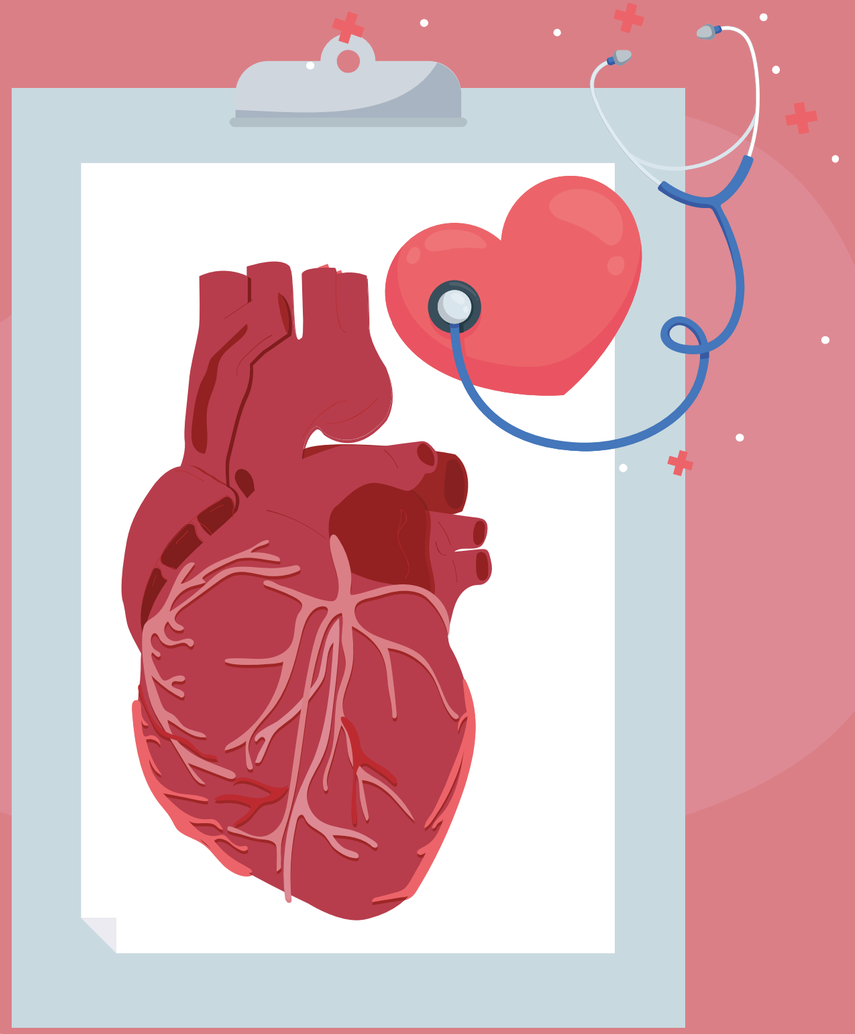
Heart Disease Diagnostic Analysis



By Ritika Prakash

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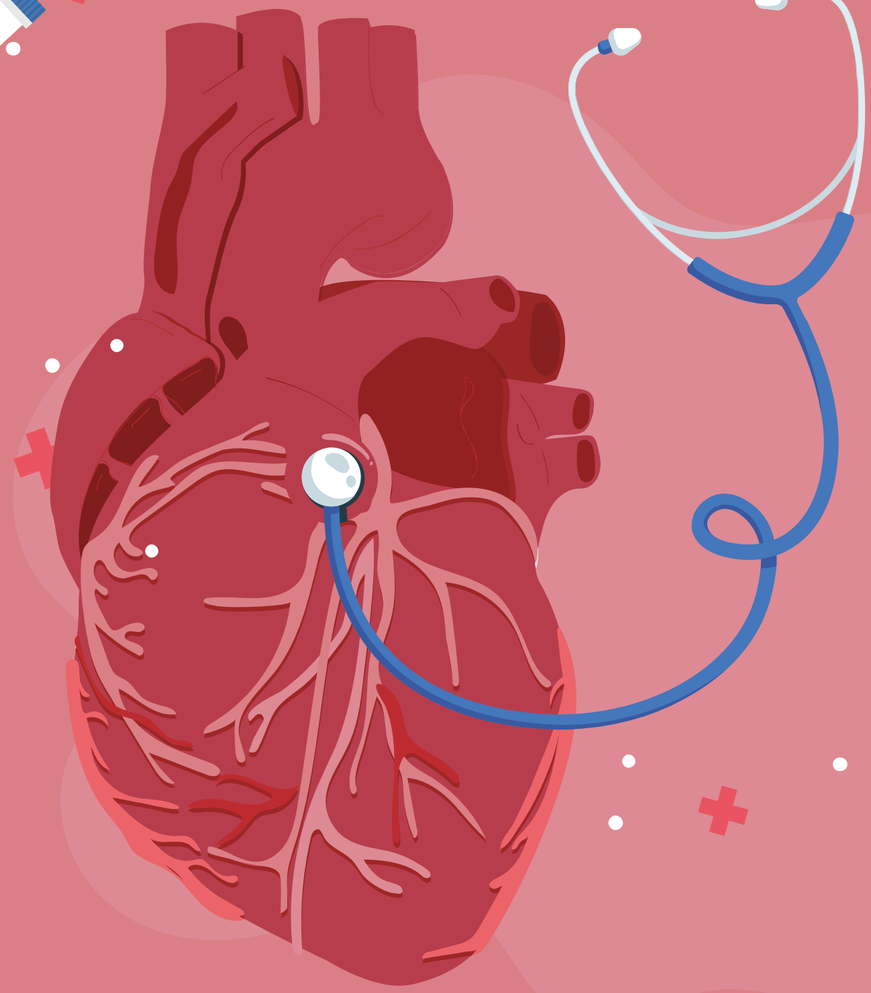
Introduction

This project focuses on improving heart disease diagnosis through data analysis using Python. As heart disease is a leading cause of mortality, the aim is to use machine learning techniques to develop predictive models for early detection. The analysis seeks to provide clinicians with actionable insights, enhancing diagnosis and treatment.

