Methods

Research Question: Do drinking water quality violations disproportionately impact low-income communities and communities of color in Massachusetts?

This analysis compares spatial clustering of water quality violations with clustering of income, race, and population change in Massachusetts towns to determine if there are any overlapping patterns. Spatial autocorrelation uses information about neighboring locations to identify clusters and outliers. Based on the selected attribute, each location is classified as a cluster of similar locations, an outlier that is dissimilar from its neighbors, or not significantly correlated with its neighbors.

An initial analysis of all health-based drinking water quality violations did not show any clusters. However, there were spatial clusters for some types of violations when considered as a group. The most common violations in the state are for the Total Coliform Rule, the Disinfectants and Disinfection Byproducts Rule, and the Lead and Copper Rule. Clustering for these types of violations is shown in the maps to the right.

Results

Safe Drinking Water Access in Massachusetts

Maintaining Safe Drinking Water

Drinking water quality in the United States is generally very high. However, harmful contaminants do sometimes enter public water supplies. The Safe Drinking Water Act provides for the protection of public drinking water supplies setting minimum standards for the amount of chemical and microbial contaminants. If a water system exceeds these standards, the utility must notify users and take action to restore the water quality. Maintaining water quality standards requires ongoing investment in treatment and distribution systems. Most water systems in the U.S. are over 50 years old, and many in Massachusetts were established over 100 years ago. At the same time, federal spending on water utilities has decreased by as much as 52%.

Water Quality Violations and Environmental Justice

The water crisis in Flint, Michigan highlighted the possibility for severe health impacts from water quality violations in low-income communities and communities of color. A recent study correlated the number of drinking water quality violations in counties across the U.S. with income and race. This project evaluates potential correlations in Massachusetts towns.

Massachusetts Water Quality

This project focuses on health-based drinking water quality violations in Massachusetts towns between 2013 and 2017. Of the 351 towns in Massachusetts, 311 have a community water system (CWS) that provides water to all town residents year-round. From 2013 through 2017, there were over 800 water quality violations in these systems. The most common violations were for the Total Coliform and Revised Total Coliform Rules, Disinfectant and Disinfection Byproduct Rules, and the Lead and Copper Rule. Other types of violations included treatment rules for both surface and ground water, various chemical contaminant levels, and levels of radionuclides.

Data and Sources

MassGIS, Community boundaries (towns) from Survey Points, 2017.
Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, Avenza Systems, Inc., and the GIS User Community
Food and Water Watch. [2018]. U.S. Water Systems Need Sustainable Funding.