City Health Dashboard Technical Document

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SECTION 1: Overview

The City Health Dashboard (the Dashboard) is a one-stop resource allowing users to view and compare data from multiple sources on health and the factors that shape health to guide local solutions. Through a vigorous selection process, the City Health Dashboard selected 40+ metrics spanning 5 domains — clinical care, health behaviors, health outcomes, physical environment and social and economic factors — to quantify health, health determinants, and equity at the city and, where available, census tract level.

Metrics are derived from both private and publicly available data sources, with some data sources contributing several metrics and others contributing only a single metric.

Document Mission

This document is written for an audience interested in the technical attributes of the Dashboard. It provides details on which data sources, sub-tables, variables, and formulas were used to operationalize all Dashboard metrics and explains the rationale for analytic decisions.

Users are invited to contact the Dashboard (info@cityhealthdashboard.com) with general feedback or questions not addressed below.

Measure Selection Criteria

The following metric inclusion criteria were used to compile accurate, consistent, and comparable data across 5 overarching domains for cities:

- Rigorous methods underlying the original data collection
- Feasible data acquisition by the Dashboard analytic team
- Evidence of importance and validity in academic literature
- Metrics that are amenable to city-level intervention
- Time lag between the Dashboard release and data collection ≤ 5 years
- Updated regularly, preferably at least every 2 years
- Balanced across the 5 domains (clinical care, health behaviors, health outcomes, physical environment and social and economic factors)
- When possible:
    - Aligned with other existent population health reporting frameworks (e.g., County Health Rankings & Roadmaps, Vital Signs, Culture of Health)
    - Disaggregated by census tracts or demographics
    - Available for 100% of cities included in CDC's 500 Cities, PLACES projects
    - Aligned with city preferences based on input from the Dashboard pilot cities and City Advisory Board

City and Tract Selection Criteria

The Dashboard reports data for a select sample of U.S. Census Bureau geographies (collectively referred to as "cities") and their associated Census tracts. These geographies include Places (Incorporated and Designated), County Subdivisions (Minor Civil Divisions), and Hawaiian Counties.[1-4] See Appendix B ("Detailed Notes on Selection of Cities and Tracts") for more detail on city and tract selection criteria and usage of FIPS codes. Contact info@cityhealthdashboard.com with any questions.

Updates to Technical Documentation

This technical document is updated iteratively as needed. Please note that the date of the most recent update of this document is noted on its first page and footer.

Please see Appendix F: Updates Summary for an outline of changes made to each version of this document.

Multi-year Data: Appropriate Usage for Evaluating Trends Over Time

The Dashboard displays multiple years of data for many of its metrics. Before evaluating trends over time, users should be aware of the caveats associated with multi-year data from specific data sources.

Please refer to https://www.cityhealthdashboard.com/multi-year-data for caveats associated with specific metrics and data sources.

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Downloading Dashboard Data

Users should note that much of the data outlined in this document is available for free download at www.cityhealthdashboard.com/data-downloads.

Users should consult the Data Dictionary, available at www.cityhealthdashboard.com/data-downloads, for more detail.

Please contact the Dashboard at info@cityhealthdashboard.com with any questions or concerns.

Citing Dashboard Data and Technical Document

City Health Dashboard should be cited when the data or graphics are used, including in published presentations, articles, research, blogs, policy documents, and other print or digital media.

We encourage use of Dashboard data and visualizations, and suggest the following citation:

> Department of Population Health, NYU Langone Health. City Health Dashboard. https://www.cityhealthdashboard.com/. Accessed [INSERT DATE OF ACCESS].

To cite our Technical Document, we suggest the following citation:

> City Health Dashboard Team. *City Health Dashboard Technical Document*. New York: City Health Dashboard; [YEAR]. Available at www.cityhealthdashboard.com/technical-documentation. Accessed [INSERT DATE OF ACCESS].

Feedback or Errors

Users are encouraged to contact the Dashboard with comments or questions regarding cityhealthdashboard.com and any documents available for download from it, including this Technical Document, at info@cityhealthdashboard.com.

Measure Overview

The Dashboard presents measures in one of three different formats: percentage, rate, or index. The type of measure is determined by the data that are analyzed to derive each estimate. All measures are calculated at the city level; measures are also calculated by demographic subgroups or at the tract level if the underlying data allow for such disaggregation. For more information about these measures, including data sources, years of data, and measure calculation, visit the website Metric page or refer to the rest of the City Health Dashboard Technical Document.

Domain	Metric Name	Metric Description	Data Source	Tract Estimates	Demographic Subgroups	Most Current Data Period
Clinical Care	Dental Care	Percentage of adults who reported visiting a dentist in the past year	PLACES Project, Centers for Disease Control	Yes	Not Available	2022, 1 year modeled estimate
	Prenatal Care	Percentage of births for which prenatal care began in the first trimester	Natality Data, National Vital Statistics System, National Center for Health Statistics	No	Race/Ethnicity	2023, 3 year estimate
	Routine Checkup, 18+	Percentage of adults who reported visiting a doctor for routine checkup in the past year	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Uninsured	Percentage of population ≤64 years old without health insurance	American Community Survey, U.S. Census Bureau	Yes	Age, Sex, Race/Ethnicity	2024, 5 year estimate
Health Behaviors	Binge Drinking	Percentage of adults who reported binge drinking in the past 30 days	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Physical Inactivity	Percentage of adults who reported no leisure-time physical activity in the past 30 days	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Smoking	Percentage of adults who reported current cigarette smoking	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Teen Births	Births per 1,000 females aged 15-19	Natality Data, National Vital Statistics System, National Center for Health Statistics	No	Race/Ethnicity	2023, 3 year estimate
Health Outcomes	Breast Cancer Deaths	Deaths due to breast cancer per 100,000 females	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Race/Ethnicity	2023, 3 year estimate
	Cardiovascular Disease Deaths	Deaths due to cardiovascular disease per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 3 year estimate
	Colorectal Cancer Deaths	Deaths due to colorectal cancer per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 3 year estimate
	Diabetes	Percentage of adults who reported having diabetes	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate

	Firearm Homicides	Deaths due to firearm homicide per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 4 year estimate
	Firearm Suicides	Deaths due to firearm suicide per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 4 year estimate
	Frequent Mental Distress	Percentage of adults who reported experiencing ≥14 days of poor mental health in the past 30 days	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Frequent Physical Distress	Percentage of adults who reported experiencing ≥14 days of poor physical health in the past 30 days	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	High Blood Pressure	Percentage of adults who reported having high blood pressure	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Independent Living Difficulty	Percentage of adults who reported difficulty doing errands alone because of a physical, mental, or emotional condition	American Community Survey, U.S. Census Bureau	Yes	Age	2024, 5 year estimate
	Life Expectancy - City-Level	Average life expectancy at birth, in years	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023,
	Life Expectancy - Neighborhood-Level, 2015	Average life expectancy at birth, in years	U.S. Small-area Life Expectancy Estimates Project (USALEEP)	Yes	Not Available	2015, 6 year modeled estimate
	Low Birthweight	Percentage of live births with low birthweight (<2500 grams)	Natality Data, National Vital Statistics System, National Center for Health Statistics	No	Race/Ethnicity	2023, 3 year estimate
	Obesity	Percentage of adults with a body mass index (BMI) ≥30 kg/m², based on their reported weight and height	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate
	Opioid Overdose Deaths	Deaths due to opioid overdose per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 3 year estimate
	Premature Deaths (All Causes)	Years of potential life lost before age 75 per 100,000 people	Multiple Cause of Death Data, National Vital Statistics System, National Center for Health Statistics	No	Sex, Race/Ethnicity	2023, 3 year estimate
Physical Environment	Air Pollution - Ozone	Average daily maximum concentration (parts per billion) of ground-level ozone throughout a month	George Mason University	Yes	Not Available	12/2025, 1 month average estimate
	Air Pollution - Particulate Matter	Average daily concentration (μg/m³) of fine particulate matter (PM2.5) per cubic meter of air throughout a month	George Mason University	Yes	Not Available	12/2025, 1 month average estimate

	CO2 Emissions - Census Tract Average	Tract level emissions of CO2 in metric tons throughout the year, averaged across the city	Crosswalk Labs	Yes	Sector breakdowns available: Commercial Buildings, Electricity Production, Industrial Buildings, Residential Buildings, Transportation	2025, 1 year estimate
	CO2 Emissions - Per Capita	Average total emissions, citywide, per person, of CO2 (in metric tons) from fossil fuels throughout the year	Crosswalk Labs	No	Sector breakdowns available: Commercial Buildings, Electricity Production, Industrial Buildings, Residential Buildings, Transportation	2025, 1 year estimate
	Housing with Potential Lead Risk	Percentage of housing stock with potential elevated lead risk	American Community Survey, U.S. Census Bureau	Yes	Not Available	2024, 5 year estimate
	Lead Exposure Risk Index	Index (1-10) reflecting poverty-adjusted risk of housing-based lead exposure	American Community Survey, U.S. Census Bureau	Yes	Not Available	2024, 5 year estimate
	Park Access	Percentage of the population living within a 10 minute walk of a publicly accessible park	ParkServe®	Yes	Age, Race/Ethnicity	2024 *
	Walkability	Index (0-100) reflecting amenities accessible by walking as calculated by Walk Score	Walk Score®	Yes	Not Available	2025 *
Social and Economic Factors	Broadband Connection	Percentage of households with high speed broadband internet connection (cable, fiber optic, DSL)	American Community Survey, U.S. Census Bureau	Yes	Not Available	2024, 5 year estimate
	Children in Poverty	Percentage of children living in households ≤100% of the federal poverty level	American Community Survey, U.S. Census Bureau	Yes	Race/Ethnicity	2024, 5 year estimate
	Chronic Absenteeism	Percentage of public school students who miss 10% or more school days in an academic year. Note: this metric is at the city (not school district) level.	National Center for Education Statistics, U.S. Department of Education	No	Sex, Race/Ethnicity	School year ending in 2023
	Food Insecurity	Percentage of adults who reported that during the past year they did not have enough food and did not have money to get more	PLACES Project, Centers for Disease Control	Yes	Not Available	2023, 1 year modeled estimate

High School Completion	Percentage of adults ≥25 years old with a high school diploma or equivalent, or higher degree	American Community Survey, U.S. Census Bureau	Yes	Age, Sex, Race/Ethnicity	2024, 5 year estimate
Income Inequality	Index (-100 to +100) reflecting households with income at the extremes of the national income distribution (the top or bottom 20%)	American Community Survey, U.S. Census Bureau	Yes	Not Available	2022, 5 year estimate
Neighborhood Racial/Ethnic Segregation	Index (0-100) reflecting the geographic clustering of racial/ethnic groups across the area	American Community Survey, U.S. Census Bureau	No	Not Available	2024, 5 year estimate
Racial/Ethnic Diversity	Index (0-100) reflecting how evenly distributed the population is across the racial/ethnic groups living in this area	American Community Survey, U.S. Census Bureau	Yes	Not Available	2024, 5 year estimate
Rent Burden	Percentage of households where ≥30% of income is spent on rent	American Community Survey, U.S. Census Bureau	Yes	Not Available	2024, 5 year estimate
Third-Grade Reading Scores	Average reading test scores (in grade levels) of third graders in public schools. Note: this metric is at the city (not school district) level.	Stanford Education Data Archive	No	Sex, Race/Ethnicity	School year ending in 2019
Unemployment - Annual, Neighborhood-Level	Percentage of population ≥16 years old who are unemployed but seeking work	American Community Survey, U.S. Census Bureau	Yes	Age, Sex, Race/Ethnicity	2024, 5 year estimate
Unemployment - Current, City-Level	Percentage of population ≥16 years old who are unemployed but seeking work, by month	Local Area Unemployment Statistics, U.S. Bureau of Labor Statistics	No	Not Available	04/2026, 1 month modeled estimate
Voter Participation	Percentage of the voting-eligible population who voted in the past general election	L2 and American Community Survey	Yes	Age, Sex	2024, General Election
Youth Not in Work or School	Percentage of youth aged 16-19 who are neither working nor in school, also known as "disconnected youth"	American Community Survey, U.S. Census Bureau	Yes	Sex	2024, 5 year estimate

** Only one year of data is available for this metric*

SECTION 2: Dashboard Analytic Decisions

Confidence Intervals (CIs)

Confidence intervals (CIs), also known as confidence limits, provide a measure of the variation around a given estimate of a population value. For consistency, this document exclusively uses the term confidence intervals.

Dashboard CIs are reported at the 90% level

Ninety-five percent CIs are most commonly reported in the scientific literature. However, the Dashboard reports 90% CIs for a number of reasons. Most notably, the Census Bureau recommends calculation of 90% CIs when using American Community Survey data.[5] The Dashboard opted to construct 90% CIs from standard errors where necessary to ensure consistency between measures.

Formulas for CI calculation

There are a number of formulas for deriving CIs; selection depends on properties of the underlying data. See Section 3 below for specifics on the formula used.

Confidence intervals for percentages were manually restricted to minimum 0 and maximum 100 when raw values exceeded these bounds.

Note on CIs for the Dashboard index values

As a rule, CIs were not calculated for the Dashboard's index values because indices reflect a weighted composite of measures that are then scaled, making CI calculation relatively complicated.

Data Censoring and Flagging

The Dashboard censors and flags for users any city-level estimates that are missing sufficient contributing data or have insufficient sample size to generate reliable estimates.

Censoring

The Dashboard censors city-level estimates that meet these criteria:

- For city-level estimates that are aggregated from census tracts (see Appendix E for more about this method), estimates are censored when > 30% of the city's population are missing contributing data
- For city-level estimates with available numerator/denominator, estimates are censored when num<10 and denom<50
- For city-level education-based metrics and city-level race and ethnicity estimates for Premature Deaths (all causes), estimates are censored when the number of events contributing to the estimate is <20
- For ACS city-level estimates with available relative standard error (RSE), estimates are censored when RSE >=50%
- For ACS city-level estimates with available CIs, estimates are censored when the estimate is 0 and the CI is (0, 100)

The Dashboard censors tract-level estimates that meet these criteria:

- For census tracts with more than 95% of their population outside of city boundaries, all associated estimates are censored
- For ACS census tract estimates with available RSE, estimates are censored when RSE >=80%
- For ACS census tract estimates with available CIs, estimates are censored when the estimate is 0 and the CI is (0, 100)

There are some additional metric-specific censorship criteria; please see metric sections below for more information. Censored estimates are noted on the website and in downloadable data. See the Downloadable Data Codebook, available at www.cityhealthdashboard.com/data-downloads, for more information. Please email info@cityhealthdashboard.com with any questions.

Flagging

The Dashboard flags city-level estimates that meet these criteria:

- For city-level estimates that are aggregated from census tracts (see Appendix E for more about this method), estimates are flagged when > 15% and < 30% of the city's population are missing contributing data
- For city-level estimates with available numerator/denominator, estimates are flagged when numerator<50
- For ACS city-level estimates with available RSE, estimates are flagged when RSE >=30% and <50%
- For ACS city-level estimates with available CIs, estimates that are 0 and not censored are flagged

Flagged estimates indicate that extra caution is needed when interpreting these data points, and are noted on the website and in downloadable data. See the Downloadable Data Data Dictionary, available at www.cityhealthdashboard.com/data-downloads, for more information. Please email info@cityhealthdashboard.com with any questions.

Data Disclaimer

Estimates presented in the Dashboard are subject to the same limitations as those inherent in the source datasets. We identify the most likely sources of bias as necessary for each measure, but users should consult the data sources to understand potential biases more fully.

Data Rounding

All calculated values were rounded to one decimal place immediately prior to data export.

Use of County-Level Data on the Dashboard

County-level data are used in some instances where city-level data are unavailable/censored. Given that county geographies and populations do not always align with cities, this is only done in certain cases:

- For coterminous city/county where the spatial extent between city and county are the same and city-level data are not available
- For consolidated cities where city and county share governments and the spatial extents are similar, but the county may include some unincorporated areas.
- Hawaiian counties are presented across the website. See Appendix B for more information.

When this occurs, it is noted on the website and in downloadable data. Please see the Downloadable Data Codebook, available at www.cityhealthdashboard.com/data-downloads, for more details.

Dashboard City Average Estimates

Dashboard city average estimates on the Dashboard averages data from the cities represented on the Dashboard, by metric, demographic group, and year. The estimates are not intended to reflect estimates for the United States nationally, unless otherwise noted.

Averages are calculated after censoring criteria are applied.

Population Percentages

Text describing population breakdowns by racial and ethnic demographic group accompanies metric values on the Demographic Detail page. The values are calculated using American Community Survey (ACS) data. These values are not available for download; please email info@cityhealthdashboard.com for more information on their calculation.

Race and Ethnicity Categories

Where possible, the Dashboard disaggregates metrics by the following demographic groups: Asian (*Asian, or Native Hawaiian and Other Pacific Islander*); Black; Hispanic; White; American Indian and Alaska Native; Two or more Race; and Other.[6] Based on data availability from each data source, American Indian and Alaska Native and Two or more Races are sometimes included in the Other group. Different data sources may define the above race and ethnicity categories slightly differently, for example whether the group is in combination with any other races or Hispanic ethnicity. See data source-specific sections for more details by data source. Users can find more information about these demographic breakdowns in our blog.

The City Overview for each city also includes a more granular breakdown of each city's racial and ethnic composition by city and census tract to enable a more nuanced understanding of each area. See "Demographics Overview" and "Demographics by Census Tracts" on the City Overview page for more.

Note on American Indian and Alaska Native Data: Federally collected data on American Indian and Alaska Native populations have limitations, including undercounting and varying inclusion criteria. Tribal nations have the right to govern the use of their data, and the Dashboard encourages data users to explore Indigenous-led data efforts and sovereignty principles. Please see the FAQ for more details.

Validation

The Dashboard implements a multi-step data validation process to ensure the accuracy of metric value calculation and data uploaded to the website display. Please email info@cityhealthdashboard.com if you have questions about this process.

ZIP Codes

Estimates at the ZIP code level are not provided on the Dashboard.

However, City Health Dashboard's Metric Detail pages indicate a ZIP code associated with each tract estimate. While tracts may cross the boundaries of more than one ZIP code, the Dashboard identifies only the ZIP code with the most overlap with the tract. This ZIP code is identified using a ZIP-TRACT Crosswalk from the USPS and HUD. Current versions used on the Dashboard are 4th Quarter 2022 for tracts using 2010 Census boundaries, and 1st Quarter 2024 for tracts using 2020 Census boundaries.[7]

City and Tract Demographics Overview

Users interested in the demographic make-up of their city and census tracts can explore demographic tables and maps on the "Demographics Overview" and "Demographics by Census Tract" tabs of the City Overview web page (a sample link for New York, NY is provided here). Estimates come from the American Community Survey (ACS) 5-year estimates. A list of ACS table names used for each demographic group is included below. Please contact info@cityhealthdashboard.com for specific variable names. Users can find more information about these demographic estimates in our blog.

Demographic Groups	ACS Table Name	ACS Table Description
Age (all groups)	DP05	ACS Demographic and Housing Estimates
American Indian and Alaska Native	DP05	ACS Demographic and Housing Estimates
Asian (all groups)	B02018	Asian Alone or in Any Combination by Selected Groups
Black or African American	DP05	ACS Demographic and Housing Estimates
Foreign-born (all groups)	B06004 B, D, H, & I	Place of Birth
Foreign-born (total only)	B05012	Nativity in the United States
Hispanic or Latino (all groups)	B03001	Hispanic or Latino Origin by Specific Origin
Native Hawaiian and Other Pacific Islander (all groups)	B02019	Native Hawaiian and Other Pacific Islander Alone or in Any Combination by Selected Groups
White, not Hispanic or Latino	DP05	ACS Demographic and Housing Estimates
Total population	DP05	ACS Demographic and Housing Estimates
Other race alone	DP05	ACS Demographic and Housing Estimates
Two or more races	DP05	ACS Demographic and Housing Estimates

"Estimate should be interpreted with caution"

Demographic estimates are labeled with a caution symbol when they meet one of the following two criteria:

1. The demographic group's count estimate is 0.
2. The relative standard error (RSE) of the demographic group's count estimate is > 30%, where:

$$RSE = \left(\frac{SE}{Estimate}\right) * 100$$

Interested users are welcome to email info@cityhealthdashboard.com with further questions.

Redlining Maps

When viewing a metric map on the Metric Detail page of the City Health Dashboard, you can scroll down to the "Redlining Map" icon on the bottom left of the map screen. (Note: Not all Dashboard cities have this feature available since the original 1930s HOLC project only focused on ~ 200 large cities/areas.) Once

you select the icon, maps of redlined areas within the city will replace metric maps. A box will pop up with information about the maps and with the option to select various redlining grades. Dashboard redlining maps are modified from Mapping Inequality's publicly available files as follows:

1. All areas with the same grade (i.e. grade A) are combined into one polygon per city.
2. Grades are clipped to present-day Dashboard city boundaries. When <10% of an original grade overlaps with the city boundary (i.e. a "sliver") it is removed from maps.
3. Some HOLC maps were created for larger counties or regions (e.g. Los Angeles region). We provide redlining maps for any Dashboard city with >5% of its area covered by HOLC grades and/or any city that contains more than one original HOLC grade.
    a. Only a small portion of many cities' current boundaries are covered by redlining maps due to shifts in city boundaries since the maps were drawn and because some cities are on the edges of originally redlined areas.
    b. Many cities won't have all grades (A-D), because their current city boundaries are covered by only a small portion of an originally redlined area.
4. Areas graded as Industrial and Commercial are not presented.

