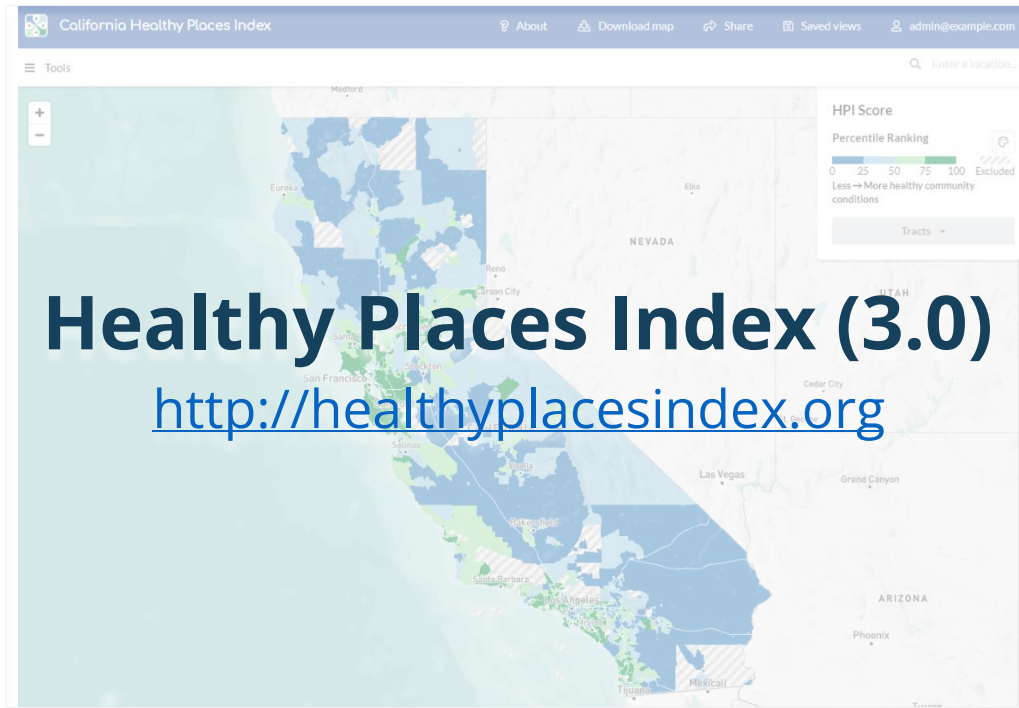




Public Health AllianceTM OF SOUTHERN CALIFORNIA



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Technical Summary

INTRODUCTION

The California Health Places Index (HPI 3.0) summarizes the healthiness of community conditions of California census tracts based on the distribution of 23 indicators of social determinants of health. Through a mapping application, the HPI links to policies that contribute to improving community conditions and health equity. Since 2018, hundreds of governmental agencies, grant applicants, health care systems, and researchers have used HPI 2.0 to prioritize more than \$1 billion in funding opportunities. HPI 2.0 reflected community conditions that were prevalent between 2011 and 2015. Our HPI 3.0 update incorporates newer data from 2015 to 2019, updated policy guides, and new features and functions to the mapping application.

METHODS

To maintain continuity, HPI 3.0 drew from the same publicly available data sources and applied the same methodology as HPI 2.0. 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, health care access. (HPI 2.0 used ACS, 2011-2015.) 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 updated and added more than 370 decision support indicators representing health outcomes, climate change exposures, and social vulnerabilities. We provided updated race/ethnicity data (2015-2019) including 22 Asian and 12 Native Hawaiian/Pacific Island subgroups, 52 Native American/Alaskan Native tribal entities and 33 race-stratified indicators (11 of which are in the HPI).

RESULTS

Compared to HPI 2.0, HPI 3.0 had 7790 eligible census tracts, a net decrease of 3, based on a 2015-2019 annual average population ≥ 1500 and group quarters percentage of $< 50\%$. Of 25 indicators in HPI 2.0, twenty-one were retained with updated data. Three indicators were retired (two parent family, alcohol availability, access to healthy foods) based on feedback from users and lack of association with

LEB. A new indicator – participation in the 2020 census – was added to the social domain. Supermarkets were added to the retail density indicator, and per capita income substituted for household income in the economic domain. Domain weights were similar between versions. Compared to HPI 2.0, HPI 3.0 had a higher correlation with LEB (r , 0.60 vs. 0.56) and greater variance-explained (R^2 , 35.5% vs 31.0%). Changes in the census tract distribution of HPI scores appeared to be mostly due to updated data rather than changes in domains weights. The proportion of agreement in the quartile (Yes/No) of census tracts with the least healthy community conditions among the 7766 census tracts in both versions was 91%. On average, lower HPI 3.0 scores occurred in census tracts in the San Joaquin Valley, Los Angeles area, and the Inland Empire, and among census tracts with the highest percentage of Black and Latino residents. While there was overlap of the most disadvantaged quartile of HPI 3.0 census tracts with the corresponding quartiles of CalEnviroscreen 4.0, the Social Vulnerability Index, and 200% of the federal poverty (sensitivity 0.64, 0.75, 0.84, respectively), populations of discordant census tracts were significant (1.5 to 3.5 million), illustrating that framing an index around social determinants of health prioritizes specific populations that other indices do not.

DISCUSSION

Updates of indicator projects must navigate the imperative of more up-to-date data with the data availability from numerous governmental organizations updating their own data at irregular intervals, technical requirements such as census tract eligibility, methodologic and data continuity, and user feedback. HPI 3.0 maintains a high degree of continuity with the previous version, and provides a platform for many new features that respond to the challenges of structural racism, climate change, and the COVID-19 pandemic. The HPI continues to be a vital community resource, whose users are helping shape its future.

Background

The purpose of this report is to provide technical information on the Healthy Places Index, HPI, (version 3.0), its 23 constituent indicators, and additional indicators that provide decision-support. The report also provides information on the features of the mapping application (<https://map.healthyplacesindex.org>) and policy guides 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.¹⁻⁹ 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 ^{10, p.125}, 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.¹¹ 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.¹⁻⁹

WHAT IS THE HEALTHY PLACES INDEX?

The Healthy Places Index is the product of the Public Health Alliance of Southern California ("Alliance") who, in 2014, convened a Steering Committee of approximately 20 public health practitioners and researchers from health departments across California (see Appendix A for the list of Steering Committee members), including the California Department of Health and the Bay Area Regional Health Inequities Initiative (BARHII). With Steering Committee guidance, the 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 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” and the fundamental resources for health are “... peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity.” 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.¹²

VERSION HISTORY AND WHAT'S NEW IN HPI?

Health Disadvantage Index (HDI, ~HPI 1.0), 2015-2016

The first version of the HPI was published by the Public Health Alliance in February 2015 as the Health Disadvantage Index.¹³ The HDI presented a composite score for each California census tract based on 28 individual indicators, organized into 8 groupings, or domains. The most recent data then available was generally from 2008 to 2012. For each census tract, each indicator was expressed on a standardized scale (Z-scores) of increasing disadvantage, and averaged for each domain. The overall score was calculated as the weighted sum of domain scores. The weights of each domain were informed by a literature review that assessed the relative impact of the domain on overall health status. With enhanced technical documentation, the HDI appeared as a Web-based mapping application in January of 2016.¹⁴

Healthy Places Index (HPI 2.0), 2017-2020

In May 2016, the Steering Committee made several recommendations to Alliance staff to guide future versions:

- Update the indicator values using the most recent available data
- Shift a few individual indicators between the education and social domains
- Exclude health outcomes as a component of the index
- Validate the index against a health outcome
- Revise the method for assigning weights
- Explore a version that optionally includes an explicit measure of race/ethnicity, and
- Harmonize the index with indicator projects at the California Department of Public Health.

In 2017, to implement the recommendations, the Alliance partnered with the Center on Society and Health of the Virginia Commonwealth University (<https://societyhealth.vcu.edu/>) to assist with index construction and help further develop a communications strategy. The result was the Healthy Places Index (HPI 2.0),¹⁵ which preserved the same conceptual roots as HDI from the social determinants of health, but communicated the overall score and indicators in a positive frame – opportunities for community health improvement – rather than as a negative and potentially stigmatizing "disadvantage". The HPI 2.0 updated many of the same domains and indicators as HDI, and included the following features:

- Updated indicator data from the 2011 to 2015 time period
- A revised Education domain consolidating all education indicators
- Health outcomes available to users as decision support layer, but omitted from the index
- Revised domain weights using statistical methods that optimize the correlation between life expectancy at birth and the HPI score for California census tracts
- A separate version of HPI that included residential, racial segregation domain.

In June 2018, we launched a new mapping application (<http://map.healthyplacesindex.org>) that:

- Visualized the HPI score and indicator profiles of user-selected census tracts
- Linked indicators and domains to actionable policies that address the social determinants of health

- Provided complementary data layers on climate threats and community resilience, health outcomes, health behaviors, and other indices of disadvantage
- Aggregated HPI scores and indicator values to user-selected geographies and jurisdictional boundaries of cities, counties, legislative districts, and other geographies.
- Created a customized report for user-selected geographies and indicators, and
- Created a custom index based on user-selected indicators.

Healthy Places Index (HPI 3.0)

An updated version of the HPI was launched in 2022 and includes:

- Updated census tract data, centering on 2015-2019, for HPI scores, core indicators, and life expectancy at birth
- Zip code tabulation areas (ZCTA) as a new geography
- Increased emphasis on race/ethnicity and race/ethnicity-stratified indicators
- Expanded set of decision support data layers including health outcomes, homelessness, disability, public school educational outcomes, and climate change and climate-health vulnerability
- "Point" data layers that represent the locations of health care facilities, schools, toxics emitters, and other sensitive sites
- Updated mapping platform with even faster response times and the ability to filter indicators by race/ethnicity
- Side-by-side maps of indicators for geographic or longitudinal comparisons
- Dynamically generated policy opportunities tailored to neighborhood conditions
- Updated policy guides with supporting evidence
- Peer-review and publication in [Public Health Reports](#).¹⁶

In response to the COVID-19 pandemic, a companion mapping application was created (<https://covid19.healthyplacesindex.org/>) to track ongoing 14-day average case rates and death rates stratified by race/ethnicity for California counties and cumulative case rates and death rates by county (starting April 2020). Drawing data from HPI indicators and decision support layers, the mapping application also displays community conditions and medical conditions that increase the risk for COVID-19 exposure, transmission, hospitalization and death.

HPI 3.0 Documentation Change Notes

March 6, 2022

Initial release.

June 9, 2022

Clarification of HPI version history, pages 2 - 3.

Added methodology for calculation of HPI quartiles, pages 13, 18, and 39.

June 23, 2022

Added developer information on the HPI 3.0 mapping application, page 64.

July 26, 2022

Updated description of features available on the HPI 3.0 mapping application, page 65.

September 20, 2022

Clarification of spatial aggregation methodology used on HPI 3.0 mapping application, page 65.

METHODS: INDEX CONSTRUCTION

An overview of index construction is presented below.

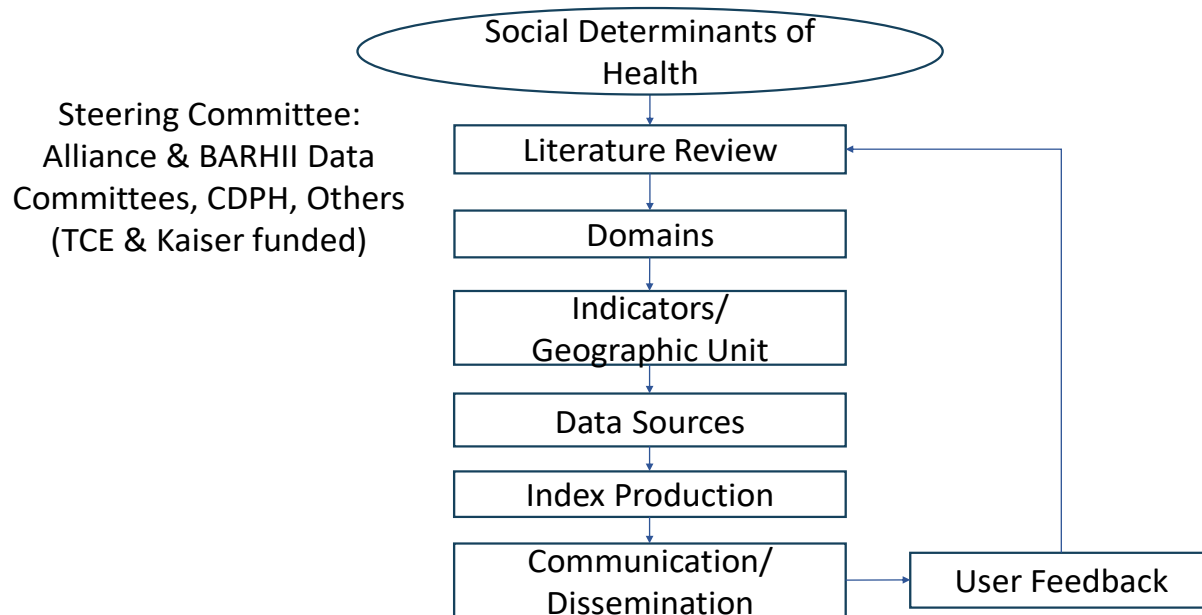


Figure 1. Overview of Index construction

DOMAINS AND INDICATORS

The grouping of indicators within domains or "policy action areas" reflect widely recognized thematic areas of the social determinants of health^{17, 18} and are consistent with those described by the Centers for Disease Control.¹⁷ Informed by the literature and our Steering Committee, we grouped potential indicators to eight thematic groups or policy action areas:

- Economics
- Education
- Healthcare access
- Housing
- Neighborhood conditions
- Clean Environment
- Social environment, and

- Transportation.

The criteria for selection of individual indicators were:

- 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 California census tracts
- Low levels of collinearity with other indicators within a domain
- Continuity with previous HPI versions, and
- Alignment with indicator projects at CDPH.

To maintain consistency across versions, the pool of candidate indicators included those in the previous version of HPI (Table 1).^{15, Table 3} Three of the candidate indicators were inconsistent with the above criteria or posed challenges to communicate policy actions:

- Feedback from users raised concerns that "Two parent families" communicated a potentially stigmatizing message regarding other family types.
- Likewise, "Off-site alcohol sales" was difficult to communicate with positive framing.
- For "access to supermarkets"¹⁹ in updated data (2014-2018), the criteria for a positive correlation with life expectancy was not met.

In response, we retired "Two parent family" from the Social domain, and "Off-site alcohol sales" and "access to supermarkets" from the Neighborhood domain. To ensure that access to healthy foods was represented in the Neighborhood domain, we modified the existing "Retail density" indicator to include supermarkets and similar food establishments. After a literature review of social capital indicators,^{20, 21} we added "Census response rate" to the Social domain as a measure of social capital or social cohesion.

We also received user feedback that "median household income" may inadequately describe the economic hardships of multigenerational households with few income earners. In response, we now use "per capita income".

Thus, there were 23 indicators in HPI 3.0. As in previous versions of the HPI, data at the census tract were not publicly available for several desirable indicators

Table 1. Policy Action Areas (Domains), Indicators and their Data Sources for the Healthy Places Index 3.0 and 2.0

| Policy Action/Indicator | Data Source[†], Year | |
|--|--------------------------------------|-------------------|
| | HPI 3.0 | HPI 2.0 |
| Economic | | |
| Percent of the population with an income exceeding 200% of federal poverty level | ACS, 2015-2019 | ACS, 2011-2015 |
| Percentage of population aged 25-64 who are employed | ACS, 2015-2019 | ACS, 2011-2015 |
| Median Household Income | ACS, 2015-2019 | ACS, 2011-2015 |
| Per capita income | ACS, 2015-2019 | |
| Education | | |
| Percentage of population over age 25 with a bachelor's education or higher | ACS, 2015-2019 | ACS, 2011-2015 |
| Percentage of 15-17 year olds enrolled in school | ACS 2015-2019 | ACS, 2011-2015 |
| Percentage of 3 and 4 year olds enrolled in pre-school | ACS, 2015-2019 | ACS, 2011-2015 |
| Social | | |
| Percentage of registered voters voting in the 2020 general election | UC Berkeley, 2020 | UC Berkeley, 2012 |
| Percentage of family households with children under 18 with two parents | | ACS, 2011-2015 |
| Percent of the population responding to the 2020 census (short form) | Census, 2020 | |
| Transportation | | |
| Percentage of households with access to an automobile | ACS, 2015-2019 | ACS, 2011-2015 |
| Percentage of workers (16 years and older) commuting by walking, cycling, or transit (excluding working from home) | ACS, 2015-2019 | ACS, 2011-2015 |
| Healthcare Access | | |
| Percentage of adults aged 18 to 64 years currently insured | ACS, 2015-2019 | ACS, 2011-2015 |
| Neighborhood | | |
| Percentage of the population living within ½ -mile of a park, beach, or open space greater than 1 acre | GreenInfo, 2012 | GreenInfo, 2012 |
| Population-weighted percentage of the census tract area with tree canopy | NLCD, 2011 | NLCD, 2011 |

| | | |
|---|-------------------------|-------------------|
| Percentage of the population residing within ¼ mile of an off-site sales alcohol outlet | | ABC, 2014 |
| Percentage of the urban and small town population residing less than 1/2 mile from a supermarket/large grocery store, and the percent of the rural population living less than 1 miles from a supermarket/large grocery store | | USDA, 2015 |
| Combined employment density for retail, entertainment, supermarkets , and educational uses (jobs/acre) | LODES, 2014-2018 | USEPA, 2006-2010 |
| Housing | | |
| Percentage of occupied housing units occupied by property owners | ACS, 2015-2019 | ACS, 2011-2015 |
| Percent of households with complete kitchen facilities and plumbing | CHAS, 2014-2018 | CHAS, 2010-2014 |
| Percentage of low income homeowners paying more than 50% of income on housing | CHAS, 2014-2018 | CHAS, 2010-2014 |
| Percentage of low income renter households paying more than 50% of income on housing | CHAS, 2013-2017 | CHAS, 2010-2014 |
| Percentage of households with less or equal to 1 occupant per room | ACS, 2015-2019 | ACS, 2011-2015 |
| Clean Environment | | |
| Annual average spatial distribution of gridded diesel PM emissions from on-road and non-road sources 2016 (tons/year). | CalEPA, 2016 | CalEPA, 2012 |
| CalEnviroScreen 4.0 drinking water contaminant index for selected contaminants | CalEPA, 2011-2019 | CalEPA, 2005-2013 |
| 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 | CalEPA, 2011-2013 |
| Annual mean concentration of PM2.5 (µg/m ³) over three years (2015 to 2017). | CalEPA, 2015-2017 | CalEPA, 2012-2014 |

Note: Indicators in **bold** were added in HPI 3.0; Indicators in ~~strikethrough~~ were retired in HPI 3.0

[†] ABC, Alcoholic Beverage Commission ²²; ACS, American Community Survey ²³; CHAS, Comprehensive Housing Assessment System ²⁴; CalEPA; California Environmental Protection Agency ²⁵; GreenInfo, (CaLANDS) ²⁶ NLCD, National Land Cover Database²⁷; USDA FARA, U.S. Department of Agriculture Food Access Research Atlas¹⁹; USEPA, U.S. Environmental Protection Agency ²⁸; LODES, LEHD Origin-Destination Employment Statistics (LODES)²⁹; UC Berkeley, University of California, Berkeley ³⁰

including crime, school quality and performance, and health care quality. We do provide county level data for crime, law enforcement, and public school educational outcomes in the decision support layers.

Geographic Inclusion and Exclusion Criteria

HPI 3.0 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. Until the major data providers such as the American Community Survey release data using the newer 2020 census boundary files, we will continue to use 2010 census tract boundaries.

Census tracts were included in the index if they had a population of 1500 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, 2015-2019.²³ 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

As in previous versions of the HPI, 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). Updated estimates of life expectancy for California census tracts, 2010-2015, were available from the USALEEP project of the Centers for Disease Control and Prevention.³¹ A small number of HPI-eligible census tracts also had missing LEB. To determine whether *knn* or geographic near neighbors was an appropriate method of imputation, we used the Average Nearest Neighbor Index in ArcGIS 10.8 (ESRI, Redlands, CA) to assess whether the distribution tracts with missing LEB were randomly distributed or clustered. We found no clear pattern of randomness in the 10 counties where most (77%) missing data occurred, which favors geographic near neighbors as the most appropriate imputation method. We used the ArcGIS 10.8

Toolbox 'Near Table' to generate up to 10 geographic neighboring census tracts for computing an average LEB assigned to tract with missing LEB.

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, 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 criteria 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.³² 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 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, include 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, Percentile Rankings and Quartiles

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.

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

The census tract percentile of individual indicators, domain \bar{Z} scores, and the overall HPI score was based on their rank order among 7790 census tracts. Ties were assigned the arithmetic average of their ranks. Zero percentile was the least healthy community conditions, and 100 percentile was 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

In HPI 2.0, we examined sensitivity of the domain weights to different estimation methods and rural vs urban census tracts.¹⁵ The domain weights varied little with or with imputing missing data. We observed that algorithms that maximized the

association with LEB led to some domains having less than a 5% weight. For the update, we used methods of the preferred WQS approach of constraining the model so the each domain had at least a 5% weight.

The consistency of 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, populations density, land use, and distance to and continuity with adjacent population centers.³³ 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 and the HPI Update

As a complement to the standard HPI, we previously created a version with a ninth domain that used the Index of Dissimilarity of Black resident as an indicator of racial residential segregation.¹⁵ This indicator aggregates race-specific population counts from 2020 Census blocks to census tracts. We were not able to update this indicator because block-level data from the 2020 Census was not available.

Since developing the race/ethnicity version of HPI, we received feedback from users regarding methodological limitations of the Index of Dissimilarity, and, more broadly, concern with indicators that focused on a single race/ethnicity rather than multiple race/ethnicities.³⁴ We also received feedback that the positive association between the HPI score and the percentage of 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. We reached out to several national experts on race/ethnicity, including sociologists and social epidemiologists, who concurred that additional strategies would help elucidate the complexities of race and place. The adverse impact of COVID-19 on American Indian/Alaskan Native, Latinx, Black, Asian and Native Hawaiian/Pacific Islander communities also highlighted the need to disaggregate race/ethnicity at the finest geographic level possible.

In response, we made several significant additions to the HPI:

- Stratification of 11 HPI indicators by race/ethnicity (Table 2) using census categories: Latinx (Hispanic) and non-Latinx (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 poverty, income, college educational attainment in adults, health insurance, housing cost burden, uncrowded housing, and availability of a vehicle.

- Race/ethnicity stratification of indicators in the decision support layers, including infant death rates at the county geography (Table 2).
- New county layers in decision support describing historical red lining, the representation of different race/ethnicities among elected officials.³⁶
- New indicators in the decision support layers describing multi-racial/ethnic diversity (Diversity Index, Theil H Index).
- New 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 has added a new feature that allows users to filter an indicator's census tracts by a user selected threshold for one or more racial/ethnicity (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 a single race alone and in combination with other races.

Decision-Support Indicators and Domains

Our Steering Committee and many users recognized the utility of including retired HPI indicators, 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 include:

- Health outcomes from the CDC/Robert Wood Johnson PLACES Project³⁷
- Climate threats
- Demographic and built environment indicators of climate change vulnerability or resilience developed by CDPH, and

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

| Typology/Indicator | Geolevel | Race/Ethnicity Categories |
|---------------------------------|---------------|---|
| Non-Mutually Excl. 9 Categories | | |
| HPI: | | |
| abovepoverty | county, place | All American Indian and Alaska Native alone Asian alone Black or African American alone Hispanic or Latino Native Hawaiian & Other Pacific Islander alone Some other race alone Two or more races White alone, not Hispanic or Latino |
| bachelorsed | county, place | |
| commute | county, place | |
| employed | county, place | |
| homeownership | county, place | |
| income | county, place | |
| inhighschool | county, place | |
| inpreschool | county, place | |
| insured | county, place | |
| percapitaincome | county, place | |
| uncrowded | county, place | |
| Decision Support: | | |
| foreignborn_citizen | county, place | |
| foreignborn_notcitizen | county, place | |
| broadband | county, place | |
| computer | county, place | |
| Mutually Exclusive 9 Categories | | |
| census_participation | county, place | Total |
| | | Latino |
| Infant_mortality | county | Non-Hispanic Black |
| | | Non-Hispanic American Indian and Alaska Native |
| | | Non-Hispanic Asian |
| | | Non-Hispanic Native Hawaiian/Pacific Islander |
| | | Non-Hispanic Two or More Races |
| | | Non-Hispanic White |
| Non-Hispanic Other | | |
| Mutually Exclusive 8 Categories | | |
| chronic_absenteeism | county | Total |
| denied_mortgages | county, place | Latino |
| hs_grad | county | Non-Hispanic Black |
| low_birthweight | county | Non-Hispanic American Indian and Alaska Native |
| perception_of_safety | county | Non-Hispanic Asian |
| police_race | county, place | Non-Hispanic Native Hawaiian/Pacific Islander |
| staff_diversity | county | Non-Hispanic Two or More Races |
| student_homelessness | county | Non-Hispanic White |
| suspension | county | |

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

| Typology/Indicator | Geolevel | Race/Ethnicity Categories |
|---|----------|--|
| Mutually Exclusive 7 Categories | | Total |
| gr3_ela_scores | county | Latino |
| | | Non-Hispanic Black |
| gr3_math_scores | county | Non-Hispanic American Indian and Alaska Native |
| | | Non-Hispanic Asian |
| | | Non-Hispanic Two or More Races |
| | | Non-Hispanic White |
| Mutually Exclusive 6 Categories (NHPI, Multiple race, Other not included) | | Total |
| asthma | county | Latino |
| | | Non-Hispanic Black |
| life_expectancy | county | Non-Hispanic American Indian and Alaska Native |
| | | Non-Hispanic Asian |
| | | Non-Hispanic White |
| | | |
| Mutually Exclusive 6 Categories (NHPI, Multiple race, Other not included) | | Total |
| usual_source_of_care | county | Latino |
| | | Non-Hispanic Black |
| | | Non-Hispanic Asian |
| | | Non-Hispanic Two or More Races |
| | | Non-Hispanic White |
| Mutually Exclusive 5 Categories (AIAN, NHPI, Multiple race, Other not included) | | Total |
| got_help | county | Latino |
| | | Non-Hispanic Black |
| | | Non-Hispanic Asian |
| | | Non-Hispanic White |

- Candidate indicators for the HPI that did not meet all the inclusion criteria.
- All HPI and decision support indicators from HPI 2.0.

