County Health Rankings & Roadmaps

Technical Documentation

Version 1

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Contents

BACKGROUND & CONCEPTUAL GROUNDING

About us: County Health Rankings & Roadmaps

County Health Rankings & Roadmaps (CHR&R) is a program of the University of Wisconsin Population Health Institute. CHR&R is known for effectively translating and communicating complex data and evidence-informed policy into accessible models, reports, and products that deepen the understanding of what makes communities healthy and inspires and supports improvement efforts. CHR&R's work is rooted in a sincere belief in health equity, the idea that everyone deserves a fair and just opportunity to be as healthy as possible.

CHR&R provides data, evidence, guidance, and examples to build awareness of the multiple factors that influence health and support leaders in growing community power to improve health equity. CHR&R produces the County Health Rankings every year. The Rankings are unique in their ability to measure the health of nearly every county in all 50 states, and are complemented by guidance, tools, and resources designed to accelerate community learning and action.

History

The University of Wisconsin Population Health Institute (UWPHI) has been supported by the Robert Wood Johnson Foundation (RWJF) since 2008 to develop what is now known as the County Health Rankings & Roadmaps (CHR&R) program. The first national County Health Rankings were released on February 17, 2010.

Goals

- Build awareness of the multiple factors that influence health.
- Provide a reliable, sustainable source of local data and evidence to communities to help them identify opportunities to improve their health.
- Engage and activate local leaders from many sectors in creating sustainable community change.
- Connect community leaders and grow community power to improve health.

The County Health Rankings Dataset

The County Health Rankings include about 100 measures that help communities understand how healthy their residents are today (Health Outcomes) and what will impact their health in the future (Health Factors). Annually, CHR&R updates these measures using the most recently available data for nearly all U.S. counties. Not all measures are used to calculate a county's rank. The CHR&R dataset contains:

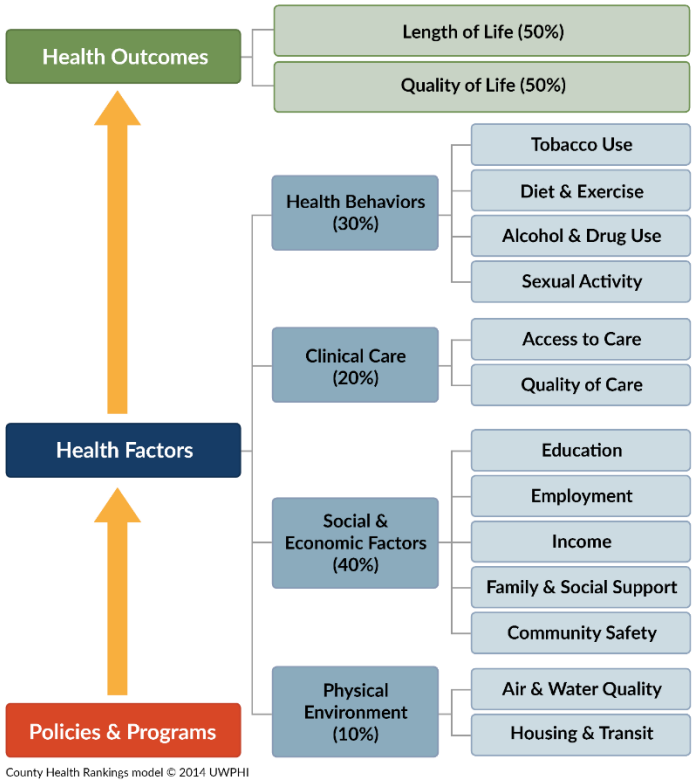
- Ranked measures, which are used in the calculation of state-specific county ranks. Ranked measures are combined using weights according to the CHR&R model to create a Health Outcomes Rank and a Health Factors Rank for each county within each state.
- Additional measures, which provide helpful community context but do not contribute to the Ranks. Additional measures may be Health Outcomes, Health Factors, or demographics. Demographic data are included for every county to provide context for the place and its data.

Conceptual Model: The County Health Rankings Model of Health

The Rankings are rooted in a conceptual model of the social determinants of health. The ranks incorporate 35 ranked measures that help communities understand how healthy their residents are today (Health Outcomes) and what will impact their health in the future (Health Factors).

The County Health Rankings Model emphasizes the many factors that influence how long and how well we live. The Model also portrays the methodology by which counties in each of the 50 states are ranked.

Figure 1: County Health Rankings Conceptual Model of Health



The Health Outcomes Rank comprises five measures (Premature Death, Poor or Fair Health, Poor Physical Health Days, Poor Mental Health Days, and Low Birthweight) and the Health Factors Rank comprises 29 measures (Table 1) within the Health Factor Areas of Health Behaviors, Clinical Care, Social & Economic Factors and Physical Environment. Additional (unranked) measures populate all Health Outcome and Health Factor Areas.

CHR&R Measures

The CHR&R team goes through a careful and deliberate process when selecting measures for inclusion. We consider measures that meet our program's goals, ensuring they reflect important aspects of population health that can be improved, and we consider measures that are innovative to meet the needs of communities. Our measures are also selected based on their technical and analytical feasibility, ensuring they are not limited by availability, cost, validity, coverage, or other concerns.

CHR&R measures describe community conditions that can be modified, called Health Factors. Health Factors influence Health Outcomes, or how long and how well people live within that community.

Considerations for County Health Rankings Measures

Measures of Health Factors and unranked measures are expanded, pared, or revised annually based on the considerations below. These considerations ensure that the CHR&R dataset remains consistent, salient, legitimate, credible, and grounded in equity. Measures may not meet all considerations due to geographic, data source, and time

limitations. To operationalize these considerations, we regularly evaluate data sources and methods and seek expert input and review from scholars, practitioners, and external advisors.