Key areas explored include:

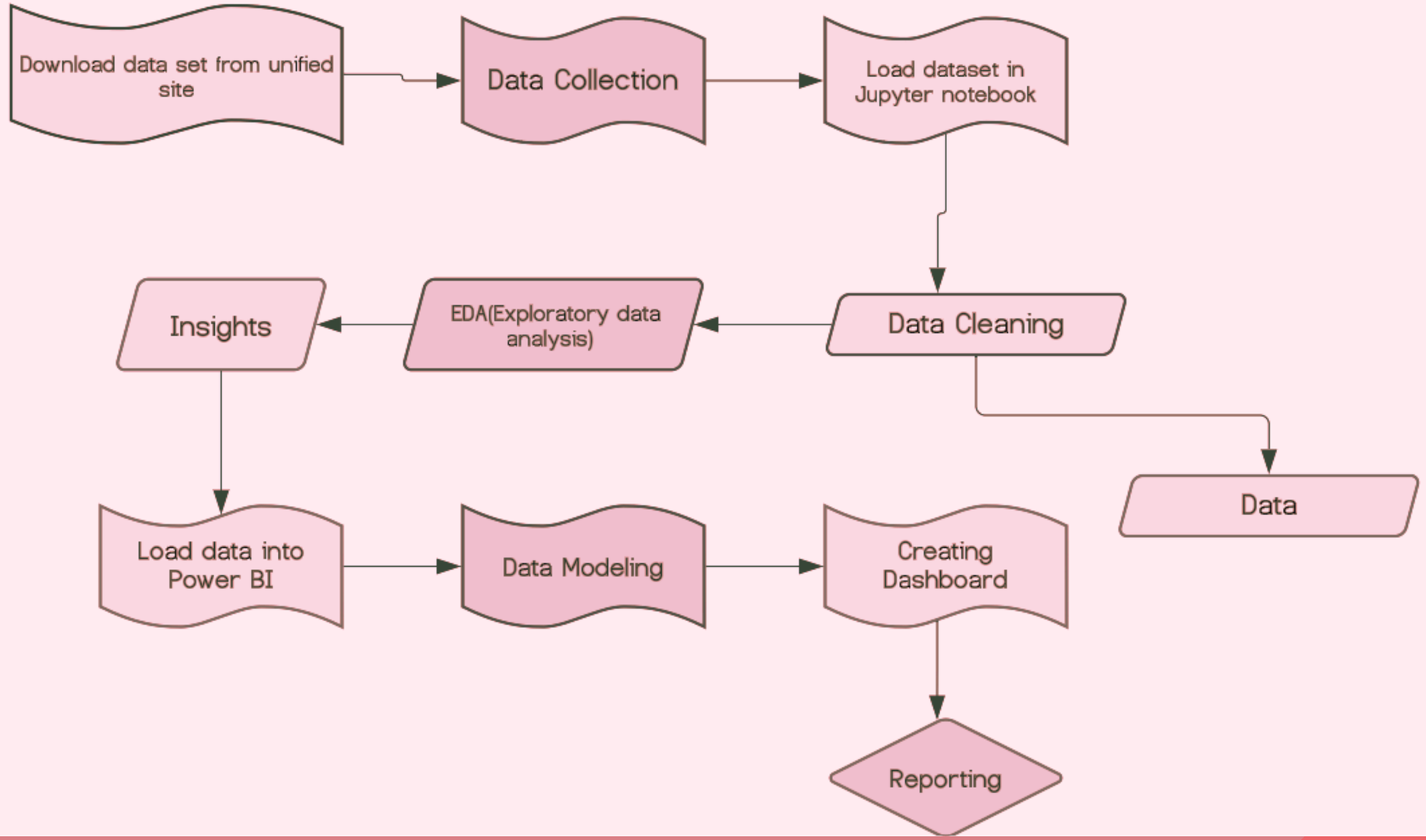
- Understanding Heart Disease – Accurate diagnosis is essential for effective treatment and prevention.
- Predictive Modeling – Machine learning will help identify risk factors for early detection.
- Insights for Clinicians – Uncover trends to support informed decision-making and better patient care.



Problem Statement

Health is real wealth in the pandemic time we all realized the brute effects of covid-19 on all irrespective of any status. You are required to analyze this health and medical data for better future preparation

Flow chart


Download data set from unified site
Data Collection
Load dataset in Jupyter notebook
Data Cleaning
EDA(Exploratory data analysis)
Insights
Load data into Power BI
Data Modeling
Creating Dashboard
Reporting
Data

This endeavor unfolded through carefully executed, critical stages.

1

Data Extraction📊

Acquiring heart disease diagnostic data from the database.

2

Data Transformation🧹

Cleaning and preparing the data, addressing missing values, and ensuring it's formatted for thorough analysis.

3

Data Loading💾

Storing the refined data in an optimal format for seamless analysis.

4

Exploratory Data Analysis (EDA) 🔍

Leveraging Python libraries like pandas, matplotlib, and seaborn to delve deep into the data. Uncovering distributions, correlations, and significant patterns.

