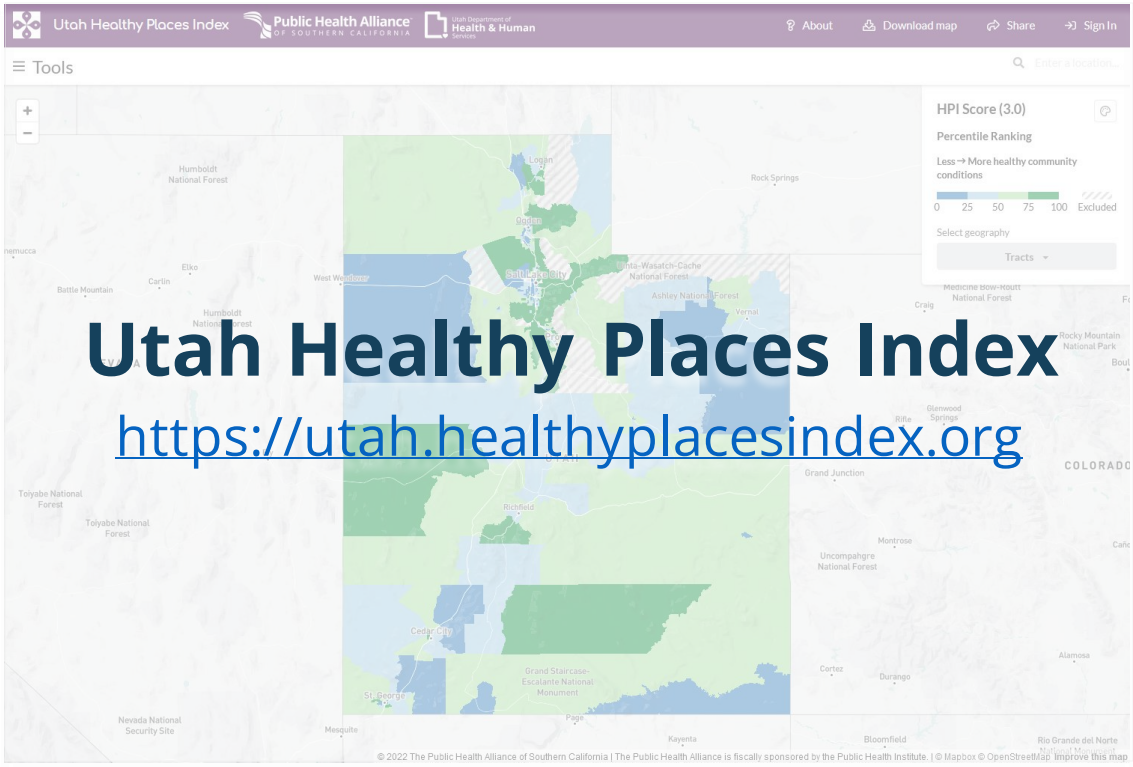

Utah Healthy Places Index

https://utah.healthyplacesindex.org

By Public Health Alliance of Southern California

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Technical Summary

INTRODUCTION

The Utah Healthy Places Index (HPI) summarizes the healthiness of community conditions of Utah census tracts based on the distribution of 20 indicators of social determinants of health. The healthier a community, the higher the HPI score. A web-based mapping application allows people to interactively explore HPI data. The HPI applies a positive frame focusing on assets a community has that they can build on, rather than what is lacking. Each HPI indicator is linked to a Policy Action Guide, which highlights equitable solutions to improving community health.

METHODS

To maintain continuity, Utah HPI drew from the same publicly available data sources and applied the same peer-reviewed and published methodology as the California HPI[1]. The American Community Survey (ACS), 2015-2019, made up half of the individual indicators, which were scaled using Z-Scores and averaged by domains that correspond to policy action areas: economic, education, social, housing, transportation, clean environment, neighborhood, and healthcare access. We applied weighted quantile regression to calculate domain weights, which optimized the association of the HPI score with life expectancy at birth (LEB). We also produced 347 decision support indicators representing health outcomes and behaviors, social vulnerabilities, community conditions, equity, diversity and inclusion, and race/ethnicity data including 22 Asian and 11 Native Hawaiian/Pacific Islander subgroups, 52 Native American/Alaskan Native tribal entities and 33 race-stratified indicators (9 of which are in the HPI).

RESULTS

The Utah HPI had 575 eligible census tracts based on a 2015-2019 annual average population ≥ 1500 and group quarters percentage of < 50%. Utah HPI had a high correlation with LEB (r, 0.56) and variance-explained (R^2, 31%). On average, lower HPI scores occurred in census tracts in the Wasatch Front, and among census tracts with the highest percentage of Hispanic or Latino residents. While there was overlap of the most disadvantaged quartile of HPI census tracts with the corresponding quartiles of the Social Vulnerability Index, the Child Opportunity Index, <80% of median household income, 200% of the federal poverty, and Utah

Health Improvement Index (reported at Utah small area) populations of discordant geographies were significant (207,000 to 278,000), illustrating that framing an index around social determinants of health prioritizes specific populations that other indices do not.

DISCUSSION

As an index that is both framed around the social determinants of health and focused on local data, the Utah Healthy Places Index fills a gap left by other indices in Utah, which rely on national data sources or solely emphasize economic well-being. The Utah HPI also provides a platform for many features and data layers that respond to current challenges such as structural racism, climate change, and the COVID-19 pandemic. The twenty-seven extensive Policy Action Guides available alongside the HPI indicators strengthens its ability to be used by state and local government agencies, hospitals, advocacy groups, and others to improve the health of communities in Utah.

Background

The purpose of this report is to provide technical information on the Utah Healthy Places Index (HPI) its 20 constituent indicators, and additional indicators that provide decision-support. The report also provides information on the features of the mapping application (https://map.utah.healthyplacesindex.org) and Policy Action Guides (https://policies.utah.healthyplacesindex.org) that link indicators to a menu of policy actions.

Many governmental entities, academic institutions, and private organizations have developed composite indexes of disadvantage or opportunity.[2–10] These measures allow policy makers and communities to target interventions and resources to areas with the greatest cumulative extent of deprivation. The international practice of disadvantage measurement shares several common concepts and approaches. First, the indexes define deprivation as having multiple dimensions. For example, according to Townsend[11(p125)], people are deprived when they lack the types of diets, clothing, housing, household facilities and fuel and environmental, educational, working and social conditions, activities and facilities which are customary. Second, the experience of disadvantage is a cumulative function of the number and types of deprivation that people experience.[12] Accordingly, deprivation indexes at the small geographic area include the economic resources, social inclusion, health, educational resources, and shared public infrastructure, and physical environmental hazards. Third, the individual domains comprising disadvantage are both components of and consequences of disadvantage. Neighborhood disadvantage predicts poorer human development outcomes, including lower levels of human health, impaired child development, lower educational achievement, and the experience of violence. At the same time, these outcomes may be considered elements of cumulative neighborhood disadvantage.[2–10]

WHAT IS THE HEALTHY PLACES INDEX?

The California Healthy Places Index™ (“California HPI”) is the product of the Public Health Alliance of Southern California ("Public Health Alliance") who, in 2014, convened a Steering Committee of approximately 20 public health practitioners and researchers from health departments across California, including the California Department of Health and the Bay Area Regional Health Inequities Initiative (BARHII). With Steering Committee guidance, the Public Health Alliance staff and

consultants conducted literature reviews and embarked on constructing the index. The HPI utilizes the following definition of *health disadvantage*:

> Health disadvantage is the inability of people to fulfill basic human needs required for full social participation and optimal health and well-being. These needs include but are not limited to the needs for economic security, food, shelter, safety, transportation, education, social connection and political participation.

The definition incorporates a holistic concept of health and recognition that health is produced by community factors not addressed by our health care system. As articulated by the World Health Organization, health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"[13] and the fundamental resources for health are "… peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity."[14] Similarly, the definition of health disadvantage is inclusive of the diverse non-medical economic, cultural, political, and environmental factors that influence physical and cognitive function, behavior, and disease. These factors are often called health determinants, social determinants of health (SDOH), or social drivers of health.[14]

The California HPI has been used by scores of organizations from local, regional, and state government; health care organizations, advocacy groups, academics, and individuals.[15] It has been used to direct more than one billion of state grant-making dollars to communities most in need. Perhaps the most significant use case is the California Department of Public Health incorporating the HPI in metrics for implementing non-pharmacological interventions,[16,17] vaccine distribution,[18] and conducting public health surveillance of COVID-19, including case rates, test positivity, vaccination rates, and mortality rates.[19]

WHAT IS THE UTAH HEALTHY PLACES INDEX?

In 2021, the Utah Department of Health & Human Services ("DHHS") contacted the Public Health Alliance with interest of creating a Healthy Places Index for the state of Utah. Through a joint initiative with DHHS and the Public Health Alliance, Utah Healthy Places Index was developed and launched in 2022. As in the development of the California HPI, DHHS assembled a cross-sector Steering Committee of approximately 100 partners and stakeholders (see Appendix A for the list of Steering Committee affiliations), including state and local public health jurisdictions,

the Governor's Office of Economic Opportunity, Utah Department of Transportation, Utah State Board of Education, and many others. With Steering Committee guidance, the DHHS and Public Health Alliance staff embarked on constructing the Utah HPI. Between January and August 2022, DHHS facilitated 18 stakeholder engagement meetings. This engagement informed UT HPI indicator and decision support layer selection, as well as refinements to the interactive mapping application.

UTAH HPI DOCUMENTATION CHANGE NOTES

October 20, 2022
Initial release.

June 8, 2023
Information provided on mid-cycle data update of Diesel PM and PM 2.5 and temporary removal of Clean Environment domain score from the Utah HPI map platform, page 24.

METHODS: INDEX CONSTRUCTION

The peer-reviewed and published methodology for the California HPI[1] was applied for development of the Utah HPI. An overview of index construction is presented below.

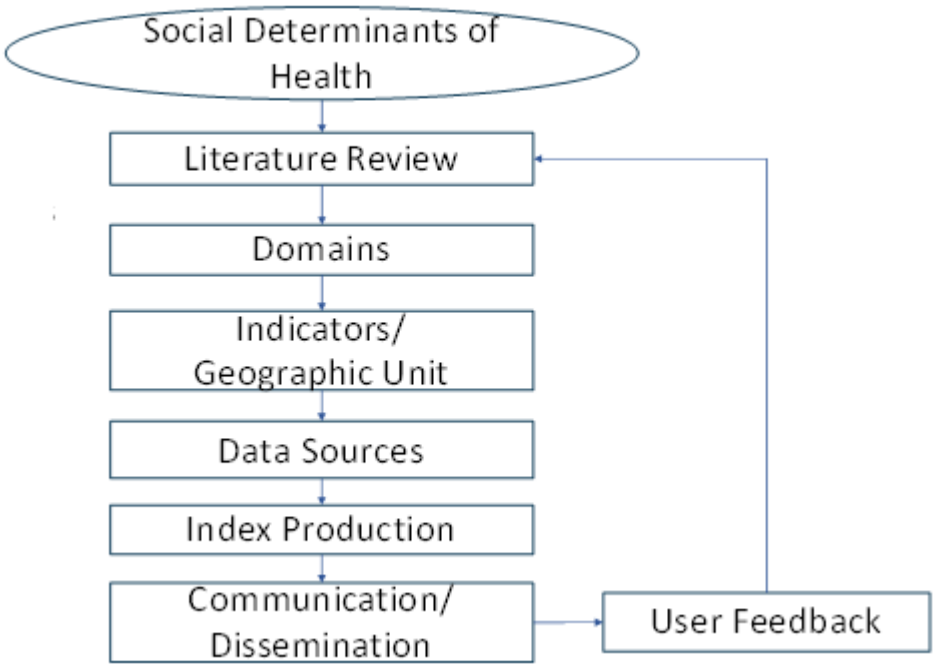


Figure 1. Overview of Index construction

DOMAINS AND INDICATORS

The grouping of indicators within domains or "policy action areas" reflect widely recognized thematic areas of the social determinants of health[20,21] and are consistent with those described by the Centers for Disease Control.[20] Informed by literature and the DHHS Steering Committee, we grouped potential indicators into eight thematic groups or policy action areas:

- Education
- Transportation
- Housing
- Social

- Clean Environment
- Neighborhood
- Healthcare Access, and
- Economic

The criteria for selection of individual indicators were:

- Continuity with California HPI 3.0
- Accessible public data sources
- Up-to-date data at the geographical level of census tract
- Geographical coverage for all eligible 2010 census tracts
- Linkage to policy and other actions ("actionability")
- Association with life expectancy at birth in Utah census tracts
- Low levels of collinearity with other indicators within a domain

To maintain consistency across versions, the pool of candidate indicators began with those in the California HPI (Table 1).[1(tbl1)] Four of the candidate indictors were inconsistent with the above criteria, specifically a contrary association with life expectancy at birth:

- Drinking Water Contaminants
- Park Access
- Active Commuting
- Retail Density

A fifth candidate indicator, Ozone, was found to be highly collinear with Diesel PM and PM 2.5 in the Clean Environment domain and was removed during index construction.

As a result, Drinking Water Contaminants, Retail Density, Active Commuting, and Ozone do not appear in the Utah HPI. Park Access was redefined as park acres per capita and included in the index, and a new indicator, Bike Lane Access, was constructed to replace Active Commuting. Thus, there were 20 indicators in the Utah HPI.

Table 1. Policy Action Areas (Domains), Indicators and their Data Sources for the Utah Healthy Places Index and the California Healthy Places Index

	Data Source†, Year	
Policy Action/Indicator	**Utah HPI**	**California HPI**
Education		
Bachelor's Education or Higher (Percentage of population over age 25 with a bachelor's education or higher)	ACS, 2015-2019	ACS, 2015-2019
High School Enrollment (Percentage of 15–17-year-olds enrolled in school)	ACS, 2015-2019	ACS 2015-2019
Pre-School Enrollment (Percentage of 3- and 4-year-olds enrolled in pre-school)	ACS, 2015-2019	ACS, 2015-2019
Transportation		
Automobile Access (Percentage of households with access to an automobile)	ACS, 2015-2019	ACS, 2015-2019
~~Active Commuting (Percentage of workers (16 years and older) commuting by walking, cycling, or transit (excluding working from home)~~		ACS, 2015-2019
Bike Lane Access (Total miles of bike lanes and paths)	**UGRC / Transportation, 2022**	
Housing		
Homeownership (Percentage of occupied housing units occupied by property owners)	ACS, 2015-2019	ACS, 2015-2019
Housing Habitability (Percent of households with complete kitchen facilities and plumbing)	CHAS, 2013-2017	CHAS, 2014-2018
Low-Income Homeowner Severe Housing Cost Burden (Percentage of low-income homeowners paying more than 50% of income on housing)	CHAS, 2014-2018	CHAS, 2014-2018
Low-Income Renter Severe Housing Cost Burden (Percentage of low-income renter households paying more than 50% of income on housing)	CHAS, 2013-2017	CHAS, 2013-2017
Uncrowded Housing (Percentage of households with less or equal to 1 occupant per room)	ACS, 2015-2019	ACS, 2015-2019
Social		

Voting (Percentage of registered voters voting in the 2020 general election)	Utah Lt. Governor's Office/VEST, 2020	UC Berkeley, 2020
2020 Census Response Rate (Percent of the population responding to the 2020 census (short form))	Census, 2020	Census, 2020
Clean Environment		
Diesel PM (Annual diesel PM concentrations in µg/m^3 (Utah) | Spatial distribution of gridded diesel PM emissions from on-road and non-road sources in 2016 in tons/year (California))	**US EPA EJSCREEN, 2020**	CalEPA, 2016
~~Drinking Water Contaminants (CalEnviroScreen 4.0 drinking water contaminant index for selected contaminants)~~		CalEPA, 2011-2019
~~Ozone (Mean of summer months (May-October) of the daily maximum 8-hour ozone concentration (ppm), averaged over three years (2017 to 2019))~~		CalEPA, 2017-2019
PM 2.5 (Annual mean concentration of $PM_{2.5}$ (µg/m^3))	**US EPA EJSCREEN, 2020**	CalEPA, 2015-2017
Neighborhood		
~~Park Access (Percentage of the population living within ½ -mile of a park, beach, or open space greater than 1 acre)~~		GreenInfo, 2012
Park Access (Total acres of parks, public land, and public golf courses per person)	**UGRC / Recreation, 2016-2020**	
Tree Canopy (Population-weighted percentage of the census tract area with tree canopy)	**HCI/NLCD, 2016**	NLCD, 2011
~~Retail Density (Gross retail, entertainment, services, and education employment density (jobs/acre) on unprotected land)~~		EPA Smart Location Database 3.0, 2021
Healthcare Access		
Insured Adults (Percentage of adults aged 19 to 64 years currently insured (Utah) | Percentage of adults aged 18 to 64 years currently insured (California))	ACS, 2015-2019	ACS, 2015-2019

Economic		
Above Poverty (Percent of the population with an income exceeding 200% of federal poverty level)	ACS, 2015-2019	ACS, 2015-2019
Employed (Percentage of population aged 20-64 who are employed (Utah) | Percentage of population aged 25-64 who are employed (California))	ACS, 2015-2019	ACS, 2015-2019
Per Capita Income (Average income computed for every man, woman, and child in a particular group)	ACS, 2015-2019	ACS, 2015-2019

Note: Indicators in **bold** were added in Utah HPI; Indicators in ~~strikethrough~~ appear in the California HPI but not the Utah HPI

†ACS, American Community Survey[22]; CHAS, Comprehensive Housing Assessment System[23]; GreenInfo, (CaLANDS)[24]; NLCD, National Land Cover Database[25]; Utah Lieutenant Governor's Office[26]; UGRC, Utah Geospatial Resource Center[27]; US EPA EJSCREEN, U.S. Environmental Protection Agency Environmental Justice Screening and Mapping Tool[28]; VEST, Voting Election Science Team[29]; UC Berkeley, University of California, Berkeley[30]; CalEPA, California Environmental Protection Agency[31]; EPA Smart Location Database 3.0[32]

Geographic Inclusion and Exclusion Criteria

Utah HPI geographies are based on 2010 census tract boundaries. Boundary files for the 2020 census were released in September 2021; however, other than population counts, much of the data incorporated into HPI relies on multiple year (e.g., 2015-2019) data collection tied to 2010 census tract boundaries. As a result, we will continue to use 2010 census tract boundaries.

Census tracts were included in the index if they had a population of 1,500 or greater AND a group quarters population less than 50% of the total population in 5-year annual average estimates of the American Community Survey, 2015-2019.[22] These eligibility criteria aimed to improve the statistical reliability and validity of the index. Census tracts with large share of institutional populations that are mobility restricted (e.g., nursing homes, prisons) and/or are (temporarily) economically dependent on others (e.g., college students) often generate spurious results.

Missing Data

A handful of indicators had a small percentage of eligible census tracts with missing data. Rather than exclude the entire census tract from the HPI, imputation of missing data was done using a nearest (covariate) neighbor algorithm (knnImputation option in the DMwR R package).

Estimates of life expectancy for Utah census tracts, 2010-2015, were available from the USALEEP project of the Centers for Disease Control and Prevention.[33] A small number of HPI-eligible census tracts had missing LEB. To determine whether nearest covariate neighbor or geographic near neighbors was an appropriate method of imputation, we used the Monte-Carlo simulation of join-count statistics to assess the geographic distribution of census tracts with missing data. The join-count statistic is a method of measuring the degree of clustering or dispersion of binary nominal data (i.e., yes/no) among a set of spatially adjacent polygons. Adjacent polygons for the join-count statistic were defined using the Rook criteria. This means that two polygons were considered adjacent neighbors if they share a common boundary. Because many metrics of spatial clustering or dispersion may be sensitive to geographic scale, the Monte-Carlo simulation of join-count statistics was conducted for all HPI-eligible census tracts in Utah, and for a subset of HPI-eligible census tracts only in Salt Lake, Utah, and Davis Counties. Join-count

statistics indicated that the spatial distribution of missing tracts was not random, so missing LEB data was imputed from geographically proximate census tracts with USALEEP LEB data. Geographic adjacent neighbors were defined using the Rook criteria. All Utah census tracts missing LEB data had at least two adjacent neighbors. The imputed LEB for missing census tracts was computed using the arithmetic mean of the LEB values of the identified adjacent census tracts. Imputation of LEB for Utah census tracts join-count statistics tests were conducted using the spdep R package.

Indicator Standardization and Scaling

Each indicator was standardized by computing its Z-score, which is aligned so that higher values indicated greater advantage. This required "flipping" (multiplying by -1 or subtracting from 100%) for Clean Environment variables and severe housing cost burden measures, which were framed in the negative direction: higher values indicate less advantage.

For a given indicator, the Z score, Z, for the *i*th census tract is the difference between the census tract value, *X*, and the overall variable mean, μ, divided by the variable's standard deviation, σ:

$$Z_i = \frac{X_i - \mu}{\sigma}.$$

Multicollinearity was assessed for each of the domains by calculating a within-domain variance inflation factor (VIF) for each candidate indicator. A VIF of 4 or greater was used as a criterion for identifying excessive multi-collinearity among domain indicators.

Domain Weighting

Domain weights were empirically estimated using weighted and constrained least squares regression model of the eight domain scores against LEB.[34] This regression model, also called weighted quantile sums (WQS), is fit using the eight domain scores and LEB for each census tract. This model simultaneously estimates the domain weights and the association between the HPI score and LEB in such a way that:

- The association between HPI score and LEB is maximized.
- Domains are allotted more weight if they contribute more to the prediction of LEB.
- All domains are guaranteed a minimum 5% weight. Because all domains and indicators were carefully chosen based on expert opinion and evidence for an association with health in the literature, we wanted to ensure that each domain retained a minimum weight. A minimum weight of 5% leaves 60% of the weighting to the modeling process (8 domains $\times$ 5% = 40% will be in the model based on this criteria).
- If a modeled domain weight were much larger than expected based on expectations from the literature and prior experience with an index like this, we would consider instituting an upper bound with the advice and consent of the Steering Committee. (This contingency did not occur.)

The model was run using LEB data for all HPI-eligible tracts, including a small number with imputed data (see above). We updated the R program used to carry out the WQS regression using a fixed seed value. This avoided slight variations in domain weights from run-to-run of the model.

Final Index and Percentile Rankings

The Z-scores of each domain were first averaged to produce a domain score, $\bar{Z}$. The HPI was then calculated for each census tract by multiplying each domain score by the corresponding estimated domain weight, and summing across the eight domains.

$$\text{HPI} = (w_1 \times \bar{Z}_{Economic}) + (w_2 \times \bar{Z}_{Education}) + (w_3 \times \bar{Z}_{HealthcareAccess}) + (w_4 \times \bar{Z}_{Housing}) + (w_5 \times \bar{Z}_{Neighborhood}) + (w_6 \times \bar{Z}_{Clean\ Environment}) + (w_7 \times \bar{Z}_{Social}) + (w_8 \times \bar{Z}_{Transportation})$$

The census tract percentile of individual indicators, domain $\bar{Z}$ scores, and the overall HPI score was based on their rank order among 575 census tracts. The methodology for assigning percentile ranks to tied values depended upon the distribution of the HPI indicator. For HPI indicators where the indicator values were uniformly or normally distributed, ties were assigned the arithmetic average of their ranks, whereas the maximum or minimum value of their ranks was assigned when the indicators were left-skewed or right-skewed, respectively. Zeroth

percentile represented the least healthy community conditions and 100th percentile represented the most healthy.

Quartiles were assigned according to the percentile rank assigned. The assignments are as follows:

- Percentiles [0th, 25th] were assigned Quartile 1 (Least Healthy)
- Percentiles (25th, 50th] were assigned Quartile 2
- Percentiles (50th, 75th] were assigned Quartile 3
- Percentiles (75th, 100th] were assigned Quartile 4 (Most Healthy)

Sensitivity Analyses of Domain Weights and Urban Bias

Sensitivity analyses conducted for California HPI 2.0 found that domain weights vary little with or without imputing missing data.[1] We also observed that algorithms that maximized the association with LEB led to some domains having less than a 5% weight. For the Utah HPI, we used methods of the preferred WQS approach of constraining the model so that each domain had at least a 5% weight.
The consistency of Utah HPI in rural and urbanized census tracts was analyzed through a comparison of correlations between the index and LEB. The definition of rural and urban followed the three categories used in U.S. 2010 Census and American Community Survey, which factors population thresholds, population7 density, land use, and distance to and continuity with adjacent population centers.[35] Generally, urbanized areas are those with 50,000 or more people. Urban clusters are areas with at least 2,500 but fewer than 50,000 people, and rural is any other area.