Strategic Considerations
Alignment with CHR&R goals

- The measure speaks to a current or emerging population health issue and increases the value of CHR&R tools.
- The measure reflects aspects of population health that can be influenced through local, state, or national policies, practices, and systems change.
- The measure provides quantitative or qualitative information to explain concepts in the County Health Rankings Model.
- The measure supports data fluency and alignment in the field of data-to-action initiatives (e.g., America's Health Rankings, City Health Dashboard).
- The measure is of interest to community members, leaders, advocates, community health activists, equity champions, and field actors in public health and health care.

Theoretical Considerations
Connection of the measure to health and equity

- The measure and its association with population health are scientifically supported through peer reviewed literature or expert opinion and a strong evidence base.
- CHR&R internal analyses (quantitative and qualitative) support the measure's connection to health.
- The measure clarifies the existence of health disparities and the potential for unfair, unjust differences.
- The measure centers learning from the wealth of knowledge, experiences, and priorities of a socially marginalized group.

Source Considerations
Assessment of data sources and their methodology

- The measure draws from a data source that has transparent methodology and underlying assumptions.
- Source data are available for free or low cost.
- Source methods are valid. Data quality is maintained and updated regularly (within the past 3-5 years), where applicable.

Analytical Considerations
Feasibility of quantitative and qualitative analysis for evaluation and production

- The measure draws from data that are available at, or can be aggregated to, the county level.

- Data can be disaggregated among population groups with an emphasis on groups that have historically or currently experience social disadvantage (e.g., race, ethnicity, gender, sex, education, disability status, family type, neighborhood, income, or wealth).
- The measure and its association with health and health disparities are validated internally and consistent with scholarly literature or expert evidence.
- The measure is numeric, ordinal, or binary to quantify differences that capture advantage or disadvantage between counties.
- The measure uses data that are available for most counties nationwide.
- The measure uses data that are representative locally and comparable across jurisdictions within a state.

Communication Considerations

Ability to meaningfully communicate and apply the measure to improve health and equity

- The measure and its association with health and equity can effectively be communicated.
- The measure is recognized and documented by public health, healthcare, adjacent fields, or marginalized communities to have the ability to make change or have influence within systems of oppression.
- CHR&R can communicate limitations of the data and methods to audiences who want to interpret and apply the measure.
- The measure reflects a distinct concept and "call to action."

METHODS

Rankings Methods

How do we calculate the Rankings? First, we receive, review, and prepare data from dozens of data sources across the U.S. Then, we follow these steps:

1. **Assign weights:** First, counties are ranked within each of the 50 U.S. states using measures that are assigned relative weights within the Health Outcomes and Health Factors Areas.
2. **Calculate Z-scores:** Next, measures are standardized within each state using a Z-score.
3. **Create composite scores:** The ranks are then calculated based on weighted sums of the standardized measures within each state—we call these weighted sums a composite score. The county with the lowest composite score (best health) gets a rank of #1 for that state and the county with the highest composite score (worst health) is assigned the lowest rank.
4. **Calculate Ranks and quartiles:** After the Ranks are calculated, CHR&R calculates quartiles. Counties are grouped into four equally sized groups (quartiles) from Least Healthy to Healthiest (Lowest 0-25%, Lower 25-50%, Higher 50-75%, and Healthiest 75-100%) within each state.
5. **Create supplemental tools:** Lastly, we calculate trend and Areas to Explore and Areas of Strength.

For more detail on County Health Rankings methods see some CHR&R key publications:

- Catlin BB, Athens JK, Kindig DA, Park H, Remington PL. Different perspectives for assigning weights to determinants of health. County Health Rankings Working Paper.
- Remington PL, Catlin BB, Gennuso KP. The County Health Ranking: rationale and methods. Population Health Metrics. 2025;13(11).

1. Assign weights

Each ranked measure contributes weight to the Health Outcome or Health Factor rank calculation relative to other ranked measures. Generally, ranked measures and corresponding weights are not changed year-to-year to retain consistency in methods.

Table 1: Weights Corresponding to Health Outcome and Health Factor Measures

Health Outcomes	
Length of Life	
Premature Death	50%
Quality of Life	
Poor or Fair Health	10%
Poor Physical Health Days	10%
Poor Mental Health Days	10%
Low Birthweight	20%
Health Factors	
Health Behaviors	
Adult Smoking	10%
Adult Obesity	5%
Food Environment Index	2%
Physical Inactivity	2%

Access to Exercise Opportunities	1%
Excessive Drinking	2.5%
Alcohol-Impaired Driving Deaths	2.5%
Sexually Transmitted Infections	2.5%
Teen Births	2.5%
Clinical Care	
Uninsured	5%
Primary Care Physicians	3%
Dentists	1%
Mental Health Providers	1%
Preventable Hospital Stays	5%
Mammography Screening	2.5%
Flu Vaccinations	2.5%
Social & Economic Factors	
High School Completion	5%
Some College	5%
Unemployment	10%
Children in Poverty	7.5%
Income Inequality	2.5%
Children in Single-Parent Households	2.5%
Social Associations	2.5%
Injury Deaths	5%
Physical Environment	
Air Pollution - Particulate Matter	2.5%
Drinking Water Violations	2.5%
Severe Housing Problems	2%
Driving Alone to Work	2%
Long Commute - Driving Alone	1%

2. Calculate Z-scores

Our measures use different types of data as input, and when calculated, the measures use different types of metrics as output. Some measures use percentages, while others use rates, averages, or other metrics.