For indicators that are consistent across time periods, it is also possible to display the same indicator from 2011-2015 and 2015-2019, providing a longitudinal portrait of census tracts.

DESCRIPTIVE AND CONCORDANCE ANALYSES

We described the census tract distribution of HPI scores, and quartiles of census tract HPI scores by California regions and race/ethnicity. Quartiles were distributed as follows: quartile 1 [0th percentile, 25th percentile], quartile 2 (25th percentile, 50th percentile], quartile 3 (50th percentile, 75th percentile], and quartile 4 (75th percentile, 100th percentile]. To stratify census tracts by race/ethnicity, we classify census tracts by the quartile of the highest percentage of a specific race/ethnicity. The quartile with the highest percentage had a majority for Asian, Latino and White residents.

HPI 3.0 vs HPI 2.0

To assess the continuity between the updated and previous version of HPI, we compared the concordance between census tracts in their most disadvantaged quartile quartiles. We computed the following agreement statistics for dichotomous variables in 2 by 2 contingency tables:

| HPI 3.0 | Alternative Index | |
|--|-----------------------------|------------------------------|
| | Most Dis- Advantaged 25% | Least Dis- Advantaged 75% |
| Least Healthy Community Conditions, 25% | a | b |
| Most Healthy Community Conditions, 75% | c | d |

where Sensitivity = $\frac{a}{a+c}$

Specificity = $\frac{d}{b+d}$

$$\text{Positive predictive value} = \frac{a}{a+b}$$

$$\text{Proportion of agreement} = \frac{a+d}{a+b+c+d}$$

To assess the independent impacts of updated data and domain weights, we carried out concordance analyses in which HPI scores were recomputed using updated data and previous domain weights. We then carried out a concordance analysis between the updated version (with both updated data and domain weights) and the previous version.

Other Indices of Disadvantage

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

- CalEnviroScreen 4.0³⁸, developed in 2014 by the California Environmental Protection Agency
- The federal poverty level, a long-standing component of many indices of disadvantage
- 80% of the median household income, and
- Social Vulnerability Index (SVI).³⁹

For HPI, CES, SVI, and poverty we dichotomized the percentile distribution of the total score at 25% (i.e. 25% most disadvantaged census tracts). The 25% percentile cut point was chosen because California EPA designated the 25% highest scoring census tracts in CES as disadvantaged communities. We chose cut points above and below 80% of the 2015-2019 California annual median household income (\$61,818 × 0.8 = \$49,454).

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, 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 | CES 4.0 ³⁸ | Social Vulnerability Index ³⁹ , ⁴⁰ ENREF_9_2 | Poverty/ 80% Median Income |
|-------------------------------|--|---|--|
| Purpose | Identify pollution- burdened census tracts for enforcement, training, and public outreach | Help public health officials and emergency response planners identify communities needing support before, during, and after a hazardous event | Identify economically disadvantaged communities |
| Conceptual basis | Disadvantage is determined by exposure to air, soil, and water pollution and its interaction with biological, social, and health characteristics of population subgroups | 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 |
| Number of Indicators | 21 | 15 | Poverty, 200% of federal poverty level; 80% of median household income |
| Domains | Pollution Burden and Population Burden | Socio-economic, Household Composition & Disability, Minority Status & Language, Housing Type & Transportation | NA |
| Standardization of indicators | Quintile distribution score (1-5) | Percentile | NA |
| Weighting | Equal | Equal | N/A |
| Final Score | Multiply domain scores, rescale | Sum percentile of each indicator, rescale 0-100 | |

CalEnviroScreen 4.0

CalEnviroScreen (October 2021 update²⁵) was developed by the California Environmental Protection Agency, which states "CalEnviroScreen is primarily designed to assist the Agency in carrying out its environmental justice mission to conduct its activities in a manner that ensures the fair treatment of all Californians, including minority and low-income populations." Its original purpose was to guide its internal enforcement, education, and training efforts. With the passage of SB535, its use broadened to include designating disadvantaged communities for enhanced funding in California climate change and transportation programs.

CES organizes indicators into two broad domains representing pollution burden and population characteristics, which include sensitive populations and socioeconomic factors. The final score represents the multiplicative interaction of the pollution burden and population characteristics. This follows observations in the epidemiologic and toxicological literature in which population characteristics amplify health effects of specific environmental pollutants. Seven of the 21 indicators in CES are also used in the HPI (unemployment, poverty, low educational attainment, PM2.5, ozone, diesel particulate matter, drinking water contaminants).

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.⁴¹ The Women, Infant, and Children Program⁴² administered by the California Department of Public Health is an example of a state governmental program that uses the federal poverty level (185% of FPL) to establish program eligibility. For HPI and CES, poverty was defined at 200% of the federal poverty level.

Median Household Income

Percent of median household income for a given geographic area is used by several governmental agencies to define low income households that are eligible for

benefits programs such as housing assistance,^{43, 44} or a disadvantaged community (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)³⁶ 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 the comparison with HPI, we downloaded the California version (2014-2018) and created an overall score based on California 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 8057 California census tracts, 7,790 met our eligibility criteria based on population size ($\geq 1,500$; ACS 2015-2019) and living in group quarters ($<50\%$). Of the 268 excluded census tracts, 63 met both exclusion criteria, 136 were excluded because of insufficient population alone, and 68 were excluded for group quarters alone. Table 4 lists the census tracts that were retired from HPI 2.0 and those newly eligible in HPI 3.0. The geographic distribution of new and retired tracts is shown in Figure 2. There was no distinct geographic shift in the distribution of eligible tracts (e.g., newly eligible tracts were not more urban than retired tracts.)

HPI INDICATORS, DOMAINS, AND WEIGHTS

The final set of 23 indicators of HPI 3.0 are presented in Table 5 with their association with LEB. The assessment of multicollinearity within domains did not show any VIF values above 4 and no indicators were excluded within domains due to concerns with multi-collinearity. Applying the WQS package in R to HPI indicators, weights were obtained for the eight domains (Table 6, Figure 3). The correlation between LEB and the HPI score was strong ($r = 0.60$) and a large proportion of the variation was explained ($R^2 = 0.36$) in simple linear regression.

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 compared to urban clusters in rural areas and rural census tracts: 0.60 ($N=7049$ urban census tracts), 0.46 ($N=371$ urban clusters in rural areas), and 0.47 ($N= 369$ rural census tracts).

Table 4. Retired Census Tracts from HPI 2.0 and Newly Eligible Census tracts in HPI 3.0

| Retired (HPI 2.0) | | Newly Eligible (HPI 3.0) | |
|-------------------|--------------|--------------------------|--------------|
| County | Census Tract | County | Census Tract |
| Calaveras | 6009000503 | Alameda | 6001450102 |
| Kern | 6029006004 | Fresno | 6019005605 |
| Lassen | 6035040100 | Kern | 6029001600 |
| Los Angeles | 6037265410 | Kern | 6029003303 |
| Los Angeles | 6037277400 | Kern | 6029003304 |
| Los Angeles | 6037550400 | Los Angeles | 6037137000 |
| Los Angeles | 6037554103 | Los Angeles | 6037461700 |
| Los Angeles | 6037930401 | Los Angeles | 6037502802 |
| Mariposa | 6043000400 | Los Angeles | 6037573401 |
| Merced | 6047002401 | Los Angeles | 6037920303 |
| Placer | 6061020106 | Monterey | 6053010306 |
| Placer | 6061022014 | Orange | 6059042106 |
| Plumas | 6063000201 | Orange | 6059052404 |
| Riverside | 6065044404 | Riverside | 6065044807 |
| Riverside | 6065044405 | Riverside | 6065045122 |
| Riverside | 6065044520 | Sacramento | 6067000800 |
| Sacramento | 6067005201 | Sacramento | 6067005301 |
| San Bernardino | 6071011002 | Sacramento | 6067009110 |
| San Bernardino | 6071011203 | San Bernardino | 6071002207 |
| San Bernardino | 6071025100 | San Bernardino | 6071011204 |
| San Bernardino | 6071940100 | San Diego | 6073010501 |
| San Diego | 6073009106 | San Francisco | 6075011800 |
| San Diego | 6073013415 | San Luis Obispo | 6079010603 |
| Santa Clara | 6085513000 | Shasta | 6089012500 |
| Santa Cruz | 6087123300 | | |
| Sutter | 6101050900 | | |
| Ventura | 6111005700 | | |
| | | | |

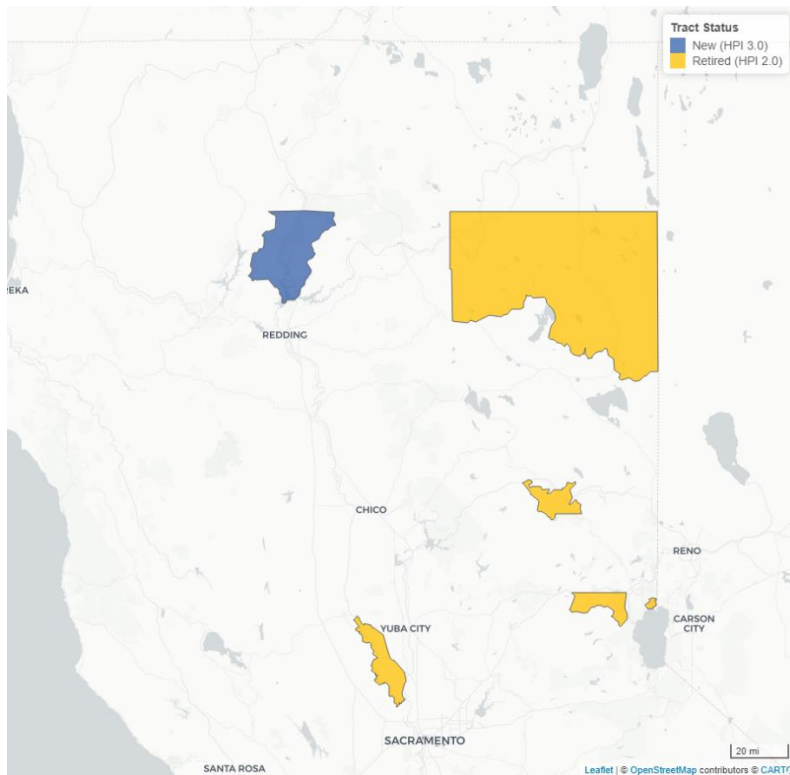
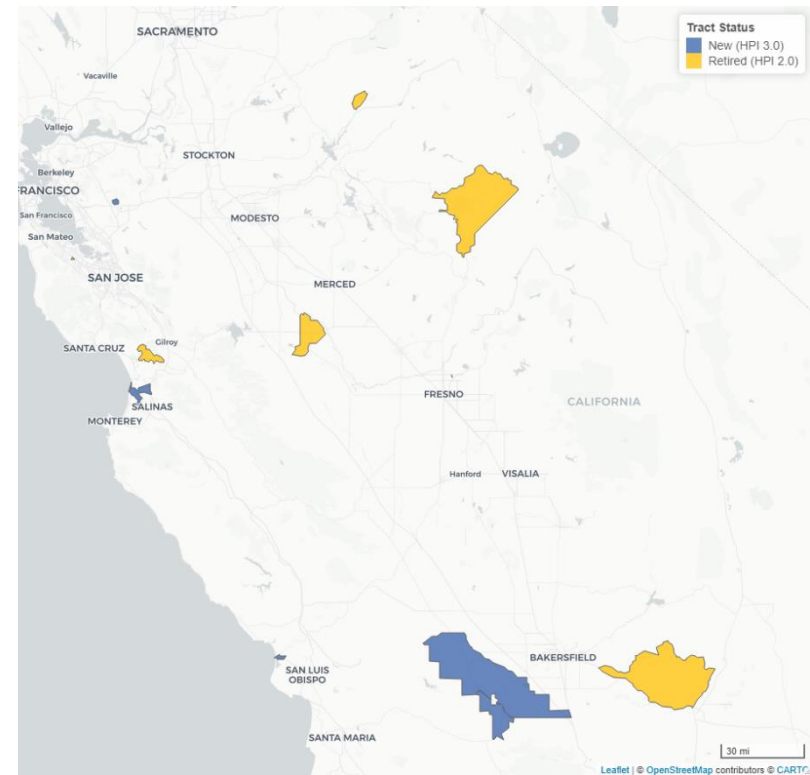
A. Northern California**B. Mid-California**

Figure 2. Distribution of Retired Census Tracts (HPI 2.0) and New Census Tracts (HPI 3.0)

C. Southern California

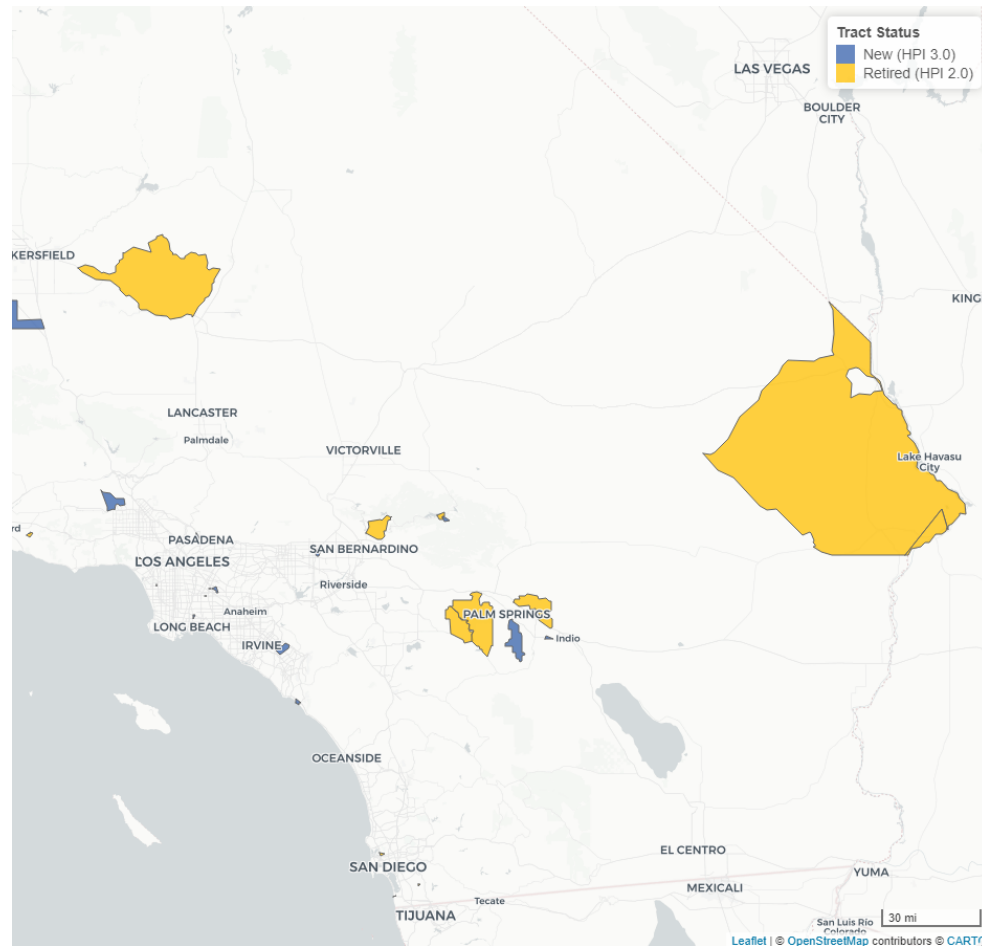


Figure 2. Distribution of Retired Census Tracts (HPI 2.0) and New Census Tracts (HPI 3.0)

Table 5. Policy Action Areas (Domains), Indicators and their Data Sources for the Healthy Places Index 3.0

| Policy Action/ Indicator | Definition | Correlation with LEB | Data Source[†], Year |
|-------------------------------------|--|---------------------------------|--|
| Economic | | | |
| abovepoverty | Percent of the population with an income exceeding 200% of federal poverty level | 0.58 | ACS, 2015-2019 |
| employed | Percentage of population aged 25-64 who are employed | 0.40 | ACS, 2015-2019 |
| percapitaincome | Per capita income | 0.53 | ACS, 2015-2019 |
| Education | | | |
| bachelorsed | Percentage of population over age 25 with a bachelor's education or higher | 0.57 | ACS, 2015-2019 |
| inhighschool | Percentage of 15-17 year olds enrolled in school | 0.08 | ACS, 2015-2019 |
| inpreschool | Percentage of 3 and 4 year olds enrolled in pre-school | 0.29 | ACS, 2015-2019 |
| Social | | | |
| voting | Percentage of registered voters voting in the 2020 general election | 0.52 | UC Berkeley, 2020 |
| censusresponse | Percentage of 2020 decennial households who completed census forms online, by mail, or by phone | 0.37 | Decennial Census 2020 |
| Transportation | | | |
| automobile | Percentage of households with access to an automobile | 0.25 | ACS, 2015-2019 |
| commute | Percentage of workers (16 years and older) commuting by walking, cycling, or transit (excluding working from home) | 0.02 | ACS, 2015-2019 |
| Healthcare Access | | | |
| insured | Percentage of adults aged 18 to 64 years currently insured | 0.37 | ACS, 2015-2019 |

Table 5. Policy Action Areas (Domains), Indicators and their Data Sources for the Healthy Places Index 3.0

| Neighborhood | | | |
|--------------------------|--|-------|-------------------|
| parkaccess | Percentage of the population living within ½ -mile of a park, beach, or open space greater than 1 acre | 0.08 | GreenInfo, 2012 |
| treecanopy | Population-weighted percentage of the census tract area with tree canopy | 0.13 | NLCD, 2011 |
| retail | Combined employment density for retail, entertainment, and educational uses (jobs/acre) | 0.02 | USEPA, 2010 |
| Housing | | | |
| homeownership | Percentage of occupied housing units occupied by property owners | 0.33 | ACS, 2015-2019 |
| houstorepair | Percent of households with complete kitchen facilities and plumbing | 0.09 | ACS, 2015-2019 |
| ownsevere | Percentage of low income homeowners paying more than 50% of income on housing costs | -0.13 | CHAS, 2010-2014 |
| rentsevere | Percentage of low income renter households paying more than 50% of income on housing costs | -0.26 | CHAS, 2010-2014 |
| uncrowded | Percentage of households with less or equal to 1 occupant per room | 0.29 | ACS, 2015-2019 |
| Clean Environment | | | |
| dieselpm | Spatial distribution of gridded diesel PM emissions from on-road and non-road sources for a 2016 summer day in July (kg/day) Census tracts were ordered by diesel PM concentration values and assigned a percentile based on the statewide distribution of values. | -0.08 | CalEPA, 2016 |
| h20contam | Cal EnviroScreen 4.0 drinking water contaminant index for selected contaminants | -0.06 | 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). Census tracts were ordered by ozone concentration values and assigned a percentile based on the statewide distribution of values. | -0.21 | CalEPA, 2017-2019 |
| pm25 | Annual mean concentration of PM2.5 (average of quarterly means, µg/m³), over three years (2015 to 2017) Census tracts were ordered by | -0.09 | CalEPA, 2015-2017 |

| | | | |
|--|---|--|--|
| | PM2.5 concentration values and assigned a percentile based on the statewide distribution of values. | | |
|--|---|--|--|

[†] ACS, American Community Survey ²³; CHAS, Comprehensive Housing Assessment System ²⁴; CalEPA; California Environmental Protection Agency ²⁵; GreenInfo, (CaLANDS) ²⁶ NLCD, National Land Cover Database²⁷; USEPA, U.S. Environmental Protection Agency ²⁸; LODES, LEHD Origin-Destination Employment Statistics (LODES)²⁹; UC Berkeley, University of California, Berkeley³⁰

| <u>Economic</u> 35% | <u>Education</u> 18% | <u>Transportation</u> 13% | <u>Social</u> 13% | <u>Housing</u> 5.3% | <u>Healthcare Access</u> 5.3% | <u>Clean Environment</u> 5.2% | <u>Neighborhood</u> 5.2% |
|--|--|---|--|---|--|--|--|
| <ul style="list-style-type: none"> • Employed • Per Capita Income • Above Poverty | <ul style="list-style-type: none"> • In Pre- School • In High School • Bachelor's Education or Higher | <ul style="list-style-type: none"> • Automobile Access • Active Commuting | <ul style="list-style-type: none"> • Census Response Rate • Voting in 2020 | <ul style="list-style-type: none"> • Low-Income Renter Severe Housing Cost Burden • Low-Income Homeowner Severe Housing Cost Burden • Housing Habitability • Uncrowded Housing • Homeownership | <ul style="list-style-type: none"> • Insured Adults | <ul style="list-style-type: none"> • Ozone • PM 2.5 • Diesel PM • Water Contaminants | <ul style="list-style-type: none"> • Retail Density • Park Access • Tree Canopy |

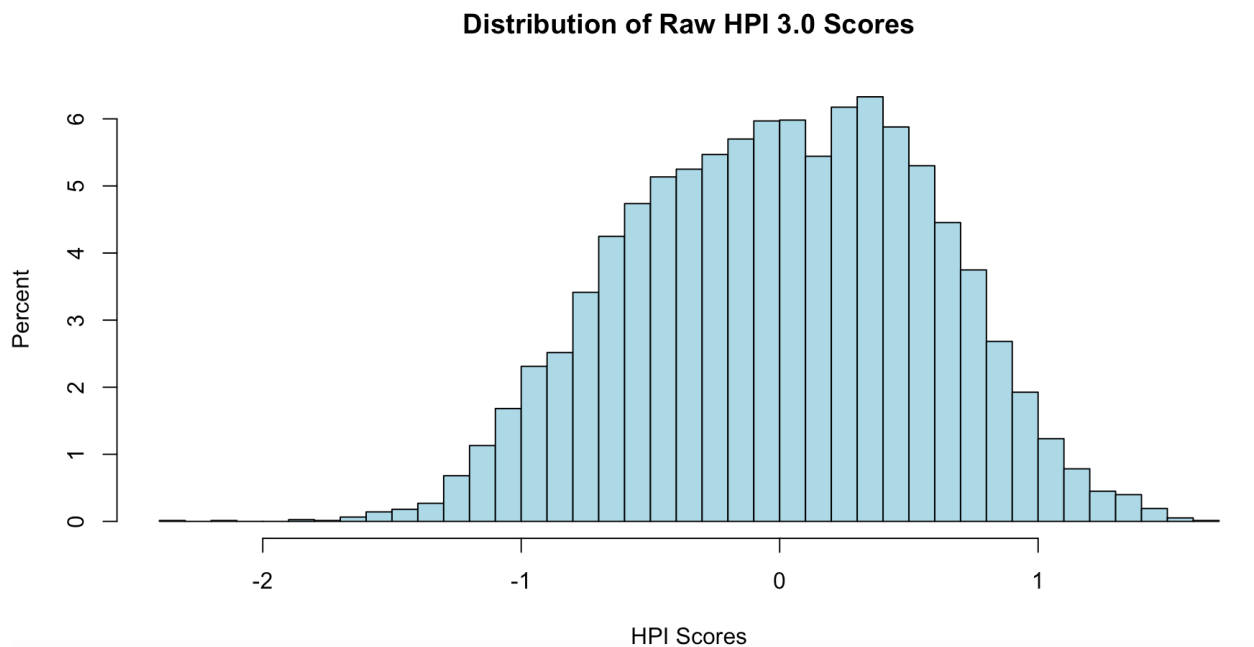
Figure 3. Health Places Index Policy Action Areas (Domains), Weights, and Individual Indicators

Table 6. Weighted Quantile Sums Domain Weights

| Domain | Weight |
|-------------------|--------|
| Economic | 0.35 |
| Education | 0.18 |
| Social | 0.13 |
| Transportation | 0.13 |
| Housing | 0.053 |
| Insurance | 0.053 |
| Clean Environment | 0.052 |
| Neighborhood | 0.052 |

DESCRIPTIVE ANALYSES

This frequency distribution of census tracts by HPI score is presented in Figure 4. The distribution ranges from -2.4 to 1.7 with a mean centered at 0, and approximates a normal curve.

**Figure 4. Distribution of HPI scores for 7,790 California census tracts**

Most indicator domains were positively correlated with each other. Figure 5 illustrates Pearson correlations among the HPI score and component unweighted

indicator domain scores. Domain scores for economic, education, social and healthcare domains tended to have high correlations with each other.

| Domain | Economic | Education | Social | Trans. | Health-care | Neighborhood | Housing | Clean Env. |
|--------------------------|----------|-----------|--------|--------|-------------|--------------|---------|------------|
| Economic | 1 | | | | | | | |
| Education | 0.63 | 1 | | | | | | |
| Social | 0.73 | 0.48 | 1 | | | | | |
| Transportation | 0.44 | 0.35 | 0.35 | 1 | | | | |
| Healthcare | 0.61 | 0.46 | 0.66 | 0.28 | 1 | | | |
| Neighborhood | 0.29 | 0.28 | 0.17 | 0.13 | 0.21 | 1 | | |
| Housing | 0.55 | 0.33 | 0.67 | 0.32 | 0.62 | 0.02 | 1 | |
| Clean Environment | 0.33 | 0.23 | 0.39 | 0.3 | 0.31 | 0.28 | 0.29 | 1 |

Figure 5. Pearson Correlations Among HPI Domains, California, 2010

Geographic Distribution of HPI and Domain Scores

Table 7 gives the distribution of census tracts by quartile of HPI score by California region. The San Joaquin Valley and Inland Empire have a disproportionate share of census tracts in the quartile with the least healthy community conditions and lower mean HPI scores. The Bay Area has the smallest share of such census tracts. Population counts show a similar pattern (Table 8). All California counties except Alpine had an HPI-eligible census tract. Twelve counties, mostly in the northern and central Sierras and the Bay Area, did not have any census tracts in the quartile with the least healthy community conditions (Alpine, Colusa, El Dorado, Inyo, Mono, Napa, Nevada, Plumas, San Benito, Sierra, Sonoma, Tuolumne). However, rural areas had a higher proportion of the census tracts in the least healthy quartile (31.7%; 117/369) than urban areas (24.7%, 1830/7420).

