

**Who We Are:** MJ Lab is an interdisciplinary research group based at Massachusetts General Hospital at Harvard Medical School, led by Dr. Jalali. We harness simulation modeling, informatics research, and artificial intelligence to tackle the toughest health challenges. Our work contributes to medical decision-making, population health, policy-making, and health equity.

**Our Work:** We work closely with subject matter experts and apply advanced analytical methods to uncover the root causes of health issues and develop sustainable solutions. From studying substance use and GLP-1 use dynamics to examining pandemic control strategies and identifying optimal cancer screening strategies, our work is versatile and adaptive to the needs of diverse populations, with a particular focus on vulnerable populations.

Examples of methods we apply include:

- **Advanced Statistical Analysis and Data Science:** We employ advanced statistical methods and data science to uncover patterns from longitudinal data, predict outcomes, and derive actionable insights from complex datasets.
- **Generative AI:** We leverage generative AI to create tools that enhance data analysis, generate dynamic simulations, and synthesize scientific evidence.
- **Systems Thinking and Simulation Modeling:** We utilize system dynamics, ranging from qualitative participatory methods to quantitative modeling, including cohort and agent-based approaches, to address complex health issues.
- **Cost-Effectiveness Analysis:** We use model-based simulations to assess the cost-effectiveness of policies and interventions, ensuring that public health actions are both impactful and economically feasible.
- **Optimization:** We apply optimization techniques to improve intervention efficiency and resource allocation, maximizing the effectiveness of solutions.

**Impact:** We are dedicated to making a real-world impact by collaborating directly with policymakers, healthcare providers, community organizations, and industry partners, ensuring our work translates into meaningful change. The lab is a member of the National Center's Joint Disaster Medicine and Public Health Ecosystem, contributing to nationwide disaster readiness efforts. Additionally, Dr. Jalali serves on the Board of Scientific Counselors at the CDC's National Center for Injury Prevention and Control.

**Mentorship:** At MJ Lab, we take pride in fostering the growth and success of our team members. We've mentored over 15 postdoctoral associates and more than two dozen students, many of whom have progressed to faculty positions at institutions like Georgia Tech, Dartmouth College, and McGill University, secured internships at the White House, or pursued PhD programs at MIT and Harvard. We emphasize personalized mentorship that not only builds research skills but also empowers team members with professional development and leadership opportunities.

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