5

Dashboard Development 📈

Crafting an intuitive dashboard using visualization tool Power BI. Featuring dynamic charts, insightful graphs, and informative tables to present key findings.

6

Key Metrics Identification 📊

Pinpointing pivotal metrics like heart disease prevalence rates, demographic distributions by age and gender, and critical risk factors.

7

Insights and Recommendations 📝

Summarizing actionable insights derived from the analysis. Offering strategic recommendations for future healthcare strategies and preventive measures.

Exploratory Data Analysis (EDA) Report

Age

Older patients are at a higher risk of developing heart disease.

Blood Pressure

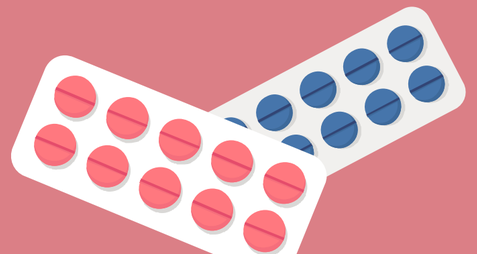
Elevated blood pressure is a significant risk factor for heart disease.

Cholesterol

High levels of LDL cholesterol increase the risk of heart disease.

Gender

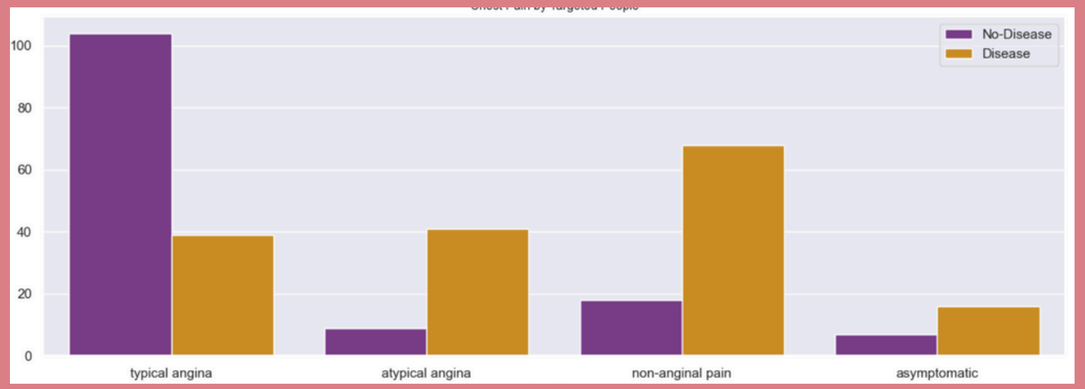
Males are generally at a higher risk of heart disease compared to females.



Visualization and Insights

This section will highlight key insights from the dataset through visuals, focusing on gender distribution and its link to heart disease, along with a comparison of chest pain types and their prevalence among patients.

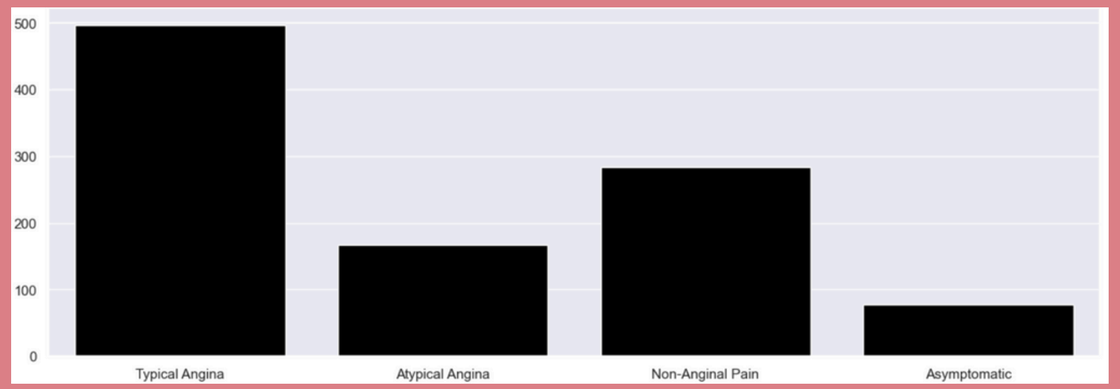
1



Chest Pain Distribution As PerTarget Variable

- Healthy people having Chest Pain due to stress , physical activity etc , & varies as per gender