Table 7. Distribution of Disadvantaged Census Tracts by Region, California, 2019

| Region | Quartile of HPI Score | | | | Sum | Percent Least Healthy (Least/Sum) |
|--------------------|---|------|------|--|------|-----------------------------------|
| | Least Healthy Community Conditions 1 | 2 | 3 | Most Healthy Community Conditions 4 | | |
| Bay Area | 69 | 199 | 384 | 896 | 1548 | 4% |
| Inland Valley | 317 | 282 | 175 | 24 | 798 | 40% |
| Los Angeles Area | 846 | 737 | 664 | 589 | 2836 | 30% |
| Sacramento Area | 71 | 136 | 183 | 110 | 500 | 14% |
| San Diego | 117 | 160 | 188 | 176 | 641 | 18% |
| San Joaquin Valley | 384 | 214 | 123 | 17 | 738 | 52% |
| Other | 143 | 220 | 230 | 136 | 729 | 20% |
| Sum | 1947 | 1948 | 1947 | 1948 | 7790 | 25% |

† Regions by County:

Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma

San Joaquin Valley: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare

Inland Valley: Riverside, San Bernardino

Sacramento Area: El Dorado, Placer, Sacramento, Sutter, Yolo, Yuba

Los Angeles Area: Los Angeles County, Orange County

San Diego: Imperial, San Diego

Other: Butte, Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, Tuolumne, Monterey, San Benito, Santa Cruz, Del Norte, Humboldt, Lake, Mendocino, Trinity, Lassen, Modoc, Nevada, Plumas, Sierra, Siskiyou, Colusa, Glenn, Tehama, San Luis Obispo, Santa Barbara, Shasta, Ventura

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

| Region | Quartile of HPI Score | | | | Sum | Percent Least Healthy |
|-----------------------|---|-----------|------------|--|------------|--------------------------|
| | Least Healthy Community Conditions 1 | 2 | 3 | Most Healthy Community Conditions 4 | | |
| Bay Area | 317,090 | 1,008,659 | 1,959,180 | 4,364,259 | 7,649,188 | 4% |
| Inland Valley | 1,697,675 | 1,562,796 | 1,111,713 | 122,658 | 4,494,842 | 38% |
| Los Angeles Area | 3,748,347 | 3,533,888 | 3,094,188 | 2,755,163 | 13,131,586 | 29% |
| Sacramento Area | 364,758 | 627,473 | 924,141 | 538,635 | 2,455,007 | 15% |
| San Diego | 635,500 | 860,581 | 1,033,748 | 921,926 | 3,451,755 | 18% |
| San Joaquin Valley | 2,002,118 | 1,267,542 | 772,654 | 88,741 | 4,131,055 | 48% |
| Other | 647,899 | 1,053,589 | 1,164,487 | 613,638 | 3,479,613 | 19% |
| Sum | 9,413,387 | 9,914,528 | 10,060,111 | 9,405,020 | 38,793,046 | 24% |

† Regions by County:

Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma

San Joaquin Valley: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare

Inland Valley: Riverside, San Bernardino

Sacramento Area: El Dorado, Placer, Sacramento, Sutter, Yolo, Yuba

Los Angeles Area: Los Angeles County, Orange County

San Diego: Imperial, San Diego

Other: Butte, Alpine, Amador, Calaveras, Inyo, Mariposa, Mono, Tuolumne, Monterey, San Benito, Santa Cruz, Del Norte, Humboldt, Lake, Mendocino, Trinity, Lassen, Modoc, Nevada, Plumas, Sierra, Siskiyou, Colusa, Glenn, Tehama, San Luis Obispo, Santa Barbara, Shasta, Ventura

American Indian Areas Coverage

There are 196 census tracts in California that partially overlap with American Indian Areas. Of those 196 tracts, 182 (93%) met our HPI eligibility criteria and 14 (7%) were excluded due to insufficient population and/or percentage of population living in group quarters. Most American Indian Areas in California that overlap with an excluded census tract also overlap with one or more adjacent eligible tracts. Of the 110 distinct American Indian Areas, 105 (95%) 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 6.

A. Northern California

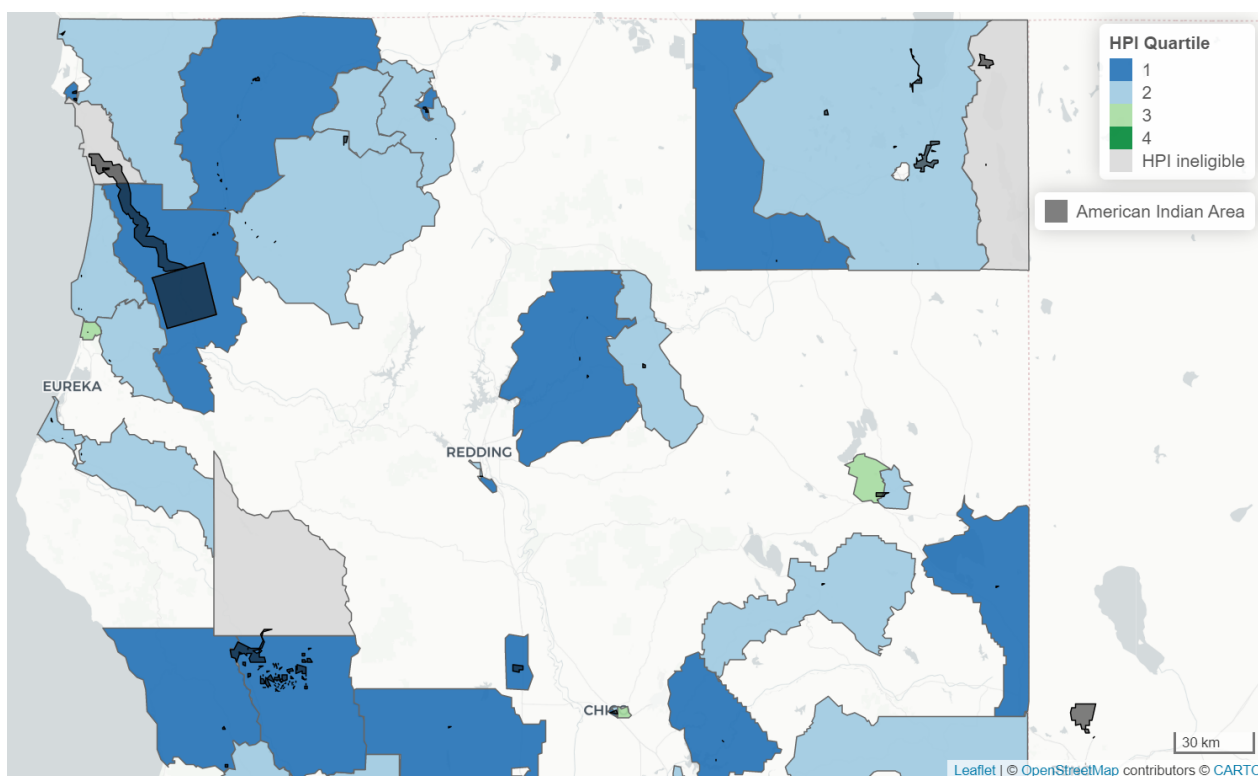


Figure 6. Distribution of American Indian Areas and HPI 3.0 Eligible Census Tracts

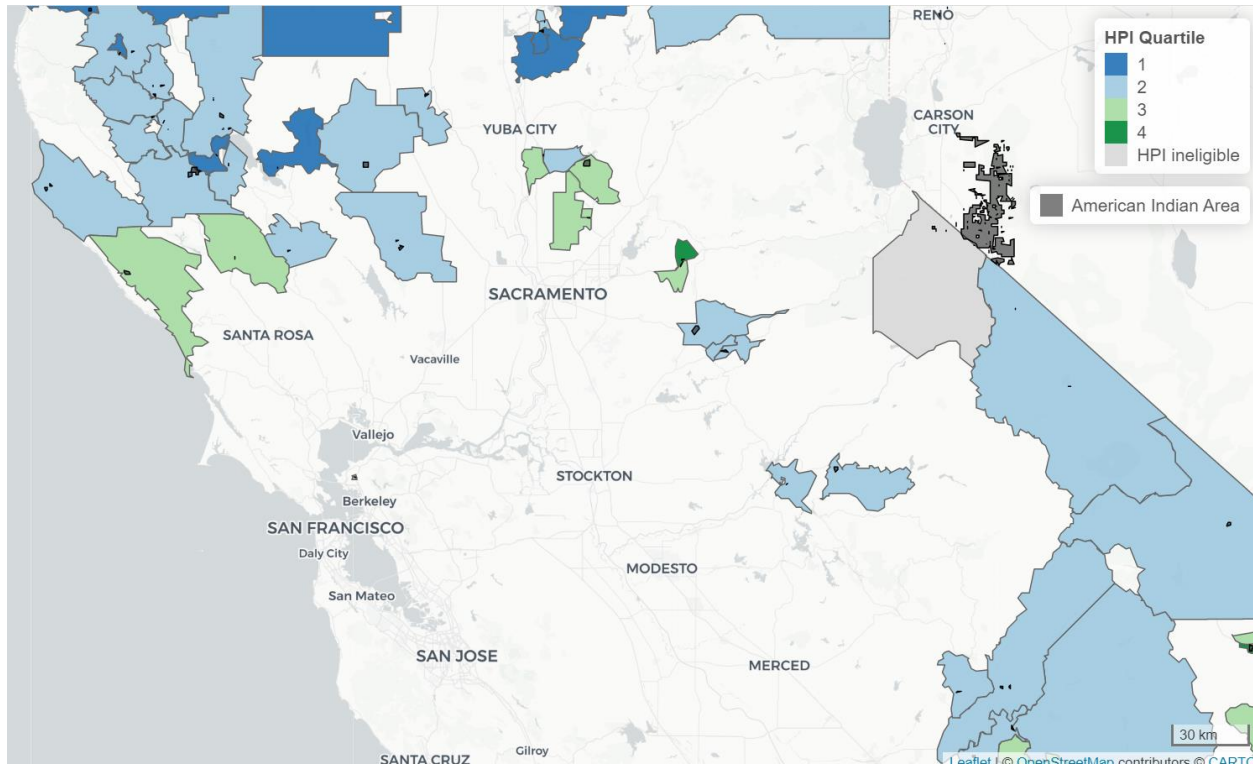
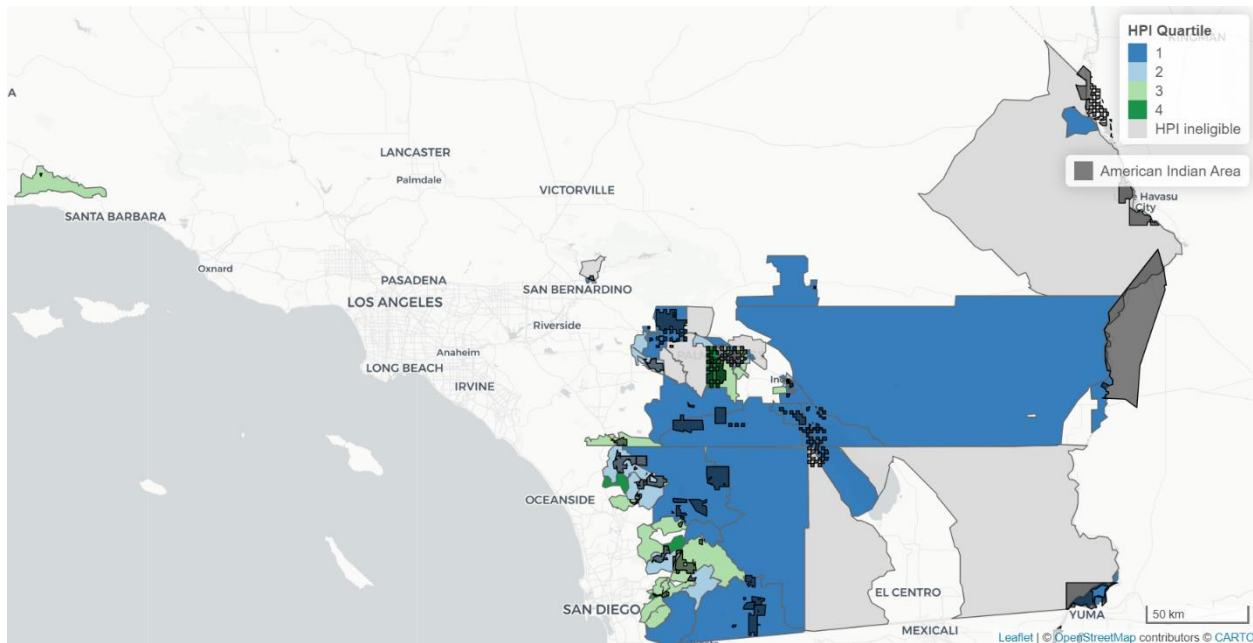
B. Mid-California**C. Southern California**

Figure 6. Distribution of American Indian Areas and HPI 3.0 Eligible Census Tracts

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 7). Given the geographic dispersion and small proportion of Native American/Alaskan Native and Native Hawaiian/Pacific Islanders in any given census tract, we restricted the analysis to Asian, Black, Latinx, and White.

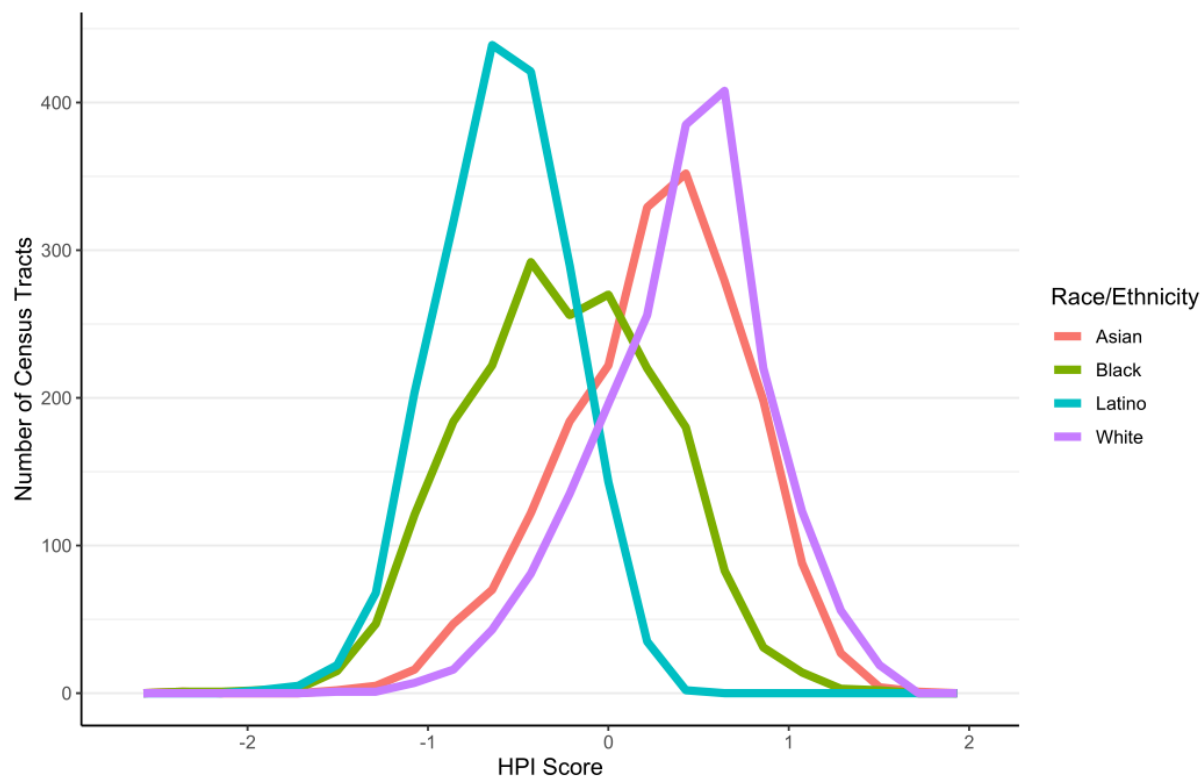


Figure 7. Distribution of HPI 3.0 Scores in Quartile of Census Tracts With the Highest Proportion of Asian, Black, Latino, and White Residents, California, 2015-2019 (Higher HPI Score = Healthier Community Conditions)

HPI scores in census tracts with high concentration of Asian (median 31%) and White (median 72%) skewed towards higher values (more opportunity). HPI scores in census tracts with high concentration of Latinx (median 76%) and Black (median 12%) skewed toward less healthy community conditions.

Comparison of HPI 3.0 and HPI 2.0

HPI 3.0 and HPI 2.0 are similar in that they have the same domains, common definitions of indicators, and the same methodology to determine domain weights. They differ in that a small subset of census tracts in HPI 2.0 did not meet eligibility criteria in an updated time period, the values of indicators changed with updated data, and there was a net change in the number of indicators (four dropped, 2 added). Table 9 compares domains weights and R^2 values of the regression of HPI score and LEB for the two HPI versions.

Compared to HPI 2.0, HPI 3.0 had a higher correlation with LEB (r , 0.60 vs. 0.56) and greater variance-explained (R^2 , 35.5% vs 31.0%). Compared to HPI 2.0, the HPI 3.0 domains of economic, education, and social domains increased by ≤ 0.05 , and the transportation domain decreased by 0.03.

Table 9. Comparison of domain weights, R^2 values

| Weights | HPI 3.0 | HPI 2.0 |
|----------------------------|---------|---------|
| Economic | 0.35 | 0.32 |
| Education | 0.18 | 0.19 |
| Social | 0.13 | 0.10 |
| Transportation | 0.13 | 0.16 |
| Housing | 0.053 | 0.05 |
| Insurance | 0.053 | 0.05 |
| Clean Environment | 0.052 | 0.05 |
| Neighborhood | 0.052 | 0.08 |
| R^2 for HPI Score on LEB | 0.36 | 0.31 |

To assess the independent contributions of updated data and changes in domains and indicators, we first examined census tract concordance of the HPI 2.0 quartile with the least healthy community conditions and that of a version with updated data (2015-2019), but that retained HPI 2.0 eligible census tracts, domain weights, and indicators (Table 10A). To assess the change in census tract concordance, simultaneously updating data and domain weights, we compared the 25% least healthy census tracts between HPI 3.0 and HPI 2.0 for the 7767 census tracts they have in common (Table 10B). The least healthy quartile (Quartile 1) included any census tract with an HPI score between the 0th and 25th percentile, inclusive. Updating data, but retaining HPI domain weights shifted 18% (~348) census tracts from HPI 2.0 quartile with the least healthy community conditions (Table 10A).

Simultaneous updating of data and domain weights in HPI 3.0 had a similar shift in the least healthy census tracts from HPI 2.0. This suggests that there is a high concordance and continuity in census tracts with the least healthy community conditions between HPI 2.0 and HPI 3.0, and that updating data (from 2011-2015 to 2015-2019) accounted for most of the change. (This is not surprising given that the indicators and domain weights changed little between versions).

Table 10. Concordance of HPI 2.0 and HPI 3.0 Census Tracts in the Quartile with the Least Healthy Community Conditions in Versions with Updated Data and Updated Domain Weights

| Census Tracts | | | | |
|---|---|------|------|------|
| A. Updated Data and HPI 2.0 Domain Weights | | | | |
| HPI 2.0 with Updated Data (2015-2019) | | | | |
| Least Healthy 25% | | | | |
| HPI 2.0 (2011-2015) | | Y | N | Sum |
| Least Healthy Community Conditions, 25% | Y | 1600 | 348 | 1948 |
| | N | 347 | 5497 | 5844 |
| Sum | | 1947 | 5845 | 7792 |
| B. Updated Data and Updated Domain Weights | | | | |
| HPI 3.0 | | | | |
| Least Healthy 25% | | | | |
| HPI 2.0 (2011-2015) | | Y | N | Sum |
| Least Healthy Community Conditions, 25% | Y | 1608 | 330 | 1938 |
| | N | 333 | 5495 | 5828 |
| Sum | | 1941 | 5825 | 7766 |

The geographic distribution of concordant and discordant census tracts (Table 10B) are presented in Figure 8.

Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, Northern California

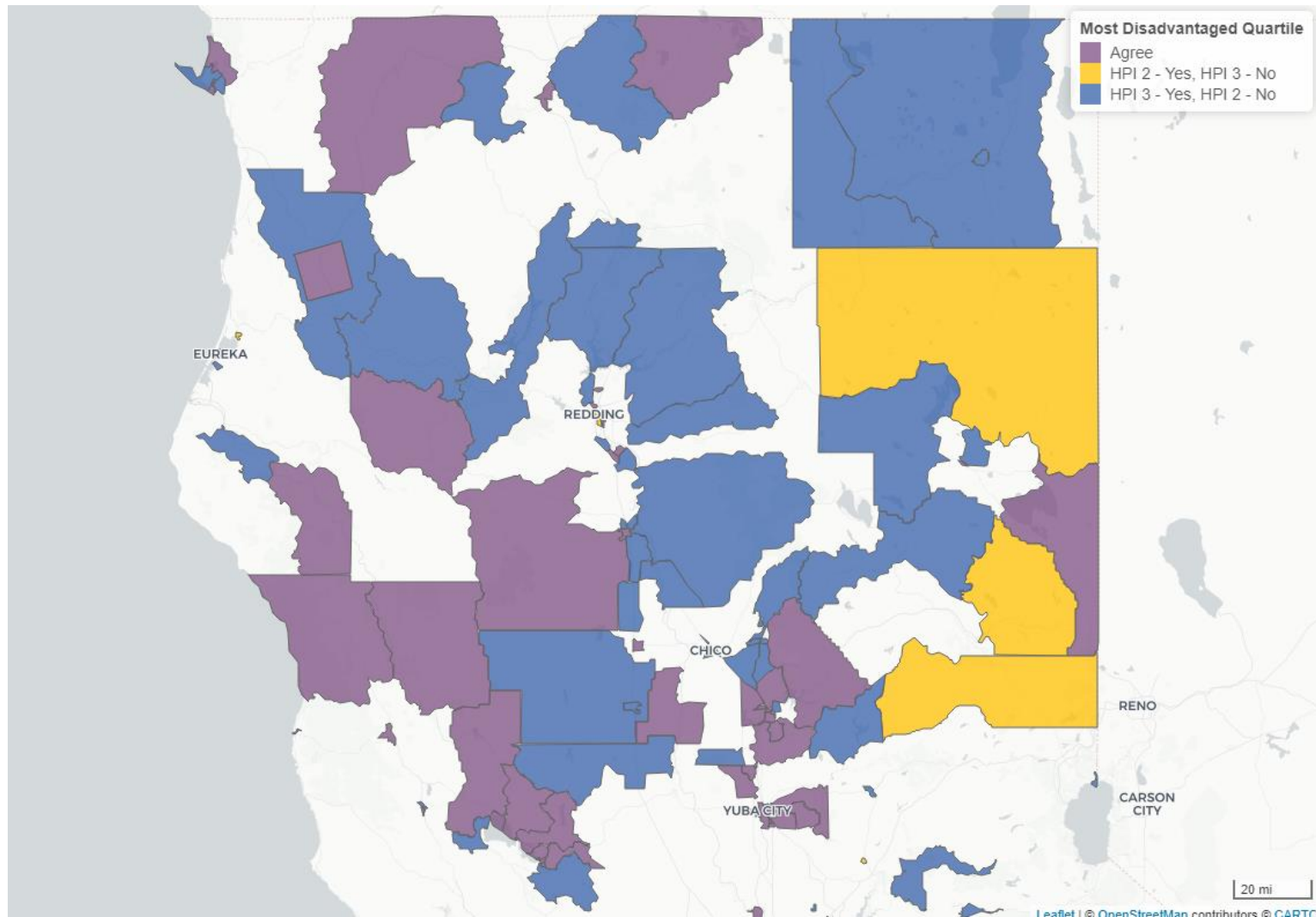


Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, Mid-California

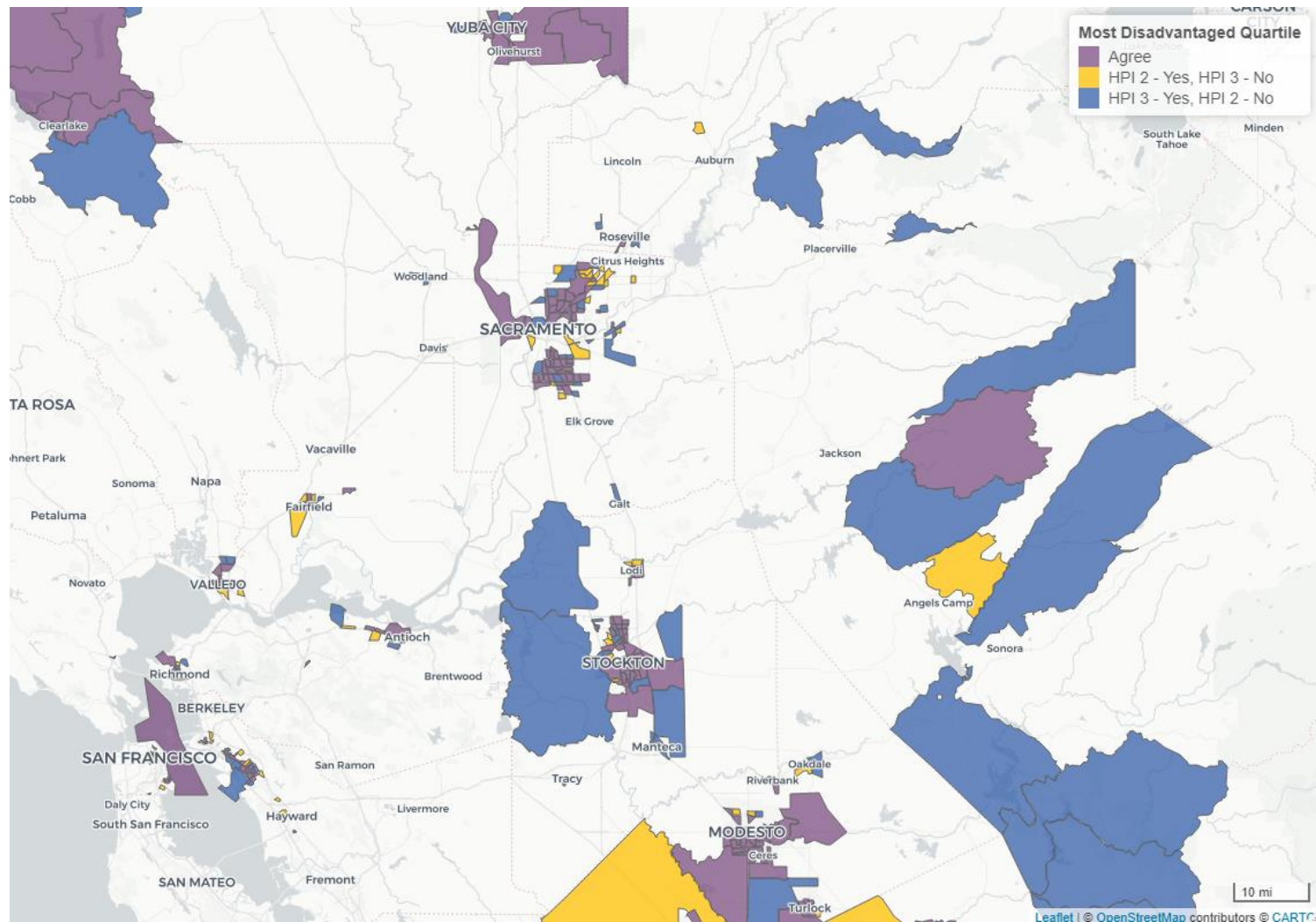


Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, San Joaquin Valley

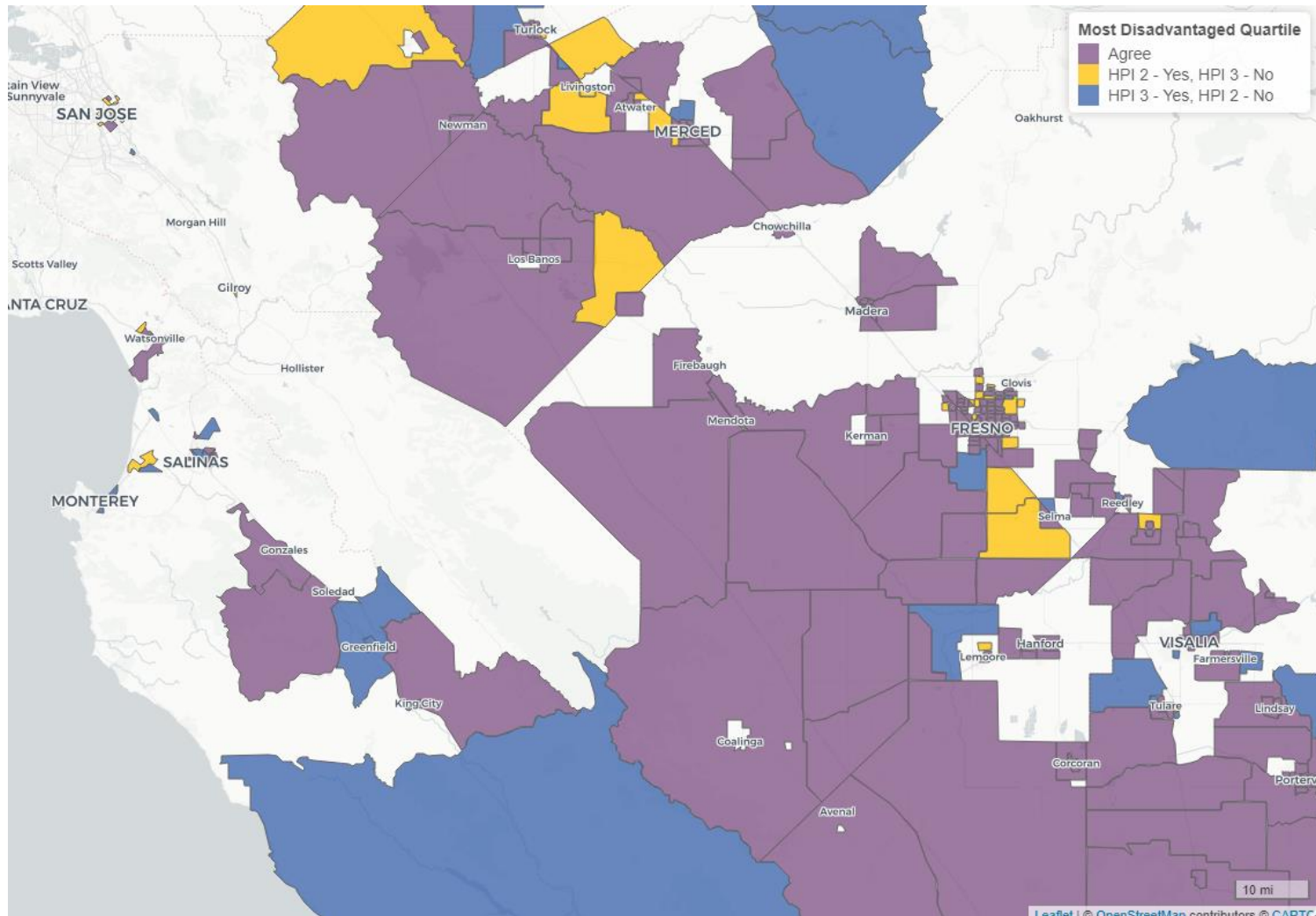


Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, San Joaquin Valley

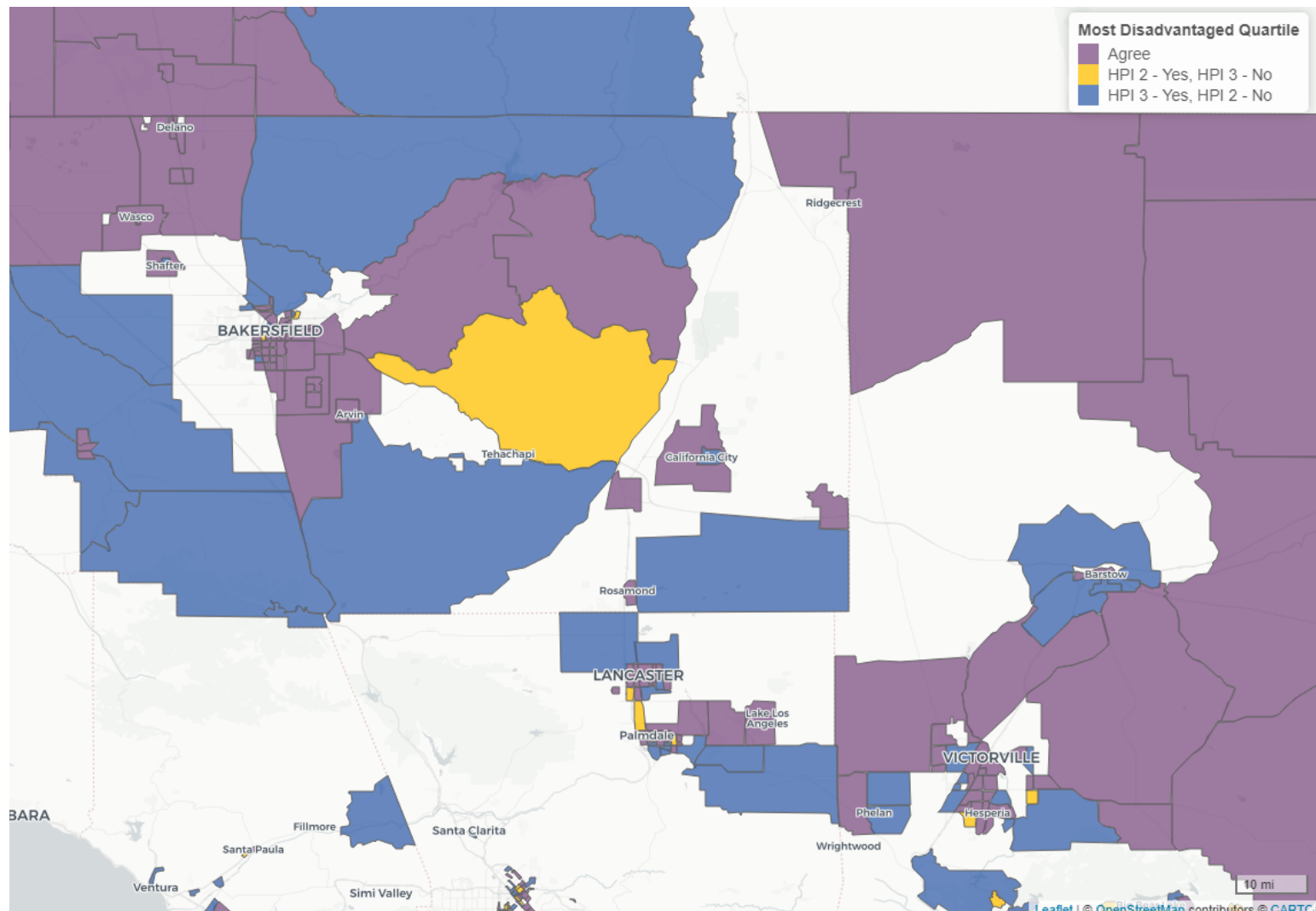


Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, Los Angeles

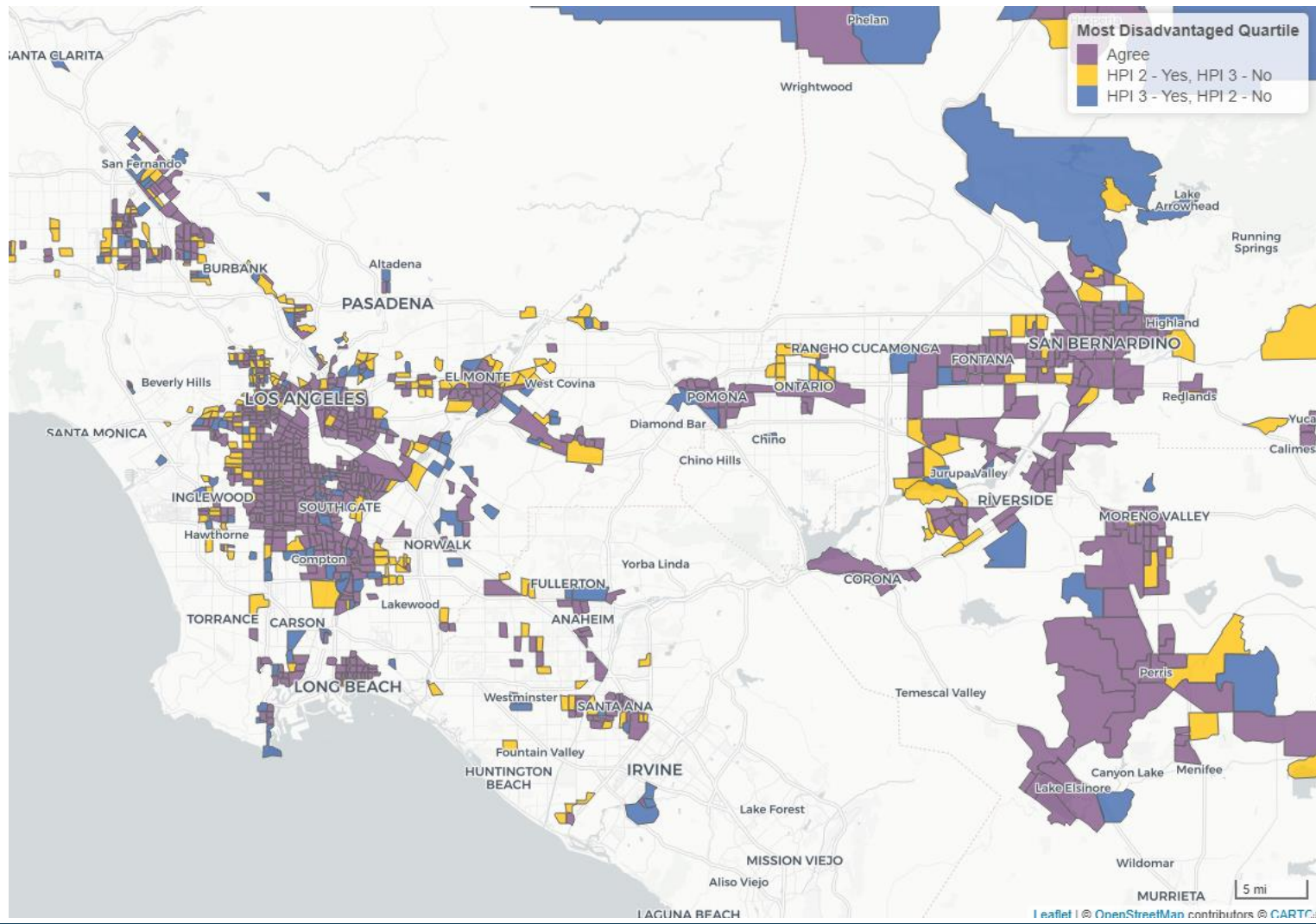
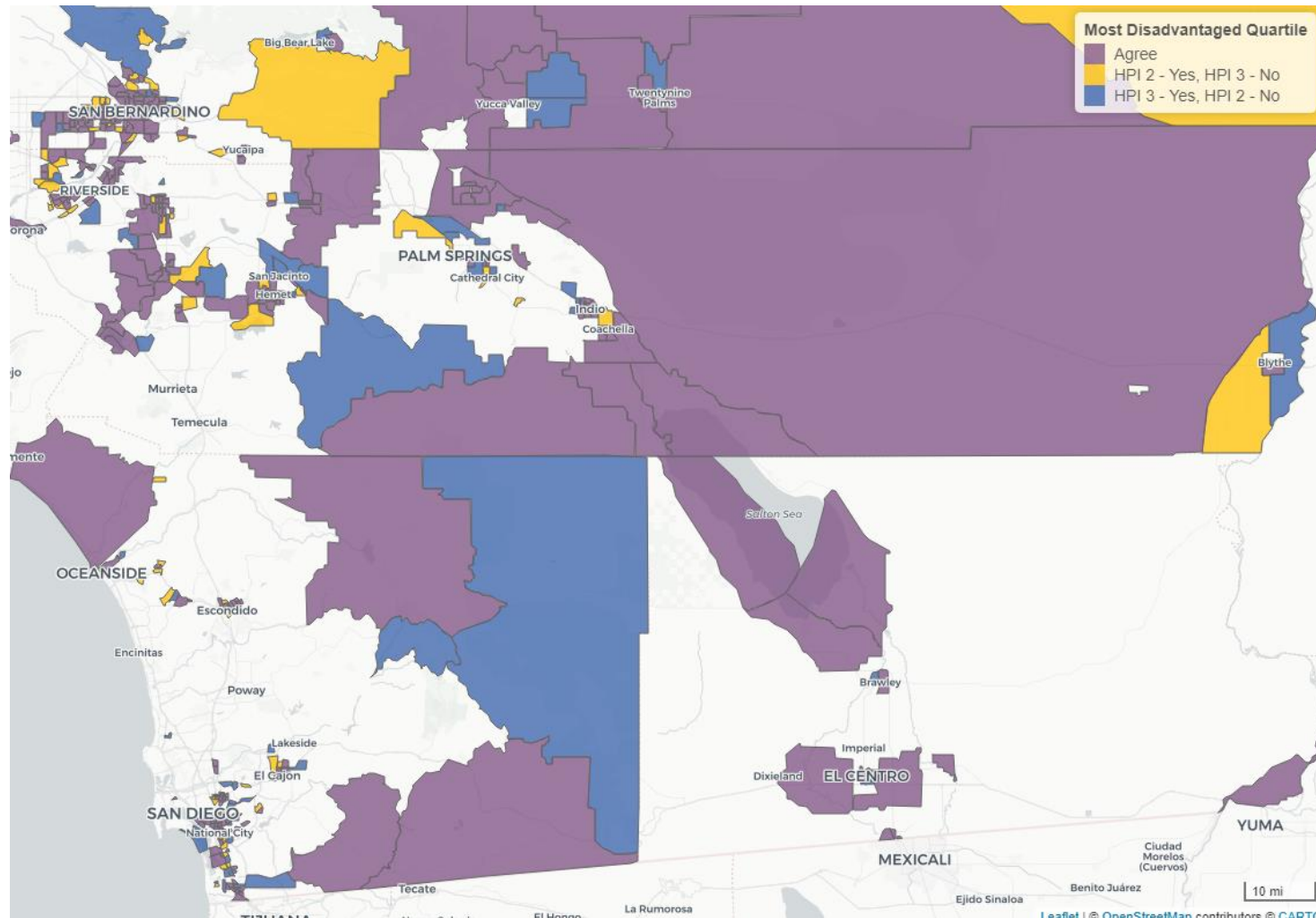


Figure 8. Concordance of the Quartile of Census Tracts with the Least Healthy Community Conditions, HPI 3.0 vs HPI 2.0, Southern California



Impact of Weighting Domains (compared to equal weighting)

Of the 1947 (25%) census tracts with the lowest HPI scores, 257 (13.2%) were discordant between the HPI and a re-calculated HPI in which there was no weighting (Table 11). Weighting has a modest impact on membership of census tracts in the quartile with the least healthy community conditions.

Table 11. Concordance of HPI Weighted and Equal Weighted Domains

| Census Tracts | | HPI 3.0 | | |
|-----------------|-----|-------------------|------|------|
| | | Least Healthy 25% | | |
| HPI 3.0 | | Y | N | Sum |
| Equal Weight | | | | |
| Least Healthy | Y | 1690 | 257 | 1947 |
| Community | N | 257 | 5586 | 5843 |
| Conditions, 25% | | | | |
| | Sum | 1947 | 5843 | 7790 |

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 CalEnviroScreen and the Social Vulnerability Index are presented in Table 12 and 13 along with comparisons census tracts below 200% of the federal poverty level and 80% (\$49,454) of the median household income.

Approximately 640 census tracts, accounting for 3 million Californians, were in disagreement. CES had more California counties than HPI without any census tracts in the least advantaged quartile (27 vs. 12): Alpine, Amador, Calaveras, Colusa, Del Norte, El Dorado, Humboldt, Inyo, Lake, Lassen, Marin, Mariposa, Mendocino, Modoc, Mono, Napa, Nevada, Placer, Plumas, San Benito, San Luis Obispo, Shasta, Sierra, Siskiyou, Tehama, Trinity, and Tuolumne. Sixteen counties had at least one census tract in the quartile of HPI with the least healthy community conditions but no census tract in the most disadvantaged CES 4.0 quartile.

Table 12. Census Tract Agreement Between HPI and Alternative Indexes

| A. | | CES 4.0 | | | | | | | |
|---------------|-----|------------------------------|------|------|-------------|-------------|------|------|--|
| | | 25% Most Disadvantaged | | | | | | | |
| | | Y | N | Sum | Sensitivity | Specificity | PA | PPV | |
| HPI 3.0 | Y | 1311 | 636 | 1947 | 0.67 | 0.89 | 0.84 | 0.67 | |
| Least Healthy | N | 642 | 5200 | 5842 | | | | | |
| Community | | | | | | | | | |
| Conditions, | | | | | | | | | |
| 25% | Sum | 1953 | 5836 | 7789 | | | | | |
| B. | | SVI | | | | | | | |
| | | 25% Most Disadvantaged | | | | | | | |
| | | Y | N | Sum | Sensitivity | Specificity | PA | PPV | |
| HPI 3.0 | Y | 1508 | 439 | 1947 | 0.76 | 0.92 | 0.88 | 0.77 | |
| Least Healthy | N | 466 | 5377 | 5843 | | | | | |
| Community | | | | | | | | | |
| Conditions, | | | | | | | | | |
| 25% | Sum | 1974 | 5816 | 7790 | | | | | |
| C. | | Poverty | | | | | | | |
| | | 25% Most Disadvantaged | | | | | | | |
| | | Y | N | Sum | Sensitivity | Specificity | PA | PPV | |
| HPI 3.0 | Y | 1636 | 311 | 1947 | 0.84 | 0.95 | 0.92 | 0.84 | |
| Least Healthy | N | 311 | 5532 | 5843 | | | | | |
| Community | | | | | | | | | |
| Conditions, | | | | | | | | | |
| 25% | Sum | 1947 | 5843 | 7790 | | | | | |
| D. | | <80% Median Household Income | | | | | | | |
| | | 25% Most Disadvantaged | | | | | | | |
| | | Y | N | Sum | Sensitivity | Specificity | PA | PPV | |
| HPI 3.0 | Y | 1789 | 158 | 1947 | 0.67 | 0.97 | 0.87 | 0.92 | |
| Least Healthy | N | 882 | 4961 | 5843 | | | | | |
| Community | | | | | | | | | |
| Conditions, | | | | | | | | | |
| 25% | Sum | 2671 | 5119 | 7790 | | | | | |

CES, CalEnviroScreen 4.0; SVI, Social Vulnerability Index

Table 13. Residential Population in Census Tracts by Agreement Status for HPI and Alternative Indexes

| A. CES | | CES | | | | | | |
|---------------------------|-----|------------------------|------------|------------|-------------|-------------|------|------|
| | | 25% Most Disadvantaged | | | Sensitivity | Specificity | PA | PPV |
| | | Y | N | Sum | | | | |
| HPI 3.0 | Y | 6,295,085 | 3,118,302 | 9,413,387 | 0.66 | 0.89 | 0.84 | 0.67 |
| Least Healthy | N | 3,265,203 | 26,109,389 | 29,374,592 | | | | |
| Community Conditions, 25% | Sum | 9,560,288 | 29,227,691 | 38,787,979 | | | | |

| B. SVI | | SVI | | | | | | |
|---------------------------|-----|------------------------|------------|------------|-------------|-------------|------|------|
| | | 25% Most Disadvantaged | | | Sensitivity | Specificity | PA | PPV |
| | | Y | N | Sum | | | | |
| HPI 3.0 | Y | 7,382,915 | 2,030,472 | 9,413,387 | 0.75 | 0.93 | 0.88 | 0.78 |
| Least Healthy | N | 2,503,362 | 26,876,297 | 29,379,659 | | | | |
| Community Conditions, 25% | Sum | 9,886,277 | 28,906,769 | 38,793,046 | | | | |

| C. | | Poverty | | | | | | |
|---------------------------|-----|------------------------|------------|------------|-------------|-------------|------|------|
| | | 25% Most Disadvantaged | | | Sensitivity | Specificity | PA | PPV |
| | | Y | N | Sum | | | | |
| HPI 3.0 | Y | 7,870,092 | 1,543,295 | 9,413,387 | 0.84 | 0.95 | 0.92 | 0.84 |
| Least Healthy | N | 1,546,607 | 27,833,052 | 29,379,659 | | | | |
| Community Conditions, 25% | Sum | 9,416,699 | 29,376,347 | 38,793,046 | | | | |

| D. | | <80% Median Household Income | | | | | | |
|-------------------------|-----|------------------------------|------------|------------|-------------|-------------|------|------|
| | | 25% Most Disadvantaged | | | | | | |
| | | Y | N | Sum | Sensitivity | Specificity | PA | PPV |
| HPI 3.0 | Y | 8,595,955 | 817,432 | 9,413,387 | 0.68 | 0.97 | 0.87 | 0.91 |
| Least Healthy Community | N | 4,113,310 | 25,266,349 | 29,379,659 | | | | |
| Conditions, 25% | Sum | 12,709,265 | 26,083,781 | 38,793,046 | | | | |

CES, CalEnviroScreen 4.0; SVI, Social Vulnerability Index

These 16 counties are rural and are from California's north and central coast and northern Sierras: Calaveras, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Placer, Plumas, San Luis Obispo, Santa Barbara, Shasta, Sierra, Siskiyou, Tehama, and Trinity.

The positive predictive value of HPI with the indices that emphasized economic status (poverty, and 80% median household income) ranged from 0.87 to 0.92. Federal poverty level (<200%) had the fewest number of discordant census tracts and population.

Decision-Support Indicators and Domains

HPI 3.0 supports 373 indicators in its decision support layers. These encompass:

- Race/ethnicity, residential racial segregation and diversity, and economic inequality (N=232)
- Climate change exposure, adaptive capacity, and population sensitivity (N= 74) to extreme heat, sea level rise, and wildfires, which build on CDPH's Climate Change Vulnerability Indicators and the HPI Extreme Heat Edition, which is a partnership between the UCLA Luskin Center and the Public Health Alliance of Southern California
- Health outcomes and health behaviors from the CDC PLACES³⁷ project (N=37)
- Indicators not elsewhere included from the Well-Being in the Nation (WIN) Project⁴⁶ (N = 28)
- Indictors from other indexes (such as CalEnviroScreen and the Social Vulnerability Index), and indictors unique to the earlier version (2.0) of the HPI.

The decision support indicators are listed in Table 14 and Appendix B includes a data dictionary. The majority of these are available at census tract geography; approximately 40 are available only for counties, including food insecurity, homelessness, and school academic performance. Race/ethnicity stratified indicators are available at city/tow geographies.

In addition to indicators representing populations or environmental exposures in census tracts and other geographical areas, we have included one GIS layer for California tribal areas and 11 point layers that represent the location of hospitals, skilled nursing homes and other health care facilities, schools, subsidized housing, and other types of facilities (Table 15).

