HEART DISEASE RISK ANALYSIS & VISUALIZATION USING TABLEAU

Project Team Members:

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1. PROJECT OVERVIEW

1.1 Introduction

Heart disease is one of the leading causes of death globally. Early detection of risk factors such as age, diabetes, BMI, smoking habits, stroke history, and general health conditions plays a crucial role in prevention and effective treatment. This project focuses on analyzing heart disease datasets using Tableau to identify critical risk factors and transform raw healthcare data into meaningful visual insights.

1.2 Problem Statement

Healthcare professionals often deal with large volumes of raw medical data that are difficult to interpret. Traditional tabular reports do not provide clear insights into patterns and relationships among risk factors. Therefore, this project aims to convert health-related datasets into interactive dashboards that simplify analysis and support informed decision-making.

1.3 Objectives

- Analyze heart disease data using advanced visualization techniques.
- Identify key risk factors contributing to heart disease.
- Develop interactive dashboards using Tableau Public.
- Present findings through Tableau Story feature.
- Publish and demonstrate the project for stakeholder review.

2. ACTIVITY 1: PROJECT DEMONSTRATION

2.1 Tools & Technologies Used

Tableau Public – Data Visualization Platform
MySQL Workbench – Database Management
CSV Dataset – Data Source
HTML – Portfolio Integration

2.2 End-to-End Working Procedure

Step 1: Data Collection – The dataset includes attributes such as age, gender, BMI, diabetes, smoking status, stroke history, physical activity, general health, and heart disease indicator.

Step 2: Database Setup – Created database schema in MySQL, imported dataset, verified table structure and data types.

Step 3: Connecting Tableau – Established MySQL connection in Tableau Public and imported dataset into workspace.

Step 4: Data Preparation – Handled missing values, validated data types, created calculated fields, grouped age categories.

Step 5: Dashboard Creation – Developed Overview and Risk Factor dashboards.

Step 6: Story Creation – Structured story points (Overview, Risk Analysis, Conclusion).

Step 7: Publishing – Published dashboards to Tableau Public and integrated link into HTML page.

3. DASHBOARD ANALYSIS

Dashboard 1: Overview Analysis

Gender vs Heart Disease Analysis
Age Group Distribution
Stroke vs Heart Disease
Physical Activity Impact

This dashboard highlights overall trends and distribution patterns across demographic groups.

Dashboard 2: Risk Factor Analysis

BMI vs Diabetes Correlation
Smoking vs Heart Disease
General Health vs Heart Disease
Risk Factor Comparison

This dashboard focuses on identifying high-risk populations and understanding the correlation between multiple risk factors.

4. KEY INSIGHTS

• Heart disease prevalence increases significantly with age.
• Diabetic individuals show higher risk of cardiovascular complications.
• Smoking increases probability of heart disease.
• Poor general health strongly correlates with higher risk.
• BMI contributes to cardiovascular risk patterns.

5. SYSTEM ARCHITECTURE

CSV Dataset → MySQL Database → Tableau Public → Dashboards → Story →
Published Output

6. IMPLEMENTATION STEPS

Database Implementation: Created schema and imported data.

Visualization Development: Created worksheets, designed charts, applied filters.

Story Development: Organized dashboards logically with captions.

Testing: Verified accuracy, filter functionality, navigation.

Deployment: Published to Tableau Public and integrated into web portfolio.

7. LIMITATIONS

- Static dataset without real-time updates.
- No machine learning prediction model.
- Limited attributes based on available dataset.

8. FUTURE ENHANCEMENTS

- Implement machine learning prediction model.
- Develop Flask-based web application.
- Integrate real-time healthcare datasets.
- Add advanced analytics and forecasting models.

9. PROJECT OUTCOME

The project successfully transformed healthcare data into structured visual insights. Interactive dashboards improve usability, understanding, and reproducibility for stakeholders.

10. CONCLUSION

This project demonstrates how data visualization techniques can effectively analyze healthcare datasets. Tableau dashboards provide clear understanding of heart disease risk factors and support data-driven decision-making.

11. DATA FOUNDATION & DATA QUALITY ASSESSMENT

11.1 Data Source Description

The dataset used in this project consists of multiple healthcare-related attributes including demographic information, lifestyle indicators, and medical history records. The data was collected in CSV format and imported into MySQL for structured storage. The dataset contains thousands of patient records ensuring sufficient data volume for meaningful visualization and pattern discovery.

11.2 Data Cleaning Process

The data cleaning process included removal of duplicate entries, correction of inconsistent formatting, handling of missing values, and validation of data types. Numeric fields such as BMI and Age were validated for correct ranges. Categorical fields such as smoking status and diabetes were standardized to maintain consistency across the dataset.

11.3 Data Validation

Data validation checks were performed to ensure referential integrity and logical consistency between related attributes. For example, age groups were verified against actual age values, and heart disease indicators were checked for binary accuracy. This process ensured high reliability and accuracy of visual insights.

12. DASHBOARD DESIGN & FEATURES

12.1 Visualization Types Used

The project includes multiple visualization types such as bar charts, pie charts, line charts, heat maps, and box plots. Each visualization was carefully selected based on the type of data and the analytical objective. Bar charts were used for categorical comparisons, heat maps for correlation analysis, and box plots for distribution insights.

12.2 Interactive Features

Interactive filters allow users to dynamically select age groups, gender, smoking status, and other risk factors. Hover tooltips provide detailed information for each data point. Dashboard actions enable seamless navigation between overview and risk analysis dashboards.

12.3 User Experience Considerations

The dashboard design follows clarity and simplicity principles. Color schemes were selected to highlight risk severity. Proper spacing, labeling, and legends ensure readability. The layout supports both desktop and web-based viewing through Tableau Public.

13. DETAILED ANALYSIS & INSIGHTS

13.1 Demographic Analysis

Analysis of demographic variables shows that older age groups exhibit significantly higher prevalence of heart disease. Gender-based comparison indicates slight variation in risk distribution between male and female populations.

13.2 Lifestyle Risk Factors

Smoking and lack of physical activity were found to strongly correlate with higher heart disease rates. Individuals with sedentary lifestyles show greater cardiovascular risk compared to physically active individuals.

13.3 Medical Condition Correlation

Diabetes and high BMI values significantly increase heart disease probability. The visualization clearly demonstrates the compounded risk when multiple medical conditions coexist.

14. PROJECT MANAGEMENT & TEAM CONTRIBUTION

14.1 Team Members

GUDAVALLI NAGA SREEVIDYA – Dashboard Design & Documentation
MARELLA RAJITHA – Data Preparation & Visualization
KONDAMUDHI MAHESH BABU – Database Management & Testing
KATTA VENKATA TARUN – Integration & Deployment

14.2 Development Methodology

The project followed a structured step-by-step development approach including requirement analysis, database setup, dashboard development, testing, and deployment. Regular reviews ensured quality and consistency throughout the development lifecycle.

15. APPENDICES

15.1 Technical Specifications

Tableau Version: Tableau Public 2024 or above
Database: MySQL Workbench
Data Format: CSV
Deployment Platform: Tableau Public Web

15.2 User Guide

Step 1: Open Tableau Public link.
Step 2: Use filters to customize view.
Step 3: Navigate through story points.
Step 4: Analyze insights and export if required.

15.3 References

Healthcare statistical reports and publicly available cardiovascular datasets were used for academic and analytical purposes.