

Do Bristol County residents have adequate spatial accessibility to Opioid Treatment Centers?

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Introduction

This project seeks to create a spatial accessibility model to understand the accessibility and availability of Bristol County residents to Substance Abuse Treatment Centers. Understanding the disparities in access is critical to this county given the significant impacts that the opioid epidemic has had on residents living here. From 2013 to 2015 the estimated death rate among residents was within the range of 19.6 to 24 per 100,000 people, making it among the highest counties within Massachusetts.⁶ In 2016, Bristol County averaged four opioid overdose deaths a week.⁵ The overarching goal of this simulation is to compare discrepancies in current coverage gaps corroborated with geographic regions with high resident opioid related deaths to propose an alternative location for a treatment center or provide a suggestion for increased capacity for an existing facility.

Methods

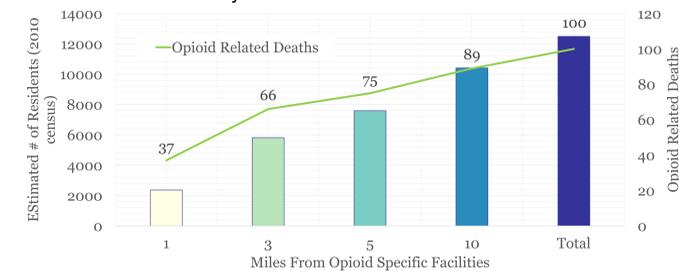
Data Inputs:

Three data sets were used in this simulation: 2010 Census block data¹, Substance Abuse Treatment Center locations from SAMSHA², and locations of residents who deceased due to opioid-related causes in 2013 based on ICD codes³. Given that the Census blocks are the smallest geographic unit of population tabulation, it is the best estimate of population available. The SAMSHA substance abuse facilities are composed of state certified agencies and updated annually. Specific facilities that serve opioid populations are noted on their website. The mortality data set is from a publicly available record at the Registry of Vital Records at the MA department of health and only records known resident deaths. Importantly, it excludes the homeless population and residents whose deaths occurred out of state.