Table 14. Variables and Definition, Healthy Places Index (HPI 3.0), 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 Name | Definition | Data Source, Year |
|---|--|-------------------------------|
| Racial Residential Segregation and Economic Inequality | | |
| diversity_index | 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 | WhoLeadsUs, 2015-2019 |
| redlined | Neighborhood historically redlined | Mapping Inequality, 1935-1940 |
| gini_city | Gini Coefficient: Measure of unequal incomes within a city | ACS, 2011-2015 |
| gini | Gini Coefficient: Measure of unequal incomes within a county | ACS, 2011-2015 |
| lq_aian | Location Quotient: Measure of American Indian or Alaska Native residential segregation | ACS, 2015-2019 |
| lq_asian | Location Quotient: Measure of Asian residential segregation | ACS, 2015-2019 |
| lq_black | Location Quotient: Measure of Black or African American residential segregation | ACS, 2015-2019 |
| lq_hispanic | Location Quotient: Measure of Hispanic or Latino residential segregation | ACS, 2015-2019 |
| lq_nhpi | Location Quotient: Measure of Native Hawaiian or Other Pacific Islander residential segregation | ACS, 2015-2019 |
| lq_white | Location Quotient: Measure of White residential segregation | ACS, 2015-2019 |
| police_race | Rate of race of police force (per 1,000 people of that race) | Adv Project CA, 2017 |
| iod_nonwhite | Index of Dissimilarity: Measure of non-White residential segregation | Decennial Census, 2010 |
| iod_asian | Index of Dissimilarity: Measure of Asian residential segregation | Decennial Census, 2010 |
| iod | Index of Dissimilarity: Measure of Black or African American residential segregation | Decennial Census, 2010 |
| iod_latino | Index of Dissimilarity: Measure of Hispanic or Latino residential segregation | Decennial Census, 2010 |
| theilh | Theil Index (0 to 1) measuring racial segregation with 0 as least diverse | ACS2019 |
| Health Outcomes | | |
| ARTHRITIS | Percent of adults diagnosed with arthritis | CDC PLACES, 2018 |
| asthma | Percent of people with asthma by race/ethnicity | Adv. Project CA, 2017 |
| asthmaer | Rate of emergency room visits for asthma (per 10,000 ER visits) | CES3.0, 2011-2013 |
| BPHIGH | Percent of adults diagnosed with high blood pressure | CDC PLACES, 2018 |

| Variable Name | Definition | Data Source, Year |
|------------------|---|-----------------------|
| CANCER | Percent of adults diagnosed with cancer (except skin cancer) | CDC PLACES, 2018 |
| CASTHMA | Percent of people 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 |
| DIABETES | Percent of adults diagnosed with diabetes (other than diabetes during pregnancy) | CDC PLACES, 2018 |
| deathsdespair | Average number of yearly deaths due to suicide, drugs, or alcohol (per 100,000) | CDC/WONDER, 2015-2019 |
| got_help | Percent of adults who got help for mental/emotional or alcohol/drug issues by race/ethnicity | Adv. Project CA, 2017 |
| heartattack | Rate of emergency room visits for heart attacks (per 10,000 ER visits) | CES 3.0, 2011-2013 |
| infant_mortality | Rate of infant deaths (per 1,000) | CDPH, 2021 |
| KIDNEY | Percent of adults diagnosed with chronic kidney disease | CDC PLACES, 2018 |
| lbw | Percent of babies born with a low birth weight | CES 3.0, 2006-2012 |
| leb | Estimate of life expectancy at birth | CDC USALEEP, 2018 |
| life_expectancy | Estimate of life expectancy at birth by race/ethnicity | Adv. Project CA, 2017 |
| low_birthweight | Percent of babies born with a low birth weight by race/ethnicity | Adv. Project CA, 2017 |
| MHLTH | Percent of adults who felt their mental health was not good during 2 or more weeks of the previous month | CDC PLACES, 2018 |
| OBESITY | Percent of adults with obesity (a BMI of at least 30.0 kg/m ²) | CDC PLACES, 2018 |
| pedshurt | Average rate of severe and fatal injuries, over the past five years, to people walking (per 100,000 people) | HCI/SWITRS, 2006-2010 |
| PHLTH | Percent of adults who felt their physical health was not good during 2 or more weeks of the previous month | CDC PLACES, 2018 |
| PretermBirths | Percent of singleton births delivered preterm (<37 weeks of gestation) | CEHTP, 2015 - 2015 |
| STROKE | Percent of adults who have been diagnosed with a stroke | CDC PLACES, 2018 |
| YouthAsthmaE | | |
| Dvisits | Asthma emergency department visits among 0-17 year olds (per 10,000 residents) | CA HCAI, 2017 |
| disability | Percent of people who have a disability | ACS, 2015-2019 |

| Variable Name | Definition | Data Source, Year |
|--|---|-------------------------|
| Health Risk Factors | | |
| 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 |
| Climate Change and Sensitive Populations (People) | | |
| DaysAbove100F_2035_2064 | Projected number of days above 100 degrees F in Mid-Century (2035 - 2064) under the RCP 8.5 scenario. | CalAdapt 2.0 |
| DaysAbove100F_2070_2099 | Projected number of days above 100 degrees F in End of Century (2070 - 2099) under the RCP 8.5 scenario. | CalAdapt 2.0 |
| DaysAbove90F_2035_2064 | Projected number of days above 90 degrees F in Mid-Century (2035 - 2064) under the RCP 8.5 scenario. | CalAdapt 2.0 |
| DaysAbove90F_2070_2099 | Projected number of days above 90 degrees F in End of Century (2070 - 2099) under the RCP 8.5 scenario. | CalAdapt 2.0 |
| EH_RCP8.5_2035_2064 | Projected number of extreme heat days in Mid-Century (2035 - 2064) under the RCP 8.5 scenario exceeding the 98th percentile historical temperature threshold (1960-1991) | CalAdapt 2.0 |
| EH_RCP8.5_2070_2099 | Projected number of extreme heat days in End of Century (2070 - 2099) under the RCP 8.5 scenario exceeding the 98th percentile historical temperature threshold (1960-1991) | CalAdapt 2.0 |
| sealevel | Percent of people expected to be in flood zones in 2100, due to sea level rise and a 100-year flood event | Pacific Institute, 2009 |
| wildfire | Percent of people living in areas with a very high risk for wildfires | CalFIRE, 2007 |
| aircon | Percent of households with air conditioning | RAS, 2009 |
| impervsurf | Percent impervious surface cover | NLCD, 2011 |
| UHII | Index measuring urban-rural heat difference | CalEPA, 2015 |
| Age_under5 | Percent of population who are young children | ACS, 2014 - 2018 |
| Age5_14 | Percent of people aged between 5-14 | ACS, 2014 - 2018 |
| children | Percent of people under 5 years old | ACS, 2011-2015 |
| Disability65 | Percent of people 65 years and older with disabilities | ACS, 2014 - 2018 |
| english_itvw | Percent of people, aged 5 and older, that speak English "less than very well" | ACS, 2015-2019 |

| Variable Name | Definition | Data Source, Year |
|------------------------|--|-------------------|
| englishspeak | Percent of households where at least one person, aged 14 years or older, speaks English well | ACS, 2011-2015 |
| ExposedWorkers_2016 | Percent of workers who spend over half of their time in a place that is not indoors and air-conditioned. | CA EDD, 2016 |
| ExposedWorkers_2026 | Projected percent of workers who will spend over half of their time in a place that is not indoors and air-conditioned in 2026 | CA EDD, 2026 |
| 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, 2011-2015 |
| 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 (incl. Mandarin & Cantonese) at home | ACS, 2015-2019 |
| 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/ 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/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, 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, 2014 - 2018 |
| Livealone65 | Percent of people 65 years and older living alone | ACS, 2014 - 2018 |
| Nonwhite65 | Percent of people 65 years and older who are non-White | ACS, 2014 - 2018 |
| outdoors | Percent of workers older than 16 who work outdoors. | ACS, 2011-2015 |
| Perc65plus | Percent of people aged 65 or older | ACS, 2014 - 2018 |

| Variable Name | Definition | Data Source, Year |
|---|--|----------------------|
| Perc75plus | Percent of people aged 75 or older | ACS, 2014 - 2018 |
| Poverty65 | Percent of population 65 years and older with incomes below the poverty level | ACS, 2014 - 2018 |
| Projected_pop_under5_2050 | Projected percent of people under 5 in 2050 | CDOF |
| ProjectedPop_2050_5to14 | Projected percent of people aged between 5 to 14 in 2050 | CDOF |
| ProjectedPop_2050_65plus | Projected percent of people aged 65 and older in 2050 | CDOF |
| ProjectedPop_2050_total | Projected population in 2050 | CDOF |
| usual_source_of_care | Percent of people with a usual source of medical care | Adv Project CA, 2017 |
| multgen | Percent of population living in multigenerational households (PEW definition) | iPUMS, 2015-2019 |
| incarceration | Rate of people incarcerated (per 1,000) | Adv Project CA, 2017 |
| Climate Change and Sensitive Housing Characteristics (Place) | | |
| HCVunits_17 | Housing Choice Voucher units, for every 1,000 housing units | HUD/ACS , 2017 |
| AllHUDunits_17 | Number of housing units subsidized by any HUD program, for every 1,000 housing units | HUD/ACS , 2017 |
| LIHTC_HU_18 | Number of active Low-Income Housing Tax Credits units for every 1,000 housing units | HUD/ACS , 2018 |
| OtherHUDunits_17 | 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 | HUD/ACS , 2017 |
| PHunits_17 | Number of public housing units, for every 1,000 housing units | HUD/ACS , 2017 |
| Housebuild1940 | Percent of homes built before 1940 | ACS, 2014 - 2018 |
| MobileHomes | Percent of households living in mobile homes | ACS, 2014 - 2018 |
| RV_Van_Boat | Percent of households living in RV, van, or boat | ACS, 2014 - 2018 |
| denied_mortgages | Percent of mortgage applications that were denied | Adv Project CA, 2017 |
| homevalue | Median home value | ACS, 2015-2019 |

| Variable Name | Definition | Data Source, Year |
|---|--|-----------------------------------|
| rent | Median rent | ACS, 2015-2019 |
| recentmove | Percent of households with new (moved in 2015 or later) residents | ACS, 2015-2019 |
| computer | Percent of people in households with a computer | ACS, 2015-2019 |
| broadband | Percent of people in households with an internet subscription (broadband of any type) | ACS, 2015-2019 |
| perception_of_safety | Percent of adults who reported feeling safe in their neighborhood all of the time | Adv Project CA, 2017 |
| crimerate | Number of violent crimes per 1,000 people | FBI Uniform Crime Reporting, 2013 |
| use_of_force | Average rate of civilians injured in law enforcement incidents (per 100,000) | Adv Project CA, 2017 |
| Youth and Schools | | |
| gr3_ela_scores | Percent of 3rd graders scoring proficient or better in English Language Arts | Adv Project CA, 2017 |
| gr3_math_scores | Percent of 3rd graders scoring proficient or better in Mathematics | Adv Project CA, 2017 |
| chronic_absenteeism | Rate of chronically absent students (per 100) | Adv Project CA, 2017 |
| staff_diversity | Ratio of staff of a race per 100 students of the same race | Adv Project CA, 2017 |
| hs_grad | Percent of high school students who graduate within a four-year period | Adv Project CA, 2017 |
| student_homelessness | Percent of students experiencing homelessness | Adv Project CA, 2017 |
| suspension | Rate of students suspended (per 100) | Adv Project CA, 2017 |
| frim | Percent of K-12 students who are eligible to participate in the Free & Reduced Meal Program | CDE, 2015-2016 |
| status_offenses | Annual average of youth arrests for status offenses (per 10,000) | Adv Project CA, 2017 |
| Well-Being In the Nation (WIN) Project, not included elsewhere | | |
| 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 |

| Variable Name | Definition | Data Source, Year |
|-------------------------------|--|------------------------------|
| difficultyselfcare | Percent of people who have difficulty bathing or dressing | ACS, 2015-2019 |
| difficultyvision | Percent of people who are blind or have serious difficulty seeing, even when wearing glasses | ACS, 2015-2019 |
| edspend | Spending per student | CDE, 2018-2019 |
| femalegender | Percent of people who are female | ACS, 2015-2019 |
| foodinsecure | Percent of people who lack adequate access to food | CHR2021/MapMealGap2018, 2021 |
| hsgrad | Percent of students who graduate high school within four years of entering ninth grade | CDE, 2018-2019 |
| Variable Name | Definition | Data Source, Year |
| idleteen | Percent of 16 to 19 year olds not enrolled in school or working | ACS, 2015-2019 |
| infantdeaths | Average yearly rate of infant deaths (per 1,000) | CHHSA/, 2021 |
| mva | Average number of yearly deaths due to motor vehicle injuries (per 100,000) | CDC/WONDER, 2015-2019 |
| 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, 2000-2010 |
| nonenglishspeaking | Percent of people, aged 5 and older, that speak a language other than English at home | ACS, 2015-2019 |
| walkability | US EPA walkability score (intersection density, proximity to transit, employment/housing mix) | USEPA/SLD3NWI, 2018 |
| homeless population | 5-year average of the 1-day census of people experiencing homelessness per 10,000 population | USHUD/NAEH, 2019 |
| lawenforcement | Five-year annual average number of law enforcement personnel per 1,000 population | CADOJ/OJ/CJP, 2019 |
| Other Indexes of Disadvantage | | |
| CES30Score | CalEnviroScreen 3.0 Score (Index score measuring population-pollution interaction) | CES 3.0, 2018 |
| ces40score | CalEnviroScreen 4.0 Score (Index score measuring population-pollution interaction) | CCES 4.0, 2021 |
| lt80pct | Low-income households (80% of median household income) | ACS, 2015-2019 |
| svi | Social Vulnerability Index: Index measuring social vulnerability | CDC ATSDR, 2018 |
| hi_score | Hardship Index: score measuring economic hardship | ACS, 2011-2015 |

| Variable Name | Definition | Data Source, Year |
|---------------------------------|--|-----------------------------|
| Retired Indicators from HPI 2.0 | | |
| alcoffsale | Percent of people who live further than a quarter-mile from a store that sells alcohol | ABC, 2014 |
| alconsale | Percent of people who live further than a quarter mile from a store that sells alcohol for consumption on-site | ABC, 2014 |
| income | Median annual household income | 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 FARA, 2017 |
| traffic_impacts | Traffic density on highways within 150 feet of census tract boundaries | CES 4.0, 2021 |
| transitaccess | Percent of people living close to convenient, reliable transit, as defined by a half-mile or ten-minute walk, that comes every fifteen minutes or less during peak commute times | MTC SACOG SCAG SANDAG, 2012 |
| twoparent | Percent of children with two married or partnered parents/caregivers | ACS, 2011-2015 |
| voter12 | Percent of registered voters who voted in the 2012 general election | UCBSD , 2012 |
| voter16 | Percent of registered voters who voted in the 2016 general election | UCBSD , 2016 |

† ABC, California Alcoholic Beverage Commission; ACS, American Community Survey; Adv. Project CA, Advancement Project California (Race Counts); ATSDR, Agency for Toxic Substances Disease Registry; CHAS, Comprehensive Housing Assessment System, US Dept. of Housing and Urban Development (HUD); CDE, California Department of Education; CalEPA, California Environmental Protection Agency; CDOF, California Department of Finance; CalFIRE, California Department of Forestry and Fire Protection; CES, CalEnviroScreen; HCAI, California Department of Health Care Access and Information; CHHSA, California Health & Humans Services Agency; CDPH, California Department of Public Health; CDC, Centers for Disease Control; Census, 2010 U.S. Decennial Census; CHR, County Health Rankings; iPUMS, Public Use Microdata, American Community Survey; MTC, Metropolitan Transportation Commission; NLCD, National Land Cover Database; RAS, Report on Appliance Saturation; SACOG, Sacramento Area Council of Governments; SANDAG, San Diego Association of Governments; SCAG, Southern California Association of Governments; SWITRS, Statewide Integrated Traffic Records System; USDA FARA, U.S. Department of Agriculture Food Access Research Atlas; USEPA, U.S. Environmental Protection Agency; UCBSD, UC Berkeley, Statewide Database; UCR, Uniform Crime Report; UW/ICPSR, University of Wisconsin; VCU, Virginia Commonwealth University

Table 15. Facilities and Other Points of Interest

| Variable | Data Source | Table | Variable(s) |
|--------------------------|--|---------------------------------|---|
| air_pollution | US EPA, 2021 | Air_pollution | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| brownfields | US EPA, 2021 | Brownfields | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| superfund | US EPA, 2021 | Superfund | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| toxics | US EPA, 2021 | Toxic_Substances_Control_Act | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| hazardous_waste | US EPA, EJSCREEN, 2020 | Hazardous waste (TSDF) | URL: https://geopub.epa.gov/arcgis/rest/services/ejscreen/ejscreen_v2020/MapServer/ |
| water_dischargers | US EPA, 2021 | Water_dischargers | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| hospitals | Office of Statewide Health Planning and Development Geohub, 2020 | OSHPD Healthcare Facilities | URL: https://oshpd-chhsagency.opendata.arcgis.com/datasets/oshpd-healthcare-facilities/ Filtered by license_category_desc == "General Acute Care Hospital" and facility_status_desc == "Open" |
| prisons | US Dept. of Homeland Security, 2020 | Prison_Boundaries | URL: https://services1.arcgis.com/Hp6G80Pky0om7QvQ/ArcGIS/rest/services/Prison_Boundaries/FeatureServer |
| public_housing | US Department of Housing and Urban Development, 2021 | PUBLIC_HOUSING_BUILDING | URL: https://services.arcgis.com/VTyQ9soqVukalltT/arcgis/rest/services/Public_Housing_Buildings/FeatureServer/ |
| subsidized_housing | US Department of Housing and Urban Development, 2021 | MULTIFAMILY_PROPERTIES_ASSISTED | URL: https://services.arcgis.com/VTyQ9soqVukalltT/arcgis/rest/services/Multifamily_Properties_Assisted/FeatureServer/ |
| public_schools | National Center for Education Statistics, 2020 | Public School Locations 2019-20 | URL: https://nces.ed.gov/opengis/rest/services/K12_School_Locations/EDGE_GEOCODE_PUBLICSCH_1920/MapServer/ |
| CA_American_Indian_Areas | Census TIGER/line, 2019 and American Community Survey, 2019 | B01001 | URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html B01001_001E Estimate!!Total |

Note: all layers are point spatial type, except CA_American Indian Areas, which are polygons

MAPPING APPLICATION

The HPI 3.0 mapping application was purpose-built using open source tools by [Axis Maps](#), a geospatial web design and development company. The new application significantly expanded the content and functionality found in the HPI 2.0 application. The HPI score, domains, and individual indicators are presented as interactive maps (Figure 9) that provide the values and percentile rankings for 1) all 23 HPI indicators, 8 domains and the overall HPI score and 2) more than 370 decision support indicators (Table 14).

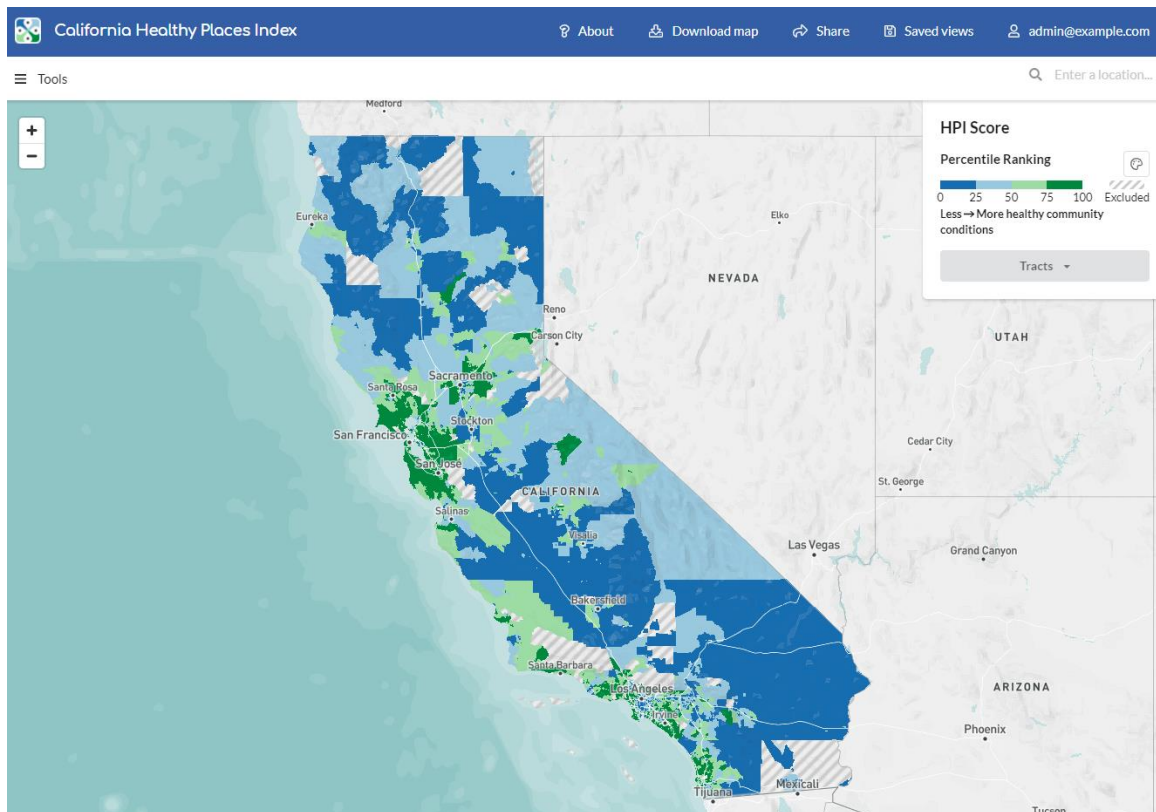


Figure 9. Interactive HPI Map (<http://map.healthyplacesindex.org>)

A navigation panel allows users to explore potential policy options for improving health by linking domains and indicators to briefs that describe 32 policy guides and 311 policy actions. In addition to the 23 HPI indicators, the mapping application also provides more than 370 selectable decision-support data layers covering health outcomes, behavioral risk factors, climate change threats and vulnerabilities, and additional information. 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 data over time 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 nine 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 file⁴⁷ 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 and their aggregations (Core Based Statistical Areas, and transportation planning regions of Metropolitan Planning Organizations), cities and CDPs, elementary school districts, Medical Service Study Areas, 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 percent above poverty indicator, or 2) has only a value available, such as HPI score or the ozone 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; Latino; and, of any ethnicity: Asian, Black, American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, Two or more races, and Other.

A new map feature allows users to filter census tracts based on the percentage of residents of one or more race/ethnicity groups. For example, if one wanted to view HPI scores (or any other indicator) for census tracts with at least 100 Native Hawaiian or other Pacific Islanders alone, one would move the Population Count slider lower limit to 100 (Figure 10). One can also specify combinations of race/ethnicity groups meeting thresholds (e.g., Asian + Latino > 50%).

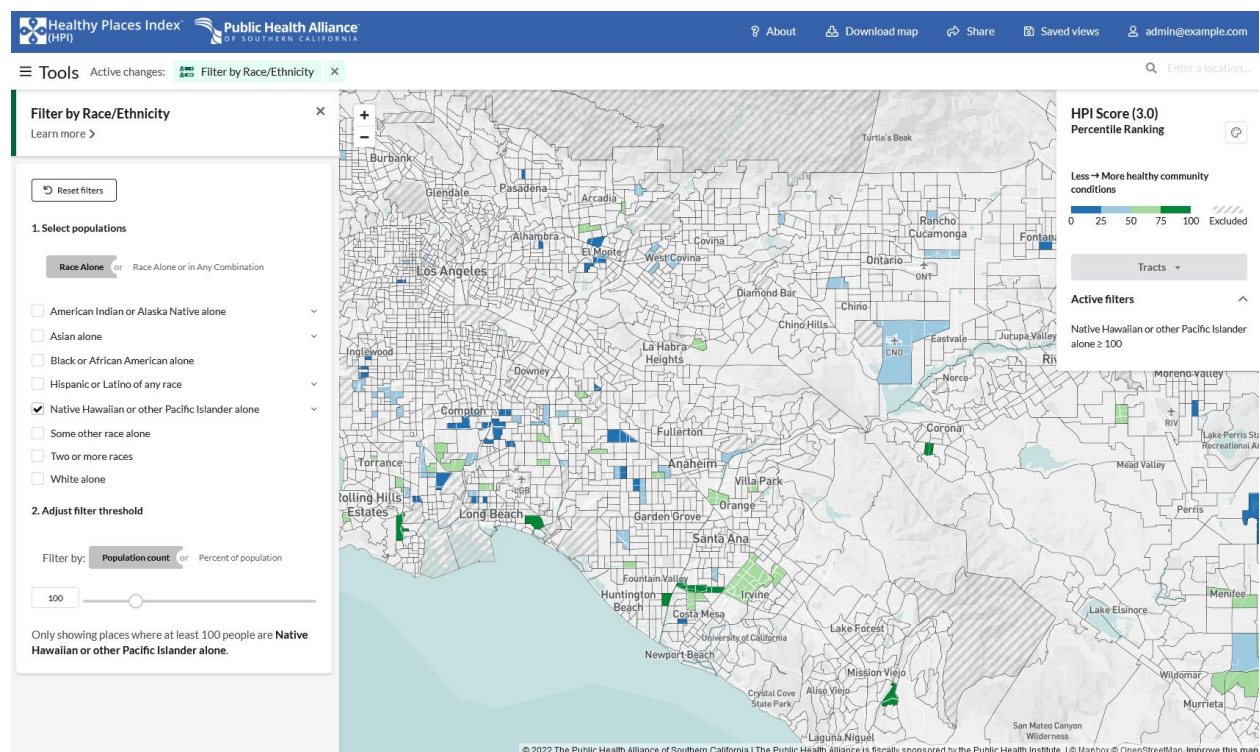


Figure 10. Filtering by Race/ethnicity

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://map.healthypacesindex.org/>. Documentation on use of the API endpoint is available through the Healthy Places Index website.

POLICY PLATFORM

Overview

The HPI is built on the premise that an important part of improving health outcomes and health equity in California 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 HPI is designed to facilitate efforts to improve community conditions on the ground by linking each HPI indicator and Climate and Health Vulnerability Indicators (CHVI) to policy action, exemplified through 31 Policy Guides. Each policy guide offers a menu of 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 and Updates

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 ⁴⁸·

⁵¹ [_ENREF_16_1_ENREF_16_1_ENREF_16_1](#)). 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 California 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.

For HPI 3.0, we reviewed the 30 policy guides from HPI 2.0 with an explicit framework to assess the level of evidence for each policy: strong, sufficient, emergent, promising, insufficient, and against (Table 16). These classifications were derived from *The Community Guide*⁵² of the Community Preventive Services Task Force and industry best practices for assessing public health evidence.

Table 16. 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.

Our recommended 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.

Of note, a few policy areas in HPI 2.0 were modified in HPI 3.0. These include a narrower scope of screening for developmental delays in children (Preschool Enrollment>Early Child Wellness) and more focused us of Ban the Box policies for employment (Employed>Build Workforce Development and Pathways). The literature suggests that more targeted application of these policies will reduce unintended adverse consequences. Review of evidence also did not support the inclusion of microenterprise support programs (Employed>Develop Community Economic Capacity), which has an inconsistent track record.

