

Visualizing and Predicting Heart Diseases with an Interactive Dash Board

Introduction:

Heart disease (heart disease) is a group of diseases related to cardiovascular diseases, manifested by a violation of the normal functioning of the heart. May be caused by damage to the epicardium, pericardium, myocardium, endocardium, valvular apparatus of the heart, heart vessels. According to the National Heart, Lung, and Blood Institute in Framingham (USA), the most important factors in the development of cardiovascular disease in humans are obesity, sedentary lifestyle, and smoking.

In this project we are trying to analyze the heart disease related data and be able to extract some insights from the data using Business Intelligence tools. To Extract the Insights from the data and put the data in the form of visualizations, Dashboards and Story we employed Tableau tool.

Project Flow:

To accomplish this, we have to complete all the activities listed below,

- Define Problem / Problem
Understanding o Specify the business
problem o Business requirements o
Literature Survey o Social or Business
Impact.
- Data Collection & Extraction
from Database o Collect the dataset, o
Storing Data in DB o Perform SQL
Operations o Connect DB with Tableau

- Data Preparation o Prepare the Data

for Visualization

- Data Visualizations o No of

Unique Visualizations

- Dashboard o Responsive and

Design of Dashboard

- Story o No of Scenes of Story ●

Performance Testing o Amount of

Data Rendered to DB ‘

o Utilization of Data Filters o No of Calculation Fields o No of

Visualizations/ Graphs ● Web Integration o Dashboard and Story

embed with UI With Flask ● Project Demonstration & Documentation

o Record explanation Video for project end to end solution o Project

Documentation-Step by step project development procedure

• Define Problem / Problem Understanding:

Problem Statement: Heart diseases are a leading cause of death globally, and early detection is crucial for effective prevention and treatment. The problem at hand is the lack of easily accessible and comprehensive tools for visualizing and predicting heart diseases. Existing methods and platforms often fall short in delivering user-friendly interfaces that allow individuals and healthcare practitioners to analyze and understand heart health data effectively. Many people remain unaware of their specific risk factors, impeding early intervention and preventive measures. This information gap limits timely decision-making in healthcare. To address this, the development of an interactive dashboard for visualizing and predicting heart diseases is essential, ensuring that data-driven insights are readily available, empowering individuals to manage their health, and aiding healthcare professionals in making informed decisions.

Business requirements:

The health care industry produces a huge amount of data. This data is not always made use to the full extent and is often underutilized. Using this huge amount of data, a disease can be detected, predicted, or even cured. The business requirements

for analyzing the Heart Disease in world include identifying patterns and comparing factors of heart disease, creating interactive dashboards and reports, identifying areas for improvement, making data-driven decisions, comparing to the current situation and creating forecasting models for future performance. The ultimate goal is to gain insights and improve performance through data visualization techniques.

Literature Survey:

A literature survey is essential for gaining insights into existing research, methodologies, and best practices. It provides a foundation for informed decisionmaking and ensures that the project builds upon previous knowledge and avoids redundancy.

The literature survey for "Visualizing and Predicting Heart Diseases with an Interactive Dashboard" reviews heart disease prediction models, risk factors, data sources, visualization techniques, interactive healthcare dashboards, user interface design, machine learning in healthcare, challenges, validation, and recent advancements. It informs the project's development by integrating prior research and established principles into the interactive healthcare dashboard.

Social or Business Impact:

Social Impact: Analyzing heart disease has profound social impacts, ranging from individual-level health outcomes to community empowerment and public health initiatives. By promoting awareness, prevention, equitable healthcare access, and research advancements, heart disease analysis plays a crucial role in improving the well-being of individuals and society as a whole.

Business Model/Impact: Analyzing heart disease has substantial business impacts across various sectors, including healthcare, medical technology, pharmaceuticals, digital health, insurance, research, workplace wellness, and consumer products. It creates market opportunities, drives innovation, and influences policy and advocacy efforts in the fight against heart disease.

• Data Collection & Extraction from Database:

Downloading the dataset: Downloaded the data set to make visualizations.

Understand the data: Data contains all the meta information regarding the columns described in the CSV files.

Column Description of the Dataset:

1. Heart Disease- target trait.
2. BMI – A value that allows you to assess the degree of correspondence between a person's mass and his height, and thereby indirectly judge whether the mass is insufficient, normal or excessive. It is important in determining the indications for the need for treatment.
3. Smoking: It is a major risk factor for cardiovascular disease. When smoke from a cigarette is inhaled, the reaction of the cardiovascular system immediately follows:
within one minute, the heart rate begins to rise, increasing by 30% within ten minutes
of smoking. The bad habit also increases blood pressure, fibrinogen and platelet levels, making blood clots more likely.
4. Alcohol Drinking - alcohol causes not only temporary disturbances in the functioning
of the heart, but also permanent ones. Heart pain after alcohol is not the only health problem associated with alcohol consumption.
5. Stroke - Ischemic stroke occurs 4 times more often than haemorrhagic. One of the leading causes of this suffering is heart disease, which impairs its functioning, as a result of which the blood flow in the arteries is disturbed and the blood supply to the brain is reduced. Another cause of stroke in heart disease is thromboembolism, when clots form in the cavities of the heart (most often with heart failure) - blood clots.
6. Physical Health - how many days in a month did you feel poor physical health.
7. Mental Health - how many days in a month did you feel poor mental health.
8. DiffWalking - difficulty climbing stairs.
9. Sex - gender of a person.
10. Age Category - age category of the subjects.
11. Race- Race is a complex social construct that categorizes people into distinct groups
based on certain physical and genetic characteristics
12. Diabetic – Person suffering from Diabetes
13. Physical Activity - adults who reported doing physical activity or exercise during the past 30 days other than their regular job
14. GenHealth - well-being.
15. Sleep Time - number of hours of sleep.
16. Asthma- Asthma is a chronic respiratory condition due to breathing Issue
17. Kidney Disease – Disease related to Kidney
18. Skin Cancer – People suffering from Skin Cancer.

Storing Data in DB & Perform SQL Operations:

The image displays two screenshots of the MySQL Workbench application. The top screenshot shows the 'Welcome to MySQL Workbench' dialog, which provides an overview of the tool's capabilities and links to documentation, the blog, and forums. The bottom screenshot shows the main interface with a SQL query executed against the 'heart' database.

MySQL Connections

- Local instance MySQL80
 - root@localhost:3306

Welcome to MySQL Workbench

MySQL Workbench is the official graphical user interface (GUI) tool for MySQL. It allows you to design, create and browse your database schemas, work with database objects and insert data as well as design and run SQL queries to work with stored data. You can also migrate schemas and data from other database vendors to your MySQL database.

[Browse Documentation >](#) [Read the Blog >](#) [Discuss on the Forums >](#)

MySQL File 3*

```
1 use heart;
2 select * from heart_new2;
3
4
```

HeartDisease	BMI	Smoking	AlcoholDrinking	Stroke	PhysicalHealth	MentalHealth	DiffWalking	Sex	AgeCategory	Race	Diabetes
No	18.6	Yes	No	3	30	No	Female	55-59	White	Yes	
No	20.34	No	No	0	0	No	Female	80 or older	White	No	
No	26.58	Yes	No	20	30	No	Male	65-69	White	Yes	
No	24.21	No	No	0	0	No	Female	75-79	White	No	
No	23.71	No	No	28	0	Yes	Female	40-44	White	No	
Yes	28.87	Yes	No	6	0	Yes	Female	75-79	Black	No	
No	21.63	No	No	15	0	No	Female	70-74	White	No	
No	31.64	Yes	No	5	0	Yes	Female	80 or older	White	Yes	
No	26.45	No	No	0	0	No	Female	80 or older	White	No, bor	
No	40.69	No	No	0	0	Yes	Male	65-69	White	No	

Schema: heart

Action Output

#	Time	Action	Message	Duration / Fetch
1	20:35:49	select * from heart_new2	4500 row(s) returned	0.047 sec / 0.062 sec

Connect DB with Tableau:

Tableau - Heart

File Data Server Window Help

Connections Add

localhost MySQL

Database heart

Table heart_new2

New Custom SQL

New Union

New Table Extension

heart_new2 (heart)

Connection Live Extract

Filters 0 Add

heart_new2

Need more data?
Drag tables here to relate them. [Learn more](#)

heart_new2 19 fields 4500 rows 100 rows

Name	heart_new2	heart_new2	heart_new2	heart_new2	heart_new2	heart_new2	heart_new2
	Heart Disease	BMI	Smoking	Alcohol Drinking	Stroke	Physical Health	Mental Health
No	16.6000	Yes	No	No		3	30
No	20.3400	No	No	No	Yes	0	0
No	26.5800	Yes	No	No	No	20	30
No	24.2100	No	No	No	No	0	0
No	23.7100	No	No	No	No	28	0
Yes	28.8700	Yes	No	No	No	6	0

Fields

Type	Field Name	Physical Table	Remote File...
Abc	Heart Disease	heart_new2	HeartDisease
Abc	BMI	heart_new2	BMI
Abc	Smoking	heart_new2	Smoking

Data Source vs HeartDisease Asthma vs HeartDisease Race vs Mental Health Impact of smoking,Alcohol,diff w... BMI vs Gen Health Age vs BMI Other Disease vs Heart Disease Motion Chart Mental Health vs Physical Health Sheet 14