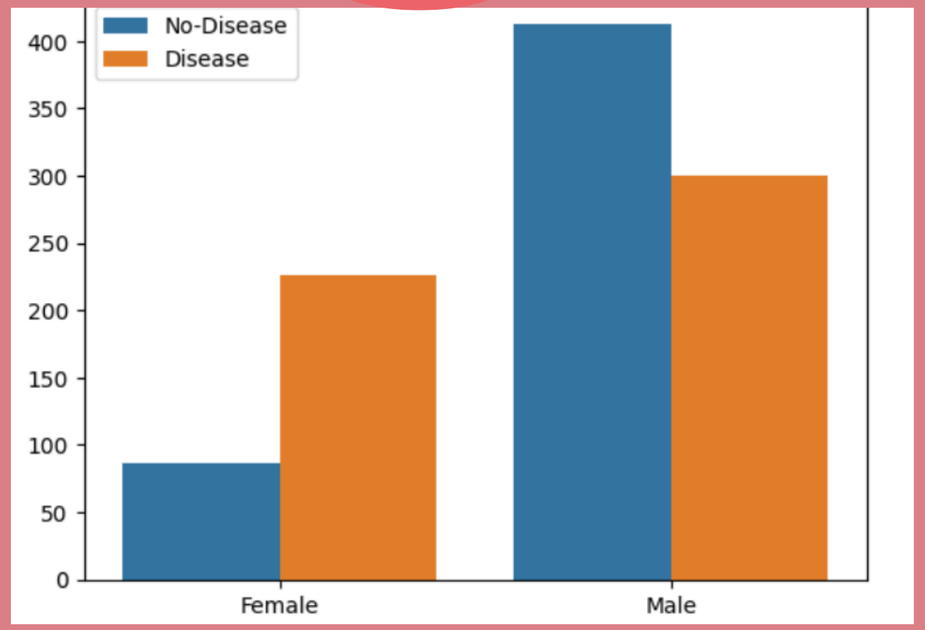
2



Chest Pain Type

Chest pain type "Typical angina" is common

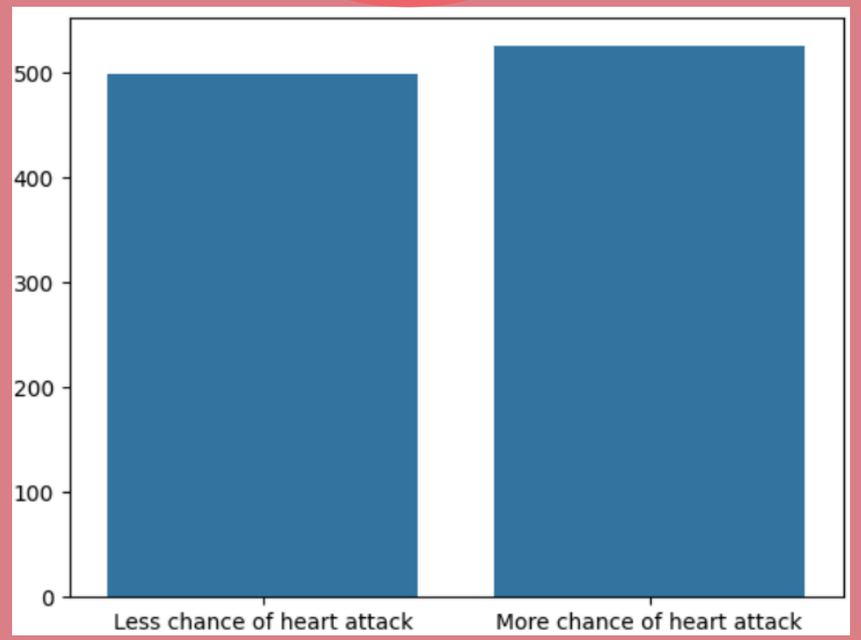
3



Gender Distribution According to the TargetVariable

- More Disease and No-Disease patients are Men

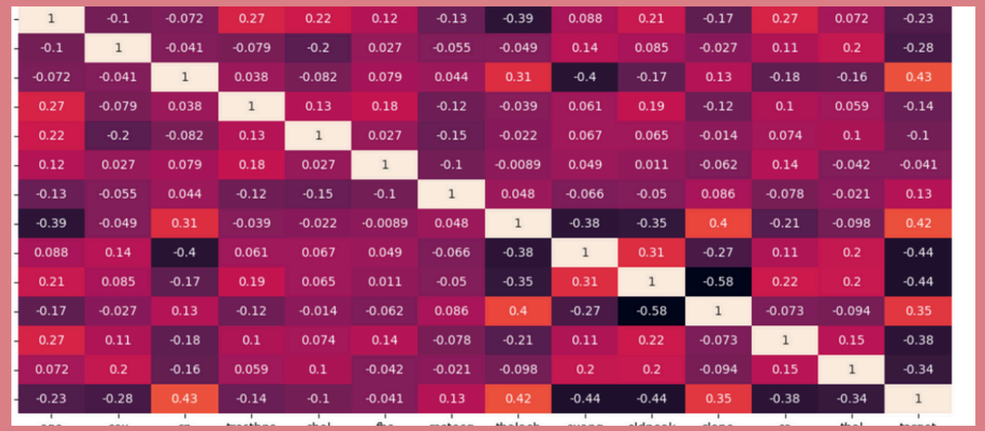
4



Heart disease: who has it, who doesn't?

- People who have more chance of heart attack: 526
- People who have less chance of heart attack: 499

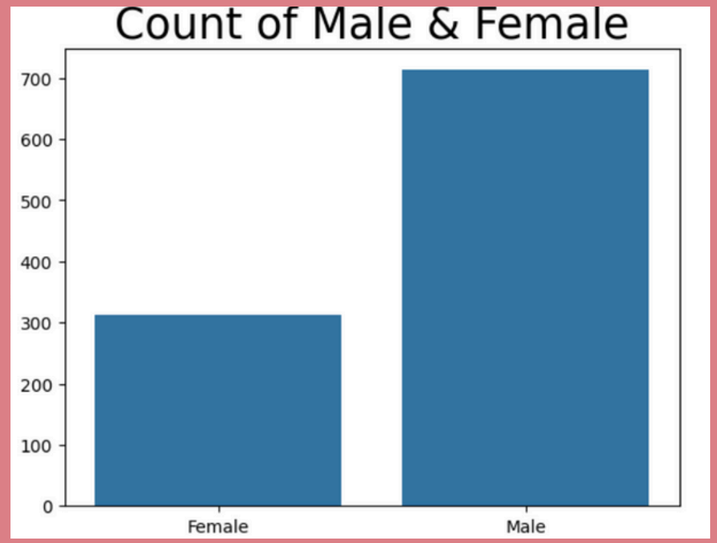
5



Co-relation matrix

- Positive Correlation: target slope, thalach, and cp
- Negative Correlation :ca, oldpeak, exang, sex, age with target

