County Health Rankings & Roadmaps Working Paper

Updates to Methods and Tools for Practical Application to Improve Health and Equity

March 2025

County Health Rankings & Roadmaps

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SCHOOL OF MEDICINE AND PUBLIC HEALTH

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Introduction

County Health Rankings & Roadmaps (CHR&R) is a program of the University of Wisconsin Population Health Institute (UWPHI), developed with support from the Robert Wood Johnson Foundation (RWJF) since 2008. The primary goal of the program articulated in the original grant proposal was "to increase awareness of the multiple determinants and summary measures of population health among policymakers in order to engage multiple sectors in population health improvement efforts." CHR&R draws attention not only to the multiple determinants of health, but the unequal distribution of those determinants of health within and across counties.

While the outcomes of the first decade of work have been transformative, the start of the programs' second decade was marked by the overlapping and multiplicative crises of racism and the COVID-19 pandemic, underscoring the urgent need to rethink how we position our assets and advance our work. CHR&R is dedicated to accelerating the use of data, evidence, guidance and stories to support action on the social determinants of health (SDOH) while also bringing our suite of tools and resources forward through innovation focused on the structural determinants of health and health inequity.
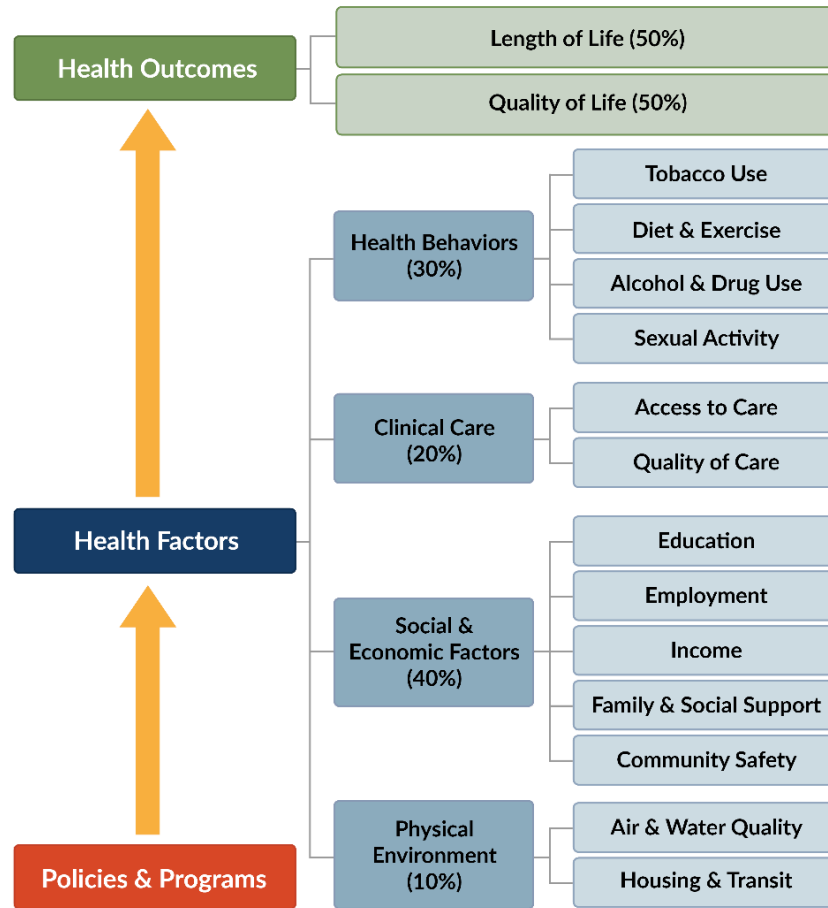
We are recognized as a continuously evolving 'learning lab' and have invested heavily in the discovery and development of innovative, practice-oriented intellectual assets in the most recent five years. Perhaps the most well-known intellectual assets of CHR&R are the annual county health assessments and the model of health from which they are derived. We determined that responding to the moment and reaching our goals of fostering deep health equity and social solidarity while growing the relevance and utility of a data to action approach would require research and development of updates, including evolution of the:

- 2014 County Health Rankings (CHR) Model of Health: in step with the evolution of the field in understanding the structural forces relevant to SDOH and population health outcomes, and with consideration of the limitations of our current model in this conversation
- CHR&R annual county health assessments: to refine our approach to data-informed comparisons of county-level health, updating weights for the new model to address relative contributions of the determinants of health, and to invest in necessary data repair given contemporary shifts in the federal data infrastructure and presentation standards for age and racialized groups

To inform our evolution, we undertook an expansive process of engaging and collecting input from CHR&R users and advisors, partners, and subject matter experts. We integrated findings from our own internal analyses and those from CHR&R research grantees and from theory and literature in fields related to the social and structural determinants of population health. This working paper will provide an overview of these inputs and a rationale for the decisions made during implementation of updates to CHR&R's data assets including our summary measures of health and approach to accelerating data to action. The development of the new University of Wisconsin Population Health Institute (UWPHI) Model of Health (Figure 1b) that replaced the CHR Model (Figure 1a) in 2025 – a process that took place concurrently with the updates to the data assets – will be described elsewhere.
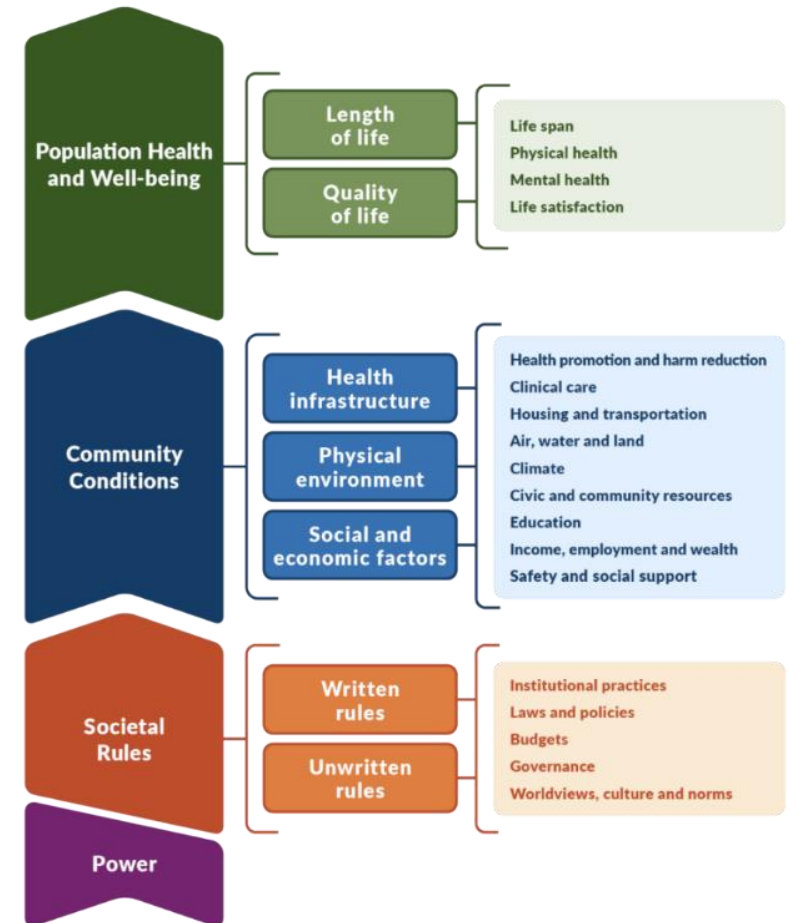
Figure 1. Evolution of Models of Health from 2014 to present