Standardizing each of these measures transforms them to the same metric – a mean (average) value of 0 (zero) and a standard deviation (measure of spread) of 1. We refer to these as Z-scores, where:

$$Z = \frac{\text{(County Value) - (Average of Counties in State)}}{\text{(Standard Deviation of Counties in State)}}$$

Each Z-score is relative to the other counties in that state – not compared to an absolute standard – and shown in the metric of standard deviations. A positive Z-score indicates a value for that county higher than the average of counties in that state; a negative Z-score indicates a value for that county lower than the average of counties in that state. For example, if a county has a Z-score on a measure of 1.2 that means the county is 1.2 standard deviations above the state average of counties for that measure. For counties with a population of 20,000 or less, any Z-score less than -3.0 or greater than 3.0 is truncated to -3.0 or 3.0, respectively.

Reverse Coding of Some Measures

For most CHR&R measures, a higher Z-score score indicates poorer health (e.g., Children in Poverty). However, for some of our measures (e.g., High School Completion) a higher Z-score indicates better health. For these measures, we take this into account when computing composite scores by computing the Z-score as usual and then multiplying it by -1, so that a higher Z-score indicates poorer health for all measures. The following ranked measures are reverse coded in this manner:

- Food Environment Index
- Access to Exercise Opportunities
- Flu Vaccinations
- Mammography Screening
- High School Completion
- Some College
- Social Associations

3. Create Composite Scores

The scores computed for individual counties are weighted composites of the Z-scores where the weights represent relative importance towards total county health as determined by the CHR&R model (Table 1, Figure 1). A weighted composite is computed by multiplying each Z-score by its assigned weight and then summing all weighted Z-scores. Below is the formula we use for our weighted composite scores:

$$\text{Composite} = \sum w_i Z_i$$

In this formula, the Z_i values are the Z-scores of the Ranked Measures. The w_i values are the measure-specific weights. The $\sum$ sign indicates summation of the resultant values.

All CHR&R composite scores use the formula above, standardized Z-scores for each measure (reverse coded when necessary—see above), and the weights described in previous sections. Composite scores are computed separately by state.

4. Calculating Ranks & Quartiles

To generate Ranks, composite scores are sorted from lowest to highest within each state. The county with the lowest composite score (best health) is ranked #1 in that state and the county with the highest composite score (worst health) is assigned the lowest rank in that state.

CHR&R does not suggest that individual ranks represent statistically significant differences between counties. That is, the top ranked county in a state (#1) is not necessarily significantly healthier than the second ranked county (#2).

Beginning in 2021, we have displayed data in quartiles on the county snapshot to support comparison of a county to a similar grouping in each state. Health Outcome and Health Factor rankings are grouped into four equally sized groups (quartiles), ranging from the least healthy to healthiest counties (Lowest 0-25%, Lower 25-50%, Higher 50-75%, or Highest 75-100%) within each state. A county with a rank of #1 lies in the Healthiest (Highest 75-100%) quartile.

5. Create Supplemental Tools

Create Tools Materials: Document Trends

Examining changes in Health Outcomes over time can provide an overall sense of community progress toward better health. Trends in Health Factors can inform specific health programs and may reflect the impact of local efforts.

We conduct linear regressions using all years of data shown in the trend graph to calculate whether a trend is decreasing, increasing, or stable. For each measure with trend data available, a detailed trend graph can be viewed by clicking on the graph icons in the county snapshot.

Each graph icon is color-coded to communicate the direction of the trend:

- Red - The county value is trending worse for this measure
- Yellow - The county value shows no significant trend
- Green - The county value is trending better for this measure
- Grey - Additional information is needed to interpret the trend for this measure
- Black - Trend graph is available, but no interpretation has been provided

Trend data are available for:

- Twelve ranked measures: Premature Death, Alcohol-Impaired Driving Deaths, Sexually Transmitted Infections, Uninsured, Primary Care Physicians, Dentists, Preventable Hospital Stays, Mammography Screening, Flu Vaccinations, Unemployment, Children in Poverty, Air Pollution; and
- Three additional measures: Uninsured Adults, Uninsured Children, and School Funding Adequacy.

Trend datasets and accompanying documentation are available for download in .csv and .sas format on the Rankings Data and Documentation webpage.

Create Supplemental Tools: Areas to Explore and Areas of Strength

Areas of Strength and Areas to Explore are calculated for ranked Health Factors measures to highlight where a significant improvement or decline will lead to a similar change in overall Health Factor Rank. Areas of Strength and Areas to Explore are intended to serve as a ***starting point*** for identifying areas of strength or improvement in your county.

We obtain Areas to Explore and Areas of Strength by comparing your county value to your state value and the national value (median of counties) for each ranked health factor measure. For measures where your county is doing meaningfully better than the state and national values, these are highlighted as Areas of Strength and for measures where your county is doing meaningfully worse than the state and national values, these measures are highlighted as Areas to Explore.

Responsible Data Use

CHR&R tries to rank all counties or county equivalents that have a Federal Information Processing Standard (FIPS) code. Data limitations such as data missingness can lead to special considerations for ranking methods.

Limitations of Data Comparability Across States

CHR&R uses data from many sources, each with different methods for collection and processing of the data. For most of our measures, county data is comparable between counties within states and also comparable across state lines. For a few of our measures, caution must be exercised when making comparisons between counties in different states. See Appendix 3 for a list of measures which should be compared with caution across states.

Addressing Missing Data in Rank Calculations

If a county has sufficient data to be assigned a rank, but is missing data for a given ranked measure, we assign the state mean for that measure value to calculate the county's rank.