- **Data Preparation:**

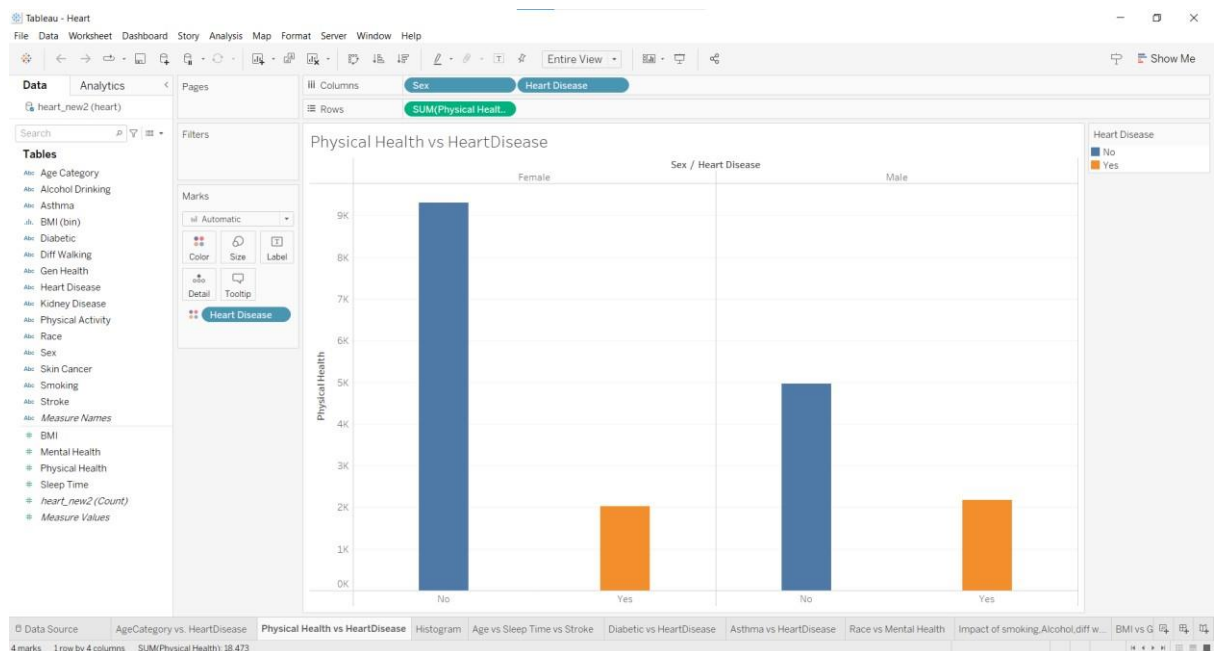
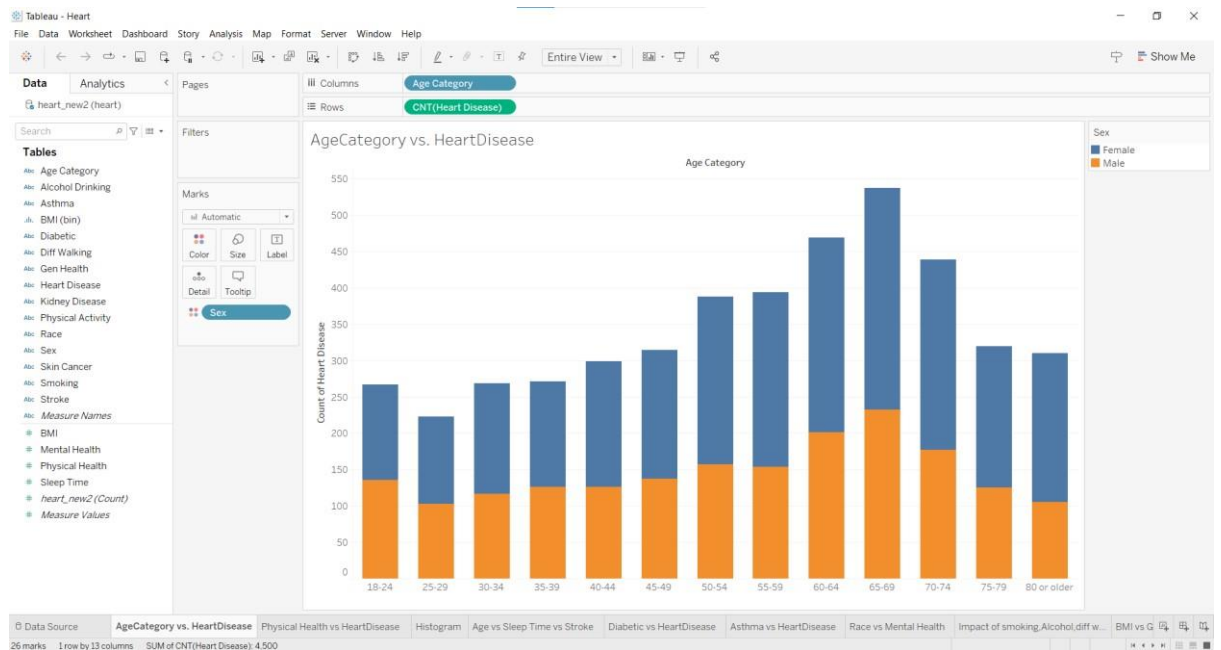
Prepare the Data for Visualization:

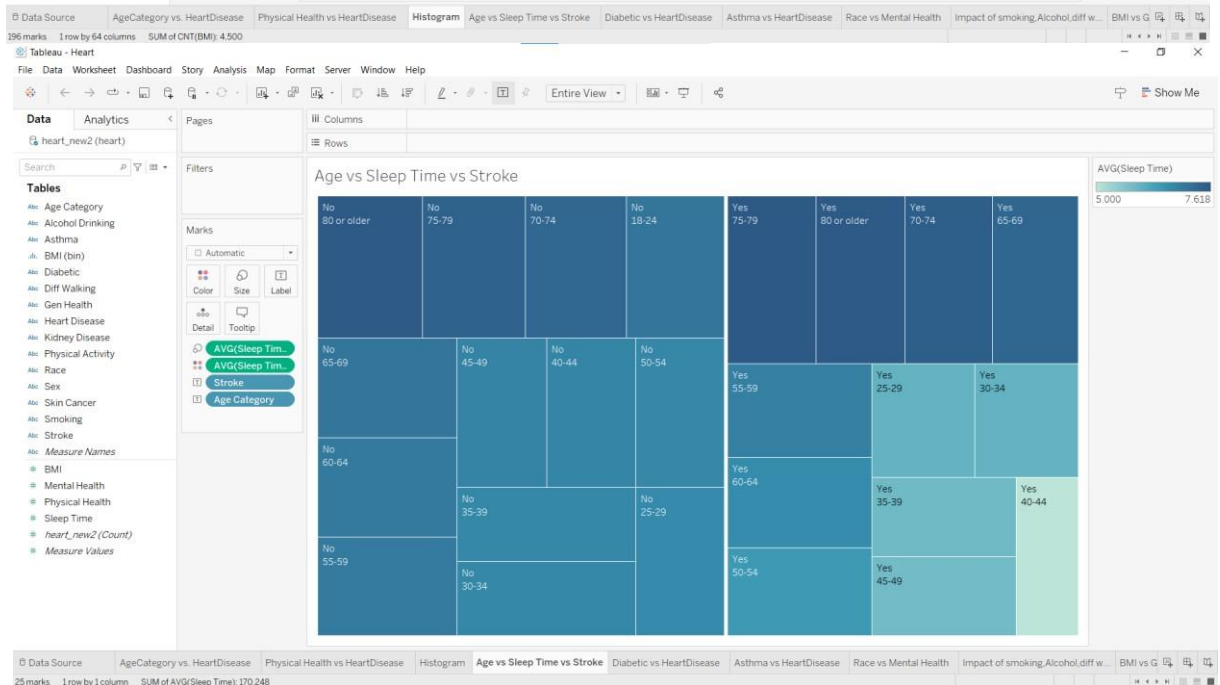
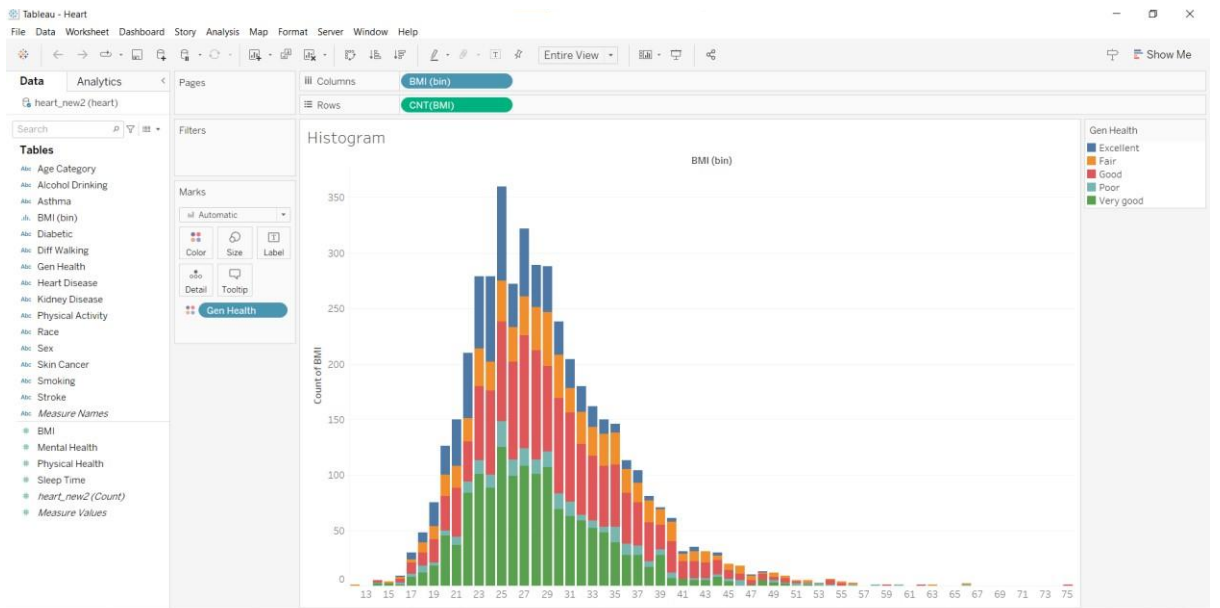
Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency. Since the data is already cleaned we can move to visualization.