1a. CHR Model of Health (2014-2024)

County Health Rankings model © 2014 UWPHI

1b UWPHI Model of Health (2025-Present)

University of Wisconsin Population Health Institute Model of Health © 2025

Updates to CHR&R data assets

CHR&R has data for over 80 health-related measures that help communities understand more about health and opportunities in their communities, how healthy their residents are today and what factors are impacting future health. We update these measures each year using the most recently available data for nearly all United States counties, compiled from a variety of national and state data sources, and present them in a County Health Snapshot along with state and national values. Sub-county data by race/ethnicity are presented where available, and measures with multiple years of data are presented with county, state and national trend lines. To produce the annual County Health Rankings – now called the Annual Data Release as of 2024 – a select subset of measures is standardized and combined using scientifically-informed weights to provide nearly all counties with local Community Conditions and Population Health and Well-being summaries.

Summary measures (also referred to as composite indicators or indices) combine individual measures with the intent to capture relevant, multi-part aspects of a concept, such as length and quality of life. CHR&R, like numerous data platforms, distills vast amounts of data into a curated subset of measures that allow comparisons of dimensions such as health outcomes or socioeconomic environments between states, counties and/or socio-demographically similar communities. Summary measures of population health are important to assess, prioritize and improve the health of communities, and therefore must be generated with attention to responsible use of data and transparency in methods.

Changes to the CHR&R data source infrastructure and the introduction of the new UWPHI Model of Health provided both the opportunity and necessity to revisit the strengths and limitations of our approach to deriving and communicating our data assets. The following sections will discuss three key changes to the way CHR&R is working to:

- Refine the CHR&R approach to comparing county-level summary measures of population health
- Derive new, nominal weights for summary measure components based on an updated model of population health
- Respond to data infrastructure changes with implications for sub-county data

1. Refine the CHR&R approach comparing county-level summary measures of population health

To calculate summary measures, CHR&R standardizes a set of measures to a single scale (a z-score) and then aggregates the measures using nominal weights[1] assigned according to the model of population health (Appendix A). Until 2024, CHR&R sorted the component measure z-scores for Community Conditions and Population Health and Well-being (formerly Health Factors and Health Outcomes z-scores, respectively) on a spectrum of healthiest to least healthy within states to provide each county with an ordinal rank. Comparing the CHR&R summary measures using ordinal

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[1] In weighted arithmetic averages like the CHR&R summary measures, nominal weights are communicated by developers as a form of judgement of the relative importance of different variables to the summary. See the reference for Paruolo (2013) for more information.

ranks, where each county in a state received a unique rank from #1 (healthiest) to #X (total ranked counties in a state, least healthy) provided a simple measure of the relative health of a county within a state. However, ordinal ranks do not necessarily reflect practical or even statistically significant differences between counties and, without an understanding of the underlying data, can be misinterpreted as absolute truths. Random variation in underlying county values, or "statistical noise," sometimes makes it difficult to make meaningful distinctions between counties that are in the middle of the distribution. Thus, community action driven primarily by ordinal ranks, especially for counties in the middle quartiles, is at a greater risk of being misinformed. In addition, the creation of within-state rankings has precluded the comparison of counties across the U.S., a feature that would be useful for counties on the border lines of states, for instance, or counties with shared historic, geographic, demographic, or other similarities across the country. Below, we outline an improved method for summary measures of population health at the county level. The new method supports data-informed comparisons across the U.S. and a focus on meaningful differences that can better support action.

