNRTY_PLR >= 0.90 | The tract takes a value of 1, if the MNRTY_PLR >=90% | |

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| LIMENG_E | Persons (age 5+) who speak English "less than well" estimate, 2019 | B16005 | B16005_007E + B16005_008E + B16005_012E + B16005_013E + B16005_017E + B16005_018E + B16005_022E + B16005_023E + B16005_029E + B16005_030E + B16005_034E + B16005_035E + B16005_039E + B16005_040E + B16005_044E + B16005_045E | | https://data.census.gov/cedsci/table?q=B16005&g=0500000US06037.140000&tid=ACSDT5Y2019.B16005&hidePreview=false |
| LIMENG_M | Persons (age 5+) who speak English "less than well" estimate MOE, 2019 | | SQRT(B16005_0 07M ^2 + B16005_008M ^2 + B16005_012M ^2 + B16005_013M ^2 + B16005_017M ^2 + B16005_018M ^2 + B16005_022M ^2 + B16005_023M ^2 + B16005_029M ^2 + B16005_030M ^2 + B16005_034M ^2 + B16005_035M ^2 + B16005_039M ^2 + B16005_040M ^2 + B16005_044M ^2 + B16005_045M ^2) | | |
| LIMENG_PE | Percentage of persons (age 5+) who speak English "less than well" est, 2019 | | (LIMENG_E/B16 005_001E)*100 | | |
| LIMENG_PM | Percentage of persons (age 5+) who speak English "less than well" est MOE, 2019 | | ((SQRT(LIMENG_E^2-((LIMENG_EP/100)^2* B16005_001M^ 2)))/ B16005_001E)* 100 | | |

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| LIMENG_PLR | Percentile ranking of people who can speak english less than well | CALC-ULATED | PERCENTRANK.INC on LIMENG_PE array with 4 significant digits | This is inverted, so census tracts with less english speaking would be towards 0 and those that have better English language skills are towards 1. This is an indicator that provides the extent of integrability into the society | |
| LIMENG_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | LIMENG_PLR <= 0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest percent of non-english speakers and 1 indicates the exact opposite | |
| LIMENG_FLAG_RSLNC | This variable gives 1 for most resilient census tracts | | LIMENG_PLR>=0.90 | | |
| NOVEH_E | Households with no vehicle available estimate, 2019 | DP04 | DP04_0058E | | https://data.census.gov/cedsci/table?q=DP04&g=0500000US06037.140000&tid=ACSDP5Y2019.DP04&hidePreview=false |
| NOVEH_M | Households with no vehicle available estimate MOE, 2019 | | DP04_0058M | | |
| NOVEH_PE | Percentage of households with no vehicle available estimate, 2019 | | DP04_0058PE | | |

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| NOVEH_PM | Percent of households with no vehicle available estimate MOE | | DP04_0058PM | | |
| NOVEH_PLR | Percentile ranking of people who do not have a vehicle | CALC-ULATED | PERCENTRANK.I NC on NOVEH_PE array with 4 significant digits | The index is calculated and inverted, i.e., the original is INVERTED to make it inline with SecDev Index | |
| NOVEH_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | NOVEH_PLR <= 0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest percent of non-english speakers and 1 indicates the exact opposite | |
| NOVEH_FLAG_RSLNC | This variable gives 1 for most resilient census tracts | | NOVEH_PLR >= 0.90 | | |
| CROWD_E | At household level (occupied housing units), more people than rooms estimate, 2019 | DP04 | DP04_0078E + DP04_0079E | | |
| CROWD_M | At house-hold level (occupied housing units), more people than rooms est MOE, 2019 | | SQRT(DP04_007 8M^2 + DP04_0079M^2 ) | | |