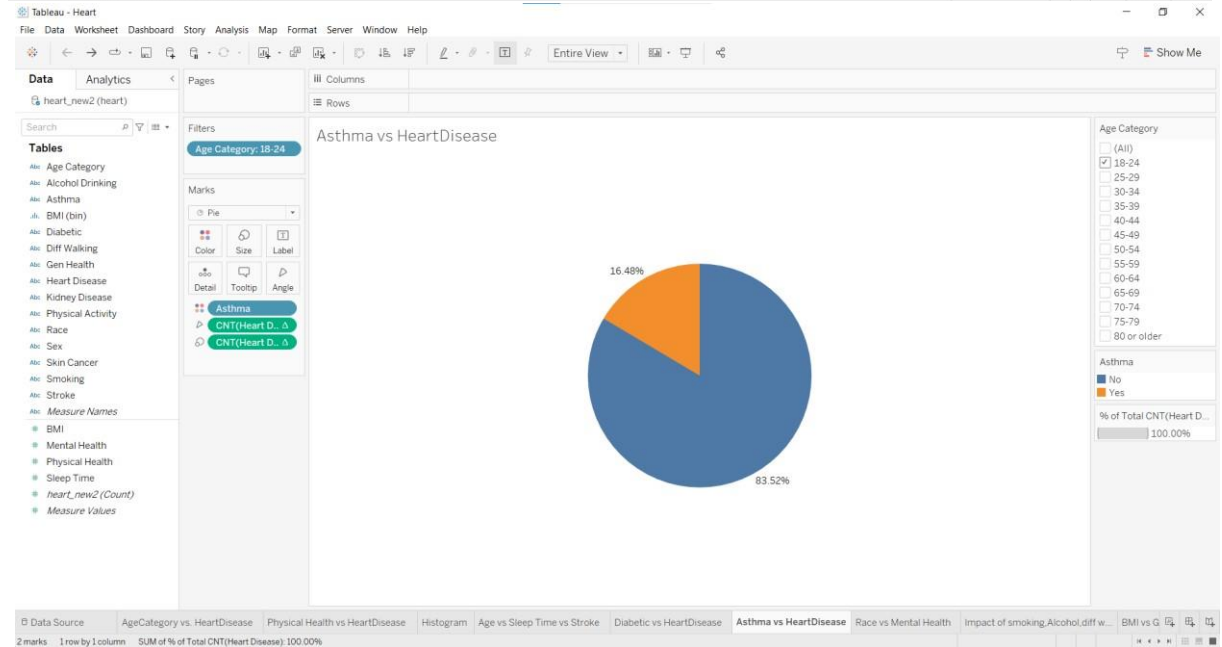
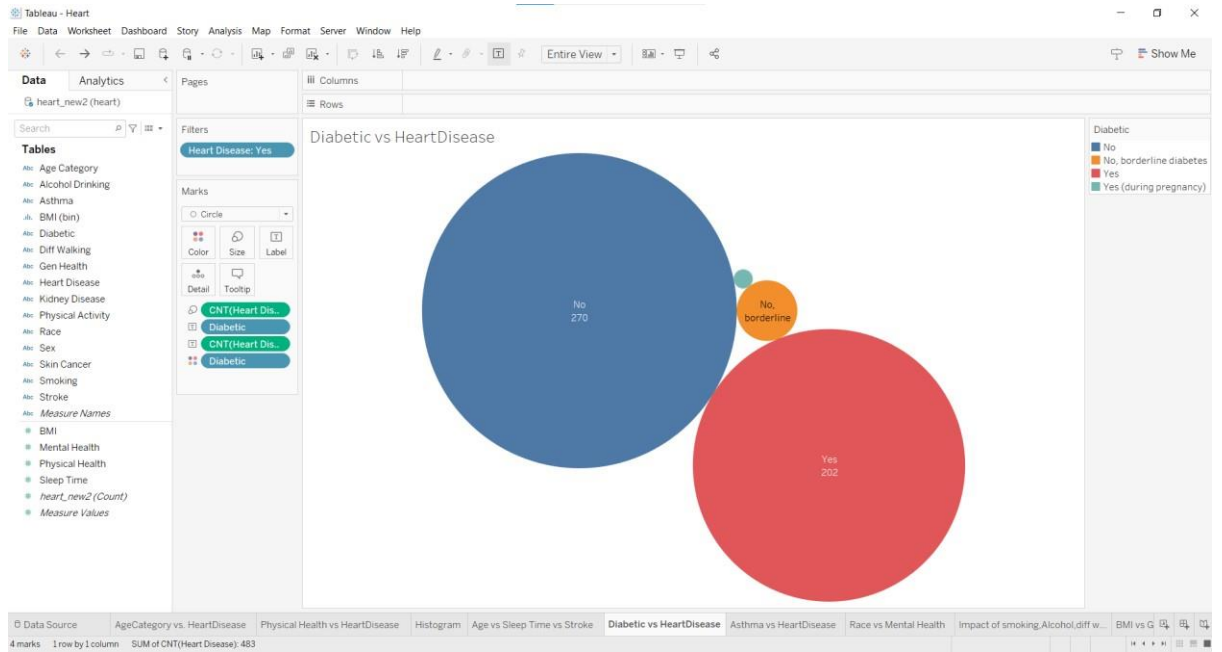
- **Data Visualization:**

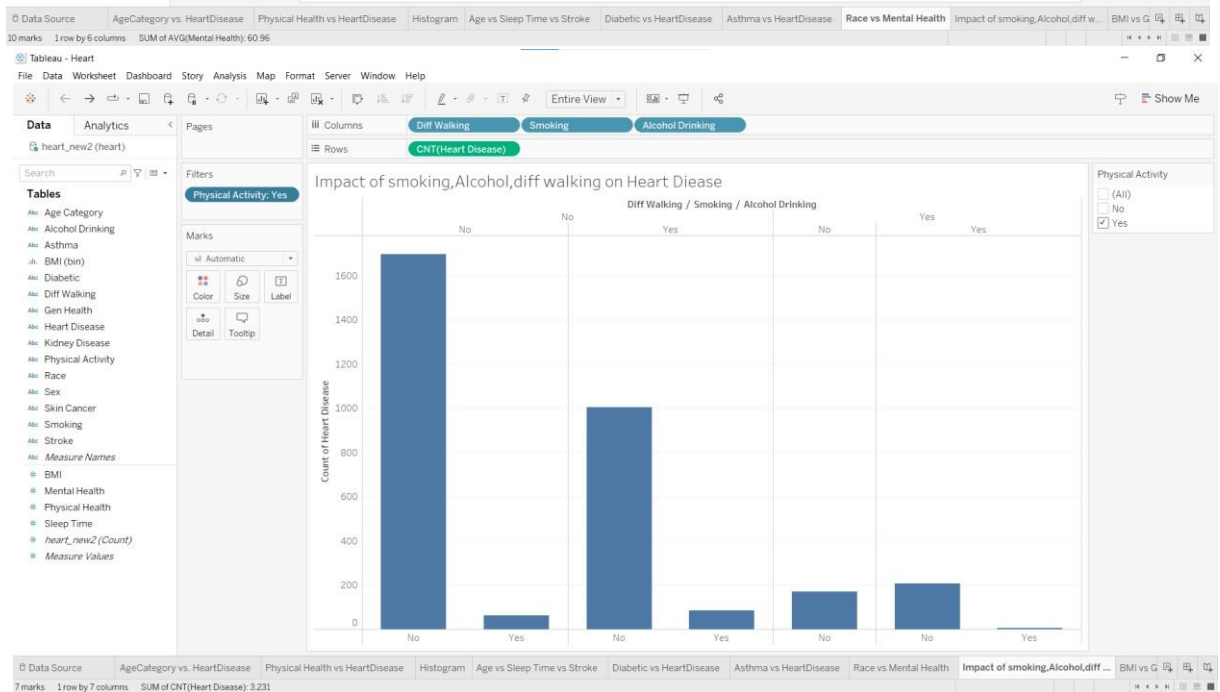
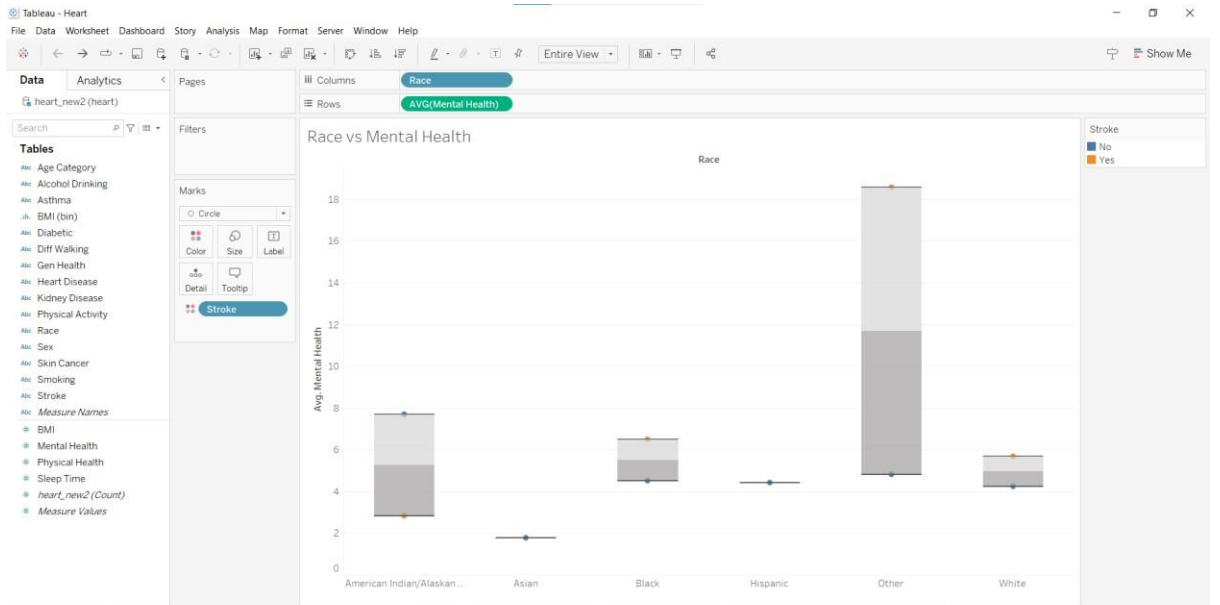
Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

