

# HEART DISEASE ANALYSIS

## USING TABLEAU

### 1. INTRODUCTION

#### 1.1 Project Overview

Heart disease is one of the leading causes of death worldwide. Early identification of risk factors such as high cholesterol, high blood pressure, abnormal heart rate, and lifestyle conditions can help prevent serious complications. However, medical datasets often contain large volumes of patient information that are difficult to interpret using traditional methods.

With the advancement of data analytics and visualization tools, healthcare professionals can now analyze complex medical data more efficiently. Tableau is a powerful Business Intelligence tool that converts raw data into meaningful visual insights through interactive dashboards.

The project titled “**Heart Disease Analysis using Tableau**” focuses on analyzing patient health data and presenting it through interactive visualizations. The dashboards help users understand disease distribution, identify high-risk groups, and analyze relationships between different medical parameters.

The project also integrates Tableau dashboards into a web interface, allowing users to access and interact with the visualizations easily through a browser.

This project demonstrates a complete end-to-end workflow:

- Data collection
- Data cleaning
- Data visualization
- Dashboard publishing
- Web integration

## **1.2 Purpose**

The main purpose of the project is to analyze heart disease data and provide meaningful insights through visualization.

Specific purposes include:

1. To analyze patient health records and identify disease patterns
2. To understand the impact of medical factors such as age, cholesterol, and blood pressure
3. To visualize heart disease distribution among different groups
4. To create interactive dashboards using Tableau
5. To integrate dashboards into a web application for easy access
6. To demonstrate practical use of data analytics in healthcare

## **2. IDEATION PHASE**

### **2.1 Problem Statement**

Healthcare organizations collect large amounts of patient data. However, this data is usually stored in spreadsheets or databases, making it difficult to:

- Identify high-risk patients quickly
- Understand disease trends
- Compare medical parameters
- Make data-driven decisions

Traditional reports are static and lack interactivity.

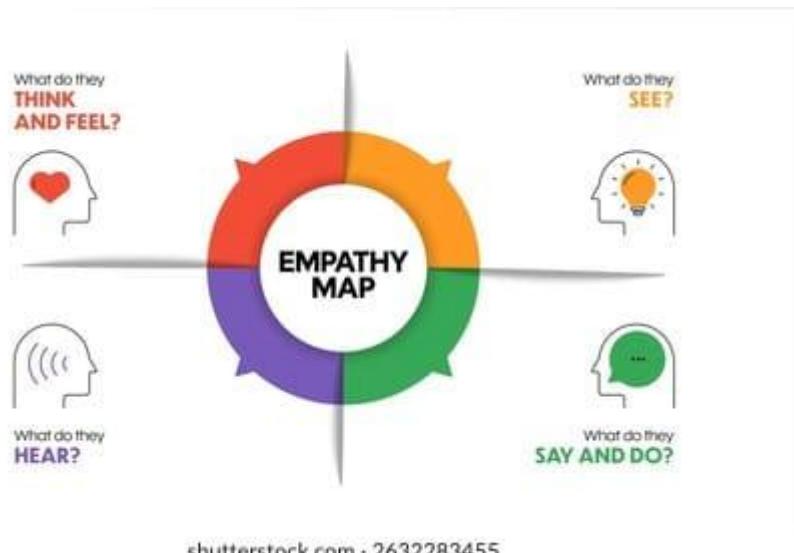
There is a need for an interactive and visual analytics system that helps analyze heart disease data and identify key risk factors through an easy-to-use web platform.

## 2.2 Empathy Map (Users)

### Target Users

- Doctors and healthcare professionals
- Medical researchers
- Students
- Health analysts

### Empathy Map Diagram



### Empathy Map Explanation

#### 1. Think

Users want to understand how different medical factors affect heart disease. They think about questions such as:

- Which age group is more affected?
- How do cholesterol and blood pressure influence heart disease?
- Are there differences based on gender?

They expect clear and meaningful insights from the data without needing complex technical knowledge.

#### 2. Feel

Users often feel overwhelmed when working with large medical datasets in raw tabular form. They may feel confused or unsure about interpreting the data.

correctly. They prefer a system that presents information visually so that patterns and relationships can be understood easily and quickly.

### 3. Say

Users expect:

- Interactive and easy-to-use dashboards
- Clear charts and visual comparisons
- Quick filtering options
- Accurate and reliable information

### 4. Do

Users interact with the system by:

- Opening the web dashboard
- Applying filters (age, gender, medical parameters)
- Comparing charts and trends
- Exploring patterns to understand risk factors

They analyze the visuals and draw conclusions based on the insights provided.