6

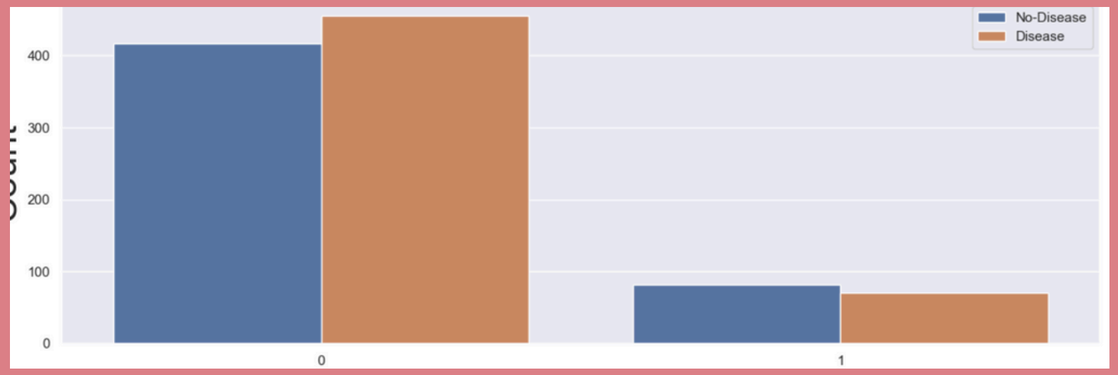


Count of Male and Female

Male : 713

Female : 312

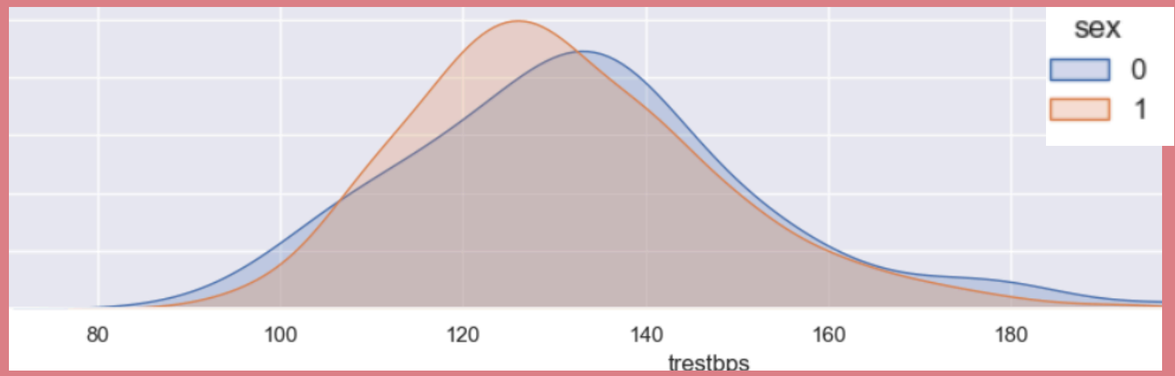
7



Fasting Blood Sugar Distribution According ToTargetVariable

Fasting blood sugar > 120 mg/dl is Diabetes indicator without Disease.

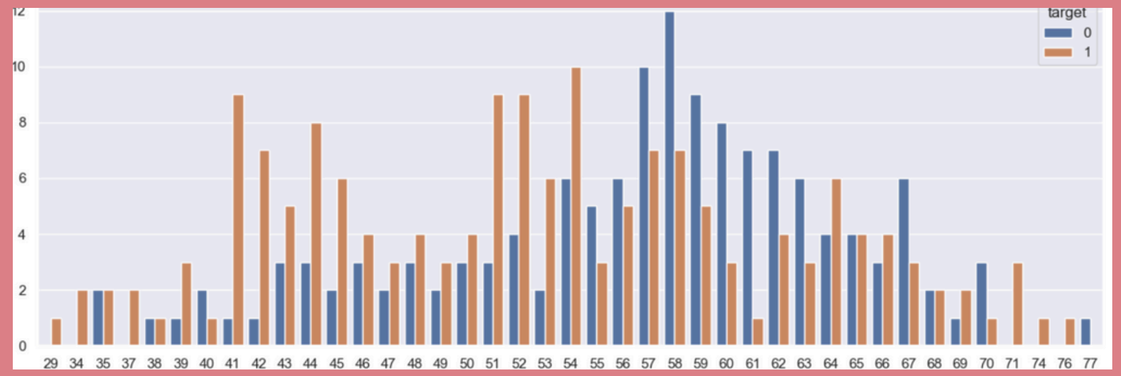
8



Resting Blood Pressure as per Gender

Females having less resting bp (120) than male (140)