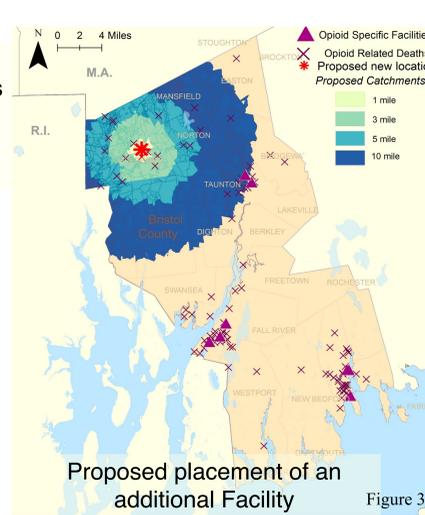
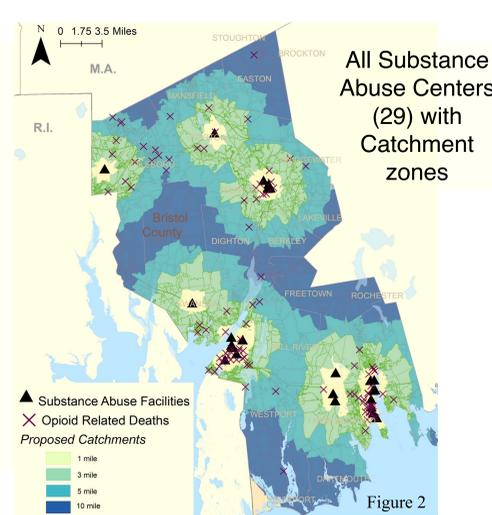
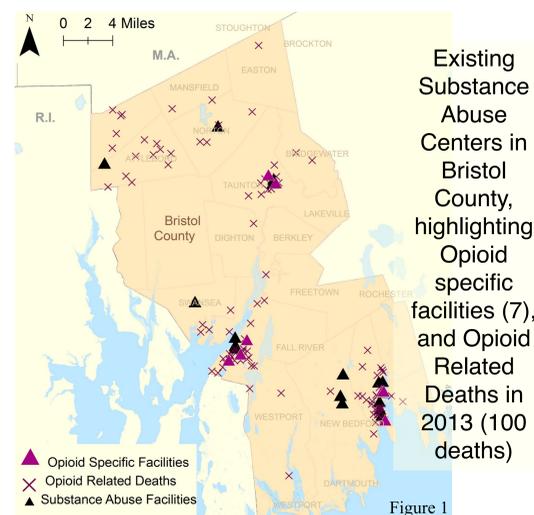
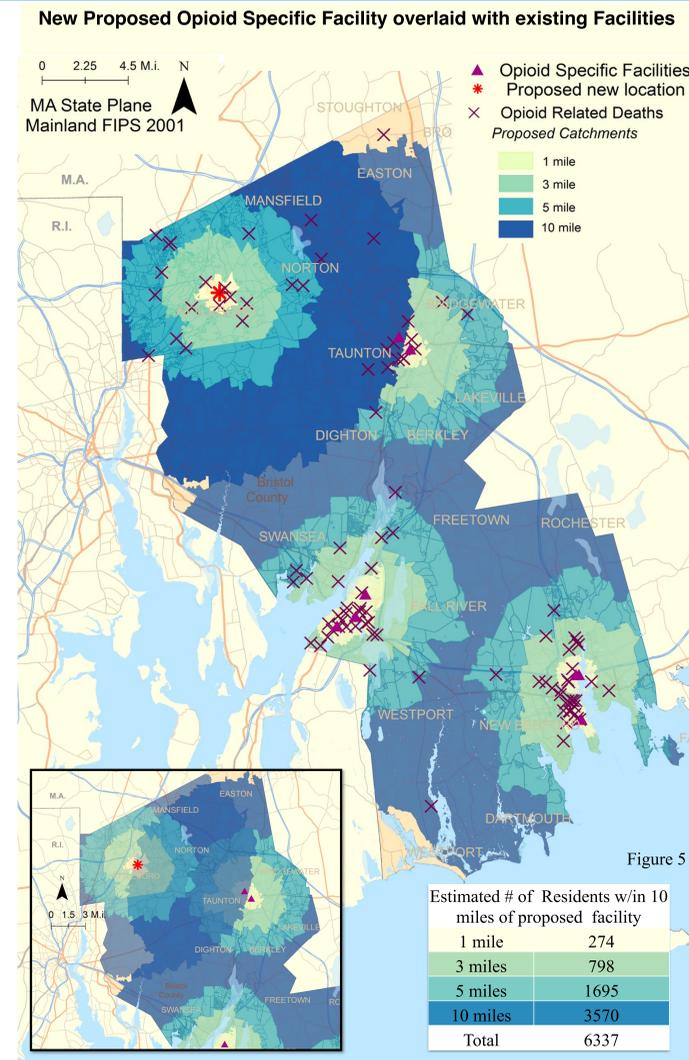
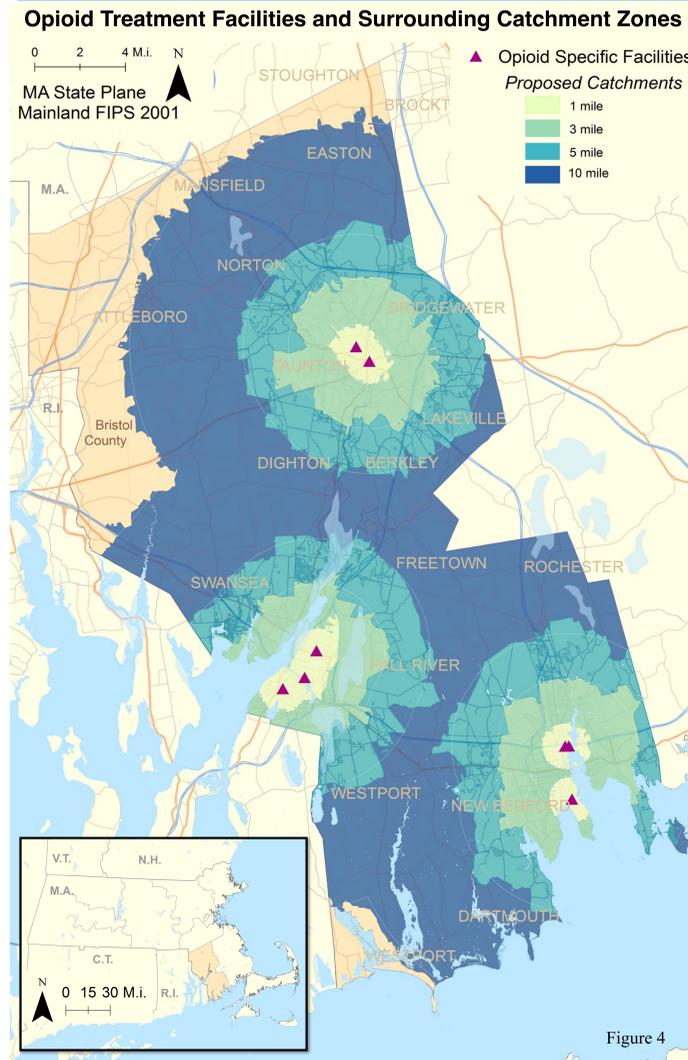
Method:

