

# Geospatial Healthcare Resource Allocation Problems with Fairness Considerations



Dr. Shan Liu

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**Time: 1:30 pm – 2:20 pm**

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## BIO

Shan Liu is an associate professor of Industrial & Systems Engineering at the University of Washington. Her research focuses on the design and evaluation of healthcare interventions to improve patients' health and enable cost-effective care delivery. She develops methods in sequential decision making, decision analytics, and systems modeling to optimize healthcare systems. She has received multiple grants from the National Science Foundation and National Institutes of Health. Dr. Liu received her Ph.D. in Management Science & Engineering from Stanford University, a S.M. in Technology and Policy from MIT, and a B.S. in Electrical Engineering from The University of Texas at Austin.

## ABSTRACT

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.