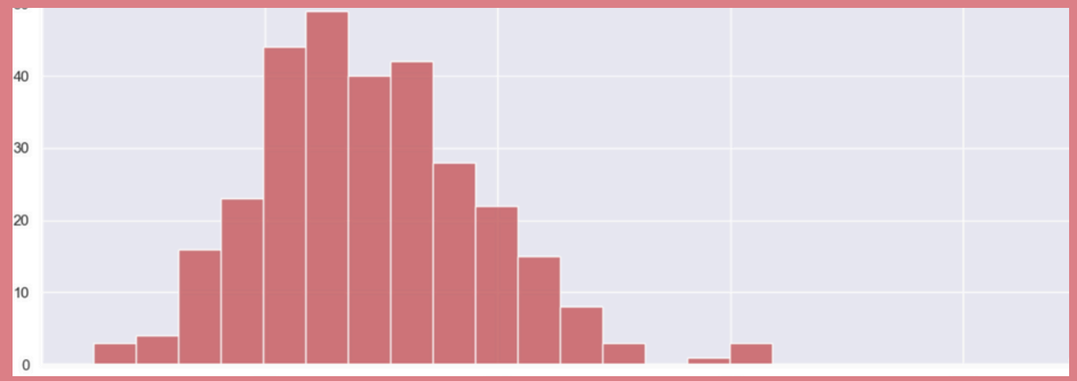
9



Age Distribution in the Dataset

Most of the people in the study, have age in between 50-60

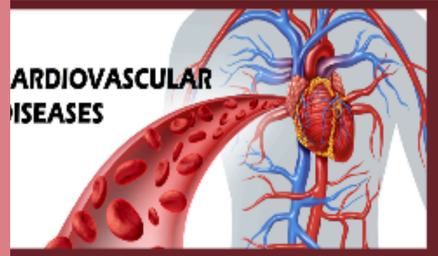
10



Distribution of Serum Cholesterol

Healthy Cholesterol is <200 mg/dl

1 Dashboard



Heart Disease Diagnostic Analysis

Heart Disease: All

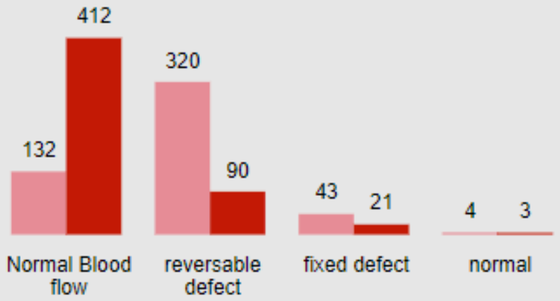
Chest Pain Type: All

Thalassemia: All

Gender
- Select all
- Female
- Male

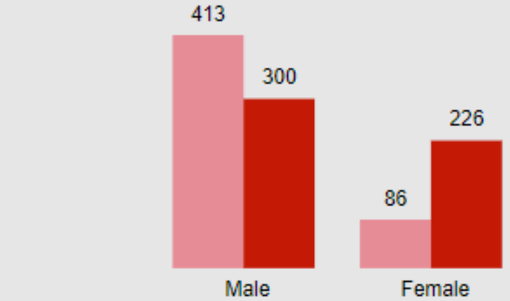
Heart Disease By Thalassemia

Absent Present



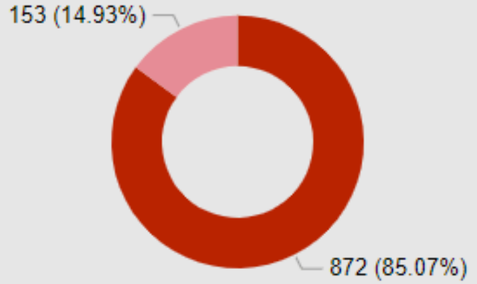
Heart Disease by Gender

Absent Present



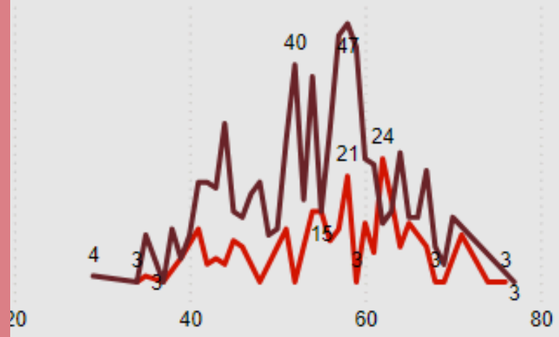
Heart Disease by FBS Status

Less than or equal to 120 mg/dl More than 120 mg/dl



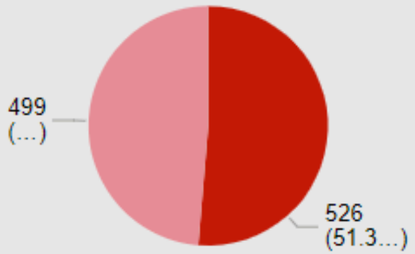
Heart Disease by age and Gender

Female Male

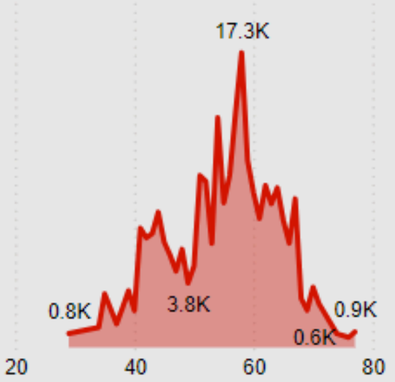


Count of Heart Disease

Present Absent

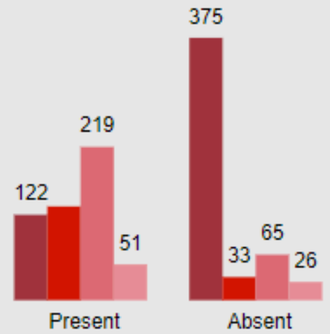


Cholesterol by age



Chest Pain by Pain Type

Asymtomatic Atypical Angina Non-Anginal... Typical A...