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| CROWD_PE | Percentage of occupied housing units with more people than rooms estimate, 2019 | | (CROWD_E/ DP04_0002E)*1 00 | | (Occupied housing units with more people than rooms estimate / Occupied housing units estimate)*100 |
| CROWD_PM | Percentage of occupied housing units with more people than rooms estimate MOE, 2019 | | ((SQRT(CROWD_M^2-((CROWD_PE/100)^2* DP04_0002M^2 )))/ DP04_0002E)*1 00 | | |
| CROWD_PLR | Percentile ranking of people who live in crowded households | CALC-ULATED | PERCENTRANK.I NC on CROWD_PE array with 4 significant digits | The index is calculated and inverted to be in line with SecDev Scale. | |
| CROWD_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | CROWD_PLR<=0.10 | On the inverted scale, 0 indicates census tract with highest percent of crowded households and 1 indicates the exact opposite | |
| CROWD_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | CROWD_PLR>=0.90 | | |
| MLTI+MOB_E | Combinat-ion of: (i) Ho using in str-uctures with 10 or more units & (ii) Mobile homes; est., 2019 | DP04 | DP04_0012E + DP04_0013E + DP04_0014E | | |

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| MLTI+MOB_M | Combina-tion of (i) Housing in structures with 10 or more units & (ii) Mobile homes; est MOE, 2019 | | SQRT(DP04_00 2M^2 + DP04_0013M ^2+ DP04_0014M ^2) | | |
| MLTI+MOB_PE | Percentage of housing units that have housing in structures with 10 or more units or mobile homes, est 2019 | | MLTI+MOB_E/Total number of housing units in a census tract | | |
| MLTI+MOB_PM | Percentage of housing units with multi housing structure and mobile units, MOE, est. 2019 | | ((SQRT(MLTI+MOB_M^2 - ((MLTI+MOB_PE/100)^2* DP04_0001M^2 )))/ DP04_0001E)*100 | | |
| MLTI+MOB_ PLR | Percentile ranking of people who live in multi unit households and mobile homes | CALC-ULATED | PERCENTRANK.I NC on MLTI+MOB_PE array with 4 significant digits | The index is calculated and inverted, to make it inline with SecDev Index | |
| MLTI+MOB_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | MLTI+MOB_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest percentage | |

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| MLTI+MOB_ FLAG_RSLNC | This variable gives 1 for most Resilience census tracts | | MLTI+MOB_PLR>=0.90 | of multi house units and mobile units; and, 1 indicates the exact opposite | |
| **QUALITY OF LIFE (4)**<br>Currently these indicators are not publicly available; as and when they are available either publicly or provided by the cities, this index would be updated. | | | | | |
| **BURDEN OF DISEASE (10)** | | | | | |
| ARTHRITIS_ CrudePrev | Model-based estimate for crude prevalence of arthritis among adults aged >=18 years, 2016 | | | | https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Census-Tract-level-Data-GIS-Friendly-Fo/k25u-mg9b |
| ARTHRITIS_ Crude95I | Est confide-nce interval for crude prevalence of arthritis among adults aged ≥18 years, 2016 | | | | |
| ARTHRITIS_ PLR | Percentile ranking of census tracts according to the number of people suffering with Arthritis | | PERCENTRANK.INC on ARTHRITIS_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |

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| ARTHRITIS_ FLAG_VLRNBL | This variable gives 1 for most Vulnerable census tracts | | ARTHRITIS_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with arthritis and 1 indicates the exact opposite | |
| ARTHRITIS_ FLAG_RSLNC | This variable gives 1 for most Resilient tracts | | ARTHRITIS_PLR>=0.90 | | |
| BPHIGH_ CrudePrev | Model-based estimate for crude prevalence of high blood pressure among adults aged >=18 years, 2015 | | | | |
| BPHIGH_ Crude95I | Est. confid-ence interval for crude prevalence of high blood pressure among adults aged >=18 years | | | | |
| BPHIGH_PLR | Percentile ranking of census tracts according to the number of people suffering with BP or hyperten-sion | CALC-ULATED | PERCENTRANK.INC on BPHIGH_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |

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| BPHIGH_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | BPHIGH_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with BP and 1 indicates the exact opposite | |
| BPHIGH_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | BPHIGH_PLR>=0.90 | | |
| CANCER_CrudePrev | Model based estimate for crude prevalence of cancer (excluding skin cancer) among adults aged >=18 years, 2016 | | | | |
| CANCER_Crude95I | Estimated confidence interval for above indicator | | | | |
| CANCER_PLR | Percentile ranking of census tracts according to the number of people suffering with Cancer | CALC-ULATED | PERCENTRANK.INC on CANCER_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |

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| CANCER_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | CANCER_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with Cancer and 1 indicates the exact opposite | |
| CANCER_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | CANCER_PLR>=0.90 | | |
| ASTHMA_ CrudePrev | Model bas- ed estimate for crude prevalence of current asthma among adults aged >=18 years, 2016 | | | | |
| ASTHMA_ Crude95I | Est. confid- ence interval for above indicator | | | | |
| ASTHMA_PLR | Percentile ranking of census tracts according to the number of people suffering with Asthma | CALC- ULATED | PERCENTRANK.INC on ASTHMA_CrudePrev array with 4 significant digits | The original is inverted to make it inline with SecDev Index | |
| ASTHMA_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | ASTHMA_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with | |

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| ASTHMA_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | ASTHMA_PLR>=0.90 | Asthma and 1 indicates the exact opposite | |
| CHD_ CrudePrev | Model bas- ed estimate for crude prevalence of coronary heart disease among adults aged >=18 years, 2016 | | | | |
| CHD_Crude95I | Est confid- ence interval for above indicator | | | | |
| CHD_PLR | Percentile ranking of census tracts according to the number of people suffering with Coronary heart disease | CALC - ULATED | PERCENTRANK.INC on CHD_CrudePrev array with 4 significant digits | The original is inverted to make it inline with SecDev Index | |
| CHD_FLAG_ VLNRBL | This variable gives 1 for most Vulnerable census tracts | | CHD_PLR<=0.10 | On the inverted scale, 0 indicates census tract with highest number of | |

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| CHD_FLAG_ RSLNC | This variable gives 1 for most Resilient census tracts | | CHD_PLR>=0.90 | people with Coronary Heart Disease (CHD) and 1 indicates the exact opposite | |
| COPD_ CrudePrev | Model bas-ed estimate for crude prevalence of chronic obstructive pulmonary disease among adults aged >=18 years, 2016 | | | | |
| COPD_ Crude95I | Est confid-ence interval for crude prevalence of chronic obstructive pulmonary disease among adults aged >=18 years | | | | |
| COPD_PLR | Percentile ranking of census tracts according to the number of people suffering with Chronic Obstructive Pulmonary Disease | CALC-ULATED | PERCENTRANK.INC on COPD_CrudePrev array with 4 significant digits | The original is inverted to make it inline with SecDev Index | |

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| COPD_FLAG_ VLNRBL | This variable gives 1 for most Vulnerable census tracts | | COPD_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with COPD and 1 indicates the exact opposite | |
| COPD_FLAG_ RSLNC | This variable gives 1 for most Resilient census tracts | | COPD_PLR>=0.90 | | |
| DIABETES_ CrudePrev | Model based estimate for crude prevalence of diagnosed diabetes among adults aged >=18 years, 2016 | | | | |
| DIABETES_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| DIABETES_ PLR | Percentile ranking of census tracts according to the number of people suffering with diabetes | CALCULATED | PERCENTRANK.INC on Diabetes_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| DIABETES_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | Diabetes_PLR<=0.10 | On the inverted scale, 0 indicates census tract with highest | |

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| DIABETES_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | Diabetes_PLR>=0.90 | number of people with Diabetes and 1 indicates the exact opposite | |
| HIGHCHOL_ CrudePrev | Model bas-ed estimate for crude prevalence of high cholesterol among adults aged >=18 years who have been screened in the past 5 years, 2015 | | | | |
| HIGHCHOL_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| HIGHCHOL_ PLR | Percentile ranking of census tracts according to the number of people suffering with High Cholesterol | CALC-ULATED | PERCENTRANK.INC on HIGHCHOL_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| HIGHCHOL_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | HIGHCHOL_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with high | |