1.A. New and improved methods: Cluster analysis and data-informed county comparisons for summary measures of population health
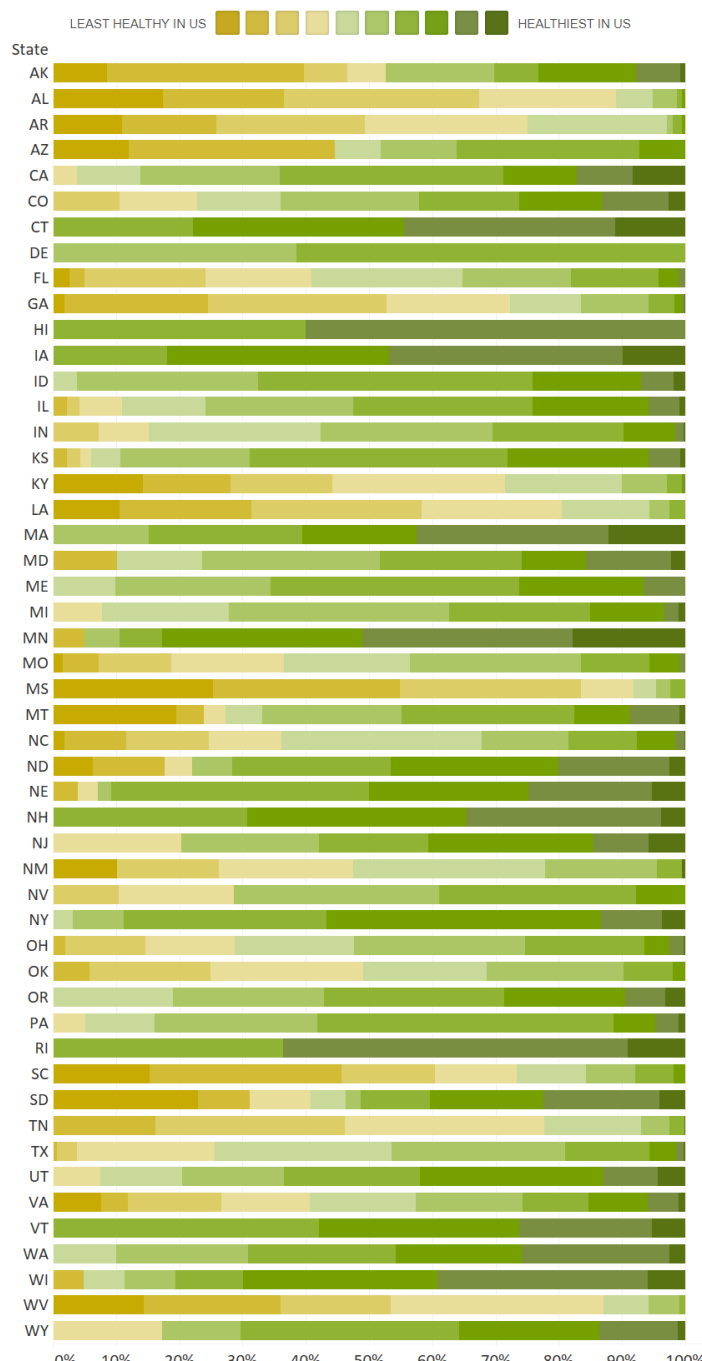
Cluster analysis is a collection of methods that can create data-informed groupings of counties; useful for identifying meaningful gaps and similarities between them, and highlighting areas to prioritize action. Beginning in 2024, CHR&R applies a cluster analysis approach to summary measures of population health, namely the composite Community Conditions and Population Health and Well-being z-score values for each county. Specifically, CHR&R calculates z-scores using a national distribution (rather than within-state) and uses K-means clustering to partition n observations into k=10 clusters, identifying the optimal grouping of the counties for each possible cluster (Pollock, Gangnon, Gennuso, & Givens, 2024). Clusters are determined by creating 10 random centroids of the data and then assigning each data point to the nearest centroid. The centroid of each cluster is then moved to the average of the data in the cluster and the process is repeated until no data points change groups. See Figure 2 and Appendix B for data-informed clusters by state and the geographic distribution across the U.S. CHR&R applies a cluster analysis to all counties with summary measures, nationally, to generate the updated data-informed approach to comparing counties called Health Groups. Each county is grouped within data-informed clusters (e.g., Health Groups 1-10) based on their z-score rather than sorting z-scores and applying an ordinal rank. A cap of 10 clusters, k, was imposed according to an analyses to assess the potential loss of information in limiting clusters (using the Wasserstein metric, also known as Earth Mover's Distance, a measure of the distance between two probability distributions) and to support ease of communication.

1.B. How a data-informed approach to comparing county health can support action

CHR&R's updated approach to comparing county health, Health Groups, provides additional context for summary measures of population health and a data-informed understanding of the health status of a county that can be compared within several settings. For example, by switching from 50 state-specific distributions of z-scores to a single national distribution, this approach

enables comparison of a county with similar counties of a state, region, or nationally, based on the data-informed grouping.

Figure 2. Distribution of Population Health and Well-being Health Groups by State (2024)

Data-informed comparisons are an enhancement of ordinal rank methods in several ways that can support community-led health improvement efforts. Specifically, the updated approach to comparing counties more fully considers the underlying spread and imprecision in the data and better identifies the relative position of counties. This approach can be applied to several types of summary measures, including measures of health disparities (forthcoming), reveal counties that are similar or not meaningfully different from one another, and support identification of peer-health counties across geographies and over time. This approach can also support comparisons within settings that extend outside of state jurisdiction where structural determinants influence the health of populations, such as regions with types of policy-relevant classification (e.g., rural and urban), disinvestment or development, environmental resources or disaster, or sovereignty (e.g., Tribal nations).

Counties that are similar in Population Health and Well-being or Community Conditions within and across states may be more motivated to work together to advocate for structural interventions that can advance health and equity under the new approach. Unlike with ordinal ranks, a county does not have to outperform other counties to see an improvement because data-informed groupings are

not constrained to a certain number of counties in each group. Rather than communicating solely a frame of competition based on ordinal rankings within states, the updated approach to comparing counties may encourage collaboration and solidarity, leading to resource allocation according to need.

2. Derive new, nominal weights for summary measure components based on an updated model of population health.

As stated in section 1, a key part of the process when calculating the CHR&R summary measures is the weighting of individual measures according to the component weights identified by the model of population health. The weights derived by CHR&R and assigned to the two Health Outcomes (i.e., Length and Quality of Life) and the four Health Factors components (i.e., Clinical Care, Social & Economic Factors, Health Behaviors, and the Physical Environment) of the original CHR Model of Health (Figure 1a) are considered "nominal weights". Nominal weights can be interpreted as a reflection of the perceived relative importance of the aforementioned components – a form of judgement based on multiple inputs including an understanding of the literature, a historical perspective, and/or analytic approaches. For example, a valid interpretation of the 40% weight assigned to the Social & Economic Factors component seen in the CHR model is that CHR&R believes it *should* make up 2/5 of the Health Factors summary measure and that the Social & Economic Factors component *should* have approximately twice the influence on the Health Factors summary measure as the Clinical Care component, which has a weight of 20%.

With that, there are two important things to note about nominal weights:

1. Nominal weights are often misinterpreted as the actual, mathematical, relative importance of the individual components to the resulting value of the summary measure. However, the true relative importance is something that is only understood a posteriori and is dependent on the characteristics of measures' distributions and their correlation structure (Paruolo, Saisana, & Slatelli, 2013). Therefore, it would not be a valid interpretation to expect exactly double the return on investment in the Social & Economic Factors compared to Clinical Care in the improvement of the Health Factors summary score of the original model, for example.
2. The nominal weights used by CHR&R are rescaled to unity sum and converted to percentages that equal 100%. There were several considerations that influenced the decision to display the weights on the original model as a percentage summing to 100%, such as ease of communication and to start conversations. However, this choice was not without critique (Krieger, 2017). Some have misinterpreted the Health Factors weights summing to 100%, for instance, to mean that the CHR&R model and its Health Factors measures are intended to explain all the possible variation in Health Outcomes. Firstly, the nominal weights assigned to the four Health Factors components were meant to represent their perceived relative contribution to the Health Factors summary score, not the Health Outcomes summary score. Secondly, even in a hypothetical model where the Health Factors weights were meant to be interpreted as a relative contribution to Health Outcomes, there is, of course, significant omitted variable bias (including variables known to be impactful to health but cannot be adequately quantified in the measurement model, like genetics), regional variation, and other statistical factors that result in unexplained or residual variance. Several studies have explored this question as an academic exercise and discuss relative contributions in the context of

explained vs. unexplained variance (Park, Roubal, Jovaag, Gennuso, & Catlin, 2015; Hood, Gennuso, Swain, & Catlin, 2016).