Unranked Counties

Some counties in the nation are too small to have reliable measurements for Health Outcome measures. These counties are not ranked.

Counties are not ranked if any of the following is true:

1. County had a missing value for Premature Death (i.e., there are less than 20 deaths during the time period and data are suppressed for privacy reasons).
2. County had an unreliable value for Premature Death and no other measures of morbidity were available.
3. County had an unreliable Premature Death value, an unreliable Low Birthweight value, and no other morbidity measures.

   NOTE: Values for Premature Death are considered unreliable when the standard error of the estimate is more than 20% of the estimate value and the measure value is outside the previous year's confidence interval. Both missing and unreliable values for Premature Death show up as blank in a county snapshot. However, advanced users may want to visit our analytic files to understand if specific data is missing or unreliable. Values for Low Birthweight are considered unreliable when the standard error of the estimate is greater than 20% of the estimate value.

CHR&R methods increase the number of ranked counties through:

- **Careful data selection:** Ranked measures are based on data which are available for the greatest number of counties.
- **Imputation:** In some cases, data are combined over multiple years of data. For several measures, CHR&R averages multiple years of data, giving equal weight to each observation year. This approach increases the number of small, sparsely populated counties with reliable data estimates.
- **Use of modeled data:** Some measures, including Adult Smoking, Adult Obesity, and Children in Poverty, are based not only on survey response, but depend on statistical modeling techniques that improve the precision of the estimates.

DATA USE

Downloading the Data

Guide to Files

County Health Rankings data are downloadable in .csv and .sas format for analytic use. You can find the files in two places on our website:

- National files are available from download on our Rankings Data & Documentation webpage.
- State-specific files are available for download from the respective state data page on the CHR&R website.

Data Sharing

CHR&R data sharing is dependent on the data use regulations of the source data. If you are interested in making a data request, please use the Contact Us form available on the website. Please include details of your request including any specifications. A member of our team will follow up and notify you if we are able to fulfill the data request and if so, establish a timeline. Institutional Review Board (IRB) approval may be requested if applicable. Your use of the data may be subject to Data Use Agreements. Cite CHR&R when you publish your work. CHR&R has provided a suggested citation on our FAQ page. For more information, review CHR&R's Terms of Use.

Missing Data

If a value is displayed as missing (.) or blank that means data is unavailable for that county or race/ethnicity group. This could mean data is unavailable, unreliable, or has been suppressed due to small numbers and resulting privacy concerns. Data suppression guidelines are generally established by the data sources.

Data Operations

Age-adjustment of Measures

Age-adjustment is a strategy used to increase the comparability of measure values between counties that have different age structures, or within-county comparisons over time if the age structure of the county has changed. Age-adjustment is especially important for measures related to age. We adjust county values for measures known to differ by age so all counties reflect a standard age distribution and comparisons will be meaningful.

Age-adjustment can mask the absolute burden of a health need in a county – especially in counties with many residents of the ages at highest risk. Measure data tables are available on the county snapshots to communicate the absolute number of events occurring for many measures where the county value has been age-adjusted. CHR&R follows best practice to determine which measures are age-adjusted.

Table 2: Age-Adjusted County Health Rankings Measures

Measure	Ranked/ Additional	Health Outcome/ Health Factor
Premature Death (YPLL)	Ranked	Health Outcome
Poor or Fair Health	Ranked	Health Outcome
Poor Physical Health Days	Ranked	Health Outcome
Poor Mental Health Days	Ranked	Health Outcome
Adult Smoking	Ranked	Health Factor
Excessive Drinking	Ranked	Health Factor
Preventable Hospital Stays	Ranked	Health Factor

Flu Vaccinations	Ranked	Health Factor
Adult Obesity	Ranked	Health Factor
Physical Inactivity	Ranked	Health Factor
Premature Age-Adjusted Mortality	Additional	Health Outcome
Life Expectancy	Additional	Health Outcome
Diabetes Prevalence	Additional	Health Outcome
Frequent Physical Distress	Additional	Health Outcome
Frequent Mental Distress	Additional	Health Outcome
Insufficient Sleep	Additional	Health Factor
Suicides	Additional	Health Factor

Data Disaggregated by Race Subgroups

Health Outcomes and Health Factors can differ by age, gender, race, ethnicity, ability, and sexual orientation, among many other characteristics within counties. Variation may also exist between neighborhoods or ZIP codes. Disaggregation means breaking data down into smaller, meaningful subgroups. Disaggregated data are often broken down by characteristics of people or where they live. Disaggregated data can reveal inequalities that are otherwise hidden.

Table 3: County Health Rankings Measures Disaggregated by Race

Measure	**Ranked/ Additional**	**Health Outcome/ Health Factor**
Premature Death	Ranked	Health Outcome
Low Birthweight	Ranked	Health Outcome
Teen Births	Ranked	Health Factor
Preventable Hospital Stays	Ranked	Health Factor
Mammography Screening	Ranked	Health Factor
Flu Vaccinations	Ranked	Health Factor
Children in Poverty	Ranked	Health Factor
Injury Deaths	Ranked	Health Factor
Driving Alone to Work	Ranked	Health Factor
Infant Mortality	Additional	Health Outcome
Child Mortality	Additional	Health Outcome
Premature Age-Adjusted Mortality	Additional	Health Outcome
Life Expectancy	Additional	Health Outcome
Median Household Income	Additional	Health Factor
Suicides	Additional	Health Factor
Homicides	Additional	Health Factor
Firearm Fatalities	Additional	Health Factor
Drug Overdose Deaths	Additional	Health Factor
Motor Vehicle Crash Deaths	Additional	Health Factor
Reading Scores	Additional	Health Factor
Math Scores	Additional	Health Factor

How are race and ethnicity categories defined?