You can read more about this feature in our blog. Please email info@cityhealthdashboard.com with any further questions.

Customized Areas

This feature allows users to combine census tract estimates within a city to derive customized area data for any of the Dashboard's 30+ neighborhood-level metrics. You can access this feature on the Metric Detail page by clicking the "Custom Area" tab on the "Find Values" sidebar or by directly clicking on multiple census tracts and clicking "add tract to customized area". From there, the Dashboard will immediately calculate a weighted average for the customized area.

Population-weighted estimates (i.e. "weighted averages") for customized areas are calculated using the same methods as detailed in *Appendix E: Block Population-Weighted Aggregation from Census Tract to City for Selected Metrics*.

The formula used is as follows. Population counts from census tracts with missing metric estimates are excluded from the population weight (P) calculation.

$$Est_{\,custom\ area} = \sum_{i=1}^{n} est_{census\ tract\ i} * P_{census\ tract\ i}$$

$$P_{census\ tract\ i} = \frac{census\ tract\ i\ population\ in\ custom\ area}{custom\ area\ population}$$

Where: n represents the number of tracts (*i*) within the custom area

Total population weights are used for all metrics. Variable selection depends on the Census vintage of the metric and data period.

Population Weight	Decennial Census Vintage	File (Table)	Variable
Total	2010	Summary File 1 (P9)	*P009001 – Hispanic or Latino, and Not Hispanic or Latino by Race!!Total*
	2020	Demographic and Housing Characteristics File (P9)	*P9_001N – Hispanic or Latino, and Not Hispanic or Latino by Race!!Total:*

You can read more about this feature in our blog. Please email info@cityhealthdashboard.com with any further questions.

Analytic Software

All analyses were performed in R using tidyverse, tidycensus, tigris, and sf packages, among others.[8-12]

SECTION 3: Data Sources and Metric Analyses

Introduction to this Section

This section is organized by data source, with notes on elements specific to individual metrics.

American Community Survey (ACS)

General notes

ACS is administered by the US Census Bureau. All data was obtained from the Census API[13] using R and the tidycensus package.[9] Place and county subdivision data were used for city-level analyses; Tract data were used for tract-level analyses; County data were used for county-level analyses (*only Hawaii counties for all years and Bibb county, GA prior to 2014*). All data from ACS are 5-year estimates.

Variable labels (e.g., Estimate; SEX AND AGE - Total population), not names (e.g., S2801_C01_017E), are outlined in this section. Variable labelling conventions used by the US Census Bureau's API are recorded below, except where otherwise noted.

Multi-year data

Data from 2013 - 2024 (5 Year Estimates) are used on the Dashboard.

Variable name changes in annual data releases are assessed by the Dashboard's analytic staff as per the US Census Bureau's technical documentation regarding table and geography changes.[14-19] Metric-specific sections note where analogous labels change over time. For parsimony and clarity, only the most recently available labels are listed in this document. Please contact info@cityhealthdashboard.com with any questions about specific variable names or labels used in prior year analyses.

Weights

Weights were not applied to ACS data because data do not require additional weighting.

Categorizing race and ethnicity

Tables ending in the following letters were used to calculate metrics by race and ethnicity:

- American Indian and Alaska Native: Tables ending in C (American Indian and Alaska Native alone)
- Asian: Tables ending in D (Asian alone); Tables ending in E (Native Hawaiian and Other Pacific Islander alone)
- Black: Tables ending in B (Black or African American alone)
- Hispanic: Tables ending in I (Hispanic or Latino)
- Other: Tables ending in F (Some other race alone)
- Two or more Races: Tables ending in G (Two or more races)
- White: Tables ending in H (White alone, not Hispanic or Latino)

Users should note that, unless specified otherwise (i.e., certain values from data table DP05, see Racial/ethnic diversity and Neighborhood racial/ethnic segregation sections below), estimates for demographic groups derived from ACS data include individuals of Hispanic/Latino ethnicity. Values presented for white are always for "White, non-Hispanic", as per the data available for download from

ACS. Individuals represented in the following racial categories who also identify as Hispanic may also contribute to counts for the Hispanic demographic subgroup: Asian, Black, American Indian and Alaska Native, and Other. These categorizations reflect data that are available from the selected metric tables and are in line with best practices for race and ethnicity categorization.

Refer to Section 2 “Race and ethnicity categories” (above) for more detail on Dashboard definitions.

Confidence intervals

CIs for all ACS data were calculated according to the formula estimate ± MOE. Approximated MOE’s for aggregated count data and derived proportions in ACS data were calculated as per the US Census Bureau’s publication.[20] Relevant formulas are presented verbatim here for users’ reference:

Calculating MOE’s for Aggregated Count Data[20] (p. A-14)

$$MOE_{aggregated\ count} = \pm\sqrt{\sum_c MOE_c^2}$$, “where MOE_c is the MOE of the cth component estimate”

Note: When calculating the MOE for a summed estimate which includes multiple zero estimates, per the Census’ recommendation, only the MOE for one of the zero estimates was used in the calculation. This prevents the MOE from being artificially inflated.[21]

Calculating MOE’s for Derived Proportions[20] (p. A-14, A-15)

$$MOE_{derived\ proportion} = \pm\frac{\sqrt{MOE_{numerator}^2 - (\hat{p}^2 * MOE_{denominator}^2)}}{\hat{X}_{denominator}}$$

“where $MOE_{numerator}$ is the MOE of the numerator; $MOE_{denominator}$ is the MOE of the denominator; $\hat{p} = \frac{\hat{X}_{numerator}}{\hat{X}_{denominator}}$ is the derived proportion; $\hat{X}_{numerator}$ is the estimate used as the numerator of the derived proportion; $\hat{X}_{denominator}$ is the estimate used as the denominator of the derived proportion.”

Note: Estimates with particularly large margins of error sometimes resulted in an incalculable value of $\sqrt{MOE_{numerator}^2 - (\hat{p}^2 * MOE_{denominator}^2)}$ because $MOE_{numerator}^2 - \left(\hat{p}^2 * MOE_{denominator}^2\right)$ resulted in a negative value. In these cases, per the Census’ recommendation, the formula for derived ratios was used instead, which provides a conservative estimate of the MOE.

Calculating MOE’s for Derived Ratios[20] (p. A-15)

$$MOE_{derived\ ratio} = \pm\frac{\sqrt{MOE_{numerator}^2 + (\hat{R}^2 * MOE_{denominator}^2)}}{\hat{X}_{denominator}}$$

When confidence intervals extended less than 0 or greater than 100 for proportion metrics, these were set to 0 or 100, respectively.

Data censoring and flagging

The Dashboard censors and flags certain estimates that are unstable. Refer to Section 2 “Data Censoring and Flagging” (above) for detailed information on numerator, denominator, and RSE cutoffs. Indexes are not censored or flagged based on numerator, denominator or RSE cutoffs. Since RSE is not calculatable for estimates of zero as denominator, the Dashboard further censors ACS percent estimates that are 0% and have a confidence interval of (0, 100) and flags all other 0% estimates. Certain metrics have additional censoring or flagging criteria as noted below in metric-specific notes.

Metric-specific notes

Broadband connection

Data tables

Data table S2801 was used to calculate percentage of households with connections to high speed broadband internet (including cable, fiber optic, and DSL connections). The metric is available for years 2017 forward.

Analysis

$$\text{Broadband connection} = \frac{[\text{Households with connections to high speed broadband internet}]}{\text{Total households}} \times 100\%$$

Broadband connection is presented as reported using the variable labelled as:

- Estimate!!Percent!!Total households!!TYPE OF INTERNET SUBSCRIPTIONS!!With an Internet subscription:!!Broadband of any type!!Broadband such as cable, fiber optic or DSL

The associated margin of error variable was pulled to calculate confidence intervals.

Children in poverty

Data tables

Data table B17020 and associated race and ethnicity-specific tables were used to calculate percentage of children in poverty at city and tract levels. For details on how race and ethnicity categories were defined, refer to the *Categorizing Race and Ethnicity* section above.

Analysis

$$\text{Children in poverty} = \frac{[\text{Children age} < 18 \text{ living in households below the poverty threshold}]}{\text{Total number of children age} < 18 \text{ living in households}} \times 100\%$$

Variables with the following labels within each data table were summed to calculate the numerator:

- Estimate!!Total!!Income in the past 12 months below poverty level!!Under 6 years
- Estimate!!Total!!Income in the past 12 months below poverty level!!6 to 11 years
- Estimate!!Total!!Income in the past 12 months below poverty level!!12 to 17 years

Numerator variables were summed with variables with the following labels within each data table to calculate the denominator:

- Estimate!!Total!!Income in the past 12 months at or above poverty level!!Under 6 years
- Estimate!!Total!!Income in the past 12 months at or above poverty level!!6 to 11 years
- Estimate!!Total!!Income in the past 12 months at or above poverty level!!12 to 17 years

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals associated with these values.

High school completion

Data tables

High school completion represents the percent of the population over age 25 that has completed at least a high school degree or equivalent.

Data table S1501 was used to calculate high school completion for total population and disaggregated by sex and age. Variable selection changed between years (see below).

Data tables C15002B, C15002C, C15002D, C15002E, C15002F, C15002G, C15002H, and C15002I were used to calculate high school completion, disaggregated by race and ethnicity.

Analysis

$$\text{High school completion} = \frac{\text{[Residents aged 25 or older with high school diploma (or equivalent) or higher]}}{\text{Total population aged 25 or older}} \times 100\%$$

Total population; Sex: 2017 Forward Analyses (Table S1501)

High school completion is presented as reported using variables labelled as:

- Estimate!!Percent!!Population 25 years and over!!High school graduate or higher
- Estimate!!Percent Male!!Population 25 years and over!!High school graduate or higher
- Estimate!!Percent Female!!Population 25 years and over!!High school graduate or higher

Total population; Sex: 2015-2016 Analyses (Table S1501)

Variables with the following labels were summed to calculate the numerator (replace “Total” with “Male” or “Female” for sex-specific estimates):

- Total!!Estimate!!Population 25 years and over!!High school graduate (includes equivalency)
- Total!!Estimate!!Population 25 years and over!!Some college, no degree
- Total!!Estimate!!Population 25 years and over!!Associate's degree
- Total!!Estimate!!Population 25 years and over!!Bachelor's degree
- Total!!Estimate!!Population 25 years and over!!Graduate or professional degree

This variable was used for the denominator (replace “Total” with “Male” or “Female” for sex-specific estimates):

- Total!!Estimate!!Population 25 years and over

Total population; Sex: 2013-2014 Analyses (Table S1501)

High school completion was calculated by summing the variables with the following labels (replace “Total” with “Male” or “Female” for sex-specific estimates):

- Total!!Estimate!!Population 25 years and over!!High school graduate (includes equivalency)
- Total!!Estimate!!Population 25 years and over!!Some college, no degree
- Total!!Estimate!!Population 25 years and over!!Associate's degree
- Total!!Estimate!!Population 25 years and over!!Bachelor's degree
- Total!!Estimate!!Population 25 years and over!!Graduate or professional degree

Age: 2015 Forward Analyses (Table S1501)

High school completion is presented as reported using variables labelled as:

- Percent!!Estimate!!Population 25 to 34 years!!High school graduate or higher
- Percent!!Estimate!!Population 35 to 44 years!!High school graduate or higher
- Percent!!Estimate!!Population 45 to 64 years!!High school graduate or higher
- Percent!!Estimate!!Population 65 years and over!!High school graduate or higher

Age: 2013-2014 Analyses (Table S1501)

High school completion is presented as reported using variables labelled as:

- Total!!Estimate!!Population 25 to 34 years!!High school graduate or higher
- Total!!Estimate!!Population 35 to 44 years!!High school graduate or higher
- Total!!Estimate!!Population 45 to 64 years!!High school graduate or higher

- Total!!Estimate!!Population 65 years and over!!High school graduate or higher

Race and ethnicity Analyses (Tables C15002x)

Variables with the following labels were summed to calculate the numerator. See above "Categorizing race and ethnicity" section for information on which tables are used for each subgroup.

- Estimate!!Total!!Male!!High school graduate (includes equivalency)
- Estimate!!Total!!Male!!Some college or associate's degree
- Estimate!!Total!!Male!!Bachelor's degree or higher
- Estimate!!Total!!Female!!High school graduate (includes equivalency)
- Estimate!!Total!!Female!!Some college or associate's degree
- Estimate!!Total!!Female!!Bachelor's degree or higher

This variable was used for the denominator:

- Estimate!!Total

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals associated with these values.

Notes on analysis

As of October 2020, the Dashboard revised its high school graduation metric, by changing the data source from state-based education data to the American Community Survey. While the old metric looked at public school students who graduated within four years of entering ninth grade in high schools geographically located within the city (whether or not students lived in the city), this new metric looks at high school completion rates among all city (or census tract) residents aged 25+ years old, regardless of where they went to high school.

Income inequality

Data tables

Data table B19001 was used to calculate income inequality at both city and tract levels. Data table B19080 was used to define the 20th and 80th household income percentiles for each year.

Analysis

Income Inequality at the Extremes (ICE) was calculated as per Krieger and colleagues.[22]

The formula for ICE is as follows:

$$\text{ICE} = \frac{\text{[Number of households in 80th income percentile] - [Number of households in 20th income percentile]}}{\text{Total households with known income level in geographic area}} \times 100\%$$

Where values of ICE range from -100 to 100.

Data are presented for years where the cut points available from table B19001 most closely represent the 20th and 80th household income percentiles[22], defined using 1-year estimates from table B19080.

Year	20th Percentile Cut Point	80th Percentile Cut Point
2022	< $29,999	> $150,000
2018	< $24,999	> $125,000

Variables with the following labels in ACS Table B19001 were summed to calculate the number of households above the 80th percentile for each year:

- Estimate!!Total!!$125,000 to $149,999
- Estimate!!Total!!$150,000 to $199,999
- Estimate!!Total!!$200,000 or more

Variables with the following labels were summed to calculate the number of households below the 20th percentile for each year:

- Estimate!!Total!!Less than $10,000
- Estimate!!Total!!$10,000 to $14,999
- Estimate!!Total!!$15,000 to $19,999
- Estimate!!Total!!$20,000 to $24,999
- Estimate!!Total!!$25,000 to $29,999

In both City and Tract analyses, the variable with the following label was used to represent total households with known income level:

- Estimate!!Total

Notes on analysis

Confidence intervals were not calculated because ICE is an index.

As of July 2024, the Dashboard limited the presentation of income inequality data to 2018 and 2022 after discovering temporal variation in this metric related to the metric definition and data availability. While incomes on average increase every year, shifting percentiles up, the income variables used in the calculation are categorical and are not able to be adjusted accordingly each year. Due to this, the Dashboard now only presents the years of data where there is the most alignment between the percentiles and the income variable cut points. The Dashboard concurrently transitioned to using ACS Table B19080 to define our percentiles rather than US Census Bureau Table H-1 (All Races).

Independent Living Difficulty

Data tables

Data table S1810 was used to calculate the independent living difficulty metric at both city and tract levels.

Analysis

$$\text{Independent living difficulty} = \frac{\text{[Population reporting difficulty living independently]}}{\text{Total civilian non-institutional population}} \text{x100\%}$$

For 2015 forward, independent living difficulty is presented as reported using the variable labelled as:

- Estimate!!Percent with a disability!!Total civilian noninstitutionalized population!!DISABILITY TYPE BY DETAILED AGE!!With an independent living difficulty

For 2015 forward, independent living difficulty by age is presented as reported using the variables labelled as:

- Estimate!!Percent with a disability!!Total civilian noninstitutionalized population!!DISABILITY TYPE BY DETAILED AGE!!With an independent living difficulty!!Population 18 to 64 years
- Estimate!!Percent with a disability!!Total civilian noninstitutionalized population!!DISABILITY TYPE BY DETAILED AGE!!With an independent living difficulty!!Population 65 years and over

Notes on analysis

Associated margins of error variables are used to calculate confidence intervals associated with these values.

Housing with potential lead risk

Data tables

Data table B25034 was used to calculate housing risk data at both city and tract levels.

Analysis

The lead analysis was performed as per methodology initially developed by the Washington State Department of Health.[23] Vox Media worked in conjunction with Washington State Department of Health to apply this methodology on a national scale.[24] The Dashboard adapted Vox Media's Python code available on Github[25] for the present analysis, which was conducted by the Dashboard using R v4.1.0 and originally validated using Python v3.6.[26] The Washington State Department of Health's analysis uses variables from 2014 and research from 2002 to inform age of housing weights and lead dust hazard guidance. [23] In updating the analysis to represent all housing stock built in 2010 or later for years subsequent to 2014, variables were added for housing stock built using table B25034. Age of housing weights were updated using the 2021 American Healthy Homes Survey II, published by the U.S. Department of Housing and Urban Development.[27] The updated weights from this source (in the table below) reflect the most recent lead dust hazard guidance, which significantly lowers the acceptable threshold. This update complies with EPA guidance.[28]

Year Housing was Built	% of Housing Units with Significant Lead-Based Paint Hazards
Before 1940	78.0
1940-1959	51.2
1960-1977	17.2
1978-2017	4.7

Housing with Potential Lead Risk is a Dashboard metric sub-analysis based on the Washington State Department of Health/Vox Media analysis intended to report the percentage of housing stock at risk for lead due to the age of the housing. Users can note that this value is the "housing_risk" variable in the original posted Python code.[25] We count the number of housing units in each of four time periods: pre-1940, 1940-59, 1960-79, 1980 or newer. The count of housing units in each time period is weighted by the likelihood of lead exposure due to building age (weights are extrapolated from American Healthy Homes Survey II, 2021. *Please note that available ACS building age variables do not perfectly align with suggested weights. Email info@cityhealthdashboard.com for further details.*). This results in an overall percent of housing likely to have some risk of lead exposure.

$$\text{Housing with potential lead risk} = \frac{\text{[Weighted sum of housing stock at risk for lead]}}{\text{Total housing stock}} \times 100\%$$

The following variables were used to categorize housing stock by age:

- Estimate!!Total:!!Built 1939 or earlier
- Estimate!!Total:!!Built 1940 to 1949
- Estimate!!Total:!!Built 1950 to 1959
- Estimate!!Total:!!Built 1960 to 1969
- Estimate!!Total:!!Built 1970 to 1979
- Estimate!!Total:!!Built 1980 to 1989
- Estimate!!Total:!!Built 1990 to 1999
- Estimate!!Total:!!Built 2000 to 2009
- Estimate!!Total!!Built 2010 or later *(data year 2013 and 2014 only)*

- Estimate!!Total:!!Built 2010 to 2013 *(data year 2015-2020 only)*
- Estimate!!Total:!!Built 2014 or later *(data year 2015-2020 only)*
- Estimate!!Total:!!Built 2010 to 2019 Estimate!!Total:!!Built 2020 or later *(data year 2021 and later)*
- Estimate!!Total:!!Built 2020 or later *(data year 2021 and 2022) (data year 2021 and later)*

The following variable was used to represent total housing stock:

- Estimate!!Total

Margins of error (MOE) for these estimate values were derived using the following protocol: calculating adjusted MOE's for each housing-age group that had summed estimates[20]; weighting those MOE's with the same weights used to calculate the numerator; and then calculating an MOE for a derived proportion.[20] See section "*ACS: Calculating MOEs for aggregate count data and derived proportions*" for this equation in full.

Notes on analysis

The Dashboard Team determined that estimates with a 3.25% or greater absolute increase from year to year were unstable and therefore are censored.

Lead exposure risk index

Data tables

Data table B25034 was used to calculate housing risk at both city and tract levels. S1701 was used for calculating poverty risk at both city and tract levels.

Analysis

We took the Dashboard Housing with Potential Lead Risk metric (see earlier section for details on weights and lead threshold guidance) and factored in information about the percentage of the population living at or below 125% of the federal poverty level (poverty risk). We z-standardized poverty risk and housing with potential lead risk variables, weighted each by weights extrapolated from American Healthy Homes Survey II, 2021[27], and summed these two components to get a raw lead risk score. We then ranked these scores from 1, or lowest risk, to 10, or highest risk, to create a scale of overall lead exposure risk.

$$\text{Housing risk} = \frac{\text{[Weighted sum of housing stock at risk for lead]}}{\text{Total housing stock}} \times 100\%$$

$$\text{Poverty risk} = \frac{\text{[Population below 125\% of poverty level]}}{\text{Total population}} \times 100\%$$

Raw lead risk score = Weighted and z-scored housing risk + Weighted and z-scored poverty risk
Lead exposure risk index = Decile ranked raw lead risk score

The following variables were used to categorize housing stock by age:

- Estimate!!Total:!!Built 1939 or earlier
- Estimate!!Total:!!Built 1940 to 1949
- Estimate!!Total:!!Built 1950 to 1959
- Estimate!!Total:!!Built 1960 to 1969
- Estimate!!Total:!!Built 1970 to 1979
- Estimate!!Total:!!Built 1980 to 1989
- Estimate!!Total:!!Built 1990 to 1999
- Estimate!!Total:!!Built 2000 to 2009
- Estimate!!Total!!Built 2010 or later *(data year 2013 and 2014 only)*

- Estimate!!Total:!!Built 2010 to 2013 *(data year 2015-2020 only)*
- Estimate!!Total:!!Built 2014 or later *data year 2015-2020 only)*
- Estimate!!Total:!!Built 2010 to 2019 *(data year 2021 and later)*
- Estimate!!Total:!!Built 2020 or later *(data year 2021 and later)*

The following variable was used to represent total housing stock:

- Confidence intervals were not calculated because lead exposure risk is a ranked index. Estimate!!Total

The following variable was used to represent individuals living in poverty:

- Estimate!!Total!!Population for whom poverty status is determined!!All individuals with income below the following poverty ratios!!125 percent of poverty level

The following variable was used to represent total population for poverty risk calculations:

- Estimate!!Total!!Population for whom poverty status is determined

Notes on analysis

a. Confidence intervals were not calculated because lead exposure risk is a ranked index.
b. The Dashboard Team determined that estimates with a change of 2 deciles or more year to year were unstable and therefore are censored.
c. The decile ranking ranks risk of lead exposure risk relative to the other cities included on the Dashboard, not all US cities. Thus, a city/tract level estimate might change when other cities/tracts are added to the calculation pool.