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| HIGHCHOL_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | HIGHCHOL_PLR>=0.90 | cholesterol and 1 indicates the exact opposite | |
| KIDNEY_ CrudePrev | Model bas ed estimate for crude prevalence of chronic kidney disease among adults aged >=18 years, 2016 | | | | |
| KIDNEY_ Crude95I | Estimated confidence interval for above indicator | | | | |
| KIDNEY_PLR | Percentile ranking of census tracts according to the number of people suffering with Kidney disease | CALC - ULATED | PERCENTRANK.INC on Kidney_CrudePrev array with 4 significant digits | The original is inverted to make it inline with SecDev Index | |
| KIDNEY_FLAG_ VLNRBL | This variable gives 1 for most Vulnerable census tracts | | Kidney_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with Kidney Disease and 1 indicates | |

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| KIDNEY_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | Kidney_PLR>=0.90 | the exact opposite | |
| STROKE_CrudePrev | Model-based estimate for crude prevalence of stroke among adults aged >=18 years, 2016 | | | | |
| STROKE_Crude95I | Estimated confidence interval for crude prevalence of stroke among adults aged >=18 years | | | | |
| STROKE_PLR | Percentile ranking of census tracts according to the number of people suffering with Stroke | CALC-ULATED | PERCENTRANK.INC on Stroke_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| STROKE_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | Stroke_PLR<=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with highest number of people with Stroke and 1 indicates the | |

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| STROKE_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | Stroke_PLR>=0.90 | exact opposite | |
| **CLINICAL CARE AND LIFESTYLE CHOICES (16)** Source: 500 Cities: Census Tract-level Data (GIS Friendly Format), 2018 release | | | | | |
| ACCESS2_ CrudePrev (Insurance) | Model bas ed estimate for crude prevalence of current lack of health insurance among adults aged 18-64 years, 2016 | | | | |
| ACCESS2_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| INSRNCE_PLR | Percentile ranking of census tracts according to their access to health insurance | CALC-ULATED | PERCENTRANK.INC on ACCESS2_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| INSRNCE_Flag_ VLNRBL | This variable gives 1 for most Vulnerable census tracts | | INSRNCE_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high prevalence of lack of health insurance | |

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| INSRNCE_Flag_RSLNC | This variable gives 1 for most Resilient census tracts | | INSRNCE_PLR >=0.90 | and 1 indicates the exact opposite | |
| BINGE_CrudePrev | Model-based estimate for crude prevalence of binge drinking among adults aged >=18 years, 2016 | | | | |
| BINGE_Crude95I | Estimated confidence interval for the above indicator | | | | |
| BINGE_PLR | Percentile ranking of census tracts according to prevalence of binge drinking | CALC-ULATED | PERCENTRANK.INC on BINGE_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| BINGE_Flag_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | BINGE_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high prevalence of binge drinking and 1 indicates the exact opposite | |
| BINGE_Flag_RSLNC | This variable gives 1 for most Resilient census tracts | | BINGE_PLR >=0.90 | | |

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| CHECKUP_ CrudePrev | Model-based estimate for crude prevalence of visits to doctor for routine checkup within the past year among adults aged >=18 years, 2016 | | | | |
| CHECKUP_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| CHECKUP_ PLR | Percentile ranking of census tracts according to prevalence of visits to doctor for routine checkup within past year among adults | CALC-ULATED | PERCENTRANK.INC on CHECKUP_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |
| CHECKUP_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | CHECKUP_PLR <=0.10 | On the inverted scale, 0 indicates census tract with low prevalence of visits to doctor for routine checkup within past year among adults; and, | |