The process to derive the original weighting scheme is described in a 2010 working paper (Booske, Athens, Kindig, Park, & Remington, 2010). The authors arrived at the weights by drawing from several different perspectives, including a historical perspective, a review of the literature, a scan of weighting schemes used by other health rankings platforms, findings from internal analyses, and a pragmatic (stakeholder engagement) approach. Table 1 summarizes the alternate weighting distributions suggested by these five perspectives and the weighting scheme that was ultimately selected for the County Health Rankings.

Table 1. Summary of Perspectives on Health Factor Weight Assignment from 2010 CHR&R Working Paper

	Historical Perspective	Literature Review	Other Rankings*			Analytic Approach	Pragmatic Approach	*County Health Rankings*
			AHR	WI, KS, TN	NM			
Social and economic factors	Increasing importance ↑	21% (up to 8x clinical care)	27%	40%	40%	55%	25%	**40%**
Health behaviors		57%	37%	40%	40%	37%	25%	**30%**
Clinical care		14% (up to 50%)	27%	10%	15%	21%	25%	**20%**
Environmental factors		7%	9%	10%	5%	-3%	25%	**10%**

*AHR = America's Health Rankings; the four other rankings were done within the states of Wisconsin, Kansas, Tennessee, and New Mexico.

When tasked with updating the weighting scheme for the new UWPHI Model of Health (Figure 1b), we considered several alternate approaches to the original methods with varying degrees of methodological complexity, ranging from using equal weights to "optimized weights." At one end of the spectrum is equally weighting at the component level (e.g., the pragmatic approach in Table 1) or at the individual measure level that has the benefit of simplicity and agnosticism to values for which the relationships are so complex that a true understanding of the relative contributions of health determinants to outcomes is sometimes referred to as a "fantasy equation" (Kindig & Mullahy, 2022). However, the fact that each overall component comprises a different number of individual measures would result in de facto weighting that is not based on any logical understanding of the underlying measures, but rather the number of measures in each component. On the other end of the spectrum, optimized weights force the relative importance of the measure or summary measure to match the nominal weight it has been assigned by first observing the actual relative importance of the individual measures to the summary measure and then calculating an adjustment to apply to the weight, such as forcing the Social & Economic Factors measures to quantitatively explain 40% of the variation in the Community Conditions summary score, for example. While this approach provides a predictable result on paper, it does not provide any additional understanding about the relative, real-world importance of the measures to the summary scores. In addition, calculating optimized weights involves a more intensive implementation process that is difficult to explain, with weights that would necessarily change

annually. For these reasons, we decided to continue to calculate summary measures using nominal weights to strike the right balance of analytic and communication concerns.

2.A. Analytic approach to analyzing weighting scheme options for the 2025 UWPHI Model of Health

The decision to continue to express the relative importance of the Population Health and Well-being and Community Conditions components using nominal weights meant the approach to update the weights for the 2025 UWPHI Model of Health could build upon the theoretical foundation laid by the first model. The process began with engaging internal researchers and expertise as well as external advisors, including the CHR&R Scientific Advisory Group, on an updated approach to the weighting scheme. The most significant changes are as follows:

- The change from four Health Factors components to three Community Conditions components
- The absorption of several Select[2] Health Behaviors measures into the Health Infrastructure component (formerly separate Clinical Care and Health Behaviors components) and the reassignment of the remainder to additional measures
- The addition of some Select measures to the Physical Environment component

A series of exercises were conducted in the summer of 2024 to quantify the internal and external expert opinions using qualitative methods. A consensus of the relative contributions of the three Community Conditions components given the redistribution of measures was used as a starting point to inform a series of statistical analyses guided by the following analytic questions:

1. What is the relative contribution of the three Community Conditions components to the Community Conditions summary measure?
2. What is the relative contribution of the three Community Conditions components to the Population Health and Well-being (formerly Health Outcomes) summary measure?

To address these questions, we followed similar analytic approaches of previously published papers by CHR&R[3] and the work of partners[4] proposing methodologies to understand the relative contributions of such components in this type of model. Namely, correlative and regression techniques have been used to extract values of importance for summary components. These previously-established approaches were revisited and applied to the new UWPHI Model of Health to provide analytic evidence for the relative importance of each overall component area. Specifically, summary z-scores were calculated and standardized across all counties in the nation for the newly-mapped measures that comprise the Health Infrastructure, Physical Environment, and Social & Economic Factors components using data from the 2024 Annual Data Release. In calculating the summary z-scores for each component, weights to individual component measures

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[2] Select measures, as opposed to CHR&R's Additional measures, are the 29 measures combined into the Population Health and Well-being and Community Conditions summary scores.
[3] See references for Hood (2016) and Park (2015).
[4] A CHR&R Research Grant was awarded to Harvard University in 2017 to examine how choices made in the calculation of summary measures, such as the weighting scheme and aggregation method, influence the resulting ranks.

were applied such that all three component areas would receive equal or 'impartial' weight in order to start with the premise that no information is known about how much each component should be weighted in comparison with the others. Correlation analyses were then run between these three component-area summary z-scores and the overall Community Conditions summary z-score to address the first analytic question, as well as with the overall Population Health and Well-being summary z-score to address the second analytic question. Ordinary least squares regression models were run with the three component-area summary z-scores as independent variables and the Population Health and Well-being summary z-score as the dependent variable, with rescaled regression coefficients as another approach to analyze the relative importance of the component areas. This regression model was also used to examine a tertiary analytic question, to see how much unexplained variance remained in the outcome after Community Conditions are accounted for in the new model.

