

Heat-Vulnerability Index for New York State

What is heat vulnerability?

Vulnerability to heat is how likely a person is to be injured or harmed during periods of hot weather. Heat vulnerability has been linked to individuals' characteristics (health status, socio-demographics, etc.) as well as certain aspects of the community where one lives (environment, community demographics). These characteristics or "heat vulnerability factors" can play an important role in one's ability to adapt to heat.

What is the Heat Vulnerability Index?

Although the effects of extreme heat on health can often be prevented, heat-related deaths and illness are common during the summer, especially in vulnerable populations. Since vulnerability and adaptability to extreme heat in New York State (NYS) are growing concerns, the New York State Department of Health (NYSDOH) created the Heat Vulnerability Index (HVI) to help local and state public health officials identify and map heat-vulnerable areas and populations in NYS.

The HVI can assist in directing adaptation resources based on characteristics of vulnerable populations in that community and can inform long-term heat-mitigation planning efforts in the community.

The HVI can help local agencies make decisions to:

- set up cooling centers in rural and vulnerable areas where many do not have access to air-conditioning at home;
- provide transportation to and from cooling centers in low income neighborhoods where there may not be public transportation or few people own vehicles;
- include risk communication and alert messaging in multiple languages especially among communities with high proportions of people who do not understand English well;
- arrange home visits for people in high risk groups like the elderly living alone.

How was the HVI developed?

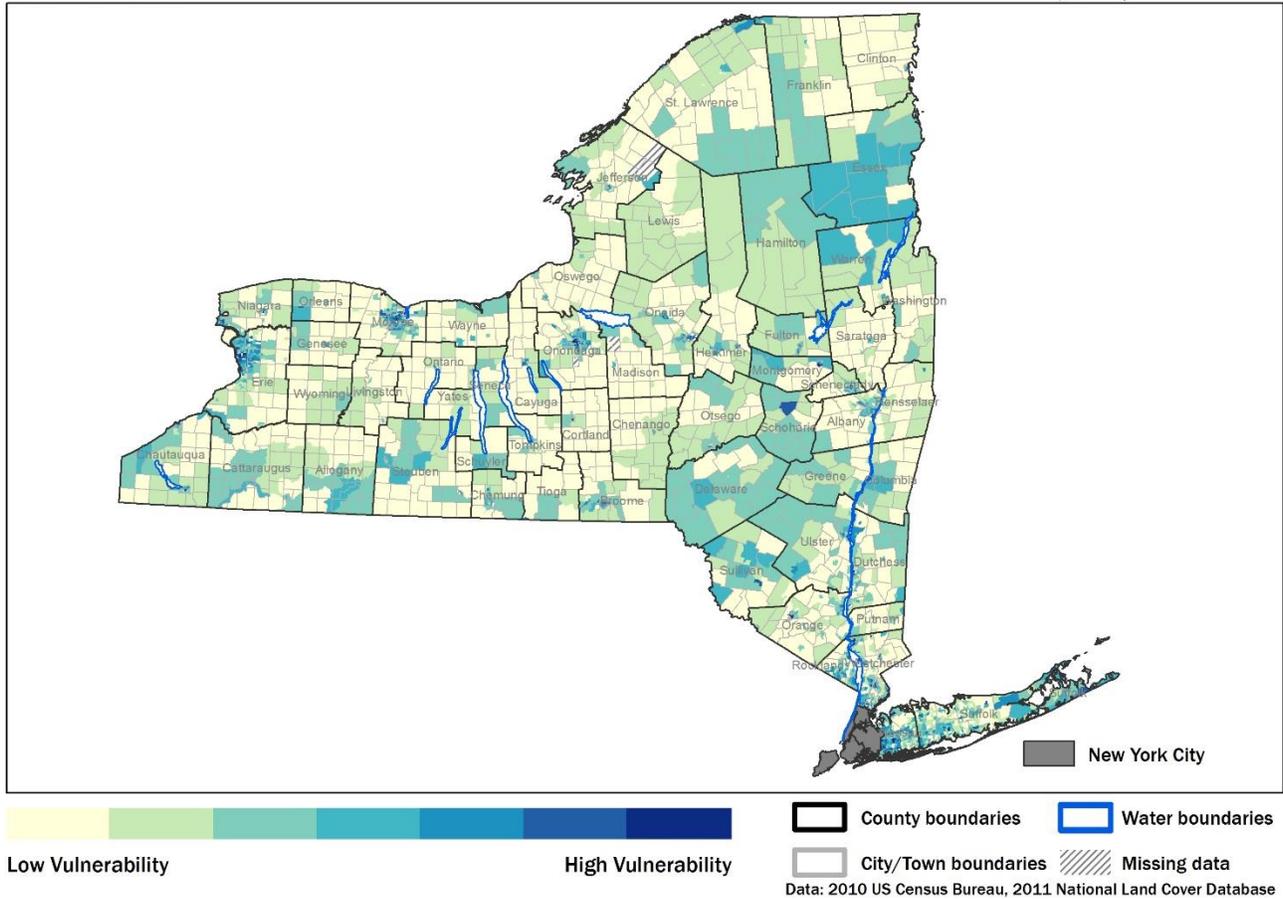
Statewide HVI maps and county reports have been developed to identify heat vulnerability for each census tract. These are based on 13 environmental and socio-demographic heat vulnerability factors identified from previous studies. Census tracts are subdivisions of counties as defined by the US Census Bureau to collect, provide and present statistical data. Census tract level information for these heat vulnerability factors was obtained from the 2006-2010 US Census Bureau American Community Survey (ACS) and 2011 National Land Cover Database (NLCD). The 13 factors were grouped into four categories that represent different aspects of heat vulnerability, which in turn were used to estimate the overall HVI for each census tract.