### Why this diagram is important

- Easy understanding of patient data
- Quick identification of risk factors
- Interactive filtering and comparison

Users feel overwhelmed by raw data and prefer visual dashboards for decision making

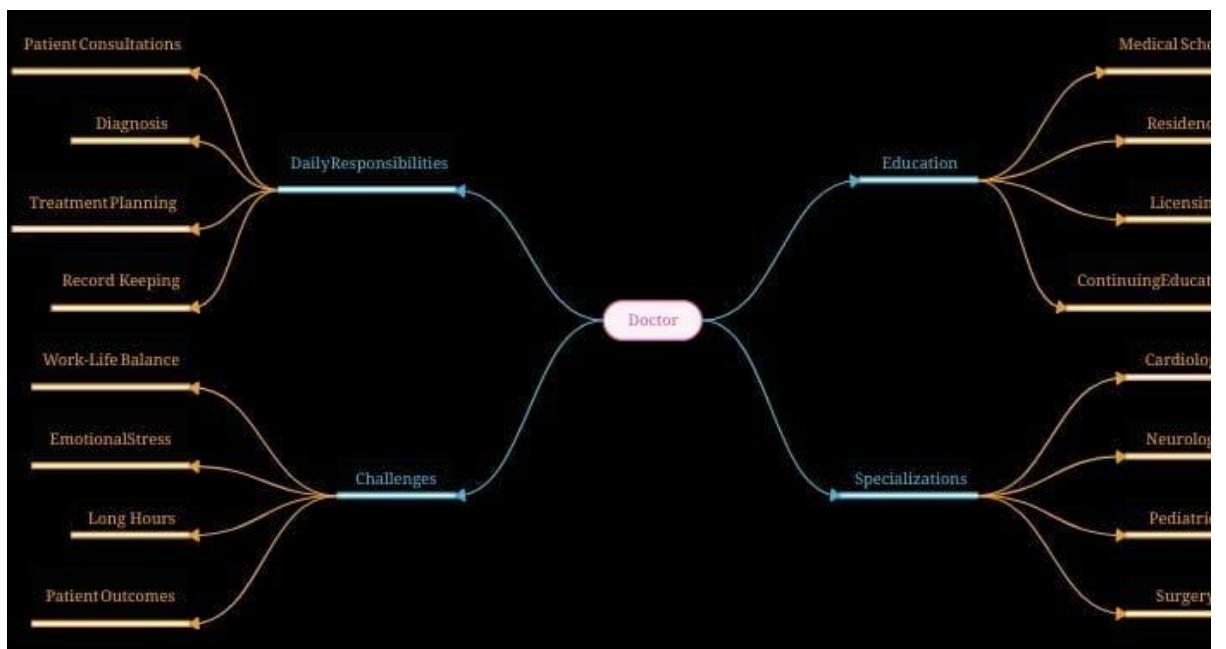
## 2.3 Brainstorming

Brainstorming helped identify the key analysis areas:

- Disease vs Age analysis

- Gender-wise disease distribution
- Cholesterol level analysis
- Blood pressure comparison
- Heart rate and exercise impact
- Interactive dashboard with filters

## Brainstorming Diagram



## Brainstorming Outcomes

- Multiple charts combined into one dashboard
- Web-based access
- User-friendly design

## 2.4 Objectives

- To analyze heart disease dataset
- To identify key risk factors
- To create interactive Tableau dashboards
- To integrate the dashboard into a web application
- To enable easy access and filtering

### **3.Scope**

The scope of the **Heart Disease Analysis using Tableau** project focuses on analyzing and visualizing patient health data to understand the major factors associated with heart disease. The project is limited to descriptive analysis and visualization, aiming to provide meaningful insights from existing medical data rather than performing clinical diagnosis or predictive modeling.

The system covers the analysis of important medical parameters such as age, gender, chest pain type, cholesterol level, resting blood pressure, fasting blood sugar, ECG results, and maximum heart rate. These attributes are studied to identify patterns and relationships that influence the occurrence of heart disease. The visualizations help users understand how the disease is distributed across different patient groups and which factors are commonly associated with higher risk.

The project includes the development of interactive dashboards using Tableau. Users can apply filters to explore the data based on specific conditions such as age group, gender, or particular medical values. This interactive feature enables detailed and customized analysis, making the system more effective than traditional static reports.

Another important aspect of the project scope is web integration. The Tableau dashboard is published online and embedded into a web page using HTML, allowing users to access and interact with the visualizations through a browser. This improves accessibility and makes the system easy to use for students, researchers, and healthcare learners.