Results from these analyses are shown in Table 2, below. Correlation analyses of the three summary measure components with the Community Conditions summary score showed a relative weight of 34%, 28%, and 38% for Health Infrastructure, Physical Environment, and Social & Economic Factors, respectively. Due to the intent of these component-level weights as explained above, these relative weights provide the most analytic information to inform our decisions. When the components were correlated with the Population Health and Well-being summary score, Social & Economic Factors increased in weight while the other two components decreased in weight with 31%, 21%, and 48% for Health Infrastructure, Physical Environment, and Social & Economic Factors, respectively. Using regression analysis as the method of approach for the Population Health and Well-being summary score yielded relative weights of 28%, 14%, and 59% for Health Infrastructure, Physical Environment, and Social & Economic Factors, respectively. Learnings from our previous model informed the importance of understanding how much measured health determinants explain variation in health. Thus, a regression analysis was performed including all measures for all three components to answer our tertiary research question, resulting in percent variation in health explained of 91%, meaning that only 9% of the variation in the Population Health and Well-being summary score was left unexplained after factoring in all Select measures of Community Conditions captured in the model.

Table 2. Results of Three Analytic Approaches to Relative Weights Assignment for UWPHI Model of Health Components (2024 CHR&R Data)

	Community Conditions-Rescaled Correlations	**Population Health and Well-being**-Rescaled Correlations	**Population Health and Well-being**- Rescaled Regression Coefficients
Health Infrastructure	34%	31%	28%
Physical Environment	28%	21%	14%
Social & Economic Factors	38%	48%	59%

2.B. Approach to the selection of a weighting scheme for the 2025 UWPHI Model of Health

These results left us with several viable options that were necessarily balanced with theoretical and pragmatic considerations. For example, the ability to communicate the weights, as round numbers and in relation to one another, would be beneficial for users. Evidence from the literature, use of weights in other platforms, and qualitative assessments from internal and external experts also needed to be taken into account. And critically, the addition of new model components and rearrangement of components in the former model necessitated further pragmatic considerations. Through synthesis of expert opinion, research, and analysis, we derived new weights for the component areas: 25%, 25%, and 50%, for Health Infrastructure, Physical Environment, and Social & Economic Factors, respectively. These weights allowed for balance across components with some allowance for the future addition of measures, ease of communication, consistency with other sources and expert input, and sufficient reflection of the analytic results.

Weights were then applied to individual component measures with a top-down approach, using a method of assigning nominal weight values of 'high' (8%), 'medium-high' (4%), 'medium-low' (2%) and 'low' (1%) relative weights to each measure. These levels were informed by correlation methods as above, consistency with CHR&R's previous model weights, and practical considerations for the aggregation to component-level total weights. The newly derived component-level and measure-level weights are shown in Appendix C, which compares measures and weights between the CHR Model of Health and the UWPHI Model of Health.

The modus operandi at CHR&R has been to keep the health outcomes measures consistent to aid tracking progress, and to reevaluate health determinants measures annually to ensure that the dataset for each Annual Release remains salient, legitimate, credible, and grounded in equity. As can be seen in Appendix C, the updates to measures and weights from the CHR model to the UWPHI model have followed this practice. The individual measures that make up the Population Health and Well-being summary score, and their assigned weights, are the same as the previous Health Outcomes summary score, while the measures and weights for the transition from Health Factors to Community Conditions were reevaluated. Appendix D shows U.S. county maps of the Health Factors and Community Conditions summary scores using data from the 2024 Annual Release, respectively. The comparable geographic spread shown in the maps and the high correlation between the two summary scores of 95% demonstrated consistency in the latent constructs that these measures were designed to capture; however, outlier counties displaying less agreement could be noted and investigated further. Regardless, and as always, CHR&R encourages tracking individual measures over time to monitor progress as opposed to tracking year-to-year changes in the summary measures that underly the Health Groups and former Ranks.

3. Respond to data source infrastructure changes and implications for population counts

3.A. Background on presentation standards for age and racialized groups leading to an evolved approach

CHR&R currently offers data disaggregated by race for 21 measures; 13 of these measures are calculated using data from the National Center for Health Statistics (NCHS, Appendix D). CHR&R presents these disaggregated data with the intent to communicate inequitable exposures to less healthy community conditions, which would otherwise be hidden at the overall county level. In 2022, NCHS – the primary source of CHR&R's vital statistics – made changes to the way data are reported by age and race. In response, CHR&R had to adapt its methods for vitality measures calculated using specific age groups and those disaggregated by race.

Where possible, CHR&R follows the Office of Management and Budget (OMB) standards for presentation of racialized population groups. As OMB standards and data collection methods have evolved, the practice of race bridging has been used to preserve comparable categories representing racialized groups across data sources. Race bridging has been used to introduce compatibility between multi-race and single-race data collection systems such that race-specific statistics can be compared over time, even as data collection systems evolve and diverge. While race bridging methods can maintain compatible categories over time, these methods have the disadvantage of clouding self-identification through mathematical reassignment of multi-race identities to multiple single-race categorizations and disproportionately impact racialized groups with smaller populations like those classified as American Indian and Alaska Native and Asian or Pacific Islander (Ingram, et al., 2003).

Through 2023, CHR&R had, alongside many other data systems, presented data disaggregated among the four minimum categories specified in the 1977 OMB standards for measures constructed from NCHS data. NCHS continued to use the older standards as states individually updated their reporting to meet the 1997 standards according to different timetables. This was made possible via methods collaboratively developed by NCHS and the U.S. Census Bureau that bridged the 31 race categories introduced by the 1997 OMB standards (and used in the decennial Census since 2000) to the four categories widely adopted as a result of the 1977 OMB standards. With all 50 states finally reporting to the same standard in 2017[5], NCHS no longer had the need to produce custom bridged-race population estimates and has since switched to using the U.S. Census Bureau's publicly available, annual, postcensal population estimates.

In 2024, CHR&R likewise adjusted methods and shifted to census data as the primary source of population estimates. The discontinuation of the NCHS race bridging methods and shift to census data population estimates introduces two key issues for the 13 CHR&R measures of mortality and natality which previously used NCHS bridged-race population estimates:

1. Changes to race categories: The census population estimates follow the 1997 OMB standards and there is currently no guidance for the construction of bridged-race population estimates compatible with the 2020 census methods of collection and coding for race and ethnicity data. This means that CHR&R (and other data systems) must adopt the race categories specified in the 1997 OMB standards or pursue reconstruction of race bridging methods compatible with the 2020 census data collection and coding methods.