The four heat vulnerability categories were mapped in addition to an overall HVI map. These include 1) language vulnerability; 2) socio-economic vulnerability; 3) environmental and urban vulnerability; and 4) elderly isolation and elderly vulnerability. These were developed to display populations that are most vulnerable to heat.

The HVI (Figure 1) and four heat vulnerability categories (Figure 2-5) were mapped to display populations in NYS that are most vulnerable to heat.

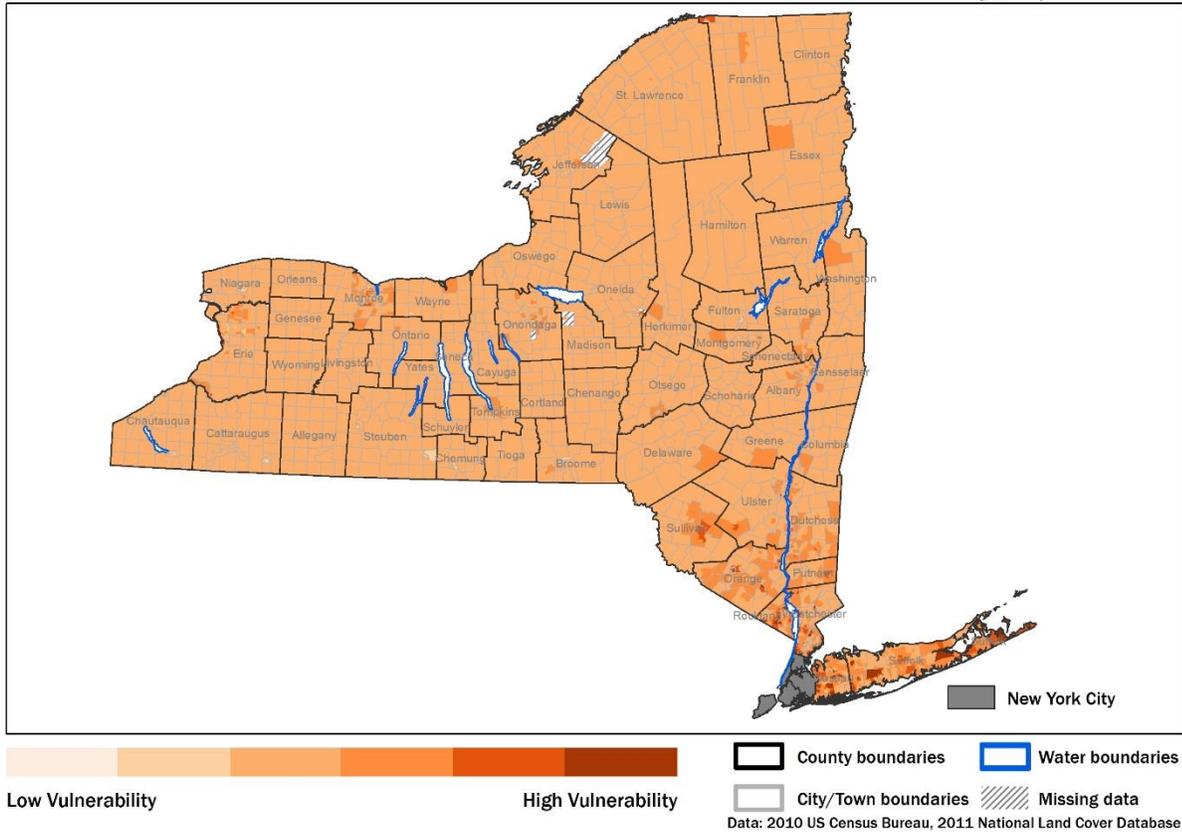
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**Figure 1. Heat Vulnerability Index
New York State**



