

FEELING VULNERABLE?

AN ANALYSIS OF VULNERABILITY INDICES IN MASSACHUSETTS

Introduction

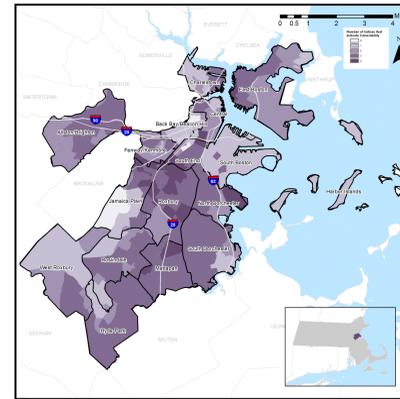
When attempting to assess which communities might benefit from an increase in services, funding, or programming, policy makers or researchers might use a vulnerability index. Vulnerability indexes are tools created by combining data to identify areas that experience higher levels of vulnerability due to social and environmental factors. There is not, however, one single index used by spatial analysts to describe vulnerability, as there is disagreement as to what factors are most important. The aim of this project is to better understand the areas in Massachusetts that are identified as vulnerable, as well as understand the variation of different indexes. Because vulnerability indices are used as tools to promote policy change, direct funding and resources, and change public perception, understanding how much they can vary might encourage us to think more critically about their use.

Index Name	Indicators
R/ECAPs	A racial/ethnic concentration threshold and a poverty test
Mapping Opportunity Index	19 factors covering educational opportunity, economic opportunity, and neighborhood/housing quality.
Environmental Justice Populations	Percent minority population, income, and limited English language.
Social Vulnerability Index	14 factors covering socioeconomic status, household composition, race/ethnicity/language, and housing/transportation.

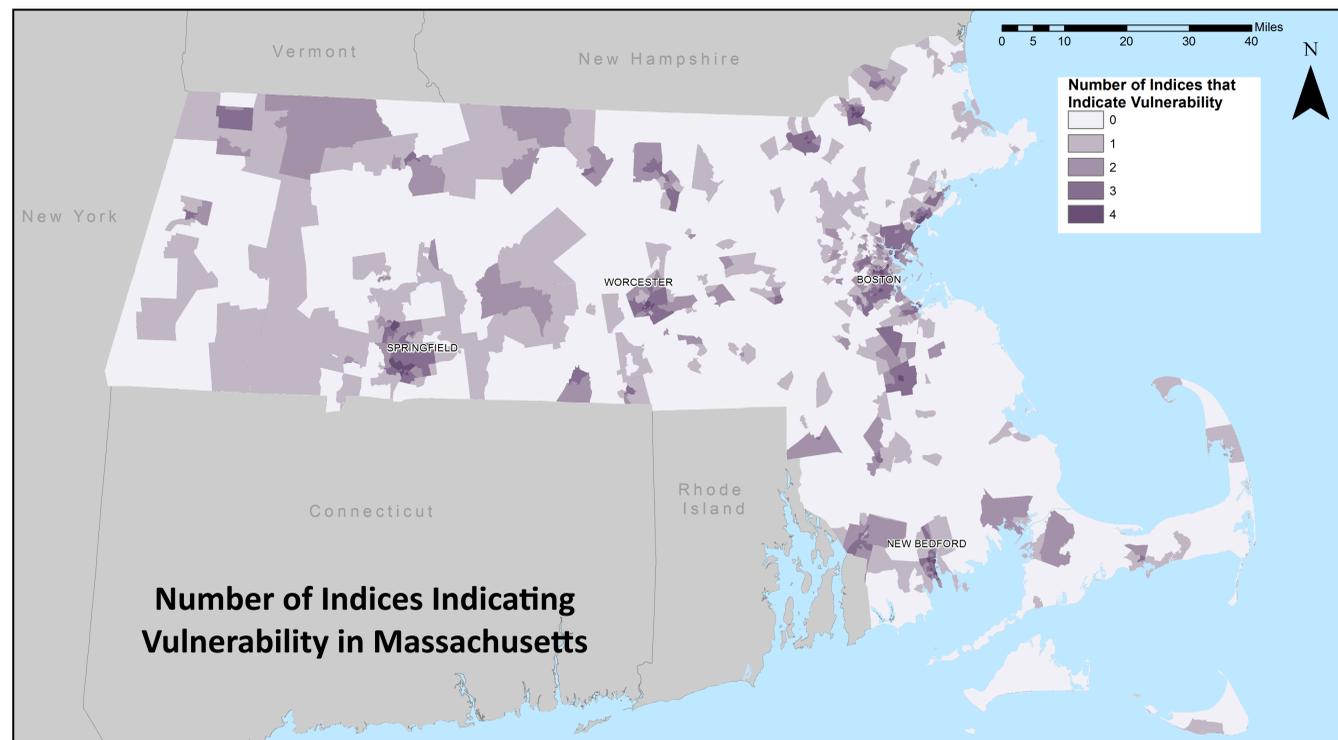
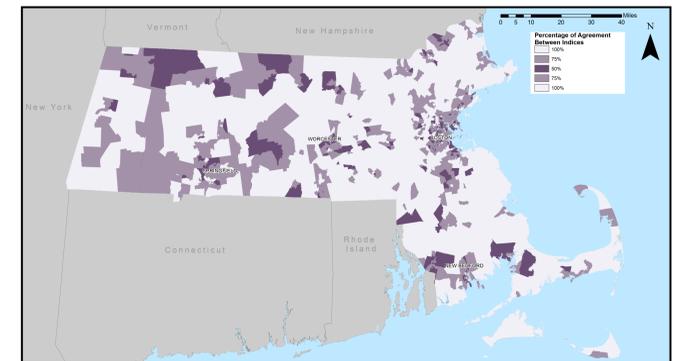
Methods and Scale