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| CHECKUP_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | CHECKUP_PLR >=0.90 | 1 is the exact opposite | |
| CHOLSCREEN_ CrudePrev | Model bas ed estimate for crude prevalence of choles- terol screen- ing among adults aged >=18 years, 2015 | | | | |
| CHOLSCREEN_ Crude95I | Estimated confidence interval the above indicator | | | | |
| CHOLSCREEN_ PLR | Percentile ranking of census tracts according to prevalence of cholesterol screening among adults | CALC- ULATED | PERCENTRANK.INC on CHOLSCREEN_CrudePre v array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |
| CHOLSCREEN_ FLAG_ VLNRBL | This variable gives 1 for most Vulnerable census tracts | | CHOLSCREEN_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of choles- terol screen- ing among adults; 1 indicates the exact opposite | |

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| CHOLSCREEN_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | CHOLSCREEN_PLR >=0.90 | | |
| COLON_ SCREEN_ CrudePrev | Model bas ed estimate for crude prevalence of fecal occult blood test, sigmoi- doscopy, or colonosco- py among adults aged 50–75 years, 2016 | | | | |
| COLON_ SCREEN_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| COLON_ SCREEN_PLR | Percentile ranking of census tracts according to prevalence of colon screening among adults | CALC- ULATED | PERCENTRANK.INC on COLON_SCREEN_Crude Prev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |
| COLON_ SCREEN_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | COLON_SCREEN_PLR <=0.10 | On the inverted scale, 0 indicates census tract with low prevalence of colon screening among adults; 1 indicates the | |

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| COLON_ SCREEN_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | COLON_SCREEN_PLR >=0.90 | exact opposite | |
| COREM_ CrudePrev | Model bas ed estimate for crude preval- ence of older adult men aged >=65 years who are up to date on a core set of clinical preventive services: Flu shot past year, PPV shot ever, Colorectal cancer screening, 2016 | | | | |
| COREM_ Crude95I | Estimated confidence interval for above indicator | | | | |
| COREM_PLR | Percentile ranking of census tracts according to prevalence of testing among men above 65 years | CALC- ULATED | PERCENTRANK.INC on COREM_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |

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| COREM_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | COREM_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of testing among men above 65 years; 1 indicates the exact opposite | |
| COREM_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | COREM_PLR >=0.90 | | |
| COREW_CrudePrev | Model bas ed estimate for crude prevalence of older adult women aged >=65 years who are up to date on a core set of clinical preventive services: Flu shot past year, PPV shot ever, Colorectal cancer screening, and Mammo gram past 2 years, 2016 | | | | |
| COREW_Crude95I | Estimated confidence interval for the above indicator | | | | |

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| COREW_PLR | Percentile ranking of census tracts according to prevalence of testing among women above 65 years | CALC-ULATED | PERCENTRANK.INC on COREW_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |
| COREW_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | COREW_PLR <=0.10 | On the inverted scale, 0 indicates census tract with low prevalence of testing among women above 65 years; 1 indicates the exact opposite | |
| COREW_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | COREW_PLR >=0.90 | | |
| SMKING_CrudePrev | Model-based estimate for crude prevalence of current smoking among adults aged >=18 years, 2016 | | | | |
| SMKING_Crude95I | Estimated confidence interval for the above indicator | | | | |

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| SMKING_PLR | Percentile ranking of census tracts according to prevalence of current smoking among adults | CALC-ULATED | PERCENTRANK.INC on SMKING_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| SMKING_ FLAG_VLNRBL | This variable gives 1 for most Vulner able census tracts | | SMKING_PLR <=0.10 | On the inverted scale, 0 indicates census tract with high prevalence of smoking among adults; 1 indicates the exact opposite | |
| SMKING_FLAG_ RSLNC | This variable gives 1 for most Resilient census tracts | | SMKING_PLR >=0.90 | | |
| DENTAL_ CrudePrev | Model bas ed estimate for crude prevalence of visits to dentist or dental clinic among adults aged >=18 years, 2016 | | | | |
| DENTAL_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| DENTAL_PLR | Percentile ranking of census tracts according to prevalence of visits to | CALC-ULATED | PERCENTRANK.INC on DENTAL_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |