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[5] West Virgina was the last state to report multiple-race data to NCHS in September 2017.
https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_09-508.pdf

2. Loss of data for granular age groups: The census population estimates are presented in 5-year age categories in contrast to the single-year and 10-year age categories that were formerly available through NCHS data. The loss of the single-year categories has implications for measures that are age-adjusted and measures that utilize specific, granular population estimates in their calculation. Appendix E indicates CHR&R measures implicated and includes Premature Death (Years of Potential Life Lost), Life Expectancy, Premature Age-Adjusted Mortality, Child Mortality, Suicides, and Infant Mortality. With the shift to census population estimates, these measure calculations will require new methods that draw from available data.

3.B. Proposed methods changes affecting a subset of CHR&R measures

Categorization of race data

The data infrastructure changes impacting the race categories available in population estimations offers CHR&R an opportunity to reevaluate our approach to data disaggregation and refocus our efforts to increase the visibility of structural racism and its effects. These changes also provide an opportunity to modernize our approach to the categorization of racialized population groups to better align with the identities that individuals and communities have self-assigned.

In 2024, CHR&R shifted from the current four minimum categories for race representative of the 1977 OMB standards toward the 31 race categories introduced by the 1997 OMB standards. As a first step towards the ultimate goal of presenting as many of the 31 categories as data availability will allow, from 2024 forwards CHR&R will provide the following six categories in county data snapshots: White; Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; and "Two or more races". We recognize that the practice of aggregating those reporting more than one race into a joint category for the sake of simplicity and preservation of small numbers can both aid and hinder efforts to advance racial equity – simultaneously maintaining visibility for those who would otherwise not be captured among the single-race categories while creating a category too heterogeneous to hold meaning for interpretation of the group's health experience. CHR&R will present a "Two or more races" category to support comparability with external data presentations and between jurisdictions while continuing to explore the capability of providing a flexible set of categories for representation of racialized people in county and state snapshots.

Table 3: CHR&R Categories for Presentation of Data for Racialized Population Groups

2023	2024
American Indian or Alaska Native	American Indian or Alaska Native
Asian	Asian
Black	Black
Hispanic	Hispanic
White	Native Hawaiian or Other Pacific Islander
	Two or more races
	White

Age group categorization

The loss of single-year and 10-year age group data previously available through the NCHS population estimates implicates two classes of affected measures: age-adjusted measures and those that require population estimates for specific age groups not represented in the default 5-year census categories, such as Infant Mortality. To maintain as much consistency as possible with previous methods, starting in 2024 CHR&R combined available data from NCHS and the census to recreate the age groupings necessary to calculate CHR&R measures and adjusted the definition of measures where this is not possible.

Most 5-year age categories from the census can be combined to create the age categories CHR&R uses for age-adjustment with a few key exceptions in the youngest age groups. For instance, when CHR&R calculates Premature Death, the youngest three age groups used are <1 year, 1-14 years, and 15-24 years. The census, on the other hand, has the 5-year age categories <5 years, 5-9 years, 10-14 years, 15-19 years, and 20-24 years. To recreate the required <1 year and 1-14 years age groups, CHR&R will approximate the size of the infant population in a given year using the number of live births from NCHS birth data. This approach to approximating the infant population aligns with CDC WONDER, NCHS's web-based system for disseminating public health data. This number will then be subtracted from the census' <5 years age group to create a custom 1-4 years age group, which will be added to the census' 5-9 years and 10-14 years age groups resulting in the necessary <1 year and 1-14 years groupings. The single-year age group of <1 year made available by this method will also be used to calculate the CHR&R Infant Mortality measure (deaths before one year of age per 1,000 live births) and other CHR&R measures that require an approximation of the infant population.

The census age categorization also required an adjustment to the definition and calculation of the CHR&R measure Child Mortality. Through 2023, CHR&R defined Child Mortality as the number of deaths among residents under age 18 per 100,000 population. The number of residents under age 18 was readily obtainable through a combination of single-year age groups from the NCHS population estimates. The 5-year census age groups necessitate an adjustment to the definition and calculation of Child Mortality. From 2024, Child Mortality is defined as the number of deaths among residents under age 20 per 100,000 population and calculated using the census 5-year age categories and the infant age population approximated by the number of live births.

Appendices

- **Appendix A. Select Measures of Population Health and Assigned Weights (2025)**
- **Appendix B. Geographic Distribution of the National Health Outcomes Z-score Values and the 10 National Health Outcomes Z-score Clusters**
- **Appendix C. Comparison of Select Measures and Assigned Weights between the CHR Model of Health (2014-2024) and the UWPHI Model of Health (2025)**
- **Appendix D. Geographic Distribution of the Health Factors summary z-scores and the Community Conditions summary z-scores from 2024 CHR&R data**
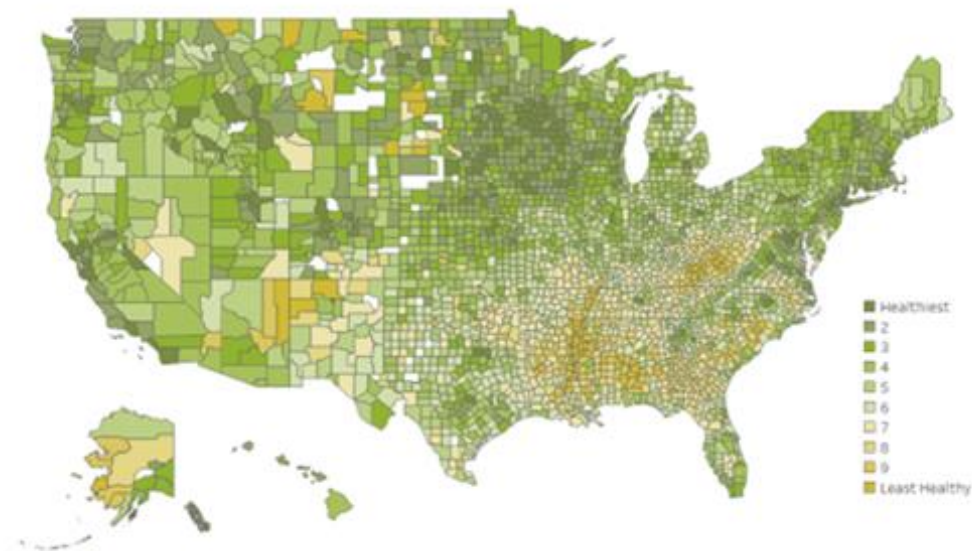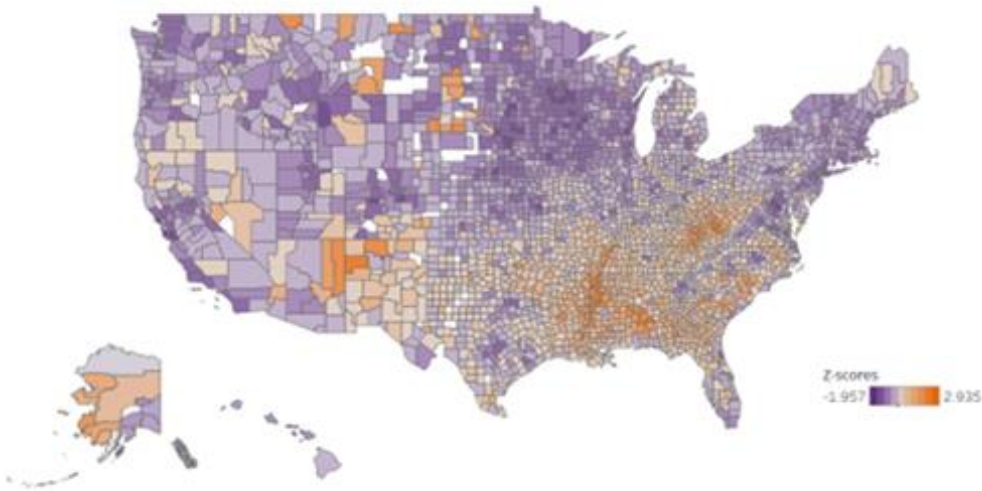- **Appendix E. CHR&R Measures Affected by Changes in Data Source Infrastructure**