Neighborhood racial/ethnic segregation

Data tables

Data table DP05 was used to calculate racial/ethnic segregation at the city level.

Analysis

Segregation was quantified as per Iceland's formula for H, the entropy index.[29]

Iceland defines the entropy index as follows: "The entropy index is the weighted average deviation of each unit's entropy from the metropolitan-wide entropy, expressed as a fraction of the metropolitan area's total entropy." [29] The equation for H provides a raw value between 0-1. The segregation (entropy index) values that are presented on the Dashboard represent H*100 to provide segregation scores that range from 0 to 100.

Segregation on the Dashboard is calculated using the following formula, adapted from the entropy index:

$$\text{Neighborhood racial/ethnic segregation} = \sum_{i=i}^{n} \frac{t_i(E-E_i)}{ET} \times 100$$

Where:

t_i refers to the total population of tract i
T is the metropolitan area population
n is the number of tracts
E is the metropolitan area diversity (entropy) score
E_i is the tract i's diversity (entropy) score

Iceland defines entropy scores for cities and tracts as follows: "A metropolitan area's entropy score is calculated as:

$$E \text{ (city entropy/diversity)} = \sum_{r=1}^{r} (\pi_r) \ln[\frac{1}{\pi_r}]$$

Where:

$\boldsymbol{\pi_r}$ refers to a particular racial/ethnic group's proportion of the whole metropolitan area population…

A unit within the metropolitan area, such as a census tract, would analogously have its entropy score, or diversity, defined as:

$$E_i \text{ (tract entropy/diversity)} = \sum_{r=1}^{r} (\pi_{ri}) \ln[\frac{1}{\pi_{ri}}]$$

Where:

$\boldsymbol{\pi_{ri}}$ refers to a particular racial/ethnic group's proportion of the population in tract i."[29]

As per footnote 5 in Iceland,[29] $\ln\left[\frac{1}{\pi_r}\right]$ is set to 0 when the proportion of a particular group is in a given geography (π_r) is 0. This is done for calculations of both E and E_i.

Variables with the following labels were used in the diversity and segregation analyses:

- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Black or African American alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!American Indian and Alaska Native alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Asian alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Native Hawaiian and Other Pacific Islander alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Some other race alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Two or more races
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!White alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Hispanic or Latino (of any race)

Notes on analysis

The estimates of persons in each racial/ethnic group within a city's tracts were summed to calculate the total population within each city. This calculated total population is not reported on the Dashboard. Users should note that this value sometimes equals the city's actual total population estimate reported in DP05. However, the summed total of tract total populations sometimes over-counts the total population of a city. This is because Census tract boundaries are not perfectly nested within Census place (city) boundaries. The Dashboard used this method for the purposes of calculating denominators for Diversity and Segregation (E, E(i) and H) analyses because the entropy index analyses demand that proportions of racial/ethnic groups sum to a total of 1. Thus, for the purposes of our calculation, the "total population" of a geographic area was necessarily the sum of the total population of each mutually exclusive racial/ethnic group within the area. Further, the entropy index analysis examines the relationship between populations at the city and tract level; analysis thus required use of all the tracts associated with a given city.

The Dashboard does not release segregation (H) scores for cities with a single census tract because the entropy index is not valid in cities in which residents may only live in a single census tract. Due to the nature of how this metric is calculated and changes in census tract boundaries over time, estimates are not always comparable before and after 2020.

Confidence intervals were not calculated because the entropy scores are components of an index.

Racial/ethnic diversity

Data tables

Data table DP05 was used to calculate racial/ethnic diversity values at the city and tract levels.

Analysis

Racial/ethnic diversity represents how much of the maximum possible entropy (or diversity) is exhibited in a given tract or city. A lower value (closer to 0) indicates that all residents belong to one racial/ethnic group (low diversity) and a higher value (closer to 100) indicates that all racial/ethnic groups are in equal proportion (high diversity). This measure does not incorporate geographic distributions of racial/ethnic groups. Diversity (or entropy) was quantified using Iceland's formulas for E and E_i entropy scores (see below).[29] In our analysis, E and E_i represent city and tract racial/ethnic diversity scores (or entropy), respectively.

$$\text{Racial/ethnic diversity} = \frac{[\text{City or tract entropy score } (E \text{ or } E_i)]}{\text{Maximum possible entropy score}} \times 100$$

Where:

Maximum possible entropy score is ln(5), as there are 5 racial/ethnic groups in the calculation

Iceland defines entropy scores for cities and tracts as follows: "A metropolitan area's entropy score is calculated as:

$$E \text{ (city entropy/diversity)} = \sum_{r=1}^{r} (\pi_r) \ln[\frac{1}{\pi_r}]$$

Where:

$\boldsymbol{\pi_r}$ refers to a particular racial/ethnic group's proportion of the whole metropolitan area population…

A unit within the metropolitan area, such as a census tract, would analogously have its entropy score, or diversity, defined as:

$$E_i \text{ (tract entropy/diversity)} = \sum_{r=1}^{r} (\pi_{ri}) \ln[\frac{1}{\pi_{ri}}]$$

Where:

$\boldsymbol{\pi_{ri}}$ refers to a particular racial/ethnic group's proportion of the population in tract i."[29]

As per footnote 5 in Iceland,[29] $\ln\left[\frac{1}{\pi_r}\right]$ and is set to 0 when the proportion of a particular group is in a given geography (π_r) is 0. This is done for calculations of both E and E_i.

Variables with the following labels were used in the diversity and segregation analyses:

- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Black or African American alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!American Indian and Alaska Native alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Asian alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Native Hawaiian and Other Pacific Islander alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Some other race alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!Two or more races
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Not Hispanic or Latino!!White alone
- Estimate!!HISPANIC OR LATINO AND RACE!!Total population!!Hispanic or Latino (of any race)

Notes on analysis

The estimates of persons in each racial/ethnic group within a city's tracts were summed to calculate the total population within each city. This calculated total population is not reported on the Dashboard. Users should note that while this value sometimes equals the city's actual total population estimate reported in DP05, the summed total of tract total populations sometimes over counts the total population of a city. This is likely because Census tract boundaries are not perfectly nested within Census place (city)

boundaries. The Dashboard used this method for the purposes of calculating denominators for diversity and segregation (E, E(i) and H) analyses because the entropy index analyses demands that proportions of racial/ethnic groups sum to a total of 1. Thus, for the purposes of our calculation, the "total population" of a geographic area was necessarily the sum of the total population of each mutually exclusive racial/ethnic group within the area. Further, the entropy index analysis examines the relationship between populations at the city and tract level; analysis thus required use of all the tracts associated with a given city.

Confidence intervals were not calculated because the entropy scores are components of an index. See the “Confidence intervals” section in Section 2 above for more details.

Rent burden

Data tables

Data table DP04 was used to calculate rent burden at both city and tract levels.

Analysis

$$\text{Rent burden} = \frac{\text{[Households paying ≥30\% of monthly income on rent]}}{\text{Total renter-occupied units with reported income}} \times 100\%$$

In both City and Tract analyses, the variables in DP04 with the following labels were summed to calculate the numerator:

- Estimate!!GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME (GRAPI)!!Occupied units paying rent (excluding units where GRAPI cannot be computed)!!30.0 to 34.9 percent
- Estimate!!GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME (GRAPI)!!Occupied units paying rent (excluding units where GRAPI cannot be computed)!!35.0 percent or more

In both City and Tract analyses, the variable in DP04 with the following labels were summed to calculate the denominator:

- Estimate!! GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME (GRAPI)!! Occupied units paying rent (excluding units where GRAPI cannot be computed)

NOTE: Variable labels for 2013 and 2014 tables are slightly different from labels for 2015 Forward. Only the most recently available labels are provided here. Please email info@cityhealthdashboard.com with any questions or for more detailed information about variable naming over time.

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals associated with these values.

Unemployment – annual, neighborhood level

Data tables

Data table S2301 was used to report annual unemployment rates, disaggregated by race and ethnicity, sex, and age at the city level.

Analysis

$$\text{Unemployment} = \frac{\text{[Population age 16 and over that is unemployed and actively seeking work]}}{\text{Total population age 16 and over employed or actively seeking work}} \times 100\%$$

Total population; sex breakdown, age breakdown; Black; White; Hispanic; Other, Two or more Races, American Indian and Alaska Native: 2013 Forward City Analyses (Table S2301)

Annual unemployment rates reported in S2301 are presented as reported using variables labelled as:

- Estimate!!Unemployment rate!!Population 16 years and over
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Black or African American alone
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!White alone, not Hispanic or Latino
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Hispanic or Latino origin (of any race)
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!American Indian and Alaska Native alone
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Some other race alone
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Two or more races
- Estimate!!Unemployment rate!!Population 20 to 64 years!!SEX!!Male
- Estimate!!Unemployment rate!!Population 20 to 64 years!!SEX!!Female
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!16 to 19 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!20 to 24 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!25 to 29 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!30 to 34 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!35 to 44 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!45 to 54 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!55 to 59 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!60 to 64 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!65 to 74 years
- Estimate!!Unemployment rate!!Population 16 years and over!!AGE!!75 years and over

Asian: 2013 Forward City Analyses (Table S2301)

Estimates and confidence intervals values for “Asian” are weighted averages of estimates and confidence intervals for the subgroups that comprise these groups throughout the Dashboard.

The value for “Asian” is a weighted average of the variables associated with the following labels in S2301:

- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Asian alone
- Estimate!!Unemployment rate!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Native Hawaiian and Other Pacific Islander alone

Estimate and confidence interval values are weighted by the relative proportion of each of these groups within the summed total population of these two groups within each city as per ACS table S2301, using the variables with the following labels:

- Estimate!!Total!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Asian alone
- Estimate!!Total!!Population 16 years and over!!RACE AND HISPANIC OR LATINO ORIGIN!!Native Hawaiian and Other Pacific Islander alone

When any of the above variables used for summation were missing, the entire summed estimate was set to missing.

Associated margins of error variables were used to calculate confidence intervals associated with these values for all demographic subgroups and total population.

Total population: 2013 Forward Tract Analyses (Table S2301)

Annual unemployment rate was reported using the variable with the following label in table S2301:

- Estimate!!Unemployment rate!!Population 16 years and over

Uninsured

Data tables

Uninsured status refers specifically to health insurance status, not lack of any type of insurance.

Data table S2701 was used to report percent of the civilian noninstitutionalized population without health insurance for ages 0-64 at the city and tract levels; this stratum is referred to as “total population”.

Data table S2701 was used to report percent of the civilian noninstitutionalized population without health insurance, disaggregated by age, at the city level for 2015 Forward. Age strata change over time in accordance with data availability. Of note, the Census Bureau changed age categories as of the 2017 data release to better align with the current health insurance landscape.[30]

Summary of available age strata for uninsured, by year			
	2013, 2014	**2015, 2016**	**2017 Forward**
Age breakdown (*city only*)	*unavailable*	0-17	0-18
		18-24	19-25
		25-34	26-34
		35-44	35-44
		45-64	45-64

Data table B27001 was used to report uninsured, disaggregated by sex, at the city level.

Data tables C27001B, C27001C, C27001D, C27001E, C27001F, C27001G, C27001H, and C27001I were used to calculate uninsured, disaggregated by race and ethnicity, at the city level.

Analysis

$$\text{Uninsured} = \frac{\text{[Population age 0-64 that have no current health insurance coverage]}}{\text{Total population aged 0-64}} \times 100\%$$

Total population, Age: 2015 Forward Analyses (Table S2701)

Variables associated with the following labels are summed to calculate the numerator for total population, at the city and census tract level:

- 2013, 2014:
  - Number Uninsured!!Estimate!!AGE!!Under 18 years
  - Number Uninsured!!Estimate!!AGE!!18 to 64 years
- 2015, 2016:
  - Uninsured!!Estimate!!AGE!!Under 18 years
  - Uninsured!!Estimate!!AGE!!18 to 64 years
- 2017 Forward:
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!Under 19 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!19 to 25 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!26 to 34 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!35 to 44 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!45 to 54 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!55 to 64 years

Variables associated with the following labels are summed to calculate the denominator for total population, at the city and census tract level:

- 2013, 2014, 2015, 2016:
  - Total!!Estimate!!AGE!!Under 18 years
  - Total!!Estimate!!AGE!!18 to 64 years
- 2017 Forward:

- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!Under 19 years
- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!19 to 25 years
- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!26 to 34 years
- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!35 to 44 years
- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!45 to 54 years
- Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!55 to 64 years

NOTE: Detailed age breakdowns are not available in 2013 and 2014. Additionally, variable labeling conventions and age strata changed slightly between years, which is noted below.

Percent uninsured disaggregated by age are presented as reported in the S2701 data table using the variables labelled as:

- 2015, 2016:
  - Percent Uninsured!!Estimate!!AGE!!Under 18 years
  - Percent Uninsured!!Estimate!!AGE!!18 to 64 years!!18 to 24 years
  - Percent Uninsured!!Estimate!!AGE!!18 to 64 years!!25 to 34 years
  - Percent Uninsured!!Estimate!!AGE!!18 to 64 years!!35 to 44 years
- 2017 Forward:
  - Estimate!!Percent Uninsured!!Civilian noninstitutionalized population!!AGE!!Under 19 years
  - Estimate!!Percent Uninsured!!Civilian noninstitutionalized population!!AGE!!19 to 25 years
  - Estimate!!Percent Uninsured!!Civilian noninstitutionalized population!!AGE!!26 to 34 years
  - Estimate!!Percent Uninsured!!Civilian noninstitutionalized population!!AGE!!35 to 44 years

Variables associated with the following labels are summed to calculate the numerator for age 45-64:

- 2015, 2016:
  - Uninsured!!Estimate!!AGE!!18 to 64 years!!45 to 54 years
  - Uninsured!!Estimate!!AGE!!18 to 64 years!!55 to 64 years
- 2017 Forward:
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!45 to 54 years
  - Estimate!!Uninsured!!Civilian noninstitutionalized population!!AGE!!55 to 64 years

Variables associated with the following labels are summed to calculate the denominator for age 45-64:

- 2015, 2016:
  - Total!!Estimate!!AGE!!18 to 64 years!!45 to 54 years
  - Total!!Estimate!!AGE!!18 to 64 years!!55 to 64 years
- 2017 Forward:
  - Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!45 to 54 years
  - Estimate!!Total!!Civilian noninstitutionalized population!!AGE!!55 to 64 years

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals for these values.

Sex: 2013 Forward Analyses (Table B27001)

Table B27001 is used to calculate percentage of uninsured male and female populations at the city level only

Variables associated with the following labels are summed to calculate the numerator for males:

- Estimate!!Total!!Male!!Under 6 years!!No health insurance coverage
- Estimate!!Total!!Male!!6 to 18 years!!No health insurance coverage
- Estimate!!Total!!Male!!19 to 25 years!!No health insurance coverage
- Estimate!!Total!!Male!!26 to 34 years!!No health insurance coverage
- Estimate!!Total!!Male!!35 to 44 years!!No health insurance coverage
- Estimate!!Total!!Male!!45 to 54 years!!No health insurance coverage
- Estimate!!Total!!Male!!55 to 64 years!!No health insurance coverage

Variables associated with the following labels are summed to calculate the denominator for males:

- Estimate!!Total!!Male!!Under 6 years
- Estimate!!Total!!Male!!6 to 18 years
- Estimate!!Total!!Male!!19 to 25 years
- Estimate!!Total!!Male!!26 to 34 years
- Estimate!!Total!!Male!!35 to 44 years
- Estimate!!Total!!Male!!45 to 54 years
- Estimate!!Total!!Male!!55 to 64 years

Variables associated with the following labels are summed to calculate the numerator for females:

- Estimate!!Total!!Female!!Under 6 years!!No health insurance coverage
- Estimate!!Total!!Female!!6 to 18 years!!No health insurance coverage
- Estimate!!Total!!Female!!19 to 25 years!!No health insurance coverage
- Estimate!!Total!!Female!!26 to 34 years!!No health insurance coverage
- Estimate!!Total!!Female!!35 to 44 years!!No health insurance coverage
- Estimate!!Total!!Female!!45 to 54 years!!No health insurance coverage
- Estimate!!Total!!Female!!55 to 64 years!!No health insurance coverage

Variables associated with the following labels are summed to calculate the denominator for females:

- Estimate!!Total!!Female!!Under 6 years
- Estimate!!Total!!Female!!6 to 18 years
- Estimate!!Total!!Female!!19 to 25 years
- Estimate!!Total!!Female!!26 to 34 years
- Estimate!!Total!!Female!!35 to 44 years
- Estimate!!Total!!Female!!45 to 54 years
- Estimate!!Total!!Female!!55 to 64 years

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals for these values.

Race/ethnicity: 2013 Forward Analyses
(Tables C27001B, C27001C, C27001D, C27001E, C27001F, C27001G, C27001H, C27001I)

Race and ethnicity-specific tables from the C27001 series are used to calculate percent of uninsured populations, by race and ethnicity and at the city level only. See section on *Categorizing Race and Ethnicity* in the general ACS section above for definitions of each race group.

Variables associated with the following labels are summed to calculate the numerator, per racial or ethnic group:

- Estimate!!Total!!Under 19 years!!No health insurance coverage
- Estimate!!Total!!19 to 64 years!!No health insurance coverage

Variables associated with the following labels are summed to calculate the denominator, per racial or ethnic group:

- Estimate!!Total!!Under 19 years
- Estimate!!Total!!19 to 64 years

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals for these values.

Youth Not in Work or School

Data tables

Data table B14005 was used to calculate the percentage of youth 16-19 years who are neither working nor in school, also known as “disconnected youth”.

Analysis

$$\text{Youth not in work or school} = \frac{[\text{Youth aged 16-19 who are neither working nor in school}]}{\text{Total youth aged 16-19}} \times 100\%$$

Variables associated with the following labels were summed to calculate the numerator for males:

- Estimate!!Total:!!Male:!!Not enrolled in school:!!High school graduate (includes equivalency):!!Unemployed
- Estimate!!Total:!!Male:!!Not enrolled in school:!!High school graduate (includes equivalency):!!Not in labor force
- Estimate!!Total:!!Male:!!Not enrolled in school:!!Not high school graduate:!!Unemployed
- Estimate!!Total:!!Male:!!Not enrolled in school:!!Not high school graduate:!!Not in labor force

The following variable was used as the denominator for males:

- Estimate!!Total:!!Male:

Variables associated with the following labels were summed to calculate the numerator for females:

- Estimate!!Total:!!Female:!!Not enrolled in school:!!High school graduate (includes equivalency):!!Unemployed
- Estimate!!Total:!!Female:!!Not enrolled in school:!!High school graduate (includes equivalency):!!Not in labor force
- Estimate!!Total:!!Female:!!Not enrolled in school:!!Not high school graduate:!!Unemployed
- Estimate!!Total:!!Female:!!Not enrolled in school:!!Not high school graduate:!!Not in labor force

The following variable was used as the denominator for females:

- Estimate!!Total:!!Female:

Total population numerators and denominators were calculated by summing all the male and female variables.

When any of the above variables used for summation were missing, the entire summed estimate was set to missing. Associated margins of error variables are used to calculate confidence intervals for these values.

Crosswalk Labs

General note

These CO_2 emissions come from Crosswalk Labs, which integrates observations and uses an activity-based model to estimate CO_2 emissions. Activity data refers to any information that results in the use of energy or emission of greenhouse gases. The activity data for the model uses a variety of data sources such as the National Emissions Inventory (NEI) and the U.S. Energy Information Administration (EIA) State Energy Data System (SEDS) to generate emissions estimates. They estimate emissions from cars, buildings, factories, and airplanes by combining official records from state, local, and tribal agencies with consistent methodology across the nation. The result is a clear, reliable view of where carbon is coming from across different parts of the country.

These data estimate the CO_2 being generated right at the source. By observing these emissions at a neighborhood or city level, we provide clear insight into how much CO_2 that region generates

Crosswalk Labs breaks down CO_2 emissions into five key sectors to help you see where emission is coming from:

- **Residential Buildings:** houses, apartments, and other homes.
- **Commercial Buildings:** offices, stores, restaurants, and similar spaces.
- **Industrial Buildings:** factories and industrial facilities.
- **Electricity production:** power plants generating the electricity we all use.

- **Transportation:** on-road vehicles, like cars and trucks.