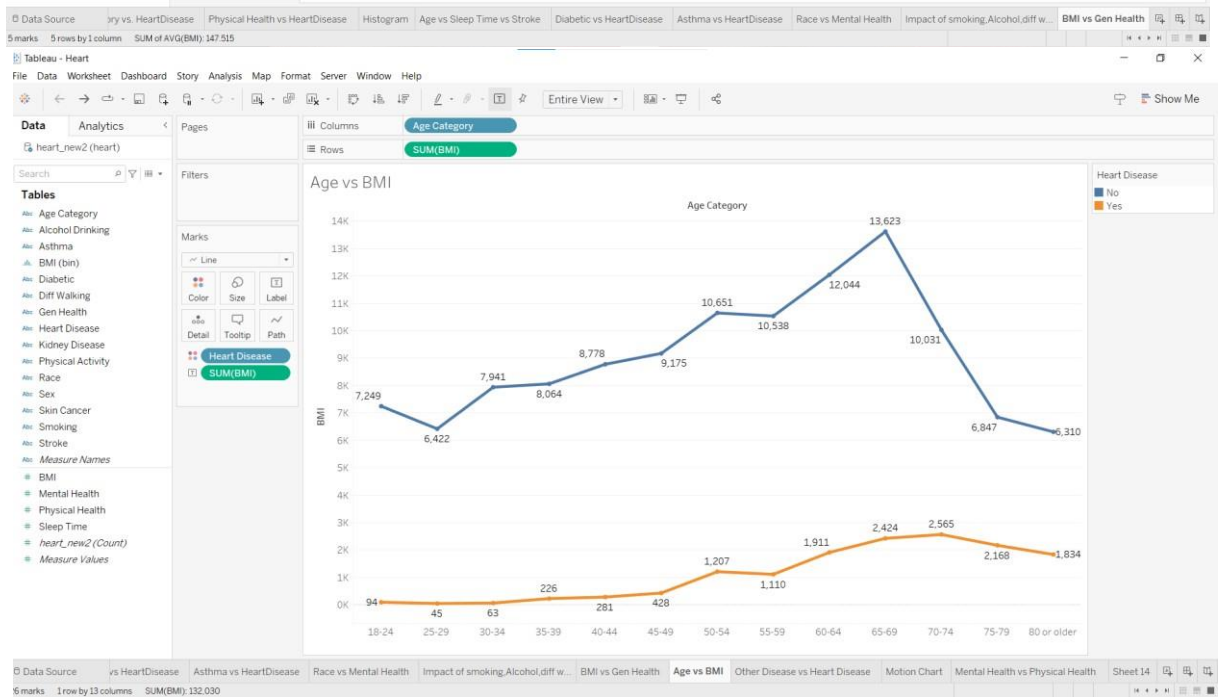
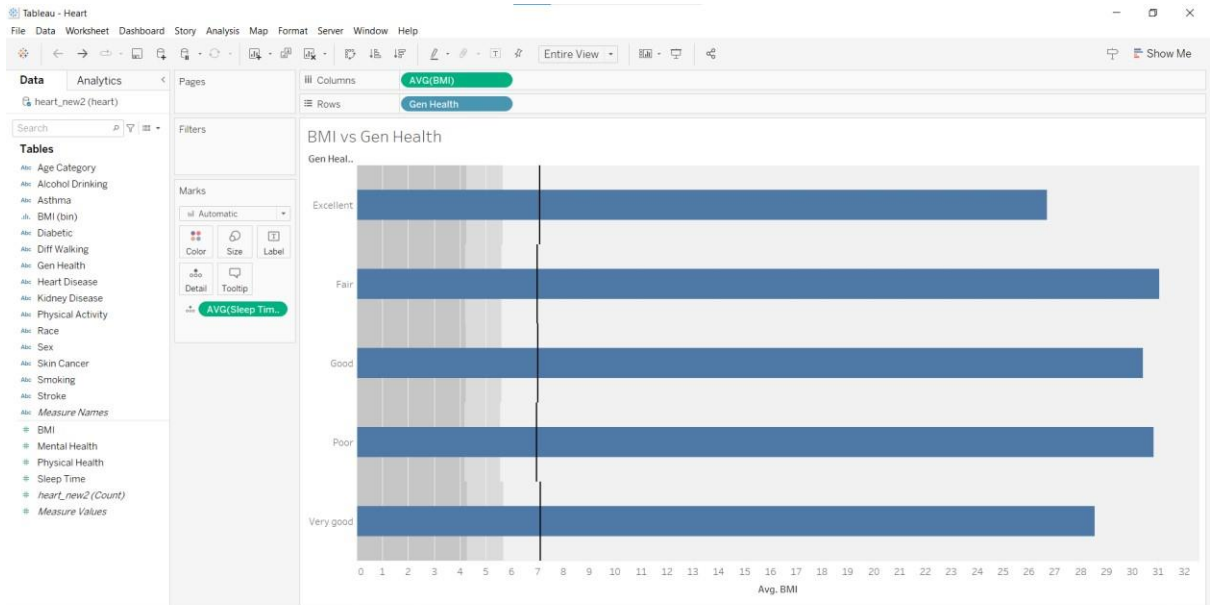
No of Unique Visualizations: 13

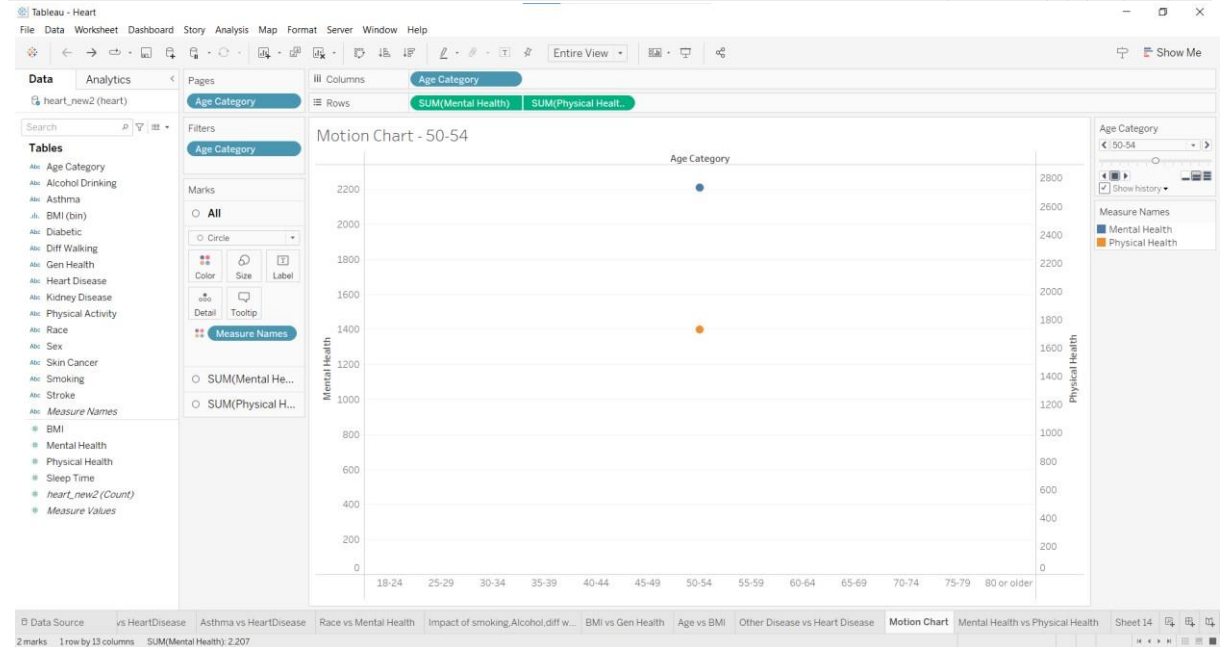
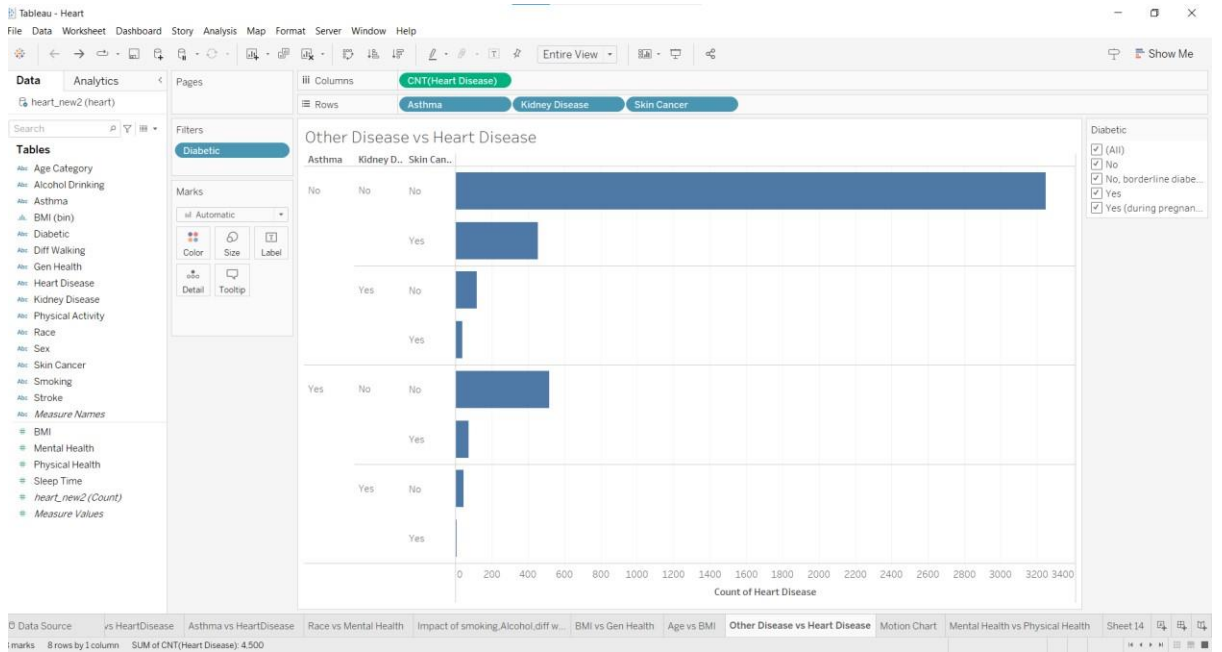