Race and ethnicity are different forms of identity but are sometimes categorized in non-exclusive ways.

- **Race** is a form of identity constructed by our society to give meaning to different groupings of observable physical traits. An individual may identify with more than one race group.
- **Ethnicity** is used to group individuals according to shared cultural elements.

Racial and ethnic categorizations relate to health because our society groups people based on their perceived identities. These categorizations have meaning because of social and political factors, including systems of power such as racism. Understanding the variation among racial and ethnic groupings in Health Factors and Health Outcomes is key to addressing historical and current context that underlie these differences.

Data sources differ in methods for defining and grouping race and ethnicity categories. To incorporate as much information as possible in our summaries, CHR&R race/ethnicity categories vary by data source.

With a few exceptions, CHR&R adheres to the following nomenclature originally defined by The Office of Management and Budget (OMB):

- **American Indian & Alaska Native (AIAN):** includes people who identify as American Indian or Alaska Native and do not identify as Hispanic.
- **Asian:** includes people who identify as Asian or Pacific Islander and do not identify as Hispanic.
- **Black:** includes people who identify as Black or African American and do not identify as Hispanic.
- **Hispanic:** includes people who identify as Mexican, Puerto Rican, Cuban, Central or South American, other Hispanic, or Hispanic of unknown origin.
- **White:** includes people who identify as white and do not identify as Hispanic.

Racial and ethnic categorization masks variation within groups. Individuals may identify with multiple races, indicating that none of the offered categories reflect their identity; these individuals are not included in our summaries. OMB categories have limitations and have changed over time; these limitations and changes reflect the importance of attending to contemporary racialization as a principle informing approaches to measurement. For some data sources, race categories other than white also include people who identify as Hispanic.

The above definitions apply to all measures using data from the National Center for Health Statistics (see Appendix 5). For this data source, all race/ethnicity categories are exclusive so that each individual fits into only one category.

Other data sources offer slight nuances of the race/ethnicity categories listed above:

- The American Community Survey (ACS) only provides an exclusive race and ethnicity category for people who identify as non-Hispanic White. An individual who identifies as Hispanic and as Black would be included in both the Hispanic and Black race/ethnicity categories. Another difference with ACS data is the separate race categories for people who identify as Asian and people who identify as Hawaiian & Other Pacific Islander. For measures of Children in Poverty and Driving Alone to Work, CHR&R reports a combined estimate for the Asian & Other Pacific Islander categories, while for Median Household Income we only report the Asian race category.
- Measures using data from the Center for Medicare and Medicaid Services (Mammography, Preventable Hospital Stays, Flu Vaccinations) follows the ACS categories with the exception of having a combined Asian/Pacific Islander category. For this data source, race and ethnicity are not self-reported.
- The Stanford Education Data Archive used for the Reading and Math Scores measures follow the National Center for Education Statistics (NCES) definitions of Asian or Pacific Islander, American Indian & Alaska Native, non-Hispanic Black, non-Hispanic White, and Hispanic.

APPENDICES

Appendix 1: FIPS code changes

During the last decade, several county definitions have changed due to mergers with another county, being dissolved and distributed into other counties, or undergoing a name change. In the descriptions of the county changes (below) former counties are italicized, while current counties that are now included in the Rankings are bolded.

In Alaska:

- *Prince of Wales – Outer Ketchikan Census Area* was dissolved and distributed into other counties including **Ketchikan Gateway Borough, Prince of Wales-Hyder Census Area,** and **Wrangell City and Borough**
- *Skagway-Hoonah-Angoon Census Area* was split into **Hoonah-Angoon Census Area** and **Skagway Municipality**
- *Wrangell-Petersburg Census Area* was split into **Hoonah-Angoon Census Area, Petersburg Borough,** and **Skagway Municipality**
- *Wade Hampton Census Area* was renamed **Kusilvak Census Area**

In South Dakota:

- *Shannon County* was renamed **Oglala Lakota County**

In Virginia:

- *Bedford City* was absorbed into **Bedford County**. The new Bedford County has the same name as when these counties were separate; however, measures over time may not be consistent since the county composition has changed.

These changes mean that data for these former counties are no longer displayed on our website; therefore, if a county was ranked prior to 2017, there may appear to be a gap in ranks for that year on our website. However, data for these former counties will continue to be available in the files available for download for the years these counties existed. For more detailed information on the county changes (and/or FIPS code changes) listed above, please see https://www.census.gov/programs-surveys/geography/technical-documentation/county-changes.html.

Appendix 2: Changes in Ranked Measures, 2010-2023

Years of available data are represented by arrows. Broken arrows represent substantial changes in the data source or calculation of the measure that would affect year-to-year comparisons.