Appendix A. Select Measures of Population Health and Assigned Weights (2025)

	Measure	Weight	Data Source	Years of Data
POPULATION HEALTH AND WELL-BEING				
LENGTH OF LIFE				
Life span	Premature Death*	50%	National Center for Health Statistics - Natality and Mortality Files; Census Population Estimates Program	2020-2022
QUALITY OF LIFE				
Physical health	Poor Physical Health Days	10%	Behavioral Risk Factor Surveillance System	2022
	Low Birth Weight*	20%	National Center for Health Statistics - Natality Files	2017-2023
Mental health	Poor Mental Health Days	10%	Behavioral Risk Factor Surveillance System	2022
Life satisfaction	Poor or Fair Health	10%	Behavioral Risk Factor Surveillance System	2022
COMMUNITY CONDITIONS				
HEALTH INFRASTRUCTURE				
Health promotion and harm reduction	Flu Vaccinations*	4%	Mapping Medicare Disparities Tool	2022
	Access to Exercise Opportunities	4%	ArcGIS Business Analyst and ArcGIS Online; YMCA; US Census TIGER/Line Shapefiles	2024, 2022 & 2020
	Food Environment Index+	4%	USDA Food Environment Atlas; Map the Meal Gap from Feeding America	2019 & 2022
Clinical care	Primary Care Physicians	2%	Area Health Resource File/American Medical Association	2021
	Mental Health Providers	1%	CMS, National Provider Identification	2024
	Dentists	1%	Area Health Resource File/National Provider Identifier Downloadable File	2022
	Preventable Hospital Stays*	4%	Mapping Medicare Disparities Tool	2022
	Mammography Screening*	1%	Mapping Medicare Disparities Tool	2022
	Uninsured	4%	Small Area Health Insurance Estimates	2022
PHYSICAL ENVIRONMENT				
Housing and transportation	Severe Housing Problems	4%	Comprehensive Housing Affordability Strategy (CHAS) data	2017-2021

	Driving Alone to Work*	2%	American Community Survey, five-year estimates	2019-2023
	Long Commute - Driving Alone	1%	American Community Survey, five-year estimates	2019-2023
Air, water and land	Air Pollution: Particulate Matter	8%	Environmental Public Health Tracking Network	2020
	Drinking Water Violations⁺	4%	Safe Drinking Water Information System	2023
Civic and community resources	Broadband Access	4%	American Community Survey, five-year estimates	2019-2023
	Library Access	2%	Institute of Museum and Library Services	2022
SOCIAL AND ECONOMIC FACTORS				
Education	Some College	8%	American Community Survey, five-year estimates	2019-2023
	High School Completion	8%	American Community Survey, five-year estimates	2019-2023
Income, employment and wealth	Unemployment	8%	Bureau of Labor Statistics	2023
	Income Inequality	8%	American Community Survey, five-year estimates	2019-2023
	Children in Poverty*	8%	Small Area Income and Poverty Estimates; American Community Survey, five-year estimates	2023 & 2019-2023
Safety and social support	Injury Deaths*	4%	National Center for Health Statistics - Mortality Files; Census Population Estimates Program	2018-2022
	Social Associations	2%	County Business Patterns	2022
	Child Care Cost Burden	4%	The Living Wage Institute; Small Area Income and Poverty Estimates	2024 & 2023

*Subgroup data available by race and ethnicity; ⁺Data availability or recency varies by state