Race/Ethnicity in the HPI

Measures of race/ethnicity are excluded from the HPI. This decision was made in response to feedback received in the development of the California HPI that the positive association between the HPI score and the percentage of Hispanic or Latino or Asian census tract residents was emblematic of the Latino/immigrant paradox,[35] whose contributors appear to be related to recent immigration, health selection for emigration, and social cohesion – even in the presence of racism and socio-economic isolation by the larger society. In development of California HPI 3.0, the Public Health Alliance reached out to several national experts on race/ethnicity, including sociologists and social epidemiologists, who recommended that

alternative strategies – such as disaggregating data by race/ethnicity - would help elucidate the complexities of race and place. The adverse impact of COVID-19 on American Indian/Alaskan Native, Hispanic or Latino, Black, Asian and Native Hawaiian/Pacific Islander communities also highlighted the need to disaggregate race/ethnicity at the finest geographic level possible.

The HPI favors an intentional race and place approach. The mapping application includes features and decision support layers designed to help users examine the intersection, and individual contribution, of community conditions and race/ethnicity as drivers of health outcomes:

- Stratification of 9 HPI indicators by race/ethnicity (Table 2) using Census Bureau categories: Hispanic and non-Hispanic American Indian/Alaskan Native, Asian, Black, Multiple races, Other, and White. The stratification was available at the geographic level of city or place for indicators of Above Poverty, Bachelor's Education or Higher, Employed, Homeownership, High School Enrollment, Pre-School Enrollment, Insured Adults, Per Capita Income, and Uncrowded Housing.

- Race/ethnicity stratification of 7 indicators in the decision support layers (Table 2).

- Indicators in the decision support layers describing historical red lining, and the representation of different race/ethnicities among elected officials.[36]

- Indicators in the decision support layers describing multi-racial/ethnic diversity (Diversity Index, Theil H Index).

- City/place layers in decision support providing detailed breakdowns (2015-2019) of Asian subgroups (22 categories) and subgroups of Native Hawaiian/Pacific Islanders (10 categories).

- The mapping platform includes a feature that allows users to filter an indicator's census tracts by a user selected threshold for one or more racial/ethnicities (e.g., above poverty in census tracts with 10 percent or more Native Hawaiian/Pacific Islander residents). Selections can be made for specific, mutually exclusive race/ethnic groups, or non-mutually exclusive groups made up of a single race alone and in combination with other races.

Table 2. Indicators by Race/Ethnicity Categories and Geographic Level

Typology/Indicator	Geolevel	Race/Ethnicity Categories
Non-Mutually Excl. 9 Categories		
HPI:		
Above Poverty	county, place	
Bachelor's Education or Higher	county, place	
Employed	county, place	
Homeownership	county, place	
High School Enrollment	county, place	Each indicator listed to the left were produced with the following categories:
Pre-School Enrollment	county, place	All
Insured Adults	county, place	American Indian and Alaska Native alone
Per Capita Income	county, place	Asian alone
Uncrowded Housing	county, place	Black or African American alone
		Hispanic or Latino
Decision Support:		Native Hawaiian & Other Pacific Islander alone
Foreign-Born Citizens	county, place	Some other race alone
Foreign-Born Non-Citizens	county, place	Two or more races
Households with Broadband	county, place	White alone, not Hispanic or Latino
Households with a Computer	county, place	
65+ with Disability	county, place	
Median Household Income	county, place	
Low-Income Households	county, place	

Decision-Support Indicators and Domains

The DHHS Steering Committee and many users recognized the utility of including candidate HPI indicators not included in the final HPI score, indicators that did not have complete statewide census tract coverage, and other indicators reflecting a wide range of topics that can be used in conjunction with the census tract HPI scores and rankings.

Under the rubric of "decision support indicators", these topic areas included:

- Health risk factors and outcomes from the CDC/Robert Wood Johnson PLACES Project[37]
- Priority Equity Indicators
- Community Conditions Decision Support
- Demographics and Population
- Economic Decision Support

- Equity, Diversity, and Inclusion
- Healthcare Access Decision Support
- Housing Decision Support
- Other Indices of Disadvantage
- School and Education
- Race, Ethnicity, Ancestry, and Tribal Groups

While the organization of decision support layers differs slightly from CA HPI, the vast majority of individual layers were retained and produced for Utah geographies. In addition, DHHS and Public Health Alliance produced 30 Utah-specific layers that do not appear in CA HPI. These layers were selected by DHHS and the Utah HPI Steering Committee to reflect interest, utility to users, and available data.

DESCRIPTIVE AND CONCORDANCE ANALYSES

We described the census tract distribution of HPI scores, and quartiles of census tract HPI scores by Utah regions and by race/ethnicity. To stratify census tracts by race/ethnicity, we classify census tracts by the quartile of the highest percentage of a specific race/ethnicity. Among tracts within the top quartile of White resident population, White residents comprised the majority of a tract's population; this was not the case among top quartile of Hispanic or Latino resident tracts, where Hispanic or Latino residents made up less than half of a tract's population.

Other Indices of Disadvantage

The Utah Healthy Places Index was also compared to individual indicators and indices that are used by Utah and federal governmental agencies and local health departments to define disadvantaged communities (Table 3). These include:

- Health Improvement Index (HII)[38], developed by the Utah Department of Health & Human Services
- 200% of the federal poverty level, a long-standing component of many indices of disadvantage
- 80% of the median household income,
- Child Opportunity Index[39], and
- Social Vulnerability Index (SVI)[40]

For HPI, COI, SVI, and poverty we dichotomized the percentile distribution of the total score at 25% (i.e., 25% most disadvantaged census tracts). We chose cut points above and below 80% of the 2015-2019 Utah annual median household income ($71,621 × 0.8 = $57,297).

We computed sensitivity, specificity, positive predictive value, and proportion of agreement for the different index comparisons using HPI as the screening variable and the alternative index as the reference. In addition to the number of census tracts (or small areas in the case of HII), we used 2015-2019 ACS data on census tracts to estimate the size of residential population in agreement or disagreement areas. All comparisons included only HPI eligible census tracts based on a 5-year (2015-2019) annual average population of ≥1500 residents and a group quarters population <50%.

Table 3. Description of Indices to Describe Community Disadvantage

Index/ Indicator	Health Improvement Index[38]	Social Vulnerability Index [40,41]	Poverty/ 80% Median Income	Child Opportunity Index[39]
Purpose	Inform policies and interventions to efficiently and effectively reduce the burden of diseases	Help public health officials and emergency response planners identify communities needing support before, during, and after a hazardous event	Identify economically disadvantaged communities	Provide users with information to make a positive impact through research and support actions to change policies that increase equitable access to opportunity.
Conceptual basis	Describe important social determinants of health such as demographics, economic inequality, opportunity structure, resource availability, and socioeconomic status.	Factors associated with poor outcomes in communities impacted by severe weather, floods, disease outbreaks, chemical exposure, and other emergencies.	The amount of family income falls below a threshold to sustain adequate standard of living	Measures neighborhood resources and conditions that influence children's healthy development.
Number of Indicators	9	15	Poverty, 200% of federal poverty level; 80% of median household income	29
Domains	N/A	Socio-economic, Household Composition & Disability, Minority Status & Language, Housing Type & Transportation	N/A	Education, Health & Environment, Social & Economic

Standardization of indicators	N/A	Percentile	N/A	Z-score transformation
Weighting	Indicators weighted on factor analysis coefficients	Equal	N/A	Indicators and domains are weighted on rescaled, average correlation coefficients. Domain scores and overall score is calculated via weighted sum
Final Score	Weighted sum, standardized to mean of 100 and standard deviation of 20	Sum percentile of each indicator, rescale 0-100	N/A	Weighted sum

Health Improvement Index

The Utah Health Improvement Index (HII) was developed by DHHS in 2018 (most recently updated in 2022) to guide interventions and "advance health equity and reduce, in an efficient and effective way, the burden of health disparities"[38] in Utah. The HII is divided into five categories: very high, high, average, low, very low, with higher index scores representing greater need. Four of the 9 indicators in HII are also used (or are closely matched) in the HPI (income, homeownership, employment, and poverty rate).

Child Opportunity Index

The Child Opportunity Index is a nationwide index developed by diversitydatakids.org in conjunction with the Kirwan Institute for the Study of Race and Ethnicity at Ohio State University in 2014. It "measures neighborhood resources and conditions that matter for children's healthy development"[39] and allows users to compare the level of opportunity that neighborhoods provide to children. The COI uses 29 indicators, each grouped into 3 domains: 1) education, 2) health and environment, and 3) social and economic. For the comparison with HPI, we downloaded the Utah-normed version (2015), which ranks neighborhoods relative to one another within the state. Seven of the 29 indicators (poverty, bachelor's education or higher, PM2.5, insured adults, unemployment, homeownership, and income) are exact or near matches with those in the HPI. Several COI indicators are included in HPI decision support layers (supermarket access, walkability, 3rd grade proficiency (reading), 3rd grade proficiency (math), ozone, and two-parent households).

Poverty

Multiples of the federal poverty level are commonly used to describe economic disadvantage and establish eligibility for some federal and state health and human service programs. The poverty level is an income threshold adjusted for family composition and size and includes money income before taxes, but excludes capital gains and noncash benefits such as public housing, Medicaid, and food stamps.[42] The Women, Infant, and Children Program[43] administered by DHHS is an example of a state governmental program that uses the federal poverty level (185% of FPL)

to establish program eligibility. For HPI, poverty was defined at 200% of the federal poverty level.

Median Household Income

Percent of median household income for a given geographic area has been used by several governmental agencies to define low income households that are eligible for benefits programs such as housing assistance,[44] or emergency rent relief (80%).[45] (Of note, per capita income is one of the indicators in the HPI economic resources domain).

Social Vulnerability Index

The Social Vulnerability Index (SVI)[27] was developed by the Agency for Toxic Substances & Disease Registry (part of the Centers for Disease Control & Prevention) to help public health officials and emergency planners identify communities that need support before, during, and after a public health emergency associated with natural disasters or disease outbreaks. The SVI organizes 15 variables for each census tract in the United States into 4 themes: 1) Socio-economic, 2) Household Composition & Disability, 3) Minority Status & Language, and 4) Housing Type & Transportation. Census tracts for each of the 15 indicators are given a percentile and an overall score is based on the sum of percentile ranks, which is rescaled from 0 to 100 with 100 being the most vulnerable. For comparison with HPI, we downloaded the Utah version (2014-2018) and created an overall score based on Utah census tracts. Six of the 15 indicators (poverty, educational attainment, employment, income, crowded housing, and access to vehicle) are exact or near matches with those in the HPI. Several SVI indicators are included in HPI decision support layers (age 65 years and older, disability, minority, English language proficiency).

DATA PROCESSING AND QUALITY ASSURANCE PROCEDURES

Data were acquired from application programming interfaces (APIs) or as downloaded comma separated values files from public websites of the

organizations that developed or processed data from primary sources. R programs were written to abstract numerator, denominator, and outcomes (e.g., percent or rate), and the margin of error when available. The specific construction of indicators from source files is provided in Appendix B (Data Dictionary and Source Data Variable Transformations for HPI Files). Data quality was first checked by examining distributions, missing data, and potential outliers of individual indicators and their percentile rankings (for correct directionality). The resulting data files were rechecked using an R program that generated distributions, missing data, Z-scores, and domain averages, and recomputed the HPI score using reported domain weights. A discrepant indicator was checked and corrected, if necessary, until the indicators values matched exactly or with slight rounding error.

RESULTS

CENSUS TRACT ELIGIBILITY

Of the 588 Utah census tracts (2010 vintage), 575 met our eligibility criteria based on population size (≥1,500; ACS 2015-2019) and living in group quarters (<50%). Of the 13 excluded census tracts, 10 were excluded because of insufficient population alone, and 3 were excluded for group quarters alone. Table 4 lists the census tracts that are ineligible.

Table 4. Ineligible Census Tracts in Utah HPI

Census Tract	County	Ineligibility Reason
49005980100	Cache	Population <1500
49009960100	Daggett	Population <1500
49011125600	Davis	Population <1500
49029970200	Morgan	Population <1500
49035100200	Salt Lake County	Population <1500
49035101400	Salt Lake County	Group Quarters >50%
49035112818	Salt Lake County	Group Quarters >50%
49035980000	Salt Lake County	Population <1500
49043964203	Summit	Population <1500
49045980000	Tooele	Population <1500
49049001602	Utah County	Group Quarters >50%
49049010900	Utah County	Population <1500
49049980100	Utah County	Population <1500

HPI INDICATORS, DOMAINS, AND WEIGHTS

The final set of 20 indicators comprising Utah HPI are presented in Table 5 with their association with LEB. The Ozone indicator was excluded from the final HPI score due to concerns with multicollinearity (VIF of 9) within the Clean Environment domain. Upon removal of Ozone, all final HPI indicators had VIF values below 4, indicating no multicollinearity problems within HPI domains. Applying the WQS package in R to HPI indicators, weights were obtained for the eight domains (Table 6, Figure 2). The correlation between LEB and the HPI score was strong (r = 0.56)

and a large proportion of the variation was explained ($R^2 = 0.31$) in simple linear regression.

In May 2023, errors were found in the calculation of the Diesel PM and PM 2.5 measures. These were corrected and the updated data made available on the HPI map platform and through the HPI data API. The HPI score has not been re-computed, pending an HPI data refresh scheduled for early 2024. While this update is in process, the Clean Environment domain score has been temporarily removed from the Utah HPI map platform (values for Diesel PM and PM 2.5 may still be viewed).

Rural/Urban

Associations (Pearson r) between life expectancy at birth and the HPI score were positively correlated in each of three strata of urbanization, but showed a stronger association in urban census tracts (0.59, n = 468) compared to urban clusters in rural areas (0.51, n = 47) and rural census tracts (0.42, n = 60).

Table 5. Policy Action Areas (Domains), Indicators and their Data Sources for the Utah Healthy Places Index

Policy Action Area / Indicator	Definition	Correlation with LEB	Data Source†, Year
Education			
bachelorsed	Percentage of population over age 25 with a bachelor's education or higher	0.44	ACS, 2015-2019
inhighschool	Percentage of 15–17-year-olds enrolled in school	0.09	ACS, 2015-2019
inpreschool	Percentage of 3- and 4-year-olds enrolled in pre-school	0.12	ACS, 2015-2019
Transportation			
automobile	Percentage of households with access to an automobile	0.41	ACS, 2015-2019
bikeaccess	Total miles of bike lanes and paths	0.09	ACS, 2015-2019 UGRC/Transportation, 2022
Housing			
homeownership	Percentage of occupied housing units occupied by property owners	0.38	ACS, 2015-2019
houserepair	Percent of households with complete kitchen facilities and plumbing	0.13	CHAS, 2013-2017
ownsevere	Percentage of low-income homeowners paying more than 50% of income on housing costs	-0.13	CHAS, 2013-2017
rentsevere	Percentage of low-income renter households paying more than 50% of income on housing costs	-0.18	CHAS, 2013-2017
uncrowded	Percentage of households with less or equal to 1 occupant per room	0.33	ACS, 2015-2019
Social			
voting	Percentage of registered voters voting in the 2020 general election	0.47	Utah Lieutenant Governor's Office/VEST, 2020

censusresponse	Percentage of 2020 decennial households who completed census forms online, by mail, or by phone	0.13	Decennial Census, 2020
Clean Environment			
dieselpm	Diesel particulate matter level in air, µg/m^3 in 2018	-0.28	US EPA EJSCREEN, 2020
pm25	Annual mean concentration of PM2.5, in µg/m^3 in 2018	-0.07	US EPA EJSCREEN, 2020
Neighborhood			
parkaccess	Total acres of parks, public land, and public golf courses per person	0.18	UGRC/Recreation, 2016-2020
treecanopy	Population-weighted percentage of the census tract area with tree canopy	0.28	NLCD, 2016
Healthcare Access			
insured	Percentage of adults aged 19 to 64 years with health insurance	0.37	ACS, 2015-2019
Economic			
abovepoverty	Percent of the population with an income exceeding 200% of federal poverty level	0.46	ACS, 2015-2019
employed	Percentage of population aged 20-64 who are employed	0.08	ACS, 2015-2019
percapitaincome	Average income computed for every man, woman, and child in a particular group	0.39	ACS, 2015-2019

† ACS, American Community Survey[22]; UGRC, Utah Geospatial Resource Center[27]; CHAS, Comprehensive Housing Assessment System [24]; VEST, Voting and Election Science Team[29]; US EPA EJSCREEN, U.S. Environmental Protection Agency Environmental Justice Screening and Mapping Tool[28]; NLCD, National Land Cover Database[25]; Utah Lieutenant Governor's Office[26]

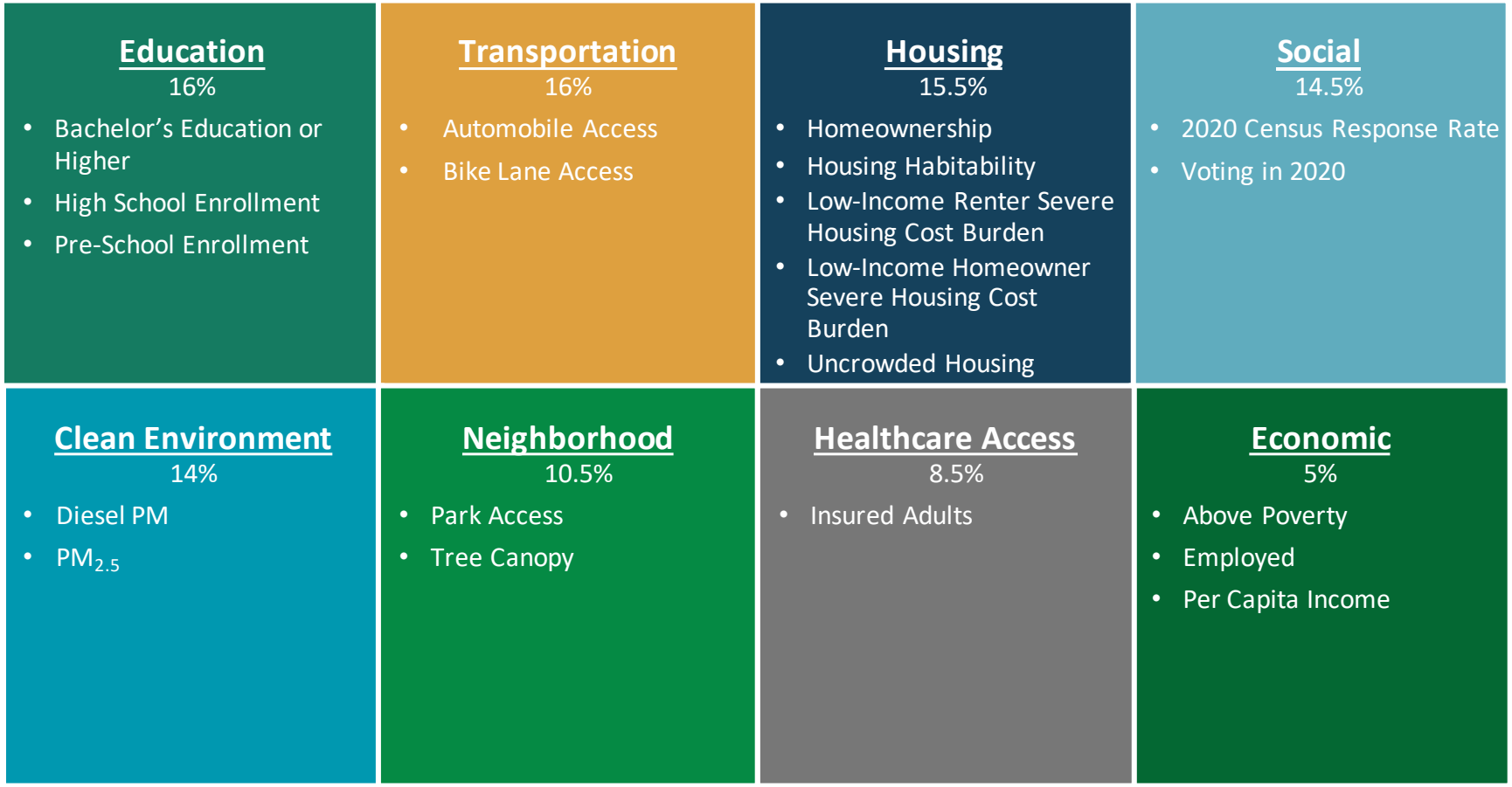


Figure 2. Utah Healthy Places Index Policy Action Areas (Domains), Weights, and Individual Indicators

Table 6. Weighted Quantile Sums Domain Weights

Domain	Weight
Education	0.160
Transportation	0.160
Housing	0.155
Social	0.145
Clean Environment	0.140
Neighborhood	0.105
Healthcare Access	0.085
Economic	0.050

DESCRIPTIVE ANALYSES

This frequency distribution of census tracts by HPI score is presented in Figure 3. The distribution ranges from -1.45 to 1.17 with a mean centered at 0, and approximates a normal curve.

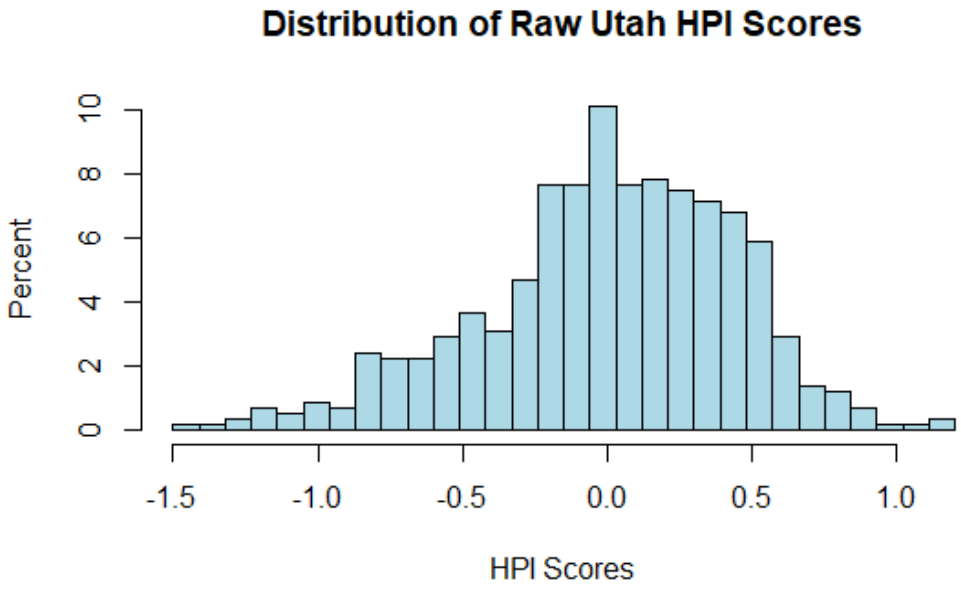


Figure 3. Distribution of HPI scores for 575 Utah census tracts

Most indicator domains were positively correlated with each other. Figure 4 illustrates Pearson correlations among the HPI score and component unweighted indicator domain scores. Domain scores for economic, education, social, healthcare access and housing domains tended to have high correlations with each other.

Domain	Economic	Education	Social	Trans.	Health-care Access	Neigh-borhood	Housing	Clean Env.
Economic	1							
Education	0.51	1						
Social	0.58	0.38	1					
Transportation	0.32	0.19	0.28	1				
Healthcare Access	0.58	0.47	0.65	0.26	1			
Neighborhood	0.22	0.23	-0.12	-0.01	0.09	1		
Housing	0.59	0.26	0.58	0.36	0.51	0.15	1	
Clean Environment	-0.05	-0.01	-0.01	0.1	0.09	0.16	0.17	1

Figure 4. Pearson Correlations Among HPI Domains, Utah

Geographic Distribution of HPI and Domain Scores

Table 7 gives the distribution of census tracts by quartile of HPI score by Utah region. The Wasatch Front has a disproportionate share of census tracts in the quartile with the least healthy community conditions and lower mean HPI scores. Population counts show a similar pattern (Table 8). All Utah counties except Daggett had an HPI-eligible census tract. Fourteen counties, mostly in rural Utah, did not have any census tracts in the quartile with the least healthy community conditions (Beaver, Daggett, Emery, Garfield, Juab, Millard, Morgan, Piute, Rich, Sanpete, Sevier, Summit, Wasatch, and Wayne). Rural areas had a lower proportion of the census tracts in the least healthy quartile (14.0%; 15/107) than urban areas (27.4%, 128/468).