For additional information and updates, please visit: https://docs.crosswalk.io/ or email: contact@crosswalk.io

Multi-year data

Annual Data from 2010 are presented on the Dashboard.

Weights

Not applicable.

Categorizing race/ethnicity

Not applicable.

Confidence intervals

Not applicable.

Metric-specific notes

CO2 Emissions - Per Capita

Data represent average total emissions, citywide, per person, of CO_2 (in metric tons) from fossil fuels throughout the year

Data tables

City level emissions data were received directly from Crosswalk Labs. Population denominators were derived from DP05 table from American Community Survey

Analysis

City-level per capita estimates were calculated by dividing total city-level CO_2 emissions by the population for the given year.

CO2 Emissions – Census Tract Average

Data tables

Tract level emissions data were received directly from Crosswalk Labs. City-level estimates were calculated by the Dashboard team.

Analysis

Tract-level estimates represent total raw CO_2 (in metric tons) emissions from fossil fuels throughout the year. City-level estimates represent the unweighted average of tract-level CO_2 emissions within each city.

George Mason University Air Quality Team

General note

These data were created by fusing ground observations from the US Environmental Protection Agency (EPA) Air Quality System (AQS) network and computer model prediction from the National Oceanic and Atmospheric Administration (NOAA) National Air Quality Forecast Capability (NAQFC) by the George Mason University air quality team.

Weights

The data from the George Mason University air quality team provides monthly average of daily maximum tract-level estimates for all tracts in the contiguous United States.

The Dashboard uses a block population-weighted aggregation method to calculate city-level estimates. Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how this method.

Categorizing race/ethnicity

Not applicable.

Confidence intervals

Not applicable.

Metric-specific notes

Air pollution – ozone

Data represent modeled estimates and do not include estimates for Alaska and Hawaii.

EPA CMAQ RSIG and GMU North America Chemical Reanalysis (NACR) are commonly used, publicly available data sources for ozone pollution. While the RSIG presently includes a longer data period, North America Chemical Reanalysis (NACR) uses more up-to-date emission and real-time forecasting data to provide ozone data in a timelier manner (up to yesterday). Both RSIG and NACR provide ozone pollution (parts per billion (ppb)) data for 12 kilometer square areas, which is larger than many census tracts. EPA CMAQ RSIG further smooths the data to provide census tract-level estimates, while NACR are provided at the 12-kilometer square area level only. As such, adjacent census tracts might share the same ozone pollution value (ppb).

Multi-year data

Monthly Data from January 2018 are presented on the Dashboard.

Data tables

Tract level data were received directly from George Mason University. Monthly average of daily maximum 8-hour concentration of ground-level ozone in parts per billion are reported at the census tract level.

Analysis

The model prediction data are used to fill in gaps between air quality monitors, in particular in rural and suburban areas. The model estimates spatial and temporal variations of air pollution based on three major components: emission, meteorology and chemistry. A list of emission sources is provided in Table 1. The meteorology data are provided by the Weather Research and Forecast (WRF) model. The

chemistry model is based on the US EPA Community Multiscale Air Quality (CMAQ) model. To merge the model and monitoring data, the optimal interpolation (OI) method is used to generate a fused surface concentration across the Continental United States at 12km gridding. The gridded data are converted into census tract level by averaging all grid points included in the tract.

Table 2. List of emission sources used to estimate ozone

Year of Update	Emission Sources Included
2018	Anthropogenic Sources: Agriculture, transportation (vehicle/air/railroad/marine), electricity generation units (EGUs), non-EGU point sources, oil/gas, residential wood combustion Natural Sources: biogenic; sea-salt;
2019	Anthropogenic Sources: Agriculture, transportation (vehicle/air/railroad/marine), electricity generation units (EGUs), non-EGU point sources, oil/gas, residential wood combustion Natural Sources: biogenic; sea-salt;
2020-forward	Anthropogenic Sources: Agriculture, transportation (vehicle/air/railroad/marine), electricity generation units (EGUs), non-EGU point sources, oil/gas, residential wood combustion Natural Sources: Biogenic; Sea-salt; Wildfires

To calculate city-level estimates, block-level population weights were applied to the census tract annual averages and the weighted block values were summed to the city level. Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how block-level weights are calculated and applied.

Air pollution – PM2.5

Data represent modeled estimates and do not include estimates for Alaska and Hawaii.

EPA CMAQ RSIG and GMU North America Chemical Reanalysis (NACR) are commonly used, publicly available data sources for $PM_{2.5}$ pollution. While the RSIG presently includes a longer data period, North America Chemical Reanalysis (NACR) uses more up-to-date emission and real-time forecasting data to provide $PM_{2.5}$ data in a timelier manner (up to yesterday). Both RSIG and NACR provide $PM_{2.5}$ pollution (microgram per cubic meter (□g/m^3)) data for 12 kilometer square areas, which is larger than many census tracts. EPA CMAQ RSIG further smooths the data to provide census tract-level estimates, while NACR are provided at the 12-kilometer square area level only. As such, adjacent census tracts might share the same $PM_{2.5}$ pollution value (□g/m^3).

Multi-year data

Monthly Data from January 2022 are presented on the Dashboard.

Data tables

Tract level data were received directly from George Mason University. Monthly average of daily maximum 8-hour concentration of $PM_{2.5}$ per cubic meter are reported at the census tract level.

Analysis

The model prediction data are used to fill in gaps between air quality monitors, in particular in rural and suburban areas. The model estimates spatial and temporal variations of air pollution based on three major components: emission, meteorology and chemistry. A list of emission sources is provided in Table 2. The meteorology data are provided by the Weather Research and Forecast (WRF) model. The chemistry model is based on the US EPA Community Multiscale Air Quality (CMAQ) model. To merge the

model and monitoring data, the optimal interpolation (OI) method is used to generate a fused surface concentration across the Continental United States at 12km gridding. The gridded data are converted into census tract level by averaging all grid points included in the tract.

Table 2. List of emission sources used to estimate $PM_{2.5}$

Year of Update	Emission Sources Included
2022-forward	Anthropogenic Sources: Agriculture, transportation (vehicle/air/railroad/marine), electricity generation units (EGUs), non-EGU point sources, oil/gas, residential wood combustion Natural Sources: biogenic; sea-salt; windblown dust; biomass burning

2013-2018 data previously presented on the Dashboard were derived from the Environmental Protection Agency, Community Multiscale Air Quality Remote Sensing Information Gateway (CMAQ RSIG). These data can be requested via email at info@cityhealthdashboard.com

L2

General notes

Voter participation represents the percentage of the voting eligible population who voted in a general election.

The voter participation data were derived from the L2, accessed through NYU library. For additional information please email info@cityhealthdashboard.com.

Weights

No weights were applied to the analysis.

Confidence intervals

CIs are not presented because MOE or SE data were not presented in the underlying dataset.

Metric-specific notes

Voter Participation

Data tables

The counts for voter participation were retrieved from the National Voter File, provided by L2, for general election.

The voting-eligible population data were sourced from the Citizen Voting Age Population (CVAP) by Race and Ethnicity - A Special Tabulation from the 2022 ACS 5-Year Estimates (derived from 2018-2022 data). We chose to use the 2018-2022 5-year estimates for the 2020 general election because we believe these estimates better represent the underlying population trend in 2020 than the 2016-2020 5-year estimates. 2019-2023 5-year estimates were used for 2024 general election estimates.

For cities not provided by American Community Survey special tabulation directly, the Dashboard uses a block population-weighted aggregation method to calculate city-level estimates. An aggregation indicator was applied for city estimates calculated using this aggregation method. Please see Appendix E: Block Population-Weighted Aggregation for Selected Metrics for more information about how this method.

We provided voter participation estimates by sex and age groups: Age 18-29, Age 30-44, Age 45-64, Age 65+.

Analysis

To obtain tract and city-level estimates, the Dashboard used the longitude and latitude of voters' residential addresses, geocoded by NYU Langone Health Geocoding Center, and performed a spatial join with the city and tract boundary to determine voter participation for general election.

$$\text{Voter participation} = \frac{[\text{Number of voters voted in a general election}]}{\text{Voting-eligible population of the election year}} \times 100\%$$

Variables from ACS CVAP with the following labels were used as our denominators:

- Total population: Estimate!!Total!!Citizens 18 years and over
- Age 18-29: Estimate!!Total!!Citizens 18 years and over!!AGE!!18 to 29 years
- Age 30-44: Estimate!!Total!!Citizens 18 years and over!!AGE!!30 to 44 years
- Age 45-64: Estimate!!Total!!Citizens 18 years and over!!AGE!!45 to 64 years
- Age 65+: Estimate!!Total!!Citizens 18 years and over!!AGE!!65 years and over
- Male: Estimate!!Total!!Citizens 18 years and over!!SEX!!Male
- Female: Estimate!!Total!!Citizens 18 years and over!!SEX!!Female

Notes on analysis

As part of the validation process, the Dashboard Team compared the reported county-level voter participation count with official county numbers. It's important to note that our voter participation estimates may not exactly match the numbers reported by the state. This discrepancy can be attributed to several factors, including:

1) The imprecision of the geocoding process.
2) Time lags between election day and when states release their voter file.
3) The imprecision of the ACS population denominator estimate.

We applied censorship to city and census tract estimates under certain conditions: when we observed a >10% discrepancy between our voter participation estimates and official county figures, when estimates exceeded 100%, and in locations with fewer than 10 votes in any given election. Additionally, some estimates have been suppressed due to concerns about the reliability of the underlying data. For more information, please email info@cityhealthdashboard.com.

As not all states release the birth year of voters in their voter file, we have only provided age categories for the following 25 states:

Alabama	Louisiana	New Mexico
Arizona	Maine	Pennsylvania
Colorado	Michigan	South Carolina
Delaware	Minnesota	Tennessee
Georgia	Missouri	Texas
Illinois	Montana	Vermont
Iowa	Nebraska	Virginia
Kansas	Nevada	
Kentucky	New Jersey	

Local Area Unemployment Statistics, U.S. Bureau of Labor Statistics

General notes

Local Area Unemployment Statistics (LAUS) data are published by the U.S. Bureau of Labor Statistics. The LAUS program provides monthly and annual unemployment and labor force data for many geographies, by place of residence. Estimates are derived from the Current Population Survey (CPS)[31], Current Employment Statistics (CES) survey, and state unemployment insurance (UI) systems and disaggregated using data from the Census Bureau's American Community Survey (ACS) and annual population estimates from the Population Estimates Program[32] by applying a handbook approach and a blended base method.[33]

Multi-year data

LAUS unemployment rates are released monthly. Monthly estimates are, on average, released by LAUS three months after the month has passed. The Dashboard provides monthly estimates starting from January 2018. Due to the government shutdown in October 2025, the Dashboard is unable to present data on monthly unemployment for this month.

NOTE: The U.S. Bureau of Labor Statistics regularly updates these estimates. Estimates may have changed due to updated inputs to sub-state estimation and other data changes.[34] The Dashboard recommends using the most recently updated data published.

Weights

The Dashboard reports LAUS data as downloaded. No weights were applied.

Categorizing race and ethnicity

LAUS data are not categorized by race and ethnicity.

Confidence intervals

CIs are not presented for LAUS data.

Metric-specific notes

Unemployment – current, city-level

Data tables

City-level data are downloaded monthly directly from the Bureau of Labor Statistics.[35]

Analysis

City-level estimates represent the proportion of the civilian non-institutionalized population that is unemployed and actively seeking work:

$$\text{Unemployment} = \frac{[\text{Population aged} \geq 16 \text{ that is unemployed and actively seeking work}]}{\text{Total population aged} \geq 16} \times 100\%$$

LAUS provides Series Identifiers[36], which are 20-digit unique identifiers that contain information about the geography and analysis performed. The Dashboard made the following selections to obtain monthly unemployment data for cities (see Appendix B for more information on city selection):

For Incorporated Places:

- Prefix = “LA”
- Seasonal Adjustment Code = “U” (“Not Seasonally Adjusted”)
- Area Code = “CT” + Place FIPS code (7 digit) + “000000” [37]
- Measure Code = “03” (“Unemployment rate”)

For County Subdivisions:

- Prefix = “LA”
- Seasonal Adjustment Code = “U” (“Not Seasonally Adjusted”)
- Area Code = “CS” + State FIPS code (2 digit) + County Subdivision FIPS code (5 digit) + “000000”
- Measure Code = “03” (“Unemployment rate”)

For Hawaii Counties:

- Prefix = “LA”
- Seasonal Adjustment Code = “U” (“Not Seasonally Adjusted”)
- Area Code = “CN” + County FIPS Code (5 digit) + “00000000”
- Measure Code = “03” (“Unemployment rate”)

Data for cities with populations under 25,000 are available; however, smaller cities tend to have a high proportion of missing data.
Manual FIPS code matching was required for four consolidated cities because LAUS only releases (consolidated) estimates. Consolidated cities share a government with their county but retain unincorporated areas with distinct governments. (balance) estimates do not include these unincorporated areas, while (consolidated) estimates do. Therefore, data for these cities are equivalent to county estimates and include populations that live within unincorporated areas[38].

Dashboard Geography Reported	***LAUS Geography Reported***
Athens-Clarke County unified government (balance)	Athens-Clarke County (consolidated) city
Augusta-Richmond County consolidated government (balance)	Augusta-Richmond County (consolidated) city
Louisville/Jefferson County metro government (balance)	Louisville-Jefferson County (consolidated) city
Nashville-Davidson metropolitan government (balance)	Nashville-Davidson (consolidated) city
Milford city (balance)	Milford (consolidated) city/town

National Center for Education Statistics and U.S. Department of Education

General notes

Chronic Absenteeism represents the percent of public school elementary and secondary students who miss 10% or more school days in an academic year. NOTE: this metric is calculated at the city-level, not the school district-level, and thus should not be used to evaluate school district performance.

Chronic Absenteeism estimates are calculated using school level chronic absenteeism count data published by the U.S. Department of Education initiatives Ed*Facts*[39] and Ed Data Express[40] (data group 814), and enrollment data from the National Center for Education Statistics (NCES).[41] This metric has been modified twice during its tenure on the Dashboard: once in November 2021 and once in December 2023. Both modifications included source updates and refinements to school exclusion criteria, therefore currently published data should not be compared with previously published data. Current estimates consider consultations with the Stanford Education Data Archive along with expanded data availability to provide multiple years of data. If you would more information on these changes, email info@cityhealthdashboard.com.

Weights

No weights were applied to the analysis.

Categorizing race and ethnicity

Racial and ethnic groups are defined as follows:

- Asian: Asian or Asian Pacific Islander students; Native Hawaiian or Other Pacific Islander Students
- Black: Black or African American students
- Hispanic: Hispanic/Latino students
- White: White students
- Other: American Indian/Alaska Native students; Students who are multiple races

Confidence intervals

CIs are not presented because MOE or SE data were not presented in the underlying dataset, which presents counts.

Metric-specific notes

Chronic Absenteeism

Data tables

School-level chronic absenteeism counts are retrieved from the U.S. Department of Education website, ED Data Express[40], for school years (SY) 2019-2020 onward. SY 2017-2018 chronic absenteeism counts are retrieved via the U.S. Department of Education initiative, Ed*Facts*[39]. SY 2018-2019 absenteeism counts are not available through either data initiative as of the last Dashboard update date. School level enrollment counts are accessed through NCES enrollment data for the associated school year[41]. The two datasets are joined using the NCES school id number.

Analysis

To obtain city-level estimates, the Dashboard creates a school to city crosswalk for each school year, assigning schools to cities with a 200 meter buffer. Note that schools that fall within a city's 200 meter buffer range may later be assigned to a different adjacent city as the Dashboard adds more cities, which may slightly change city-level estimates. See Appendix D for more details.

Schools that meet the following criteria, as detailed in the NCES data, are removed from the crosswalk:

- Private schools
- Pre-K and adult education schools
- Schools classified as special education schools
- Schools that are classified as "closed", "inactive", or otherwise not operating during the given school year
- Schools that are primarily virtual (*note: schools that temporarily taught remotely during the COVID 19 pandemic are not excluded*)
    - For SY 2020-2021 data, the Dashboard team found that 51 schools in 5 states changed their virtual status for only this school year. The Dashboard team made the decision to classify these schools as non-virtual for the SY 2020-2021 year based on the surrounding school years of data so that they might be included in the calculation.
- Schools were additionally removed from the calculation if either the numerator or denominator value was missing or if the chronic absenteeism estimate was greater than 100% and therefore considered unstable.

Chronic absenteeism at the city-level for each school year is calculated by summing the students reported by schools as chronically absent, then dividing by the total number of students enrolled at those schools at time of reporting. See the following formula:

$$\text{Chronic absenteeism} = \frac{\sum_{i=1}^{n} \text{Students who miss 10\% or more school days in an academic year}}{\sum_{i=1}^{n} \text{Total students enrolled}}$$

Where: n = the number of schools assigned to that city

City-level estimates are suppressed if the numerator (number of students chronically absent) is less than 20 students, or if the number of schools with data available for a given city is less than 60% of the total number of schools in that city. City-level estimates are also censored if the state-level estimate was deemed unreliable through external validation. This applies to cities in Arizona, Idaho, and Washington in data year 2022 (SY 2021-2022).

National Vital Statistics System (NVSS)

General notes

Unless otherwise specified (see section "City/County Indicator" below), deaths are assigned to the reported city of residence of the deceased; births are assigned to the city of residence reported by the mother. All NVSS data were analyzed using R.

Restricted use NVSS data geo-coded to the city level are available through the National Association for Public Health Statistics and Information Systems (NAPHSIS). Data request forms are available online.[42]

Users should be cautious when comparing values from different states because of variation in classifying cause of death across locations. This is particularly true for deaths related to opioid overdose.

The downloadable data tables shared on the City Health Dashboard website were not released as micro-level downloadable datasets from NCHS/RDC. Rather .csv aggregated data tables were created using analyses conducted per NCHS disclosure requirements in a secure environment and released as approved output. The findings and conclusions on this website are those of the author(s) and do not represent the views of the Research Data Center, the National Center for Health Statistics, or the Centers for Disease Control and Prevention. NCHS does not recommend further analysis of these tables because linking them to individually identifiable data from other NCHS or non-NCHS datasets could potentially

cause disclosure. If you believe a disclosure has occurred please contact info@cityhealthdashboard.com and RDCA@cdc.gov.

NOTE: Beginning on December 3rd 2024 for natality metrics and August 26th 2026 for mortality metrics, the Dashboard uses data from New Jersey State Health Assessment Data (NJSHAD),[43] a public health data source managed by the New Jersey Department of Health, to provide mortality estimates (except opioid overdose deaths) and natality estimates for all New Jersey cities. Estimates from these data sources are valid for comparison with NCHS/RDC data presented on the Dashboard. For further information, please see Appendix C. Please contact info@cityhealthdashboard.com with any questions.

Multi-year data

NOTE: A single year is used to refer to NVSS data throughout the Dashboard. However, multiple years of data are used in the Dashboard's analyses of NVSS data. Nomenclature is determined based on the most recent year of data used in an analysis.

Multiple Cause of Death Data

MCDD data for 2012 through 2023 for the following metrics are presented on the Dashboard as 3 year pooled estimates (For example, 2012 analyses use data from 2010, 2011 and 2012): opioid overdose deaths, breast cancer deaths, cardiovascular disease deaths, colorectal cancer deaths, premature deaths (all causes), life expectancy.

MCDD data for 2014 through 2020 and 2022 through 2023 for the following metrics are presented on the Dashboard as 5 year pooled estimates (For example, 2014 analyses use data from 2010-2014): firearm homicides and firearm suicides. Due to bridge-single race transition (see *Categorizing race and ethnicity* section below), in 2021 we presented 4 year pooled estimates for these two metrics.

However, fewer years of data within each set are used in the event that city and/or county-level estimates are not available for all specified years in the dataset received by the Dashboard.

The Dashboard provides more information on how many years of data were utilized for all MCDD reported values under "Source" on our website and "period_type" in downloadable data. They specify how many years of data were used in the calculation and also serve as a multiplier for population. Population denominators from the endpoint of each wave of data are used as the multiplier. However, data availability for each year varies by city. For example, "Calculated by the Dashboard Team using data from 2021, 1-year estimate" indicates that only 1 year of data were used between 2018-2021 for breast cancer deaths. Please email info@cityhealthdashboard.com for more details.

Natality Data

ND data for 2012 through 2023 for the following metrics are presented on the Dashboard as 3 year pooled estimates (For example, 2012 analyses use data from 2010, 2011 and 2012): prenatal care, low birthweight, and teen births. 2015 prenatal care estimates are calculated using data from 2014 and 2015 only for the majority of the cities; see section "Prenatal care" below for more detail.

However, fewer years of data within each set are used in the event that city and/or county-level estimates are not available for all specified years in the dataset received by the Dashboard.

The Dashboard provides more information on how many years of data were utilized for all ND reported values under "Source" on our website and "period_type" in downloadable data. They specify how many years of data were used in the calculation and also serve as a multiplier for population. Population denominators are calculated as the sum of three years of data when available. However, data availability for each year varies by city. For example, "Calculated by the Dashboard Team using data from 2021, 1-year estimate" indicates that only 1 year of data was used between 2018-2021 for prenatal care. Please email info@cityhealthdashboard.com for more details.

