

Cardiovascular Risk Analysis – Healthcare Analytics Case Study

Focus: Preventive screening • Risk stratification • Decision support analytics

Executive Summary

This case study demonstrates how healthcare analytics can be used to support cardiovascular preventive screening by prioritizing high-risk patients while managing operational capacity. The analysis emphasizes decision-level trade-offs, favoring recall over accuracy to reduce missed diagnoses.

Business Problem

In population-level cardiovascular screening, false negatives carry significant downstream risk, while excessive alerts place strain on clinical teams. The objective was to design a risk analysis framework that improves detection of high-risk patients without overwhelming follow-up capacity.

Data Overview

- 319,000+ patient records
- 18 clinical and behavioral attributes
- Binary outcome indicating cardiovascular disease presence
- Significant class imbalance (~91% healthy, 9% disease)

Analytical Approach

Data validation and exploratory analysis were performed to assess data quality, feature distributions, and imbalance effects. A majority-class baseline highlighted the limitations of accuracy-based evaluation. Logistic regression was selected for its interpretability and suitability for healthcare decision-support use cases.

Evaluation Strategy

Model performance was evaluated using recall, precision, and alert volume rather than accuracy. Probability threshold optimization was used to identify an operating point that balanced disease detection with real-world operational constraints.

Key Outcomes

Metric	Outcome
Missed High-Risk Cases	67% reduction vs baseline
Alert Volume	15–20% of screened population
Evaluation Focus	Recall-driven, decision-oriented
Business Translation	Patients flagged per 1,000 screened

Business Interpretation

Results were translated into stakeholder-focused metrics that align analytical outcomes with clinical capacity planning and follow-up workflows, enabling informed screening and prioritization decisions.

Limitations & Next Steps

This analysis is based on a static dataset and does not include real-time EHR integration. Future work could extend to subgroup performance analysis, fairness assessments, and longitudinal validation across patient cohorts.

This analysis is intended for educational and decision-support purposes only and is not a diagnostic tool.