2 Dashboard

Heart Disease Diagnostic Analysis

All

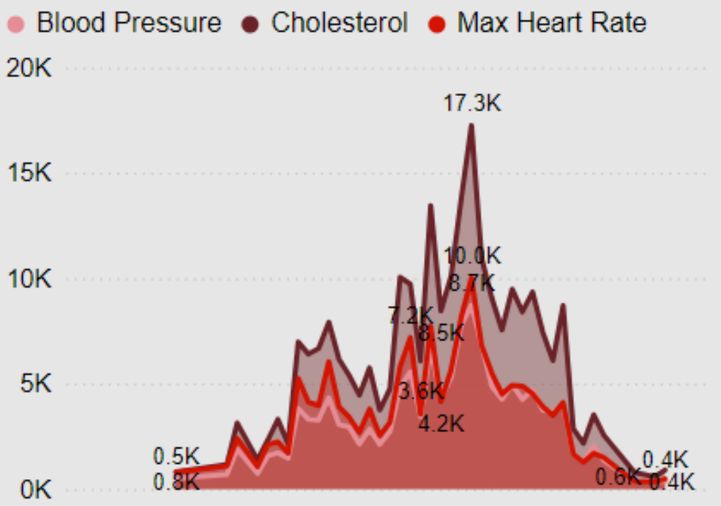
Total Patient
1025

Average RBP
131.61

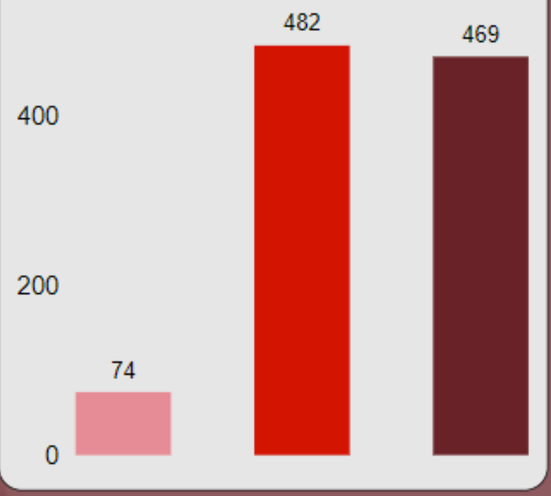
Avg Cholesterol
246.00

Max Heart Rate
202

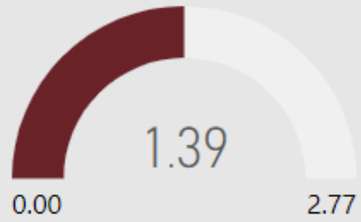
Blood Pressure,Cholestrol and Max heart rate By Age



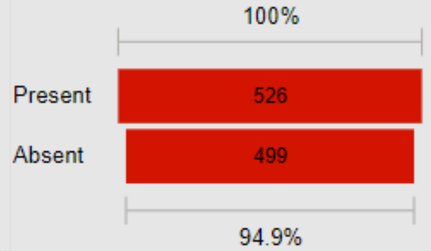
Age by Slope



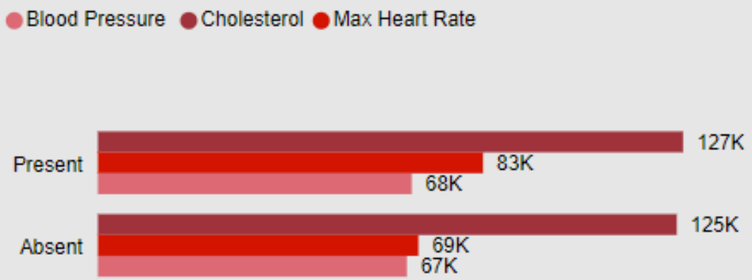
Average of Slope



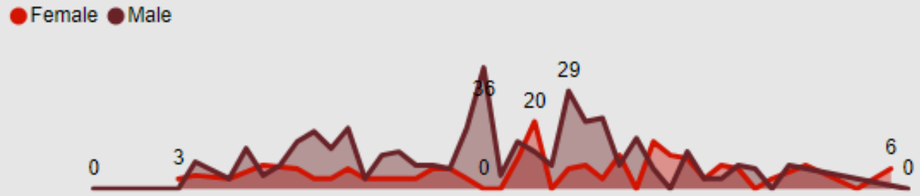
Chest Pain by Heart Disease



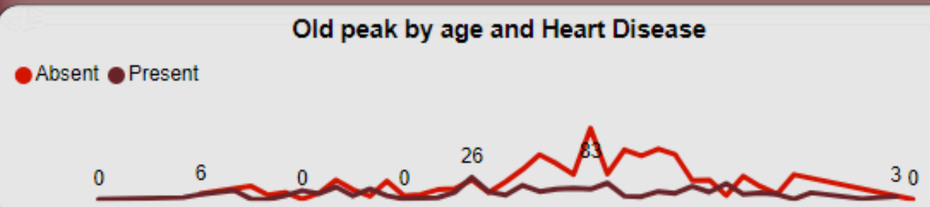
Blood Pressure , Cholesterol and Max Heart Rate Achieved by Heart Disease



Blood Pressure,Cholestrol and Max heart rate By Age



Old peak by age and Heart Disease



Observations:

1

Heart Disease Prevalence

A slight majority of the population (51.3%) has heart disease, with a notable gender disparity favoring males.

2

Gender Differences:

Males are more likely to suffer from heart disease than females, with a
- significantly higher prevalence of ST depression among men.

3

Age and Heart Disease:

Middle-aged individuals (40-59) show the highest prevalence of heart disease, while the elderly (60-79) have a lower risk.

4

Chest Pain Types

Typical angina is more common in men, especially among older adults, and is strongly linked to heart disease.

Obervations:

5

Cholesterol and Blood Pressure Trends

Both cholesterol and blood pressure levels tend to rise between the ages of 50-60 and continue to increase until age 70.

6

Electrocardiogram (ECG) Patterns:

Left ventricular hypertrophy and downsloping ST segments, detectable through ECG, are strongly linked to heart disease. In contrast, normal ECG results indicate lower risk, while ST depression tends to rise between ages 30-40.