The X and Y coordinates of substance abuse facilities and mortality data were geo-referenced in ArcGIS. A vector model was then created with underlying conceptual model of potential residential access to existing substance abuse facilities with decaying distance beginning at a 10 mile radius. This was made possible by using radial buffers and a select and sum model in which the estimated number of residents living in blocks that contained their geographic centroid within the proposed catchments of 1,3, 5, and 10 miles were tabulated. This was done for all facilities as well as an opioid specific facilities. Prior literature has recommended the use of 10 miles as a catchment area for a facility, and researchers have noted the increased likelihood for participation of drug treatment programs if living within 1 mile of the facility.⁴

Estimated number of residents served by existing Opioid Specific Facilities by catchment area and resident deaths



Results



Analysis

The Bristol County accessibility to all substance abuse centers map (Figure 2) estimates adequate coverage within a 10-mile radius of existing facilities. However, the catchment areas of facilities that offered opioid support and treatment shows an apparent disparity in coverage, especially in the North-East region of the county. In this area, there is estimated to be both a lack of coverage and a high number of opioid related deaths. Consequently, this is the best estimate of where either an existing facility should increase their capacity to offer opioid related services or the county should consider building a new facility (as demonstrated in figure 3). The proposed facility in the Attleboro region of the county estimates an increase in access to an estimated 6337 residents living in block groups that have their geographic centroid within the 10, 5, 3, and 1 mile radius of the facility according to the 2010 census. It would also be near the 11 resident deaths reported in 2013 that were not near an existing facilities. The inset map in Figure 5 shows that there is some overlap in coverage which accounts for an estimated 2,476 residents that are within the 10 mile range of the existing facilities near Taunton.

Discussion

While this model does provide a good estimate of spatial accessibility, there are a few factors that could improve the simulation. One being that the exact residents' locations within blocks are not known, but rather the geographic centroid of the block is used as the point of reference. Consequently, these arbitrary shapes are not reflective of the actual conditions on the ground and subject to the modifiable areal unit problem. Another factor is the use of Euclidean distance through radial buffers as a measure of accessibility. This is not true in reality as people must drive or walk on sidewalks to get to facilities, which would be better simulated with a network analysis model. Radial buffers can also lead to an inaccurate count of the estimated number of people living in blocks because it only counts blocks that have their centroid within the buffer. However, this did not seem to systematically favor either an over or under estimation. Lastly, since the focus of this project was on Bristol County, only facilities within the area were identified. This creates another flaw inherent in the model as people do not limit themselves to geographic county lines when getting care. Despite these weaknesses, the information created in this hypothetical model can be used to inform public health planning and facilitate further inquiry into regions estimated to be without adequate access. In further research, it would also be pertinent to research non-spatial factors affecting access to opioid services.

Works Cited

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