Table 7. Distribution of Census Tracts by Region by HPI Quartile, Utah, 2019

	Quartile of HPI Score					
Region	Least Healthy Community Conditions 1	2	3	Most Healthy Community Conditions 4	Sum	Percent Least Healthy (Least/Sum)
Wasatch Front	118	98	98	122	436	27%
Other	25	46	46	22	139	18%
Sum	143	144	144	144	575	25%

† Regions by County:
Wasatch Front: Davis, Salt Lake, Utah, Weber
Other: Beaver, Box Elder, Cache, Duchesne, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, Morgan, Piute, Rich, San Juan, Sanpete, Sevier, Summit, Tooele, Uintah, Wasatch, Washington, Wayne

Table 8. Distribution of Populations by Region by HPI Quartile, Utah, 2019

	Quartile of Utah HPI Score					
Region	Least Healthy Community Conditions 1	2	3	Most Healthy Community Conditions 4	Sum	Percent Least Healthy
Wasatch Front	582,158	497,673	529,213	714,348	2,323,392	25%
Other	133,485	266,037	254,146	104,593	758,261	18%
Sum	715,643	763,710	783,359	818,941	3,081,653	23%

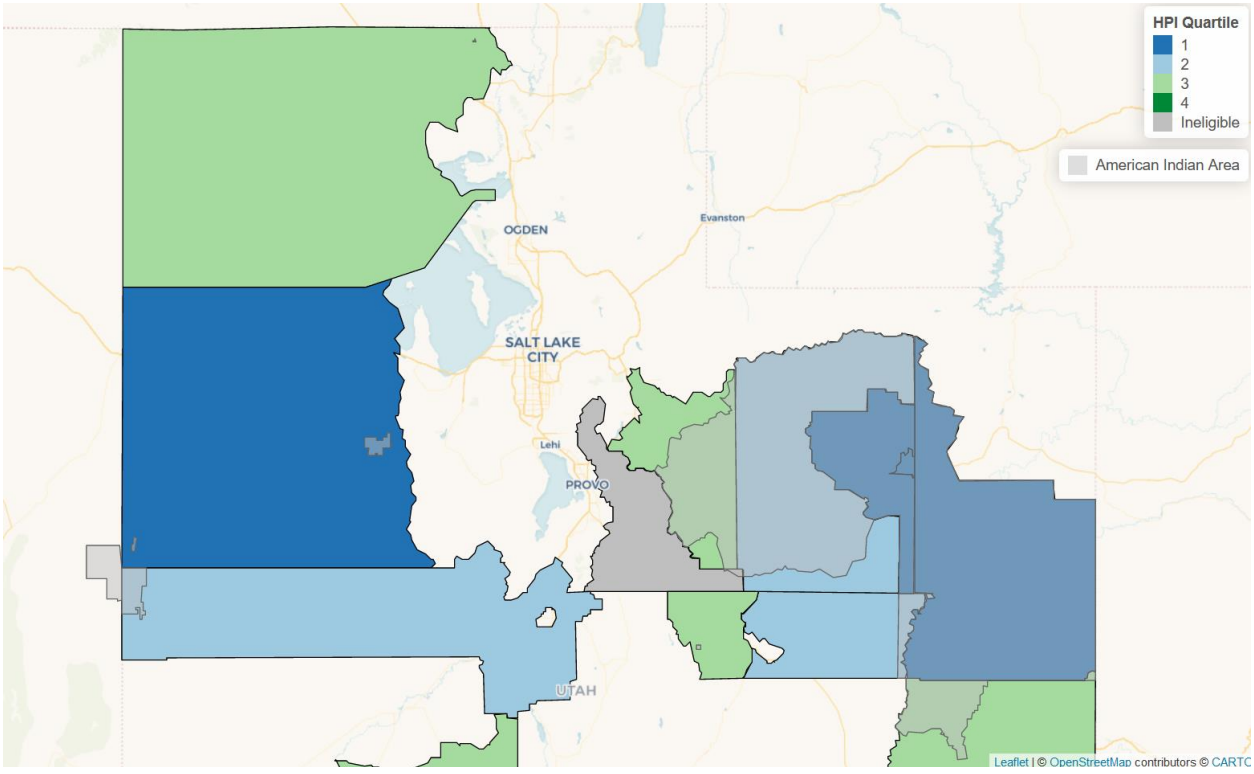
† Regions by County:
Wasatch Front: Davis, Salt Lake, Utah, Weber
Other: Beaver, Box Elder, Cache, Duchesne, Emery, Garfield, Grand, Iron, Juab, Kane, Millard, Morgan, Piute, Rich, San Juan, Sanpete, Sevier, Summit, Tooele, Uintah, Wasatch, Washington, Wayne

American Indian Areas Coverage

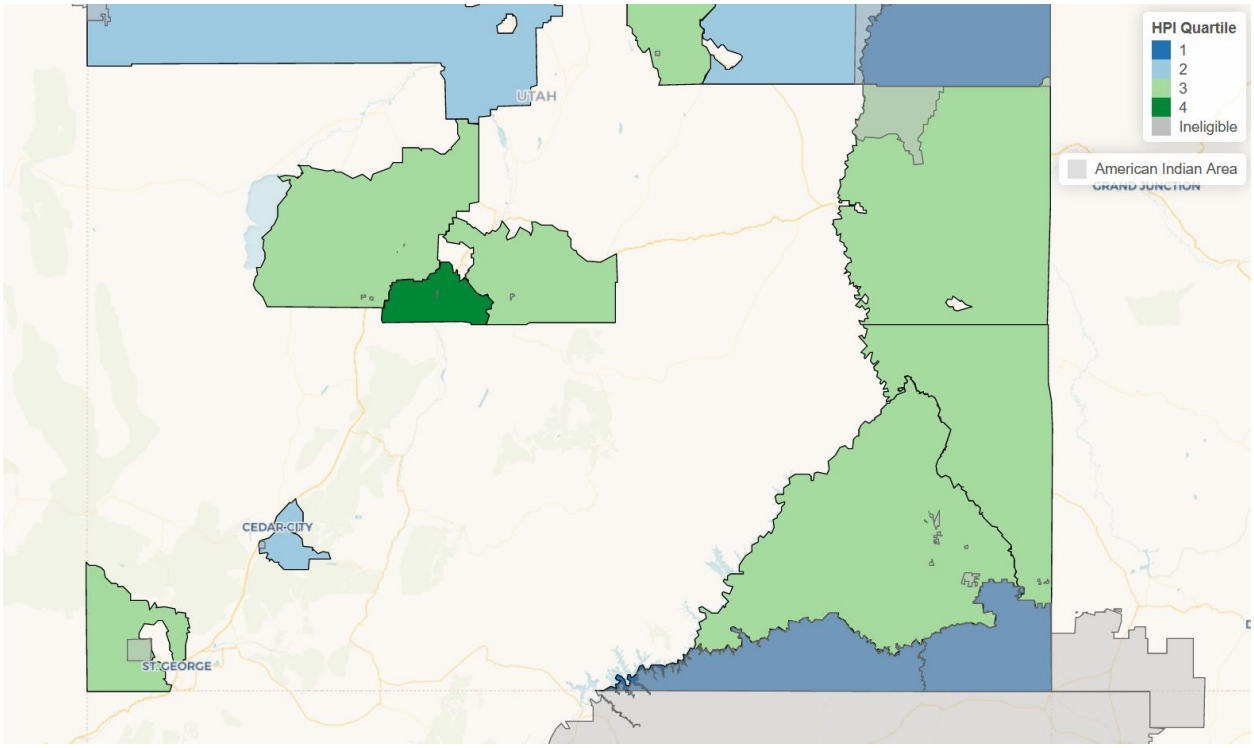
There are 22 census tracts in Utah that completely or partially overlap with American Indian Areas. Of those 22 tracts, 21 (95.5%) met our HPI eligibility criteria and 1 (4.5%) was excluded due to insufficient population and/or percentage of population living in group quarters. All 7 distinct American Indian Areas (Goshute, Navajo Nation, Northwestern Shoshone, Paiute, Skull Valley, Uintah and Ouray, and Ute Mountain) have at least partial coverage by HPI-eligible tracts. The geographic distribution of American Indian Areas and their overlap with HPI-eligible census tracts is shown in Figure 5.

Figure 5. Distribution of American Indian Areas and Utah HPI Eligible Census Tracts

A. Northern Utah



B. Southern Utah



Distribution of HPI Scores by Race/Ethnicity

To describe the distribution of HPI scores by race/ethnicity, we used area-based (census tract) measures of race/ethnicity, focusing on the quartile of census tracts with the greatest proportion of a given race/ethnicity (Figure 6). Given the geographic dispersion and small proportion of Asian, Black, Native American/Alaskan Native and Native Hawaiian/Pacific Islanders in any given census tract, we restricted the analysis to Hispanic or Latino and White.

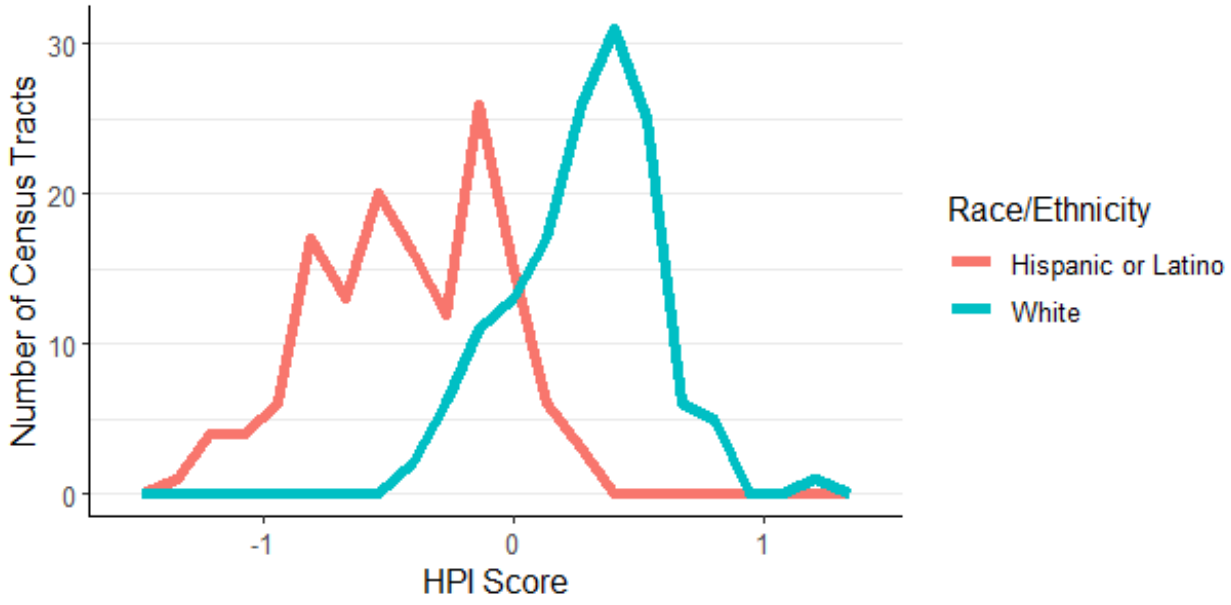


Figure 6. Distribution of Utah HPI Scores in Quartile of Census Tracts with the Highest Proportion of Hispanic or Latino and White Residents, Utah, 2015-2019 (Higher HPI Score = Healthier Community Conditions)

HPI scores in census tracts with high concentration of White residents (mean 92%) skewed towards higher values (more opportunity). HPI scores in census tracts with high concentration of Hispanic or Latino residents (mean 31%) skewed toward less healthy community conditions.

Impact of Weighting Domains (compared to equal weighting)

Of the 143 (25%) census tracts with the lowest HPI scores, 7 (4.9%) were discordant between the HPI and a re-calculated HPI in which there was no weighting (Table 9). Weighting has a modest impact on membership of census tracts in the quartile with the least healthy community conditions.

Table 9. Concordance of Utah HPI Weighted and Equal Weighted Domains

Census Tracts				
		Utah HPI		
		Least Healthy 25%		
Utah HPI Equal Weight		Y	N	Sum
Least Healthy Community Conditions, 25%	Y	136	8	144
	N	7	424	431
	Sum	143	432	575

Comparison with Other Indices of Disadvantage

The concordance of the least healthy 25% of HPI census tracts and the 25% of those with the least favorable scores in Social Vulnerability Index (SVI) and the Child Opportunity Index are presented in Table 10 and 11 along with comparisons of census tracts below 200% of the federal poverty level and 80% ($57,296) of the median household income. Since the Utah Health Improvement Index is published only at the Utah small areas geography, a similar analysis of using the small area geography was conducted to assess the concordance between the least healthy 25% of HPI small areas and the least favorable Health Improvement Index scores.

Approximately 45 census tracts, accounting for 257 thousand Utahns, were in disagreement between the most disadvantaged SVI and HPI quartiles. HPI had more Utah counties than SVI without any census tracts in the least healthy quartile (14 vs. 8): Beaver, Daggett, Emery, Garfield, Juab, Millard, Morgan, Piute, Rich, Sanpete, Sevier, Summit, Wasatch, and Wayne. Seven counties had at least one census tract in the most vulnerable SVI quartile, but no census tract in the quartile of HPI with the least healthy community conditions. These 7 counties were rural and located in central Utah: Beaver, Emery, Garfield, Juab, Millard, Sanpete, Sevier.

The positive accuracy of HPI with the indices that emphasized economic status (poverty, and 80% median household income) ranged from 0.82 to 0.85. COI had the fewest number of discordant census tracts and population.

Table 10. Census Tract or Small Area Agreement Between Utah HPI and Alternative Indexes

A. SVI

25% Most Disadvantaged

		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI Least Healthy Community Conditions, 25%	Y	99	44	143	0.69	0.90	0.85	0.69
	N	45	387	432				
	Sum	144	431	575				

B. COI

25% Most Disadvantaged

		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI Least Healthy Community Conditions, 25%	Y	98	45	143	0.69	0.90	0.85	0.69
	N	44	388	432				
	Sum	142	433	575				

C. Poverty (<200 % Federal Poverty Level)

25% Most Disadvantaged

		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI Least Healthy Community Conditions, 25%	Y	98	45	143	0.69	0.90	0.84	0.69
	N	45	387	432				
	Sum	143	432	575				

D. Median Household Income

<80% Median Household Income

		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI Least Healthy Community Conditions, 25%	Y	96	47	143	0.62	0.89	0.82	0.67
	N	59	373	432				
	Sum	155	420	575				

E. HII

		25% Most Disadvantaged						
		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI	Y	17	8	25	0.68	0.89	0.84	0.68
Least Healthy Community Conditions, 25%	N	8	66	74				
	Sum	25	74	99				

SVI, Social Vulnerability Index; COI, Child Opportunity Index; HII, Health Improvement Index; PA, Proportion of Agreement; PPV, Positive Predictive Value

Table 11. Residential Population in Census Tracts or Small Areas by Agreement Status for Utah HPI and Alternative Indexes

A. SVI		SVI						
		25% Most Disadvantaged						
Utah HPI		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Least Healthy	Y	506,689	208,954	715,643	0.66	0.91	0.85	0.71
Community Conditions,	N	256,544	2,109,466	2,366,010				
25%	Sum	763,233	2,318,420	3,081,653				

B. COI		COI						
		25% Most Disadvantaged						
		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI	Y	483,579	232,064	715,643	0.70	0.90	0.86	0.68
Least Healthy	N	206,705	2,159,305	2,366,010				
Community Conditions,	Sum	690,284	2,391,369	3,081,653				
25%								

C.		Poverty						
		25% Most Disadvantaged						
		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI	Y	470,971	244,672	715,643	0.69	0.90	0.85	0.66
Least Healthy	N	209,349	2,156,661	2,366,010				
Community Conditions,	Sum	680,320	2,401,333	3,081,653				
25%								

D. Median Household Income

		<80% Median Household Income						
		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI	Y	445,864	269,779	727,667	0.62	0.89	0.83	0.62
Least Healthy Community Conditions, 25%	N	269,156	2,096,854	2,353,986				
	Sum	715,020	2,366,633	3,081,653				

E. HII

		Y	N	Sum	Sensitivity	Specificity	PA	PPV
Utah HPI	Y	604,100	255,097	859,197	0.69	0.89	0.83	0.70
Least Healthy Community Conditions, 25%	N	278,068	2,066,013	2,344,081				
	Sum	882,168	2,321,110	3,203,278				

SVI, Social Vulnerability Index; COI, Child Opportunity Index; HII, Health Improvement Index; PA, Proportion of Agreement; PPV, Positive Predictive Value

Decision-Support Indicators and Domains

Utah HPI includes 347 indicators in its decision support layers. These encompass:

- Health risk factors and outcomes from the CDC/Robert Wood Johnson PLACES Project[3737] and the Utah Indicator-Based Information System for Public Health (IBIS-PH) (N = 35)
- Community conditions not captured within the HPI, including measures of neighborhood quality (N = 14); housing stock and affordability (N = 11); food security, working conditions, and economic prosperity (N = 9); and healthcare access, services, and cost (N = 6).
- Demographics and population (N = 28)
- Equity, diversity, inclusion, and residential segregation measures (N = 16)
- Indicators from other indices of disadvantage, such as the Social Vulnerability Index and the Utah Health Improvement Index (N = 4)
- Elementary school educational attainment and readiness (N = 5)
- Race, Ethnicity, Ancestry, and Tribal Groups (N = 219)

The decision support indicators are listed in Table 12 and Appendix B includes a data dictionary. The majority of these are available at census tract geography; 23 are available only for small area, and 10 are available only for counties. Race/ethnicity stratified indicators are available at county and city/town geographies.

Table 12. Variables and Definitions, Utah Healthy Places Index, Decision Support Indicators

2010 US Census Classification of Race/Ethnicity and Country of Origin: Asian, Native Hawaiian/Pacific Islander, and Hispanic Subgroups				
Mutually Exclusive Race/Ethnicity	Alone and in Combination with Other Races	Subgroups a) Alone and b) Alone and In Combination		
		Asian	NHPI	Hispanic Country of Origin
American Indian/Alaskan Native	AIAN	Indian	Hawaiian	Central American:
Asian	Asian	Bangladeshi	Samoan	Costa Rican
Black	Black	Bhutanese	Tongan	Guatemalan
Hispanic or Latino		Burmese	Other Polynesian	Honduran
Native Hawaiian/Pacific Islander	NHPI	Cambodian	Guamanian	Nicaraguan
Other	Other	Chinese	Marshallese	Other Central American
Two or more races	Two or more races	Filipino	Other Micronesian	Panamanian
White	White	Hmong	Fijian	Salvadoran
		Indonesian	Other Melanesian	Cuban
		Japanese	Other Pacific Islander	Dominican (Dominican Republic)
		Korean		Mexican
		Laotian		Other Hispanic or Latino:
		Malaysian		All other Hispanic or Latino
		Mongolian		Spaniard
		Nepalese		Spanish
		Okinawan		Spanish American
		Pakistani		Puerto Rican
		Sri Lankan		South American:
		Taiwanese		Argentinean
		Thai		Bolivian
		Vietnamese		Chilean
				Colombian
				Ecuadorian
				Other South American
				Paraguayan
				Peruvian
				Uruguayan
				Venezuelan

2010 US Census Classification of Tribal Identification of Native American/Alaskan Native Subgroups	
Subgroup	Subgroup
Apache	Ottawa
Arapaho	Paiute
Blackfeet	Pima
Canadian and French American Indian	Potawatomi
Central American Indian	Pueblo
Cherokee	Puget Sound Salish
Cheyenne	Seminole
Chickasaw	Shoshone
Chippewa	Sioux
Choctaw	South American Indian
Colville	Spanish American Indian
Comanche	Tlingit-Haida
Cree	Tohono O'Odham
Creek	Tsimshian
Crow	Two or More American Indian or Alaska Native Tribes
Delaware	Ute
Hopi	Yakama
Houma	Yaqui
Inupiat	Yuman
Iroquois	Yup'ik
Kiowa	Alaska Native Not Specified
Lumbee	Alaskan Athabascan
Menominee	Aleut
Mexican American Indian	All other American Indian tribes (with only one tribe)
Navajo	American Indian Not specified
Osage	American Indian or Alaska Native tribes, not specified

* Groups are available for a) Alone and b) Alone and in combination with Other Races

Variable	Definition	Data Source†, Year
Priority Equity Indicators		
diversity_index	How likely it is that two people, chosen randomly, will be of different race/ethnicities	ACS, 2015-2019
electeds_diff	Difference in percent of County elected officials who are non-White and percent of residents who are non-White	ACS, 2015-2019
redlined	Neighborhood historically redlined	Mapping Inequality, 1935-1940
Community Conditions Decision Support		
broadband	Percent of people in households with an internet subscription (broadband of any type)	ACS, 2015-2019
computer	Percent of people in households with a computer	ACS, 2015-2019
crashes	**Rate of motor vehicle crashes per 100,000 population of residence by Utah small area**	**UDOT, 2021**
h20contam_viopaccr	**Population-weighted average of Safe Water Drinking Act violation points accrued by a community water system over the last 5 years**	**EPA ECHO DWSS, 2016-2021**
libraryaccess	**Average distance from a library weighted by population size**	**UGRC/Library, 2021**
netmigration	The difference between the number of immigrants entering a county and the number of emigrants leaving a county from 2000 to 2010.	UW/ICPSR_NME_2000_2010, 2000-2010
ozone	Average amount of ozone in the air during the most polluted 8 hours of summer days, measured in parts per million	US EPA EJSCREEN, 2020
radon	**Percent of Indoor Radon Test Levels Above 4 pCi/L**	**Utah Environmental Public Health Tracking System, DHHS, 2016-2020**
recentmove	Percent of households with new (moved in 2015 or later) residents	ACS, 2015-2019
supermkts	Percent of people in urban areas who live less than a half mile from a supermarket/large grocery store, or less than 1 mile in rural areas.	USDA Food Access Research Atlas, 2017

Variable	Definition	Data Source†, Year
transit	**Percent of people living close to convenient, reliable transit, as defined by a half-mile or ten-minute walk, that comes every thirty minutes or less during peak commute times**	**ACS, 2020**
twoparent	Percent of children with two married or partnered parents/caregivers	ACS, 2015-2019
walk	**Percent of population within a 10 minute walk to a local park or trailhead**	**2020 Census/PL 94-171 Redistricting Data Summary Files/P1; State Geographic Information Database, UGRC, 2020**
walkability_index	**US EPA walkability score.**	**US EPA Smart Location Database 3.0, 2019**
Demographics and Population		
age_under5	Percent of population who are young children.	ACS, 2015-2019
age5_14	Percent of people aged between 5-14.	ACS, 2015-2019
civilianveteran	Percent of civilian adults that are veterans.	ACS, 2015-2019
english_ltvw	Percent of people, aged 5 and older, that speak English "less than very well".	ACS, 2015-2019
englishspeak	Percent of households where at least one person, aged 14 years or older, speaks English well	ACS, 2015-2019
femalegender	Percent of people who are female.	ACS, 2015-2019
foreignborn_citizen	Percent of people born outside of the US who are naturalized US citizens	ACS, 2015-2019
foreignborn_notcitizen	Percent of people born outside of the US that are not US citizens	ACS, 2015-2019
immigrant	Percent of people born outside of the US	ACS, 2015-2019
lang_arabic	Percent of people, aged 5 and older, that speak Arabic at home	ACS, 2015-2019
lang_chinese	Percent of people, aged 5 and older, that speak Chinese (including Mandarin and Cantonese) at home	ACS, 2015-2019