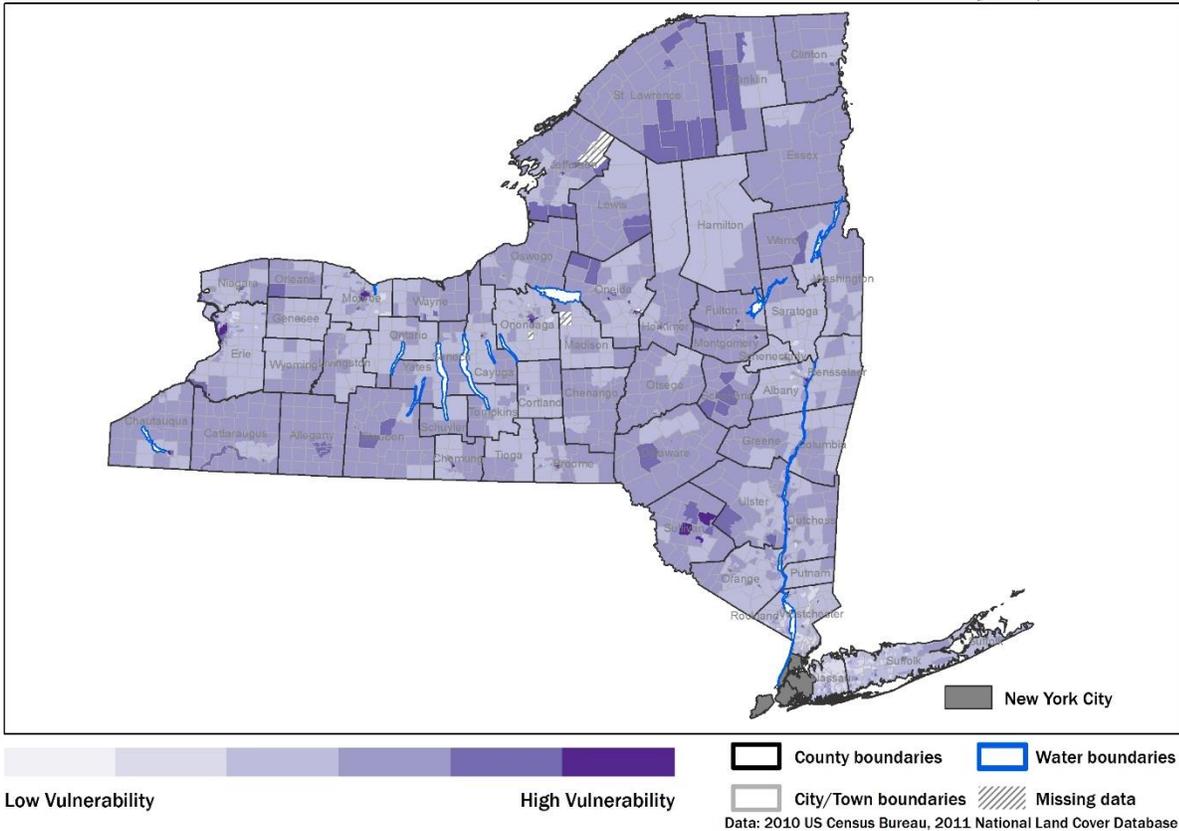
Overall the Heat Vulnerability Index for NYS showed that metropolitan and inner cities are most heat vulnerable. More than a third of NYS population resides in areas identified as moderately to highly vulnerable to heat. In addition to identifying overall heat vulnerability, it is important to recognize specific vulnerabilities among population subgroups and take appropriate actions to reduce heat effects.