Appendix B. Geographic Distribution of the National Population Health and Well-being Z-score Values⁺ (top) and the Population Health and Well-being Z-score Health Groups (bottom)
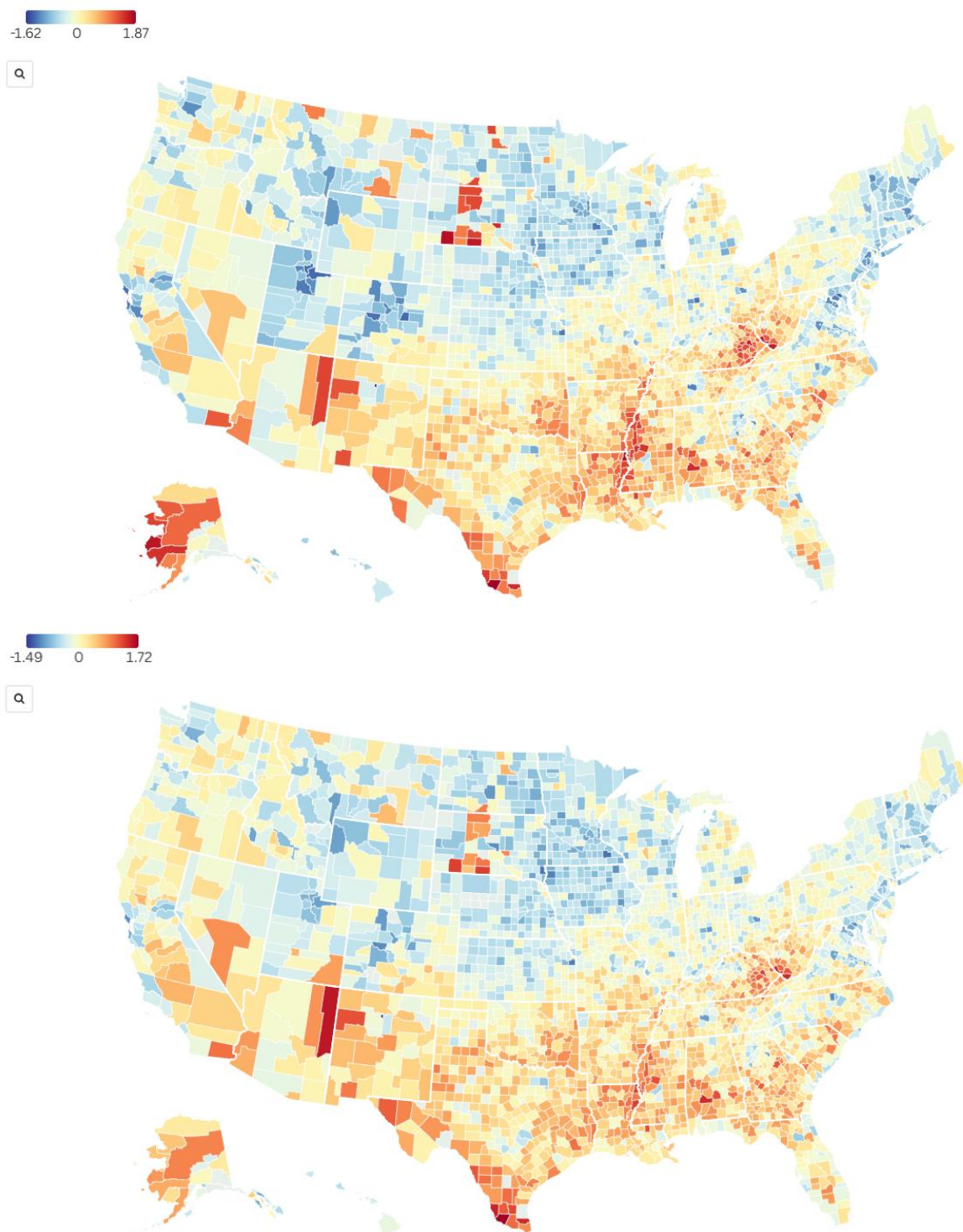

⁺lower z-score value indicates better health, higher value indicates worse health

Appendix C. Comparison of Select Measures and Assigned Weights between the CHR Model of Health (2014-2024) and the UWPHI Model of Health (2025)

	Focus Area	Measure	Old	New
Population Health and Well-being (formerly Health Outcomes)				
Length of Life	Life span	Premature Death	50%	50%
Quality of life	Physical health	Low Birth Weight	20%	20%
	Physical health	Poor Physical Health Days	10%	10%
	Mental health	Poor Mental Health Days	10%	10%
	Life satisfaction	Poor or Fair Health	10%	10%
Community Conditions (formerly Health Factors)				
Health infrastructure 25% (formerly Clinical Care and Health Behaviors)	Health promotion and harm reduction	Access to Exercise Opportunities	1%	4%
	Health promotion and harm reduction	Flu Vaccinations	2.5%	4%
	Health promotion and harm reduction	Food Environment Index	2%	4%
	Clinical care	Mammography Screening	2.5%	1%
	Clinical care	Preventable Hospital Stays	5%	4%
	Clinical care	Uninsured	5%	4%
	Clinical care	Primary Care Physicians	3%	2%
	Clinical care	Mental Health Providers	1%	1%
	Clinical care	Dentists	1%	1%
Physical environment 25%	Air, water and land	Air Pollution - Particulate Matter	2.5%	8%
	Air, water and land	Drinking Water Violations	2.5%	4%
	Climate*			
	Civic and community resources	Broadband Access	0%	4%
	Civic and community resources	Libraries Access	0%	2%
	Housing and transportation	Severe Housing Problems	2%	4%
	Housing and transportation	Driving Alone to Work	2%	2%
	Housing and transportation	Long Commute - Driving Alone	1%	1%
Social and economic factors 50%	Education	High School Completion	5%	8%
	Education	Some College	5%	8%
	Income, employment and wealth	Children in Poverty	7.5%	8%
	Income, employment and wealth	Income Inequality	2.5%	8%
	Income, employment and wealth	Unemployment	10%	8%
	Safety and social support	Social Associations	2.5%	2%
	Safety and social support	Injury Deaths	5%	4%
	Safety and social support	Child Care Cost Burden	0%	4%

Note: Eight 2024 measures moved from Select to Additional for 2025: Teen Births, Sexually Transmitted Infections, Excessive Driving, Alcohol-impaired Driving Deaths, Adult Obesity, Adult Smoking, Physical Inactivity, and Children in Single-parent Households. *Climate is a focus area of the UWPHI model that does not have a Select Measure as of 2025.

Appendix D. Geographic Distribution of the 2024 Health Factors Summary Z-score Values[+] (top) and the 2024 Community Conditions Summary Z-score Values[+] (bottom)

[+]lower z-score value indicates better health, higher value indicates worse health

Appendix E. CHR&R Measures Affected by Changes in Data Source Infrastructure (2024)

Measure	Current Data Source	Disaggregated by racial groups	Calculated using single-year age groups
Premature Death (Years of Potential Life Lost)	NCHS – mortality files	✓	✓
Life Expectancy	NCHS – mortality files	✓	✓
Premature Age-Adjusted Mortality	NCHS – mortality files	✓	✓
Child Mortality	NCHS – mortality files	✓	✓
Infant Mortality	NCHS – mortality files	✓	✓
Drug Overdose Deaths	NCHS – mortality files	✓	
Injury Deaths	NCHS – mortality files	✓	
Homicides	NCHS – mortality files	✓	
Suicides	NCHS – mortality files	✓	✓
Firearm Fatalities	NCHS – mortality files	✓	
Motor Vehicle Crash Deaths	NCHS – mortality files	✓	
Low Birth Weight	NCHS - natality files	✓	
Teen Births	NCHS - natality files	✓	

* Premature Death and Life Expectancy measure calculations account for population age structure without application of age-adjustment.

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