Variable	Definition	Data Source†, Year
lang_english	Percent of people, aged 5 and older, that speak English at home.	ACS, 2015-2019
lang_french	Percent of people, aged 5 and older, that speak French, Haitian, or Cajun at home	ACS, 2015-2019
lang_german	Percent of people, aged 5 and older, that speak German or other West Germanic languages at home	ACS, 2015-2019
lang_korean	Percent of people, aged 5 and older, that speak Korean at home	ACS, 2015-2019
lang_other	Percent of people, aged 5 and older, that speak other or unspecified languages at home	ACS, 2015-2019
lang_other_api	Percent of people, aged 5 and older, that speak other Asian and Pacific Island languages at home	ACS, 2015-2019
lang_other_indo	Percent of people, aged 5 and older, that speak other Indo-European languages at home	ACS, 2015-2019
lang_russian	Percent of people, aged 5 and older, that speak Russian, Polish, or other Slavic languages at home	ACS, 2015-2019
lang_spanish	Percent of people, aged 5 and older, that speak Spanish at home	ACS, 2015-2019
lang_tagalog	Percent of people, aged 5 and older, that speak Tagalog (including Filipino) at home	ACS, 2015-2019
lang_vietnamese	Percent of people, aged 5 and older, that speak Vietnamese at home	ACS, 2015-2019
language65	Percent of people 65 years and older who do not speak English fluently	ACS, 2015-2019
livealone65	Percent of people 65 years and older living alone	ACS, 2015-2019
nonenglishspeaking	Percent of people, aged 5 and older, that speak a language other than English at home.	ACS, 2015-2019
nonwhite65	Percent of people 65 years and older who are non-White	ACS, 2015-2019
perc65plus	Percent of people aged 65 or older.	ACS, 2015-2019
perc75plus	Percent of people aged 75 or older.	ACS, 2015-2019
Economic Decision Support		
childpoverty	Percent of children in poverty.	ACS, 2015-2019

Variable	Definition	Data Source†, Year
foodassist_fed	**Percent of Utah adults who report that anyone in their household received benefits from a federal food assistance program such as SNAP (food stamps), WIC, and free and reduced lunch program in the past 12 months**	**Utah BRFSS, 2019-2020**
foodassist_nonfed	**Percent of Utah adults who report that anyone in their household received benefits from a non federal food source such as "Meals on Wheels", food pantries, food banks, soup kitchens, church welfare, backpack programs, or any other charitable food source in the past 12 months**	**Utah BRFSS, 2019-2020**
foodinsecure	Average 5-year percent of population who lack adequate access to food.	CHR2021/MapMealGap 2019
income	Median annual household income.	ACS, 2015-2019
job_availability	**Total jobs in businesses covered by the Employment Security Act per 10,000 population aged 20-64**	**Utah Department of Workforce Services/FirmFind Data, ACS 2021**
labor_participation	**Percentage of the civilian noninstitutional population 16 years and older that is working or actively looking for work**	**ACS, 2015-2019**
outdoors	Percent of workers older than 16 who work outdoors	ACS, 2015-2019
poverty65	Percent of population 65 years and older with incomes below the poverty level	ACS, 2015-2019
Equity, Diversity, and Inclusion		
gini	Measure of income inequality within a county.	ACS, 2015-2019
gini_city	Measure of income inequality within a city.	ACS, 2015-2019
iod	Measure of Black or African American residential segregation	Decennial Census, 2010
iod_asian	Measure of Asian residential segregation	Decennial Census, 2010
iod_latino	Measure of Hispanic or Latino residential segregation	Decennial Census, 2010
iod_nonwhite	Measure of non-White residential segregation	Decennial Census, 2010
lq_aian	Measure of American Indian or Alaska Native residential segregation	ACS, 2015-2019
lq_asian	Measure of Asian residential segregation	ACS, 2015-2019
lq_black	Measure of Black or African American residential segregation	ACS, 2015-2019
lq_hispanic	Measure of Hispanic or Latino residential segregation	ACS, 2015-2019

Variable	Definition	Data Source†, Year
lq_nhpi	Measure of Native Hawaiian or Other Pacific Islander residential segregation	ACS, 2015-2019
lq_white	Measure of White residential segregation	ACS, 2015-2019
theil	Theil Index (0 to 1) measuring racial segregation with 0 as least diverse	ACS, 2015-2019
Health Outcomes		
ARTHRITIS	Percent of adults diagnosed with arthritis	CDC PLACES, 2018
BPHIGH	Percent of adults diagnosed with high blood pressure	CDC PLACES, 2018
CANCER	Percent of adults diagnosed with cancer (except skin cancer)	CDC PLACES, 2018
CASTHMA	Percent of adults with asthma	CDC PLACES, 2018
CHD	Percent of adults diagnosed with angina or coronary heart disease (CHD)	CDC PLACES, 2018
COPD	Percent of adults diagnosed with chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis	CDC PLACES, 2018
covid	**Case Incidence Rate per 100,000 population of COVID-19 from March 2020 through February 2022. A confirmed case is any person with a positive SARS-CoV2 PCR or antigen test.**	**DHHS / Division of Population Health, 2020-2022**
deathsdespair	Average number of yearly deaths due to suicide, drugs, or alcohol (per 100,000).	CDC/WONDER/UCOD, 2015-2019
DIABETES	Percent of adults diagnosed with diabetes (other than diabetes during pregnancy)	CDC PLACES, 2018
difficultyambulatory	Percent of people who have serious difficulty walking or climbing stairs.	ACS, 2015-2019
difficultycognitive	Percent of people who have difficulty remembering, concentrating, or making decisions.	ACS, 2015-2019
difficultyhearing	Percent people who are deaf or have serious hearing difficulty.	ACS, 2015-2019
difficultyindependent	Percent of people who have difficulty doing errands such as visiting a doctor's office or shopping.	ACS, 2015-2019
difficultyselfcare	Percent of people who have difficulty bathing or dressing.	ACS, 2015-2019

Variable	Definition	Data Source†, Year
difficultyvision	Percent of people who are blind or have serious difficulty seeing, even when wearing glasses.	ACS, 2015-2019
disability	Percent of people who have a disability.	ACS, 2015-2019
disability65	Percent of people 65 years and older with disabilities	ACS, 2015-2019
fall	**Age-adjusted rate per 10,000 of emergency department visits for falls**	**UEDED, BEMS, DHHS, 2018-2019**
flupneu	**Age-adjusted deaths per 100,000 population caused by influenza or pneumonia**	**UVRD, OVRS DHHS, 2015-2019**
KIDNEY	Percentage of adults diagnosed with chronic kidney disease	CDC PLACES, 2018
leb	Estimate of life expectancy at birth.	CDC USALEEP, 2018
MHLTH	Percentage of adults who felt their mental health was not good during 2 or more weeks of the previous month.	CDC PLACES, 2018
mva	Average number of yearly deaths due to motor vehicle injuries (per 100,000).	CDC/WONDER/UCOD, 2015-2019
mvc	**Age-adjusted rate per 10,000 of emergency department visits for motor vehicle traffic-related injuries (MVT-Occupant, MVT-Motorcyclist, MVT-Pedalcyclist, MVT-Pedestrian, MVT-Other, MVT-Unspecified, excludes MV non-traffic)**	**UEDED, BEMS, DHHS, 2018-2020**
OBESITY	Percentage of adults with obesity (a BMI of at least 30.0 kg/m^2).	CDC PLACES, 2018
overdose	**Age-adjusted deaths per 100,000 population caused by drugs involving any opioid**	**UVRD, OVRS DHHS, 2016-2020**
PHLTH	Percent of adults who felt their physical health was not good during 2 or more weeks of the previous month.	CDC PLACES, 2018
preterm	**Percent of live births that are less than 34 weeks gestation**	**Utah Birth Certificate Database, 2017-2019**
STROKE	Percent of adults who have been diagnosed with a stroke	CDC PLACES, 2018
suicide	**Age-adjusted Deaths by Suicide per 100,000 population**	**UVRD, OVRS DHHS, 2016-2020**

Variable	Definition	Data Source†, Year
tbi	**Age-adjusted rate per 10,000 of emergency department visits for traumatic brain injury of all causes and intents**	**UEDED, BEMS, DHHS, 2018-2020**
Health Risk Factors		
ACE	**Age-adjusted percentage of adults with ACE score 4+ out of 8**	**Utah BRFSS, 2018-2020**
BINGE	Percent of adults who drank 5 or more alcoholic drinks (men) or 4 or more alcoholic drinks (women) at least once within the past month	CDC PLACES, 2018
CSMOKING	Percent of adults who currently smoke.	CDC PLACES, 2018
LPA	Percent of people who do not exercise or participate in physical activities (outside of their regular job)	CDC PLACES, 2018
Healthcare Access Decision Support		
apncu	**Percentage of pregnant women who received adequate prenatal care**	**Utah Birth Certificate Database, OVRS DHHS, 2020**
cost	**Age-adjusted percentage of adults unable to get needed care due to cost**	**Utah BRFSS, 2018-2020**
insured_children	**Percentage of population 18 years and younger covered by any type (private or public) of health insurance**	**ACS, 2015-2019**
prenatalcare	**Percentage of pregnant women with prenatal care in the first trimester**	**Utah Birth Certificate Database, OVRS DHHS, 2016-2020**
RouDentHlthCare	**Age-adjusted percentage of adults who received dental care in the past 12 months**	**Utah BRFSS, 2016-2020**
RoutineMedChk	**Age-adjusted percentage of adults who received a routine medical checkup in the past 12 months**	**Utah BRFSS, 2018-2020**
Housing Decision Support		
AllHUDunits	Number of housing units subsidized by any HUD program, for every 1,000 housing units	2019 HUDPSH/ ACS, 2015-2019
HCVunits	Housing Choice Voucher units, for every 1,000 housing units	2019 HUDPSH/ ACS, 2015-2019
homevalue	Median home value	ACS, 2015-2019

Variable	Definition	Data Source†, Year
housebuild1940	Percent of homes built before 1940	ACS, 2015-2019
HTA	**Housing plus transportation costs as a percentage of income for a typical household in the region**	**National Transit-Oriented Development Database, 2013**
LIHTC_HU	Number of active Low-Income Housing Tax Credits units for every 1,000 housing units	2019 HUDPSH/ ACS, 2015-2019
mobilehomes	Percent of households living in mobile homes	ACS, 2015-2019
OtherHUDunits	Number of housing units subsidized through the Section 8 moderate rehabilitation; Section 8 project-based rental assistance; rent supplement; rental assistance payment; Section 236; Section 202 for the elderly; or Section 811 for persons with disabilities, for every 1,000 housing units	2019 HUDPSH/ ACS, 2015-2019
PHunits	Number of public housing units, for every 1,000 housing units	2019 HUDPSH/ ACS, B25001, 2015-2019
rent	Median rent	ACS, 2015-2019
rv_van_boat	Percent of households living in RV, van, or boat	ACS, 2015-2019
Other Indices of Disadvantage		
hi_score	Index score measuring economic hardship	ACS, 2015-2019
hii	**The Utah Health Improvement Index (HII) is a composite health equity measure by Utah Small Area.**	**DHHS / Division of Population Health, 2016-2020**
lt80pct	Low-income households	ACS, 2015-2019
svi	Index measuring social vulnerability	CDC Agency for Toxic Substances and Disease Registry, 2018
School and Education		
idleteen	Percent of 16- to 19-year-olds not enrolled in school or working.	ACS, 2015-2019

Variable	Definition	Data Source†, Year
KEEP_literacy	**Percentage of children with sufficient prerequisite knowledge and skills on KEEP (Kindergarten Entry and Exit Profile) literacy**	**UDRC, 2016-2018**
KEEP_numeracy	**Percentage of children with sufficient prerequisite knowledge and skills on KEEP (Kindergarten Entry and Exit Profile) numeracy**	**UDRC, 2016-2018**
SAGE_ELA	**Percentage of children who scored "proficient" on 3rd grade SAGE (Student Assessment of Growth and Excellence) ELA (English Language Arts)**	**UDRC, 2016-2018**
SAGE_math	**Percentage of children who scored "proficient" on 3rd grade SAGE (Student Assessment of Growth and Excellence) MATH**	**UDRC, 2016-2018**

Note: Indicators in **bold** are unique to Utah HPI. † ACS, American Community Survey[22]; BEMS, Bureau of Emergency Medical Services[46]; EPA ECHO DWSS, Environmental Protection Agency Enforcement and Compliance History Online Drinking Water System Search[47]; HUDPSH, HUD Picture of Subsidized Households[48]; OVRS, Office of Vital Records and Statistics[46]; DHHS, Utah Department of Health & Human Services[38]; UDRC, Utah Data Research Center[38]; UGRC, Utah Geospatial Resource Center[27]; US EPA EJSCREEN, U.S. Environmental Protection Agency Environmental Justice Screening and Mapping Tool[28]; Utah Environmental Public Health Tracking System[49]; USDA Food Access Research Atlas[50]; US EPA Smart Location Database 3.0[32]; BRFSS, Behavioral Risk Factor Surveillance System[46]; Map the Meal Gap[51]; Department of Workforce Services – Firm Find Data[52]; CDC PLACES[37]; DHHS Division of Population Health[38]; CDC WONDER[53]; USALEEP, U.S. Small-Area Life Expectancy Estimates Project[33]; Utah Birth Certificate Database[46]; UDOT, Utah Department of Transportation[54]; National Transit-Oriented Development Database[55]

MAPPING APPLICATION

The HPI score, domains, and individual indicators are presented as interactive maps (Figure 7) that provide the values and percentile rankings for 1) all 20 HPI indicators, 8 domains and the overall HPI score and 2) nearly 350 decision support indicators (Table 12).

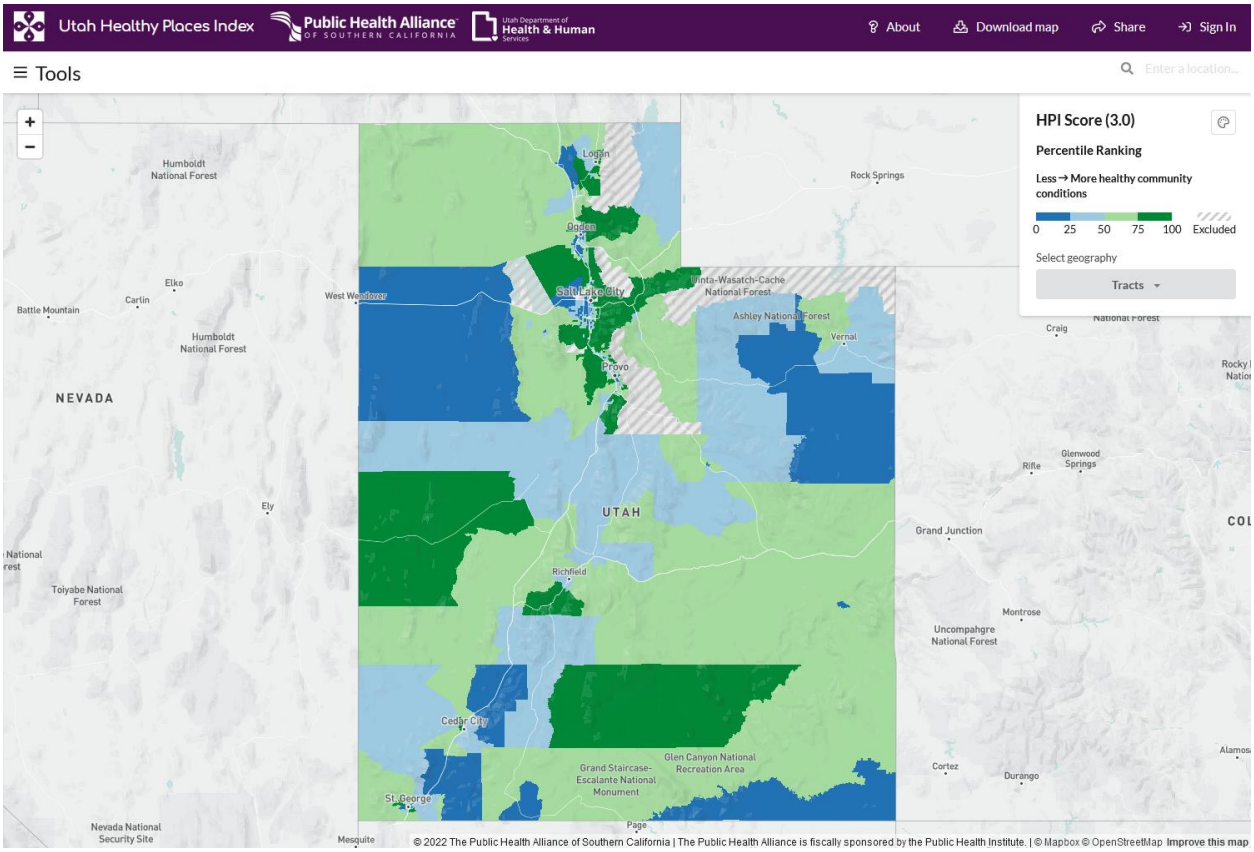


Figure 7. Interactive HPI Map (http://map.utah.healthyplacesindex.org/)

A navigation panel allows users to explore potential policy options for improving health by linking domains and indicators to briefs that describe 27 policy guides and 300 policy actions. In addition to the 20 HPI indicators, the mapping application also provides more than 347 selectable decision-support data layers covering health outcomes, behavioral risk factors, equity, diversity, and inclusion, race/ethnicity, and more. The mapping application also allows users to pool adjacent census tracts and calculate population-weighted average HPI scores and aggregate census tract data to city, county, and other large geographies. Other features let users filter the map by race/ethnicity or the indicator criteria of

their choice, upload their own geographies and data, and compare indicators in a split-map view.

The HPI at Different Geographic Scales

One of the most useful features of the mapping application is the availability of the HPI, its indicators, and indicators in most decision support layers at the level of census tracts as well as ten other telescoping civil-political geographies. Our methods for calculating the HPI and indicator values at multiple geographies are specific to:

- ZIP Code Tabulation Areas (ZCTA),
- All other geographies
    - With numerator/denominator
    - Without numerator/denominator (value only).

Calculating HPI and indicator values at ZIP code tabulation areas posed a special challenge. We were able to compute ZCTA values for 12 HPI indicators directly from the American Community Survey, 2015-2019. For other non-ACS sourced HPI indicators, as well as HPI score and domain scores, we used the US Census ZCTA-to-census tract relationship file[56] to compute a population-weighted allocation of census tract values to the ZCTAs they intersect. This method produced more accurate estimates compared to alternatives based on centroids, simple areal allocation, or areal interpolation using kriging.

For all other geographies, which includes counties, Small Areas, cities and Census-designated places, elementary school districts, local health districts, and congressional and state legislative districts, we use proportional areal allocation to generate HPI score and indicator values. An area weight is calculated as the percent of the source (census tract) polygon that intersects the target geography polygon. The following steps of the proportional areal allocation methodology depend on whether the HPI indicator 1) has numerator and denominator estimates available from the data source, such as the Above Poverty indicator, or 2) has only a value available, such as HPI score or the Tree Canopy indicator. Given that distinction, this area weight is either:

1) multiplied by census tract-level numerators and denominators for HPI indicators to calculate weighted numerators and denominators for the intersecting area. These weighted numerators and denominators are

summed for all census tracts intersecting the target geography and the target geography value is calculated as the summed weighted numerators divided by the summed weighted denominators.

2) multiplied by the census tract population (ACS 2015-2019) to calculate the weighted population size of the intersecting area. Values for the target geographies are then created from the population-weighted average of intersecting census tracts using the area-weighted population estimates.

This same weighting methodology is applied to both geographies that are congruent with census tracts, such as counties, and those that are not congruent with census tracts, such as elementary school districts. In the case of congruent geographies, however, the area weight will always equal one and the resulting weighted population size or weighted numerators and denominators of the intersecting area will always be the original population, numerator, or denominator estimates.

Race/Ethnicity Stratification and Filtering

Several HPI indicators (Table 2, Methods) are available at the place and county geographies from the ACS, 2015-2019, stratified by non-mutually exclusive categories of race/ethnicity. These categories are non-Hispanic White; Hispanic or Latino; and, of any ethnicity: Asian, Black, American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, Two or more races, and Other.

A key map feature allows users to filter census tracts based on the percentage of residents of one or more race/ethnicity groups (Filter by Race/Ethnicity). For example, if one wanted to view HPI scores (or any other indicator) for census tracts with at least 100 people from Venezuela alone, one would move the Population Count slider lower limit to 100 (Figure 8). One can also specify combinations of race/ethnicity groups meeting thresholds (e.g., Asian + Hispanic or Latino > 50%).

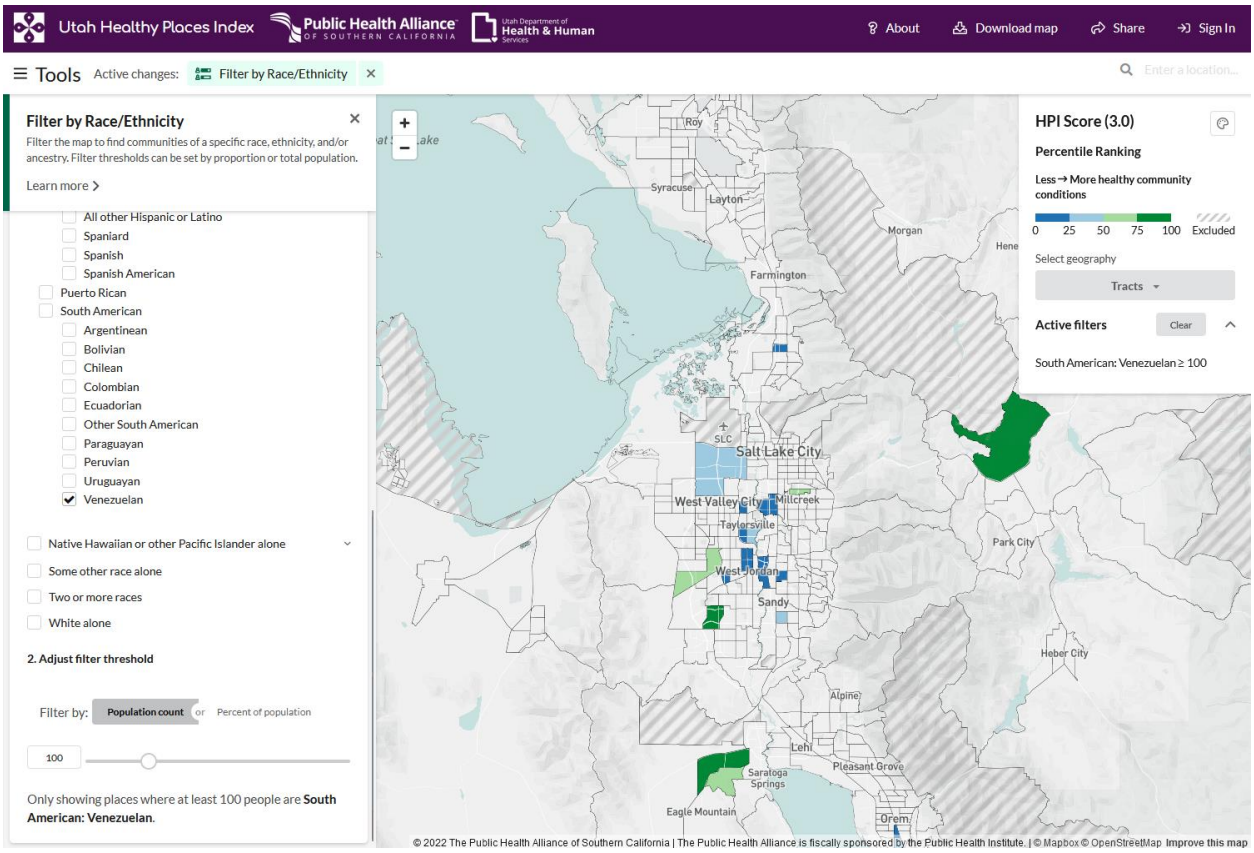


Figure 8. Filtering by Race/ethnicity

APPLICATION PROGRAMMING INTERFACE (API)

HPI scores, indicators, and decision support layers may be downloaded from an application programming interface endpoint. Year of data, geography, and race/ethnicity stratification (optional) may be selected. People who are interested should request an API key through https://api.utah.healthyplacesindex.org/. Documentation on use of the API endpoint is provided alongside the API sign-up page.

POLICY PLATFORM

Overview

The Utah HPI is built on the premise that an important part of improving health outcomes and health equity in Utah requires both accurate data to understand the

conditions that shape health, and strong action to shift resources and reshape the places we live. While primarily a data tool, the Utah HPI is designed to facilitate efforts to improve community conditions on the ground by linking each Utah HPI indicator to policy action, exemplified through 27 Policy Guides. Each policy guide offers a menu of evidence-based, best practices, and emerging policy options that target that indicator. In some cases, these are very directly connected, for instance, policies designed to boost educational opportunity are tied to the education policy action area. Where appropriate, we have also included policies intended to address the root drivers of indicator values, such as policies to improve economic opportunity, which will in turn shape housing affordability, insurance access, and the possibilities open to single-parent households.