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| | dental clinic among adults | | | | |
| DENTAL_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | DENTAL_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of dental visits; 1 indicates the exact opposite | |
| DENTAL_Flag_RSLNC | This variable gives 1 for most Resilient census tracts | | DENTAL_PLR >=0.90 | | |
| LPA_CrudePrev | Model bas ed estimate for crude prevalence of no leisure-time physical activity among adults aged >=18 years, 2016 | | | | |
| LPA_Crude95 | Estimated confidence interval for the above indicator | | | | |
| LPA_PLR | Percentile ranking of census tracts according to prevalence of NO leisure time and physical activity among adults | CALC-ULATED | PERCENTRANK.INC on LPA_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |

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| LPA_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | LPA_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of No leisure time and physical activity among adults; 1 indicates the exact opposite | |
| LPA_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | LPA_PLR >=0.90 | | |
| MAMMOUSE_CrudePrev | Model bas ed estimate for crude prevalence of mammo graphy use among women aged 50–74 years, 2016 | | | | |
| MAMMOUSE_Crude95I | Estimated confidence interval for the above indicator | | | | |
| MAMMOUSE_PLR | Percentile ranking of census tracts according to prevalence of mamo graphy among women aged 50-74 | CALC-ULATED | PERCENTRANK.INC on MAMMOUSE_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |

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| MAMMOUSE_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | MAMMOUSE_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of mammo graphy among women aged between 50 - 74; and, 1 indicates the exact opposite | |
| MAMMOUSE_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | MAMMOUSE_PLR >=0.90 | | |
| MHLTH_ CrudePrev | Model bas ed estimate for crude prevalence of mental health not good for >=14 days among adults aged >=18 years, 2016 | | | | |
| MHLTH_ Crude95I | Estimated confidence interval for the above indicator | | | | |
| MHLTH_PLR | Percentile ranking of census tracts according to prevalence of mental health not good for >=14 days among adults | CALC- ULATED | PERCENTRANK.INC on MHLTH_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |

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| MHLTH_FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | MHLTH_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high prevalence of not good mental health among adults; 1 indicates the exact opposite | |
| MHLTH_FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | MHLTH_PLR >=0.90 | | |
| OBESITY_CrudePrev | Model bas ed estimate for crude prevalence of obesity among adults aged >=18 years, 2016 | | | | |
| OBESITY_Crude95I | Estimated confidence interval for above indicator | | | | |
| OBESITY_PLR | Percentile ranking of census tracts according to prevalence of obesity among adults | CALC-ULATED | PERCENTRANK.INC on OBESITY_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| OBESITY_FLAG_VLNRBL | This variable gives 1 for most Vulner able census tracts | | OBESITY_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high prevalence of obesity | |

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| OBESITY_FLAG _RSLNC | This variable gives 1 for most Resilient census tracts | | OBESITY_PLR >=0.90 | among adults; 1 indicates the exact opposite | |
| PAPTEST_ CrudePrev | Model bas ed estimate for crude prevalence of papan-icolaou smear use among adult women (21–65 yrs) 2016 | | | | |
| PAPTEST_ Crude95I | Estimated confidence interval for above indicator | | | | |
| PAPTEST_PLR | Percentile ranking of census tracts according to prevalence of Pap smear test among women aged 21-65 | CALC-ULATED | PERCENTRANK.INC on PAPTEST_CrudePrev array with 4 significant digits | This index is a positive one; hence, it is NOT inverted. | |
| PAPTEST_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | PAPTEST_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with low prevalence of pap test among women aged between 21 - 65; and,1 indicates the exact | |

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| PAPTEST_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | PAPTEST_PLR >=0.90 | opposite | |
| PHLTH_ CrudePrev | Model bas ed estimate for crude prevalence of physical health not good for >=14 days among adults aged >=18 years, 2016 | | | | |
| PHLTH_ Crude95I | Estimated confidence interval for above indicator | | | | |
| PHLTH_PLR | Percentile ranking of census tracts according to prevalence of physical health not good for >=14 days among adults | CALC- ULATED | PERCENTRANK.INC on PHLTH_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| PHLTH_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census tracts | | PHLTH_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high prevalence of not good physical health | |