A new guide corresponding to the new indicator "Census Response Rate" was added in HPI 3.0. Research supports this indicator as a measure of social cohesion and/or social capital.^{20, 21, 53} New policies address improving census response rates in historically marginalized (social domain, 18 policies) and conducting a census during public health emergencies such as the COVID-19 pandemic (economic, 6; education, 1; housing, 5; and neighborhood, 4).

The content of all policy guides in HPI 3.0 were rewritten to reflect the CDC's style guide for framing health equity and avoiding stigmatizing language.⁵⁴

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 web tool by clicking on a given indicator, or through the stand-alone Policy Guide site.

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

Since its introduction in 2015, we have documented well over 100 instances of the HPI being used by scores of organizations from local, regional, and state government; health care organizations, advocacy groups, academics, and individuals.⁵⁵ For the purpose of documenting community need, the HPI is used in directing more than one billion of state grant-making dollars. Perhaps the most significant use case is the California Department of Public Health incorporating the HPI in metrics for implementing non-pharmacological interventions,^{56, 57} vaccine distribution,⁵⁸ and conducting public health surveillance of COVID-19, including case rates, test positivity, vaccination rates, and mortality rates.⁵⁹

Since the last update of the HPI in 2018, 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 California communities. 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.⁵⁹

The Alliance has responded to these "tri-demics" by elevating data on race/ethnicity into its COVID-19 website and the HPI 3.0 update. 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, climate change, 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.⁶⁰ Likewise, we have added new climate change layers that provide detail on predicted heat exposures due to different carbon emission levels, and population sensitivities related to age, housing stock, poverty, and outdoors work.

Updates of indicator projects must navigate the imperative of more up-to-date data with the data availability from numerous governmental organizations updating

their own data at irregular intervals, technical requirements such as census tract eligibility, methodologic and data continuity, and user feedback. Of the 25 indicators in HPI 2.0, 22 were substantively the same in HPI 3.0, and one indicator was new (census response rate). A modest number of census tracts entered or left eligibility based on population and groups quarters thresholds, and after updating data and applying the same methodology for scaling and weighting, a large percentage (82%) of the most disadvantaged quartile of census tracts were common to both HPI 2.0 and HPI 3.0.

BEST PRACTICES TO EXPLORE RACE AND PLACE

HPI is a powerful tool to reveal neighborhood conditions that drive the health of the communities. 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 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.⁶¹ 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.⁶²⁻⁶⁴

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

The HPI 3.0 has new features that adds 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 California. 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 new 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).

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. 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 Health 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 or more of these attributes, there could be a breakdown that creates a data gap. Table 17 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 Health illustrates that social drivers of health can become a routine component of public health surveillance and population-based clinical quality.⁶⁵ We are developing an interactive feature 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.

Story telling

We are in the development phase of incorporating lived experience of users and story-telling into the HPI mapping application. Links to photographs, slideshows,

Table 17. Data Attributes, Barriers, and Solutions to Close Data Gaps that Impact the Healthy Places Index

| Attribute | Barrier | Example(s) | Possible Solutions |
|----------------------------|---|--|---|
| Centralized | <ul style="list-style-type: none"> Multiple, autonomous local agencies collect data | Farm Labor Housing; bicycle/pedestrian counts | <ul style="list-style-type: none"> Require local agencies to report to State agency (HCD), and/or Provide funding to non-governmental organizations to compile from public sources |
| Standardized | <ul style="list-style-type: none"> Multiple competing indicators | Gentrification | <ul style="list-style-type: none"> Governmental adoption/endorsement or recommendation of experts |
| Complete and accurate | <ul style="list-style-type: none"> Partial coverage of eligible population Database poorly maintained | Physician to population ratio | <ul style="list-style-type: none"> Statute/regulation requiring collection of data Adoption of data quality standards by agency collecting information |
| Digitized/Machine Readable | <ul style="list-style-type: none"> Paperbound record keeping or non-standardized databases | Court records home foreclosure | <ul style="list-style-type: none"> Require agency to digitize data and/or provide funding to do so |
| Geographic Resolution | <ul style="list-style-type: none"> Data collection uses ZIP code for convenience or by statute Street address or location not geocoded to census tract | Hospitalization/emergency department rates; police related violence; | <ul style="list-style-type: none"> Modify state law to allow collection of address information to geocode to census tract Assist state agencies with funding and/or technical support to geocode address/location information |
| Public Availability | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Modify existing statutes/regulations/guidance to permit public reporting at census tract Modify internal agency policies to allow disclosure consistent with California law |

| Attribute | Barrier | Example(s) | Possible Solutions |
|-------------------------------|--|---|--|
| Statistically Reliable Sample | <ul style="list-style-type: none"> • 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; Latino subgroups; unhoused population | <ul style="list-style-type: none"> • Increases funding of data collection entity (e.g. California health Interview Survey, CHIS) to allow greater sampling and oversampling of numerically small populations • Leverage multi-year datasets by pooling • Engage with groups understand their data needs |
| Timely | <ul style="list-style-type: none"> • Data collection interval is not continuous or infrequent | Tree canopy, land cover | <ul style="list-style-type: none"> • Change of agencies' methodology/increase funding to enhance geographic detail and timeliness |
| Scope | <ul style="list-style-type: none"> • Important issue not included or dropped from data collection | Physical activity in CHIS. Reasons for WIC utilization changes; immigration status | <ul style="list-style-type: none"> • Provide stable and adequate funding to collect data • Prohibit law enforcement agencies from accessing personal identifiers in surveys |

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.

LIMITATIONS AND CHALLENGES

There were a few limitations in data availability for the update: 1) ACS data overlapped for 2015; 2) updates for some indicators (tree canopy, parks) were not available. Data on crime at the census tract was still not available from public sources. Geographically refined data on sexual orientation and gender identity are also lacking.

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.

We anticipate that, with the completion of the 2020 decennial census, census tract boundaries will change. 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 mapping application to the 2020 census boundaries.

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APPENDICES

A. HPI STEERING COMMITTEE, COMMUNICATIONS ADVISORS, FOCUS GROUPS, AND BETA TESTERS

Members of the HPI Steering Committee (HPI 2, HPI 3)

Meileen Acosta, Solano County Department of Public Health (2,3)
 Matt Beyers, Alameda County Health Department (2,3)
 Dulce Bustamante, Office of Health Equity, California Department of Public Health (2)
 Charlene Contreras, Los Angeles County Department of Public Health (2)
 Dave Dauphine, California Department of Public Health (2)
 Satvinder Dhaliwal, Fresno County Department of Public Health (2,3)
 Scott Fujimoto, Center for Health Statistics and Informatics, Cal. Dept. Public Health
 Elizabeth Gazarek, Kings County Department of Public Health (2,3)
 Solange Gould, Office of Health Equity, California Department of Public Health (2)
 Wendy Hetherington, Riverside County Department of Public Health (2,3)
 David Holstius, Bay Area Air Quality Management District (2)
 Trav Ichinose, Orange County Department of Public Health (2,3)
 Melissa Jones, Executive Director, Bay Area Regional Health Inequities Initiative (2,3)
 Tammy Lee, Alameda County Health Department (2)
 Meredith Milet, Office of Health Equity, California Department of Public Health (2,3)
 Julie Nagasako, Fusion Center for Strategic Development, Cal. Dept. of Public Health (2,3)
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 Linda Rudolph, Public Health Institute (2,3)
 Michael Samuel, Fusion Center, Cal. Dept. of Public Health (2,3)
 Paul Simon (2,3), Elizabeth Rhoades (3), William Nicholas (3), LA Co. Dept. Public Health
 Latesa Slone, California Department of Public Health (2)
 Jason Vargo, Office of Health Equity, California Department of Public Health (2)
 Jessica Harris, Sierra County Public Health (3)
 Derek Chapman (2,3), Stephen Woolf (2,3), Virginia Commonwealth University

Members of the Communications Advisory Group (HPI 2)

Elizabeth Baca, California Office of Planning and Research
 Rye Baerg, Southern California Council of Governments
 Dalila Butler, PolicyLink
 Lianne Dillon and Julia Caplan, CA Strategic Growth Council, Health In All Policies Team
 Solange Gould & Meredith Millet, California Dept. of Public Health, Office of Health Equity
 Melissa Jones, Bay Area Regional Health Inequities Initiative
 Jennifer Lopez, Kaiser
 Kate Meis and Paul Zykovsky, Local Government Commission
 Sarah Reyes, The California Endowment
 Kathi Shaff, Berkeley Media Studies Group
 Kerri Timmer, Sierra Business Council

Elva Yanez and Rob Baird, Prevention Institute

Members of HPI 3.0 Focus Groups and Beta Testers

Jackie Tran, AAPI Data Disaggregation Committee

Doreena Wong, Asian Resources

Heather Berg, San Joaquin Valley Health Coalition

Matt Beyers, BARHII and Alameda County Public Health

Grace Cotangco, Prevention Institute

Michael Castro, San Bernardino PHD

Lianne Dillon, Public Health Institute

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Andy Krackov, Hillcrest Advisory Group

Michael Kramer, Emory University

Mashariki Kudumu, March of Dimes

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Kevin Meconis, Riverside University Health System

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Pedro Spindler-Ruiz, Los Angeles

Matt Swope, Kaiser Permanente

Ventura County Public Health

Aruni Ganewatte

Erin Slack

Lucas Zucker, CAUSE

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 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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</p> <p>Numerator = S1701_C01_042E Denominator = S1701_C01_001E Numerator SE = S1701_C01_042E / 1.645 Denominator SE = S1701_C01_001M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = [(Numerator SE)² - Value*(Denominator SE)²] / Denominator</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> <p>To reframe indicator as positive: Value = 1 - (Numerator / Denominator) Numerator = Denominator - Numerator</p> |
| automobile | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> |

| | | | |
|-------------|---------------|--------|--|
| | | | <p>Value = $1 - (DP04_0058PE / 100)$ Denominator = DP04_0057E Numerator = Value * Denominator SE = $(DP04_0058PM/100) / 1.645$</p> |
| bachelorsed | ACS2019API/5Y | DP02 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>Numerator= DP02_0068E Denominator= DP02_0059E Value = Numerator / Denominator Numerator SE = DP02_0068M / 1.645 Denominator SE = DP02_0059M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then SE = $[(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then SE = $[(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| commute | ACS2019API/5Y | B08006 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>B08006_001E = Estimate of total B08006_001M = Margin of Error of total B08006_008E = Estimate of public transportation (excluding taxicab) B08006_008M = Margin of Error of public transportation (excluding taxicab) B08006_014E = Estimate of bicycle B08006_014M = Margin of Error of bicycle B08006_015E = Estimate of walked B08006_015M = Margin of Error of walked</p> |

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| | | | <p>B08006_017E = Estimate of worked at home B08006_017M = Margin of Error of worked at home</p> <p>Numerator = B08006_008E + B08006_014E + B08006_015E Denominator = B08006_001E - B08006_017E Value = Numerator/Denominator Numerator SE = $\sqrt{(B08006_008M/1.645)^2 + (B08006_014M/1.645)^2 + (B08006_015M/1.645)^2}$ Denominator SE = $\sqrt{(B08006_001M/1.645)^2 - (B08006_017M/1.645)^2}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| dieselpm | CalEPA_CES_4.0 | | <p>URL: https://services1.arcgis.com/PCHfdHz4GIDNAhBb/ArcGIS/rest/services/DraftResultsCES4082520/FeatureServer/</p> <p>Value = diesel_4_0</p> |
| employed | ACS2019API/5Y | S2301 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>Denominator = S2301_C01_021E Value = S2301_C03_021E / 100 Numerator = Value * Denominator SE = (S2301_C03_021M/100) / 1.645</p> |

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| h20contam | CalEPA_CES_4.0 | | <p>URL: https://services1.arcgis.com/PCHfdHz4GIDNAhBb/ArcGIS/rest/services/DraftResultsCES4082520/FeatureServer/</p> <p>Value = drink_4_0</p> |
| homeownership | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>Numerator = DP04_0046E Denominator = DP04_0045E Value = Numerator / Denominator Numerator SE = DP04_0046M / 1.645 Denominator SE = DP04_0045M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = [(Numerator SE)² - Value*(Denominator SE)²] / Denominator</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> |

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|--------------|----------------------------------|---------------------------------|---|
| houstorepair | CHAS_2013-2017_Tables15A_15B_15C | Table 15A, Table 15B, Table 15C | <p>URL: https://www.huduser.gov/portal/datasets/cp.html#2006-2017_data</p> <p>ACS cannot be used because kitchen and plumbing are not exclusive of each other</p> <p>T15A_est3 = Estimate of owner occupied with mortgage AND has complete kitchen and plumbing facilities</p> <p>T15A_moe3 = Margin of Error of owner occupied with mortgage AND has complete kitchen and plumbing facilities</p> <p>T15B_est3 = Estimate of owner occupied with no mortgage AND has complete kitchen and plumbing facilities</p> <p>T15B_moe3 = Margin of Error of owner occupied with no mortgage AND has complete kitchen and plumbing facilities</p> <p>T15C_est3 = Estimate of renter occupied AND has complete kitchen and plumbing facilities</p> <p>T15C_moe3 = Margin of Error of renter occupied AND has complete kitchen and plumbing facilities</p> <p>T15A_est1 = Estimate of owner occupied with mortgage</p> <p>T15A_moe1 = Margin of Error of owner occupied with mortgage</p> <p>T15B_est1 = Estimate of owner occupied with no mortgage</p> <p>T15B_moe1 = Margin of Error of owner occupied with no mortgage</p> <p>T15C_est1 = Estimate of renter occupied</p> <p>T15C_moe1 = Margin of Error of renter occupied</p> <p>Numerator = T15A_est3 + T15B_est3 + T15C_est3</p> <p>Denominator = T15A_est1 + T15B_est1 + T15C_est1</p> <p>Value = (Numerator/denominator)</p> <p>Numerator SE = $\text{SQRT}((T15A_moe3/1.645)^2 + (T15B_moe3/1.645)^2 + (T15C_moe3/1.645)^2)$</p> <p>Denominator SE = $\text{SQRT}((T15A_moe1/1.645)^2 + (T15B_moe1/1.645)^2 + (T15C_moe1/1.645)^2)$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then</p> <p>$\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then</p> <p>$\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
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|-----------------|---------------|--------|---|
| percapitaincome | ACS2019API/5Y | B19301 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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)</p> <p>Value = B19301_001E SE = B19301_001M / 1.645</p> |
| inhighschool | ACS2019API/5Y | S1401 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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;</p> <p>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</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator</p> |
| inpreschool | ACS2019API/5Y | S1401 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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;</p> |

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| | | | <p>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</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator</p> |
| insured | ACS2019API/5Y | S2701 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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</p> <p>Numerator= S2701_C02_012E Denominator= S2701_C01_012E Value = Numerator/denominator SE = S2701_C03_012M /1.645</p> |

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|--------------------------------|---------------------|--------------|--|-----|-----------|-----------|----------|-----|
| 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 $\text{Numerator} = T8_est10 + T8_est23 + T8_est36$ $\text{Denominator} = T8_est2$ $\text{Value} = \text{Numerator}/\text{denominator}$ $\text{Denominator SE} = T8_moe2/1.645$ $\text{Numerator SE} = \sqrt{(T8_moe10/1.645)^2 + (T8_moe23/1.645)^2 + (T8_moe36/1.645)^2}$ Rent Severe $\text{Numerator} = T8_est76 + T8_est89 + T8_est102$ $\text{Denominator} = T8_est68$ $\text{Value} = \text{Numerator}/\text{denominator}$ $\text{Denominator SE} = T8_moe68/1.645$ $\text{Numerator SE} = \sqrt{(T8_moe76/1.645)^2 + (T8_moe89/1.645)^2 + (T8_moe102/1.645)^2}$ For both Own Severe and Rent Severe: If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ | | | | | |
| 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_moe 10 | T8_est3 | | T8_est76 | T8_moe76 | T8_est69 | |
| 30-50 | T8_est23 | T8_moe 23 | T8_est16 | | T8_est89 | T8_moe89 | T8_est82 | |
| 50-80 | T8_est36 | T8_moe 36 | T8_est29 | | T8_est102 | T8_moe102 | T8_est95 | |

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| ozone | CalEPA_CES_4.0 | | <p>URL: https://services1.arcgis.com/PCHfdHz4GIDNAhBb/ArcGIS/rest/services/DraftResultsCES4082520/FeatureServer/</p> <p>Value = ozone_4_0</p> |
| parkaccess | CDPH_HCI | HCI_AccessToParks_469_CA_RE_CO_CD_PL_CT-7-3-2017-ADA.xlsx | <p>URL: https://www.cdph.ca.gov/Programs/OHE/Pages/HCI-Search.aspx</p> <p>Value = Estimate / 100 SE = se / 100</p> |
| pm25 | CalEPA_CES_4.0 | | <p>URL: https://services1.arcgis.com/PCHfdHz4GIDNAhBb/ArcGIS/rest/services/DraftResultsCES4082520/FeatureServer/</p> <p>Value = pm_4_0</p> |
| retail | USEPA | SmartLocation Database 3.0 (2021) | <p>URL: https://geodata.epa.gov/arcgis/rest/services/OA/SmartLocationDatabase/MapServer/3/ Note: files is at census block group (CBG) and must be aggregated to census tract</p> <p>D1C8_Ret = Gross retail (8-tier) employment density (jobs/acre) on unprotected land D1C8_Ent = Gross entertainment (8-tier) employment density (jobs/acre) on unprotected land D1C8_Ed = Gross education(8-tier) employment density (jobs/acre) on unprotected land D1C8_SVC = Gross service (8-tier) employment density (jobs/acre) on unprotected land</p> <p>Value = D1C8_RET + D1C8_ENT + D1C8_SVC + D1C8_ED</p> |

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| treecanopy | HCI/National Land Cover Database | BRACE_TreeCanopy_458_CT_PL_CO_RE_CA | <p>URL: https://www.cdph.ca.gov/Programs/OHE/Pages/HCI-Search.aspx</p> <p>Value = (100 - estimate) / 100</p> <p>SE = SE/100</p> |
| uncrowded | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>DP04_0077M = Margin of Error of occupants per room - Occupied housing units - 1.00 or less</p> <p>DP04_0076M = Margin of Error of occupants per room - Occupied housing units</p> <p>DP04_0077E = Estimate of occupants per room- Occupied housing units - 1.00 or less</p> <p>DP04_0076E = Estimate of occupants per room- Occupied housing units</p> <p>Numerator= DP04_0077E</p> <p>Denominator= DP04_0076E</p> <p>Value = Numerator/denominator</p> <p>Numerator SE = DP04_0077M /1.645</p> <p>Denominator SE = DP04_0076M /1.645</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then</p> <p>SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then</p> <p>SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator</p> |
| voting | UC_Berkeley_Statewide_Database | | <p>URL: https://statewidedatabase.org/d10/g20.html</p> <p>Crosswalk source: https://statewidedatabase.org/d10/g20_geo_conv.html</p> <p>Note: files is at census block group (CBG) and must be aggregated to census tract</p> <p>PCTRGPREC = Percent of total registered voters in the RG precinct that are located within the transecting census block</p> <p>BLKREG = Voter registration by block</p> <p>TOTREG_R = Registered Voters (from crosswalk variable TOTREG_R)</p> |

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| | | | <p>Numerator = $PCTRGPREC/100 * TOTREG_R$</p> <p>Denominator = BLKREG</p> <p>Value = Numerator / Denominator</p> <p>SE = $\sqrt{value * (1 - value) / denominator}$</p> |
| census | Dec2020CensusAPI | Response Rate | <p>URL: https://api.census.gov/data/2020/dec/responserate/variables.html</p> <p>Note: file uses 2020 census tracts and must be crosswalked to 2010 tracts.</p> <p>CRALL = Cumulative Self-Response Rate - Overall</p> <p>Value = CRALL</p> |

Decision Support Layer Data Dictionary (Alphabetical)

| Variable Name | Data Source | Table | Variable(s) |
|---------------|--------------------------------------|-------|---|
| Age_under5 | ACS_18_5YR_S0101 | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Percent of population aged younger than 5 |
| Age5_14 | ACS_18_5YR_S0101 | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Percent of population aged between 5-14 |
| air_pollution | US EPA, Sites Reporting to EPA, 2021 | | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| aircon | RAS 2009 | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Percent of households with air conditioning |
| alcoffsale | CDPH/ABC | | URL: https://www.cdph.ca.gov/Programs/OHE/Pages/HCI-Search.aspx HCI_AlcoholOutletsQ_774_CA_RE_CO_CD_PL_CT-A-N-5-16-14.xlsx HCI_AlcoholOutletsQ_774_CO_CD_PL_CT-O-Y-5-16-14.xlsx Excel files must be appended and filtered for race_eth_code==9 & geotype=="CT" & (license_type == "Off_sale") Percent = alcoffsale_pct SE = alcoffsale_se_pct |
| alconsale | | | URL: https://www.cdph.ca.gov/Programs/OHE/Pages/HCI-Search.aspx Excel files must be appended and filtered for race_eth_code==9 & geotype=="CT" & (license_type == "On_sale") Percent = alconsale_pct SE = alconsale_se_pct |

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|----------------|--|-----------------|---|
| AllHUDunits_17 | 2015 HUD Picture of Subsidized Households; ACS2017API/5Y | B25002 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Number of housing units subsidized by any HUD program, for every 1,000 housing units</p> |
| asthma | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts</p> <p>Numerator = Number of people ever diagnosed with asthma</p> <p>Value = Percent of people ever diagnosed with asthma</p> <p>Value = data provided / 100</p> <p>Denominator = Value / Numerator</p> |
| asthmaer | CalEnviroScreen 3.0 | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Spatially modeled, age-adjusted rate of emergency department (ED) visits for asthma per 10,000</p> |
| broadband | ACS2019API/5Y/ | B28009 / B28003 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>For race/ethnicity stratified indicators:</p> <p>B28009_001E = Estimate of Total Households</p> <p>B28009_001M = Margin of Error of Total Households</p> <p>B28009_004E = Estimate of total households that have a computer with broadband internet</p> <p>B28009_004M = Margin of Error of total households that have a computer with broadband internet</p> <p>Value = B28009_004E / B28009_001E</p> <p>SE = [(B28009_004M / 1.645) ^2] / [(B28009_001M / 1.645) ^2]</p> |

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| | | | <p>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</p> <p>Value = $B28003_004E / B28003_001E$ SE = $[(B28003_004M / 1.645)^2] / [(B28003_001M / 1.645)^2]$</p> |
| brownfields | US EPA, Sites Reporting to EPA, 2021 | | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| CA_American_Indian_Areas | Census TIGER/line, 2019 and American Community Survey, 2019 | B01001 | URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html B01001_001E = Total Estimate |
| census_participation | Race_Counts_2017 | 2017 | URL: https://www.racecounts.org/ Value (provided in percentage format) were provided by Race Counts Value = Percent of population who participated in the 2010 decennial census Value = data provided / 100 |
| CES30Score | CalEnviroScreen 3.0 | | URL: https://oehha.ca.gov/calenviroscreen/ Value = CES 3.0 Score Pctile_st = CES 3.0 Percentile |
| CES40Score | CalEnviroScreen 4.0 | | URL: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40 Value = CIscore Pctile_st = CIscoreP |

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| childpoverty | ACS2019API/5Y | S1701 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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</p> <p>Numerator = S1701_C02_002E Denominator = S1701_C01_002E Proportion = Numerator/Denominator SE(proportion)= (S1701_C01_003M/100) /1.645</p> |
| children | ACS2015API/5Y | S0101 | <p>URL: https://api.census.gov/data/2015/acs/acs5/variables.html</p> <p>HC01_EST_VC01 = Estimate of total population HC01_EST_VC03 = Estimate of population under 5 years old (percent) HC01_MOE_VC03 = Margin of error of population under 5 years old</p> <p>Denominator = HC01_EST_VC01 Numerator = HC01_EST_VC01* HC01_EST_VC03/100 Percent = HC01_EST_VC03 pct_se = HC01_MOE_VC03/1.645</p> |

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| chrabs | Cal Dept of Ed | chronicabsenteeism19 | <p>URL: https://www.cde.ca.gov/ds/ad/filesabd.asp</p> <p>Percent of K-12 students absent for ³ 10% of eligible school days, 2018-2019</p> <p>Download txt file: https://www3.cde.ca.gov/demo-downloads/attendance/chrabs1819.txt</p> <p>File contains State, County (C), District, and School levels (AggregateLevel) for multiple race/ethnicities (TA = ALL), for School types (CharterSchool):</p> <p>For county averages, filter file:</p> <p>AggregateLevel == "C" & ReportingCategory == "TA" & CharterSchool == "All" "</p> <p>Numerator = ChronicAbsenteeismCount Denominator = ChronicAbsenteeismEligibleCumulativeEnrollment Value = numerator/denominator SE = sqrt(value*(1-value)/denominator) binomial se for a percent</p> |
| chronic_absenteeism | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 100 students/staff) and numerator were provided by Race Counts</p> <p>Numerator = Estimate of chronically absent students per 100 students Value = Rate of chronically absent students per 100 students</p> <p>Value = data provided Denominator = (Value/100) / Numerator</p> |
| civilianveteran | ACS2019API/5Y | S0102 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>S0102_C01_041E = Estimate of civilian population S0102_C01_042E = Percent estimation of civilian veterans over 18 S0102_C01_042M = Margin of error of civilian veterans over 18</p> |