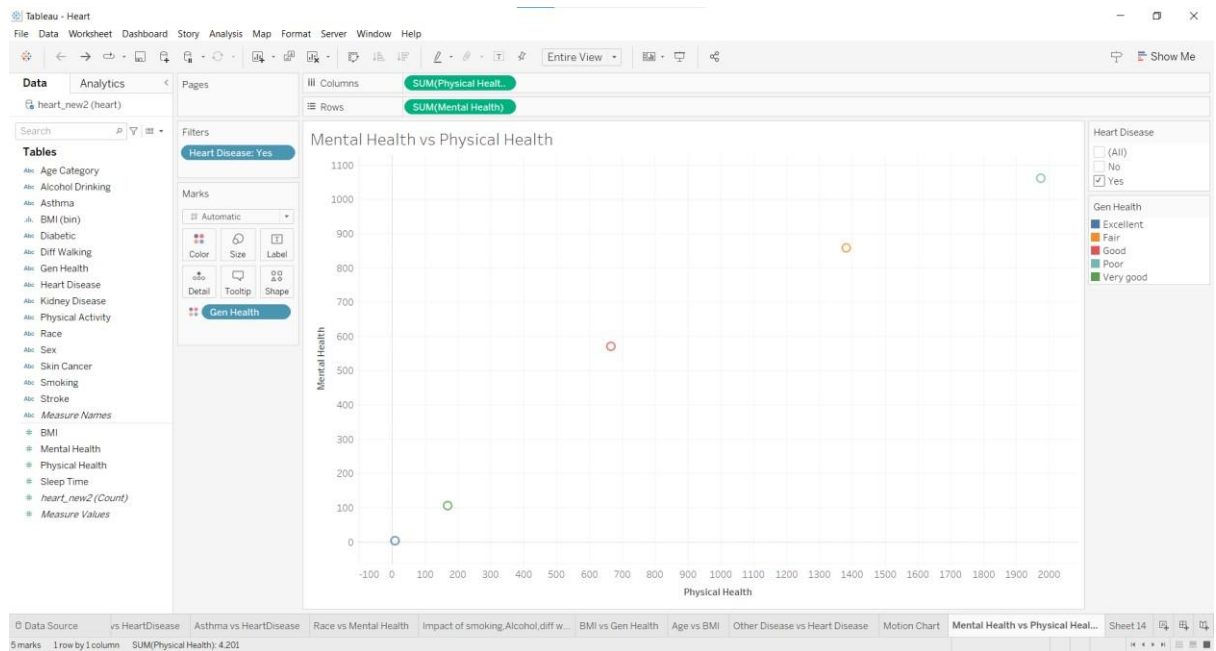








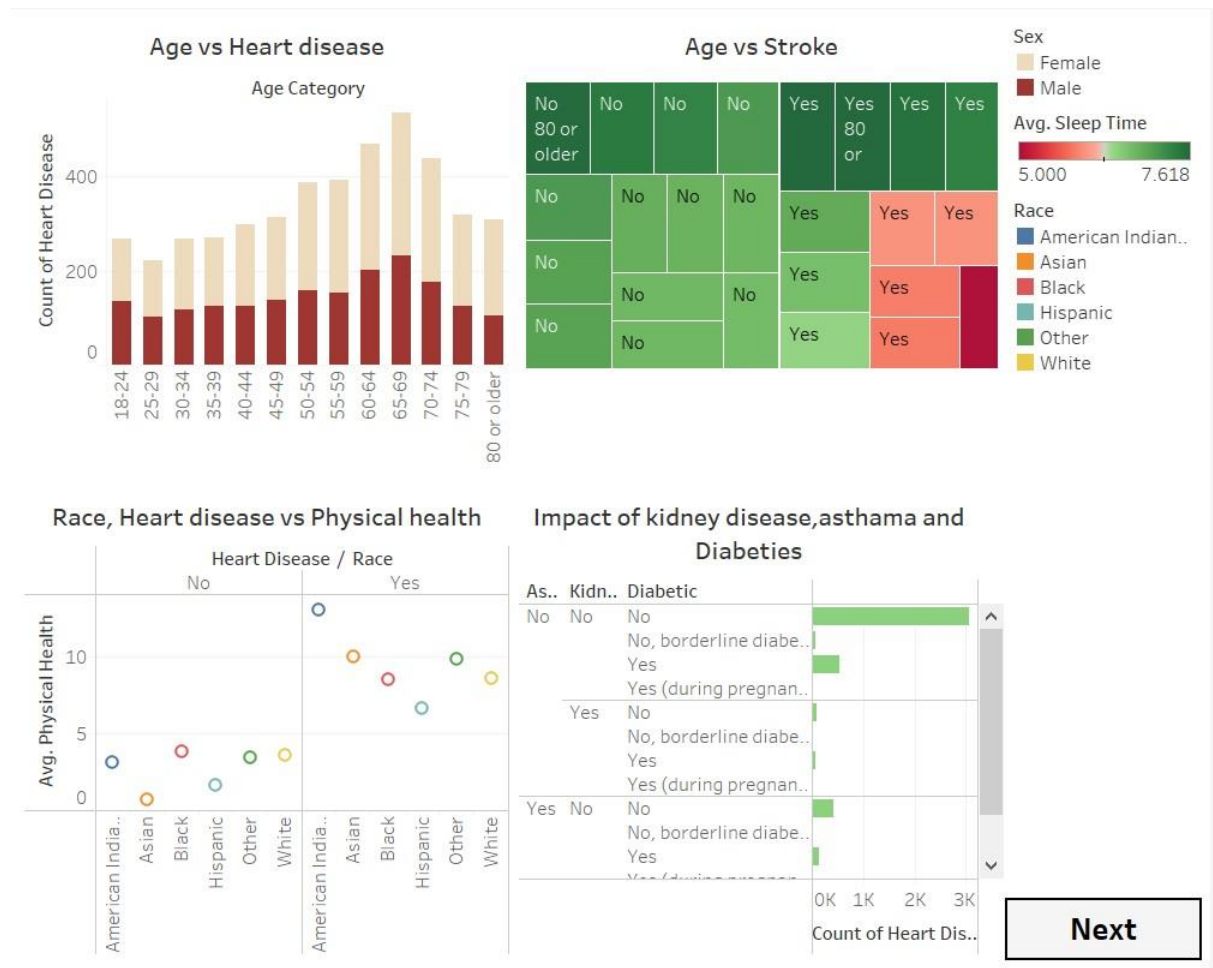


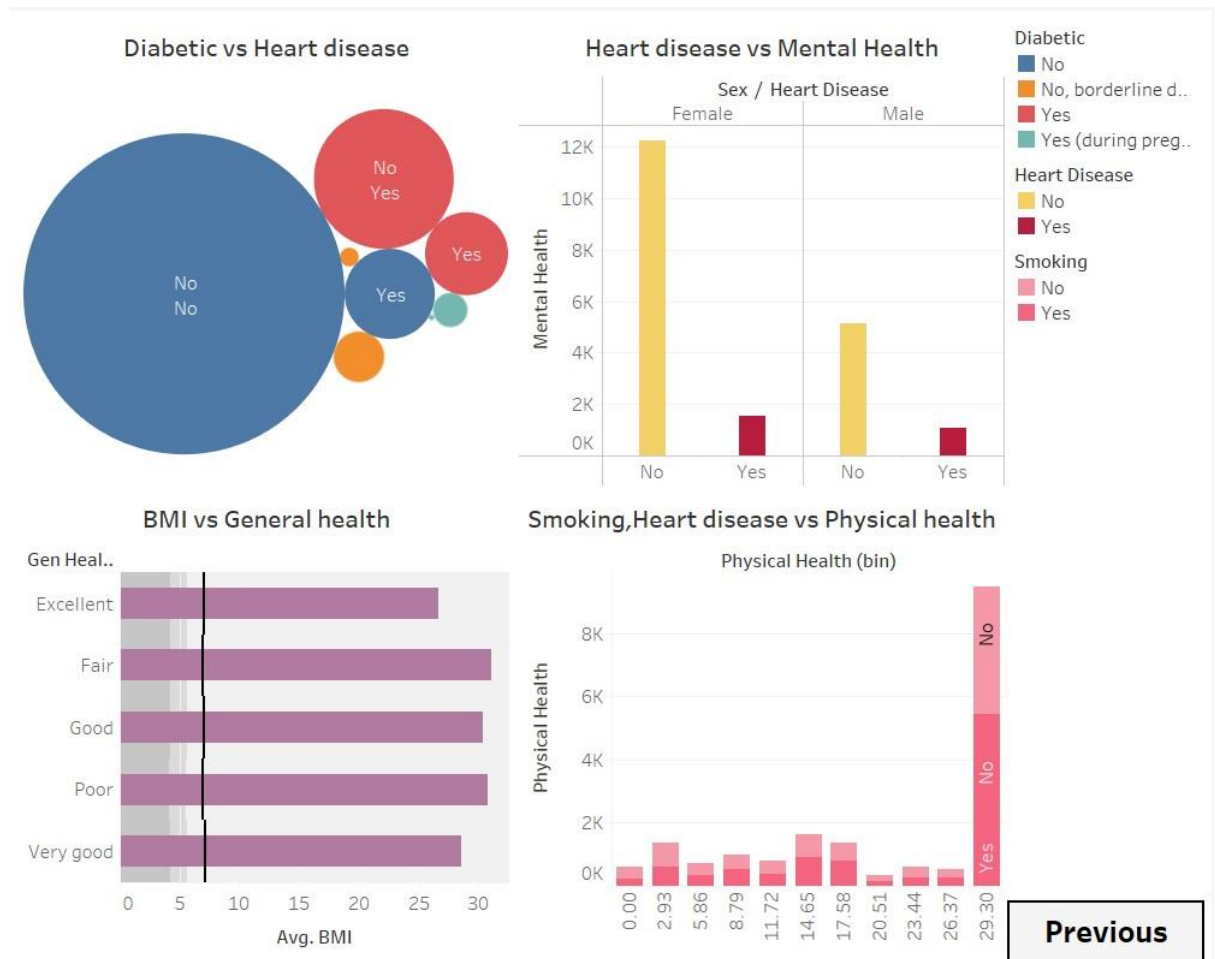


- **Dashboard:**

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Responsive and Design of Dashboard:



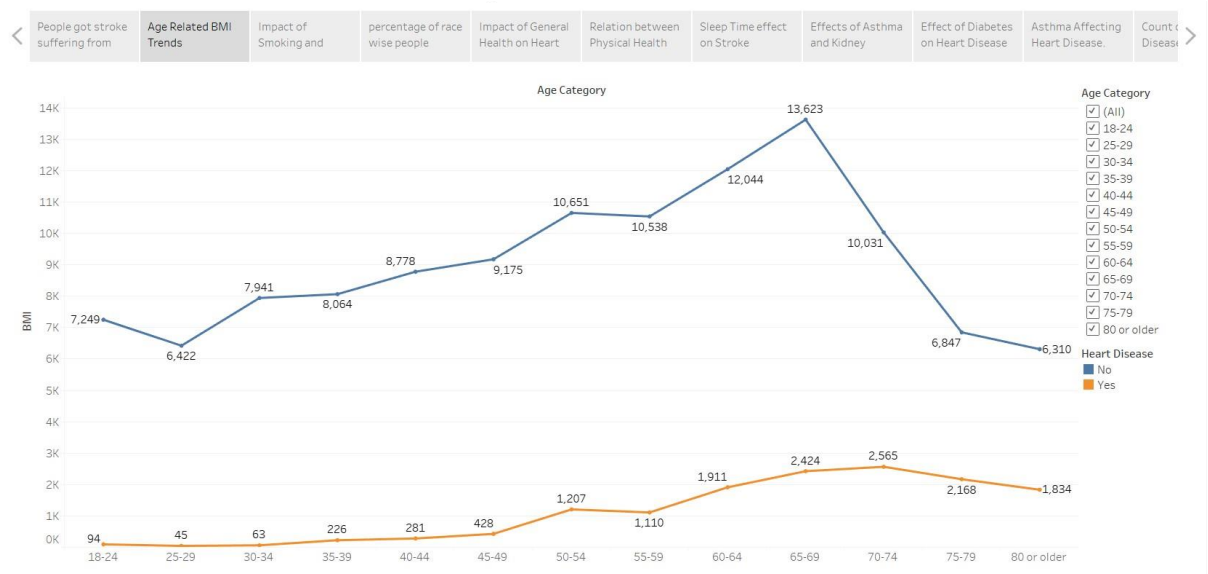
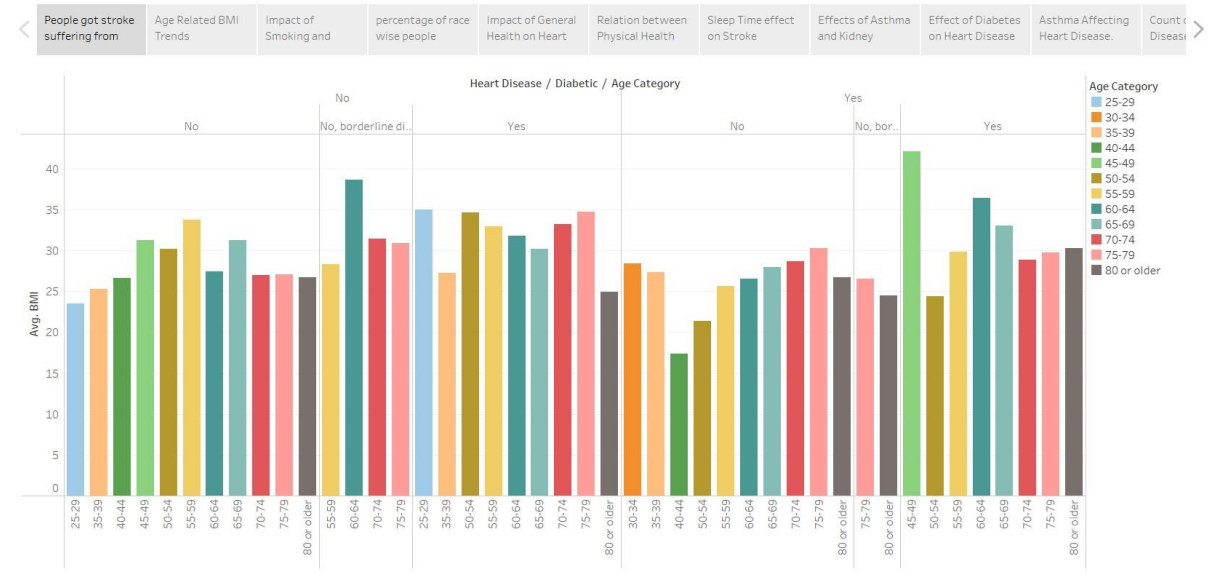


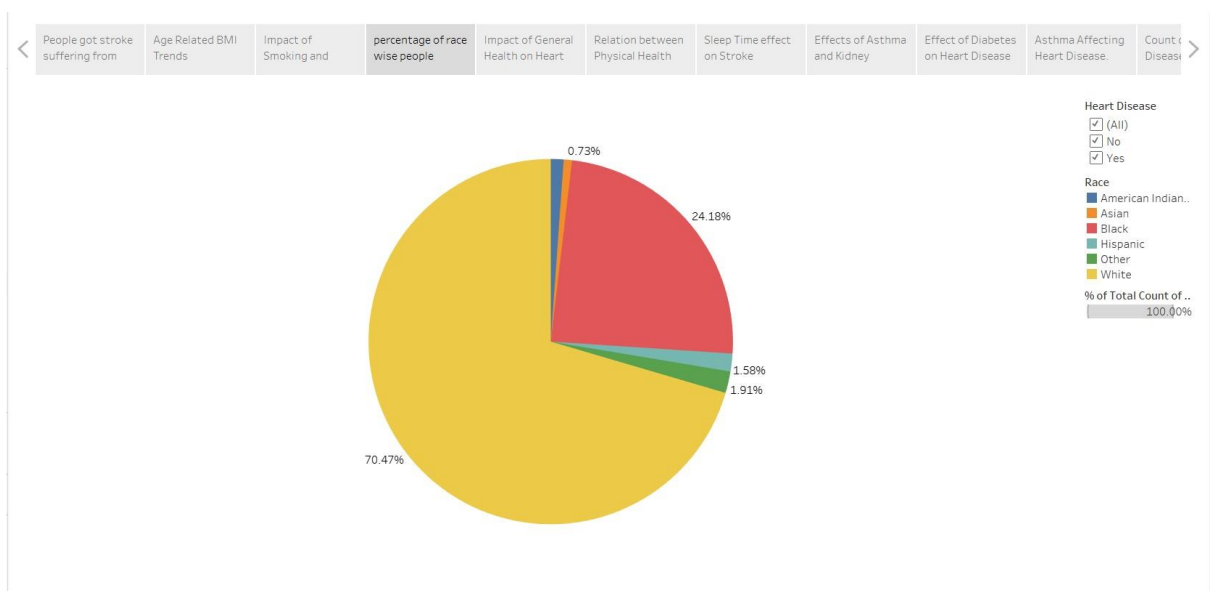
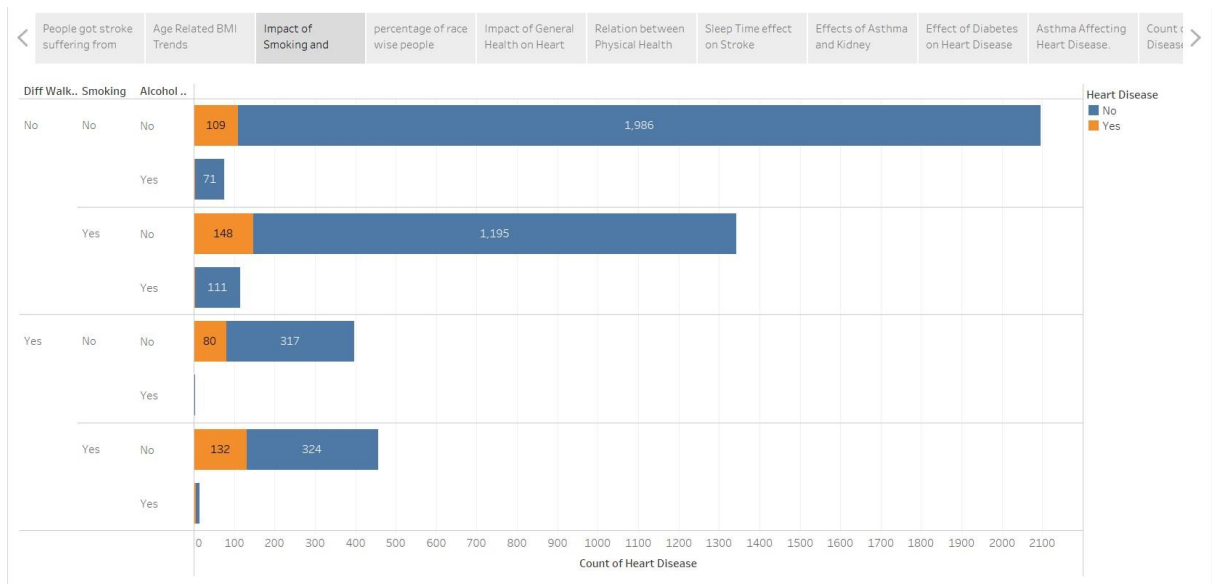
- **Story**

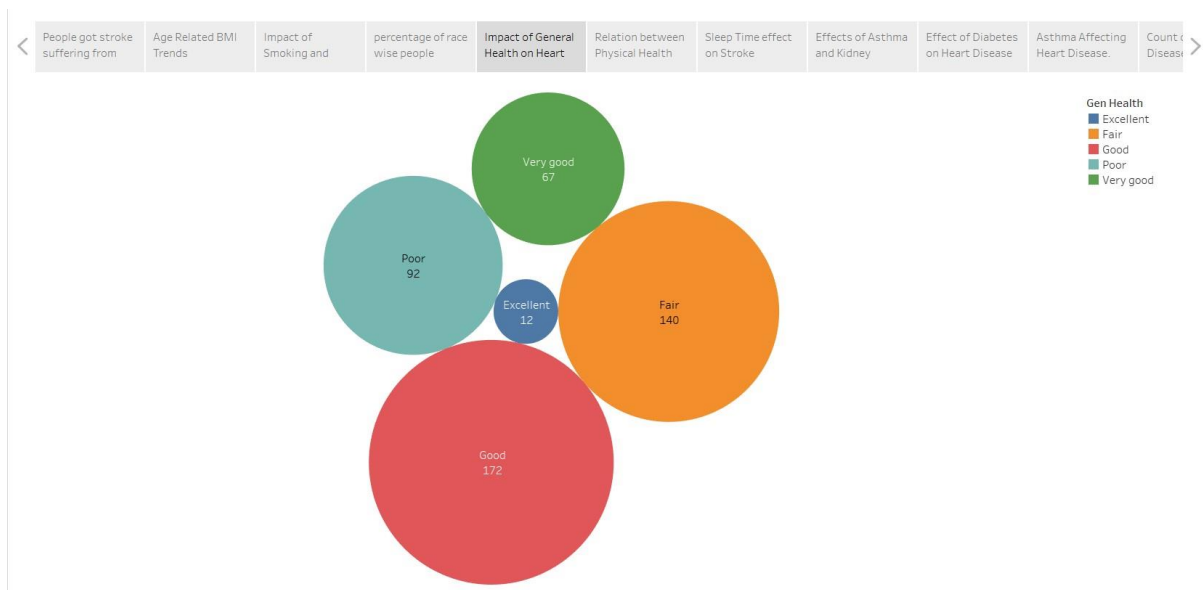
A data story is a way of presenting data and analysis in a narrative format, intending to make the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis logically and systematically, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos.