**Figure 2. Language Vulnerability
New York State**



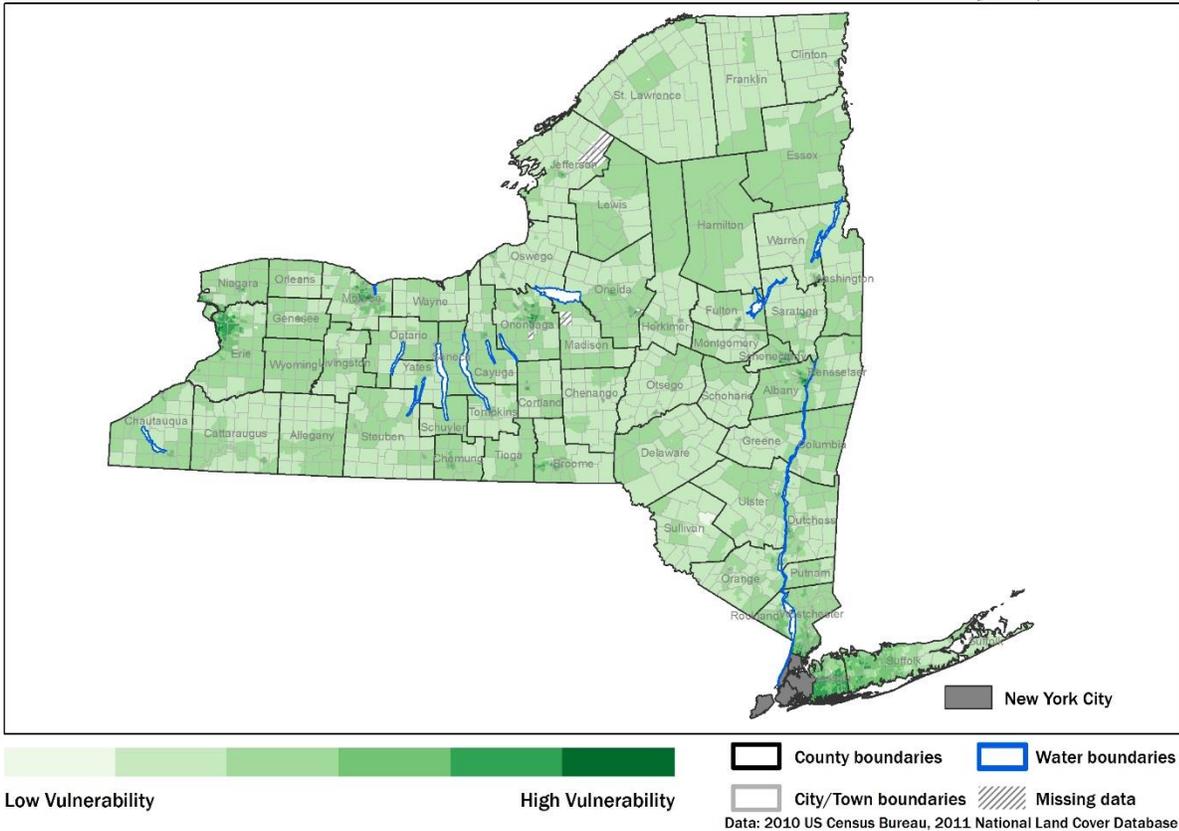
Downstate areas showed higher language vulnerability than upstate New York, reflecting the higher proportion of immigrants in these regions. Among immigrants and others with limited understanding of English, language can be a barrier to accessing resources and understanding alert messages issued during emergencies. Heat awareness messages should be provided in commonly spoken languages of the specific area to best communicate the risks of heat.

