Heart Disease Analysis Report

Introduction

Heart disease is a leading cause of mortality worldwide, making it essential to analyze key risk factors and patterns among patients. This report presents an in-depth analysis of patient health metrics to identify trends, relationships, and potential risk factors contributing to heart disease.

Dataset Overview

The dataset used in this analysis consists of health records from patients diagnosed with heart disease. It includes a variety of patient demographics, health metrics, and clinical data. The dataset comprises both patients with heart disease and those without, providing insights into factors contributing to heart disease risk.

Key dataset attributes:

- **Age**: Patient's age in years.
- **Sex**: Gender of the patient.
- **Chest Pain Type**: Categorized as typical angina, atypical angina, non-anginal pain, and asymptomatic.
- **Resting Blood Pressure**: Blood pressure in mm Hg at rest.
- **Cholesterol**: Serum cholesterol level in mg/dL.
- **Fasting Blood Sugar**: Indicates whether the fasting blood sugar is greater than 120 mg/dL.
- **Resting Electrocardiographic Results**: Results from an ECG at rest.
- **Maximum Heart Rate Achieved**: Maximum heart rate during exercise.
- **Exercise Induced Angina**: Whether exercise induced angina is observed.
- **ST Depression**: ST depression induced by exercise relative to rest.
- **Slope of Peak Exercise ST Segment**: Type of slope observed at peak exercise.
- **Thalassemia**: Blood disorder that may impact cardiovascular health.

The dataset provides a comprehensive view of various health indicators that can be used to assess heart disease risk and identify patterns among different patient groups.

Key Findings

- **Overall Heart Disease Distribution**

51.32% of patients have heart disease, while **48.68%** do not.
The dataset is balanced, making it suitable for analytical insights.

- **Patient Demographics & Risk Factors**

Metric	Value
Average Age	54.43 years
Average Heart Rate	149.11 BPM
Average Cholesterol	246.00 mg/dL
Average Blood Pressure (BP)	131.61 mmHg

These health metrics serve as indicators for assessing heart disease risk.

- **Gender-wise Heart Disease Analysis**
  - **Heart disease** prevalence is higher in **Males** compared to females.
  - **Thalassemia** prevalence is more common in **Males,** indicating a possible correlation with heart disease.

- **Chest Pain Type Breakdown**

Typical Angina is the most reported chest pain type among patients.
Chest pain is a critical factor in diagnosing heart disease.

- **Fasting Blood Sugar & Heart Disease**

Patients with **high fasting blood sugar** (FBS=1) exhibit a **greater risk** of heart disease.
This suggests that diabetes or prediabetes is a potential contributing factor to *cardiovascular issues.*

- **ST Depression & Age Impact**

Older individuals show higher **ST depression** values after exercise, suggesting possible *ischemic* heart conditions.

- **Heart Disease Trends by Age**

The highest number of heart disease cases occur in the **40-60** years age group.
Middle-aged individuals are a high-risk category for cardiovascular diseases.

Conclusions & Recommendations

Conclusions:

- ✓ Heart disease affects a significant portion of the population, especially males and middle-aged individuals.
- ✓ Elevated fasting blood sugar, cholesterol levels, and ST depression values correlate strongly with heart disease.
- ✓ Chest pain type is a major diagnostic factor for predicting heart disease presence.

Recommendations:

- ✓ Segment patients into different risk groups based on their age, cholesterol, and heart rate levels.
- ✓ Explore machine learning models for predictive analytics and early heart disease detection.
- ✓ Raise awareness on regular heart health monitoring, especially for individuals over 40 years of age.