However, the project is limited to analytical and educational purposes. It does not provide real-time data processing, clinical recommendations, or disease prediction. The analysis depends on the quality and completeness of the dataset used. Despite these limitations, the project demonstrates how data visualization and business intelligence tools can be effectively applied in the healthcare domain to support data understanding and awareness.

In the future, the system scope can be extended to include real-time data integration, machine learning-based prediction models, mobile-friendly dashboards, and cloud deployment for wider accessibility.

## 4. Methodology



The methodology of the **Heart Disease Analysis using Tableau with Web Integration** project describes the systematic steps followed to collect, process, analyze, and present the data in an interactive and user-friendly manner. The project follows a structured workflow to ensure accurate analysis and effective visualization of heart disease data.

## 1. Data Collection

The first step in the methodology is collecting the heart disease dataset. The dataset contains patient health records with various medical attributes such as age, gender, cholesterol level, resting blood pressure, chest pain type, fasting blood sugar, ECG results, maximum heart rate, and the target variable indicating the presence or absence of heart disease.

The data is obtained in CSV format from a reliable public healthcare dataset source. This dataset serves as the foundation for the entire analysis process.

## 2. Data Preparation and Cleaning

Before analysis, the dataset is examined for:

- Missing values
- Duplicate records
- Incorrect data formats
- Inconsistent values

Necessary preprocessing steps are performed, such as:

- Removing null or invalid entries
- Converting data types where required
- Standardizing categorical values

This step ensures that the data is accurate, clean, and suitable for visualization.

## 3. Data Import into Tableau

After cleaning, the dataset is imported into Tableau. Tableau establishes a connection with the CSV file and prepares the data for analysis. Fields are categorized as:

- Dimensions (e.g., gender, chest pain type)

- Measures (e.g., age, cholesterol, blood pressure)

This classification helps in creating meaningful visualizations.

## 4. Data Analysis and Visualization

Multiple charts and graphs are created to analyze the relationship between medical parameters and heart disease. The key visualizations include:

- Heart disease distribution (Yes/No)
- Age-wise analysis
- Gender-wise comparison
- Cholesterol level analysis
- Blood pressure comparison
- Chest pain type vs heart disease
- Maximum heart rate analysis

These visualizations help identify trends, patterns, and risk factors associated with heart disease.

## 5. Dashboard Design

All individual charts are combined into a single interactive dashboard. The dashboard includes:

- Multiple visual components
- Filters for age, gender, and medical parameters
- Dynamic updates based on user selection
- Clear layout and labels for easy understanding

This allows users to explore the data interactively and perform customized analysis.

## 6. Publishing the Dashboard

The completed dashboard is published to **Tableau Public** or Tableau Server. Publishing generates a shareable link and an embed code that can be used for web integration.

## **7. Web Integration**

The Tableau dashboard is embedded into a web page using HTML iframe. This allows users to access and interact with the dashboard through a browser without opening Tableau separately.

## **8. Testing and Validation**

The system is tested to ensure:

- Dashboard loads properly
- Filters work correctly
- Data is displayed accurately
- Web integration functions smoothly
- Performance is stable without lag

## **9. User Interaction and Insight Generation**

Users can:

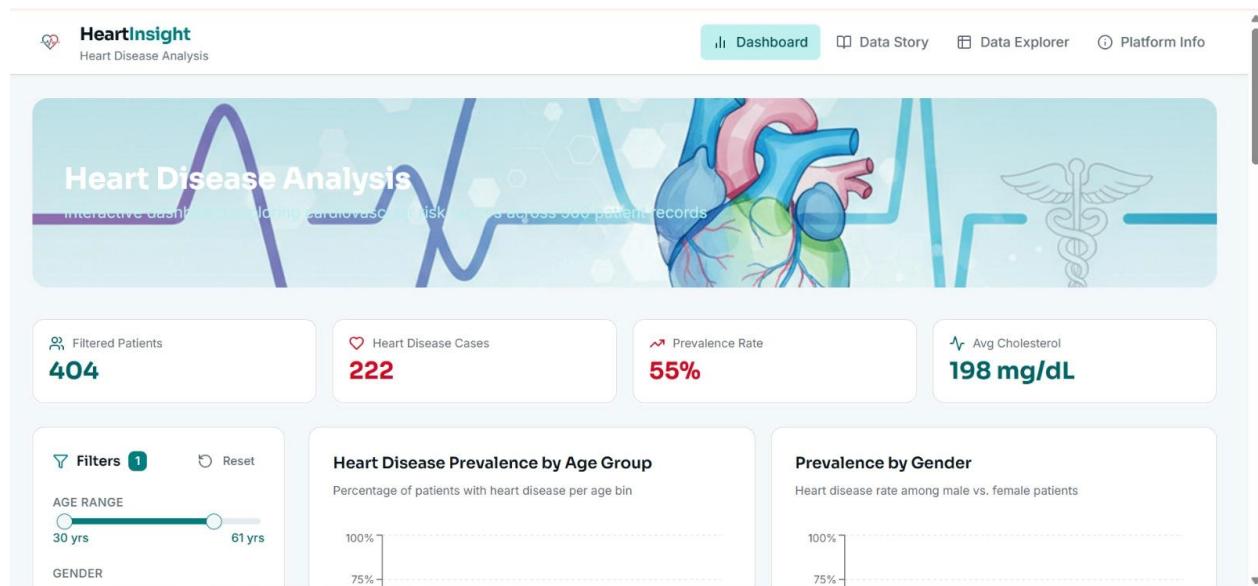
- Apply filters
- Compare different patient groups
- Analyze trends
- Identify high-risk factors