Methods

Each policy guide is based on a review of the literature connecting a given indicator to health combined with a scan of best practices and conversations with and review from experts in each field (See examples [57–60]). A variety of multi-sector partners and content experts provided input on the policy guide language, including adding resources, information, and Utah examples when applicable. Where possible we have included policies that are evidence based (see below) or are considered industry best-practices. We also recognize that qualitative data and stories that relate lived experience from communities are powerful means to shape policy as well. However, since many policy areas in Utah are rapidly evolving as innovative practices are introduced on the ground, we have also included emerging practices with the potential to improve health. Policy Guides evolve along with best practices, and we encourage user feedback and suggestions about policies and resources to include. It should also be noted that we have prioritized policies that specifically address equity and have the potential to close racial, ethnic, gender, economic and geographic disparities in health outcomes.

We reviewed the 27 policy guides with an explicit framework to assess the level of evidence for each policy: strong, sufficient, emergent, promising, insufficient, and against (Table 13). These classifications were derived from *The Community Guide*[61] of the Community Preventive Service 's Task Force and industry best practices for assessing public health evidence.

Table 13. Level of Evidence for Policy Actions

Recommendation	Level of Evidence
Strong	A policy action is recommended based on multiple high-quality, well-designed research studies demonstrating a clear causal relationship between a policy action and the intended outcome. Research studies with a high level of internal and external validity lead us to a high level of confidence that an intervention will achieve its intended outcomes across varied contexts
Sufficient	A body of evidence supports the policy recommendation, but due to a smaller number of high-quality studies, the degree of confidence is not as high.
Emergent	The policy action is supported by theoretical evidence and expert opinion but has not yet had a body of research assessing the impact of the intervention. Actions in this classification may be of a critical nature for intervention due to major focusing events, such as an emerging health crisis.
Promising	The policy action is based on sound theory and expert opinion with initial supportive evidence. Policies in this classification may also be particularly difficult to assess in a research study.
Insufficient	The policy action has either a conflicting body of evidence-based on context or has not had requisite high-quality research design applied to the subject matter.
Against	Research Analysis shows that a policy action is either ineffective or is harmful.

We also understand that public health policy can be challenging to assess from a strict empirical approach due to the complicated set of variables at play in any community. While randomized controlled trials (RCTs) are the gold standard for assessing efficacy in a clinical health setting, the rigorous methodology of RCTs are not be suitable for complex public health interventions due to the highly contextual and costly nature of controlled trials. Alternative research methods such as quasi-experimental designs and observational studies may be more advantageous for capturing the impacts of policy actions targeted at public health and community building. To allow stakeholders to make informed decisions about emergent and

promising practices, we base our recommendations on sound theory, expert opinion, and the developing body of research evidence.

The policy actions are only included if they fall into the categories of strong, sufficient, emergent, or promising evidence. Insufficient or deleterious policies are not recommended to our stakeholders for evidence-informed policymaking.

The content of all policy guides were written to reflect the CDC's style guide for framing health equity and avoiding stigmatizing language.[62]

Use

Each HPI indicator is tied to a variety of policy options that are designed to directly address that indicator, or to influence the root drivers of that indicator. These options are grouped by the general pathway through which they influence health, for instance “Economic Opportunity”, “Health Coverage”, “Transportation”, and then further divided into specific types of intervention, such as “Support Walking and Biking”, or “Plan for Green Communities”. Users can access these options from within the HPI mapping application by using the Policy Opportunities function, or through the stand-alone Policy Guide site (https://policies.utah.healthyplacesindex.org/).

Since many decisions that shape health are made at the local level, and by actors outside of public health, policy guides are directed to local jurisdictions outside the public health field. Each local jurisdiction is different, and will need different approaches to address long-standing health inequities. The policy guide therefore provides a menu of potential policies for jurisdictions to consider—not a one-size fits all template.

Users wishing to improve community conditions, and their corresponding HPI scores, can use these menus of policies to select a set of policy interventions for further consideration. For each policy, the Policy Guide includes links to guidance documents, examples, and in some cases funding sources. Where possible we have utilized documents produced by government agencies or other authoritative sources, although there also many examples of community-led or smaller scale interventions.

Dynamic Policy Opportunities

To simplify policy selection, the interactive HPI map includes a **Policy Opportunities** panel that dynamically displays a subset of policies tied to low-ranking indicators within a selected neighborhood. This function works by first prioritizing the tract's HPI indicators based on their association with life expectancy at birth. HPI indicators are sorted by the inverse of their percentile rank multiplied by the domain weight. From this sorted list, the top three indicators are selected, with no more than one indicator from each domain. Policy opportunities from the selected indicators are then displayed.

DISCUSSION

The Utah HPI stands out from other indices of advantage/disadvantage in several important ways. First, the Utah HPI is framed around the social determinants of health, which provides a more holistic view of the neighborhood conditions that support health in comparison to indices and measures focused on economic well-being (i.e. the Utah Health Improvement Index, 200% of the federal poverty level, and <80% of median household income). Second, the Utah HPI was constructed using indicator sources unique to Utah, such as Bike Lane Access, which are not included in other nationwide indices such as the CDC's Social Vulnerability Index or the Child Opportunity Index. In addition, the Utah HPI includes over 30 Utah-specific decision support layers selected by the Utah HPI steering committee, such as COVID-19 case incidence rates, birthing persons' access to adequate prenatal care, and opioid-related overdose death rates. These unique data layers allow users of the HPI to evaluate measures specifically relevant to Utah in concert with HPI indicators and the overall HPI score.

Although the development process for the Utah HPI mirrored that of the California HPI, the Utah HPI differs from the California HPI. The domain weights used to calculate the HPI score were more evenly balanced across all 8 domains in the Utah HPI compared to the California HPI, meaning that no single domain had an outsized influence on the HPI score. Another important difference in domain weights occurred with the Economic domain. While the economic domain was weighted the lowest out of all 8 domains (5% weight) in the Utah HPI, it was weighted the highest of all 8 domains in the California HPI (35% weight). Since domain weights are influenced in part by their correlation with LEB, this suggests that the economic domain – including measures of Above Poverty, Per Capita Income, and Employed - contributed much less to the prediction of LEB in the Utah HPI compared to the California HPI. The lower correlation of the economic domain with life expectancy in Utah compared to California could be due to the fact that Utah has the lowest level of income inequality in the US according to ACS 2015-2019 estimates (as measured by the GINI index of income inequality), while California had one of the highest levels of income inequality in the nation.[22]

BEST PRACTICES TO EXPLORE RACE AND PLACE

Within the last several years, three events have transformed the health equity landscape. The killing of George Floyd has made individuals and institutions confront the pervasiveness and recalcitrance of structural racism in the United States. Wildfires, accelerated by climate change, have devastated scores of communities in the Western United States. The COVID-19 pandemic has revealed how the social determinants of health and race are inextricably linked to community health, particularly among those with the least opportunity.[19]

We have responded to these "tri-demics" by elevating data on race/ethnicity into the Utah HPI. Users can quickly identify census tracts with non-white populations and highlight their community conditions using the HPI, its individual indicators, and a large number of other indicators covering health, and community demographics. Through data, we also elevated the visibility of diverse racial/ethnicity groups within major census categories. These include 22 Asian subgroups and 12 subgroups of Native Hawaiian/Pacific Islander. These groupings are available in mutually exclusive race/ethnicity categories and non-mutually exclusive categories of a single race alone and in combination with other races. In addition to data, we provide many other resources to support local health departments and public health professionals combat racism and promote health equity.[63] Likewise, we include data layers – such as age, characteristics of housing stock, poverty, and outdoor work – that may speak to a community's susceptibility or resilience to climate change.

HPI is a powerful tool to reveal neighborhood conditions that drive community health. Viewing the drivers of health through the lens of neighborhood conditions is one among a number of important perspectives to understand community health.

Multiple Perspectives for the Drivers of Health

The health of individuals and the communities are intimately tied to race and other characteristics of people and the places they live. For example, research has shown that people in living in poverty have poorer health outcomes than people living above poverty, and that this has been repeatedly observed no matter what neighborhood the poor and rich live in. However, poor people living in neighborhoods of concentrated poverty have worse health than the poor who live

in other neighborhoods.[64] These findings emphasize that individual and community environments both contribute to a person's health and well-being. "Race, place, and people" are shaped by larger economic, social, housing, transportation forces or systems that drive resource allocation for individuals and communities. These systems are often called "upstream" drivers of health but it is methodologically challenging to incorporate these influences in tools that focus on individuals and neighborhoods. This is an important data gap (see below), although conceptual models provide insights on how these upstream forces work across people and places.[65–67]

Exploring Race, Place, and People with the Healthy Places Index

The Utah HPI has features that add a people (population) perspective to the place perspective. We provide indicators that are specific to different race/ethnicity groups. This allows users to see the community conditions of members of the same race/ethnicity across small and large areas of Utah. When mapped side-by-side with the overall HPI score, this comparison can reveal census tracts with very healthy living conditions overall, but with subgroups with less opportunity. This is salient for race/ethnicity groups who are numerically small and geographically dispersed (e.g. Native Hawaiian/Pacific Islander), and whose community conditions would be obscured by limiting data exploration to the "average" census tract population. These tools can also help visualize situations in which unhealthy community conditions of a specific race/ethnicity group are geographically widespread, which suggests policy action that goes beyond a strict place-based approach. Additional data on small populations within census tracts also advances our understanding, but this is currently a challenging data gap (discussed below). Since Utah is more rural and racially homogenous than other states, like California, limited information may be available.

In addition to the HPI score, we urge users to create HPI maps with our race/ethnicity stratification and filtering tools to assure that no subgroup has been overlooked. Our filtering tools can be used to inform community outreach to small or geographically dispersed race/ethnicity groups and subgroups. However, the usefulness of these tools may be limited in rural parts of Utah, where census tracts cover a wide area. In the case of people living on tribal lands or reservations, we provide a layer for mapping – Population in American Indian Areas – that is an overlay of tribal land boundaries and population counts. In addition to data tools,

we rely on "ground truthing" of our results by community-based organizations and residents, who identify potential data gaps and limitations so policy makers can be alerted and benefit from the knowledge of and engagement by community-based organizations and residents.

DATA GAPS

The Healthy Places Index is built on public data collected by governmental agencies, universities, and nonprofit organizations. Some government agencies collect data themselves by conducting surveys of the public or by monitoring environmental conditions with specialized instruments in the field. By statute, some governmental agencies are charged with collecting data from private and public businesses such as health care facilities. Universities may conduct their own surveys or compile public records. Some non-profit organizations also compile data on their own members or public records. These efforts are largely funded by government and philanthropies. What makes the use of the data possible in the Healthy Places Index is the convergence of all the following attributes:

- Centralized
- Standardized
- Complete and accurate
- Digitized and machine readable
- Geographically resolved at the census tract
- Public and non-confidential
- Statistically reliable sample size
- Timely

If data collection does not fulfill one of more of these attributes, there could be a breakdown that creates a data gap. Table 14 illustrates these attributes and gives examples of barriers, impacted indicators, and potential solutions. The solutions are specific to indicators, but include changes to: a) state laws and regulations, b) agencies' data collection methods and data processing, c) agencies' internal policies on public release of data, and/or d) funding to maximize data yield.

FUTURE IMPROVEMENTS

Health Outcomes Equity Tool

We are in the development phase for several new features. The incorporation of the HPI into the pandemic response of the California Department of Public illustrates that social drivers of health can become a routine component of public health surveillance and population-based clinical quality.[68] We are developing an interactive, stand-alone tool that will allow users to upload their "cases", which can be linked to census tract values of the HPI and populations categorized by HPI scores/quantiles. This "Health Outcomes Equity Tool" can produce case- and rate-based metrics which can be mapped along with HPI percentiles. This type of visualization will help identify geographic areas of both high rates and high disadvantage. Carried out over time, this produces a time series to help assess whether interventions narrow gaps in equity.

Storytelling

The HPI, and decision support layers available through the mapping platform, provide data to quantify the lived experience of communities and neighborhoods throughout the state. Yet, elevating the stories of citizens, residents, and community-based organizations *alongside* the HPI would offer a fuller account of neighborhood community conditions. Links to photographs, slideshows, and videos are potential venues to complement numerical data with qualitative data of compelling stories of neighbors and neighborhoods.

National HPI

Organizations throughout the United States have expressed an interest in a national version of the Healthy Places Index. They are particularly attracted to the asset-based positive framing, validation of the index with life expectancy, the granularity of data, the ease of navigating the map application, and the linkage of data to action/policy via the policy guides. Because most of the individual indicators in the HPI are sourced from national datasets, a national HPI is feasible. We are seeking resources and welcome partnerships to take the HPI to other states and the entire United States.

Table 14. Data Attributes, Barriers, and Solutions to Close Data Gaps that Impact the Healthy Places Index

Attribute	Barrier	Example(s)	Possible Solutions
Centralized	• Multiple, autonomous local agencies collect data	Farm Labor Housing; bicycle/pedestrian counts	• Require local agencies to report to state agency, and/or • Provide funding to non-governmental organizations to compile from public sources
Standardized	• Multiple competing indicators	Gentrification	• Governmental adoption/endorsement or recommendation of experts
Complete and accurate	• Partial coverage of eligible population • Database poorly maintained	Physician to population ratio	• Statute/regulation requiring collection of data • Adoption of data quality standards by agency collecting information
Digitized/Machine Readable	• Paperbound record keeping or non-standardized databases	Court records home foreclosure	• Require agency to digitize data and/or provide funding to do so
Geographic Resolution	• Street address or location not collected or reported • Street address or location not geocoded to census tract	Police related violence	• Assist state agencies with funding and/or technical support to collection, reporting, and geocoding address/location information
Public Availability	• No statute or regulation that requires public release with geographic detail • Internal policy of data collection agency to not release data at all or at fine geographic detail	Crime data, hate crimes, incarceration data by race/ethnicity	• Modify existing statutes/regulations/guidance to permit public reporting at census tract • Modify internal agency policies to allow disclosure consistent with state and local law

Attribute	Barrier	Example(s)	Possible Solutions
Statistically Reliable Sample	• Sample protocol adequate for large geographic areas or large populations • Multi-year data not pooled	Racial attitudes; Sexism; Gender identity/sexual orientation; Asian subgroups; Native Hawaiian Pacific Islander subgroups; American Indian; religion; Hispanic or Latino subgroups; unhoused population	• Increases funding of data collection entity to allow greater sampling and oversampling of numerically small populations • Leverage multi-year datasets by pooling • Engage with groups understand their data needs
Timely	• Data collection interval is not continuous or infrequent	Tree canopy, land cover	• Change of agencies' methodology/increase funding to enhance geographic detail and timeliness
Scope	• Important issue not included or dropped from data collection	Reasons for WIC utilization changes; immigration status	• Provide stable and adequate funding to collect data • Prohibit law enforcement agencies from accessing personal identifiers in surveys

LIMITATIONS AND CHALLENGES

There were a few limitations in data availability for the Utah HPI. Detailed data on drinking water quality for many parts of Utah were not available due to lack of monitoring and reporting of drinking contaminants in groundwater wells. Data on crime at the census tract level was not available from public sources. Geographically refined data on sexual orientation and gender identity are also lacking.

Several indicators included in the Utah HPI, such as Bike Lane Access, Housing Habitability, and High School Enrollment, have very limited variability across the 575 eligible census tracts. With many tied values, it can be difficult to interpret percentile ranks. To minimize confusion in interpretation or distortion of the data, methods for assigning percentile ranks to tied values were selected on a per-indicator basis. Still, it can be challenging to use percentile ranks alone to detect meaningful differences in HPI indicator values across communities.

There are inherent limitations in ACS data collection, which relies on a continuous probability sample, which produces reasonably stable estimates for census tracts over a 5-year period. These are cumulative cross sectional measures that cannot reflect sudden or rapid changes in the population or its characteristics.

In-person data collection for the ACS during the pandemic was severely curtailed, leading to a higher reliance on statistical modeling than data aggregation. The pandemic was associated with intra- and inter-regional population movements (e.g., college students returning home, higher income groups migrating to less urban settings, etc.) and housing instability as eviction moratoria lapse. The durability of these effects is unknown, but will play out over the next several years. We will seek guidance of public health and national data organizations on how to approach discontinuities in data collection and analysis caused by the pandemic. Place-based, cross-sectional measures are in general sensitive to other population dynamics such as mass evacuation due to wildfires and climate emergencies, gentrification, community succession, and displacement.

Although 2020 census tract boundaries have been released by the Census Bureau, many of our data sources are only available at 2010 census tract boundaries. When data are produced for 2020 census tract boundaries by the many U.S. governmental agencies we rely on for the bulk of HPI data, we will begin the process of migrating our data and the map to the 2020 census boundaries.

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APPENDICES

A. UTAH HPI STEERING COMMITTEE PARTNER AND STAKEHOLDER AFFILIATIONS

Association for Utah Community Health
Community Development Corporation of Utah
Davis4Health
Get Healthy Utah
Huntsman Cancer Institute
Intermountain Healthcare
Kem C. Gardner Policy Institute
Local Health Districts
Salt Lake City Government
Trauma Informed Utah
United Way of Salt Lake
University of Utah
Utah Association of Local Health Departments
Utah Data Research Center
Utah Department of Culture and Community Engagement
Utah Department of Environmental Quality
Utah Department of Transportation
Utah Department of Workforce Services
Utah Geospatial Resource Center
Utah Governor's Office of Planning and Budget
Utah Governor’s Office of Economic Opportunity
Utah Health Policy Project
Utah League of Cities and Towns
Utah State Board of Education
Utah Transit Authority
Utahns Against Hunger
Voices for Utah Children
Wasatch Front Regional Council

B. DATA DICTIONARY AND SOURCE DATA VARIABLE TRANSFORMATIONS FOR HPI

HPI Indicators Data Dictionary

Variable Name	Data Source	Table	Variable(s)

abovepoverty	ACS2019API/5Y	S1701	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html
			
			S1701_C01_001E = Estimate of population for whom poverty status is determined
			S1701_C01_001M = Margin of Error of all individuals with income below 200 percent poverty level
			S1701_C01_042E = Estimate of all individuals with income below 200 percent poverty level
			S1701_C01_042M = Margin of Error of all individuals with income below 200 percent poverty level
			
			Numerator = S1701_C01_042E
			Denominator = S1701_C01_001E
			Numerator SE = S1701_C01_042E / 1.645
			Denominator SE = S1701_C01_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator
			
			To reframe indicator as positive:
			Value = 1 - (Numerator / Denominator)
			Numerator.= Denominator - Numerator

automobile	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP04_0058PE = Percent; vehicles available - Occupied housing units - No vehicles available DP04_0058PM = Percent Margin of Error; vehicles available - Occupied housing units - No vehicles available DP04_0057E = Estimate of vehicles available - Occupied housing units Value = 1 - (DP04_0058PE / 100) Denominator = DP04_0057E Numerator = Value * Denominator SE = (DP04_0058PM/100) / 1.645

bachelorsed	ACS2019API/5Y	DP02	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html
			
			DP02_0059E = Estimate of total population ages 25 and older
			DP02_0059M = Margin of Error of total population ages 25 and older
			DP02_0068E = Estimate of educational attainment - Bachelor's degree or higher
			DP02_0068M = Margin of Error of educational attainment - Bachelor's degree or higher
			
			Numerator= DP02_0068E
			Denominator= DP02_0059E
			Value = Numerator / Denominator
			Numerator SE = DP02_0068M / 1.645
			Denominator SE = DP02_0059M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

bikeaccess	Utah Geospatial Resource Center	Recreation	URL: https://gis.utah.gov/data/recreation/ Population: sum of 2020 census block population counts with centers within the respective tract's boundaries

			Bike lanes and paths: bike lanes include designated lanes on either or both sides of a roadway; paths includes paved paths that are part of major trail systems Numerator = Total miles of bike lanes and paths Denominator = Sum of 2020 census block population counts with centers within the respective tract's boundaries Value = Total miles of bike lanes and paths/sum of 2020 census block population counts with centers within the respective tract's boundaries
censusresponse	Dec2020CensusAPI	Response Rate	URL: https://api.census.gov/data/2020/dec/responserate/variables.html Note: file uses 2020 census tracts and must be crosswalked to 2010 tracts. CRALL = Cumulative Self-Response Rate - Overall Value = CRALL
dieselpm	US EPA EJSCREEN		URL: https://geopub.epa.gov/arcgis/rest/services/ejscreen/ejscreen_v2020/MapServer/4/query?where=STATE_NAME+%3D+%27Utah%27&outFields=ID,OZONE,PM25,DSLPM&returnGeometry=false&f=pjson&resultOffset=" Value = DSLPM

employed	ACS2019API/5Y	S2301	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html S2301_C01_021E = Estimate of total population ages 20-64 S2301_C03_021E = Estimate of population to Employment Ratio, ages 20-64 S2301_C03_021M = Margin of Error of population to Employment Ratio, ages 20-64 Denominator = S2301_C01_021E Value = S2301_C03_021E / 100 Numerator = Value * Denominator SE = (S2301_C03_021M/100) / 1.645

homeownership	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html
			
			DP04_0045E = Estimate of housing tenure - occupied housing units
			DP04_0045M = Margin of Error of housing tenure - occupied housing units
			DP04_0046E = Estimate of housing tenure - occupied housing units Owner-occupied
			DP04_0046M = Margin of Error of housing tenure - occupied housing units Owner-occupied
			
			Numerator = DP04_0046E
			Denominator = DP04_0045E
			Value = Numerator / Denominator
			Numerator SE = DP04_0046M / 1.645
			Denominator SE = DP04_0045M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

houserepair	CHAS_2013-2017_Tables15A_15B_15C	Table 15A, Table 15B, Table 15C	URL: https://www.huduser.gov/portal/datasets/cp.html#2006-2017_data
			ACS cannot be used because kitchen and plumbing are not exclusive of each other
			T15A_est3 = Estimate of owner occupied with mortgage AND has complete kitchen and plumbing facilities
			T15A_moe3 = Margin of Error of owner occupied with mortgage AND has complete kitchen and plumbing facilities
			T15B_est3 = Estimate of owner occupied with no mortgage AND has complete kitchen and plumbing facilities
			T15B_moe3 = Margin of Error of owner occupied with no mortgage AND has complete kitchen and plumbing facilities
			T15C_est3 = Estimate of renter occupied AND has complete kitchen and plumbing facilities
			T15C_moe3 = Margin of Error of renter occupied AND has complete kitchen and plumbing facilities
			T15A_est1 = Estimate of owner occupied with mortgage
			T15A_moe1 = Margin of Error of owner occupied with mortgage
			T15B_est1 = Estimate of owner occupied with no mortgage
			T15B_moe1 = Margin of Error of owner occupied with no mortgage
			T15C_est1 = Estimate of renter occupied
			T15C_moe1 = Margin of Error of renter occupied
			
			Numerator = T15A_est3 + T15B_est3 + T15C_est3
			Denominator = T15A_est1 +T15B_est1 + T15C_est1
			Value = (Numerator/denominator)
			Numerator SE = SQRT((T15A_moe3/1.645)^2 + (T15B_moe3/1.645)^2 + (T15C_moe3/1.645)^2)
			Denominator SE = SQRT((T15A_moe1/1.645)^2 + (T15B_moe1/1.645)^2 + (T15C_moe1/1.645)^2)
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

percapitaincome	ACS2019API/5Y	B19301	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B19301_001E = Estimate of per capita income in the past 12 months (in 2019 inflation-adjusted dollars) B19301_001M = Margin of Error of per capita income in the past 12 months (in 2019 inflation-adjusted dollars) Value = B19301_001E SE = B19301_001M / 1.645

inhighschool	ACS2019API/5Y	S1401	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html
			
			S1401_C01_019E = Estimate of population 15 to 17 years
			S1401_C01_020E = Estimate of population 15 to 17 years - Enrolled in School;
			S1401_C01_019M = Margin of Error of population 15 to 17 years
			S1401_C01_020M = Margin of Error of population 15 to 17 years - Enrolled in School;
			
			Numerator = S1401_C01_020E
			Denominator = S1401_C01_019E
			Value = Numerator/denominator
			Numerator SE = S1401_C01_020M /1.645
			Denominator SE = S1401_C01_019M /1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

inpreschool	ACS2019API/5Y	S1401	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html
			
