Analyzing Mortality Factors in Heart Disease Patients

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Abstract This study evaluates factors influencing mortality in heart disease patients using data from Faisalabad Hospital in Pakistan. Age, cholesterol levels, diabetes, and gender were analyzed using chi-square tests, t-tests, and logistic regression. All four factors were significantly associated with mortality, with diabetes and age being the strongest predictors.

Dataset Background

This dataset contains data from heart patients from Faisalabad Hospital in Pakistan. It originally included 60 variables and 368 patients. The dataset includes key demographic and clinical variables such as age, cholesterol levels, diabetes status, and gender. An exploratory data analysis revealed that deceased patients were older, had slightly lower cholesterol levels, and were more likely to have diabetes and be male.

Mortality vs. Predictors EDA

Methods

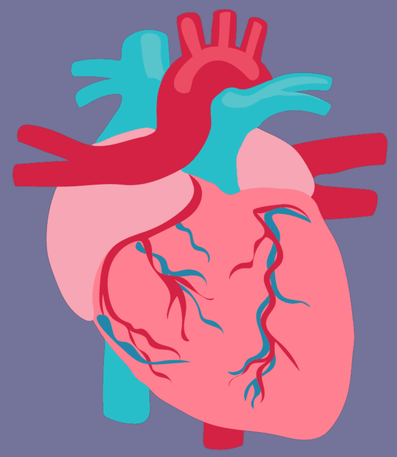
Inferential Tests

- Two-Sample t-tests for numeric variables (age, cholesterol)
- Chi-Squared Tests of Independence for categorical variables (gender, diabetes)

Logistic Regression

- Multivariate Logistic Regression model assessed the independent effects of all four predictors on mortality

Age, cholesterol, diabetes, and gender are significant predictors of mortality in heart disease patients.



Results

Using the above methods, our analyses reveal that all four factors are significantly associated with mortality:

Hypothesis Testing Results

Hypothesis	Test Type	P-Value
Gender is associated with mortality	Chi-square test	2.955e-06
Diabetes is associated with mortality	Chi-square test	2.955e-06
Age is associated with mortality	T-test	0.04704
Cholesterol is associated with mortality	T-test	0.00693
Age, cholesterol, diabetes, and gender are predictors of mortality	Logistic regression	All predictors $p < 0.01$

Evaluation

Statistical analysis identified cholesterol, gender, age, and diabetes status as significant predictors of mortality.
Variance Inflation Factor (VIF) checked for multicollinearity between predictors, confirming the independence and reliability of these variables.

Odds Ratios and Confidence Intervals for Mortality Predictors

Predictor	Odds Ratio	95% CI Lower	95% CI Upper	P-value
Cholesterol	0.993	0.987	0.998	1e-02
Gender (Male)	3.345	1.619	7.024	1e-03
Diabetes (Yes)	5.516	2.823	11.276	1e-04
Age	1.097	1.058	1.138	1e-04

Interpretation:

- A 1-unit increase in cholesterol is associated with a 0.7% reduction in the odds of mortality.
- Males have 3.35 times greater odds of mortality compared to females (reference group).
- Individuals with diabetes are 5.52 times more likely to experience mortality compared to those without diabetes (reference group).
- Each additional year of age is associated with a 9.7% increase in the odds of mortality.

Limitations

- The dataset's scope is specific to hospital records in Pakistan.
- Interaction between variables was not sufficiently explored.
- Not all variables were explored.
- Data may be skewed (95.4% depressed, 77.4% male)