The methodology ensures that raw medical data is transformed into meaningful visual insights that support learning and analytical understanding.

## **5. Tools**

- Dataset (Heart Disease CSV File)
- Tableau Public
- Microsoft Excel / Spreadsheet Tool
- HTML
- CSS
- Web Browser (Google Chrome / Edge)
- Tableau Public Hosting Platform

## 6.DashBoard



The dashboard design is an important part of the project, as it transforms individual visualizations into a single interactive interface that allows users to explore and analyze heart disease data effectively. The main objective of the dashboard is to present complex medical information in a clear, organized, and user-friendly manner so that users can easily understand patterns and relationships among different health parameters.

The dashboard is designed using Tableau by combining multiple charts such as bar charts, pie charts, line graphs, and comparison visuals. These charts display key insights including heart disease distribution, age-wise analysis, gender comparison, cholesterol levels, blood pressure patterns, chest pain types, and maximum heart rate variations. Each visualization focuses on a specific medical factor that contributes to heart disease risk.

To improve usability, the dashboard follows a structured layout. Important summary information and key indicators are placed at the top, while detailed analytical charts are arranged below in a grid format. Clear titles, labels, and legends are used to ensure that users can interpret the information without confusion. Consistent colors are applied to distinguish between patients with and without heart disease.

One of the major features of the dashboard is **interactive filtering**. Users can apply filters such as age group, gender, chest pain type, or other medical conditions. When a filter is selected, all related charts update automatically, allowing users to perform customized analysis and compare different patient

groups. This dynamic interaction helps users identify trends and risk patterns more efficiently than static reports.

The dashboard is also designed with simplicity and clarity in mind. Unnecessary visual clutter is avoided, and only relevant information is displayed. This ensures faster loading, better performance, and an improved user experience.

After designing the dashboard, it is published to Tableau Public and embedded into a web page, making it accessible through a browser. Overall, the dashboard design enables effective data exploration, supports analytical learning, and demonstrates how healthcare data can be presented in an interactive and meaningful way.

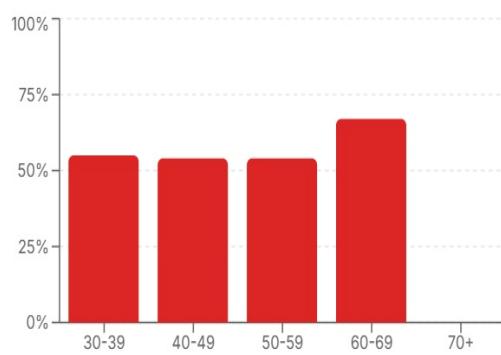
## 7. Results and Analysis

The dashboard helps identify:

- Heart Disease prevalence by Age Group and Gender
- Chest pain type Distribution
- Prevalence by race/Ethnicity
- Average cholesterol by Age Group
- Comorbidity Rates
- Age vs Max Heart Rate
- Cholesterol vs Resting Blood Pressure

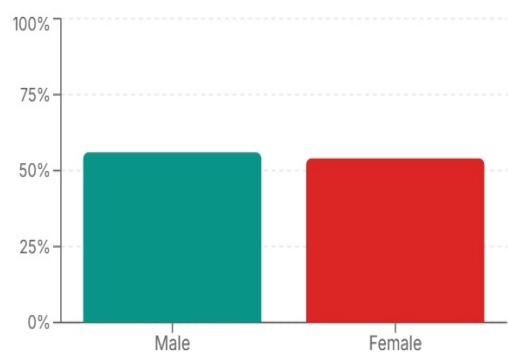
**Heart Disease Prevalence by Age Group**