**Figure 3. Socio-Economic Vulnerability
New York State**



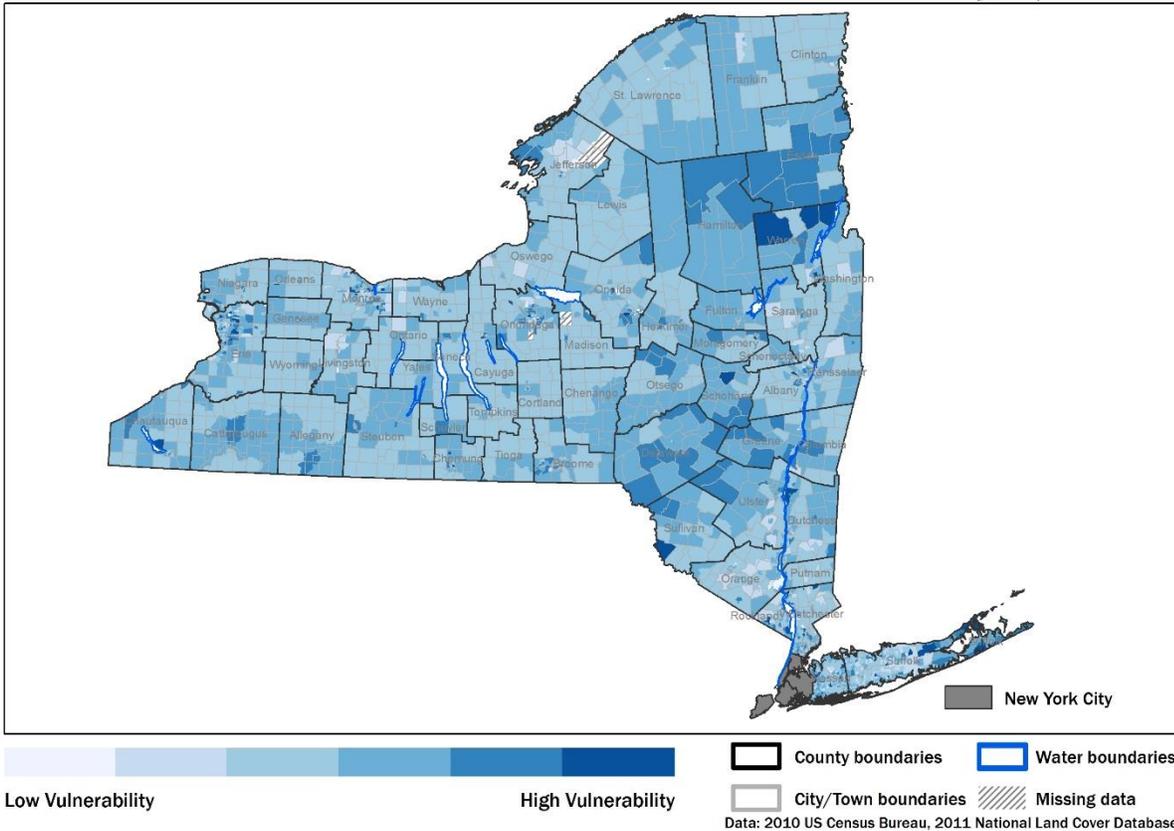
Vulnerability due to socio-economic status varied across the state with vulnerable tracts in rural and a few inner-city areas. Economic status of both an individual and their community can affect how one copes with extreme heat. While recommendations to use air conditioners during periods of extreme heat are commonly a part of cool-down messaging, this may not be an affordable option for low-income households. Community resources like cooling centers can help provide the public with a few hours of relief from hot weather. If public transportation is not available, getting to these facilities can be an obstacle for families and individuals who may not have their own vehicle.

**Figure 4. Environmental/Urban Vulnerability
New York State**



Vulnerability in urban areas is associated with the built environment where temperatures in areas covered by sealed surfaces are often considerably warmer than surfaces covered in vegetation. This is called the Urban Heat Island (UHI) effect and is observed because materials used in buildings, roads and pavements tend to retain heat. Programs to reduce heat should include developing parks, increasing green space, constructing green roofs, and using other materials that help cool rooftops and pavements.

**Figure 5. Elderly Isolation/Elderly Vulnerability
New York State**



Vulnerability among the elderly was mostly seen in rural areas of NYS where populations are often older than urban and suburban populations. Elderly people in rural areas may experience social isolation when they live away from family and the majority of the community. In addition, elderly in these areas will face the same challenges as other rural residents including fewer options for healthcare and thus less likely to receive timely assistance. For these reasons, efforts to reduce the health effects of heat should also target elderly in these areas.