

Project Overview: ComfortHealth Strategic Workforce Optimization

As part of a strategic planning initiative for ComfortHealth, a Canadian home care agency experiencing increasing demand due to demographic trends and policy support, I developed and implemented a comprehensive optimization model to guide hiring and operational decisions over a three-year horizon (2023–2025).

Role & Key Contributions

Data Preparation & Forecasting

- Collected and cleaned datasets on historical service demand, center capacities, distances between service regions and medical centers, and operating costs.
- Forecasted future regional demand using a linear trend model, providing a robust input for strategic planning.

Mathematical Modeling

- Designed a Mixed-Integer Linear Programming (MILP) model using Python and PuLP to maximize net profit.
- Defined binary and integer decision variables to model:
 - Regional service allocation
 - Annual hiring per center
 - Center operational status
- Constructed an objective function incorporating:
 - Government reimbursement
 - Wage escalation
 - Travel costs
 - Hiring and fixed operating costs
- Imposed real-world constraints including:
 - Workforce capacity based on hours
 - Maximum annual hiring limits
 - Center capacity and operational status continuity

Scenario Analysis & Optimization

- Solved the model to determine:
 - Optimal hiring plans per center (e.g., front-loading hires in 2023)
 - Which centers to open, notably confirming the strategic value of Centers E and F
 - Efficient region-to-center service assignments based on cost and proximity

Strategic Insights & Deliverables

- A detailed three-year hiring plan across all centers
- A comprehensive financial projection, including revenue estimates and an expected net loss of \$27.5 million, highlighting cost and policy risks
- Managerial recommendations on:
 - Selective vs. universal patient acceptance
 - The sensitivity of results to demand variability
 - Opportunities for cost control and reimbursement rate advocacy

Tools & Techniques

- Programming: Python (Pandas, PuLP)
- Modeling: Mixed-Integer Linear Programming (MILP)
- Analytics: Demand forecasting, financial modeling, scenario planning
- Decision Support: Data-driven recommendations and strategic scenario evaluation

Outcome

The optimization model delivered a scalable, data-informed strategy for workforce expansion and resource allocation. While the projected net loss reflected high initial investments, the insights enabled ComfortHealth to plan for long-term sustainability, prioritize cost-effective service delivery, and consider policy-based adjustments to improve margins and service coverage.