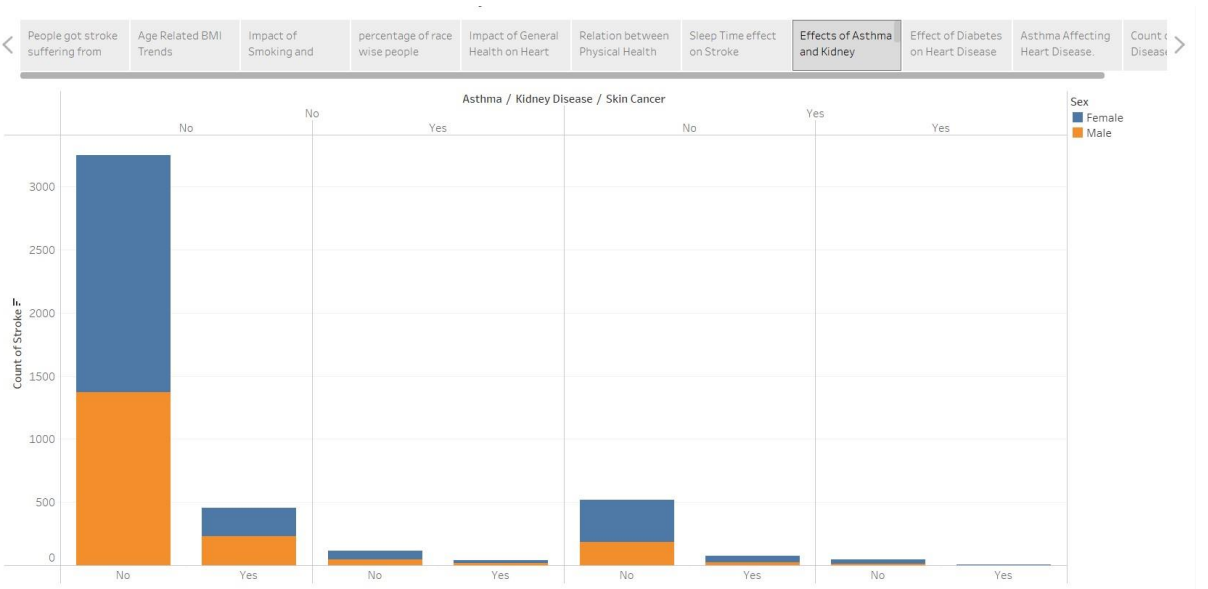
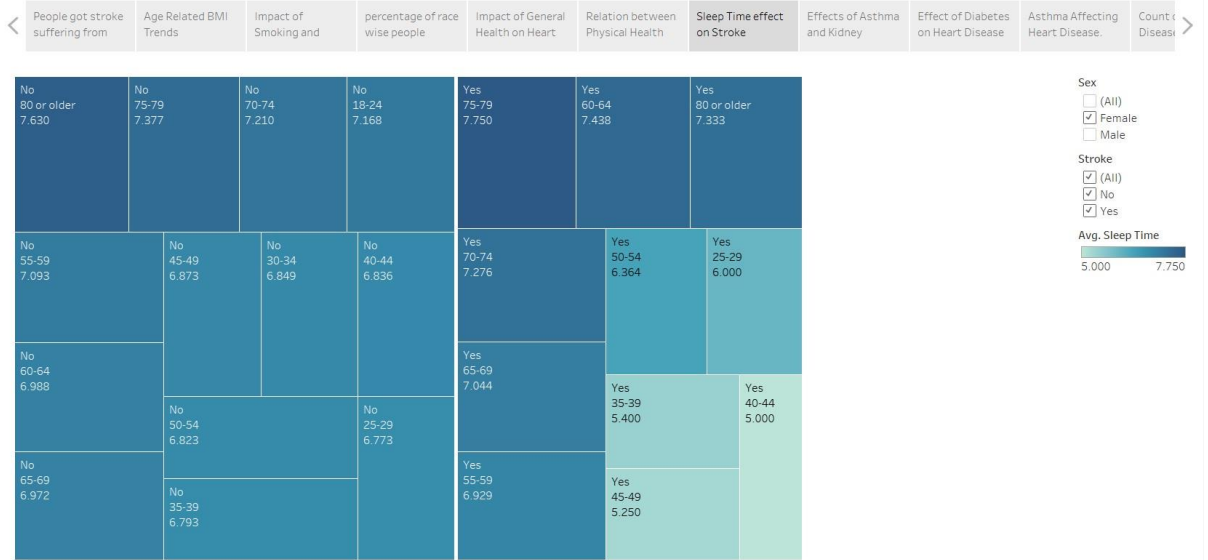
No of Scenes of Story: 11

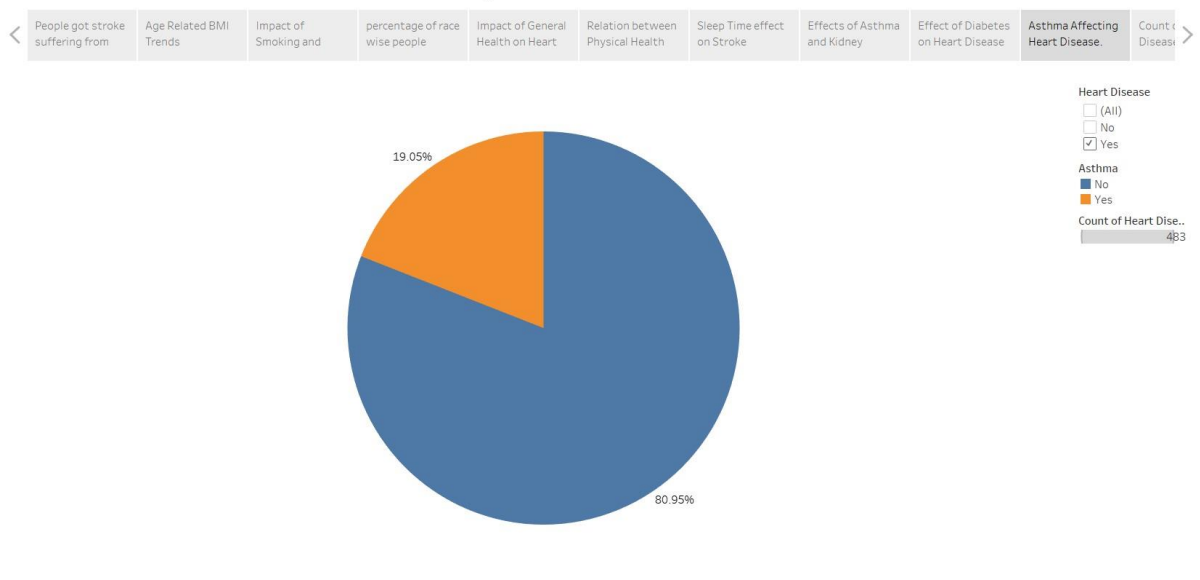
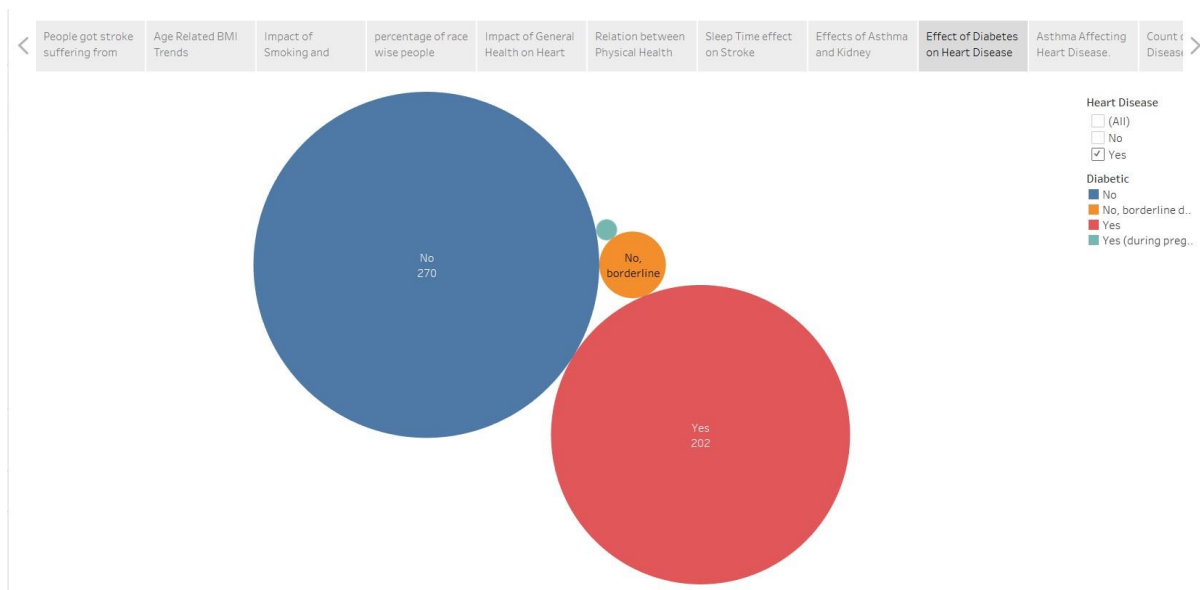
Heart Diseases Visualisation & Prediction Story