			S1401_C01_013E = Estimate of population 3 to 4 years
			S1401_C01_014E = Estimate of population 3 to 4 years - Enrolled in School
			S1401_C01_013M = Margin of Error of population 3 to 4 years
			S1401_C01_014M = Margin of Error of population 3 to 4 years - Enrolled in School
			
			Numerator = S1401_C01_014E
			Denominator = S1401_C01_013E
			Value = Numerator/denominator
			Numerator SE = S1401_C01_014M /1.645
			Denominator SE = S1401_C01_013M /1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

insured	ACS2019API/5Y	S2701	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S2701_C02_012M = Margin of Error of those insured AGE - 19 to 64 years S2701_C02_012E = Estimate of those insured AGE - 19 to 64 years S2701_C01_012E = Estimate of civilian non-inst. pop - 19 to 64 years Numerator= S2701_C02_012E Denominator= S2701_C01_012E Value = Numerator/denominator SE = S2701_C03_012M /1.645

rentsevere and ownsevere	CHAS, 2013-2017	Table 8	URL: https://www.huduser.gov/portal/datasets/cp.html#2006-2017_data
			See table below for variable names
			Own Severe
			Numerator = T8_est10 + T8_est23 + T8_est36
			Denominator = T8_est2
			
			Value = Numerator/denominator
			Denominator SE = T8_moe2/1.645
			Numerator SE = sqrt[(T8_moe10/1.645)2 + (T8_moe23/1.645)2 + (T8_moe36/1.645)2]
			
			Rent Severe
			Numerator = T8_est76 + T8_est89 + T8_est102
			Denominator = T8_est68
			Value = Numerator/denominator
			Denominator SE = T8_moe68/1.645
			Numerator SE = sqrt[(T8_moe76/1.645)2 + (T8_moe89/1.645)2 + (T8_moe102/1.645)2]
			
			For both Own Severe and Rent Severe:
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

	Owners				Renters			
	Cost Burden				Cost Burden			
Income	>50%	>50%	Total		>50%	>50%	Total	
<80% HAFMI	Estimate	MOE	Estimate	MOE	Estimate	MOE	Estimate	MOE
<30	T8_est10	T8_moe10	T8_est3		T8_est76	T8_moe76	T8_est69	
30-50	T8_est23	T8_moe23	T8_est16		T8_est89	T8_moet89	T8_est82	
50-80	T8_est36	T8_moe36	T8_est29		T8_est102	T8_moe102	T8_est95	

parkaccess_ut	Utah Geospatial Resource Center	Recreation	URL: https://gis.utah.gov/data/recreation/ Population: sum of 2020 census block population counts with centers within the respective tract's boundaries Parks, public land, and golf courses: parks from Local Parks Layer; accessible public land from Statewide Landownership Layer; golf courses from Golf Courses layer (public land includes Wildlife Reserve/Management Areas, National Forests, National Historic Sites, National Monuments, National Recreation Areas, National Wildlife Refuges, Wildernesses, or general BLM or Bureau of Reclamation land; golf courses include public (ie, no membership required) and municipal golf courses) Numerator = Total acres of parks, public land, and public golf courses Denominator = Sum of 2020 census block population counts with centers within the respective tract's boundaries Value = Total acres of parks, public land, and public golf courses/sum of 2020 census block population counts with centers within the respective tract's boundaries
pm25	US EPA EJSCREEN		URL: https://geopub.epa.gov/arcgis/rest/services/ejscreen/ejscreen_v2020/MapServer/4/query?where=STATE_NAME+%3D+%27Utah%27&outFields=ID,OZONE,PM25,DSLPM&returnGeometry=false&f=pjson&resultOffset=" Value = PM25

treecanopy	Multi-Resolution Land Characteristics Consortium, National Land Cover Database (NLCD) 2016		URL: https://www.mrlc.gov/data/nlcd-2016-usfs-tree-canopy-cover-conus Source data was obtained as a raster layer of 30 x 30-meter grids for the State of Utah. Average percent tree canopy coverage was extracted for all Utah census blocks and aggregated to census tract using population weighting. Value = Population-weighted mean % area with tree canopy coverage

uncrowded	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html
			
			DP04_0077M = Margin of Error of occupants per room - Occupied housing units - 1.00 or less
			DP04_0076M = Margin of Error of occupants per room - Occupied housing units
			DP04_0077E = Estimate of occupants per room- Occupied housing units - 1.00 or less
			DP04_0076E = Estimate of occupants per room- Occupied housing units
			
			Numerator= DP04_0077E
			Denominator= DP04_0076E
			Value = Numerator/denominator
			Numerator SE = DP04_0077M /1.645
			Denominator SE = DP04_0076M /1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

voting	Utah Lt. Governor's Office/VEST		Precinct-level Utah election results for the 2020 general election were provided by the Utah Lieutenant Governor's Office and the County Clerk's Office of San Pete County, Utah. Shapefile of Utah election precincts from Voter and Election Science Team: https://doi.org/10.7910/DVN/K7760H Value = Population-weighted percent voter turnout (calculated as number of ballots cast /

			number of registered voters). If precinct voter turnout information was incomplete, missing, or the number of ballots cast exceeded the number of registered voters*, then voter turnout was imputed by averaging the voter turnout of directly adjacent precincts. If the number of ballots cast and number of registered voters is equal to 0, then voter turnout was treated as an undefined number and excluded from analysis. Population weights were calculated using 2015-2019 census block group population totals. *A higher number of votes than number of registered voters can occur due to delays in counting election day voter registrations, which artificially decreases the number of registered voters reported for a precinct on election day. In the vast majority of precincts in which this occurred (30), the difference between the number of ballots cast and the number of registered voters was less than or equal to 3.

Decision Support Layer Data Dictionary (Alphabetical)

Variable Name	Data Source	Table	Variable(s)
ACE	Utah BRFSS 2018, 2020 (combined years)		URL: https://ibis.health.utah.gov/ibisph-view/query/result/brfss/LandlineCellAgeAdj5_ACE/ACE.html value = Age-adjusted percentage with 4+ ACEs numerator = Number of adults who report 4+ ACEs denominator = Number of adults se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/BRFSS/Age-adjusted Rates/Percentages/Adverse Childhood Experiences (ACEs age-adjusted)/Number of Adverse Childhood Experiences ACE Score (ACE Score out of 8) (ACE Score)/Step 1: Select 4+/Select Year: 2016, 2018, 2020/Select Geographic Area: Utah Small Areas/Display Data by Geographic Area
Age_under5	ACS2019API/5Y	S0101	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S0101_C01_001E = Estimate of total population S0101_C01_001M = Margin of Error of total population

			S0101_C01_002E = Estimate of <5 population S0101_C01_002M = Margin of Error of <5 population S0101_C02_002E = Estimate of percent of population <5 S0101_C02_002M = Margin of Error of percent of population <5 Numerator = S0101_C01_002E Denominator = S0101_C01_001E Value = S0101_C02_002E/100 Numerator SE = S0101_C01_002M/1.645 Denominator SE = S0101_C01_001M/1.645 SE = (S0101_C02_002M/100)/1.645
Age5_14	ACS2019API/5Y	S0101	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S0101_C01_001E = Estimate of total population S0101_C01_001M = Margin of Error of total population S0101_C01_020E = Estimate of 5-14 population S0101_C01_020M = Margin of Error of 5-14 population S0101_C02_020E = Estimate of percent of population 5-14 S0101_C02_020M = Margin of Error of percent of population 5-14 Numerator = S0101_C01_020E Denominator = S0101_C01_001E Value = S0101_C02_020E/100 Numerator SE = S0101_C01_020M/1.645 Denominator SE = S0101_C01_001M/1.645 SE = (S0101_C02_020M/100)/1.645
AllHUDunits	2019 HUD Picture of Subsidized Households; ACS2019API/5Y	B25001	Numerator URL: https://www.huduser.gov/portal/datasets/assthsg.html Download HUD data using the following specifications: 1. Year: 2019 Based on 2010 Census 2. Summary level: Summary of All HUD Programs 3. HUD program: All 4. Variables: All

			Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25001_001E = Estimate of total housing units B25001_001M = Margin of Error of total housing units Numerator = Total HUD subsidized housing units Denominator = B25001_001E Value = Numerator/Denominator * 1,000 Denominator SE = B25001_001M/1.645
apncu	Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health & Human Services, 2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/birth/PNCKotelAdeRaceSarea_09/PNC.html value = Percentage with adequate Kotelchuk Index numerator = Number of pregnant women with prenatal care Kotelchuck Index = adequate denominator = Number of live births se = Relative standard error (RSE)/coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/Birth Data/Advanced Selection/Utah Small Areas or Health Improvement Index Classifications/Prenatal Care/2009 and later/Percentage with Kotelchuck=Adequate/Select Year 2020/ Display Data by Geographic Area
broadband	ACS2019API/5Y	B28009 / B28003	URL: https://api.census.gov/data/2019/acs/acs5/variables.html For race/ethnicity stratified indicators: B28009_001E = Estimate of Total Households B28009_001M = Margin of Error of Total Households B28009_004E = Estimate of total households that have a computer with broadband internet B28009_004M = Margin of Error of total households that have a computer with broadband internet

			Value = B28009_004E / B28009_001E SE = [(B28009_004M / 1.645) ^2] / [(B28009_001M / 1.645) ^2] For census-tract level indicator: B28003_001E = Estimate of Total Households B28003_001M = Margin of Error of Total Households B28003_004E = Estimate of total households that have a computer with broadband internet B28003_004M = Margin of Error of total households that have a computer with broadband internet Value = B28003_004E / B28003_001E SE = [(B28003_004M / 1.645) ^2] / [(B28003_001M / 1.645) ^2]
childpoverty	ACS2019API/5Y	S1701	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S1701_C02_002E = Estimate of population under 18 below poverty level S1701_C01_002E = Estimate of total population under 18 S1701_C03_002M = Margin of error (percent) of population under 18 below poverty level Numerator = S1701_C02_002E Denominator = S1701_C01_002E Proportion = Numerator/Denominator SE(proportion)= (S1701_C01_003M/100) /1.645
civilianveteran	ACS2019API/5Y	S0102	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S0102_C01_041E = Estimate of civilian population over 18 S0102_C01_042E = Percent estimation of civilian veterans over 18 S0102_C01_042M = Margin of error of civilian veterans over 18 Numerator = S0102_C01_041E*(S0102_C01_042E/100) Denominator = S0102_C01_041E

			Proportion = S0102_C01_042E/100 SE(proportion) = (S0102_C01_042E/100)/1.645
computer	ACS2019API/5Y	B28009 / B28004	URL: https://api.census.gov/data/2019/acs/acs5/variables.html For race/ethnicity stratified indicators: B28009_001E = Estimate of Total Households B28009_001M = Margin of Error of Total Households B28009_002E = Estimate of total households that have a computer B28009_002M = Margin of Error of total households that have a computer Value = B28009_002E / B28009_001E SE = [(B28009_002M / 1.645) ^2] / [(B28009_001M / 1.645) ^2] For census-tract level indicator: B28003_001E = Estimate of Total Households B28003_001M = Margin of Error of Total Households B28003_002E = Estimate of total households the have a computer B28003_002M = Margin of Error of total households that have a computer Value = B28003_002E / B28003_001E SE = [(B28003_002M / 1.645) ^2] / [(B28003_001M / 1.645) ^2]
cost	Utah BRFSS 2018, 2019, 2020 (combined years)		URL: https://ibis.health.utah.gov/ibisph-view/query/result/brfss/LandlineCellAgeAdj5_UnableGetCareCost/UnableGetCareCost.html value = Age-adjusted percentage - unable to get needed care due to cost numerator = Number of adults who report being unable to get needed care due to cost denominator = Number of adults se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/BRFSS/Age-adjusted Rates/Percentages/Access to Healthcare

			(age-adjusted)/Unable to Get Needed Care Due to Cost/Step 2: Select Year: 2018, 2019, 2020/Select Geographic Area: Utah Small Areas/Display Data by Geographic Area
covid	DHHS Division of Population Health		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Case Incidence Rate per 100,000 population of COVID-19 from March 2020 through February 2022
crashes	Numetric UDOT		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Rate of motor vehicle crashes per 100,000 population of residence by Utah small area
deathsdespair	CDC WONDER	Underlying cause, 2015-2019	URL: https://wonder.cdc.gov/ucd-icd10.html https://www.jec.senate.gov/public/index.cfm/republicans/methodological-appendix-to-long-term-trends-in-deaths-of-despair/ ICD Version 10 1. Group by: County 2. Location: Utah 4. Years: 2015-2019 6. Cause of Deaths: ICD Codes Advanced Finder Options Open (Expand) ICD codes and move to selection box Numerator = Deaths/5 Denominator = Population/5 Value = 100000*Deaths/Population Se = value/sqrt(Deaths)
demographic variables	ACS2019API/5Y	B02014, B02015,	URL: https://api.census.gov/data/2019/acs/acs5/variables.html

		B02016, B02017, B02018, B02019, B03001, B03002	Numerator = See table below Denominator = _001E of each respective table Proportion = Numerator / Denominator

B02014 (AIAN alone)

Variable Name	ACS Variable
alaska_native_not_specified_pct	B02014_053E
alaskan_athabascan_pct	B02014_047E
aleut_pct	B02014_048E
all_other_american_indian_tribes_pct	B02014_044E
american_indian_not_specified_pct	B02014_045E
american_indian_or_alaska_native_tribes_not_specified_pct	B02014_054E
apache_pct	B02014_003E
arapaho_pct	B02014_004E
blackfeet_pct	B02014_005E
canadian_and_french_american_indian_pct	B02014_006E
central_american_indian_pct	B02014_007E
cherokee_pct	B02014_008E
cheyenne_pct	B02014_009E
chickasaw_pct	B02014_010E
chippewa_pct	B02014_011E

B02016 (NHPI alone)

Variable Name	ACS Variable
fijian_pct	B02016_009E
other_melanesian_pct	B02016_010E
guamanian_or_chamorro_pct	B02016_006E
marshallese_pct	B02016_007E
other_micronesian_pct	B02016_008E
other_pacific_islander_pct	B02016_011E
native_hawaiian_pct	B02016_002E
other_polynesian_pct	B02016_005E
samoan_pct	B02016_003E
tongan_pct	B02016_004E
two_or_more_nhpi_pct	B02016_012E

B02017 (AIAN alone or in combination)

Variable Name	ACS Variable
NativeAm_combo_pct	B02017_001E
alaska_native_not_specified_combo_pct	B02017_053E
alaskan_athabascan_combo_pct	B02017_047E

B02018 (Asian alone or in combination)

Variable Name	ACS Variable
asian_combo_pct	B02018_001E
asian_indian_combo_pct	B02018_002E
bangladeshi_combo_pct	B02018_003E
bhutanese_combo_pct	B02018_004E
burmese_combo_pct	B02018_005E
cambodian_combo_pct	B02018_006E
chinese_combo_pct	B02018_007E
filipino_combo_pct	B02018_008E
hmong_combo_pct	B02018_009E
indonesian_combo_pct	B02018_010E
japanese_combo_pct	B02018_011E
korean_combo_pct	B02018_012E
laotian_combo_pct	B02018_013E
malaysian_combo_pct	B02018_014E
mongolian_combo_pct	B02018_015E
nepalese_combo_pct	B02018_016E

choctaw_pct	B02014_012E	aleut_combo_pct	B02017_048E	okinawan_combo_pct	B02018_017E
colville_pct	B02014_013E	all_other_american_indian_tribes_combo_pct	B02017_044E	other_asian_not_specified_combo_pct	B02018_024E
comanche_pct	B02014_014E	american_indian_not_specified_combo_pct	B02017_045E	other_asian_specified_combo_pct	B02018_023E
cree_pct	B02014_015E	american_indian_or_alaska_native_tribes_not_specified_combo_pct	B02017_054E	pakistani_combo_pct	B02018_018E
creek_pct	B02014_016E	apache_combo_pct	B02017_003E	sri_lankan_combo_pct	B02018_019E
crow_pct	B02014_017E	arapaho_combo_pct	B02017_004E	taiwanese_combo_pct	B02018_020E
delaware_pct	B02014_018E	blackfeet_combo_pct	B02017_005E	thai_combo_pct	B02018_021E
hopi_pct	B02014_019E	canadian_and_french_american_indian_combo_pct	B02017_006E	vietnamese_combo_pct	B02018_022E
houma_pct	B02014_020E	central_american_indian_combo_pct	B02017_007E	**B02019 (NHPI alone or in combination)**	
inupiat_pct	B02014_049E	cherokee_combo_pct	B02017_008E	**Variable Name**	**ACS Variable**
iroquois_pct	B02014_021E	cheyenne_combo_pct	B02017_009E	PacificIsl_combo_pct	B02019_001E
				fijian_combo_pct	B02019_009E
kiowa_pct	B02014_022E	chickasaw_combo_pct	B02017_010E	other_melanesian_combo_pct	B02019_010E
lumbee_pct	B02014_023E	chippewa_combo_pct	B02017_011E	guamanian_or_chamorro_combo_pct	B02019_006E
menominee_pct	B02014_024E	choctaw_combo_pct	B02017_012E	marshallese_combo_pct	B02019_007E
mexican_american_indian_pct	B02014_025E	colville_combo_pct	B02017_013E	other_micronesian_combo_pct	B02019_008E
navajo_pct	B02014_026E	comanche_combo_pct	B02017_014E	other_pacific_islander_combo_pct	B02019_011E
osage_pct	B02014_027E	cree_combo_pct	B02017_015E	native_hawaiian_combo_pct	B02019_002E
ottawa_pct	B02014_028E	creek_combo_pct	B02017_016E	other_polynesian_combo_pct	B02019_005E
paiute_pct	B02014_029E	crow_combo_pct	B02017_017E	samoan_combo_pct	B02019_003E
pima_pct	B02014_030E	delaware_combo_pct	B02017_018E	tongan_combo_pct	B02019_004E
potawatomi_pct	B02014_031E	hopi_combo_pct	B02017_019E	**B03001 (Hispanic or Latino by Origin)**	

pueblo_pct	B02014_032E
puget_sound_salish_pct	B02014_033E
seminole_pct	B02014_034E
shoshone_pct	B02014_035E
sioux_pct	B02014_036E
south_american_indian_pct	B02014_037E
spanish_american_indian_pct	B02014_038E
tlingit-haida_pct	B02014_050E
tohono_o'odham_pct	B02014_039E
tsimshian_pct	B02014_051E
two_or_more_american_indian_or_alaska_native_tribes_pct	B02014_055E
ute_pct	B02014_040E
yakama_pct	B02014_041E
yaqui_pct	B02014_042E
yuman_pct	B02014_043E
yup'ik_pct	B02014_052E

B02015 (Asian alone)

Variable Name	ACS Variable
asian_indian_pct	B02015_002E
bangladeshi_pct	B02015_003E
bhutanese_pct	B02015_004E
burmese_pct	B02015_005E
houma_combo_pct	B02017_020E
inupiat_combo_pct	B02017_049E
iroquois_combo_pct	B02017_021E
kiowa_combo_pct	B02017_022E
lumbee_combo_pct	B02017_023E
menominee_combo_pct	B02017_024E
mexican_american_indian_combo_pct	B02017_025E
navajo_combo_pct	B02017_026E
osage_combo_pct	B02017_027E
ottawa_combo_pct	B02017_028E
paiute_combo_pct	B02017_029E
pima_combo_pct	B02017_030E
potawatomi_combo_pct	B02017_031E
pueblo_combo_pct	B02017_032E
puget_sound_salish_combo_pct	B02017_033E
seminole_combo_pct	B02017_034E
shoshone_combo_pct	B02017_035E
sioux_combo_pct	B02017_036E
south_american_indian_combo_pct	B02017_037E
spanish_american_indian_combo_pct	B02017_038E
tlingit-haida_combo_pct	B02017_050E
tohono_o'odham_combo_pct	B02017_039E

Variable Name	ACS Variable
central_american_pct	B03001_008E
central_american_costa_rican_pct	B03001_009E
central_american_guatemalan_pct	B03001_010E
central_american_honduran_pct	B03001_011E
central_american_nicaraguan_pct	B03001_012E
central_american_other_central_american_pct	B03001_015E
central_american_panamanian_pct	B03001_013E
central_american_salvadoran_pct	B03001_014E
cuban_pct	B03001_006E
dominican_pct	B03001_007E
mexican_pct	B03001_004E
other_hispanic_or_latino_pct	B03001_027E
other_hispanic_or_latino_all_other_hispanic_or_latino_pct	B03001_031E
other_hispanic_or_latino_spaniard_pct	B03001_028E
other_hispanic_or_latino_spanish_pct	B03001_029E
other_hispanic_or_latino_spanish_american_pct	B03001_030E
puerto_rican_pct	B03001_005E
south_american_pct	B03001_016E
south_american_argentinean_pct	B03001_017E
south_american_bolivian_pct	B03001_018E
south_american_chilean_pct	B03001_019E

cambodian_pct	B02015_006E
chinese_pct	B02015_007E
filipino_pct	B02015_008E
hmong_pct	B02015_009E
indonesian_pct	B02015_010E
japanese_pct	B02015_011E
korean_pct	B02015_012E
laotian_pct	B02015_013E
malaysian_pct	B02015_014E
mongolian_pct	B02015_015E
nepalese_pct	B02015_016E
okinawan_pct	B02015_017E
other_asian_not_specified_pct	B02015_024E
other_asian_specified_pct	B02015_023E
pakistani_pct	B02015_018E
sri_lankan_pct	B02015_019E
taiwanese_pct	B02015_020E
thai_pct	B02015_021E
two_or_more_asian_pct	B02015_025E
vietnamese_pct	B02015_022E

tsimshian_combo_pct	B02017_051E
ute_combo_pct	B02017_040E
yakama_combo_pct	B02017_041E
yaqui_combo_pct	B02017_042E
yuman_combo_pct	B02017_043E
yup'ik_combo_pct	B02017_052E

south_american_colombian_pct	B03001_020E
south_american_ecuadorian_pct	B03001_021E
south_american_other_south_american_pct	B03001_026E
south_american_paraguayan_pct	B03001_022E
south_american_peruvian_pct	B03001_023E
south_american_uruguayan_pct	B03001_024E
south_american_venezuelan_pct	B03001_025E

B03002 (Hispanic or Latino by Race)

Variable Name	ACS Variable
NativeAm_hispanic_pct	B03002_015E
asian_hispanic_pct	B03002_016E
black_histpanic_pct	B03002_014E
pi_hispanic_pct	B03002_017E
other_hispanic_pct	B03002_018E
multiple_other_hispanic_pct	B03002_020E
three_hispanic_pct	B03002_021E
multiple_hispanic_pct	B03002_019E
white_hispanic_pct	B03002_013E
NativeAm_pct	B03002_005E
asian_pct	B03002_006E
black_pct	B03002_004E
latino_pct	B03002_012E
other_pct	B03002_008E
PacificIsl_pct	B03002_007E
white_pct	B03002_003E

disability	ACS2019API/5Y	S1810	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html , variables in parentheses S1810_C01_001E = Estimate of total civilian noninstitutionalized population (disability) S1810_C02_001E = Estimate of total civilian noninstitutionalized population with a disability S1810_C02_019E = Estimate of total civilian noninstitutionalized population with a hearing disability (difficultyhearing) S1810_C02_029E = Estimate of total civilian noninstitutionalized population with a vision difficulty (difficultyvision) S1810_C02_039E = Estimate of total civilian noninstitutionalized population with a cognitive difficulty (difficultycognitive) S1810_C02_047E Estimate of total civilian noninstitutionalized population with an ambulatory difficulty (difficultyambulatory) S1810_C02_055E = Estimate of total civilian noninstitutionalized population with a self-care difficulty (difficultyselfcare) S1810_C02_063E = Estimate of total civilian noninstitutionalized population with an independent living difficulty (difficultyindependent) Numerator = S1810_C02_0XXE, where XX = 01, 19, 29, 39, 47, 55, 63 Denominator= S1810_C01_001E Proportion = numerator/Denominator SE = (S1810_C03_0XXM/100)/1.645, where X = 01, 19, 29, 39, 47, 55, 63
Disability65	ACS2019API/5Y	B18101	URL: https://api.census.gov/data/2019/acs/acs5/variables.html For race/ethnicity stratified indicators: B18101[A:I]_008E = Estimate of population 65+ B18101[A:I]_008M = Margin of Error of population 65+ B18101[A:I]_009E = Estimate of population 65+ with a disability B18101[A:I]_009M = Margin of Error of population 65+ with a disability