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| PHLTH_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | PHLTH_PLR >=0.90 | among adults; 1 indicates the exact opposite | |
| SLEEP_ CrudePrev | Model bas ed estimate for crude prevalence of sleeping less than 7 hours among adults aged >=18 years, 2016 | | | | |
| SLEEP_ Crude95I | Estimated confidence interval for crude prevalence of sleeping less than 7 hours among adults aged >=18 years | | | | |
| SLEEP_PLR | Percentile ranking of census tracts according to prevalence of lack of sleep among adults | CALC- ULATED | PERCENTRANK.INC on SLEEP_CrudePrev array with 4 significant digits | The original is Inverted to make it inline with SecDev Index | |
| SLEEP_ FLAG_VLNRBL | This variable gives 1 for most Vulnerable census | | SLEEP_PLR <=0.10 | A binary variable; on the inverted scale, 0 indicates census tract with high | |

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| | tracts | | | prevalence of not enough sleep among adults; 1 indicates the exact opposite | |
| SLEEP_ FLAG_RSLNC | This variable gives 1 for most Resilient census tracts | | SLEEP_PLR >=0.90 | | |
| **DIGITAL PREPAREDNESS (3)** | | | | | |
| NoDEVICE_E | Households that have no computer or computing device (Estimate), 2019 | B28001 | B28001_011E | This is the ACS Internet connectivity dataset. This dataset has two parts: B28001 (access to physical devices) and B28002 (access to connectivity) | https://covid19.census.gov/datasets/a47cf32bd3cc48c98edf789e3392439f_0 |
| NoDEVICE_M | Households that have no computer or computing device, MOE (Estimate), 2019 | | B28001_011M | | |
| NoDEVICE_PE | Percent of households that have no computer or computing device. Computing devices include a desktop or laptop, a smartphone, a tablet or other portable wireless computer, and some | | (B28001_011E/B28001_001E).<br><br>This calculation is already provided in the dataset and it is originally named as *B28001_calc_pct NoCompE* | | |

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| | other type of computer. | | | | |
| NoDEVICE_PM | This is the MOE of the above variable. | | This is already given in the dataset and is calculated as follows:<br><br>(100.0/B28001_001E)*(sqrt((B28001_001M)^2-1.0*((B28001_011E/B28001_001E)^2)*(B28001_011M)^2))<br><br>This variable in the original dataset is under the name: *B28001_calc_pctNoCompM* | | |
| NoDEVICE_PLR | Percentile of households that do not have a computing device | CALC-ULATED | PERCENTRANK.INC on NoDEVICE_PE array with 4 significant digits | In this case, the initial percentile rank was based on % of population that had not access to computing devices, i.e, greater lack of computing devices meant higher percentile rank; however, to make this consistent with the SecDev scale, this initial percentile rank is inverted to the final percentile rank, NoDEVICE_PLR.<br><br>In summary, high rate of lack of computing devices means low percentile rank (after inversion) and means highly vulnerable. | |
| NoDEVICE_FLAG_VRBNL | A binary variable (Flag) that takes 1, if the % of households with access to computing devices is in the bottom 10 percentile | | NoDEVICE_PLR<=10% | It takes 1, if the percentile rank is below 10%, else it takes 0 | |