Population denominators

For city-level analyses, population estimate denominators are generated from American Community Survey table B01001 (5 Year Estimates) for Place and county subdivision.[44]

- The summed population from the years in the pooled estimate is used in each analysis. For example, B01001 (2014 + 2015 + 2016, Year Estimates) is used for NVSS 2016, 3 Year Estimates; B01001 (2013 + 2014 + 2015, Year Estimates) is used for NVSS 2015, 3 Year Estimates, etc.

Weights

Multiple Cause of Death Data

Breast cancer, colorectal cancer, cardiovascular disease, and opioid overdose deaths metrics use US 2010 standardized population weights. These weights were calculated via the direct adjustment approach outlined by Klein & Schoenborn[45] utilizing the data table "QT-P1, 2010 Decennial Census" downloaded in December 2016 from American Fact Finder.[44] A list of weights can be found in Appendix A.

Premature deaths (all causes) used premature death weights and years of life lost derived from the US 2010 standardized population weights using Dranger and Remington's approach.[46] Weights for age-adjusting premature deaths were calculated using the data table "QT-P1, 2010 Decennial Census".[44] The weights are similar to those used for other mortality metrics, but were adjusted to include only the population aged 74 and younger. Weights for years of potential life lost (i.e., the number of years of life "lost" for each death within an age group) were calculated as the mid-point of the age group subtracted from the reference age using the following formula Weight (age group *i*) = 75 – Mid-point age group *i*. Weights and years of life lost are presented in Appendix A.

No weights are applied to firearm suicides, firearm homicides, and life expectancy.

Natality Data

No weights are applied to Natality data.

Categorizing race and ethnicity

Multiple Cause of Death Data

When combining race and ethnicity, Hispanic ethnicity is not mutually exclusive with any race(s) recorded for the decedent. For example, if a person is identified as Hispanic and Asian in their death certificate, this person will be counted in both the Hispanic and Asian death rates. The exception is White, which is defined as White, Non-Hispanic, and this is specified using a combination of the Hispanic origin and Race Recode variables. All race categories are single race only. Refer to Section 2 "Race and /ethnicity categories" (above) for more detail on Dashboard race definitions.

<u>2012-2019 Data</u>:

The National Center for Health Statistics releases bridged-race estimates in their deaths records data from 2012 to 2020. These estimates result from bridging the 31 race categories as specified in the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity, to the four race categories specified in the 1977 OMB standards. In short, they used a statistical model to reassign the people who identified themselves as "Two or more races" back to the "main" four race categories (White, Black, Asian/Pacific Islander and American Indian).

"Hispanic origin/race recode" and "race recode 5" variables were used to categorize race and ethnicity for all mortality metrics. "Other" race and ethnicity category is not provided.

<u>Hispanic Origin/Race Recode:</u>

- Non-Hispanic: Non-Hispanic white, Non-Hispanic Black, Non-Hispanic other races, Hispanic origin unknown
- Hispanic/Latino Mexican, Puerto Rican, Cuban, Central or South American, or other or unknown Hispanic.

Race Recode 5:

- White: White
- Black: Black
- Asian: Asian or Pacific Islander

2020+ Data

Starting from 2018, The National Center for Health Statistics releases single-race estimates in their deaths records data according to the 31 race categories as specified in the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity. Since we release 3 year pooled estimates data, we provide single-race estimates starting from 2020, 3 year estimate. “Hispanic Origin” and “Race recode 40” variables were used to categorize race and ethnicity for all mortality metrics.

Hispanic Origin:

- Non-Hispanic: Non – Hispanic, Unknown (assigned to Asian, Black, Other, or White groups);
- Hispanic: Spaniard, Mexican, Puerto Rican, Cuban, Dominican, and South American, Central American, South American, Latin American, Other Hispanic;

Race Recode 40:

- White: White;
- Black: Black;
- Asian: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other or Multiple Asian, Hawaiian, Guamanian, Samoan, Other or Multiple Pacific Islander;
- Other: American Indian or Alaskan Native (AIAN), Black and White, Black and AIAN, Black and Asian, Black and Native Hawaiian or Other Pacific Islander (NHOPI), AIAN and White, AIAN and Asian, AIAN and NHOPI, Asian and White, Asian and NHOPI, NHOPI and White, Black, AIAN and White, Black, AIAN and Asian, Black, AIAN and NHOPI, Black, Asian and White, Black, Asian and NHOPI, Black, NHOPI and White, AIAN, Asian and White, AIAN, NHOPI and White, AIAN, Asian and NHOPI, Asian, NHOPI and White, Black, AIAN, Asian and White, Black, AIAN, Asian and NHOPI, Black, AIAN, NHOPI and White, Black, Asian, NHOPI and White, AIAN, Asian, NHOPI and White, Black, AIAN, Asian, NHOPI and White, Unknown and Other Race;

The Dashboard calculates race and ethnicity estimates based on city of residence. As of 03/10/2026, estimates for the Other race group are temporarily unavailable. Email info@cityhealthdashboard.com for more detail.

Natality Data

When combining race and ethnicity, Hispanic ethnicity and race for the mother are both considered and are not mutually exclusive. For example, if the mother is identified as Hispanic and Asian in the birth certificate, this person will be classified as both Hispanic, and Asian. The exception is White, which is defined as White, Non-Hispanic, and this is specified using a combination of the Hispanic origin and Race Recode variables. Refer to Section 2 “Race and ethnicity categories” (above) for more detail on Dashboard definitions.

2012, 2013 Data:
Mother's race/Hispanic origin (mracehisp) and mother's race recode (mracerec) variables were used to categorize race and ethnicity for all natality metrics. "Other" race and ethnicity category is not provided.

- Hispanic/Latino: Mother's race/Hispanic origin code of either Mexican, Puerto Rican,
- Cuban, Central or South American, or other or unknown Hispanic.
- White: Mother's race/Hispanic origin code of non-Hispanic white
- Black: Mother's race recode code Black
- Asian: Mother's race recode code Asian or Pacific Islander

2014, 2015, 2016, 2017 Data:
Mother's Hispanic origin recode (mhisp_r) and mother's bridged race (mbrace) variables were used to categorize race and ethnicity for all natality metrics. "Other" race and ethnicity category is not provided.

- Hispanic/Latino: Mother's Hispanic origin recode code of either Mexican, Puerto Rican, Cuban, Central or South American, or other or unknown Hispanic.
- White: Mother's Hispanic origin recode code non-Hispanic, as well as a mother's bridged race code of white
- Black: Mother's bridged race code of Black
- Asian: Mother's bridged race code of Asian or Pacific Islander

2018, 2019, 2020, 2021, 2022, 2023 Data:
Starting from 2016, The National Center for Health Statistics releases single-race estimates in their birth records data according to the 31 race categories as specified in the 1997 Office of Management and Budget (OMB) standards for the collection of data on race and ethnicity. Since we release 3 year pooled estimates data, we provide single-race estimates starting from 2018, 3 year estimate.

Mother's Hispanic origin recode (mhisp_r) and Mother's Race recode 6 (mrace6) variables were used to categorize race and ethnicity for all natality metrics.

<u>Hispanic Origin:</u>

- Non-Hispanic: Non – Hispanic, Unknown (assigned to Asian, Black, Other, or White groups)
- Hispanic: Mexican, Puerto Rican, Cuban, Central and South American, Other and Unknown Hispanic origin.

<u>Race Recode 6:</u>

- White: White;
- Black: Black;
- Asian: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other or Multiple Asian, Hawaiian, Guamanian, Samoan, Other or Multiple Pacific Islander;
- Other: American Indian or Alaskan Native (AIAN), Black and White, Black and AIAN, Black and Asian, Black and Native Hawaiian or Other Pacific Islander (NHOPI), AIAN and White, AIAN and Asian, AIAN and NHOPI, Asian and White, Asian and NHOPI, NHOPI and White, Black, AIAN and White, Black, AIAN and Asian, Black, AIAN and NHOPI, Black, Asian and White, Black, Asian and NHOPI, Black, NHOPI and White, AIAN, Asian and White, AIAN, NHOPI and White, AIAN, Asian and NHOPI, Asian, NHOPI and White, Black, AIAN, Asian and White, Black, AIAN, Asian and NHOPI, Black, AIAN, NHOPI and White, Black, Asian, NHOPI and White, AIAN, Asian, NHOPI and White, Black, AIAN, Asian, NHOPI and White, Unknown and Other Race;

The Dashboard calculates total population, race and ethnicity, and sex estimates based on city of residence. As 03/10/2026 estimates for the Other race group are temporarily unavailable. Email info@cityhealthdashboard.com for more detail.

Confidence intervals

Multiple Cause of Death Data

We calculated 90% CI using the formula below:

$$\text{LCL90} = \text{estimate} - (1.645 \times \text{SE(estimate)})$$
$$\text{UCL90} = \text{estimate} + (1.645 \times \text{SE(estimate)})$$

Standard errors (SE) for breast cancer, colorectal cancer, cardiovascular disease, and opioid overdose deaths metrics were calculated according to following formula outlined by Lilienfeld and Stolley[47] in a document published by the Utah Department of Health[48]:

$$\text{SE(estimate)} = \sqrt{\left[\sum\left(\left(\text{age-group specific US 2010 standardized population weight}\right)^2 * \frac{\text{age-group specific crude mortality rate}^2}{\text{age-group specific total number of deaths}}\right)\right]}$$

SE for firearm suicides and firearm homicides were calculated according to the following formula outlined by Poisson distributions.

$$\text{SE(estimate)} = \frac{\sqrt{numerator}}{denominator} * 100{,}000$$

SE calculations for life expectancy – city-level and premature deaths (all causes) are detailed below in the metric-specific sections.

Natality Data

CIs for low birthweight and prenatal care metrics were calculated as follows:

$$\text{LCL90} = \text{estimate} - 1.645 * \sqrt{\text{estimate*((100-estimate)/numerator)}}$$
$$\text{UCL90} = \text{estimate} + 1.645 * \sqrt{\text{estimate*((100-estimate)/numerator)}}$$

CIs for teen births metric were calculated as follows:

$$\text{LCL90} = (1000 / \text{denominator}) * (\text{numerator} - (1.645 * \sqrt{\text{numerator}}))$$
$$\text{UCL90} = (1000 / \text{denominator}) * (\text{numerator} + (1.645 * \sqrt{\text{numerator}}))$$

City/County indicator

Multiple Cause of Death Data

Please note that some years of estimates for Honolulu, HI, Macon, GA, and select consolidated cities (Athens, GA; Augusta, GA; Indianapolis, IN; Louisville, KY; Nashville, TN) use data from county of residence. Consolidated cities share a government with their county, but retain unincorporated areas with

distinct governments. County estimates include populations that live within unincorporated areas; city estimates do not.[38]

The Dashboard indicates where county values were utilized for MCDD reported values using an alert in the site's "Data tips" box on the Dashboard in downloadable data, available at www.cityhealthdashboard.com/data-access.

Natality Data

Please note that some years of estimates for Honolulu, HI, Macon, GA, and select consolidated and coterminous cities use county of residence. Consolidated cities share a government with their county, but retain unincorporated areas with distinct governments. County estimates include populations that live within unincorporated areas; city estimates do not. Coterminous cities share a government with their county and have the same boundaries.[38]

The Dashboard indicates where county values were utilized for ND reported values using an alert in the site's "Data tips" box on the Dashboard and in downloadable data, available at www.cityhealthdashboard.com/data-access.

Additional Censoring

Multiple Cause of Death Data

The following cities are censored in years when there is a mismatch between the geographic boundaries used by NVSS to calculate number of deaths and the boundaries used by the Census to calculate population. This may happen due to delays in adoption of new boundaries by different agencies. The mismatch was determined by consultation with NCHS and local representatives from each city.

- Decatur, GA
- Miami Gardens, FL
- Leesburg, VA
- Princeton, NJ

Metric-specific notes

Breast cancer deaths

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of breast cancer deaths (females only): C500, C501, C502, C503, C504, C505, C506, C508, & C509. ICD-10 codes were selected for inclusion as per the 2016 SEER Program Coding and Staging Manual.[49]

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

Breast cancer deaths =

$$\sum\left(\frac{\text{age-group specific total number of breast cancer deaths among females}}{\text{multiplier * (age-group specific total female population)}} * \text{US 2010 standardized population age-group specific weight}\right) * 100{,}000$$

Notes on Analysis

Age-adjusted mortality rates are calculated as per National Association for Public Health Statistics and Information Systems recommendations.[50]

Cardiovascular disease deaths

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of cardiovascular disease deaths:

> I110, I119, I130, I131, I132, I139, I10, I120, I129, I150, I159, I210, I211, I212, I213, I214, I219, I220, I229, I241, I248, I249, I200, I201, I209, I250, I251, I253, I254, I255, I258, I259, I500, I501, I509, I600, I602, I604, I605, I606, I607, I608, I609, I610, I611, I612, I613, I614, I615, I616, I618, I619, I620, I621, I629, I630, I631, I632, I633, I634, I635, I636, I638, I639, I64, I670, I671, I672, I673, I674, I675, I676, I677, I678, I679, I690, I691, I692, I693, I694, I698

ICD-10 codes were selected for inclusion based on Nolte & McKee[51] as well as in consultation with the NYU School of Medicine's Department of Population Health.

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

Cardiovascular disease deaths =

$$\sum\left(\frac{\text{age-group specific total number of cardiovascular disease deaths}}{\text{multiplier * (age-group specific total population)}} \text{* US 2010 standardized population age-group specific weight}\right) \text{* 100,000}$$

Notes on Analysis

Age-adjusted mortality rates are calculated as per National Association for Public Health Statistics and Information Systems recommendations.[50]

Colorectal cancer deaths

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of colorectal cancer deaths: C180, C181, C182, C183, C184, C185, C186, C187, C188, C189, C19, & C20. ICD-10 codes were selected for inclusion based on the publication by Siegel, et al[52] and in consultation with the NYU School of Medicine's Division of Gastroenterology.

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

Colorectal cancer deaths =

$$\sum\left(\frac{\text{age-group specific total number of colorectal cancer deaths}}{\text{multiplier * (age-group specific total population)}} \text{* US 2010 standardized population age-group specific weight}\right) \text{* 100,000}$$

Notes on Analysis

Age-adjusted mortality rates are calculated as per National Association for Public Health Statistics and Information Systems recommendations.[50]

Firearm Homicides

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of deaths from assault by firearms: X93, X94 and X95. ICD-10 codes were selected for inclusion in consultation with the NYU School of Medicine with support from Everytown for Gun Safety.

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

$$\text{Firearm-related homicides} = \frac{\text{Firearm related deaths by homicide}}{\text{Total population}} \times 100{,}000$$

Firearm Suicides

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of deaths from intentional self-harm by firearms: X72, X73 and X74. ICD-10 codes were selected for inclusion in consultation with the NYU School of Medicine with support from Everytown for Gun Safety.

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

$$\text{Firearm-related suicides} = \frac{\text{Firearm related deaths by suicide}}{\text{Total population}} \times 100{,}000$$

Life Expectancy – City-Level

Data tables

Life Expectancy at birth was calculated using Chiang's abridged life table method, with several modifications detailed below[53-58]. Age intervals were 0, 1-4, and 10-year age groups until age 85+. Population denominators for the 0 and 1-4 age intervals were generating by multiplying population counts for the 0-4 age group by 0.2 and 0.8, respectively[59].

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

i = age interval
D_i = number of people dying in age interval
P_i = population in age interval
n_i = size of the age interval in years
a_i = fraction of interval lived by those who died in the age interval *(0.5, except for 0.1 in 0 age interval)*[53]

Analysis Steps	Formulas	Notes
Life expectancy at birth		
Age interval-specific death rate (M_i)	$\frac{D_i}{P_i}$	• Set to 0 when $D_i = 0$ and $P_i = 0$ • Set to 1 when $D_i > P_i$ • When $D_{85+} = 0$ or $P_{85+} = 0$, impute state death rate for M_{85+}
Probability of dying in age interval (q_i)	$\frac{n_i * M_i}{1 + (1 - a_i) * n_i * M_i}$	• Set to 1 when $D_i > (P_i / n_i / a_i)$ • $q_{85+} = 1$
Probability of surviving age interval (p_i)	$1 - q_i$	
Number surviving at start of age interval (l_i)	$l_{i-1} * p_{i-1}$	• l_0= 100,000 (Standard hypothetical cohort)

Number dying in age interval (d_i)	$l_i * q_i$	
Number of years lived in age interval (L_i)	$(l_{i+1} * n_i) + (d_i * n_i * a_i)$	• $L_{85+} = \frac{l_{85+}}{M_{85+}}$
Total person-years lived after age interval (T_i)	$\sum_i^{85+} L_i$	
Life expectancy (e_0)	$\frac{T_0}{l_0}$	

Confidence intervals

SE were calculated according to the following formula outlined by Chiang, with an additional adjustment term for the final age interval included as proposed by Silcocks[60,61]:

Analysis Steps	Formulas	Notes
Chiang LE variance		
Variance of probability of dying (var_{qi})	$\frac{q_i^2 * (1 - q_i)}{D_i}$	• Set D_i to 0.693 when $D_i = 0$
Weighted variance ($var1_i$)	$l_i^2 * [(1 - a_i) * n_i + e_i]^2 * var_{qi}$	• $var1_{85+} = 0$
Variance of person-years lived beyond start of interval ($var2_i$)	$\sum_i^{85+} var1_i$	
Variance of life expectancy (var_{ei})	$\frac{var2_i}{l_i^2}$	
Silcocks adjustment term for 85+ age interval		
Variance adjustment (paw)	$\frac{l_{85+}}{l_0}$	
Adjusted variance term (var_{adj})	$\frac{paw^2}{M_{85+}^3 * P_{85+}}$	• When $D_{85+} = 0$ or $P_{85+} = 0$, impute state death rate for M_{85+}
Standard error for life expectancy at birth		
Standard error (SE_0)	$\sqrt{var_{e0} + var_{adj}}$	

We calculated 90% CI using the formula below:

$$LCL90 = estimate - (1.645 \times SE(estimate))$$
$$UCL90 = estimate + (1.645 \times SE(estimate))$$

Notes on Analysis

Life Expectancy estimates were censored in the following instances:

- When the total population was <5000[58]
- When SE was >= 4
- When deaths were greater than population in at least one age interval
- When estimates were over 100
- When total deaths were < 50 and SE was missing
- When there was >= 5 years change in adjacent data periods

Low birthweight

Data tables

Low birthweight is defined as birthweight < 2500 grams (dbwt).

All births with birthweights that are either missing, unknown, or not stated are excluded from the analysis.

Analysis

$$\text{Low birthweight} = \frac{\text{Number of live births with birthweight <2500 grams}}{\text{Total number of live births}} \times 100$$

Opioid overdose deaths

Data tables

The following underlying cause of death ICD-10 codes were summed to calculate the total number of opioid overdose deaths: X40, X41, X42, X43, X44, X60, X61, X62, X63, X64, X85, Y10, Y11, Y12, Y13, & Y14 in combination with T400, T401, T402, T403, T404, & T406 multiple cause of death codes. ICD-10 codes were selected for inclusion as per the CDC's Guide to ICD-9-CM and ICD-10 Codes Related to Poisoning and Pain in addition to the Henry J Kaiser Family Foundation.[62,63]

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

$$\text{Opioid overdose deaths} = \sum\left(\frac{\text{age-group specific total number of opioid overdose deaths}}{\text{multiplier * (age-group specific total population)}} * \text{US 2010 standardized population age-group specific weight}\right) * 100{,}000$$

Notes on Analysis

Age-adjusted mortality rates are calculated as per National Association for Public Health Statistics and Information Systems recommendations.[50]

Due to reporting variability and rapid shifts in opioid use patterns, the reported estimated rates may not accurately reflect current opioid-related deaths.

Premature deaths (all causes)

Data tables

Premature deaths (all causes) rates are calculated as per Dranger and Remington's approach.[46] Refer to NVSS: Weights above and Appendix A for more detail.

All deaths with either a missing, unknown, or not stated age are excluded from the analysis.

Analysis

$$\text{Premature deaths (all causes)} = \sum\left(\begin{array}{c}\left(\frac{\text{age-group specific total number of deaths}}{\text{multiplier * (age-group specific total population)}}\right) * \\ \text{(US 2010 standardized population YPLL age-group specific weight) *} \\ \text{(age-group specific premature death weight - years of life lost)}\end{array}\right) * 100{,}000$$

Confidence Intervals

SE for premature deaths (all causes) were calculated according to the following formula outlined by Vohlonen, Bäckmand, & Korhonen:[64] A list of weights can be found in Appendix A.

$$\text{SE(estimate)} = \sqrt{\left[\sum\left(\frac{\text{age-group specific crude mortality rate}^2}{\text{age-group specific total number of deaths}} * (w_1 * w_2)\right)\right]}$$

w_1 = Age-group specific premature deaths weight--years of life lost
w_2 = US 2010 standardized population YPLL age-group specific weight

Notes on Analysis

Due to data quality concerns, we applied an additional censorship criterion for city-level race and ethnicity data: estimates are censored when the number of events contributing to the estimate is <20.

Estimates over 100,000 are censored due to data quality concerns.

Prenatal care

Data tables

Prenatal care is defined as a live birth with prenatal care beginning within the first trimester.

Analysis

$$\text{Prenatal care} = \frac{\text{Number of live births with prenatal care beginning between the first and third month}}{\text{Total number of live births}} \times 100$$

Notes on analysis

Due to changes in maternal gestational age reporting before 2014 that introduce unknown bias into the estimate across years in NCHS, we do not release prenatal care estimates for 2012, 2013, and 2014. We only provided 2- year estimates for data year 2015. 3-year estimates from 2012-2015 are available for all New Jersey cities through data from New Jersey State Health Assessment Data (See Appendix C).