			Value = B18101[A:I]_009E / B18101[A:I]_008E SE = [(B18101[A:I]_009M / 1.645) ^2] / [(B18101[A:I]_008M / 1.645) ^2] For census-tract level indicator: B18101_015E = Estimate of male population ages 65-74 B18101_015M = Margin of Error of male population ages 65-74 B18101_018E = Estimate of male population ages 75+ B18101_018M = Margin of Error of male population ages 75+ B18101_034E = Estimate of female population ages 65-74 B18101_034M = Margin of Error of female population ages 65-74 B18101_037E = Estimate of female population ages 75+ B18101_037M = Margin of Error of female population ages 75+ B18101_016E = Estimate of male population ages 65-74 with a disability B18101_016M = Margin of Error of male population ages 65-74 with a disability B18101_019E = Estimate of male population ages 75+ with a disability B18101_019M = Margin of Error of male population ages 75+ with a disability B18101_035E = Estimate of female population ages 65-74 with a disability B18101_035M = Margin of Error of female population ages 65-74 with a disability B18101_038E = Estimate of female population ages 75+ with a disability B18101_038M = Margin of Error of female population ages 75+ with a disability Numerator = Sum of Estimates of population 65+ with a disability Denominator = Sum of Estimates of population 65+ Value = numerator / denominator Numerator SE = For every population with a disability margin of error, sqrt(sum((MOE/1.645)^2) Denominator SE = For every population total margin of error, sqrt(sum((MOE/1.645)^2) If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator

			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator
diversity_index	ACS2019API/5Y	DP05	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP05_0070E = Total DP05_0071E = Latino DP05_0077E = White, Non-Hispanic DP05_0078E = Black, Non-Hispanic DP05_0079E = AIAN, Non-Hispanic DP05_0080E = Asian, Non-Hispanic DP05_0081E = NHPI, Non-Hispanic DP05_0082E = Other race, Non-Hispanic DP05_0083E = Multiple races, Non-Hispanic Denominator = DP05_0070 pct_re = Proportion of a given race/ethnicity in the population, e.g., DP05_0071 / DP05_0070 sq_pct = pct_re^2 Value = 1 - Sum of sq_pct per county
electeds_diff	ACS2019API/5Y WhoLeadsUs	DP05 N/A	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html From ACS2019API/5Y/DP05 DP05_0070E = Total DP05_0071E = Latino DP05_0077E = White, Non-Hispanic DP05_0078E = Black, Non-Hispanic DP05_0079E = AIAN, Non-Hispanic DP05_0080E = Asian, Non-Hispanic DP05_0081E = NHPI, Non-Hispanic DP05_0082E = Other race, Non-Hispanic DP05_0083E = Multiple races, Non-Hispanic From WhoLeadsUS

			White.Non.White = Race of elected official (White, Non-White, or Unknown) Office.Level = Level of elected office. For this indicator, only "administrativeArea2" (county) is used. pct_nonwhite = (DP05_0071 + DP05_0078 + DP05_0079 + DP05_0080 + DP05_0081 + DP05_0082 + DP05_0083) / DP05_0070 elected_nonwhite = Recode of White.Non.White, 1 = Non-White, 0 = White, NA = Unknown pct_elected_nonwhite = sum of elected_nonwhite per county / total elected officials per county Value = pct_elected_nonwhite - pct_nonwhite
english_ltvw	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html Each variable has an estimate and margin of error (MOE) C16001_001 = Total population over age 5 C16001_005 = Spanish speakers who speak English "less than very well" C16001_008 = French speakers who speak English "less than very well" C16001_011 = German speakers who speak English "less than very well" C16001_014 = Russian speakers who speak English "less than very well" C16001 _017 = Other Indo-European language speakers who speak English "less than very well" C16001 _020 = Korean speakers who speak English "less than very well" C16001 _023 = Chinese speakers who speak English "less than very well" C16001_026 = Vietnamese speakers who speak English "less than very well" C16001_029 = Tagalog speakers who speak English "less than very well" C16001_032 = Other A/PI speakers who speak English "less than very well" C16001_035 = Arabic speakers who speak English "less than very well" C16001 _038 = Other and Unspecified language speakers who speak English "less than very well" Numerator = C16001_005 + C16001_008 + C16001_011 + C16001_014 + C16001_017 + C16001_020 + C16001_023 + C16001_026 + C16001_029 + C16001_032 + C16001_035 + C16001_038

			Denominator = C16001_001
			Value = Numerator / Denominator
			Numerator SE = sqrt((C16001_005 MOE / 1.645)^2 + (C16001_008 MOE / 1.645)^2 + (C16001_011 MOE / 1.645)^2 + (C16001_014 MOE / 1.645)^2 + (C16001_017 MOE / 1.645)^2 + (C16001_020 MOE / 1.645)^2 + (C16001_023 MOE / 1.645)^2 + (C16001_026 MOE / 1.645)^2 + (C16001_029 MOE / 1.645)^2 + (C16001_032 MOE / 1.645)^2 + (C16001_035 MOE / 1.645)^2 + (C16001_035 MOE / 1.645)^2)
			Denominator SE = C16001_001 MOE / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

englishspeak	ACS2019API/5Y	C16002	URL: https://api.census.gov/data/2019/acs/acs5/variables.html Each variable has an estimate and margin of error (MOE) C16002_001 = Total number of households C16002_004 = Spanish-speaking limited English speaking households C16002_007 = Other Indo-European language speaking limited English speaking households C16002_010 = Asian and Pacific Island language speaking limited English speaking households C16002_013 = Other language speaking limited English speaking households Numerator = Denominator - (C16002_004E + C16002_007E + C16002_010E + C16002_013E) Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = sqrt((C16002_004M/1.645)^2 + (C16002_007M/1.645)^2 + (C16002_010M/1.645)^2 + (C16002_013M/1.645)^2) Denominator SE = C16002_001M/1.645

			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
fall	Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health & Human Services, 2018-2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/ed/InjEDSareaHospEDICD10/AgeRate.html value = Age-adjusted rates per 10,000 (or 10000*Number of ED Encounters / Number in population) numerator = Number of ED Encounters (for falls) denominator = Number in population se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/Injury Emergency Department Encounter/Advanced Selection for Utah Small Areas/ICD10-CM Coding System/All ED Encounters/Hospital ED Encounters/Age Adjusted Rates - ED Injury Encounters/Step 1: Select Year --> 2018-2020/Step 2: Select reason for hospitalization --> Falls/Step 8: Select how to display data --> Display By = Utah Small Area
femalegender	ACS2019API/5Y	DP05	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP05_0001E = Estimate of total population DP05_0003E = Estimate of female population DP05_0003PM = Percent margin of error of female population Numerator = DP05_0003E Denominator = DP05_0001E Proportion = DP05_0003E / DP05_0001E SE(proportion) = (DP05_0003PM /100)/1.645
Five Hundred Cities: ARTHRITIS BPHIGH CANCER CASTHMA	500 Cities (CDC)	2020	URL: https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Local-Data-for-Better-Health-Census-Tract-D/cwsq-ngmh To create the indicators of unduplicated census tracts for crude prevalence of all the outcomes, the data were downloaded via the PLACES API, and filtered for

CHD COPD DIABETES KIDNEY MHLTH PHLTH STROKE LPA CSMOKING BINGE OBESITY			state (StateAbbr = CA) and measure ID (ex. measureid = DIABETES) Crude prevalence in adults > 18 years = CrdPrev
flupneu	Utah Vital Records Database, Office of Vital Records and Statistics, Utah Department of Health & Human Services, 2015-2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/mort/MortSarealCD10/AgeRate.html value = Age-adjusted deaths per 100,000 population caused by influenza or pneumonia numerator = Number of deaths caused by influenza or pneumonia denominator = Population se = SE=sqrt((100,000 X numerator)/denominator) notes: IBIS steps: Data Portal/Mortality/Advanced Selection/Utah Small Areas or Health Improvement Index Classifications/Years 2010 and later/Age-adjusted Rates/Select Year 2015-2020/ Select Cause of Death: Influenza and Pneumonia/Select Utah Small Area/Display Data by Geographic Area
foodassist_fed	BRFSS,SNAP, WIC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percent of Utah adults who report that anyone in their household received benefits from a federal food assistance program such as SNAP (food stamps), WIC, and free and reduced lunch program in the past 12 months
foodassist_nonfed	BRFSS,SNAP, WIC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services

			Value = Percent of Utah adults who report that anyone in their household received benefits from a non federal food source such as "Meals on Wheels", food pantries, food banks, soup kitchens, church welfare, backpack programs, or any other charitable food source in the past 12 months
foodinsecure	Map the Meal Gap, 2015-2019		URL: https://map.feedingamerica.org/ From Feeding America Downloaded the 2015, 2016, 2017, 2018, and 2019 data. Value = mean of 2015-2019 rate numerator = mean of 2015-2019 numerators denominator = numerator / value se = sqrt(value*(1-value)/denominator)
foreignborn_citizen	ACS2019API/5Y	B05003A:I	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B05003_005E = Estimate of Total Foreign-Born Males Under 18 B05003_005M = Margin of Error of Total Foreign-Born Males Under 18 B05003_006E = Estimate of Foreign-Born Naturalized Citizen Males Under 18 B05003_006M = Margin of Error of Total Foreign-Born Naturalized Citizen Males Under 18 B05003_010E = Estimate of Total Foreign-Born Males Over 18 B05003_010M = Margin of Error of Total Foreign-Born Males Over 18 B05003_011E = Estimate of Total Foreign-Born Naturalized Citizen Males Over 18 B05003_011M = Margin of Error of Total Foreign-Born Naturalized Citizen Males Over 18 B05003_016E = Estimate of Total Foreign-Born Females Under 18 B05003_016M = Margin of Error of Total Foreign-Born Females Under 18 B05003_017E = Estimate of Foreign-Born Naturalized Citizen Females Under 18 B05003_017M = Margin of Error of Total Foreign-Born Naturalized Citizen Females Under 18 B05003_021E = Estimate of Total Foreign-Born Females Over 18 B05003_021M = Margin of Error of Total Foreign-Born Females Over 18 B05003_022E = Estimate of Total Foreign-Born Naturalized Citizen Females Over

			18
			B05003_022M = Margin of Error of Total Foreign-Born Naturalized Citizen Females Over 18
			
			Numerator = Sum of Estimates of Total Foreign-Born Naturalized Citizens
			Denominator = Sum of Estimates of Total Foreign-Born
			Value = numerator / denominator
			Numerator SE = For every foreign-born naturalized citizen margin of error, sqrt(sum((MOE/1.645)^2)
			Denominator SE = For every foreign-born total margin of error, sqrt(sum((MOE/1.645)^2)
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

foreignborn_notcitizen	ACS2019API/5Y	B05003A:I	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B05003_005E = Estimate of Total Foreign-Born Males Under 18 B05003_005M = Margin of Error of Total Foreign-Born Males Under 18 B05003_006E = Estimate of Foreign-Born Non-Citizen Males Under 18 B05003_006M = Margin of Error of Total Foreign-Born Non-Citizen Males Under 18 B05003_010E = Estimate of Total Foreign-Born Males Over 18 B05003_010M = Margin of Error of Total Foreign-Born Males Over 18 B05003_011E = Estimate of Total Foreign-Born Non-Citizen Males Over 18 B05003_011M = Margin of Error of Total Foreign-Born Non-Citizen Males Over 18 B05003_016E = Estimate of Total Foreign-Born Females Under 18 B05003_016M = Margin of Error of Total Foreign-Born Females Under 18 B05003_017E = Estimate of Foreign-Born Non-Citizen Females Under 18 B05003_017M = Margin of Error of Total Foreign-Born Non-Citizen Females Under 18

			B05003_021E = Estimate of Total Foreign-Born Females Over 18
			B05003_021M = Margin of Error of Total Foreign-Born Females Over 18
			B05003_022E = Estimate of Total Foreign-Born Non-Citizen Females Over 18
			B05003_022M = Margin of Error of Total Foreign-Born Non-Citizen Females Over 18
			
			Numerator = Sum of Estimates of Total Foreign-Born Non-Citizen
			Denominator = Sum of Estimates of Total Foreign-Born
			Value = numerator / denominator
			Numerator SE = For every foreign-born non-citizen margin of error, sqrt(sum((MOE/1.645)^2)
			Denominator SE = For every foreign-born total margin of error, sqrt(sum((MOE/1.645)^2)
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

gini (county and city)	ACS2019API/5Y	B19083	URL: https://api.census.gov/data/2019/acs/acs5/groups.html gini_pct = B19083_001E gini_se_pct = B19083_001M/1.645
h20contam	EPA ECHO / UGRC		ECHO URL: https://echo.epa.gov/tools/web-services/facility-search-drinking-water#/ UGRC URL: https://opendata.gis.utah.gov/datasets/utahDNR::culinarywaterserviceareas/about Use the following parameters for the ECHO API: p_st = “UT”, qcolumns = “1,2,14,28” Value = Population-weighted average sum of all violation points for violations

			reported during the past five years. Population weights calculated using 2015-19 ACS 5-year average block group population.
HCVunits	2019 HUD Picture of Subsidized Households; ACS2019API/5Y	B25001	Numerator URL: https://www.huduser.gov/portal/datasets/assthsg.html Download HUD data using the following specifications: 1. Year: 2019 Based on 2010 Census 2. Summary level: Census tract 3. HUD program: Housing Choice Vouchers 4. Variables: All Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25001_001E = Estimate of total housing units B25001_001M = Margin of Error of total housing units Numerator = Total Housing Choice Voucher Units Denominator = B25001_001E Value = Numerator/Denominator * 1,000 Denominator SE = B25001_001M/1.645
hi_score	ACS2019API/5Y	DP03, S0101, DP02, B19301, B25014, S1701	Methods after: Nathan RP, Adams CF. Four Perspectives on Urban Hardship. Political Science Quarterly. 1989;104(3):483-508 and Wright DJ, Montiel LM. Divided They Fall: Hardship in America's Cities and Suburbs. Albany, NY: The Nelson A. Rockefeller Institute of Government; 2007
hii	DHHS Division of Population Health		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = The Utah Health Improvement Index (HII) is a composite health equity measure by Utah Small Area. It is comprised of nine indicators that describe important determinants of health such as socioeconomic deprivation, economic

			inequality, resource availability, household composition, and opportunity structure.
homevalue	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP04_0089E = Estimate of Median Home Value DP04_0089M = Margin of Error of Median Home Value Value = DP04_0089E SE = DP04_0089M / 1.645
Housebuild1940	ACS2019API/5Y	B25034	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25034_001E = Estimate of total housing units B25034_001M = Margin of Error of total housing units B25034_011E = Estimate of housing units built before 1940 B25034_011M = Margin of Error of housing units built before 1940 Numerator = B25034_011E Denominator = B25034_001E Value = Numerator/Denominator Numerator SE = B25034_011M/1.645 Denominator SE = B25034_001M/1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
HTA	cnt.org		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Housing plus transportation costs as a percentage of income for a typical household in the region
idleteen	ACS2019API/5Y	S0902	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html Not available at census tract; partially available at county and place;

			S0902_C01_017E is actually a percent, not a integer for numerator S0902_C01_016E = Estimate of total population between ages 16 and 19 S0902_C01_017E = Percent of total population between ages 16 and 19 not enrolled in school and not in the labor force S0902_C01_017M = Margin of error (percent) of total population between ages 16 and 19 not enrolled in school and not in the labor force Numerator = S0902_C01_016E*(S0902_C01_017E/100) Denominator = S0902_C01_016E Proportion = S0902_C01_017E/100 SE(proportion) = (S0902_C01_017E/100)/1.645
immigrant	ACS2019API/5Y	B05002	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B05002_001 = Estimate of total population B05002_013 = Estimate of total foreign born population Numerator = B05002_013E Denominator = B05002_001E Value = numerator / denominator Numerator SE = B05002_013M/1.645 Denominator SE = B05002_001M/1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
income	ACS2019API/5Y	DP03, B19013	URL: https://api.census.gov/data/2019/acs/acs5/variables.html For census tract level indicator (not stratified by race/ethnicity): DP03_0062E = Estimate of median household income in the past 12 months (in 2019 inflation-adjusted dollars) DP03_0062M = Margin of error of median household income in the past 12 months (in 2019 inflation-adjusted dollars) Value = DP03_0062E

			SE = DP03_0062M / 1.645 For place and county level indicator (stratified by race/ethnicity): B19013__001E = Estimate of median household income in the past 12 months (in 2019 inflation-adjusted dollars) B19013_001M = Margin of error of median household income in the past 12 months (in 2019 inflation-adjusted dollars) Value = B19013_001E SE = B19013_001M / 1.645
insured_children	ACS2019API/5Y	S2701	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S2701_C01_002E = Estimate of population aged <6 S2701_C01_002M = Margin of Error of population aged <6 S2701_C01_003E = Estimate of population ages 6-18 S2701_C01_003M = Margin of Error of population ages 6-18 S2701_C02_002E = Estimate of insured population aged <6 S2701_C02_002M = Margin of Error of insured population aged <6 S2701_C02_003E = Estimate of insured population ages 6-18 S2701_C02_003M = Margin of Error of insured population ages 6-18 Numerator = S2701_C02_002E + S2701_C02_003E Denominator = S2701_C01_002E + S2701_C01_003E Value = Numerator/Denominator Numerator SE = sqrt((S2701_C02_002M/1.645)^2 + (S2701_C02_003M/1.645)^2) Denominator SE = sqrt((S2701_C01_002M/1.645)^2 + (S2701_C01_003M/1.645)^2) If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
iod, iod_asian, iod_latino, iod_nonwhite	ACS2010/Dec/SF1	P012001 A:I	URL: https://api.census.gov/data/2010/dec/sf1 P012001 = Population Count

			Methods follow: https://www.census.gov/prod/2002pubs/censr-3.pdf
job_availability	Department of Workforce Services - FirmFind Data; ACS2019API/5Y	B23024	Numerator URL: https://jobs.utah.gov/jsp/firmfind/#/download Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html # employees for each business is provided as a range (field named EMPRANGE). To quantify number of jobs available, the midpoint of the range is used. B23024_001E = Estimate of total population aged 20-64 Numerator = SUM(MEAN(EMPRANGE)) Denominator = B23024_001E Value = Numerator/Denominator * 10,000
KEEP_literacy	UDRC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percentage of children with sufficient prerequisite knowledge and skills on KEEP (Kindergarten Entry and Exit Profile) literacy
KEEP_numeracy	UDRC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percentage of children with sufficient prerequisite knowledge and skills on KEEP (Kindergarten Entry and Exit Profile) numeracy
labor_participation	ACS2019API/5Y	DP03	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP03_0001E = Estimate of population 16 years and over DP03_0001M = Margin of Error of population 16 years and over DP03_0002E = Estimate of population 16 years and over in labor force DP03_0002M = Margin of Error of population 16 years and over in labor force Numerator = DP03_0002E Denominator = DP03_0001E Value = Numerator/Denominator

			Numerator SE = DP03_0002M/1.645 Denominator SE = DP03_0001M/1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator

lang_arabic	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_033E = Estimate of Arabic speaking population
			C16001_033M = Margin of Error of Arabic speaking population
			
			Numerator = C16001_033E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_033M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_chinese	ACS2019API/5Y		URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_021E = Estimate of Chinese speaking population C16001_021M = Margin of Error of Chinese speaking population Numerator = C16001_021E Denominator = C16001_001E Value = Numerator / Denominator

			Numerator SE = C16001_021M/ 1.645
			Denominator SE = C16001_001M/ 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_english	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_002E = Estimate of population that speak only English
			C16001_002M = Margin of Error of population that speak only English
			
			Numerator = C16001_002E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_002M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_french	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_006E = Estimate of French speaking population C16001_006M = Margin of Error of French speaking population

			Numerator = C16001_006E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_006M / 1.645
			Denominator SE = C16001_001M / 1.645
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_german	ACS2019API/5Y		URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_009E = Estimate of German speaking population
			C16001_009M = Margin of Error of German speaking population
			
			Numerator = C16001_009E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_009M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_korean	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_018E = Estimate of Korean speaking population

			C16001_018M = Margin of Error of Korean speaking population
			
			Numerator = C16001_018E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_018M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_other	ACS2019API/5Y		URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_036E = Estimate of other and unidentified language speaking population
			C16001_036M = Margin of Error of other and unidentified language speaking population
			
			Numerator = C16001_036E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_036M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_other_api	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_030E = Estimate of other A/PI speaking population
			C16001_030M = Margin of Error of other A/PI speaking population
			
			Numerator = C16001_030E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_030M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_other_indo	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_015E = Estimate of other Indo-European speaking population C16001_015M = Margin of Error of other Indo-European speaking population Numerator = C16001_015E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_015M / 1.645 Denominator SE = C16001_001M/ 1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator

			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_russian	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_012E = Estimate of Russian speaking population
			C16001_012M = Margin of Error of Russian speaking population
			
			Numerator = C16001_012E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_012M / 1.645
			Denominator SE = C16001_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_spanish	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_003E = Estimate of Spanish speaking population C16001_003M = Margin of Error of Spanish speaking population Numerator = C16001_003E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_003M / 1.645 Denominator SE = C16001_001M / 1.645

			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_tagalog	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html
			
			C16001_001E = Estimate of total population over age 5
			C16001_001M = Margin of Error of total population over age 5
			C16001_027E = Estimate of Tagalong speaking population
			C16001_027M = Margin of Error of Tagalong speaking population
			
			Numerator = C16001_027E
			Denominator = C16001_001E
			Value = Numerator / Denominator
			Numerator SE = C16001_027M / 1.645
			Denominator SE = C16001_001M/ 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lang_vietnamese	ACS2019API/5Y	C16001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_024E = Estimate of Vietnamese speaking population C16001_024M = Margin of Error of Vietnamese speaking population Numerator = C16001_024E Denominator = C16001_001E

			Value = Numerator / Denominator
			Numerator SE = C16001_024M / 1.645
			Denominator SE = C16001_001M/ 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

Language65	ACS2019API/5Y	B16004	URL: https://api.census.gov/data/2019/acs/acs5/variables.html BI6004_046E = Estimate of total 65+ population BI6004_046M = Margin of Error of total 65+ population B16004_051E = Estimate of 65+ Spanish speakers who speak English “not well” B16004_051M = Margin of Error of 65+ Spanish speakers who speak English “not well” B16004_052E = Estimate of 65+ Spanish speakers who speak English “not at all” B16004_052M = Margin of Error of 65+ Spanish speakers who speak English “not at all” B16004_056E = Estimate of 65+ Indo-European language speakers who speak English “not well” B16004_056M = Margin of Error of 65+ Indo-European language speakers who speak English “not well” B16004_057E = Estimate of 65+ Indo-European language speakers who speak English “not at all” B16004_057M = Margin of Error of 65+ Indo-European language speakers who speak English “not at all” B16004_061E = Estimate of 65+ Asian language speakers who speak English “not well” B16004_061M = Margin of Error of 65+ Asian language speakers who speak English “not well” B16004_062E = Estimate of 65+ Asian language speakers who speak English “not at all”

			B16004_062M = Margin of Error of 65+ Asian language speakers who speak English "not at all"
			B16004_066E = Estimate of 65+ other language speakers who speak English "not well"
			B16004_066M = Margin of Error of 65+ other language speakers who speak English "not well"
			B16004_067E = Estimate of 65+ other language speakers who speak English "not at all"
			B16004_067M = Margin of Error of 65+ other language speakers who speak English "not at all"
			
			Numerator = B16004_051E + B16004_052E + B16004_056E + B16004_057E + B16004_061E + B16004_062E + B16004_066E + B16004_067E
			Denominator = BI6004_046E
			Value = Numerator/Denominator
			Numerator SE = sqrt((B16004_051M/1.645)^2 + (B16004_052M/1.645)^2 + (B16004_056M/1.645)^2 + (B16004_057M/1.645)^2 + (B16004_061M/1.645)^2 + (B16004_062M/1.645)^2 + (B16004_066M/1.645)^2 + (B16004_067M/1.645)^2)
			Denominator SE = BI6004_046M/1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

leb	CDC USALEEP 2015		URL: https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html#life-expectancy e.0. = Estimate of life expectancy at birth (LEB) se.e.0 = Standard error of LEB Value = e.0. SE = se.e.0

libraryaccess	Utah Geospatial Resource Center	Library	URL: https://gis.utah.gov/data/society/schools-libraries/#Libraries Value: Average distance from a library weighted by population size
LIHTC_HU	HUD LIHTC Database; ACS2019API/5Y	B25001	Numerator URL: https://lihtc.huduser.gov/ Reference for definition of active LIHTC: https://preservationdatabase.org/documentation/data-dictionary/ Download LIHTC data using the following specifications: 1. Variables selected for data download: HUD ID, census tract code, total units, compliance monitoring status 2. State: Utah 3. Placed-in-Service Years: 1990-2019 4. No restrictions on any other fields Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25001_001E = Estimate of total housing units B25001_001M = Margin of Error of total housing units Numerator = Total active LIHTC units per census tract (active if compliance monitoring status =/= "No Longer Monitored" AND Placed-in-Service Year + 30 > 2019) Denominator = B25001_001E Value = Numerator/Denominator * 1,000 Denominator SE = B25001_001M/1.645
Livealone65	ACS2019API/5Y	B09020	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B09020_001E = Estimate of total 65+ population B09020_001M = Margin of Error of total 65+ population B09020_015E = Estimate of males 65+ living alone B09020_015M = Margin of Error of males 65+ living alone

