

CENTER FOR HEALTHCARE ECONOMICS AND POLICY

Microsimulation Modeling for Demand for Healthcare Services

Our Team

Margaret E. Guerin-Calvert

Senior Managing Director

President, Center for Healthcare and Economics and Policy

Tel: +1.202.589.3405

Email: Margaret.Guerin-Calvert@fticonsulting.com

Susan Henley Manning, PhD

Senior Managing Director

Chief Operating Officer, Center for Healthcare Economics and Policy

Tel: +1.202.589.3458

Email: Susan.Manning@fticonsulting.com

Jen Maki, PhD

Senior Director, Center for Healthcare Economics and Policy

Tel: +1.202.589.2379

Email: Jen.Maki@fticonsulting.com

Jeremy Nighohossian, PhD

Senior Director, Center for Healthcare Economics and Policy

Tel: +1.202.589.2389

Email: Jeremy.Nighohossian@fticonsulting.com

Adopting new technologies, making other major capital improvements, or changing aspects of the local care delivery system are complex decisions that have significant financial implications. Objective and robust assessments enable stakeholders to make well-informed decisions as to whether or not they should proceed with proposed improvements.

Microsimulation is a tool that allows stakeholders to more accurately forecast future, complex situations and to enact the necessary changes to prepare today, for tomorrow. Such preparations often require an upfront investment while the true payoff may not be known for some time in the future. Rather than relying on chance, Microsimulation provides an avenue to explore the effects of a proposed program (both aggregate and distributional), to decide among alternative strategies, or to fine-tune the program before rolling it out. Complex microsimulation modeling often requires significant investment and resources. Few firms have the capabilities to perform this type of modeling in house because it requires a team of experts (coders, economists, and simulation experts) and significant lead-time to develop appropriate models. The Center for Healthcare Economics and Policy (the Center) within FTI Consulting has the right team of experts in place to construct complex microsimulation models, and provides firms the option to outsource this type of modeling, saving both time and money. The Center is one of the only firms that offers microsimulation modeling, with unrivaled access to the foremost modeling experts and to the data necessary to build microsimulation models.

The Center provides healthcare economics modeling to assess and forecast the healthcare needs of a local healthcare economy both now and in the future. We recognize that simple extrapolation from existing trends is not sufficient given the dynamic healthcare environment in which providers, insurers, and governments operate. The Center's microsimulation models are appropriately detailed and can be used to produce estimates at the service area or county, state, and national levels. The models provide economically sound estimates over time, accounting for changes in the population, economic growth, and can assess the effects of various reform initiatives. These models can produce estimates for forecasting, scenario analyses, and exploring variation in inter-area healthcare utilization.

Assessing the adequacy of healthcare services supply and its type and location requires an understanding of current and future healthcare needs of the population. The Center's customized microsimulation models can answer most questions that providers and policymakers may pose in evaluating transformational healthcare delivery and its effects. Our modeling framework includes a series of modules that capture linkages between changes in population growth, economic growth, disease prevalence, care delivery, healthcare provider supply, and utilization. The model comprises three building blocks—the base population module, the healthcare resource modules, and the forecasting module.

The Population Module

A base population module provides the underlying framework for the health needs and resource forecast. This module forecasts population growth and the changing demography of the population, at the service area or county level. The population module captures factors that influence the demand for health care, the current and changing healthcare profile and socioeconomic and demographic characteristics of the population. The module produces indices of social and economic deprivation to examine healthcare inequalities within a local healthcare economy. To capture the effect of an aging population, this module creates a synthetic population where each individual ages over time. Using a synthetic population allows us to reflect population changes in the future; the model accounts for the effect of births, deaths, and migration.

The Healthcare Resource Modules

The demand-based sub-module simulates both current and future healthcare resource utilization. The model accounts for the effects of socioeconomic and demographic factors on healthcare utilization and captures the effect of barriers to care, such as lack of transportation or inadequate supply of healthcare professionals. The model also captures patient migration patterns to account for patients that seek care out of the local healthcare economy. The model captures the influence that population level health plays in healthcare demand as health status has a profound effect on utilization. Chronic conditions account for a disproportionate share of the total healthcare resources consumed and account for over three-quarters of the total dollars spent on healthcare today. To address this important factor, the demand-based module incorporates both current and projected chronic condition prevalence among a population. The Center's microsimulation model can incorporate different assumptions regarding technology and resource utilization attributable to disease state.

PROJECT SPOTLIGHT

The Center for Healthcare Economics and Policy (the Center) was recently engaged by a major medical facility seeking an objective assessment of the likely demand for new services, taking into consideration alternative treatments and competing service providers located within the facility's service area. We recognize that simple extrapolation from existing trends is not sufficient given the dynamic healthcare environment and the inherent intricacies of population health.

For this project, we used microsimulation modeling to produce **detailed, comprehensive, and reliable** forecasts. The Center's microsimulation model accounts for changes in the population, changes in disease incidence, and changes in treatment patterns. Demand was based on anticipated market share, disease prevalence, and payer policies regarding reimbursement for treatment. We use data from various sources in developing our model. We draw on commercial claims data to estimate actual reimbursements for individuals receiving the treatment of interest at existing facilities throughout the US. We complement this data with information regarding actual reimbursements for Medicare beneficiaries receiving the treatment. We also use data from the Census, national health agencies, and from the CDC in constructing components of our model. Our modeling framework includes a series of models that capture linkages between changes in population growth, disease prevalence, and treatment patterns.