Prenatal care estimates represent a slight modification of one component of the Kotelchuck Index.[65] All births with missing or unknown prenatal care are excluded from the analysis. Prenatal care data for certain states across years are missing because these states had not implemented 2003 birth certificate revisions. If prenatal care information is missing for 10% or more of live births in a given city, all prenatal care values for that city are censored. For more information please refer to the natality public use data documentation files.[66-71]

Teen births

Data tables

Teen birth is defined as a live birth to a moth ages 15-19.

Analysis

$$\text{Teen births} = \frac{\text{Number of live births to mothers ages 15-19 across estimate years}}{\text{Sum of total female population age 15-19 across estimate years}} \times 1{,}000$$

Notes on analysis

Teen births estimates greater than or equal to 250 per 1000 population were censored due to concerns about underlying data reliability. Email info@cityhealthdashboard.com for more details.

ParkServe ®

General notes

Park access represents the percent of the population living within a 10-minute walk of a publicly accessible park. ParkServe ® created their parks database from 2016 to 2018 by obtaining GIS data on parks through outreach to cities and towns with direct request for parks data. If GIS data were not provided, park locations were collected from a series of resources, including municipal websites, county or state GIS data, and satellite imagery. On an annual basis, the parks database is updated for the 100 most populous cities in partnership with park and recreation agency staff. For other urban areas, ParkServe reviews suggested edits and implements updates on a monthly basis.

Properties included in ParkServe ® analyses:

- Publicly-owned local, state, and national parks
- Schoolyards with formalized open-access policies via joint-use agreement or school district policy
- Privately managed parks that are open to public use

Multi-year data

Multi-year data for this metric are unavailable.

Weights

Weights were not applied to city level ParkServe ® data received from ParkServe.

Categorizing race and ethnicity

City level estimates of park access are available by race and ethnicity. Data presented by the Dashboard include estimates by the following categories: White, Black, Asian (Asian; Pacific Islander), Other, American Indian and Alaska Native (Native American), Two or more Races, and Hispanic. All race categories are exclusive of Hispanic ethnicity (e.g., White Non-Hispanic). Refer to Section 2 “Race and Ethnicity Categories” (above) for more detail on Dashboard definitions.

Confidence intervals

CIs for Park Access were calculated as follows:

$$LCL90 = estimate - (1.645 \times SE(estimate))$$
$$UCL90 = estimate + (1.645 \times SE(estimate))$$

Where:

LCL90 = Calculated lower limit for the 90% confidence interval
UCL90 = Calculated upper limit for the 90% confidence interval
SE = approximate standard error

Metric-specific notes

Park access

This metric represents the percent of the population that lives within a 10-minute walk of a publicly accessible park.

Data tables

The Dashboard reports ParkServe ® calculated city and tract level estimates as received directly from ParkServe ®. These estimates are based on a block point centroid method (see ParkServe's documentation for more information).

Analysis

City and tract level data report numerators (population living within a 10-minute walk of park access and denominators for total population. City level data additionally report statistics for racial/ethnic subgroups and age subgroups. Race/ethnicity subgroups are detailed further in the above *Categorizing race and ethnicity* section. Age subgroups include Age 0-17, Age 18-64, and Age 65+. The formula for both city and tract values is:

$$\text{Park Access} = \frac{\text{[Population living within a 10-minute walk of park access]}}{\text{Total population}} \times 100\%$$

NOTE: The geographic identifier provided in the ParkServe dataset is at times a different FIPS than the Dashboard's internal FIPS list. Most commonly in the case of these mismatches, the ParkServe dataset is using a county subdivision FIPS, whereas the Dashboard uses a place FIPS. Geographic equivalencies were confirmed by examining block overlap between the two FIPS and these were recoded appropriately to match. Additionally, eight cities that ParkServe previously calculated city level estimates for were not included in the most recent data and may be newly missing to the site (Ozark, AR; Sparta, GA; Temple, GA; Ellsworth, ME; Schoolcraft, MI; Newfane, NY; Charlotte, NC; Woodruff, SC).

PLACES Project (formerly 500 Cities Project), Centers for Disease Control and Prevention

General notes

Measures of health status, health behaviors, and clinical care were estimated by the Centers for Disease Control and Prevention's 500 Cities Project[72], renamed the PLACES Project in 2020 to reflect its expansion to more geographies[73]. The PLACES Project uses identical methods to the 500 Cities Project, except that PLACES Project only releases estimates for full census tracts, whereas 500 Cities Project releases estimates for census tract portions within city boundaries (see "Geographic Coverage" section here)[73].

The PLACES and 500 Cities Projects apply a multi-level regression with post-stratification (MRP) approach to develop small area estimates (SAE) for key measures captured in the Behavioral Risk Factor Surveillance System (BRFSS). Prior to the 500 Cities Project, BRFSS measures were only available at the county, Metropolitan Statistical level or above. For further details on the methodology, see Zhang et al (2014).[74] For more information regarding these metrics, please refer to the PLACES Project's methodology pages.[75-77]

The 2024 data release from PLACES used decennial census 2020 population weight values and geographic boundaries for the first time. All metrics updated in the 2024 release use these new weights and boundaries. These include 2022 data for all available metrics and 2021 data for High Blood Pressure. All estimates prior to the 2024 PLACES data release use 2010 decennial census population weight values and geographic boundaries.

The Dashboard reports all data as received from PLACES. Estimates for New Jersey in 2019, Florida in 2021, and Kentucky and Pennsylvania in 2023 are not available as the states did not collect enough BRFSS data to meet minimum requirements for inclusion. Estimates for Food Insecurity is subject to additional missingness as the BRFSS module used for this metric is optional. The underlying data source, BRFSS, issued a warning for their 2020 data noting that 2020 data may not be comparable to other years

due to difficulties collecting samples during the 2020 pandemic, and an underlying weighting method modification.[78]

Additional censoring of PLACES estimates is occasionally employed by the Dashboard when estimates do not meet internal standards of validity. Please email info@cityhealthdashboard.com with any questions.

The following table outlines the years of PLACES Project and 500 Cities Project data available on the Dashboard, per metric. Some metrics listed are unavailable for certain years because BRFSS asks some questions every other year. Additionally, Food Insecurity became a new measure integrated into PLACES starting with the 2024 data release as part of a set of measures focused on health-related social needs. For more information, consult the PLACES Project website.[79]

Metric	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Binge drinking		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Dental care		✓		✓		✓ *		✓ *		✓ *	
Diabetes		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Food Insecurity										✓ *	✓ *
Frequent mental distress		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Frequent physical distress		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
High blood pressure	✓		✓		✓ *		✓ *		✓ *		✓ *
Obesity		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Physical inactivity		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Routine checkup, 18+		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *
Smoking		✓	✓	✓	✓	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *

* Indicates PLACES data source

Weights

The Dashboard reports PLACES Project and 500 Cities Project data as received, and no additional weights are applied in the calculation of PLACES estimates by the Dashboard analysts. (Please refer to the previous citations to learn more about how post-stratification weights are applied in the modeling process.)

The Dashboard uses a block population-weighted aggregation method to calculate city-level estimates for cities represented by County Subdivisions (cities represented by Incorporated Places are available directly from PLACES). Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how this method, and *Appendix B* for more information about city selection.

Categorizing race/ethnicity

Estimates from the PLACES Project and 500 Cities Project do not include sub-group estimates by race/ethnicity. Race/ethnicity, age, and income are included as covariates in the MRP approach used to calculate modeled estimates.

Importantly, only crude (not age-adjusted) measures are available at the census tract level. The PLACES Project and 500 Cities Project report both crude and age-adjusted estimates at the city level. For consistency and comparability between tract and city estimates, the Dashboard reports crude estimates for both tracts and cities.

Confidence intervals

Confidence intervals were included with the estimates downloaded from the 500 Cities Project. However, the 500 Cities Project reports 95% confidence intervals, rather than the 90% confidence intervals reported by the Dashboard. Upper and lower limits of the 95% confidence intervals were used to calculate an approximate standard error (SE). The SE was then used to calculate 90% confidence intervals.

$$SE = \frac{UCL95 - LCL95}{1.96 \times 2}$$

$$LCL90 = Estimate - (1.645 \times SE)$$

$$UCL90 = Estimate + (1.645 \times SE)$$

Where:

SE = approximate standard error
LCL95 = Reported lower limit for the 95% confidence interval
UCL95 = Reported upper limit for the 95% confidence interval
LCL90 = Calculated lower limit for the 90% confidence interval
UCL90 = Calculated upper limit for the 90% confidence interval

Data tables

Tract and city-level data were downloaded directly from the PLACES Project and 500 Cities Project website.[79-84]

Metric-specific notes

Definitions are taken verbatim from the PLACES Project and 500 Cities Project:

Binge drinking

Definition: Adults aged ≥18 years who report having five or more drinks (men) or four or more drinks (women) on an occasion in the past 30 days.[76]

Dental care

Definition: Percent of respondents aged ≥18 years who report having been to the dentist or dental clinic in the previous year.[77]

Diabetes

Definition: Respondents aged ≥18 years who report ever been told by a doctor, nurse, or other health professional that they have diabetes other than diabetes during pregnancy.[75]

Food insecurity

Definition: Respondents aged ≥18 who report that the food that they bought always/usually/sometimes did not last, and they didn't have money to get more.[85]

Frequent physical distress

Definition: Respondents aged ≥18 years who report 14 or more days during the past 30 days during which their physical health was not good.[75]

Frequent mental distress

Definition: Respondents aged ≥18 years who report 14 or more days during the past 30 days during which their mental health was not good.[75]

High blood pressure

Definition: Respondents aged ≥18 years who report ever having been told by a doctor, nurse, or other health professional that they have high blood pressure. Women who were told high blood pressure only during pregnancy and those who were told they had borderline hypertension were not included.[75]

Obesity

Definition: Adult obesity among adults aged ≥18 years.[76]

Physical inactivity

Definition: Respondents aged ≥18 years who answered "no" to the following question: "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?"[76]

Routine checkup, 18+

Definition: Respondents aged ≥18 years who report having been to a doctor for a routine checkup (e.g., a general physical exam, not an exam for a specific injury, illness, condition) in the previous year).[77]

Smoking

Definition: Respondents aged ≥18 years who report having smoked ≥100 cigarettes in their lifetime and currently smoke every day or some days.[76]

Stanford Education Data Archive (SEDA)

General notes

SEDA is part of the Educational Opportunity Project at Standford University, an initiative aimed at harnessing data to help scholars, policymakers, educators, and parents learn how to improve educational opportunity for all children. SEDA 5.0 achievement data are derived from the ED*Facts* data system, provided by the United States Department of Education. States report to ED*Facts* the number of students in each school, subgroup, grade and year that perform at that state's defined achievement level. SEDA obtains these data and applies a multi-step HETOP (Heteroskedastic Ordered Probit) and a pooled HETOP model to scale and aggregate average test scores from the individual school reported data to the city-level. For further details on the methodology, please see SEDA Technical Documentation[86].

The Dashboard provides SEDA a school-to-city crosswalk. SEDA uses this crosswalk to calculate city-level third grade reading estimates. The provided education estimates are city-level estimates, not school district-level estimates. Census tract-level estimates are not available. For more detailed information about how schools were assigned to cities, please refer to Appendix D.

Multi-year data

Multi-year data are available from academic years 2010-2011 through 2018-2019.

Weights

No weights are applied by Dashboard analysts.

Categorizing race and ethnicity

SEDA provides, where available, disaggregated data by race and ethnicity and by sex for third-grade reading scores. Hispanic category is mutually exclusive with other race categories. The 'Other' category

includes American Indian or Alaska Native, Two or more races, and Some other race. Asian includes Asian, Native Hawaiian and Pacific Islander. Refer to Section 2 “Race and ethnicity categories” (above) for more detail.

Confidence intervals

Confidence intervals are calculated and provided by SEDA, and follow the calculation:

$$LCL90 = estimate - (1.645 \times SE(estimate))$$
$$UCL90 = estimate + (1.645 \times SE(estimate))$$

Where:

LCL90 = Calculated lower limit for the 90% confidence interval
UCL90 = Calculated upper limit for the 90% confidence interval
SE = approximate standard error

Metric-specific notes

Third-grade reading scores

This measure represents the average reading test scores (in grade levels) of third graders in public schools in the city.

Data tables

SEDA reports reading test scores scaled around a national average grade level of 0. Dashboard analysts added 3 to each estimate calculated by SEDA to scale city estimates around a national average of 3 (for 3rd grade).

Analysis

Please see SEDA Technical Documentation[86] for detailed information on the derivation of the measures.

Additional notes

City-level data may be presented as missing for a variety of reasons. Data for some years may not have been reported by a state to the Department of Education, inducing missing values. SEDA includes state and year level reasons for missing data in their Technical Documentation, Table 4b. Other data may lack a sufficient number of observations to generate a stable estimate; city estimates were censored if they represented less than 20 students or if there were fewer than 100 assessments completed by a group in that year.

SEDA recommends users to exercise caution when comparing estimates over time, as total number of students may fluctuate based on district and state reporting to ED*Facts*.

Users may see a substantial decrease in city-level estimates in 2014. That year, 15 states received double testing waivers, which means students may have taken an alternate assessment in lieu of the reported state assessment. As a consequence, cities in these states may not have data for 2014 because data were not collected nor reported.

California
Connecticut
Idaho
Illinois
Iowa
Maryland
Massachusetts
Mississippi

Montana
Nevada
Oregon
South Dakota
Vermont
Washington
Wyoming

Data from Texas is not available across all years due to different tests.

Users should note that with the release of SEDA 5.0, some city level estimates were updated to reflect more rigorous methods. Most apparently, Texas city-level estimates for all years that were reported in SEDA 4.1 are now suppressed, along with estimates in East Orange, NJ for 2016 and Gresham, OR for 2018.

As the value for a city does not reflect a city's reading proficiency but rather a city's students' reading scores in context of a national modeled score, the Dashboard does not release numerators or denominators for this measure.

United States Small-Area Life Expectancy Project (USALEEP)

General notes

Tract-level life expectancy estimates were estimated by the United States Small-Area Life Expectancy Project (USALEEP), a joint effort of The Robert Wood Johnson Foundation, National Association for Public Health Statistics and Information Systems (NAPHSIS) and the National Center for Health Statistics (NCHS) at the Centers for Disease Control (CDC). The methodology used to calculate tract-level data is published.[59]

Multi-year data

Multi-year data for this metric are unavailable.

Weights

Weights are used to derived city-level estimates from tract data; see "Analysis" section below for more details.

Categorizing race/ethnicity

Not applicable.

Confidence intervals

Tract-level standard errors are included in downloadable USALEEP data. Ninety percent confidence intervals for tract-level data were calculated as per the following formulas:

$$LCL90 = estimate - (1.645 \times SE(estimate))$$
$$UCL90 = estimate + (1.645 \times SE(estimate))$$

Where:

LCL90 = Calculated lower limit for the 90% confidence interval

UCL90 = Calculated upper limit for the 90% confidence interval
SE = approximate standard error

Confidence intervals are not provided for city estimates.

Metric-specific notes

Life expectancy – Neighborhood-Level, 2015

Data tables

The Dashboard downloaded tract-level from USALEEP.[87-89]

Analysis

Tract-level data are reported as received.

To calculate city-level estimates, block-level population weights were applied to the census tract annual averages and the weighted block values were summed to the city level. Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how block-level weights are calculated and applied. This method was approved per email correspondence with USALEEP analytic staff at the National Center for Health Statistics.

Walk Score ®

General notes

Walk Score measures the walkability of any address[90] by incorporating walking routes to nearby amenities from multiple categories.[91] This metric is a value from 0 to 100, with 100 being more walkable.

Multi-year data

Multi-year data for this metric are unavailable.

Weights

The Dashboard uses a block population-weighted aggregation method to calculate city-level estimates. Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how this method, and *Appendix B* for more information about city selection.

The Dashboard reports tract level Walk Score data as received. No weights were applied.

Categorizing race and ethnicity

Walk Score data are not categorized by race and ethnicity.

Confidence intervals

CIs are not presented for Walk Score ® data.

Metric-specific notes

Walkability

The Dashboard reports 2025 aggregated city scores calculated from tract level data received from Redfin Real Estate.[92]

Analysis

Tract level data are presented as received.

To calculate city-level estimates, block-level population weights were applied to the Redfin Real Estate tract scores and the weighted block values were summed to the city level. Please see *Appendix E: Block Population-Weighted Aggregation for Selected Metrics* for more information about how block-level weights are calculated and applied.

For more detailed information, please refer to the "How Walk Score Works" webpage, available at https://www.redfin.com/how-walk-score-works, and the Walk Score Methodology page, available at https://www.walkscore.com/methodology.shtml.

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SECTION 5: Appendices

Appendix A: Table of US 2010 Standardized Population

Refer to NVSS: Weights (MCDD) and Premature deaths (all causes): Notes on analysis above for detail on how these weights were calculated.

Table of US 2010 Standardized Population

Age Group	Weight	Weight for YPLL Age-adjustment	Premature Deaths Weight (Years of Life Lost)
Total			
0-19 years	0.2697	0.287	65
20-34 years	0.2029	0.2159	47.5
35-44 years	0.133	0.1415	35
45-54 years	0.1458	0.1551	25
55-64 years	0.1182	0.1257	15
65-74 years	0.0703	0.0748	5
75 years and over	0.0601	0	0

Appendix B: Detailed Notes on Selection of Cities and Tracts

City Selection

The Dashboard defines 'cities' using multiple U.S. Census Bureau geographies that represent locally recognized communities or legal entities with active governments:

1) Incorporated and Designated Places[1,3]
2) County Subdivisions, specifically Minor Civil Divisions.[2]
    a. NOTE: Only select states (CT, MA, ME, MI, MN, NH, NJ, NY, PA, RI, VT, WI) contain Minor Civil Divisions with active governments.
3) Counties, for Hawaii only
    a. The Dashboard is committed to providing data for all U.S. states. Hawaii is the only state without Incorporated Places, and HI's Designated Places do not meet our population cut-off (see below). Therefore, we have elected to provide data for HI counties, which serve similar functions as city governments in Hawaii.

Incorporated and Designated Places, Minor Civil Divisions, and Hawaiian Counties across the country are included on the Dashboard if their population in the 2020 US Census is greater than 50,000. Select smaller cities with population <50,000 are also included:

1) Cities already included from the 2018 Dashboard launch based on the CDC's 500 Cities Project[72]
2) New Jersey cities added with financial support provided by New Jersey Health Initiatives[4]
3) Cities added through the Dashboard's 2022, 2023, 2024, and 2025 "Put Us on the Map" Challenges[93,94]
4) Cities for which the federal government's 1930's Home Owners' Loan Corporation (HOLC) program created redlining maps[95]
5) Additional small cities added in summer 2025

All city selection is performed in R with support of the tidycensus, tigris and sf packages.[9,10,12] Please email info@cityhealthdashboard.com for more information about this process.

Tract Selection

Census tracts are included on the Dashboard if they overlap with a Dashboard city boundary. Overlap is determined using Census blocks (the lowest-level US Census geography).[96] If at least one block within the census tract overlaps with a city boundary, then the tract is assigned to that city. Therefore, tracts may be assigned to multiple cities. Website maps represent the portion of the tract within the city boundary, not the entire census tract, whereas tract estimates on the website represent the entire tract.

Block relationship files for places and county subdivisions are pulled from the US Census Bureau and the Missouri Census Data Center.[97,98] All tract selection is performed in R with support of the tigris package.[10] Please email info@cityhealthdashboard.com for more information about this process
[99]

FIPS Codes

The Dashboard uniquely identifies geographies using the US Census Bureau FIPS Codes system.[100] Details for the number of digits in FIPS codes for Dashboard cities and tracts are below, and also detailed in the Downloadable Data Codebook, available at www.cityhealthdashboard.com/data-downloads.

A unique 11-digit tract FIPS is created by combining the 2-digit state FIPS, 3-digit county FIPS, and 6-digit tract FIPS. Place FIPS combines the 2-digit state FIPS and 5-digit place FIPS. And the county subdivision FIPS combines the 2-digit state FIPS, 3-digit county FIPS, and 5-digit county subdivision FIPS.

Note on Hawaiian FIPS code

County FIPS codes (2-digit state FIPS, 3-digit county FIPS) and county data are used to represent the Hawaiian counties presented on the Dashboard.

Census Vintages

The Dashboard presents cities and census tracts from the 2010 and 2020 Census, depending on the underlying Census vintage of metric data sources. Any tract-level FIPS code updates that occurred between Decennial Census are not reflected on the Dashboard, and data sources that have incorporated these changes are reverted to the Decennial Census FIPS codes.[99] City-level FIPS code updates are incorporated on the website. Please email info@cityhealthdashboard.com if you would like more details.

Note on Macon, GA

As of 2014, the city of Macon, GA and its county (Bibb County) share a consolidated government.[101,102] The US Census Bureau began to issue data for Macon, GA using FIPS code 13-49008 (Macon-Bibb County, Georgia) in 2014; FIPS 13-49000 (Macon city, Georgia) was used through 2013.