Construct		Focus Area	Weight	Measure	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Health Outcomes	Mortality		50%	Premature Death	→	→	→	→	→	→	→	→	→	→	→	→	→	→
	Morbidity		50%	Poor or Fair Health	→	→	→	→	→	→					→	→	→	→
				Poor Physical Health Days	→	→	→	→	→	→					→	→	→	→
				Poor Mental Health Days	→	→	→	→	→	→					→	→	→	→
				Low Birthweight	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Health Factors	Health Behaviors	Tobacco Use	10%	Adult Smoking	→	→	→	→	→	→					→	→	→	→
		Diet and Exercise	10%	Adult Obesity	→	→	→	→	→	→	→	→	→	→	→	→	→	→
				Food Environment Index					→	→	→	→	→	→	→	→	→	→
				Physical Inactivity			→	→	→	→	→	→	→	→	→	→	→	→
				Access to Exercise Opportunities					→	→	→	→	→	→	→	→	→	→
		Alcohol Use	5%	Moter Vehicle Crash Death Rate	→	→	→	→										
				Alcohol-Imparied Driving Deaths					→	→	→	→	→	→	→	→	→	→
				Excessive Drinking	→	→	→	→	→	→					→	→	→	→
		Sexual Activity	5%	Sexually Transmitted Infections	→	→	→	→	→	→	→	→	→	→	→	→	→	→
				Teen Births	→	→	→	→	→	→	→	→	→	→	→	→	→	
	Clinical Care	Access to Care	10%	Uninsured			→	→	→	→	→	→	→	→	→	→	→	→
				Uninsured Adults	→	→												
				Primary Care Physicians	→	→	→	→	→	→	→	→	→	→	→	→	→	→
				Dentists				→	→	→	→	→	→	→	→	→	→	→
				Mental Health Providers					→	→	→	→	→	→	→	→	→	→
		Quality of Care	10%	Preventable Hospital Stays	→	→	→	→	→	→	→	→	→	→	→	→	→	→
				Diabetic Monitoring	→	→	→	→	→	→	→	→	→					
				Hospice Use	→													
				Flu vaccinations										→	→	→	→	→
				Mammography Screening		→	→	→	→	→	→	→	→	→	→	→	→	→
	Social and economic factors	Education	10%	High School Graduation	→	→	→	→	→	→	→	→	→	→	→			
				High School Completion												→	→	→
				College Degrees	→													
				Some College		→	→	→	→	→	→	→	→	→	→	→	→	→
		Employment	10%	Unemployment	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Income	10%	Children in Poverty	→	→	→	→	→	→	→	→	→	→	→	→	→	→
				Income Inequality	→					→	→	→	→	→	→	→	→	→
		Family and Social Support	5%	Inadequate Social Support	→	→	→	→	→									
				Social Associations						→	→	→	→	→	→	→	→	→
				Children in Single-Parent Households	→	→	→	→	→	→	→	→	→	→	→	→	→	→
		Community Safety	5%	Violent Crime	→	→	→	→	→	→	→	→	→	→	→	→	→	
				Injury Deaths					→	→	→	→	→	→	→	→	→	→
	Physical Environment	Air and Water Quality	5%	Air Pollution - Ozone Days	→	→	→											
				Air Pollution - Particulate Matter Days	→	→	→											
				Air Pollution - Particulate Matter				→	→	→	→	→	→	→	→	→	→	→
				Drinking Water Violations				→	→	→	→	→	→	→	→	→	→	→
		Built Environment	5%	Access to Healthy Foods	→	→												
				Limited Access to Healthy Foods			→	→										
				Fast Food Restaurants			→	→										
				Liquor Store Density	→													
				Access to Recreational Facilities		→	→	→										
		Housing and Transit	5%	Severe Housing Problems					→	→	→	→	→	→	→	→	→	→
				Driving Alone to Work					→	→	→	→	→	→	→	→	→	→
				Long Commute - Driving Alone					→	→	→	→	→	→	→	→	→	→

Appendix 3: Limitations of Data Comparability across states

Behavioral Risk Factor Surveillance System (BRFSS) measures	Measures: Poor or Fair Health, Adult Smoking, Adult Obesity, Poor Physical Health Days, Poor Mental Health Days, Excessive Drinking, Physical Inactivity, Diabetes Prevalence, Frequent Physical Distress, Frequent Mental Distress, Insufficient Sleep Measures using BRFSS data are modeled and include state-level effects that may introduce error when compared across states, such as overestimating differences in border counties in different states.
HIV Prevalence	Some states offer anonymous HIV testing and these test results are not included in the national registry system.
Food Environment Index	Statistical models used to create the Food Environment Index include state-level effects that may overestimate differences in border counties in different states. Comparison of counties within a state will be more reliable than comparison of counties across states.
Sexually Transmitted Infections	Chlamydia screening patterns may vary between states and health care systems. Differences in rates may reflect differences in these screening patterns, rather than differences in the underlying rates of disease.
Food Insecurity	Statistical models that estimate food insecurity include state-level effects that may overestimate differences between border counties in different states. Comparison of counties within a state will be more reliable than comparison of counties across states.
Unemployment	The statistical model used to estimate unemployment may vary by state. More information about methodology is available from the data source.

High School Graduation	States use different methods to determine who is in a high school cohort. This means that each state considers students who transfer, disenroll, are incarcerated, or have special needs differently. States also differ in how they include online schools.
Living Wage	This measure includes the cost of child care. Child care cost data are based on market-rate surveys reported separately by state, published in different years. Some states only report state- or region-level estimates, and thus require county-level imputation. Due to this, states may differ in the extent to which estimates are modeled vs. observed.
Children Eligible for Free or Reduced Price Lunch	States are not required to participate in free or reduced price lunch programs. States can also vary on eligibility criteria, namely whether children of Medicaid recipients are eligible.
Child Care Cost Burden	Child care cost data are based on market-rate surveys reported separately by state, published in different years. Some states only report state- or region-level estimates, and thus require county-level imputation. Due to this, states may differ in the extent to which estimates are modeled vs. observed.
Child Care Centers	Child care centers are regulated by state licensing. Definitions of child care facilities vary by state. Data were acquired from respective states and therefore may be subject to reporting differences.
Juvenile Arrests	Juvenile Arrests may vary across states due to different reporting practices, arrest rules and laws, as well as different juvenile age limits. Additionally, some states report calendar year estimates while other states use fiscal year estimates.
Voter Turnout	Voter turnout at the county level is heavily influenced by state laws which may restrict or support voting access. Voter Turnout does not reflect civic participation of people who have lost their voting rights due to certain interactions with the judicial system or because of a mental disability.

