Resilience^2 Dashboard

A National, Sustainable Implementation of BRIC Resilience Scores.

About the Project

The goal of this project is to create a national, sustainable implementation of Baseline Resilience Indicators for Communities ("BRIC") initially created for FEMA Region IV (Southeastern United States) by Cutter et al[1]. By using data sourced from the United States Census ("Census"), American Community Survey ("ACS"), and other frequently-published data sources, the project can be continually updated to reflect updated resilience metrics for most indicators in the BRIC framework.

Project Granularity (County Definitions)

The resilience scores are generated based on counties as the lowest level of granularity. In this project, we use counties as defined by the U.S. Bureau of Economic Analysis ("BEA"); these county definitions differ slightly from Census county definitions by combining a small number of areas (independent cities and their surrounding counties) that the Census treats as separate entities[2].

Using the Dashboard

The Dashboard is implemented in Tableau and allows for any user to dynamically generate and filter the indices, which dynamically re-scale, based on individual need, at the county level.

Filters

Composite Indices

There are five different composite resilience indices to choose from, which can filter what is available in the Individual Indices filter (below).

Individual Indices

The user can choose to include any number of individual resilience indices. Each index has a resilience value which is dynamically re-scaled from 0 to 1 based on the states that are included.

States

The user can choose which states should be includes in both the visualization and the underlying calculations. The value of each individual index is re-scaled from 0 to 1 based on the states that are included in this filter.

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[1] Cutter, S. L., Burton, C. G., & Emrich, C. T. (2010). Disaster resilience indicators for benchmarking baseline conditions. *Journal of Homeland Security and Emergency Management*, *7*(1).

[2] https://www.census.gov/programs-surveys/popest/guidance-geographies/terms-and-definitions.html

Display

The visual display uses a sliding color scale to show the overall resilience score for each state that is included in the filter at a county level.

Calculation of Overall Resilience

Overall resilience is calculated using the sum of each of the composite resilience indices; since there are four composite resilience indices, the maximum overall resilience score is 4. Each composite resilience index is composed of the average of all individual resilience indices within the category; the composite resilience indices will always be between 0 and 1.

The overall resilience score and each composite resilience index can be viewed using the tooltip that appears when hovering over/clicking on each county.

Notes

- Most data is from the 2016 American Community Survey (5 year estimates).
- The majority of indicators are exact replicas of those used by Cutter et al in the original BRIC implementation. Where the same data was not available, proxies were used in making the calculations. For example, for Communication Capacity (Social Resilience), the original calculation was percent of the population with a telephone. Our calculation in this resilience index is the percent of housing units with telephone service, a data point available via the ACS.
- A small number of individual resilience indices – all in the institutional resilience category – were unable to be calculated due to no availability of large-scale, updated data. The search continues to find sustainable data sources to be used for these indicators.

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[3] https://informatics.indiana.edu/
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Indicator Categories and Individual Data Sources

Below you will find a collection of the composite resilience indices along with each of the individual resilience indices that comprise the respective composite score. The data used and calculation for each index is described. Some index differ from the original calculation used in the original tabulation according to BRIC methodology due to data availability.

The ID is an internal identifier used in this project and does not have any relationship to the actual indices.

Social Resilience

Social resilience deals with attributes of the individual members of communities.

ID	Name	Information
11	Educational Equity	Codes 391 (Bachelor's Degree or More) and 397 (Less Than a High School Degree) from the ACS Common Items Extract are used for this calculation. Calculation: [391] / [397]
12	Age	Codes 300 (Total Population) and 317 (Population over 65) from the ACS Common Items Extract are used for this calculation. Calculation: 1-([317] / [300])
13	Transportation Access	Codes 304 (Households) and 412 (Households with No Vehicle) from the ACS Common Items Extract are used for this calculation. Calculation: 1-([412] / [304])
14	Communication Capacity	Codes 303 (Housing Units) and 960 (Selected Housing Characteristics: No Telephone Service Available) from the ACS Common Items Extract are used for this calculation. Calculation: 1-([960] / [303])
15	Language Capacity	Codes 770 (Language Spoken at Home: Population with age 5 and above) and 771 (Language Spoken at Home: Population with age 5 and above: English Only) from the ACS Common Items Extract are used for this calculation. Calculation: [771] / [770]
16	Special Needs	Codes 300 (Total Population) and 413 (Population with Disability) from the ACS Common Items Extract are used for this calculation. Calculation: 1-([413] / [300])
17	Health Coverage	Codes 933 (HEALTH INSURANCE COVERAGE: Civilian noninstitutionalized population 18 to 64 years) and 936 (HEALTH INSURANCE COVERAGE: Civilian noninstitutionalized population 18 to 64 years: In Labor Force: Employed: With Coverage) and 941 (HEALTH INSURANCE COVERAGE: Civilian noninstitutionalized population 18 to 64 years: In Labor Force: Unemployed: With Coverage) and 946 (HEALTH INSURANCE COVERAGE: Civilian noninstitutionalized population 18 to 64 years: Not In Labor Force: With Coverage) from the ACS Common Items Extract are used for this calculation. Calculation: ([936] + [941] + [946]) / [933]

Economic Resilience

Economic resilience deals with the financial and economic factors that contribute to the resilience of communities.

