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URISA Scholarship Map Essay

I created this map in response to early pandemic challenges with a lack of hospital beds. ESRI made available hospital data provided by Definitive Healthcare, and my intention was to show which communities may be underserved. The map depicts what I've taken to calling hospital bed density (HBD). I define HBD as the population per hospital bed, in each service area. With the ultimate goal of the analysis being to approximate the population per hospital bed, the intermediate step was to calculate the population per hospital. I did this by creating hospital service areas, which are the crux of the data analysis. Each Service Area is created first as a Thiessen Polygon surrounding each hospital, and then by grouping Thiessen Polygons for hospitals within 10 miles of each other, effectively grouping a city's hospitals together. My argument for this method was it is likely that when facing an urgent need, people will go to the nearest available hospital. Therefore, to assign population to each hospital, I could approximate the total population nearest to each hospital using Thiessen Polygons. I further argued that the close proximity of hospitals within cities makes the small differences in distance between a given person and their nearest two or three hospitals negligible, necessitating the grouping. Having created the singular and grouped service areas, I calculated the hospital bed density by summing the total number of staffed hospital beds for every hospital (or singular hospital) in each service area, and divided by the total population for each service area. The population was calculated by summing the population of Census Block Groups whose centroid fell within each service area. This analysis was done in both ArcGIS Pro and Postgres/PostGIS.

The service areas are symbolized with a bivariate graduated circle with the size representing the total population of the service area and the color depicting the population per hospital bed. Combined with the color scheme, this allows for a clear distinction of problematic areas as both large and small service areas with a high ratio of population per bed will stand out, large populations with comparatively sufficient beds will not stand out but can be easily found, and service areas with both a small population and a comparatively small ratio of population to hospital bed will fade into the background.

The map tells a few stories. First, that the methods chosen are at the very least consistent. The top 25 most populous service areas (identified by their metropolitan area) show that cities as large as New York and Los Angeles, with more than 15 million people, have a similar number of people per hospital bed as cities with 10% of their population (Baltimore and Austin). Having this small measure of validation in the methods, we can look beyond the hard numbers and focus on areas that may be underserved. The map shows that Greater Atlanta, Minneapolis, Orlando, and closer to home, the rapidly growing Bastrop area all have a high ratio of population to hospital beds. These areas may be at risk of running out of hospital beds in a future pandemic or in any technological or natural disaster.