Percentage of patients with heart disease per age bin



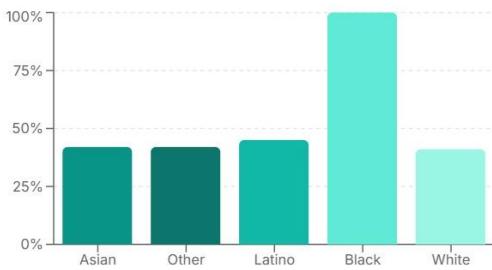
**Prevalence by Gender**

Heart disease rate among male vs. female patients



### Prevalence by Race / Ethnicity

Heart disease rate across racial groups



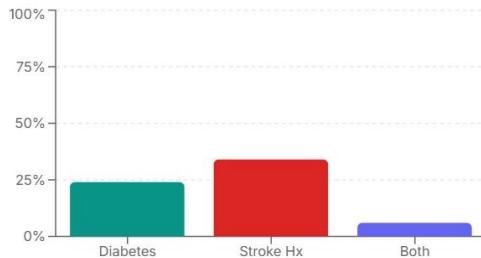
### Chest Pain Type Distribution

Breakdown of chest pain categories in the dataset



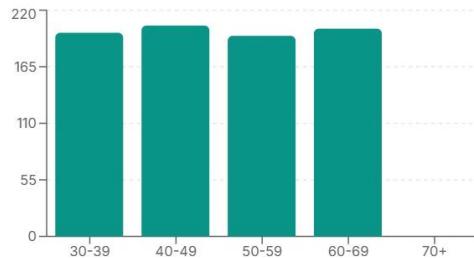
### Comorbidity Rates (Heart Disease Patients)

Diabetes and stroke history among diagnosed patients



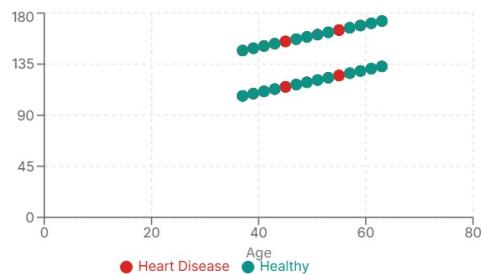
### Average Cholesterol by Age Group

Mean cholesterol levels across age bins



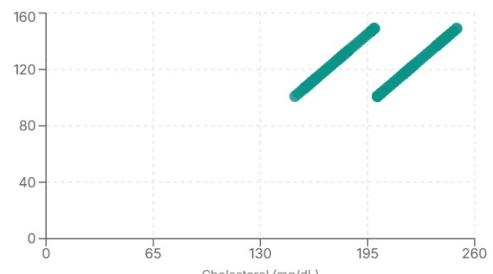
### Age vs. Max Heart Rate

Scatter plot colored by heart disease diagnosis



### Cholesterol vs. Resting Blood Pressure

Relationship between cholesterol and BP levels



## 8. Conclusion

The **Heart Disease Analysis using Tableau** project successfully demonstrates how data visualization techniques can be applied to analyze healthcare data and extract meaningful insights. The project focused on transforming raw patient records into interactive visual dashboards that help in understanding the distribution of heart disease and the impact of various medical factors such as age, gender, cholesterol level, blood pressure, chest pain type, and heart rate.

Through the use of Tableau, complex medical data was converted into clear and easy-to-understand charts and graphs. The interactive filtering feature allows users to explore the data based on specific conditions and compare different patient groups. This improves the ability to identify patterns, trends, and possible risk factors associated with heart disease.

The integration of the Tableau dashboard into a web interface further enhances accessibility, enabling users to view and interact with the analysis through a standard web browser. This makes the system user-friendly and suitable for students, researchers, and healthcare learners without requiring specialized software.

Although the project focuses only on descriptive analysis and does not include prediction or real-time data processing, it effectively demonstrates the practical application of business intelligence tools in the healthcare domain. The system provides a valuable platform for educational and analytical purposes and highlights the importance of data-driven approaches in understanding medical conditions.

Overall, the project achieves its objective of developing an end-to-end data analytics solution that combines data preparation, visualization, and web deployment, thereby contributing to improved awareness and understanding of heart disease patterns.