In order to better understand the similarities and differences between different vulnerability indices, I chose to study four indices in Massachusetts: (1) The Department of Housing and Urban Development (HUD) Racial/Ethnic Concentrated Areas of Poverty (R/ECAP) designation, (2) the Kirwan Institute Mapping Opportunity Index, (3) MassGIS Environmental Justice Populations, and (4) The Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index. Because each index uses a different scale to measure and display vulnerability, I rescaled each to two variables. For example, the Social Vulnerability Index determines the vulnerability of a census tract based on a percentage of factors that are represented in that tract, thus a percentage scale is used to display the data. After reclassifying each of the indices, I analyzed the similarity between each.

Indices Indicating Vulnerability in Boston



Percentage of Agreement Between Indices



Analysis and Limitations

The analysis shows that there are large areas of disagreement between the indices as to whether or not an area should be considered vulnerable. While it is clear that there are higher levels of perceived vulnerability closer to large cities, there are some tracts in northwestern Massachusetts, for example, wherein only half of the indices indicate vulnerability. The only areas wherein all indices agree on vulnerability are within cities with relatively high populations (the smallest is Lawrence with a population of just over 72,000 in 2000 according to the census).

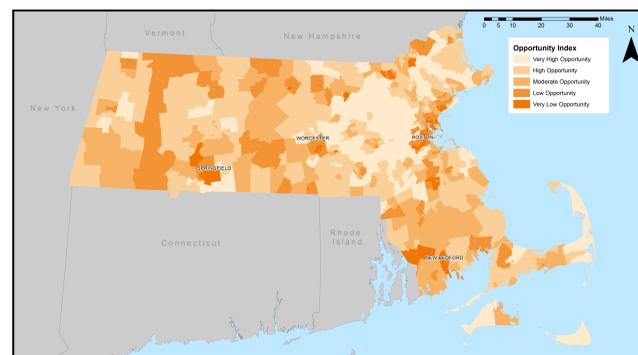
While each of the indices I chose measure the vulnerability of communities, each employs a different definition of the word “vulnerable” and uses a different scale of measurement. Due to my need to rescale the data, some of the complexities of each data set were lost in my analysis.

Design and Cartography: Allison Curtis, UEP 232
 Projections: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001
 Data Sources: US Dept. of Housing and Urban Development, Kirwan Institute, MassGIS, Agency for Toxic Substances and Disease Registry
 May 5, 2018

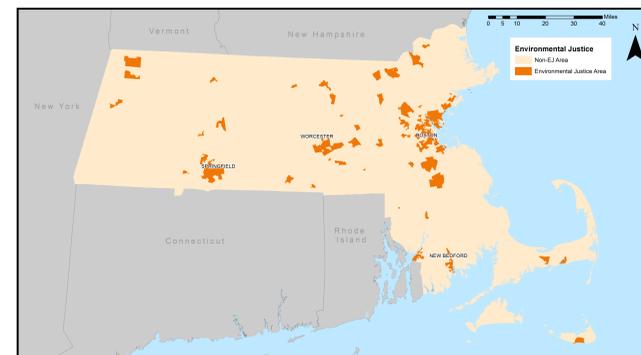
Racially/Ethnically Concentrated Areas of Poverty (RECAPs)



Mapping Opportunity Index



Environmental Justice (EJ) Populations



Social Vulnerability Index