7

Thalassemia and Heart Disease:

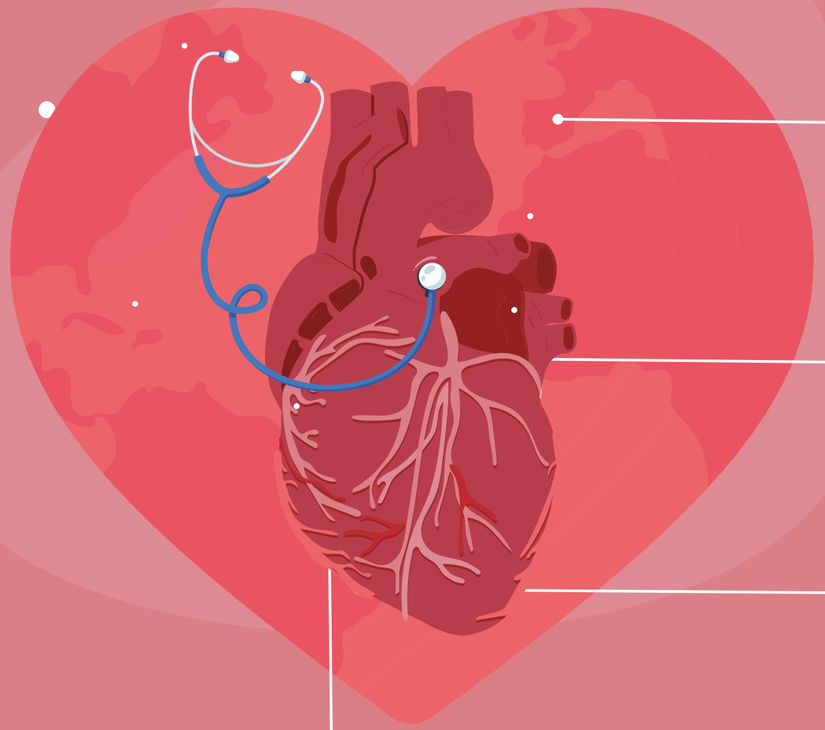
Reversible or fixed thalassemia defects show a higher association with heart disease, while normal thalassemia types present a lower incidence.

8

Heart Rate Trends and Exercise Response:

As people age, their maximum heart rate generally decreases, peaking around age 60. Heart disease patients usually have lower peak heart rates than healthy individuals, highlighting the significance of cardiovascular fitness for heart health, especially in older adults.

CONLCUSIONS

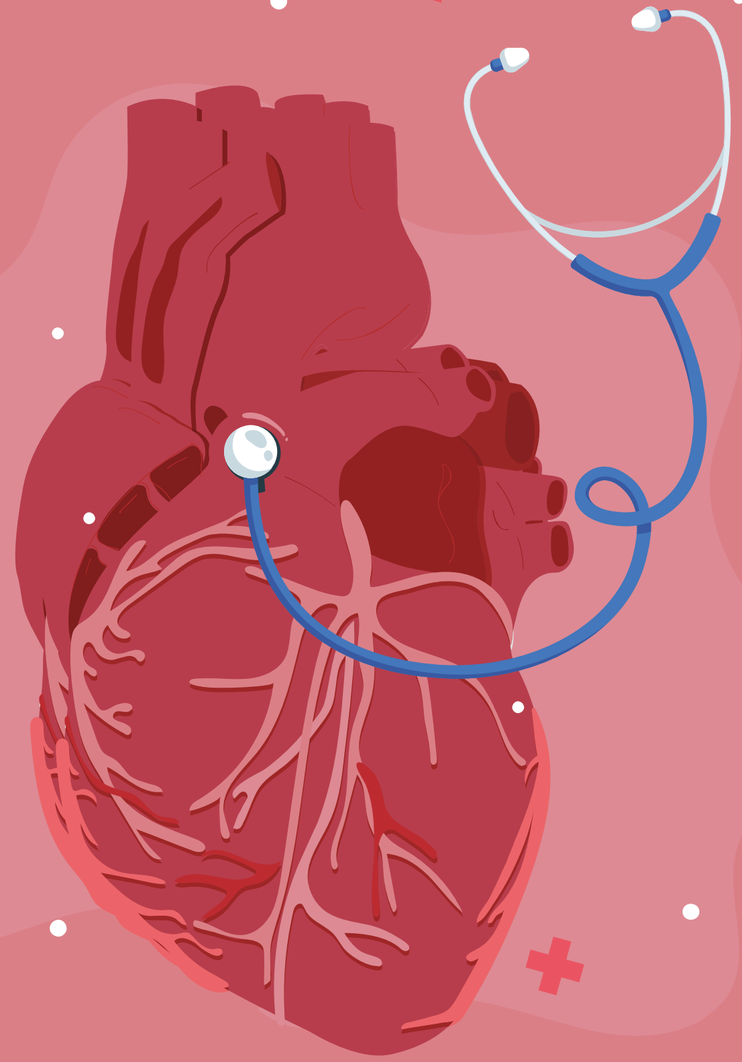


1. The analysis highlights a clear gender and age-related disparity in heart disease prevalence, with males and individuals in the 40-59 age group being at the highest risk.

2. Factors such as cholesterol levels, blood pressure, chest pain type, and specific ECG patterns further contribute to identifying those at elevated risk.

3. Monitoring these indicators is crucial, especially for middle-aged adults, as early intervention could help mitigate the progression of heart disease.

4. Key insights suggest that typical angina, ST depression, and cholesterol levels should be closely monitored to prevent complications.



Thank You