Wisconsin Heat Vulnerability Index identifies populations most at risk from extreme heat

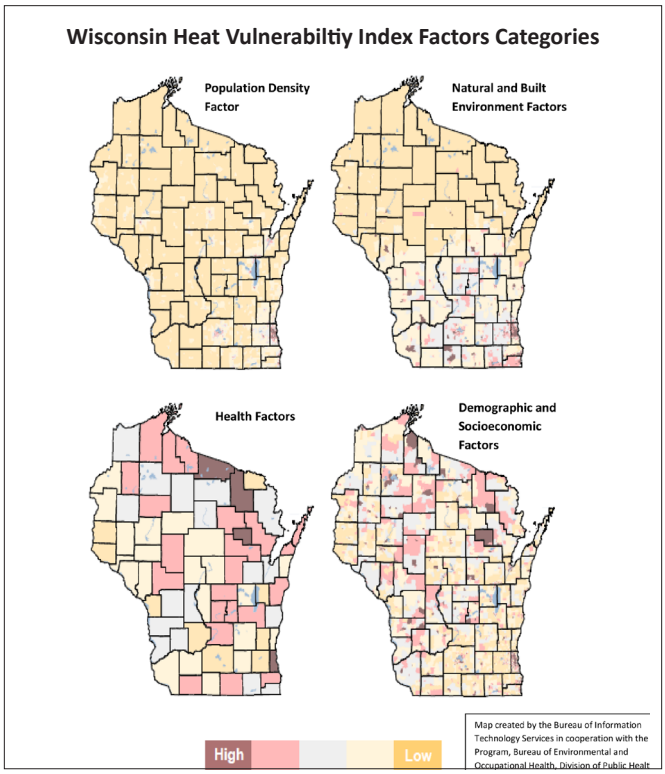
Wisconsin is getting warmer. Between 1950 and 2006, the average annual temperature increased by 1.5°F, a trend that is likely to continue, according to climate scientists. With increasing overall temperatures comes an increasing number of extreme heat events, endangering the well-being of the state's most vulnerable populations. To determine which Wisconsin communities are at highest risk of increased morbidity and mortality as a result of extreme heat, a program called Wisconsin Building Resilience Against Climate Effects (WI BRACE) has developed a heat vulnerability index (HVI) for the state of Wisconsin.

Utilizing methods similar to those developed by the San Francisco Department of Public Health, WI BRACE staff conducted a geo-spatial analysis of heat-related vulnerability with assistance from the Wisconsin Department of Health Services (DHS), the Bureau of Information Technology Services (BITS), and Geographic Information Systems (GIS) staff. The project used existing census and population data, natural and built environment data, and health factors to create an index to determine the areas of greatest risk for negative health impacts due to extreme heat.

Variables of the study were split into four categories: (1) population density, (2) health factors, (3) demographic and socioeconomic factors, and (4) natural and built environment factors. While population density was defined by a single data point, population per square mile, health factors included a variety of conditions such as diabetes prevalence, adult asthma prevalence, percentage uninsured, and more.

Studies have shown that heat-related mortality disproportionately effects elderly populations, socially isolated individuals, and those with pre-existing chronic conditions such as cardiovascular disease.

Demographic and socioeconomic factors are known to play a large role in increased heat vulnerability. Low-income and impoverished families are less likely to be able to afford air conditioning or other remedies to reduce core body temperature. Minority populations and people with a high school diploma or less have also been shown to be more vulnerable to extreme heat. To ensure representation of these communities, the HVI included the percentage of the population who identify as non-white and those with less than a high school education, as well as those living in poverty.