The resulting assessment included a determination of the likely catchment area for patients, a forecast of disease incidence and the related patient volume, and projected revenues from treatments. The components were then integrated into the client's business strategy model to provide an invaluable tool for planning and assessing the financial implications of offering new services.

The supply-based sub-module informs the adequacy of the current and projected health care resources and the workforce to meet current and future demand. Many factors influence the availability of healthcare resources and the ability of the health care workforce to meet the needs of the population. Economic growth, increased demand for healthcare (driven by increased insurance coverage, for example), the effect of reform measures, and the differential growth rate of certain provider types influences both the total number of providers in the state and the provider mix. To assess adequacy of supply, the model captures both the unique mix of providers and substitutability among physicians and mid-level care providers as the latter can have significant implications, especially as trends in care provision evolve.

Forecasting Module

The forecasting module brings together the population module and resource based modules to make projections, answer specific inquiries, and perform scenario analysis. The first phase in this process involves calibrating and validating the microsimulation model. In doing so, we use current data and produce baseline estimates that reflect the current level of healthcare utilization. These baseline estimates inform the adequacy of current provider supply to meet current healthcare demands.

The second phase forecasts rely on projections about the future, such as population growth and the impact of reform initiatives to access change. The model projects out over a 5-15 year timeframe. These forecasts are an invaluable tool for planning and for scenario analysis. Some of the questions the forecast could answer are:

1. What influence will the aging population have on the demand for healthcare services?
2. What impact will an expanded healthcare delivery system have on utilization of healthcare services and the supply of healthcare providers?
3. Will the area have sufficient healthcare resources to meet future population health needs?
4. How will current and future planned reforms affect healthcare demand, utilization, and both the supply and mix of providers in the area?
5. How will mitigating barriers to access affect health service usage?
6. How will migration (inflow and outflow) of both residents and healthcare providers affect healthcare demand and supply over the next 10 years?
7. How does area-level healthcare utilization vary throughout the region currently and how will projected variation be different in 5 years? In 10 years?
8. As integrative healthcare providers become more integrated into the standard care delivery model, what implications will this have for healthcare utilization in general?
9. If utilization were to reach a pre-determined level (an “ideal” level), how would the healthcare workforce need to change in order to meet the healthcare needs of residents?
10. What will be the prevalence rate of certain health issues and chronic conditions during the next 5 or 10 years?

For example, some elements used to construct the model will be area specific and will require assumptions or the use of econometric modeling techniques. These factors include modeling the birth rate, the mortality rate, migration (both patient and healthcare provider). Equations to construct these estimates rely on area specific data as national rates reflect a different population mix that will not mirror a local area’s population.

Finally, care delivery patterns are required to complete the model. Provider types used to treat a group of similar patients vary both within and across states. In areas where there is a strong supply of providers, care utilization patterns may include a wider set of provider types than in areas with lower supply and less variability in provider type. These can be tailored and incorporated to generate more valuable and client or area specific results.

Our Expertise

Successful development of a demand simulation model requires technical expertise and the ability to identify and incorporate data at varying levels of detail and from various sources. The data requirements are substantial and our extensive experience working with the type of data required to customize these models is a critical advantage. We are skilled in transforming large and complex datasets into data that are clean, validated, and usable. We have the technical expertise to complete a highly complex microsimulation model required to forecast the health needs of a population and assess associated workforce requirements.

As academically trained healthcare economists, our work is research- and empirically-based consultation and advising. As consultants in the healthcare field who have experience across a wide variety of industries, we ground real-world applications in sound research and empirical bases working directly with clients across the US and beyond. We maintain extensive databases containing demographic, healthcare utilization, health systems, and cost information. We have assessed healthcare supply and demand in both the US and abroad. Our modeling capabilities have been used to forecast demand, analyze the consumption of healthcare resources attributable to certain disease states, as well as to predict changes in patient flow due to reconfigurations in local care delivery.

About the Center

The Center for Healthcare Economics and Policy applies cutting-edge economics and quantitative methods to assist clients in developing and implementing market-based solutions across the spectrum of healthcare activity. The Center assists clients and communities in achieving goals by providing empirically based, actionable metrics and quantitative analyses, including powerful tools for assessing transformative change and for discerning value and benefits that inform choice and action.

The Center uses “gold standard” models and extensive proprietary and public databases to assist clients in developing strategies that address fundamental changes in demand (e.g., declining inpatient admissions) and supply (e.g., shifts in the location of care delivery or new facilities) ongoing within a system or a community. Our particular expertise is the ability to use probabilistic or predictive modeling that takes into account the impact of future changes in population health, migration, patient mix, or utilization on operations, finances, and capacity needs for health systems. These form the basis of opportunities to evaluate how best to “optimize” or re-optimize capacity or strategies proactively and with sound simulations at lower cost.