For all years of data available on the Dashboard, the Dashboard uses the geographic boundaries and FIPS codes associated with the consolidated city (FIPS 13-49008), which is equivalent to the county (FIPS 13-021). This decision was made to keep the geographic area and population represented in the data as consistent as possible across time, despite the changing governmental structure. For some years for certain metrics, only values for Macon city, GA (FIPS 13-49000) are available. When this occurs, it is noted on the website and in downloadable data. Please see the Downloadable Data Codebook, available at www.cityhealthdashboard.com/data-downloads, for more details, or email info@cityhealthdashboard.com.

Appendix C: Summary of State-Based Vital Statistics Data Sources

New Jersey State Health Assessment Data (NJSHAD)

General notes

As of December 3rd 2024 for natality metrics and August 26th 2026 for mortality metrics, the Dashboard uses data from New Jersey State Health Assessment Data (NJSHAD),[43] a public health data source managed by the New Jersey Department of Health, to provide mortality estimates (except opioid overdose deaths) and natality estimates for all New Jersey cities. Data were accessed and analyzed using procedures identical to those in NCHS/RDC analyses of NVSS data, as defined above in Section 3.

As per private correspondence with NJSHAD staff, analyses by Dashboard analytic staff, and consultation with an NYU School of Medicine faculty expert in vital statistics, estimates from these data sources are valid for comparison with NCHS/RDC NVSS data presented on the Dashboard. To establish comparability between NJSHAD and RDC/NCHS data, Dashboard staff compared estimates for New Jersey cities already on the Dashboard generated from NJSHAD data with estimates generated at RDC/NCHS. In consultation with a NYU School of Medicine faculty expert in vital statistics, Dashboard staff concluded that estimates from both datasets were identical or of inconsequential difference. Please contact info@cityhealthdashboard.com for more information on the analyses that establish comparability between NJSHAD and NCHS/RDC data or any other questions or concerns.

Metric-specific notes

Opioid overdose deaths

Not calculated by Dashboard staff using NJSHAD data due to insufficient data availability. NCHS data are used to calculate opioid overdose deaths for New Jersey cities.

Appendix D: School-to-City Crosswalk Creation

In order to calculate city-level chronic absenteeism and third-grade reading scores metrics, the Dashboard uses crosswalks that identify which schools fall within 200 meters of each Dashboard city.

School to Dashboard city crosswalks were created for each school year using R version 4.4.3 software and school data from the National Center for Education Statistics (NCES). Only schools with full geographic coordinates (latitudes and longitudes) were included.

School latitude and longitude data were converted to a spatial data frame in R using the sf package. School data were then spatially joined with Dashboard city shape files within each state using the st_join function from the sf package and the st_nn function from the nngeo package to calculate a Nearest neighbor search using a location and geodesic method with a search radius of 200 meters. Only schools that were matched to a city boundary were kept in the final sample of schools.

In cases where there was a discrepancy between the state name from the school dataset and the state identified from the geographic coordinates in the dataset, each instance was researched to confirm the correct state location. In all cases the geographic coordinates were correct, and the state names were recoded to match the geographic coordinates.

Each school was matched to only one city, with the exception of schools in cities with overlapping boundaries. These are: 1) Hempstead Village, NY and Hempstead Town, NY; 2) Levittown, PA and Bristol Township, PA.

When cities are adjacent to one another (not overlapping), schools are assigned to the city they are located within and the 200 meter boundary does not apply. This may result in schools getting “reassigned” to a different city as new cities are added to the Dashboard.

Appendix E: Block Population-Weighted Aggregation from Census Tract to City for Selected Metrics

General notes

Census tract boundaries do not perfectly align with city boundaries. When city-level estimates are unavailable and where appropriate, the Dashboard uses a block population-weighted aggregation method to estimate city estimates from tract[103-105]. This method is conceptually similar to a dasymetric approach, which accounts for population density distribution across the census tract and assumes that the underlying population and metric estimate values are equally distributed across the entire block.

Weights

Population weights are created using information at the block-level. Block relationship files for places and county subdivisions are pulled from the US Census Bureau and the Missouri Census Data Center.[97,98] Block populations come from the Decennial Census.

Different weights are applied depending on the underlying population of the metric being aggregated. Variables used for different weights are detailed below.

Population Weight	Decennial Census	File (Table)	Variable
Total	2010	Summary File 1 (P9)	*P009001 – Hispanic or Latino, and Not Hispanic or Latino by Race!!Total*
	2020	Demographic and Housing Characteristics File (P9)	*P9_001N – Hispanic or Latino, and Not Hispanic or Latino by Race!!Total:*
Adult (18+)	2010	Summary File 1 (P10)	*P010001 – Race for the Population 18 Years and Over!!Total*
	2020	Demographic and Housing Characteristics File (P10)	*P10_001N – Race for the Population 18 Years and Over!!Total:*

Analysis

Using the block relationship files to assign census tracts to cities, we then created a population weight (*P)* by dividing the overlapping population count by the full city population count. Population counts from source geographies with missing estimates were dropped from the calculation. We multiplied this population weight by the census tract estimate, then summed all weighted estimates to calculate the final derived city estimate (see Equation).

$$Est_{derived,\ city} = \sum_{i=1}^{n} est_{census\ tract\ i} * P_{(census\ tract\ i\ population\ in\ city\ |\ city\ population)}$$

Where: n represents the number of tracts (*i*) within the city boundary

Metrics

This aggregation method is currently applied to the following metrics and geographies.

Metric	Population Weight	Data Periods in 2010 Census Vintage	Data Periods in 2020 Census Vintage	Places	County Subdivisions	HI Counties
Air Pollution - Ozone	Total	01/2018-12/2020	01/2021-12/2025	✓	✓	✓
Air Pollution - Particulate Matter	Total		01/2022-12/2025	✓	✓	✓

Metric	Population Weight	Data Periods in 2010 Census Vintage	Data Periods in 2020 Census Vintage	Places	County Subdivisions	HI Counties
Binge Drinking	Adult (18+)	2014-2021	2022-2023		✓	
Dental Care	Adult (18+)	2014, 2016, 2018, 2020	2022		✓	
Diabetes	Adult (18+)	2014-2021	2022-2023		✓	
Food Insecurity	Adult (18+)		2022-2023		✓	
Frequent Mental Distress	Adult (18+)	2014-2021	2022-2023		✓	
Frequent Physical Distress	Adult (18+)	2014-2021	2022-2023		✓	
High Blood Pressure	Adult (18+)	2013, 2015, 2017, 2019	2021, 2023		✓	
Life Expectancy - Neighborhood-Level, 2015	Total	2015		✓	✓	✓
Obesity	Adult (18+)	2014-2021	2022-2023		✓	
Physical Inactivity	Adult (18+)	2014-2021	2022-2023		✓	
Routine Checkup, 18+	Adult (18+)	2014-2021	2022-2023		✓	
Smoking	Adult (18+)	2014-2021	2022-2023		✓	
Voter Participation	Total		2020, 2024		✓ *(ACS only)*	
Walkability	Total		2025	✓	✓	✓

Appendix F: Updates Summary

Technical Document Version	Date Posted Online	Update Notes

7/28/2026		• 08-26-2026 revision: NVSS/NJSHAD data update
		  ○ Natality: Remove 2012-2014 prenatal care estimates
		  ○ Mortality: Update to use NJSHAD data source for all New Jersey cities
		• ACS metrics: Add 2024 (5 year estimate) data
		  ○ Expand race groups for metrics with demographic breakdowns
		  ○ Update censorship and flagging criteria
		• Voter Participation: metric name change from Voter Turnout to Voter Participation
		• Credit Insecurity Index: Removal of metric
		• Air pollution – Ozone: Add 2025 monthly data
		• Air pollution – PM2.5: Add 2025 monthly data
		• Unemployment – Current, City-Level
		  ○ Add monthly data through April 2026
		• CO2 Emissions:
		  ○ Add 2025 data
		  ○ Update methods
		• Walkability: Add 2025 data
		• Park Access
		  ○ Expand race groups
		  ○ Add age demographic breakdowns
		  ○ Update methods for tract calculation

3/10/2026		• NVSS Natality
		  ○ Temporarily remove data for Other race group
		• NVSS Mortality
		  ○ Add 2022 and 2023 data
		  ○ Life Expectancy – City-Level: release of new metric (2012-2023)
		  ○ Update race and ethnicity definitions
		  ○ Update denominator calculation
		  ○ Update age adjustment categories for Opioid Overdose Deaths, Breast Cancer Deaths, Colorectal Cancer Deaths, Premature Deaths (all causes), Cardiovascular Disease Deaths
		  ○ Temporarily remove data for Other race group
		  ○ Update censoring criteria
		• PLACES
		  ○ Add 2023 data for 10 metrics

12/09/2025		• NVSS Natality
		  ○ Add 2022, 2023 data (except for New Jersey)
		  ○ Update race and ethnicity definitions (except for New Jersey)
		  ○ Update censorship criteria and denominator calculation for Teen Births
		• Voter turnout
		  ○ Add 2024 president election data
		  ○ Update geocoding method
		• Park access
		  ○ Update to 2024 data
		  ○ Methodology update for city-level estimates from ParkServe ®
		• Chronic absenteeism
		  ○ Add 2023 school year data
		• Unemployment – Current, City-Level
		  ○ Add monthly data through July 2025

6/25/2025		• 07-08-2025 revision: CO2 Emissions – Census Tract Average 2020-2024 city-level estimates were updated to exclude partial census tracts with less than 95% population overlap with the city boundary to ensure the estimates more accurately reflect tracts that are within each city.

	• Addition of 122 new cities, including Florida designated places, 2025 “Put Us On the Map” cities, historically redlined cities newly added to Mapping Inequality files, and additional small cities
	• ACS metrics: Add 2023 (5 year estimate) data
	  o New city-level censorship criteria applied
	• Air pollution – Ozone: Add 2024 monthly data
	• Air pollution – PM2.5: Add 2024 monthly data
	• Demographics overview: Update to 2023 data
	• Unemployment – Current, City-Level
	  o Add monthly data through February 2025
	  o Incorporated revisions to historical data from BLS
	• Food insecurity: Release of new metric (2022)
	• CO2 Emissions – Census Tract Average: Release of new metric (2010-2024)
	  o Includes emissions by sector (Commercial buildings, electricity production, industrial buildings, residential buildings, and transportation)
	• CO2 Emissions – Per Capita: Release of new metric (2010-2024)
	  o Includes emissions by sector (Commercial buildings, electricity production, industrial buildings, residential buildings, and transportation)
	• Chronic absenteeism
	  o Expanded availability for 4 states in 2022
	  o Minor changes to some city estimates where adjacent cities were added
	• New censorship of census tracts across all metrics where > 95% of the tract’s population resides outside of city boundaries

12/03/2024	• Demographics overview: Addition of new breakdowns
	• NVSS/NJSHAD (natality metrics only)
	  o Add 2021 data
	  o Data newly available for more cities
	  o Update race and ethnicity estimates to represent cities instead of counties
	  o Update to use NJSHAD data source for all New Jersey cities
	  o Prenatal Care newly available for New Jersey cities in 2012-2014
	  o Removal of Asian and Other race group data from NJ cities due to recommendation from the data source
	  o Addition of data for Other race group for 2020-2021
	• Park Access:
	  o Add 2023 data
	  o Calculation update for tract estimates to clip at shorelines
	• PLACES Project metrics:
	  o Add 2022 (1-year modeled estimate) data for 9 metrics
	  o Update all 2022 data to use 2020 geographic boundaries
	  o Update 2021 High Blood Pressure data to use 2020 geographic boundaries
	  o Removal of Preventive Services, 65+ metric
	• Unemployment – Current, City-Level
	  o Add monthly data through June 2024
	  o Small estimate changes for Hawaii counties due to revisions from the data source
	• Walkability: Add 2024 data
	• Youth Not in Work or School: Release of new metric (2013-2022), including sex breakdowns

7/27/2024	• Addition of 130 new cities, including Hawaiian counties, designated places, 2024 “Put Us On the Map” cities, and historically redlined cities
	  o Slight modification to tract inclusion for a few existing cities due to updated methodology
	• Updated city names for 48 townships in MI, NJ, and PA
	• ACS metrics: Add 2022 (5 year estimate) data
	  o High school completion: Addition of age breakdowns
	  o Housing with potential lead risk & Lead exposure risk index: Apply city-level censorship criteria to tracts; Update housing weights
	  o Income inequality: Limit metric to 2018 and 2022 data years
	  o Independent living difficultly: Release of new metric (2015-2022), including age breakdowns
	  o Racial/ethnic diversity & Neighborhood racial/ethnic segregation: Marginal change in estimates for select cities impacted by changes in tract inclusion
	  o Unemployment: Addition of age breakdowns; Update to population weighting variable for Asian and Other resulting in small estimate changes for previous years of data

		• Air pollution – Ozone: Add 2023 monthly data
		• Air pollution – PM2.5: Add 2023 monthly data
		• Chronic absenteeism
		  o Small estimate changes for select due to addition of new cities
		  o Select cities newly censored in 2022 due to unreliable state data
		• Demographics overview: Update to 2022 data; Addition of new breakdowns
		• NVSS/NJSHAD (Mortality metrics only)
		  o Add 2021 data
		  o Update race/ethnicity estimates to represent cities instead of counties, including new censorship criteria
		  o Data newly available for more cities
		• PLACES Project metrics: Update population weight for select aggregated city-level estimates
		• Third-grade reading scores:
		  o Add 2019 data
		  o Data newly available for more cities
		  o Select cities newly missing due to updated data source methodologies
		• Unemployment – current, city-level: Add data through February 2024
		• Voter turnout: Release of new metric (2020), including sex and age breakdowns

12/5/2023		• PLACES Project
		  o Add 2021 data for 9 metrics
		  o Preventive services, 65+: Update data source for Honolulu calculation weights
		• Chronic Absenteeism
		  o Update metric name from “Absenteeism” to “Chronic Absenteeism”
		  o Add 2020 – 2022 school years data using updated data sources
		  o Replace 2018 school year estimates using updated data sources
		  o Expand data availability for cities below ~66,000 population, including “Put Us On the Map” cities
		• Unemployment – current, city-level: Add data through July 2023

7/26/2023
(going forward, versioning will represent date of data release)
		• ACS metrics: Add 2021 (5 year estimate) data
		  o Uninsured: removal of age breakdowns in 2013, 2014
		  o Minor change to confidence interval calculation methods
		• Air pollution – Ozone: Add 2022 monthly data
		• Air pollution – PM2.5: New data source (monthly data for 2022); Removal of existing multi-year metric
		• COVID Local Risk Index: Removal of metric
		• Credit insecurity index: New method for generating some city-level estimates
		• Life expectancy: New method for generating city-level estimates
		• Limited access to healthy foods: Removal of metric
		• NVSS/NJSHAD: Correction of 2014 and 2017 estimates for breast cancer deaths, colorectal cancer deaths, cardiovascular disease deaths, premature deaths (all cause), and 2012, 2015, 2018 estimates for low birthweight and teen births. These corrections were applied to 10 New Jersey cities using New Jersey State Health Assessment. County estimates for these metrics for these cities were unintentionally posted on the website between 7/27/2022 – 08-02-2023. This error was also in downloadable data version 15.0, 15.1 and 16.0.
		• NVSS Breast Cancer Deaths 2013: We discovered our breast cancer deaths for 2013 was a complete duplication of 2012 data from 1/13/2020 (version 8.0) to 7/21/22 (version 15.0). This error has been fixed in version 15.0 release.
		• Park Access: Update to 2022 data
		• PLACES Project: Add 2020 data for 10 metrics
		• Unemployment – current, city-level: Add data through December 2022
		• Walkability: Update to 2022 data; New method for generating city-level estimates
		• Addition of new city estimate censorship criteria
		• Addition of 67 smaller cities from the 2023 “Put Us On the Map” Challenge
		  o Addition of prior years of data for 2022 “Put Us On the Map” cities for most metrics, where available
		• Modification of FIPS code for Macon, GA when using 2010 geographies
		• City overview, demographic estimates: Update to 2021 data

16.0	12/14/22	• Housing cost, excessive: replace housing cost, excessive with new metric Rent burden (ACS) • Air pollution -ozone: Add 2021 monthly data • Unemployment – current, city-level: Add data through Aug 2022 • Violent Crime: Removal of metric

15.1	9/6/22	• Firearm homicides: Release of new metric; 2014 - 2020 data (5 Year Estimates) • Firearm suicides: Release of new metric; 2014 - 2020 data (5 Year Estimates) • Unemployment – current, city-level: Add data through May 2022

15.0	7/21/22	• ACS metrics: Add 2020 (5 year estimate) data
		• NVSS metrics: Add 2018, 2019, and 2020 (3 year estimate) data
		• Addition of 111 new cities > 50,000 population
		  ○ 66 represented by County Subdivisions (Minor Civil Divisions)
		  ○ 45 represented by Incorporated Places
		• Addition of 29 smaller cities from the "Put Us On the Map" Challenge[93]

14.0	3/29/22	• PLACES Project: Add 2021 release (2019 data) for 9 metrics • Air pollution – particulate matter: Add 2018 data; city calculation method update • Air pollution – ozone: Release of new metric; monthly data from 1/2018-12/2020 • Credit insecurity index: Release of new metric; 2020 data
13.0	11/1/21	• Routine Checkup: Release of new metric; 2014, 2015, 2016, 2017, 2018; 500 Cities/PLACES Project (1 year estimate) data • NVSS metrics: Change data_year_type format to "2019, 3 Year Estimate" (from "2017-2019") • Limited Access to Healthy Foods update: add 2019 data • Third-Grade Reading scores: Change data source from state-based education metrics to SEDA; add data for 2011-2018 • Absenteeism update: update to 2018 data, change data source to CRDC and ED*Facts*
12.0	6/1/21	• ACS metrics: Add 2019 (5 year estimate) data • Air pollution: Add 2017 CMAQ data • Violent crime: Add 2019 UCR data • Broadband connection: Release of new metric; 2017, 2018, 2019 ACS (5 year estimate) data • Unemployment – annual, neighborhood-level: Slight revision of estimates to improve precision; see page 41 for more details.
11.0	3/1/21	• COVID Local Risk Index: Replace with updated estimates (new components and weighting); expand to all 766 Dashboard cities • PLACES Project (formerly 500 Cities Project): 2020 release; expand to all 766 cities for 2018 estimates and High blood pressure (2017 estimates) • Preventive services, 65+: Name changed from "Preventive services"; Revision of 2014, 2016 estimates and confidence levels to improve precision
10.3	2/1/21	• Income inequality: 20th and 80th percentile cut points updated for 2013, 2014 to more closely approximate underlying distribution
10.2	1/7/21	• Unemployment – annual, neighborhood-level: Metric added back to website; still available for download
10.1	10/29/20	• High school completion: Revision of metric analysis and data source; addition of tract-level data; addition of multi-year data; revision of metric name (formerly "High school graduation") • Unemployment – current, city-level: Release of new metric • Unemployment – annual, neighborhood-level: Revision of metric name (previously "Unemployment"); temporarily removed from website; still available for download • Technical Document Part 2, Education Data no longer released: Addition of Absenteeism, High school completion and Third-grade reading proficiency metrics to Technical Document Part 1
10.0	6/4/20	• COVID Local Risk Index: Release of metric for cities represented in 500 Cities Project

9.0	5/1/20	• Addition of 256 cities with populations >50,000 and not already included in 500 Cities[106] *(financial support provided by the Robert Wood Johnson Foundation)* • ACS metrics: Updated to 2018 (5 year estimate) data; 2018 ACS data for Macon, GA represented by FIPS 1349008 (Macon-Bibb County, GA) instead of 1349000 (Macon, GA) or 13021 (Bibb County, GA) • Life expectancy: Addition of data for Maine and Wisconsin as per update to USALEEP • NVSS metrics: Addition of data for some years and metrics for consolidated cities (Athens, GA; Augusta, GA; Indianapolis, IN; Louisville, KY; Nashville, TN) • Walkability: Updated to 2019; Methodology updated from tract centroid value to entire tract population weight
8.0	1/23/20	• Addition of subset of New Jersey cities (Burlington, Clayton, Egg Harbor City, Glassboro, Hammonton, Lawnside, Millville, Penns Grove, Pleasantville, Salem) *(financial support provided by New Jersey Health Initiatives)* • Air pollution: Added 2016 CMAQ data • Park access: Updated to 2018 (city); addition of tract data • Violent crime: Added 2018 UCR data • 500 Cities Project metrics: Added 2019 release • NVSS metrics: Use of NJSHAD data source for NJ cities listed above
7.0	8/29/19	• NVSS metrics: Added 2010-2012, 2011-2013, 2012-2014, 2015-2017 data ○ Prenatal care: 2010-2012, 2011-2013, 2012-2014 <u>not</u> released • NVSS metrics: Revisions to 2013-2015 and 2014-2016 data for improved accuracy
6.0	7/15/19	• Correction of Table of Contents and section label enumeration; no changes to Technical Document context or version number
6.0	6/5/19	• Information on Absenteeism moved to Technical Document Part 2: Education Data • Multi-year data added to site and associated metadata added to Technical Documentation ○ <u>Added multi-year data, by metric</u>: 500 Cities Project metrics: 2016 and 2017 releases; Air pollution: 2015; ACS metrics: 2013, 2014, 2015, 2016 (5 year estimate) data; CMAQ: 2013 data; NVSS metrics: 2013-2015 data; UCR metric: 2016 data
5.0	2/14/19	• ACS metrics: Updated to 2017 (5 year estimate) data ○ Uninsured: Note revision of age strata • Air pollution: Updated to 2014 CMAQ data; city population denominator changed from ACS DP05 2016 (5 year estimate) to ACS DP05 2014 (5 year estimate)
4.1	12/20/18	• Note regarding temporary removal of primary care physicians data from Dashboard inserted in this document
4.0	12/12/18	• 500 Cities metrics: Updated to 2018 release • NVSS metrics: Updated to 2014-2016 data
3.1	October 2018	• Absenteeism: Data source updated to 2015-16 from 2013-14 (10/29/18) • Life expectancy: Metric posted 10/2/18; minor revision to city values posted 10/29/18 • Uninsured: Data source changed to ACS from BRFSS-CDC 500 (10/29/18); revised strata • Violent crime: Updated to 2017 UCR data (10/29/18) • Revised Technical Documentation (v3.0), downloadable data (v3.0) and codebook (v3.0) (10/29/18) • Minor typos corrected in Technical Documentation (v3.1) (10/31/18)