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|------------|----------------|-----------------|--|
| | | | <p>Numerator = S0102_C01_041E*(S0102_C01_042E/100)</p> <p>Denominator = S0102_C01_041E</p> <p>Proportion = S0102_C01_042E/100</p> <p>SE(proportion) = (S0102_C01_042E/100)/1.645</p> |
| computer | ACS2019API/5Y/ | B28009 / B28004 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>For race/ethnicity stratified indicators:</p> <p>B28009_001E = Estimate of Total Households</p> <p>B28009_001M = Margin of Error of Total Households</p> <p>B28009_002E = Estimate of total households that have a computer</p> <p>B28009_002M = Margin of Error of total households that have a computer</p> <p>Value = B28009_002E / B28009_001E</p> <p>SE = [(B28009_002M / 1.645) ^2] / [(B28009_001M / 1.645) ^2]</p> <p>For census-tract level indicator:</p> <p>B28003_001E = Estimate of Total Households</p> <p>B28003_001M = Margin of Error of Total Households</p> <p>B28003_002E = Estimate of total households the have a computer</p> <p>B28003_002M = Margin of Error of total households that have a computer</p> <p>Value = B28003_002E / B28003_001E</p> <p>SE = [(B28003_002M / 1.645) ^2] / [(B28003_001M / 1.645) ^2]</p> |
| crime_rate | UCR/CDPH, 2015 | | <p>URL: https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx</p> <p>filter on Violent crime total</p> <p>value = rate</p> <p>se = se</p> |

| | | | |
|-------------------------|--|-------------|--|
| DaysAbove100F_2035_2064 | CalAdapt_CanESM2_CNRM CM5_HadGEM2-ES_MIROC5_LOCA_RCP8.5 | 2035 - 2064 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of days above 100F in Mid-Century (2035 - 2064) under the RCP 8.5 scenario, using data from California's four priority global climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5).</p> |
| DaysAbove100F_2070_2099 | CalAdapt_CanESM2_CNRM CM5_HadGEM2-ES_MIROC5_LOCA_RCP8.5 | 2070 - 2099 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of days above 100F in End of Century (2070 – 2099) under the RCP 8.5 scenario, using data from California's four priority global climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5).</p> |
| DaysAbove90F_2035_2064 | CalAdapt_CanESM2_CNRM CM5_HadGEM2-ES_MIROC5_LOCA_RCP8.5 | 2035 - 2064 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of days above 90F in Mid-Century (2035 - 2064) under the RCP 8.5 scenario, using data from California's four priority global climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5).</p> |
| DaysAbove90F_2070_2099 | CalAdapt_CanESM2_CNRM CM5_HadGEM2-ES_MIROC5_LOCA_RCP8.5 | 2070 - 2099 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of days above 90F in End of Century (2070 – 2099) under the RCP 8.5 scenario, using data from California's four priority global climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5).</p> |

| deathsdespair | CDC WONDER | Underlying cause, 2015-2019 | <div>URL: https://wonder.cdc.gov/ucd-icd10.html</div> <div>https://www.jec.senate.gov/public/index.cfm/republicans/methodological-appendix-to-long-term-trends-in-deaths-of-despair/</div> <table><thead><tr><th>ICD Version</th><th>Years in Use, U.S.</th><th>Suicide</th><th>Alcohol-Related Deaths</th><th>Drug-Related Deaths</th></tr></thead><tbody><tr><td>10</td><td>1999-2016</td><td>X60-X84, Y87.0</td><td>E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15</td><td>F11-16, X40-44, Y10-14</td></tr></tbody></table> <div>1. Group by: County 2. Location: California 4. Years: 2015-2019 6. Cause of Deaths: ICD Codes Advanced Finder Options Open (Expand) ICD codes and move to selection box</div> <div>Numerator = Deaths/5 Denominator = Population/5 Value = 100000*Deaths/Population Se = value/sqrt(Deaths)</div> | ICD Version | Years in Use, U.S. | Suicide | Alcohol-Related Deaths | Drug-Related Deaths | 10 | 1999-2016 | X60-X84, Y87.0 | E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15 | F11-16, X40-44, Y10-14 |
|---------------|--------------------|-----------------------------|---|------------------------|--------------------|---------|------------------------|---------------------|----|-----------|----------------|--|------------------------|
| ICD Version | Years in Use, U.S. | Suicide | Alcohol-Related Deaths | Drug-Related Deaths | | | | | | | | | |
| 10 | 1999-2016 | X60-X84, Y87.0 | E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15 | F11-16, X40-44, Y10-14 | | | | | | | | | |

demographic
variables

ACS2019API/5Y

B02014,
B02015,
B02016,
B02017,
B02018,
B02019,
B03001,
B03002

URL: <https://api.census.gov/data/2019/acs/acs5/variables.html>

Numerator = See table below

Denominator = _001E of each respective table

Proportion = Numerator / Denominator

| B02014 (AIAN alone) | | B02016 (NHPI alone) | | B02018 (Asian alone or in combination) | |
|---|--------------|--|--------------|--|--------------|
| Variable Name | ACS Variable | Variable Name | ACS Variable | Variable Name | ACS Variable |
| alaska_native_not_specified_pct | B02014_053E | fijian_pct | B02016_009E | asian_indian_combo_pct | B02018_002E |
| alaskan_athabascan_pct | B02014_047E | other_melanesian_pct | B02016_010E | bangladeshi_combo_pct | B02018_003E |
| aleut_pct | B02014_048E | guamanian_or_chamorro_pct | B02016_006E | bhutanese_combo_pct | B02018_004E |
| all_other_american_indian_tribes_pct | B02014_044E | marshallese_pct | B02016_007E | burmese_combo_pct | B02018_005E |
| american_indian_not_specified_pct | B02014_045E | other_micronesia_pct | B02016_008E | cambodian_combo_pct | B02018_006E |
| american_indian_or_alaska_native_tribes_not_specified_pct | B02014_054E | other_pacific_islander_pct | B02016_011E | chinese_combo_pct | B02018_007E |
| apache_pct | B02014_003E | native_hawaiian_pct | B02016_002E | filipino_combo_pct | B02018_008E |
| arapaho_pct | B02014_004E | other_polynesian_pct | B02016_005E | hmong_combo_pct | B02018_009E |
| blackfeet_pct | B02014_005E | samoan_pct | B02016_003E | indonesian_combo_pct | B02018_010E |
| canadian_and_french_american_indian_pct | B02014_006E | tongan_pct | B02016_004E | japanese_combo_pct | B02018_011E |
| central_american_indian_pct | B02014_007E | two_or_more_nhpi_pct | B02016_012E | korean_combo_pct | B02018_012E |
| cherokee_pct | B02014_008E | B02017 (AIAN alone or in combination) | | laotian_combo_pct | B02018_013E |
| cheyenne_pct | B02014_009E | Variable Name | ACS Variable | malaysian_combo_pct | B02018_014E |
| chickasaw_pct | B02014_010E | alaska_native_not_specified_combo_pct | B02017_053E | mongolian_combo_pct | B02018_015E |
| chippewa_pct | B02014_011E | alaskan_athabascan_combo_pct | B02017_047E | 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 | 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 | marshalllese_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/Latino by Origin) | |
| pueblo_pct | B02014_032E | houma_combo_pct | B02017_020E | Variable Name | ACS Variable |
| puget_sound_salish_pct | B02014_033E | inupiat_combo_pct | B02017_049E | central_american_pct | B03001_008E |
| seminole_pct | B02014_034E | iroquois_combo_pct | B02017_021E | central_american_costa_rican_pct | B03001_009E |
| shoshone_pct | B02014_035E | kiowa_combo_pct | B02017_022E | central_american_guatemalan_pct | B03001_010E |
| sioux_pct | B02014_036E | lumbee_combo_pct | B02017_023E | central_american_honduran_pct | B03001_011E |

| | | | | | |
|---|---------------------|-----------------------------------|-------------|---|-------------|
| south_american_indian_pct | B02014_037E | menominee_combo_pct | B02017_024E | central_american_nicaraguan_pct | B03001_012E |
| spanish_american_indian_pct | B02014_038E | mexican_american_indian_combo_pct | B02017_025E | central_american_other_central_american_p ct | B03001_015E |
| tlingit-haida_pct | B02014_050E | navajo_combo_pct | B02017_026E | central_american_panamanian_pct | B03001_013E |
| tohono_o'odham_pct | B02014_039E | osage_combo_pct | B02017_027E | central_american_salvadoran_pct | B03001_014E |
| tsimshian_pct | B02014_051E | ottawa_combo_pct | B02017_028E | cuban_pct | B03001_006E |
| two_or_more_american_indian_or_alaska_na tive_tribes_pct | B02014_055E | paiute_combo_pct | B02017_029E | dominican_pct | B03001_007E |
| ute_pct | B02014_040E | pima_combo_pct | B02017_030E | mexican_pct | B03001_004E |
| yakama_pct | B02014_041E | potawatomi_combo_pct | B02017_031E | other_hispanic_or_latino_pct | B03001_027E |
| yaqui_pct | B02014_042E | pueblo_combo_pct | B02017_032E | other_hispanic_or_latino_all_other_hispanic _or_latino_pct | B03001_031E |
| yuman_pct | B02014_043E | puget_sound_salish_combo_pct | B02017_033E | other_hispanic_or_latino_spaniard_pct | B03001_028E |
| yup'ik_pct | B02014_052E | seminole_combo_pct | B02017_034E | other_hispanic_or_latino_spanish_pct | B03001_029E |
| B02015 (Asian alone) | | shoshone_combo_pct | B02017_035E | other_hispanic_or_latino_spanish_american _pct | B03001_030E |
| Variable Name | ACS Variable | sioux_combo_pct | B02017_036E | puerto_rican_pct | B03001_005E |
| asian_indian_pct | B02015_002E | south_american_indian_combo_pct | B02017_037E | south_american_pct | B03001_016E |
| bangladeshi_pct | B02015_003E | spanish_american_indian_combo_pct | B02017_038E | south_american_argentinean_pct | B03001_017E |
| bhutanese_pct | B02015_004E | tlingit-haida_combo_pct | B02017_050E | south_american_bolivian_pct | B03001_018E |
| burmese_pct | B02015_005E | tohono_o'odham_combo_pct | B02017_039E | south_american_chilean_pct | B03001_019E |
| cambodian_pct | B02015_006E | tsimshian_combo_pct | B02017_051E | south_american_colombian_pct | B03001_020E |
| chinese_pct | B02015_007E | ute_combo_pct | B02017_040E | south_american_ecuadorian_pct | B03001_021E |
| filipino_pct | B02015_008E | yakama_combo_pct | B02017_041E | south_american_other_south_american_pct | B03001_026E |
| hmong_pct | B02015_009E | yaqui_combo_pct | B02017_042E | south_american_paraguayan_pct | B03001_022E |
| indonesian_pct | B02015_010E | yuman_combo_pct | B02017_043E | south_american_peruvian_pct | B03001_023E |
| japanese_pct | B02015_011E | yup'ik_combo_pct | B02017_052E | south_american_uruguayan_pct | B03001_024E |
| korean_pct | B02015_012E | | | south_american_venezuelan_pct | B03001_025E |

| | |
|-------------------------------|-------------|
| 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 |

| B03002 (Hispanic/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 |

| Variable | Source | Table | Variable(s) |
|------------------|------------------|-------|--|
| denied_mortgages | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of denied mortgage applications denied Value = Percent of denied mortgage applications denied</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| disability | ACS2019API/5Y | S1810 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html , variables in parentheses</p> <p>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)</p> <p>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</p> |

| | | | |
|-----------------|----------------|------------------------|--|
| Disability65 | ACS2018API/5Y | B1810 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of population 65 years and older with disabilities</p> |
| diversity_index | ACS2019API/5Y | DP05 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>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</p> |
| edspend | Cal Dept of Ed | Current Expense, 18-19 | <p>URL: https://www.cde.ca.gov/ds/fd/ec/currentexpense.asp</p> <p>Download Excel file (https://www.cde.ca.gov/ds/fd/ec/documents/currentexpense1819.xlsx)</p> <p>Select County Averages tab, cut-paste County, EDP 365, Current Expense ADA, Current Expense per ADA fields for 58 counties into CDOEcurrentexpense18-19/csv, add GEO_ID identifier column. Numerator = EDP365 Denominator = CurrentExpenseADA Value = CurrentExpensePerADA SE = NA</p> |

| | | | |
|---------------------|--|----------------|---|
| EH_RCP8.5_2035_2064 | CalAdapt_CanES M2_CNRM CM5_HadGEM2-ES_MIROC5_LO CA_RCP8.5 | 2035 - 2064 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of extreme heat days in Mid-Century (2035 - 2064) under the RCP 8.5 scenario. Defined as the projected number of days above the 98th percentile of daily maximum temperatures (based on observed historical data from 1961 – 1990 between April and October).</p> |
| EH_RCP8.5_2070_2099 | CalAdapt_CanES M2_CNRM CM5_HadGEM2-ES_MIROC5_LO CA_RCP8.5 | 2070 - 2099 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected number of extreme heat days in End of Century (2070 – 2099) under the RCP 8.5 scenario. Defined as the projected number of days above the 98th percentile of daily maximum temperatures (based on observed historical data from 1961 – 1990 between April and October).</p> |
| electeds_diff | ACS2019API/5Y WhoLeadsUS | DP05 N/A | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>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.</p> <p>$pct_nonwhite = (DP05_0071 + DP05_0078 + DP05_0079 + DP05_0080 + DP05_0081 +$</p> |

| | | | |
|--------------|---------------|--------|--|
| | | | <p>DP05_0082 + DP05_0083) / DP05_0070</p> <p>elected_nonwhite = Recode of White.Non.White, 1 = Non-White, 0 = White, NA = Unknown</p> <p>pct_elected_nonwhite = sum of elected_nonwhite per county / total elected officials per county</p> <p>Value = pct_elected_nonwhite - pct_nonwhite</p> |
| english_itvw | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>Each variable has an estimate and margin of error (MOE)</p> <p>C16001_001 = Total population over age 5</p> <p>C16001_005 = Spanish speakers who speak English "less than very well"</p> <p>C16001_008 = French speakers who speak English "less than very well"</p> <p>C16001_011 = German speakers who speak English "less than very well"</p> <p>C16001_014 = Russian speakers who speak English "less than very well"</p> <p>C16001_017 = Other Indo-European language speakers who speak English "less than very well"</p> <p>C16001_020 = Korean speakers who speak English "less than very well"</p> <p>C16001_023 = Chinese speakers who speak English "less than very well"</p> <p>C16001_026 = Vietnamese speakers who speak English "less than very well"</p> <p>C16001_029 = Tagalog speakers who speak English "less than very well"</p> <p>C16001_032 = Other A/PI speakers who speak English "less than very well"</p> <p>C16001_035 = Arabic speakers who speak English "less than very well"</p> <p>C16001_038 = Other and Unspecified language speakers who speak English "less than very well"</p> <p>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</p> <p>Denominator = C16001_001</p> <p>Value = Numerator / Denominator</p> <p>Numerator SE = $\sqrt{(C16001_005 \text{ MOE} / 1.645)^2 + (C16001_008 \text{ MOE} / 1.645)^2 + (C16001_011 \text{ MOE} / 1.645)^2 + (C16001_014 \text{ MOE} / 1.645)^2 + (C16001_017 \text{ MOE} / 1.645)^2 + (C16001_020 \text{ MOE} / 1.645)^2 + (C16001_023 \text{ MOE} / 1.645)^2 + (C16001_026 \text{ MOE} / 1.645)^2 + (C16001_029 \text{ MOE} / 1.645)^2 + (C16001_032 \text{ MOE} / 1.645)^2 + (C16001_035 \text{ MOE} / 1.645)^2 + (C16001_038 \text{ MOE} / 1.645)^2}$</p> |

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| | | <p>$(C16001_035 \text{ MOE} / 1.645)^2$ Denominator SE = $C16001_001 \text{ MOE} / 1.645$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| englishspeak | ACS2015API/5Y | <p>URL: https://api.census.gov/data/2015/acs/acs5/variables.html</p> <p>HD01_VD04 = Estimate of Spanish-speaking limited English speaking household HD02_VD04 = Margin of error of Spanish-speaking limited English speaking household HD01_VD07 = Estimate of other Indo-European language speaking limited English speaking household HD02_VD07 = Margin of error of other Indo-European language speaking limited English speaking household HD01_VD10 = Estimate of Asian and Pacific Island language speaking limited English speaking household HD02_VD10 = Margin of error of Asian and Pacific Island language speaking limited English speaking household HD01_VD13 = Estimate of other language speaking limited English speaking household HD02_VD13 = Margin of error of other language speaking limited English speaking household HD01_VD01 = Estimate of total population HD02_VD01 = Margin of error of total population</p> <p>Numerator = Denominator - (HD01_VD04 + HD01_VD07 + HD01_VD10 + HD01_VD13) Denominator = HD01_VD01 Percent = $(100 - \text{Numerator} / \text{denominator}) \times 100$ Numerator SE = $\sqrt{(\text{HD02_VD04} / 1.645)^2 + (\text{HD02_VD07} / 1.645)^2 + (\text{HD02_VD10} / 1.645)^2 + (\text{HD02_VD13} / 1.645)^2}$ Denominator SE = $\text{HD02_VD01} / 1.645$</p> |

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| | | | <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| EOZ | California Qualified Opportunity Zones | | <p>URL: http://dof.ca.gov/Forecasting/Demographics/opportunity_zones/</p> <p>Value = Yes/No whether area is qualified opportunity zone</p> |
| ExposedWorkers_2016 | CA_EDD2016 & DOL_ONET2019 | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of workers in "high environmental exposure occupations," defined as occupations in which over 50% of time is spent in a place that is not an indoor, air-conditioned space.</p> |
| ExposedWorkers_2026 | CA_EDD2026 & DOL_ONET2019 | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Projected percent of workers in "high environmental exposure occupations" (over 50% of time spent in a place that is not an indoor, air-conditioned space) in 2026</p> |
| femalegender | ACS2019API/5Y | DP05 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>DP05_0001E = Estimate of total population DP05_0003E = Estimate of female population DP05_0003PM = Percent margin of error of female population</p> <p>Numerator = DP05_0003E Denominator = DP05_0001E Proportion = DP05_0003E / DP05_0001E SE(proportion) = (DP05_0003PM / 100) / 1.645</p> |

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| Five Hundred Cities: ARTHRITIS BPHIGH CANCER CASTHMA CHD COPD DIABETES KIDNEY MHLTH PHLTH STROKE LPA CSMOKING BINGE OBESITY | PLACES (CDC) | 12/2020 | <p>URL: https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Local-Data-for-Better-Health-Census-Tract-D/cwsq-ngmh</p> <p>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 state (StateAbbr = CA) and measure ID (ex. measureid = DIABETES)</p> <p>Crude prevalence in adults > 18 years = CrdPrev</p> |
| foodinsecure | County Health Rankings, 2021 | Food Insecure | <p>URL: https://www.countyhealthrankings.org/explore-health-rankings/rankings-data-documentation</p> <p>Download Excel data file, filter on California, cut and paste # Food Insecure, Percent Food Insecure, FIPS, and County name into new file (CHR2021_FoodInsecure2018.csv)</p> <p>Numerator = # Food Insecure Denominator = # Food Insecure/(Percent Insecure/100) Value = Percent Insecure/100 SE = $\sqrt{\text{value} \times (1 - \text{value}) / \text{denominator}}$ - binomial se for a percent</p> |

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| foreignborn_citizen | ACS2019API/5Y | B05003A | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p> 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 </p> <p> 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, $\sqrt{\text{sum}((\text{MOE}/1.645)^2)}$ Denominator SE = For every foreign-born total margin of error, $\sqrt{\text{sum}((\text{MOE}/1.645)^2)}$ </p> <p> If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ </p> <p> If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ </p> |
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| foreignborn_notcitizen | ACS2019API/5Y/ | B05003A :I | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p> 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 </p> <p> 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, $\sqrt{\sum((MOE/1.645)^2)}$ </p> <p> If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $SE = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ </p> <p> If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $SE = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$ </p> |
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| frm | California Department of Education | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of K-12 students eligible for the Free & Reduced Meal Program in all school sites located in this census tract.</p> |
| gini (county and city) | ACS2015API/5Y | B19083 | <p>URL: http://data.census.gov</p> <p>gini_pct = HD01_VD01 gini_se_pct = HD02_VD01/1.645</p> |
| got_help | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of people who sought help for mental/emotional or alcohol/drug Issues Value = Percent of people who sought help for mental/emotional or alcohol/drug Issues</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| gr3_ela_scores | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of 3rd graders scoring proficient or better in English Language Arts Value = Percent of 3rd graders scoring proficient or better in English Language Arts</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |

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| gr3_math_scores | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate 3rd graders scoring proficient or better in Mathematics Value = Percent of 3rd graders scoring proficient or better in Mathematics</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| hazardous_waste | US EPA, EJSCREEN, 2020 | | <p>URL: https://geopub.epa.gov/arcgis/rest/services/ejscreen/ejscreen_v2020/MapServer/</p> |
| HCVunits_17 | 2015 HUD Picture of Subsidized Households; ACS2017API/5Y | B25004 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Housing Choice Voucher units, for every 1,000 housing units</p> |
| heartattack | CalEnviroScreen 3.0 | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Spatially modeled, age-adjusted rate of emergency department visits for acute myocardial infarction per 10,000</p> |
| hi_score | ACS | DP03, DEC_10_DP_DPDP1, DP02, B19301, DP04; S1701 | <p>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</p> |
| homeless | USHUD/ACS/National Coalition to End; ACS2019API/5Y | Interactive Map by County/COC | <p>URL (numerator): https://endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-dashboards/?State=California</p> <p>URL (denominator): URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> |

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| | | (num); DP05_00 70E (denom) | <p>Select last 10 years from options box</p> <p>Scroll down to time series (line graphs) of county of Continuum of Care (CoC)</p> <p>Move cursor over data points for 2015 to 2019 and manually enter into a spreadsheet with county population 5-year annual average counts</p> <p>Calculate 5-year (2015-2019) annual average number of residents (CA_Homeless2019.csv)</p> <p>Downscaling of county-specific expected 5 year annual average homeless counts (numerator) for COCs covering multiple counties is CoC rate ´ county population</p> <p>Numerator = 5-year annual average of homeless counts (manually entered)</p> <p>Denominator = DP05_0070E</p> <p>Value = 10,000*numerator/denominator</p> <p>SE = value/sqrt(numerator * 5)</p> <p>Nevada county (6057) has only 1 year (2019) of data; se = value/sqrt(numerator)</p> |
| homevalue | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>DP04_0089E = Estimate of Median Home Value</p> <p>DP04_0089M = Margin of Error of Median Home Value</p> <p>Value = DP04_0089E</p> <p>SE = DP04_0089M / 1.645</p> |
| hospitals | California Health and Human Services Office of Statewide Health Planning and Development Geohub, 2020 | | <p>URL: https://oshpd-chhsagency.opendata.arcgis.com/datasets/oshpd-healthcare-facilities/</p> <p>Filtered by license_category_desc == "General Acute Care Hospital" and facility_status_desc == "Open"</p> |
| Housebuild1940 | ACS2018API/5Y | B25034 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> |

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| | | | Value = Percent of housing units built before 1940 |
| hpi2score | Healthy Places Index, 2.0 | | <p>URL: https://healthyplacesindex.org/</p> <p>The Healthy Places Index 2.0 combines 25 community characteristics, based on the social determinants of health, into a single score for each California census tract.</p> |
| hs_grad | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of students who graduate high school (2018-19) within 4 years of entering ninth grade Value = Percent of students who graduate high school (2018-19) within 4 years of entering ninth grade</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| hsgrad | Cal Dept of Ed | ACGR19 | <p>URL: https://www.cde.ca.gov/ds/ad/filesacgr.asp</p> <p>Four-year Adjusted Cohort Graduation Rate, 2018-2019</p> <p>Download txt file: https://www3.cde.ca.gov/demo-downloads/acgr/cohort1819.txt</p> <p>File contains State, County (C), District, and School levels (AggregateLevel) for multiple race/ethnicities (TA = ALL), for School types (CharterSchool) and participation in Dashboard Alternative School Status Program, DASS:</p> <p>For county averages, filter file:</p> <p>AggregateLevel == "C" & ReportingCategory == "TA" & CharterSchool == "All" & DASS == "All"</p> <p>Numerator = Regular HS Diploma Graduates Count Denominator = CohortStudents</p> |

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| | | | <p>Value = numerator/denominator SE = $\sqrt{\text{value} \times (1 - \text{value}) / \text{denominator}}$ binomial se for a percent</p> |
| idleteen | ACS2019API/5Y | S0902 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>Not available at census tract; partially available at county and place; S0902_C01_017E is actually a percent, not a integer for numerator</p> <p>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</p> <p>Numerator = $S0902_C01_016E \times (S0902_C01_017E / 100)$ Denominator = S0902_C01_016E Proportion = $S0902_C01_017E / 100$ SE(proportion) = $(S0902_C01_017E / 100) / 1.645$</p> |
| immigrant | ACS2015API/5Y | B05002 | <p>URL: https://api.census.gov/data/2015/acs/acs5/variables.html</p> <p>HD01_VD13 = Estimate of foreign born population HD02_VD13 = Margin of error of foreign born population HD01_VD01 = Estimate of total population HD02_VD01 = Margin of error of total population</p> <p>Numerator = HD01_VD13 Denominator = HD01_VD01 Percent = Numerator/denominator x 100 Numerator SE = $HD02_VD13 / 1.645$ Denominator SE = $HD02_VD01 / 1.645$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} \times (\text{Denominator SE})^2 > 0$, then SE = $[(\text{Numerator SE})^2 - \text{Value} \times (\text{Denominator SE})^2] / \text{Denominator}$</p> |

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| | | | <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then</p> <p>$\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| impervsurf | NLCD2011 | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent impervious surface cover</p> |
| incarceration | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 1,000 of that race) and numerator were provided by Race Counts</p> <p>Numerator = Estimate of incarcerations per 1,000 people</p> <p>Value = Rate of incarcerations per 1,000 people</p> <p>Value = data provided</p> <p>Denominator = $(\text{Value}/1000) / \text{Numerator}$</p> |
| income | ACS2019API/5Y | DP03 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>DP03_0062E = Estimate of median household income (dollars)</p> <p>DP03_0062M = Margin of error of median household income (dollars)</p> <p>Value = DP03_0062E</p> <p>SE = $\text{DP03_0062M} / 1.645$</p> |
| infant_mortality | CDPH County Health Status Reports | Table 24B | <p>URL: https://data.ca.gov/dataset/county-health-status-profiles</p> <p>Numerator = Numerator_Total</p> <p>Denominator = Denominator_Total</p> <p>Value = Rate.Percentage</p> |
| infantdeaths | CHHSA/CHSP | Table24A | <p>URL: https://data.chhs.ca.gov/api/3/action/datastore_search?resource_id=3781a514-d658-4779-abb5-3c71e15c1944&q=24A</p> <p>Numerator = Numerator_Total/3</p> <p>Denominator = Denominator_Total/3</p> <p>Value = $1000 * \text{numerator} / \text{denominator}$</p> <p>SE = $\text{Value} / \sqrt{\text{Numerator_Total}}$</p> |