ID	Name	Information
21	Housing Capital	Codes 303 (Housing Units) and 965 (SELECTED HOUSING CHARACTERISTICS: Mortgage Status: Owner Occupied Units with a Mortgage) and 966 (SELECTED HOUSING CHARACTERISTICS: Mortgage Status: Owner Occupied Units without a Mortgage) from the ACS Common Items Extract are used for this calculation. Calculation: ([965] + [966])/[303]
22	Employment	Codes 300 (Total Population) and 341 (Employment 16 and Over) from the ACS Common Items Extract are used for this calculation. Calculation: [341] / [300]
23	Income & Equality (GINI Coefficient)	Table B19083: GINI Index of Income Inequality from the ACS is used for this calculation. Calculation: 1-[GINI]
24	Single Sector Employment Dependence	Code 300 (Total Population) from the ACS Common Items Extract and employment numbers from the Census County Business Patterns (NAICS Codes 11 and 21) are used for this calculation. Calculation: ([NAICS 11] + [NAICS 21]) / [300]
25	Employment (Female)	Lines 88 (SEX BY AGE BY EMPLOYMENT STATUS FOR THE POPULATION 16 YEARS AND OVER: Female) and 90, 97, 104, 111,118, 125, 132, 139, 146, 153, 160, 165, 170 (Female, Employed, by age bracket) from the ACS Table B23001 are used for this calculation. Calculation: [All but 88] / [88]
26	Business Size	Census County Business Patterns employment by business size was used for this calculation. A broad definition of small business defined by less than 500 employees was used. Calculation: 1-([Business < 500] / [Total Businesses])
27	Health Access	Code 300 (Total Population) from the ACS Common Items Extract and employment numbers for professions for physicians (NAICS codes between 291011 AND 291067) were used in this calculation. Calculation: [Employed in NAICS Codes] / [300]

Infrastructure Resilience

Infrastructure resilience deals with physical structures (housing, shelter, medical capacity, etc.) that exist within communities.

ID	Name	Information
41	Housing Type	Table B25001 Line 1 (Total Housing Units) and Table B25025 Line 10 (Mobile home) from the ACS were used in this calculation. Calculation: 1-([B25025] / [B25001])
42	Shelter Capacity	Table B25004 Line 1 (Total), Line 2 (For rent), and Line 3 (Rented, not occupied) from the ACS were used for this calculation. Calculation: ([Line 2] + [Line 3]) / [Line 1]
43	Medical Capacity	This uses data on hospitals from Centers for Medicare and Medicaid Services (CMS) and is the number of beds per population. Calculation: [Beds] / [Population]
44	Access/Evacuation Potential	This uses data from the National Highway Planning Network for the number of miles of arterial highway in each county and county size in square miles from the Census. Calculation: [Highway Miles] / [County Square Miles]
45	Housing Age	Table B25001 Line 1 (Total Hosing Units), Table B25034 Line 5 (Year Structure Built: 1980 to 1989), and Table B25034 Line 6 (Year Structure Built: 1970 to 1979) from the ACS were used for this calculation. Calculation: ([Line 5] + [Line 6]) / [Line 1]
46	Sheltering Need	Uses NAICS Code 721110 (Hotels except Casino Hotels and Motels) from the Census County Business Patterns and the total square miles from the 2000 Census. Calculation: [NAICS 721110] / [Square Miles]
47	Recovery (Schools)	Uses NAICS Code 611110 (Elementary and Secondary Schools) from the Census County Business Patterns and the total square miles from the 2000 Census. Calculation: [NAICS 611110] / [Square Miles]

Community Capital

Community Capital deals with the relationships between the individual and the community as a whole.

ID	Name	Information
51	Place Attachment – Migration	Codes 300 (Total Population) and 763 (Foreign Born Population, excluding population born at sea) from the ACS Common Items Extract are used for this calculation. Calculation: 1-([763] / [300])
52	Place Attachment – Born	Codes 747 (Total Birth Population) and 750 (Total Birth Population: Native: Born in same US state as of their residence) from the ACS Common Items Extract are used for this calculation. Calculation: [750] / [747]
53	Political Engagement	Code 300 (Total Population) from the ACS Common Items Extract and voter turnout data from StatsAmerica were used for this calculation. Calculation: [Voters] / [300]
54	Social Capital – Religion	Code 300 (Total Population) from the ACS Common Items Extract and total establishments under NAICS Code 813110 (Religious Organizations) from the Census County Business Patterns were used for this calculation. Calculation: [NAICS 813110] / [300]
55	Social Capital – Civic Involvement	Code 300 (Total Population) from the ACS Common Items Extract and total establishments under NAICS Code 8134 (Civic Organizations) from the Census County Business Patterns were used for this calculation. Calculation: [NAICS 8134] / [300]
56	Social Capital – Advocacy	Code 300 (Total Population) from the ACS Common Items Extract and total establishments under NAICS Code 8133 (Social Advocacy Organizations) from the Census County Business Patterns were used for this calculation. Calculation: [NAICS 8133] / [300]
57	Innovation	Code 300 (Total Population) from the ACS Common Items Extract and employment numbers for professions for physicians (NAICS codes in the creative class occupations) were used in this calculation. Calculation: [Employed in NAICS Codes] / [300]