SECTION 6: References

1. Ratcliffe M. Understanding "Place" in Census Bureau Data Products. Presentation. Geography Division, US Census Bureau. Accessed January 3, 2020. https://www.census.gov/content/dam/Census/data/developers/understandingplace.pdf
2. US Census Bureau. Chapter 8 - County Subdivisions. *Geographic Areas Reference Manual*. 1994:chap 8.
3. US Census Bureau. Chapter 9 - Places. *Geographic Areas Reference Manual*. 1994:chap 9.
4. City Health Dashboard. New Data, New Cities: City Health Dashboard Updates - Introducing 10 New Cities. Updated January 27, 2020. Accessed April 24, 2020, https://www.cityhealthdashboard.com/story/1152
5. Berkley J. Using American Community Survey estimates and margins of error. Presentation. Decennial Statistical Studies Division, US Census Bureau. Updated April 19, 2017. Accessed January 1, 2018. https://www.census.gov/content/dam/Census/programs-surveys/acs/guidance/training-presentations/20170419_MOE.pdf
6. US Department of Education. Final guidance on maintaining, collecting, and reporting racial and ethnic data to the U.S. Department of Education. Updated December 3, 2007. Accessed January 17, 2023. https://www.federalregister.gov/documents/2007/10/19/E7-20613/final-guidance-on-maintaining-collecting-and-reporting-racial-and-ethnic-data-to-the-us-department
7. Office of Policy Development and Research - US Department of Housing and Urban Development. HUD USPS ZIP Code Crosswalk Files (ZIP-TRACT, 2nd Quarter 2019). US Department of Housing and Urban Development. Accessed December 19, 2019. https://www.huduser.gov/portal/datasets/usps_crosswalk.html
8. R Core Team. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing. https://www.R-project.org/
9. Walker K, Herman M. tidycensus: Load US Census Boundary and Attribute Data as 'tidyverse' and 'sf'-Ready Data Frames. . https://walker-data.com/tidycensus/.
10. Walker K. tigris: Download and use Census TIGER/Line shapefiles in R. https://github.com/walkerke/tigris
11. Wickham H, Averick M, Bryan J, et al. Welcome to the tidyverse. *Journal of Open Source Software*. 2019;4(43):1686. doi:https://doi.org/10.21105/joss.01686
12. Pebesma E. Simple Features for R: Standardized Support for Spatial Vector Data. *The R Journal*. 2018;10(1):439-446. doi:10.32614/RJ-2018-009
13. US Census Bureau. Available APIs. US Department of Commerce. Accessed January, 2020. https://www.census.gov/data/developers/data-sets.html
14. US Census Bureau. Technical Documentation: Table & Geography Changes: 2013-2017 ACS 5-year Estimates. US Census Bureau. Updated November 28, 2018. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2017/5-year.html
15. US Census Bureau. Technical Documentation: Table & Geography Changes: 2012-2016 ACS 5-year Estimates. United States Census Bureau. Updated December 12, 2017. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2016/5-year.html
16. US Census Bureau. Technical Documentation: Table & Geography Changes: 2010-2015 ACS 5-year Estimates. United States Census Bureau. Updated December 8, 2016. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2015/5-year.html
17. US Census Bureau. Technical Documentation: Table & Geography Changes: 2009-2014 ACS 5-year Estimates. United States Census Bureau. Updated November 24, 2015. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2014/5-year.html
18. US Census Bureau. Technical Documentation: Table & Geography Changes: 2008-2013 ACS 5-year Estimates. United States Census Bureau. Updated May 18, 2015. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2013/5-year.html
19. US Census Bureau. Technical Documentation: Table & Geography Changes: 2014-2018 ACS 5-year Estimates. US Census Bureau. Updated December 13, 2019. Accessed March 3, 2020. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2018/5-year.html
20. US Census Bureau. *A compass for understanding and using American Community Survey Data: Appendix 1, Understanding and using ACS single-year and multiyear estimates*. Vol. 2018. https://www.census.gov/content/dam/Census/library/publications/2009/acs/ACSResearch.pdf
21. US Census Bureau. Using ACS Estimates and Margins of Error. https://www.census.gov/content/dam/Census/programs-surveys/acs/guidance/training-presentations/2016_MOE_Slides_01.pdf

22. Krieger N, Waterman PD, Spasojevic J, Li W, Maduro G, Van Wye G. Public health monitoring of privilege and deprivation with the index of concentration at the extremes. *American journal of public health*. 2016;106(2):256-263.
23. Lofy K, Davies H, Fotinos C, et al. A targeted approach to blood lead screening in children, Washington State: 2015 expert panel recommendations. Washington State Department of Health. Accessed January 9, 2018. https://assets.documentcloud.org/documents/2644455/Expert-Panel-Childhood-Lead-Screening-Guidelines.pdf
24. Frostenson S, Kliff S. Lead Exposure Risk data (readme.md). Vox Media,. Updated April 5, 2016. Accessed January 9, 2017. https://github.com/voxmedia/data-projects/tree/master/vox-lead-exposure-risk
25. Frostenson S, Kliff S. Added data for vox-lead-exposure-risk-map: Lead Exposure Risk data. Vox Media,. Updated April 5, 2016. Accessed January 9, 2017. https://github.com/voxmedia/data-projects/commit/f8ed1caa78af3232f18c0fcee23626a822fc2169
26. Foundation PS. Python Language Reference, version 3.6.
27. U.S. Department of Housing and Urban Development Office of Lead Hazard Control and Healthy Homes. *American Healthy Homes Survey II Lead Findings*. 2021. https://www.hud.gov/sites/dfiles/HH/documents/AHHS_II_Lead_Findings_Report_Final_29oct21.pdf
28. United States Environmental Protection Agency. Hazard Standards and Clearance Levels for Lead in Paint, Dust and Soil (TSCA Sections 402 and 403). Accessed 2/14/2024, 2024. https://www.epa.gov/lead/hazard-standards-and-clearance-levels-lead-paint-dust-and-soil-tsca-sections-402-and-403
29. Iceland J. The multigroup entropy index (also known as Theil's H or the Information Theory Index). US Census Bureau. Accessed January 5, 2018, https://www2.census.gov/programs-surveys/demo/about/housing-patterns/multigroup_entropy.pdf
30. US Census Bureau. Technical Documentation: Table & Geography Changes: 2013-2017 ACS 5-year Estimates: Modified Tables: Health Insurance. United States Census Bureau. Updated November 28, 2018. Accessed March 22, 2019. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2017/5-year.html
31. US Census Bureau. CPS Methodology. United States Census Bureau. 2020. https://www.census.gov/programs-surveys/cps/technical-documentation/methodology.html
32. US Census Bureau. Methodology Updates for the Vintgae 2022 Population Estimates. Updated December 5, 2022. https://www2.census.gov/about/training-workshops/2022/2022-12-05-vintage-2022-transcript.pdf
33. U.S. Bureau of Labor Statistics. Overview: Local Area Unempoyment Statistics. Accessed 9/30/20, https://www.bls.gov/lau/lauov.htm
34. U.S. Bureau of Labor Statistics. LAUS Geography and Data Changes in 2025. 2025. https://www.bls.gov/lau/geography-and-data-changes-in-2025.htm
35. U.S. Bureau of Labor Statistics. Download City LAUS Time Series Data. Accessed 9/30/20, https://download.bls.gov/pub/time.series/la/la.data.65.City
36. U.S. Bureau of Labor Statistics. Series ID Formats: Local Area Unemployment Statistics. Accessed 9/30/20, https://www.bls.gov/help/hlpforma.htm#LA
37. U.S. Bureau of Labor Statistics. Download LAUS Time Series Area Codes. Accessed 9/30/20, https://download.bls.gov/pub/time.series/la/la.area
38. US Census Bureau. Population and Housing Unit Estimates: Terms and Definitions. US Department of Commerce. Updated December 5, 2016. Accessed April 17, 2020. https://www.census.gov/programs-surveys/popest/guidance-geographies/terms-and-definitions.html
39. Collection ECRD. Downloadable Data Files. U.S. Department of Education. https://ocrdata.ed.gov/resources/downloaddatafile
40. Express ED. Data Library. Accessed 9/18/2023. https://eddataexpress.ed.gov/download/data-library?field_year_target_id=All&field_population_value=Chronically+Absent+Students&field_data_topic_target_id=All&field_reporting_level_target_id=28&field_program_target_id=All&field_file_spec_target_id=All&field_data_group_id_target_id=All&combine=
41. Statistics NCfE. ElSi Table Generator. U.S. Department of Education. 2023. https://nces.ed.gov/ccd/elsi/tablegenerator.aspx
42. Interagency Council on Statistical Policy. Standard Application Process. Accessed January 30, 2026. https://sap.nsf.gov/dataset/
43. State of New Jersey Department of Health. New Jersey State Health Assessment Data (NJSHAD). State of New Jersey Department of Health,. Updated Febuary 19, 2019. Accessed December 6-16, 2019. https://www-doh.state.nj.us/doh-shad/home/Welcome.html
44. American FactFinder. US Census Bureau. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
45. Klein R, Schoenbon C. Age adjustment using the 2000 projected US population. Centers for Disease Control and Prevention/National Center for Health Statistics https://www.cdc.gov/nchs/data/statnt/statnt20.pdf
46. Dranger E, Remington P. YPLL: A summary measure of premature mortality used in measuring the health of communities Wisconson Public Health & Health Policy Institute https://uwphi.wiscweb.wisc.edu/wp-content/uploads/sites/316/2018/06/issueBriefv05n07.pdf
47. Lilienfeld D, Stolley P. *Foundations of Epidemiology*. 3rd ed. Oxford University Press; 1994.

48. Office of Public Health Assessment. Confidence intervals in public health. Utah Department of Health, . Accessed January 9, 2018, http://health.utah.gov/opha/IBIShelp/ConfInts.pdf
49. National Cancer Institute SEER Program. SEER Program Coding Guidelines: Breast C500-C509. Accessed January 22, 2018, https://seer.cancer.gov/manuals/2016/AppendixC/Coding_Guidelines_Breast_2016.pdf
50. National Association for Public Health Statistics and Information Systems. Age-adjusted death rate. Accessed January 9, 2018. https://naphsis-web.sharepoint.com/about/Documents/Mortality_AgeAdj_Final_Lois.pdf
51. Nolte E, McKee M. *Does health care save lives? Avoidable mortality revisited*. The Nuffield Trust; 2004.
52. Siegel RL, Miller KD, Fedewa SA, et al. Colorectal cancer statistics, 2017. *CA: a cancer journal for clinicians*. 2017;67(3):177-193.
53. Chiang CL. *The Life Table and Its Applications*. Krieger Pub Co; 1983.
54. 74 United States Life Tables, 2023 (National Vital Statistics Reports) (2025).
55. Roubal AM, Pollock EA, Gennuso KP, Blomme CK, Givens ML. Comparative Methodologic and Practical Considerations for Life Expectancy as a Public Health Mortality Measure. *Public Health Rep*. Mar-Apr 2022;137(2):255-262. doi:10.1177/0033354921999407
56. County Health Rankings and Rodmaps. Mortality and Life Expectancy Calculator. Updated 11/15/2019. Accessed 07/15/2025, 2025. https://www.countyhealthrankings.org/resources/mortality-and-life-expectancy-calculator
57. Public Health England. PHE Life Expectancy Calculator. Accessed 07/15/2025, 2025. https://fingertips.phe.org.uk/documents/phe%20life%20expectancy%20calculator.xlsm
58. Eayres D, Williams E. Evaluation of methodologies for small area life expectancy estimation. *Journal of Epidemiology & Community Health*. 2004;58(3):243-249.
59. Arias E, Escobedo LA, Kennedy J, Fu C, Cisewski JA. US small-area life expectancy estimates project: methodology and results summary. 2018;
60. Silcocks P, Jenner D, Reza R. Life expectancy as a summary of mortality in a population: statistical considerations and suitability for use by health authorities. *Journal of Epidemiology & Community Health*. 2001;55(1):38-43.
61. Lo E, Vatnik D, Benedetti A, Bourbeau R. Variance models of the last age interval and their impact on life expectancy at subnational scales. *Demographic Research*. 2016;35:399-454.
62. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Guide to ICD-9-CM and ICD-10 codes related to poisoning and pain. Accessed January 22, 2018, https://stacks.cdc.gov/view/cdc/59394
63. Henry J Kaiser Family Foundation. Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted). Accessed May 5, 2018, https://www.kff.org/other/state-indicator/opioid-overdose-death-rates/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D
64. Vohlonen I, Bäckmand H, Korhonen J. Potential years of life lost: The PYLL rate in monitoring the wellbeing of a population. Northen Dimension Partnership in Public Health and Social Well-being. http://www.ndphs.org/documents/2662/Vohlonen%20Ilkka%20PYLL_article_2007.pdf
65. Kotelchuck M. An evaluation of the Kessner Adequacy of Prenatal Care Index and a proposed Adequacy of Prenatal Care Utilization Index. *Am J Public Health*. Sep 1994;84(9):1414-20.
66. Centers for Disease Control and Prevention. User guide to the 2015 natality public use file. Accessed December 7, 2018, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2015.pdf
67. Centers for Disease Control and Prevention. User guide to the 2014 natality public use file. Accessed January 22, 2018, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2014.pdf
68. Centers for Disease Control and Prevention. User guide to the 2012 natality public use file. Accessed August 22, 2019, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2012.pdf
69. Centers for Disease Control and Prevention. User guide to the 2013 natality public use file. Accessed August 22, 2019, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2013.pdf
70. Centers for Disease Control and Prevention. User guide to the 2016 natality public use file. Accessed August 22, 2019, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2016.pdf
71. Centers for Disease Control and Prevention. User guide to the 2017 natality public use file. Accessed August 22, 2019, ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2017.pdf
72. Centers for Disease Control and Prevention. About the Project - 500 Cities: Local Data for Better Health. Accessed April 10, 2018. https://www.cdc.gov/500cities/about.htm
73. Centers for Disease Control and Prevention. About the Project - PLACES: Local Data for Better Health. Accessed February 25, 2021. https://www.cdc.gov/places/about/index.html

74. Zhang X, Holt JB, Lu H, et al. Multilevel regression and poststratification for small-area estimation of population health outcomes: a case study of chronic obstructive pulmonary disease prevalence using the behavioral risk factor surveillance system. *American journal of epidemiology*. 2014;179(8):1025-1033.
75. PLACES: Local Data for Better Health. Health outcomes. Centers for Disease Control and Prevention. Updated December 8, 2020. Accessed December 8, 2020. https://www.cdc.gov/places/measure-definitions/health-outcomes/index.html
76. PLACES: Local Data for Better Health. Unhealthy behaviors. Centers for Disease Control and Prevention. Updated December 8, 2020. Accessed December 8, 2020. https://www.cdc.gov/places/measure-definitions/unhealthy-behaviors/index.html
77. PLACES: Local Data for Better Health. Prevention. Centers for Disease Control and Prevention. Updated December 8, 2020. Accessed December 8, 2020. https://www.cdc.gov/places/measure-definitions/prevention/index.html
78. PLACES: Local Data for Better Health. Current Release Notes: 2021. https://www.cdc.gov/places/help/data-notes/index.html
79. 500 Cities: Local Data for Better Health. Local Data for Better Health, 2018 Release. Updated January 4, 2021. Accessed December 4, 2018. https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Local-Data-for-Better-Health-2018-relea/rja3-32tc
80. 500 Cities: Local Data for Better Health. Local Data for Better Health, 2017 Release. Updated December 4, 2017. Accessed September 27, 2017. https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Local-Data-for-Better-Health-2017-relea/vurf-k5wr
81. 500 Cities: Local Data for Better Health. Local Data for Better Health, 2016 Release. Updated January 4, 2021. Accessed May 6, 2019. https://chronicdata.cdc.gov/500-Cities-Places/500-Cities-Local-Data-for-Better-Health-2016-relea/9z78-nsfp
82. PLACES: Local Data for Better Health. Local Data for Better Health, 2020 Tract Release. Accessed December 8, 2020, https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Census-Tract-Data-GIS-Friendly-Format-2020-/yjkw-uj5s
83. PLACES: Local Data for Better Health. Local Data for Better Health, 2020 Place Release. Accessed December 8, 2020, https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Place-Data-GIS-Friendly-Format-2020-release/vgc8-iyc4
84. PLACES: Local Data for Better Health. Local Data for Better Health, 2020 County Release. Accessed December 8, 2020, https://chronicdata.cdc.gov/500-Cities-Places/PLACES-County-Data-GIS-Friendly-Format-2020-releas/i46a-9kgh
85. PLACES: Local Data for Better Health. Health-Related Social Needs. Centers for Disease Control and Prevention. 2025. https://www.cdc.gov/places/measure-definitions/health-related-social-needs.html
86. Fahle EM, Chavez B, Kalogrides D, Shear BR, Reardon SF, Ho AD. Stanford Education Data Archive Technical Documentation Version 4.1 June 2021. 2021;
87. National Center for Health Statistics. U.S. Small-Area Life Expectancy Estimates Project - USALEEP: Life Expectancy Estimates File for United States, 2010-2015. National Center for Health Statistics,. Updated March 6, 2020. Accessed April 8, 2020. https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html
88. National Center for Health Statistics. U.S. Small-Area Life Expectancy Estimates Project - USALEEP: Life Expectancy Estimates File for Maine, 2010-2015. National Center for Health Statistics,. Updated March 6, 2020. Accessed April 8, 2020. https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html
89. National Center for Health Statistics. U.S. Small-Area Life Expectancy Estimates Project - USALEEP: Life Expectancy Estimates File for Wisconsin, 2010-2015. National Center for Health Statistics,. Updated March 6, 2020. Accessed April 8, 2020. https://www.cdc.gov/nchs/nvss/usaleep/usaleep.html
90. Walk Score®. How Walk Score Works. Walk Score. Accessed December 24, 2019. https://www.walkscore.com/how-it-works/
91. Walk Score®. Walk Score Methodology. Walk Score. Accessed December 24, 2019. https://www.walkscore.com/methodology.shtml
92. Redfin Real Estate. Redfin. https://www.redfin.com/
93. City Health Dashboard. The City Health Dashboard Selects 29 Cities for the Inagural Put Us on the Map Challenge. Updated April 13, 2022. Accessed June 24, 2022,
94. City Health Dashboard. Putting Small Cities on the Map to Advance Health Equity: Checking in on last year's cities and announcing 2023 cities! Updated April 13, 2023. July 6, 2023. https://www.cityhealthdashboard.com/blog-media/put-us-on-the-map-2023-city-announcement
95. Nelson RK, LaDale Winling, et al. Mapping Inequality: Redlining in New Deal America. Digital Scholarship Lab. https://dsl.richmond.edu/panorama/redlining
96. US Census Bureau. Standard Hierarchy of Census Geographic Entities. https://www2.census.gov/geo/pdfs/reference/geodiagram.pdf
97. US Census Bureau. Data from: Block Assignment Files: . 2010, 2020.
98. Missouri Census Data Center. Geocorr 2018: Geographic Correspondence Engine. https://mcdc.missouri.edu/applications/geocorr2018.html

99. US Census Bureau. Table & Geography Changes. https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes.html
100. US Census Bureau. Understanding Geographic Identifiers (GEOIDs). https://www.census.gov/programs-surveys/geography/guidance/geo-identifiers.html
101. Stucka M. Macon-Bibb County consolidation wins with strong majorities. August 5, 2015. http://www.macon.com/news/politics-government/election/article30109740.html
102. Macon-Bibb County. Macon-Bibb County. Accessed April 10, 2018. http://www.maconbibb.us/
103. Hao Y, Ward EM, Jemal A, Pickle LW, Thun MJ. U.S. congressional district cancer death rates. *International journal of health geographics*. 2006;5:28-28. doi:10.1186/1476-072X-5-28
104. Eicher CL, Brewer CA. Dasymetric Mapping and Areal Interpolation: Implementation and Evaluation. *Cartography and Geographic Information Science*. 2001/01/01 2001;28(2):125-138. doi:10.1559/152304001782173727
105. Rolheiser LA, Cordes J, Subramanian SV. Opioid Prescribing Rates by Congressional Districts, United States, 2016. *American journal of public health*. 2018;108(9):1214-1219. doi:10.2105/AJPH.2018.304532
106. City Health Dashboard. Small and Midsized Cities. Accessed April 24, 2020, www.cityhealthdashboard.com/citytypes