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| iod, iod_asian, iod_latino, iod_nonwhite | 2010 US Census | SF 1 census blocks | URL: https://data.census.gov/cedsci/table?d=DEC%20Summary%20File%201 (download) Methods follow: https://www.census.gov/prod/2002pubs/censr-3.pdf |
| 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 | 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_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 |

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| | | | <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_english | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_002E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_002M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_french | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_006E Denominator = C16001_001E</p> |

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| | | | <p>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</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> |
| lang_german | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_009E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_009M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = [(Numerator SE)² - Value*(Denominator SE)²] / Denominator</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> |
| lang_korean | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> |

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| | | | <p>Numerator = C16001_018E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_018M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = [(Numerator SE)² - Value*(Denominator SE)²] / Denominator</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> |
| lang_other | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_036E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_036M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = [(Numerator SE)² - Value*(Denominator SE)²] / Denominator</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = [(Numerator SE)² + Value*(Denominator SE)²] / Denominator</p> |

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| lang_other_api | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_030E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_030M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_other_indo | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_015E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_015M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |

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| | | | <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_russian | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_012E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_012M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_spanish | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_003E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_003M / 1.645 Denominator SE = C16001_001M / 1.645</p> |

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| | | | <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_tagalog | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_027E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_027M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| lang_vietnamese | ACS2019API/5Y | C16001 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>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</p> <p>Numerator = C16001_024E Denominator = C16001_001E</p> |

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| | | | <p>Value = Numerator / Denominator Numerator SE = C16001_024M / 1.645 Denominator SE = C16001_001M/ 1.645</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2] <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator</p> |
| Language65 | ACS2018API/5Y | B16004 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of population 65 years and older who speak English "not well" or "not at all"</p> |
| lawenforce | California Dept. of Justice; ACS2019API/5Y | Criminal Justice Personnel "Open Justice" interacti ve tool (num); DP05_00 70E (denom) | <p>URL: https://openjustice.doj.ca.gov/exploration/crime-statistics/criminal-justice-personnel</p> <p>Select individual county, year range 2015-2019 Copy and paste row "Law Enforcement" (sworn and civilian) (not TOTAL, which includes non-law enforcement personnel)</p> <p>Manual data entry (cut-paste) into Excel worksheet, take 5-year average; merge with county population data (5-year annual counts by county) Numerator = 5-year annual average of homeless counts (manually entered) Denominator = DP05_0070E Value = 1000*numerator/denominator SE = value/sqrt(numerator * 5)</p> |
| lbw (County) | CDPH | | <p>Value (provided in percentage format), numerator, denominator, and lower 95% confidence intervals (CI) were provided by CDPH</p> <p>NAME = State/County Numerator = Number of LBW Births Denominator = Number of Births Value = Percent LBW Births / 100</p> |

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| | | | Stratalevel = Race/Ethnicity SE = (Value - Lower 95% CI)/1.96 |
| lbw (MSSA) | CDPH | | Value (provided in percentage format), numerator, denominator, and lower 95% confidence intervals (CI) were provided by CDPH NAME = MSSA Name Numerator = Number of LBW Births Denominator = Number of Births Value = Percent LBW Births / 100 Stratalevel = Race/Ethnicity SE = (Value - Lower 95% CI)/1.96 |
| 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 |
| life_expectancy | Race_Counts_2017 | 2017 | URL: https://www.racecounts.org/ Data provided by Race Counts were solely life expectancy estimates in years |
| LIHTC_HU_18 | 2018 National Housing Preservation Database2015 HUD Picture of Subsidized Households; ACS2018API/5Y | B25003 | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Number of active Low-Income Housing Tax Credits units for every 1,000 housing units |
| Livealone65 | ACS2018API/5Y | B09020 | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Percent of population 65 years and older living alone |

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| low_birthweight | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of infants born weighing less than 2,500 grams or about 5 lbs, 8 oz by race/ethnicity of mother Value = Percent of infants born weighing less than 2,500 grams or about 5 lbs, 8 oz by race/ethnicity of mother</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| lq_aian | ACS2019API/5Y | B03002 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>B03002_001 = Total Population B03002_005 = Non-Hispanic American Indian / Alaska Native</p> <p>Numerator = B03002_005 / B03002_001 (Tract) Denominator = B03002_005 / B03002_001 (County) Value = Numerator / Denominator</p> |
| lq_asian | ACS2019API/5Y | B03002 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>B03002_001 = Total Population B03002_006 = Non-Hispanic Asian</p> <p>Numerator = B03002_006 / B03002_001 (Tract) Denominator = B03002_006 / B03002_001 (County) Value = Numerator / Denominator</p> |
| lq_black | ACS2019API/5Y | B03002 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>B03002_001 = Total Population B03002_004 = Non-Hispanic Black</p> <p>Numerator = B03002_004 / B03002_001 (Tract)</p> |

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| | | | Denominator = B03002_004 / B03002_001 (County) Value = Numerator / Denominator |
| lq_hispanic | ACS2019API/5Y | B03002 | 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 | B03002 | 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 | 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" |

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| MobileHomes | ACS2018API/5Y | B25024 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of households living in mobile homes</p> |
| mva | CDC WONDER | Underlying cause, 2015-2019 | <p>URL: https://wonder.cdc.gov/ucd-icd10.html</p> <p>1. Group by: County 2. Location: California 4. Years: 2015-2019 6. Cause of Deaths: ICD Codes: V01-V89 Advanced Finder Options Open (Expand) ICD codes and move to selection box</p> <p>Numerator = Deaths/5 Denominator = Population/5 Value = 100000*Deaths/Population SE = value/sqrt(Deaths)</p> |

| netmigration | University of Wisconsin | <p>URL: https://netmigration.wisc.edu/ https://netmigration.wisc.edu/data-details download (ICPSR_NME_2000_2010.CSV)</p> <p>Select California (stname=="California")</p> <table><tr><th colspan="2">Net Migrants</th><th colspan="2">Expected Population</th></tr><tr><th>Variable</th><th>Age Group</th><th>Variable</th><th>Age Group</th></tr><tr><td>m0ttt0</td><td>ages 0-4</td><td>e0ttt0</td><td>ages 0-4</td></tr><tr><td>m0ttt5</td><td>ages 5-9</td><td>e0ttt5</td><td>ages 5-9</td></tr><tr><td>m0ttt10</td><td>ages 10-14</td><td>e0ttt10</td><td>ages 10-14</td></tr><tr><td>m0ttt15</td><td>ages 15-19</td><td>e0ttt15</td><td>ages 15-19</td></tr><tr><td>m0ttt20</td><td>ages 20-24</td><td>e0ttt20</td><td>ages 20-24</td></tr><tr><td>m0ttt25</td><td>ages 25-29</td><td>e0ttt25</td><td>ages 25-29</td></tr><tr><td>m0ttt30</td><td>ages 30-34</td><td>e0ttt30</td><td>ages 30-34</td></tr><tr><td>m0ttt35</td><td>ages 35-39</td><td>e0ttt35</td><td>ages 35-39</td></tr><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><tr><td>m0ttt55</td><td>ages 55-59</td><td>e0ttt55</td><td>ages 55-59</td></tr><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><tr><td>m0ttt70</td><td>ages 70-74</td><td>e0ttt70</td><td>ages 70-74</td></tr><tr><td>m0ttt75</td><td>ages 75-79</td><td>e0ttt75</td><td>ages 75-79</td></tr><tr><td>m0ttt80</td><td>ages 80-84</td><td>e0ttt80</td><td>ages 80-84</td></tr><tr><td>m0ttt85</td><td>ages 85+</td><td>e0ttt85</td><td>ages 85+</td></tr></table> <p>Numerator = Σ net migration Denominator = Σ Expected population Value = numerator/denominator Se = $\sqrt{(\text{abs}(\text{value}) * (1 - \text{abs}(\text{value}))) / \text{denominator}}$ binomial SE for a percent</p> | Net Migrants | | Expected Population | | Variable | Age Group | Variable | Age Group | m0ttt0 | ages 0-4 | e0ttt0 | ages 0-4 | m0ttt5 | ages 5-9 | e0ttt5 | ages 5-9 | m0ttt10 | ages 10-14 | e0ttt10 | ages 10-14 | m0ttt15 | ages 15-19 | e0ttt15 | ages 15-19 | m0ttt20 | ages 20-24 | e0ttt20 | ages 20-24 | m0ttt25 | ages 25-29 | e0ttt25 | ages 25-29 | m0ttt30 | ages 30-34 | e0ttt30 | ages 30-34 | m0ttt35 | ages 35-39 | e0ttt35 | ages 35-39 | m0ttt40 | ages 40-44 | e0ttt40 | ages 40-44 | m0ttt45 | ages 45-49 | e0ttt45 | ages 45-49 | m0ttt50 | ages 50-54 | e0ttt50 | ages 50-54 | m0ttt55 | ages 55-59 | e0ttt55 | ages 55-59 | m0ttt60 | ages 60-64 | e0ttt60 | ages 60-64 | m0ttt65 | ages 65-69 | e0ttt65 | ages 65-69 | m0ttt70 | ages 70-74 | e0ttt70 | ages 70-74 | m0ttt75 | ages 75-79 | e0ttt75 | ages 75-79 | m0ttt80 | ages 80-84 | e0ttt80 | ages 80-84 | m0ttt85 | ages 85+ | e0ttt85 | ages 85+ |
|--------------|-------------------------|--|--------------|--|---------------------|--|----------|-----------|----------|-----------|--------|----------|--------|----------|--------|----------|--------|----------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|---------|----------|---------|----------|
| Net Migrants | | Expected Population | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Variable | Age Group | Variable | Age Group | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt0 | ages 0-4 | e0ttt0 | ages 0-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt5 | ages 5-9 | e0ttt5 | ages 5-9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt10 | ages 10-14 | e0ttt10 | ages 10-14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt15 | ages 15-19 | e0ttt15 | ages 15-19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt20 | ages 20-24 | e0ttt20 | ages 20-24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt25 | ages 25-29 | e0ttt25 | ages 25-29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt30 | ages 30-34 | e0ttt30 | ages 30-34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt35 | ages 35-39 | e0ttt35 | ages 35-39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt40 | ages 40-44 | e0ttt40 | ages 40-44 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt45 | ages 45-49 | e0ttt45 | ages 45-49 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt50 | ages 50-54 | e0ttt50 | ages 50-54 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt55 | ages 55-59 | e0ttt55 | ages 55-59 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt60 | ages 60-64 | e0ttt60 | ages 60-64 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt65 | ages 65-69 | e0ttt65 | ages 65-69 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt70 | ages 70-74 | e0ttt70 | ages 70-74 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt75 | ages 75-79 | e0ttt75 | ages 75-79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt80 | ages 80-84 | e0ttt80 | ages 80-84 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m0ttt85 | ages 85+ | e0ttt85 | ages 85+ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| nonenglishspeaking | ACS2019API/5Y | S1601_C01 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>C16001_001E = Estimate of total population over age 5 C16001_001M = Margin of Error of total population over age 5 C16001_003E = Estimate of non-English speaking population C16001_003M = Margin of Error of non-English speaking population</p> <p>Numerator = C16001_003E Denominator = C16001_001E Value = Numerator / Denominator Numerator SE = C16001_003M / 1.645 Denominator SE = C16001_001M / 1.645</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $\text{SE} = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $\text{SE} = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| nonenglishspeaking | ACS2019API/5Y | S1601 | <p>URL: https://api.census.gov/data/2019/acs/acs5/subject/variables.html</p> <p>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</p> <p>Numerator = S1601_C01_003E Denominator = S1601_C01_003E Proportion = Numerator/Denominator $\text{SE}(\text{proportion}) = (\text{S1601_C02_003M}/100) / 1.645$</p> |

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| Nonwhite65 | ACS2018API/5Y | B0100 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of population 65 years and older who are non-White</p> |
| OtherHUDunits_17 | 2017 HUD Picture of Subsidized Households; ACS2017API/5Y | B25006 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = 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</p> |
| outdoors | ACS2015_/5Y | S2401 | <p>URL: https://data.census.gov/cedsci/table?q=S2401</p> <p>HC01_EST_VC01 = Estimate of total civilian employed population over 16 HC01_MOE_VC01 = Margin of error of total civilian employed population over 16 HC01_EST_VC30 = Estimate of farming, fishing and forestry occupations HC01_EST_VC31 = Estimate of construction and extraction occupations HC01_MOE_VC30 = Margin of error of farming, fishing and forestry occupations HC01_MOE_VC31 = Margin of error of construction and extraction occupations</p> <p>Numerator = HC01_EST_VC30 + HC01_EST_VC30 Denominator = HC01_EST_VC01 Percent = Numerator/denominator Denominator SE = HC01_MOE_VC01 / 1.645 Numerator SE = (HC01_MOE_VC30/1.645)^2 + (HC01_MOE_VC31/1.645^2)^0.5</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2 > 0, then SE = [(Numerator SE)^2 - Value*(Denominator SE)^2] / Denominator</p> <p>If (Numerator SE)^2 - Value*(Denominator SE)^2 <= 0, then SE = [(Numerator SE)^2 + Value*(Denominator SE)^2] / Denominator</p> |

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| ParkAcres_per1000 | CSP_2015_Park Access | | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Number of park acres per 1,000 residents</p> |
| pedshurt | SWITRS | HCI | <p>Note this is the 5-year (2006-2010) annual average rate of severe and fatal pedestrian injuries per 100,000 population</p> <p>Download two files (HCI_RoadTrafficInjuries_753_CT_PL_CO_RE_R4_CA-12-17-13_A-N.zip, HCI_RoadTrafficInjuries_753_CT_PL_CO_12-17-13_O-Y.zip) from https://www.cdph.ca.gov/programs/Pages/HealthyCommunityIndicators.aspx</p> <p>Filter for reportyear (2006-2010), geotype (CT), and mode (pedestrian), copy and paste as .csv then add A-N and O-Y counties into single file (HCI_RoadTrafficInjuriesA-Z.csv)</p> <p>Serious and fatal injuries and rates are added together. R Program does this aggregation</p> <p>$se_pct = \sqrt{\text{Numerator}} / \text{Denominator}$</p> <p>Note: census tracts with no recorded injuries in SWITRS are set to 0 injuries and 0 injury rate</p> |
| Perc65plus | ACS2018API/5Y | S0101 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of Population aged 65 or Older</p> |
| Perc75plus | ACS2018API/5Y | S0101 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of Population aged 75 or Older</p> |
| percapitaincome | ACS2019API/5Y/ | B19301 | <p>URL: https://api.census.gov/data/2019/acs/acs5/variables.html</p> <p>B19301_001E: Estimate of per capita income in the past 12 months (in 2019 inflation-adjusted dollars)</p> <p>B19301_001M: Margin of Error of per capita income in the past 12 months (in 2019 inflation-adjusted dollars)</p> <p>Value = B19301_001E</p> <p>SE = B19301_001M / 1.645</p> |

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| perception_of_safety | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of adults who reported feeling safe in their neighborhood all of the time Value = Percent of adults who reported feeling safe in their neighborhood all of the time</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |
| PHunits_17 | 2016 HUD Picture of Subsidized Households; ACS2017API/5Y | B25005 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Number of public housing units, for every 1,000 housing units</p> |
| police_race | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 1,000 of that race) and numerator were provided by Race Counts Numerator = Estimate of race of police force (per 1,000 people of that race) Value = Rate of race of police force (per 1,000 people of that race)</p> <p>Value = data provided Denominator = (Value/1000) / Numerator</p> |
| Poverty65 | ACS2018API/5Y | S1701 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of population 65 years and older with incomes below the poverty level</p> |
| PretermBirth (County) | CDPH | | <p>Value (provided in percentage format), numerator, denominator, and lower 95% confidence intervals (CI) were provided by CDPH</p> <p>NAME = State/County Numerator = Number of PTBs Denominator = Number of Births Value = Percent PTBs / 100</p> |

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| | | | Stratalevel = Race/Ethnicity $SE = (Value - Lower\ 95\% \ CI)/1.96$ |
| PretermBirth (MSSA) | CDPH | | Value (provided in percentage format), numerator, denominator, and lower 95% confidence intervals (CI) were provided by CDPH NAME = MSSA Name Numerator = Number of PTBs Denominator = Number of Births Value = Percent PTBs / 100 Stratalevel = Race/Ethnicity $SE = (Value - Lower\ 95\% \ CI)/1.96$ |
| prisons | United States Department of Homeland Security, 2020 | | URL: https://services1.arcgis.com/Hp6G80Pky0om7QvQ/ArcGIS/rest/services/Prison_Boundaries/FeatureServer |
| Projected_pop_under5_2050 | CDF_20_project edpop | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Projected percent of population aged under 5 in 2050 |
| ProjectedPop_20_50_5to14 | CDF_20_project edpop | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Projected percent of population aged between 5-14 in 2050 |
| ProjectedPop_20_50_65plus | CDF_20_project edpop | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Projected percent of population aged 65 and older in 2050 |
| ProjectedPop_20_50_total | CDF_20_project edpop | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Projected population in 2050 |

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| public_housing | US Department of Housing and Urban Development, 2021 | | URL: https://services.arcgis.com/VTyQ9soqVukalltT/arcgis/rest/services/Public_Housing_Buildings/FeatureServer/ |
| public_schools | National Center for Education Statistics, 2020 | | URL: https://nces.ed.gov/opengis/rest/services/K12_School_Locations/EDGE_GEOCODE_PUBLICSC_H_1920/MapServer/ |
| recentmove | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>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</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 > 0$, then $SE = [(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If $(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2 \leq 0$, then $SE = [(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| redlined | Mapping Inequality | UW/ICPS R_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" |

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| rent | ACS2019API/5Y | DP04 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>DP04_0134E = Estimate of Median Gross Rent DP04_0134M = Margin of Error of Median Gross Rent</p> <p>Value = DP04_0134E SE = DP04_0134M / 1.645</p> |
| RV_Van_Boat | ACS2018API/5Y | B25024 | <p>Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/)</p> <p>Value = Percent of households living in RV, van, or boat</p> |
| sealevel | PacInstitute2009 | | <p>URL: https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx</p> <p>http://pacinst.org/the-impacts-of-sea-level-rise-on-the-california-coast-gis-data-downloads/</p> <p>Manually filtered BRACE_SLR_784_CT_PL_CO_RE_CA_11-1-2016.xlsx on Total race/ethnicity and census tract geography to create csv file BRACE_Wildfire_CT8-11-2016.csv, which was reformatted in HDI_BRACE_DS_Indicators2017-07-XX.R</p> <p>Percentile calculated only for census tracts with any inundation</p> |
| staff_diversity | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 100 students/staff) and numerator were provided by Race Counts Numerator = Estimate of staff of a race per 100 students of the same race Value = Ratio of staff of a race per 100 students of the same race</p> <p>Value = data provided Denominator = (Value/100) / Numerator</p> |

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| status_offenses | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 10,000 people) and numerator were provided by Race Counts</p> <p>Numerator = Estimate of arrests for status offenses per 10,000 youth under 18</p> <p>Value = Annual average of arrests for status offenses per 10,000 youth under 18</p> <p>Value = data provided</p> <p>Denominator = (Value/10000) / Numerator</p> |
| student_homelessness | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts</p> <p>Numerator = Estimate of students experiencing homelessness as a percentage of all enrolled students</p> <p>Value = Percent of students experiencing homelessness as a percentage of all enrolled students</p> <p>Value = data provided / 100</p> <p>Denominator = Value / Numerator</p> |
| subsidized_housing | US Department of Housing and Urban Development, 2021 | | <p>URL: https://services.arcgis.com/VTyQ9soqVukalltT/arcgis/rest/services/Multifamily_Properties_Assisted/FeatureServer/</p> |
| superfund | US EPA, Sites Reporting to EPA, 2021 | | <p>URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/</p> |

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| supermkts | USDA Food Access research Atlas, 2015 | | <p>URL: https://www.ers.usda.gov/data-products/food-access-research-atlas/download-the-data/</p> <p>lapophalf = Population count beyond 1/2 mile from supermarket (numerator urban) lapop1 = Population count beyond 1 mile from supermarket (numerator rural) POP2010 = Population count from 2010 census (denominator)</p> <p>UrbanType (HDI/Census) urban(urban_area), rural (urban_cluster, rural)</p> <p>lapophalf_pct = $100 * \text{lapophalf} / \text{POP2010}$ for urban_area lapop1pct = $100 * \text{lapop1} / \text{POP2010}$ for urban cluster and rural se_pct = $\sqrt{\text{percent} * (1 - \text{percent}) / \text{denominator}}$ percentiles only calculated for HDI eligible census tracts</p> |
| suspension | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 100 students/staff) and numerator were provided by Race Counts Numerator = Estimate of students suspended per 100 students Value = Rate of students suspended per 100 students</p> <p>Value = data provided Denominator = $(\text{Value} / 100) / \text{Numerator}$</p> |
| svi | CDC/ADSDR_SVI | | <p>https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html</p> <p>SPL_Themes = overall score RPL_Themes = percentile rank</p> <p>Value = SPL_Themes Percentile_st = RPL_Themes</p> |

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| theil | ACS2019API/5Y | DP05 | <p>URL: https://api.census.gov/data/2019/acs/acs5/profile/variables.html</p> <p>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</p> <p>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.</p> <p>The entropy index h for a tract i is:</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> $h_i = -\sum_{j=1}^k p_{ij} \ln(p_{ij})$ </div> <div style="flex: 1; border-left: 1px solid black; padding-left: 10px;"> <p>Where:</p> <p>k = number of ethnic groups (“ethnicities”) p_{ij} = proportion of population of jth ethnicity in tract i (=n_{ij}/n_i) n_{ij} = number of population of jth ethnicity in tract i n_i = total number of population in tract i</p> </div> </div> <p>To compare Entropy Indices between different cities as a whole,</p> $H = (\hat{H} - \bar{H}) / \hat{H}$ <p>\hat{H} = Entropy Index for the city as a whole (“H hat”) \bar{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</p> |
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| toxics | US EPA, Sites Reporting to EPA, 2021 | | URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/ |
| traffic_impacts | CES 4.0 | | URL: https://services1.arcgis.com/PCHfHz4GIDNAhBb/ArcGIS/rest/services/DraftResultsCES4082520/FeatureServer/ Value = traffic_4_0 |
| transitaccess | HCI2013 | | URL: https://archive.cdph.ca.gov/programs/Pages/CalBRACE-Indicators2017.aspx Manually filtered RailFerryBus10_MTC_Output_11-15-13.xls, RailFerryBus10_SACOG_Output-11-26-13.xls, RailFerryBus10_SANDAG_Output8-29-13.xls, RailFerryBus10_SCAG_Output9-5-13.xls on Total race/ethnicity and census tract geography to create csv file RailFerryBusMTC_SCAG_SACOG_SANDAG2013HCI.csv, which was reformatted in HDI_BRACE_DS_Indicators2017-07-XX.R geotypevalue redefined as text(geotypevalue,"6000000000") |
| treecanopy | CDPH/National Land Cover Database | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Population-weighted percentage of the census tract area with tree canopy |
| twoparent | ACS2019API/5Y | B09008 | 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 |

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| | | | <p>Value = Numerator / Denominator Numerator SE = $\sqrt{((B09005_002M/1.645)^2 + (B09005_003M/1.645)^2)}$ Denominator SE = B09005_001M / 1.645</p> <p>If (Numerator SE)² - Value*(Denominator SE)² > 0, then SE = $[(\text{Numerator SE})^2 - \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> <p>If (Numerator SE)² - Value*(Denominator SE)² ≤ 0, then SE = $[(\text{Numerator SE})^2 + \text{Value} * (\text{Denominator SE})^2] / \text{Denominator}$</p> |
| UHII | CalEPA | | Urban heat island index: sum of 182 day temp. differences (degree-hr) between urban and rural reference |
| use_of_force | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in rate per 100,000 people) and numerator were provided by Race Counts Numerator = Three-year estimate number of civilians injured in law enforcement incidents per 100,000 people Value = Three-year average number of civilians injured in law enforcement incidents per 100,000 people</p> <p>Value = data provided Denominator = (Value/100000) / (Numerator/3)</p> |
| usual_source_of_care | Race_Counts_2017 | 2017 | <p>URL: https://www.racecounts.org/</p> <p>Value (provided in percentage format) and numerator were provided by Race Counts Numerator = Estimate of people with a usual source of medical care Value = Percentage of people with a usual source of medical care</p> <p>Value = data provided / 100 Denominator = Value / Numerator</p> |

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| voter16 | UC_Berkeley_Statewide_Database | | <p>URL: https://statewidedatabase.org/d10/g16.html</p> <p>PCTRGPREC = Percent of total registered voters in the RG precinct that are located within the transecting census block BLKREG = Voter registration by block voters = Registered Voters (from crosswalk variable TOTREG_R)</p> <p>Numerator = PCTRGPREC/100 * voters Denominator = BLKREG</p> <p>Value = Numerator / Denominator SE = $\sqrt{\text{value} \times (1 - \text{value}) / \text{denominator}}$</p> <p>Crosswalk source: https://statewidedatabase.org/d10/g16_geo_conv.html RGPREG_KEY = Crosswalk key</p> |
| walkability | USEPA | SLD3 | <p>URL: https://www.epa.gov/smartgrowth/smart-location-mapping#SLD Download file: EPA_SmartLocationDatabase_V3_Jan_2021_Final.csv</p> <p>File is structured by 2010 census block groups</p> <p>Walkability score (census tract) = population (TotPop) weighted average of block group walkability scores (NatWalkInd)</p> |
| water_dischargers | US EPA, Sites Reporting to EPA, 2021 | | <p>URL: https://geopub.epa.gov/arcgis/rest/services/EMEF/efpoints/MapServer/</p> |
| wildfire | CDFFP2007 | FSHZ | <p>URL: https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx</p> <p>http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_statewide.php Manually filtered BRACE_Wildfire_786_CT_PL_CO_RE_CA.xlsx (downloaded from on Total race/ethnicity and census tract geography to create csv file BRACE_SLR_CT11-1-2016.csv, which was reformatted in HDI_BRACE_DS_Indicators2017-07-XX.R</p> |

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| YouthAsthmaEDvisits | OSHPD_17_asthmaED | | Processed by UCLA for the UCLA Extreme Heat Tool (URL: https://innovation.luskin.ucla.edu/climate/heat/) Value = Age-adjusted rate of asthma emergency room visits for youth |
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