Census Participation	Census data collection strategies vary by geographic area. Data collection strategies may target specific populations who live in an area or specific geographic characteristics of a region. The census advises against comparison across state lines.
Traffic Volume	States collect and report these data differently. Traffic counts are performed by state Departments of Transportation.

Appendix 4: Available Data Disaggregation

Measure	Age	Gender	Race	Education	Income	Subcounty Area
Premature Death	Yes	Yes	Yes	Yes	No	No
Poor or Fair Health	Yes	Yes	Yes	Yes	Yes	Yes
Poor Physical Health Days	Yes	Yes	Yes	Yes	Yes	Yes
Poor Mental Health Days	Yes	Yes	Yes	Yes	Yes	Yes
Low Birthweight	Yes	Yes	Yes	Yes	No	No
Adult Smoking	Yes	Yes	Yes	Yes	Yes	Yes
Adult Obesity	Yes	Yes	Yes	Yes	Yes	Yes
Food Environment Index	Yes	No	No	No	No	Yes
Physical Inactivity	Yes	Yes	Yes	Yes	Yes	Yes
Access to Exercise Opportunities	No	No	No	No	No	Yes
Excessive Drinking	Yes	Yes	Yes	Yes	Yes	Yes
Alcohol-Impaired Driving Deaths	Yes	Yes	Yes	No	No	Yes
Sexually Transmitted Infections	Yes	Yes	Yes	No	No	No
Teen Births	Yes	No	Yes	No	No	No
Uninsured	Yes	Yes	Yes	No	Yes	Yes

Measure	Age	Gender	Race	Education	Income	Subcounty Area
Primary Care Physicians	Yes	Yes	N/A	N/A	N/A	N/A
Dentists	Yes	Yes	No	No	No	No
Mental Health Providers	No	Yes	No	No	No	Yes
Preventable Hospital Stays	Yes	Yes	Yes	No	No	No
Mammography Screening	Yes	Yes	Yes	No	No	No
Flu Vaccinations	Yes	Yes	Yes	No	No	No
High School Completion	Yes	No	Yes	No	No	Yes
Some College	Yes	Yes	Yes	N/A	No	Yes
Unemployment	No	Yes	Yes	Yes	No	Yes
Children in Poverty	Yes	No	Yes	No	No	Yes
Income Inequality	No	No	No	No	N/A	Yes
Children in Single-Parent Households	No	No	No	No	No	Yes
Social Associations	No	No	No	No	No	Yes
Injury Deaths	Yes	Yes	Yes	No	No	No
Air Pollution - Particulate Matter	N/A	N/A	N/A	N/A	N/A	No
Drinking Water Violations	No	No	No	No	No	Yes
Severe Housing Problems	No	No	Yes	No	Yes	Yes
Driving Alone to Work	Yes	No	Yes	No	No	Yes
Long Commute - Driving Alone	No	No	No	No	No	Yes

Appendix 5: County Health Rankings Measures 2023

Ranked Measures

	Measure	Weight	Source	Years of Data
HEALTH OUTCOMES				
Length of Life	Premature Death*	50%	National Center for Health Statistics - Mortality Files	2018-2020
Quality of Life	Poor or Fair Health	10%	Behavioral Risk Factor Surveillance System	2020
	Poor Physical Health Days	10%	Behavioral Risk Factor Surveillance System	2020
	Poor Mental Health Days	10%	Behavioral Risk Factor Surveillance System	2020
	Low Birthweight*	20%	National Center for Health Statistics - Natality files	2014-2020
HEALTH FACTORS				
HEALTH BEHAVIORS				
Tobacco Use	Adult Smoking	10%	Behavioral Risk Factor Surveillance System	2020
Diet and Exercise	Adult Obesity	5%	Behavioral Risk Factor Surveillance System	2020
	Food Environment Index	2%	USDA Food Environment Atlas, Map the Meal Gap from Feeding America	2019 & 2020
	Physical Inactivity	2%	Behavioral Risk Factor Surveillance System	2020
	Access to Exercise Opportunities	1%	ArcGIS Business Analyst and Living Atlas of the World; YMCA; US Census TIGER/Line Shapefiles	2022 & 2020
Alcohol and Drug Use	Excessive Drinking	2.5%	Behavioral Risk Factor Surveillance System	2020
	Alcohol-Impaired Driving Deaths	2.5%	Fatality Analysis Reporting System	2016-2020
Sexual Activity	Sexually Transmitted Infections	2.5%	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention	2020
	Teen Births*	2.5%	National Center for Health Statistics - Natality files	2014-2020
CLINICAL CARE				
Access to Care	Uninsured	5%	Small Area Health Insurance Estimates	2020
	Primary Care Physicians	3%	Area Health Resource File/American Medical Association	2020
	Dentists	1%	Area Health Resource File/National Provider Identifier Downloadable File	2021
	Mental Health Providers	1%	CMS, National Provider Identification	2022
Quality of Care	Preventable Hospital Stays*	5%	Mapping Medicare Disparities Tool	2020
	Mammography Screening*	2.5%	Mapping Medicare Disparities Tool	2020

