Abstract:

This book aims to empower readers to learn and apply simulation modeling techniques to improve public health programs and healthcare systems. Readers will engage in in-depth study of public health and healthcare optimization strategies from a "systems science" perspective, which involves the use of common health economics and modeling techniques such as cost-benefit and cost-effectiveness analysis, Markov modeling, compartmental models of infectious disease, microsimulation, and machine learning. Chapters focus on applying these techniques to classical public health dilemmas such as how to choose whether or not to hire new staff or change a clinic's workflow, select a given disease screening approach, or determine the most effective population-level disease control strategy. The methods taught in this book focus on techniques that address common questions not easily answered by standard medical or public health approaches such as randomized trials or cohort studies. The book is organized around solving real-world problems, typically derived from actual experiences by staff at non-governmental organizations, departments of public health, and international health agencies. In addition to teaching the theory behind modeling methods, the book aims to confer practical skills to readers, through practice in model implementation using the free software *R*.

Book website (with statistical code for each chapter):
https://sanjaybasu.github.io/modelinghealthsystems/