Planning Equitable Accessibility to Dialysis Care: A Case Study of Hurricane Ida

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In 2021, Hurricane Ida devastated much of New Orleans. Widespread power outages closed numerous dialysis centers, which provide critical services for patients with end stage renal disease (ESRD). This forced patients to seek new facilities and led to increases in travel distance for vulnerable populations. Thus, this research employed the mathematical p-median problem using a set of GIS mapping tools to determine the optimal reassignment of potential patients to operational facilities before disaster, during disaster, and post-disaster. The resulting maps can serve as relocation plans, which inform patients of their optimal care centers. The results also displayed over-reliance on distinct dialysis centers in specific New Orleans regions. Additionally, via cluster analysis, increases in travel distance were found to be disproportionate among various demographic groups, highlighting the existence of socio-spatial inequalities in disaster recovery. First, the optimal solutions from the p-median problem showed that areas with high populations of residents aged 65+ were significantly more impacted than areas with few residents 65+. Second, high income clusters exhibited much stronger resilience post-disaster. Finally, socio-spatial inequalities along the lines of race were strikingly clear: clusters of Black populations disproportionately experienced greater travel times and demonstrated poor resilience post-disaster. These findings highlight stresses that individual dialysis centers experience and underscore which facilities need fortification to mitigate inequalities during recovery. Additionally, the proposed framework of analysis can be used to optimize the redistribution of patients to critical locations and combat intrinsic socio-spatial inequalities in other regions.

Awards Won:

National Oceanic and Atmospheric Administration - NOAA: Taking the Pulse of the Planet First Award
Second Award of $2,000