	Measure	Weight	Source	Years of Data
	Flu Vaccinations*	2.5%	Mapping Medicare Disparities Tool	2020
SOCIAL & ECONOMIC FACTORS				
Education	High School Completion	5%	American Community Survey, 5-year estimates	2017-2021
	Some College	5%	American Community Survey, 5-year estimates	2017-2021
Employment	Unemployment	10%	Bureau of Labor Statistics	2021
Income	Children in Poverty*	7.5%	Small Area Income and Poverty Estimates	2021
	Income Inequality	2.5%	American Community Survey, 5-year estimates	2017-2021
Family and Social Support	Children in Single-Parent Households	2.5%	American Community Survey, 5-year estimates	2017-2021
	Social Associations	2.5%	County Business Patterns	2020
Community Safety	Injury Deaths*	5%	National Center for Health Statistics - Mortality Files	2016-2020
PHYSICAL ENVIRONMENT				
Air and Water Quality	Air Pollution - Particulate Matter	2.5%	Environmental Public Health Tracking Network	2019
	Drinking Water Violations[+]	2.5%	Safe Drinking Water Information System	2021
Housing and Transit	Severe Housing Problems	2%	Comprehensive Housing Affordability Strategy (CHAS) data	2015-2019
	Driving Alone to Work*	2%	American Community Survey, 5-year estimates	2017-2021
	Long Commute - Driving Alone	1%	American Community Survey, 5-year estimates	2017-2021

*Indicates subgroup data by race and ethnicity is available; [+]Data not available for HI

Additional Measures

	Measure	Source	Years of Data
HEALTH OUTCOMES			
Length of Life	Life Expectancy*	National Center for Health Statistics - Mortality Files	2018-2020
	Premature Age-Adjusted Mortality*	National Center for Health Statistics - Mortality Files	2018-2020
	Child Mortality*	National Center for Health Statistics - Mortality Files	2017-2020
	Infant Mortality*	National Center for Health Statistics - Mortality Files	2014-2020
Quality of Life	Frequent Physical Distress	Behavioral Risk Factor Surveillance System	2020
	Frequent Mental Distress	Behavioral Risk Factor Surveillance System	2020
	Diabetes Prevalence	Behavioral Risk Factor Surveillance System	2020
	HIV Prevalence+	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention	2020
HEALTH FACTORS			
HEALTH BEHAVIORS			
Diet and Exercise	Food Insecurity	Map the Meal Gap	2020
	Limited Access to Healthy Foods	USDA Food Environment Atlas	2019
Alcohol and Drug Use	Drug Overdose Deaths*	National Center for Health Statistics - Mortality Files	2018-2020
Other Health Behaviors	Insufficient Sleep	Behavioral Risk Factor Surveillance System	2020
CLINICAL CARE			
Access to Care	Uninsured Adults	Small Area Health Insurance Estimates	2020
	Uninsured Children	Small Area Health Insurance Estimates	2020
	Other Primary Care Providers	CMS, National Provider Identification	2022
SOCIAL & ECONOMIC FACTORS			
Education	High School Graduation+	EDFacts	2019-2020
	Disconnected Youth	American Community Survey, 5-year estimates	2017-2021
	Reading Scores*+	Stanford Education Data Archive	2018

	Math Scores*+	Stanford Education Data Archive	2018
	School Segregation	National Center for Education Statistics	2021-2022
	School Funding Adequacy+	School Finance Indicators Database	2020
Income	Gender Pay Gap	American Community Survey, 5-year estimates	2017-2021
	Median Household Income*	Small Area Income and Poverty Estimates	2021
	Living Wage	The Living Wage Calculator	2022
	Children Eligible for Free or Reduced Price Lunch+	National Center for Education Statistics	2020-2021
Family and Social Support	Residential Segregation - Black/White	American Community Survey, 5-year estimates	2017-2021
	Childcare Cost Burden	The Living Wage Calculator; Small Area Income and Poverty Estimates	2022 & 2021
	Childcare Centers	Homeland Infrastructure Foundation-Level Data (HIFLD)	2010-2022
Community Safety	Homicides*	National Center for Health Statistics - Mortality Files	2014-2020
	Suicides*	National Center for Health Statistics - Mortality Files	2016-2020
	Firearm Fatalities*	National Center for Health Statistics - Mortality Files	2016-2020
	Motor Vehicle Crash Deaths*	National Center for Health Statistics - Mortality Files	2014-2020
	Juvenile Arrests+	Easy Access to State and County Juvenile Court Case Counts	2019
Other Social & Economic Factors	Voter Turnout+	MIT Election Data and Science Lab; American Community Survey, 5-year estimates	2020 & 2016-2020
	Census Participation	Census Operational Quality Metrics	2020
PHYSICAL ENVIRONMENT			
Housing and Transit	Traffic Volume	EJSCREEN: Environmental Justice Screening and Mapping Tool	2019
	Homeownership	American Community Survey, 5-year estimates	2017-2021
	Severe Housing Cost Burden	American Community Survey, 5-year estimates	2017-2021
	Broadband Access	American Community Survey, 5-year estimates	2017-2021

*Indicates subgroup data by race and ethnicity is available; +Data not available for all states.

Measure	Source	Years of Data
DEMOGRAPHICS		
Population	Census Population Estimates	2021
% Below 18 Years of Age	Census Population Estimates	2021
% 65 and Older	Census Population Estimates	2021
% Non-Hispanic Black	Census Population Estimates	2021
% American Indian or Alaska Native	Census Population Estimates	2021
% Asian	Census Population Estimates	2021
% Native Hawaiian or Other Pacific Islander	Census Population Estimates	2021
% Hispanic	Census Population Estimates	2021
% Non-Hispanic White	Census Population Estimates	2021
% Not Proficient in English	American Community Survey, 5-year estimates	2017-2021
% Female	Census Population Estimates	2021
% Rural	Census Population Estimates	2010