			B09020_018E = Estimate of females 65+ living alone
			B09020_018M = Margin of females 65+ living alone
			
			Numerator = B09020_015E + B09020_018E
			Denominator = B09020_001E
			Value = Numerator/Denominator
			Numerator SE = sqrt((B09020_015M/1.645)^2 + (B09020_018M/1.645)^2)
			Denominator SE = B09020_001M/1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

lq_aian	ACS2019API/5Y	B03002	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B03002_001 = Total Population B03002 _005 = Non-Hispanic American Indian / Alaska Native Numerator = B03002_005 / B03002_001 (Tract) Denominator = B03002_005 / B03002_001 (County) Value = Numerator / Denominator
lq_asian		ACS2019API /5Y	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B03002_001 = Total Population B03002 _006 = Non-Hispanic Asian Numerator = B03002_006 / B03002_001 (Tract) Denominator = B03002_006 / B03002_001 (County) Value = Numerator / Denominator
lq_black	ACS2019API/5Y	B03002	URL: https://api.census.gov/data/2019/acs/acs5/variables.html

			B03002_001 = Total Population B03002_004 = Non-Hispanic Black Numerator = B03002_004 / B03002_001 (Tract) Denominator = B03002_004 / B03002_001 (County) Value = Numerator / Denominator
lq_hispanic		ACS2019API/5Y	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B03002_001 = Total Population B03002_012 = Hispanic/Latino Numerator = B03002_012 / B03002_001 (Tract) Denominator = B03002_012 / B03002_001 (County) Value = Numerator / Denominator
lq_nhpi	ACS2019API/5Y	B03002	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B03002_001 = Total Population B03002_007 = Non-Hispanic Native Hawaiian / Pacific Islander Numerator = B03002_007 / B03002_001 (Tract) Denominator = B03002_007 / B03002_001 (County) Value = Numerator / Denominator
lq_white		ACS2019API/5Y	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B03002_001 = Total Population B03002_003 = Non-Hispanic White Numerator = B03002_003 / B03002_001 (Tract) Denominator = B03002_003 / B03002_001 (County) Value = Numerator / Denominator
lt80pct	ACS2019API/5Y	DP03 / B19013	For census-tract level indicator: URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html

			DP03_0062 = Median Household Income (State, Census tract) 80pct_mhi = .8 * DP03_0062 (State) Value = DP03_0062 (Tract) < 80pct_mhi, "Yes", DP03_0062 (Tract) > 80pct_mhi, "No" URL: https://api.census.gov/data/2019/acs/acs5/groups.html For race/ethnicity stratified indicators: B19013_001 = Median Household Income (Place) 80pct_mhi = .8 * DP03_0062 (State) Value = B19013_001 < 80pct_mhi, "Yes", B19013_001 > 80pct_mhi, "No"
MobileHomes	ACS2019API/5Y	B25024	URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25024_001E = Estimate of total housing units B25024_001M = Margin of Error of total housing units B25024_010E = Estimate of housing units that are mobile homes B25024_010M = Margin of Error of housing units that are mobile homes Numerator = B25024_010E Denominator = B25024_001E Value = Numerator/Denominator Numerator SE = B25024_010M/1.645 Denominator SE = B25024_001M/1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
mva	CDC WONDER	Underlying cause, 2015-2019	URL: https://wonder.cdc.gov/ucd-icd10.html 1. Group by: County 2. Location: Utah 4. Years: 2015-2019 6. Cause of Deaths: ICD Codes: V01-V89

			Advanced Finder Options Open (Expand) ICD codes and move to selection box Numerator = Deaths/5 Denominator = Population/5 Value = 100000*Deaths/Population SE = value/sqrt(Deaths)
mvc	Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health & Human Services, 2018-2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/ed/InjEDSareaHospEDICD10/AgeRate.html value = Age-adjusted rates per 10,000 (or 10000*Number of ED Encounters / Number in population) numerator = Number of ED Encounters (for MVT-Occupant, MVT-Motorcyclist, MVT-Pedalcyclist, MVT-Peddstrian, MVT-Other, MVT-Unspecified) denominator = Number in population se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/Injury Emergency Department Encounter/Advanced Selection for Utah Small Areas/ICD10-CM Coding System/All ED Encounters/Hospital ED Encounters/Age Adjusted Rates - ED Injury Encounters/Step 1: Select Year --> 2018-2020/Step 2: Select reason for hospitalization --> MVT-Occupant, MVT-Motorcyclist, MVT-Pedalcyclist, MVT-Peddstrian, MVT-Other, MVT-Unspecified/Step 8: Select how to display data --> Display By = Utah Small Area
netmigration	University of Wisconsin		URL: https://netmigration.wisc.edu/ https://netmigration.wisc.edu/data-details download (ICPSR_NME_2000_2010.CSV) Select California (stname=="California") Net Migrants: Variable / Age Group Expected Population: Variable / Age Group

<table>
<tr>
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<table>
<tr><td>m0ttt0</td><td>ages 0-4</td><td>e0ttt0</td><td>ages 0-4</td></tr>
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<tr><td>m0ttt40</td><td>ages 40-44</td><td>e0ttt40</td><td>ages 40-44</td></tr>
<tr><td>m0ttt45</td><td>ages 45-49</td><td>e0ttt45</td><td>ages 45-49</td></tr>
<tr><td>m0ttt50</td><td>ages 50-54</td><td>e0ttt50</td><td>ages 50-54</td></tr>
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<tr><td>m0ttt60</td><td>ages 60-64</td><td>e0ttt60</td><td>ages 60-64</td></tr>
<tr><td>m0ttt65</td><td>ages 65-69</td><td>e0ttt65</td><td>ages 65-69</td></tr>
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<tr><td>m0ttt85</td><td>ages 85+</td><td>e0ttt85</td><td>ages 85+</td></tr>
</table>

Numerator = Σ net migration
Denominator = Σ Expected population
Value = numerator/denominator
Se = sqrt(abs(value)*(1-abs(value))/denominator) binomial SE for a percent
</td>
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<tr>
<td>nonenglishspeaking</td>
<td>ACS2019API/5Y</td>
<td>S1601</td>
<td>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html

S1601_C01_001E = Estimate of total population over 5
S1601_C01_003E = Estimate of total population over 5 that speak a language other than English
S1601_C02_003M = Percent margin of error of total population over 5 that speak a language other than English

Numerator = S1601_C01_003E</td>
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</table>

			Denominator = S1601_C01_003E Proportion = Numerator/Denominator SE(proportion)= (S1601_C02_003M/100) /1.645
Nonwhite65	ACS2019API/5Y	B01001	URL: https://api.census.gov/data/2019/acs/acs5/variables.html Each variable has an estimate and margin of error (MOE) B01001_020 = Total males ages 65-66 B01001_021 = Total males ages 67-69 B01001_022 = Total males ages 70-74 B01001_023 = Total males ages 75-79 B01001_024 = Total males ages 80-84 B01001_025 = Total males ages 85+ B01001_044 = Total females ages 65-66 B01001_045 = Total females ages 67-69 B01001_046 = Total females ages 70-74 B01001_047 = Total females ages 75-79 B01001_048 = Total females ages 80-84 B01001_049 = Total females ages 85+ B01001H_014 = White non-Hispanic males ages 65-74 B01001H_015 = White non-Hispanic males ages 75-84 B01001H_016 = White non-Hispanic males ages 85+ B01001H_029 = White non-Hispanic females ages 65-74 B01001H_030 = White non-Hispanic females ages 75-84 B01001H_031 = White non-Hispanic females ages 85+ Numerator = B01001H_014 + B01001H_015 + B01001H_016 + B01001H_029 + B01001H_030 + B01001H_031 Denominator = B01001_020 + B01001_021 + B01001_022 + B01001_023 + B01001_024 + B01001_025 + B01001_044 + B01001_045 + B01001_046 + + B01001_047 + B01001_048 + B01001_049 Value = Numerator / Denominator Numerator SE = sqrt((B01001H_014 MOE / 1.645)^2 + (B01001H_015 MOE / 1.645)^2 + (B01001H_016 MOE / 1.645)^2 + (B01001H_029 MOE / 1.645)^2 +

			(B01001H_030 MOE / 1.645)^2 + (B01001H_031 MOE / 1.645)^2)
			Denominator SE = sqrt((B01001_020 MOE / 1.645)^2 + (B01001_021 MOE / 1.645)^2 + (B01001_022 MOE / 1.645)^2 + (B01001_023 MOE / 1.645)^2 + (B01001_024 MOE / 1.645)^2 + (B01001_025 MOE / 1.645)^2 + (B01001_044 MOE / 1.645)^2 + (B01001_045 MOE / 1.645)^2 + (B01001_046 MOE / 1.645)^2 + (B01001_047 MOE / 1.645)^2 + (B01001_048 MOE / 1.645)^2 + (B01001_049 MOE / 1.645)^2)
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

OtherHUDunits	2019 HUD Picture of Subsidized Households; ACS2019API/5Y	B25001	Numerator URL: https://www.huduser.gov/portal/datasets/assthsg.html Download HUD data using the following specifications: 1. Year: 2019 Based on 2010 Census 2. Summary level: Census tract 3. HUD program: Mod Rehab, Project Based Section 8, S236/BMIR, 202/PRAC, 811/PRAC 4. Variables: All Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25001_001E = Estimate of total housing units B25001_001M = Margin of Error of total housing units Numerator = Total housing units subsidized by other HUD programs Denominator = B25001_001E Value = Numerator/Denominator * 1,000 Denominator SE = B25001_001M/1.645

outdoors	ACS2019API/5Y	S2401	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html
			
			S2401_C01_001E = Estimate of total civilian employed population over 16
			S2401_C01_001M = Margin of error of total civilian employed population over 16
			S2401_C01_030E = Estimate of farming, fishing and forestry occupations
			S2401_C01_031E = Estimate of construction and extraction occupations
			S2401_C01_030M = Margin of error of farming, fishing and forestry occupations
			S2401_C01_031M = Margin of error of construction and extraction occupations
			
			Numerator = S2401_C01_030E + S2401_C01_031E
			Denominator = S2401_C01_001E
			Percent = Numerator/denominator
			Denominator SE = S2401_C01_001M/1.645
			Numerator SE = (S2401_C01_030M/1.645)^2 + (S2401_C01_031M/1.645^2)^0.5
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

overdose	Utah Vital Records Database, Office of Vital Records and Statistics, Utah Department of Health & Human Services, 2016-2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/mort/InjMortSarealCD10/AgeRate.html value = Age-adjusted deaths per 100,000 population caused by drugs involving any opioid numerator = Number of deaths caused by drugs involving any opioid denominator = Population se = SE=sqrt((100,000 X numerator)/denominator) notes: IBIS Steps: Data Portal/Injury Mortality/Advanced Selection/Utah Small Areas Years 1999 and later (ICD-10 coding system)/Leading Causes of Injury Death by Age-adjusted Rate/ Step 1: Select Year: 2016-2020/Step 2: Select Injury Cause of Death: Select Drug Overdose (Available from 2016): Select the Injury

			Indicator - Drug Overdose involving any opioid/ Step 6: How to display the data/Select Display by Geographic Area
ozone	US EPA EJSCREEN		URL: https://geopub.epa.gov/arcgis/rest/services/ejscreen/ejscreen_v2020/MapServer/4/query?where=STATE_NAME+%3D+%27Utah%27&outFields=ID,OZONE,PM25,DSLPM&returnGeometry=false&f=pjson&resultOffset=" Value = OZONE
Perc65plus	ACS2019API/5Y	S0101	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S0101_C01_001E = Estimate of total population S0101_C01_001M = Margin of Error of total population S0101_C01_030E = Estimate of 65+ population S0101_C01_030M = Margin of Error of 65+ population S0101_C02_030E = Estimate of percent of population 65+ S0101_C02_030M = Margin of Error of percent of population 65+ Numerator = S0101_C01_030E Denominator = S0101_C01_001E Value = S0101_C02_030E/100 Numerator SE = S0101_C01_030M/1.645 Denominator SE = S0101_C01_001M/1.645 SE = (S0101_C02_030M/100)/1.645
Perc75plus	ACS2019API/5Y	S0101	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S0101_C01_001E = Estimate of total population S0101_C01_001M = Margin of Error of total population S0101_C01_031E = Estimate of 75+ population S0101_C01_031M = Margin of Error of 75+ population S0101_C02_031E = Estimate of percent of population 75+ S0101_C02_031M = Margin of Error of percent of population 75+ Numerator = S0101_C01_031E

			Denominator = S0101_C01_001E Value = S0101_C02_031E/100 Numerator SE = S0101_C01_031M/1.645 Denominator SE = S0101_C01_001M/1.645 SE = (S0101_C02_031M/100)/1.645
PHunits	2019 HUD Picture of Subsidized Households; ACS2019API/5Y	B25001	Numerator URL: https://www.huduser.gov/portal/datasets/assthsg.html Download HUD data using the following specifications: 1. Year: 2019 Based on 2010 Census 2. Summary level: Census tract 3. HUD program: Public Housing 4. Variables: All Denominator URL: https://api.census.gov/data/2019/acs/acs5/variables.html B25001_001E = Estimate of total housing units B25001_001M = Margin of Error of total housing units Numerator = Total Public Housing units Denominator = B25001_001E Value = Numerator/Denominator * 1,000 Denominator SE = B25001_001M/1.645
Poverty65	ACS2019API/5Y	S1701	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html S1701_C01_010E = Estimate of total 65+ population S1701_C01_010M = Margin of Error of total 65+ population S1701_C02_010E = Estimate of 65+ below poverty S1701_C02_010M = Margin of Error of 65+ below poverty Numerator = S1701_C02_010E Denominator = S1701_C01_010E

			Value = Numerator/Denominator
			Numerator SE = S1701_C02_010M/1.645
			Denominator SE = S1701_C01_010M/1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

prenatalcare	Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health & Human Services, 2020		URL: https://ibis.health.utah.gov/ibisph-view/query/result/birth/PNCTri1Sarea_09/PNC.html value = Percent with prenatal care in the first trimester numerator = Number of pregnant women with prenatal care in the first trimester denominator = Number of live births se = Relative standard error (RSE)/coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/Birth Data/Advanced Selection/Utah Small Areas or Health Improvement Index Classifications/Prenatal Care/2009 and later/Percentage with Prenatal Care in the First Trimester/Select Year 2020/ Display Data by Geographic Area
preterm	IBIS		This data was de-identified and pre-processed by the Utah Department of Health & Human Services
radon	Utah Environmental Public Health Tracking System, Utah Department of Health & Human	2017-2019	URL: https://epht.health.utah.gov/epht-view/query/builder/radon/Radon/Percent.html Numerator = Indoor radon tests above 4 pCI/L Denominator = Total radon tests (any result) Value = Numerator/Denominator * 100

	Services, 2017-2019		

recentmove	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html
			
			DP04_0052E = Estimate of population moved in 2015-2016
			DP04_0051E = Estimate of population moved in 2017 or later
			DP04_0050E = Estimate of total occupied housing units
			DP04_0052M = Margin of error of population moved in 2015-2016
			DP04_0051M = Margin of error of population moved in 2017 or later
			DP04_0050M = Margin of error of total occupied housing units
			
			Numerator = DP04_0052E + DP04_0051E
			Denominator = DP04_0050E
			Value = Numerator/Denominator
			Numerator SE = sqrt((DP04_0052M /1.645)^2 + (DP04_0051M /1.645)^2)
			Denominator SE = DP04_0050M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

redlined	Mapping Inequality	UW/ICPSR_NME_2000_2010	Calculate spatial intersection of redlined polygons with 2010 Census tract centroids. Tract centroids that intersect redlined polygons are assigned value "Yes", tract centroids that do not intersect are assigned value "No"
rent	ACS2019API/5Y	DP04	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP04_0134E = Estimate of Median Gross Rent DP04_0134M = Margin of Error of Median Gross Rent Value = DP04_0134E SE = DP04_0134M / 1.645

RouDentHlthCare	Utah BRFSS 2016, 2018, 2020 (combined years)		URL: https://ibis.health.utah.gov/ibisph-view/query/result/brfss/LandlineCellAgeAdj5_RouDentHlthCare/RouDentHlthCare.html value = Age-adjusted percentage of adults who visited a dentist or dental hygienist in the past 12 months numerator = Number of adults who report visiting a dentist or dental hygienist in the past 12 months denominator = Number of adults se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/BRFSS/Age-adjusted Rates/Percentages/Access to Healthcare (age-adjusted)/Routine Dental Health Care/Step 1: Filter dentist within the past 12 months/Select Year: 2016, 2018, 2020/Select Geographic Area: Utah Small Areas/Display Data by Geographic Area
RoutineMedChk	Utah BRFSS 2018, 2019, 2020 (combined years)		URL: https://ibis.health.utah.gov/ibisph-view/query/result/brfss/LandlineCellAgeAdj5_RoutineMedChk/RoutineMedChk.html value = Age-adjusted percentage of adults who visited a doctor for a routine check-up in the past 12 months numerator = Number of adults who report visiting a doctor in the past 12 months denominator = Number of adults se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/BRFSS/Age-adjusted Rates/Percentages/Access to Healthcare (age-adjusted)/Routine Medical Check-up/Step 1: Filter within the past 12 months/Select Year: 2018, 2019, 2020/Select Geographic Area: Utah Small Areas/Display Data by Geographic Area
RV_Van_Boat	ACS2019API/5Y	B25024	URL: https://api.census.gov/data/2019/acs/acs5/variables.html

			B25024_001E = Estimate of total housing units B25024_001M = Margin of Error of total housing units B25024_011E = Estimate of housing units that are RVs, vans, or boats B25024_011M = Margin of Error of housing units that are RVs, vans, or boats Numerator = B25024_011E Denominator = B25024_001E Value = Numerator/Denominator Numerator SE = B25024_011M/1.645 Denominator SE = B25024_001M/1.645 If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
SAGE_ELA	UDRC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percentage of children who scored "proficient" on 3rd grade SAGE (Student Assessment of Growth and Excellence) ELA (English Language Arts)
SAGE_math	UDRC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percentage of children who scored "proficient" on 3rd grade SAGE (Student Assessment of Growth and Excellence) MATH
suicide	Utah Vital Records Database, Office of Vital Records and Statistics, Utah Department of Health & Human		URL: https://ibis.health.utah.gov/ibisph-view/query/result/mort/InjMortSareaICD10/AgeRate.html value = Age-adjusted Deaths by Suicide per 100,000 population numerator = Number of suicides denominator = Population se = SE=sqrt((100,000 X numerator)/denominator) notes: IBIS Steps: Data Portal/Injury Mortality/Advanced Selection/Utah Small

	Services, 2016-2020		Areas, Years 1999 and later/11 Age Groups Age-adjusted Rates/Step 1. Select year - 2016-2020/Step 3. Select injury intention - Suicide/Step 6. Hos to display the data - Display By: Geographic Area
supermkts	USDA Food Access research Atlas, 2015		URL: https://www.ers.usda.gov/data-products/food-access-research-atlas/download-the-data/ lapophalf = Population count beyond 1/2 mile from supermarket (numerator urban) lapop1 = Population count beyond 1 mile from supermarket (numerator ruarl) POP2010 = Population count from 2010 census (denominator) UrbanType (HDI/Census) urban(urban_area), rural (urban_cluster, rural) lapophalf_pct = 100*lapophalf/POP2010 for urban_area lapop1pct = 100*lapop1/POP2010 for urban cluster and rural se_pct = sqrt(percent*(1-percent)/denominator) percentiles only calculated for HDI eligible census tracts
svi	CDC/ADSDR_SVI		SPL_Themes = overall score RPL_Themes = percentile rank Value = SPL_Themes Percentile_st = RPL_Themes
tbi	Utah Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health &		URL: https://ibis.health.utah.gov/ibisph-view/query/result/ed/InjEDSareaHospEDICD10/AgeRate.html value = Age-adjusted rates per 10,000 (or 10000*Number of ED Encounters / Number in population) numerator = Number of ED Encounters (for TBI) denominator = Number in population se = Relative standard error (RSE) or coefficient of variation % (included in IBIS output); SE=rate*RSE unless rate is >50%. If rate is > 50%, SE=(100-rate)*RSE. notes: IBIS steps: Data Portal/Injury Emergency Department Encounter/Advanced

	Human Services, 2018-2020		Selection for Utah Small Areas/ICD10-CM Coding System/All ED Encounters/Hospital ED Encounters/Age Adjusted Rates - ED Injury Encounters/Step 1: Select Year --> 2018-2020/Step 2: Select reason for hospitalization --> ICD-10-CM injury causes = All injury causes, Select TBI indicators: Truamatic brain injury (2nd option on list)/Step 8: Select how to display data --> Display By = Utah Small Area
theil	ACS2019API/5Y	DP05	URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html DP05_0070E = Estimate of Total population DP05_0071E = Estimate of Latino population DP05_0077E = Estimate of White, Non-Hispanic population DP05_0078E = Estimate of Black, Non-Hispanic population DP05_0079E = Estimate of AIAN, Non-Hispanic population DP05_0080E = Estimate of Asian, Non-Hispanic population DP05_0081E = Estimate of NHPI, Non-Hispanic population DP05_0082E = Estimate of Other race, Non-Hispanic population DP05_0083E = Estimate of Multiple races, Non-Hispanic population Computed for counties, comparing county entropy to population-weighted (tract) average entropy (are tracts on average more (1) or less (0) diverse than county average entropy/diversity. The entropy index h for a tract i is: $h_i = -\sum_{j=1}^{k} p_{ij} \ln(p_{ij})$ Where: k =number of ethnic groups (“ethnicities”) p_{ij} =proportion of population of j^{th} ethnicity in tract i ($=n_{ij}/n_i$) n_{ij} =number of population of j^{th} ethnicity in tract i n_i =total number of population in tract i

			To compare Entropy Indices between different cities as a whole, $H = \left(\hat{H} - \overline{H}\right) / \hat{H}$ $\hat{H}$ = Entropy Index for the city as a whole ("H hat") $\overline{H}$ = the average of the individual tracts' values of h, weighted by population ("H bar") See: Benjamin Forest. Measures of Segregation and Isolation. Dartmouth College, Hanover, NH; 2005. https://www.dartmouth.edu/~segregation/IndicesofSegregation.pdf
transit	UTA / Other Transit		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percentage of population that lives within 0.25 miles of transit stops or stations with 30 min. or less headways

twoparent	ACS2019API/5Y	B09005	URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html
			
			B09005_001E = Estimate of total households
			B09005_001M = Margin of error of total households
			B09005_002E = Estimate of married couple households
			B09005_002M = Margin of error of married couple households
			B09005_003E = Estimate of cohabitating couple households
			B09005_003M = Margin of error of cohabitating couple households
			
			Numerator = B09005_002E + B09005_003E
			Denominator = B09005_001E
			Value = Numerator / Denominator
			Numerator SE = sqrt((B09005_002M/1.645)^2 + (B09005_003M/1.645)^2)
			Denominator SE = B09005_001M / 1.645
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then
			SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator
			
			If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then
			SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator

walk	UGRC		This data was de-identified and pre-processed by the Utah Department of Health & Human Services Value = Percent of population within a 10 minute walk to a local park or trailhead
walkability_index	EPA - Smart Location Database	EPA_SmartLocationDatabase_V3_Jan_2021_Final	URL: https://edg.epa.gov/EPADataCommons/public/OA/WalkabilityIndex.zip Total Population = TotPop Census block group walkability score = NatWalkInd Value = population weighted mean walkability score