

# 2024 Food Insecurity Index Methodology

Conduent’s Food Insecurity Index was developed by Conduent Healthy Communities Institute (HCI). The Food Insecurity Index is available as part of Conduent’s SocioNeeds Index® Suite, which provides analytics around social determinants of health to advance equitable outcomes. Each index summarizes multiple health and socioeconomic indicators into one validated composite score to help identify areas for action.

The SocioNeeds Index Suite can help:

- Justify and validate investments for prevention and early intervention
- Clearly communicate areas for shared action by healthcare, public health, social services, community organizations, business, and others
- Inform policies and interventions at the regional level

## Selection and Weighting of Index Components

Conduent HCI reviewed its current library of indicators for component indicators to include in the Food Insecurity Index. Indicators were considered if available at the county, zip code, and census tract level, and updated at least annually. Index components were then scored based on the strength of their Pearson correlation coefficient with selected health outcomes. The indicators that were selected to be included in the Food Insecurity Index are listed in the table below (see *Component Indicators*).

Topic	Component Indicator	Source	Period of Measure
Education	Population 25+, Less than 9 <sup>th</sup> Grade	Claritas Pop-Facts®	2024
Financial stability	Families Living Below Poverty Level	American Community Survey, 5-Year Estimates	2018-2022
Household environment	Female-Headed Single-Parent Households with Children	Claritas Pop-Facts®	2024
Personal transport expenditure	Gasoline and Other Fuels Expenditure-to-Income Ratio	Claritas Consumer Spending Dynamix	2024

A regression analysis was performed to measure the strength of the component indicators with the Food Insecure Adult population. Component indicators were standardized into Z-scores, in which they were transformed into a z-distribution with a mean value of zero and a standard deviation of one. The final index score was calculated as a weighted average of the component indicator Z-scores. The optimal weighting for each component indicator was determined by examining the Pearson correlation coefficient between the aggregated z-score of component indicators and each outcome indicator. Weights were adjusted until the optimal coefficients were observed for the association between the index and the outcome indicators.

Outcome Indicator	Locale Type	R <sup>2</sup> value	Pearson Coefficient
Food Insecurity among Adults: past 12 months	County	79%	87%
	Zip code	80%	83%

The results of our regression analysis indicate that 79% and 80% of the variation in the outcome indicator can be attributed to the Food Insecurity Index at the county and zip code levels, respectively, across the entire United States. The Pearson correlation coefficient demonstrates an 87% and 83% association between the index and the outcome indicator when optimal weights are applied. The weights listed in the table below are used to calculate the final index values.

Component Indicator	Weights
Families Living Below Poverty Level	33.7%
Female-Headed Single-Parent Households with Children	25.2%
Gasoline and Other Fuels Expenditure-to-Income Ratio	30.6%
Population 25+, Less than 9 <sup>th</sup> Grade	10.5%

Based on these weights, Families Living Below Poverty Level, Female-Headed Single-Parent Households with Children, and Gasoline and Other Fuels Expenditure-to-Income Ratio have the most impact on index values.

## Presentation of Index Values Within a Community

Final index values range from 0-100, representing the percentile of each geographic location within the entire United States. Within the community or service area, the index values are grouped into five ranks, where a low rank represents a low level of need and a high rank represents a high level of need. These ranks are determined using natural breaks classification, which groups locations into clusters based on similar index values. This method minimizes the variance within a rank and maximizes the variance between ranks. All locations with a population of over 300 persons, as reported by Claritas population estimates, are included in the Food Insecurity Index. Those with populations under 300 persons are excluded for purposes of data stability.