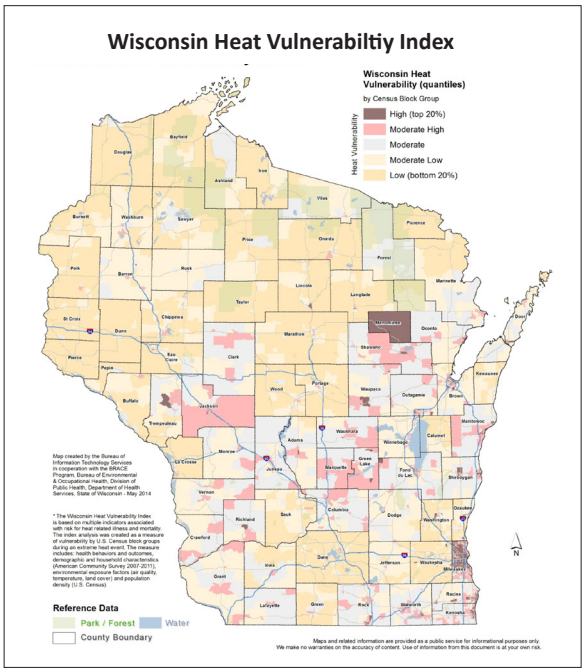
The Wisconsin HVI takes four factors into consideration to detemine vulnerability: population density, health factors, natural and built-environment factors, and demographic and socioeconomic factors.

As for natural and built environment factors, WI BRACE recognized that air pollutants have been associated with higher temperatures and increased daily mortality. While the connection between increased temperature and air pollutants such as particulate matter are not well understood, particulate matter may interact

with temperature to have an effect on mortality on hot days. Exposure to these pollutants can increase the number of emergency room visits on extremely hot days for those with respiratory and cardiovascular diseases.

The HVI also takes into account access to transportation and developed land cover as indicators of vulnerability during extreme heat events.

After analyzing the data, WI BRACE discovered that the counties with the highest heat vulnerability are



The HVI shows that Menominee and Milwaukee County have the highest heat vulnerability.

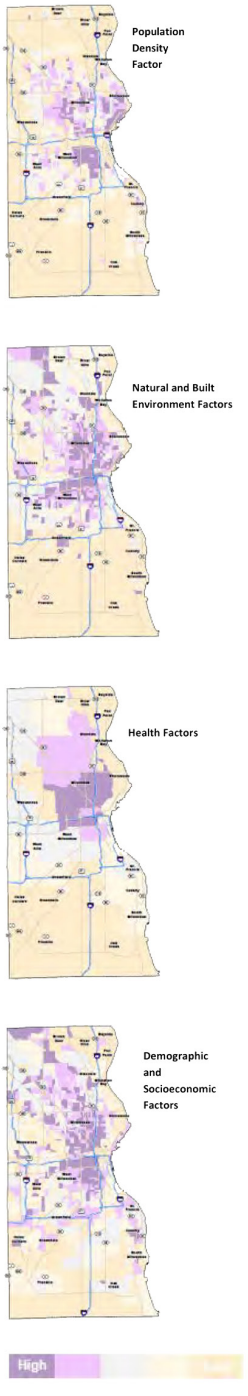
Menominee County and Milwaukee County. To get a closer look at the vulnerability of one county, the BRACE team ran an HVI on Milwaukee County, identifying high-risk neighborhoods and populations. As a result, the Wisconsin BRACE program identified the inner core of the city of Milwaukee as the most vulnerable to high heat.

With this knowledge, the BRACE program collaborated with the Milwaukee Health Department and the Milwaukee Metropolitan Area Heat Task Force to develop planning strategies to help those most at risk. The "Excessive Heat Event Coordination Plan" published by the Milwaukee Health Department is a result of that collaboration.

In addition to Milwaukee County, WI BRACE has done county-specific HVI maps for a variety of pilot projects, including Portage, Wood, La Crosse, St. Croix, Dunn, Buffalo, Pepin, and Eau Claire. WI BRACE also has a group of interns who are planning to develop HVIs for Wisconsin's remaining counties over the course of this summer.

As Wisconsin enters the summer season, local county and municipal agencies can look to the Wisconsin HVI and the Milwaukee HVI to allocate resources to the areas deemed most vulnerable. Neighborhoods and populations at a higher risk of heat stress can be targeted to receive information and additional resources, like cooling shelters, during periods of extreme heat.

Milwaukee Heat Vulnerability Index Factors



HVI factors indicate specific areas of vulnerability in Milwuakee

Research funded by: CDC Climate Ready States and Cities Initiative

The Wisconsin Initiative on Climate Change Impacts generates and shares information to limit vulnerability to climate change in Wisconsin and the Upper Midwest.

May 2015 | Jenny Peek

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