Many healthcare resource allocation problems are geospatial distribution problems facing equity-efficiency tradeoffs. This talk will feature three ongoing research projects at the UW Healthcare Analytics Lab using advanced analytics and optimization models to allocate scarce healthcare resources in a population at the county or state level.

The first project focused on minimizing turnaround time for HIV viral load testing by placing point-of-care testing machines in a hub-and-spoke network for Kisumu County, Kenya. We formulated a queueing-location-allocation model under stochastic demand with integer programming, leveraging Conditional Value at Risk. The second project focused on optimizing vaccine promotion campaigns considering disease transmission and opinion propagation with fairness. We identified near-optimal solutions for vaccine promotion campaigns across different age and geographic regions in Washington state (WA). The third project focused on assessing disparities in access to high-quality trauma care among sociodemographic groups in WA. We developed a set of geospatial and non-geospatial quality metrics and proposed an optimization model that adjusts hospital functions to improve trauma care quality while addressing fairness concerns.