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| NoDEVICE_ FLAG_RSLNC | A binary variable that accounts for tracts that have a top 90 percentile of households that have access to the internet. | | NoDEVICE_PLR>=90% | It takes 1, if the percentile rank is above 90%, else it takes 0 | |
| MobilDAT_E | Households that have a cellular data plan (estimate), 2019 | B28002 | B28002_005E | This is the ACS Internet connectivity dataset. This dataset has two parts: B28001 (access to physical devices) and B28002 (access to connectivity) | https://covid19.census.gov/datasets/a47cf32bd3cc48c98edf789e3392439f_0 |
| MobilDAT_M | Households that have a cellular data plan, MOE (Estimate), 2019 | | B28002_005M | | |
| MobilDAT_PE | Percent of households that have cellular data plan as a percentage of total number of households within a census tract, 2019 | | (B28002_005E/B28001_001E) | | |
| MobilDAT_PM | This is the MOE of the above variable. | | =SQRT((B28002_005M^2 - (B28002_005PE^2*B28001_001M^2)))/B28001_001E | | |

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| MobilDAT_PLR | Percentile of households that do have access to mobile internet data | CALC-ULATED | PERCENTRANK.INC on MobilDAT_PE array with 4 significant digits | This variable does not require to be inverted. The higher value indicates resilience and lower value indicates greater vulnerability | |
| MobilDAT_FLAG_VLRNRBL | A binary variable that takes 1, if the census tract is in the bottom 10% percentile ranking; else it takes 0. | | MobilDAT_PLR<=10% | The most vulnerable tracts where households have very low access to mobile internet | |
| MobilDAT_FLAG_RSLNC | A binary variable that takes 1, if the census tract is in the highest percentile (i.e., above 90%); else it takes 0. | | MobilDAT_PLR >=90% | It highlights the most resilient tracts where more than 90% households have mobile internet | |
| NoINTRNT_E | Households that have no access to the Internet at this house, apartment, or mobile home. Includes housing units where no one can connect to or uses the internet using a paid | B28002 | B28002_013E | This is the ACS Internet connectivity dataset. This dataset has two parts: B28001 (access to physical devices) and B28002 (access to connectivity) | https://covid19.census.gov/datasets/a47cf32bd3cc48c98edf789e3392439f_0 |

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| | service or any free service. (estimate), 2019 | | | | |
| NoINTRNT_M | Households that have no access to the internet, MOE (Estimate), 2019 | | B28002_013M | | |
| NoINTRNT_PE | Percent of Households with No Internet Access. Includes housing units where no one can connect to or uses the internet using a paid service or any free service, estimate (2019) | | This is an already calculated field that is provided as part of the dataset (*B28002_calc_pctNoIntE*): round(100.0*B28002_013E/B28001_001E,1) | | |
| NoINTRNT_PM | This is the MOE of the above variable. | | This variable is named as *B28002_calc_pctNoIntM* in the original dataset and is calculated as follows:<br><br>(100.0/B28001_001E)*(sqrt((B28002_013M)^2-1.0*((B28002_013E/B28001_001E)^2)*(B28001_001M)^2)) | | |

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| NoINTRNT_PLR | Percentile of households that do not have internet connectivity | CALC-ULATED | PERCENTRANK.INC on NoINTRNT_PE array with 4 significant digits | This variable is inverted to make it inline with the SecDev resilience scale. | |
| NoINTRNT_ FLAG_VLRNRBL | A binary variable that takes 1, if the census tracts is in the bottom 10% percentile ranking; else it takes 0. | | NoINTRNT_PLR<=10% | The most vulnerable tracts where households have very low internet connectivity | |
| NoINTRNT_ FLAG_RSLNC | A binary variable that takes 1, if the census tract is in the highest percentile (i.e., above 90%); else it takes 0. | | NoINTRNT_PLR >=90% | It highlights the most resilient tracts where more than 90% households have internet connectivity | |

**References**:


- **CDC SVI 2018 Documentation is available here.**
- **CDS 500 Cities Project database.**
- Flanagan, Barry & Gregory, Edward & Hallisey, Elaine & Heitgerd, Janet & Lewis, Brian. (2011). A Social Vulnerability Index for Disaster Management. Journal of Homeland Security and Emergency Management. 8. 10.2202/1547-7355.1792.


**Other Important Website to explain the Tables:**

https://censusreporter.org/topics/table-codes/

https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2016/