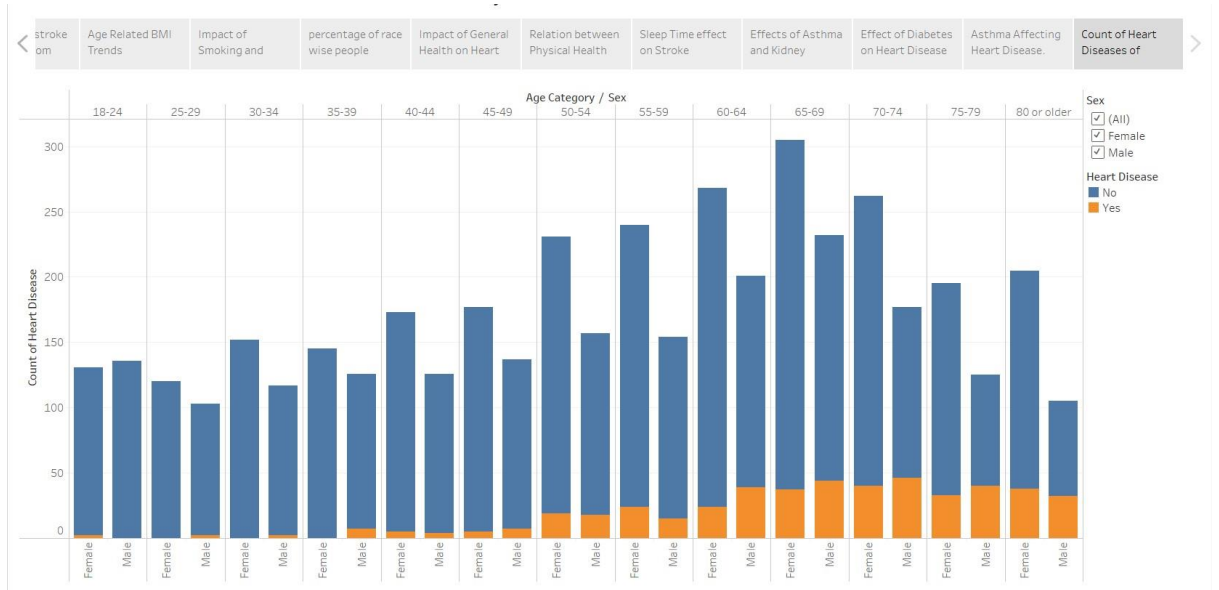




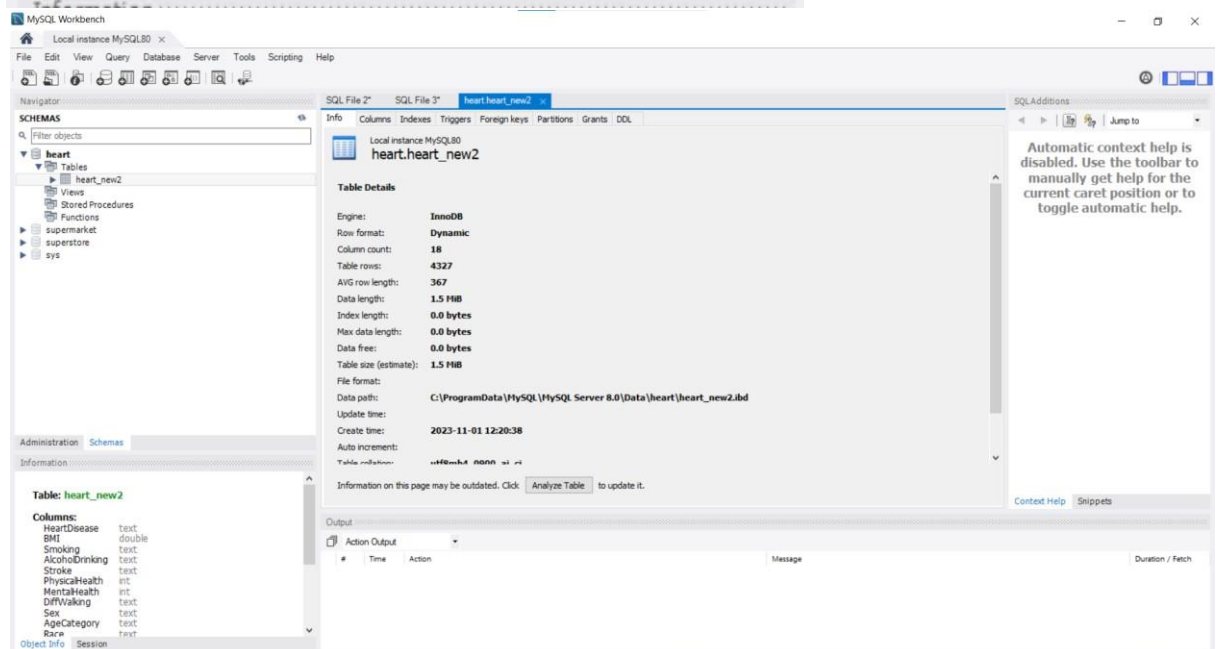
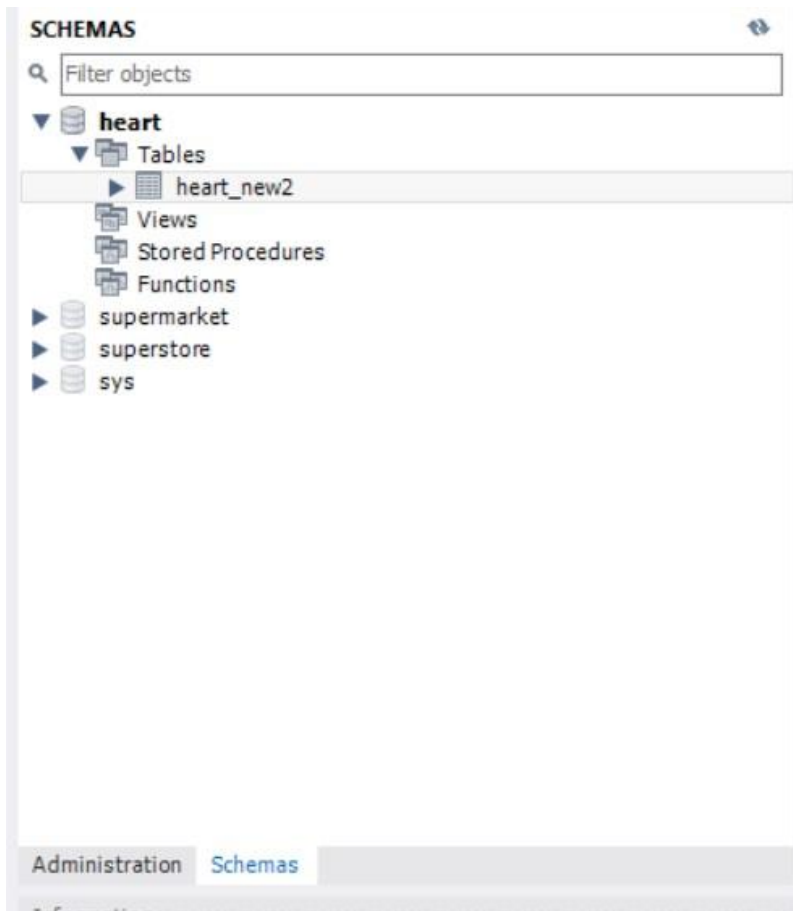




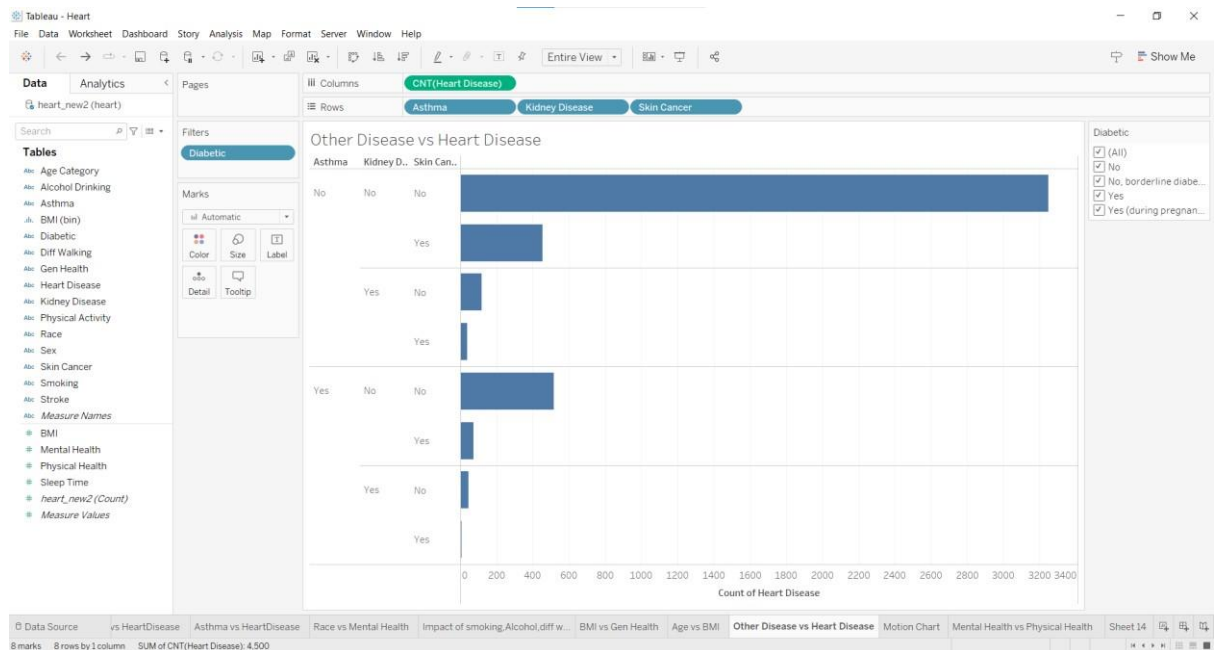
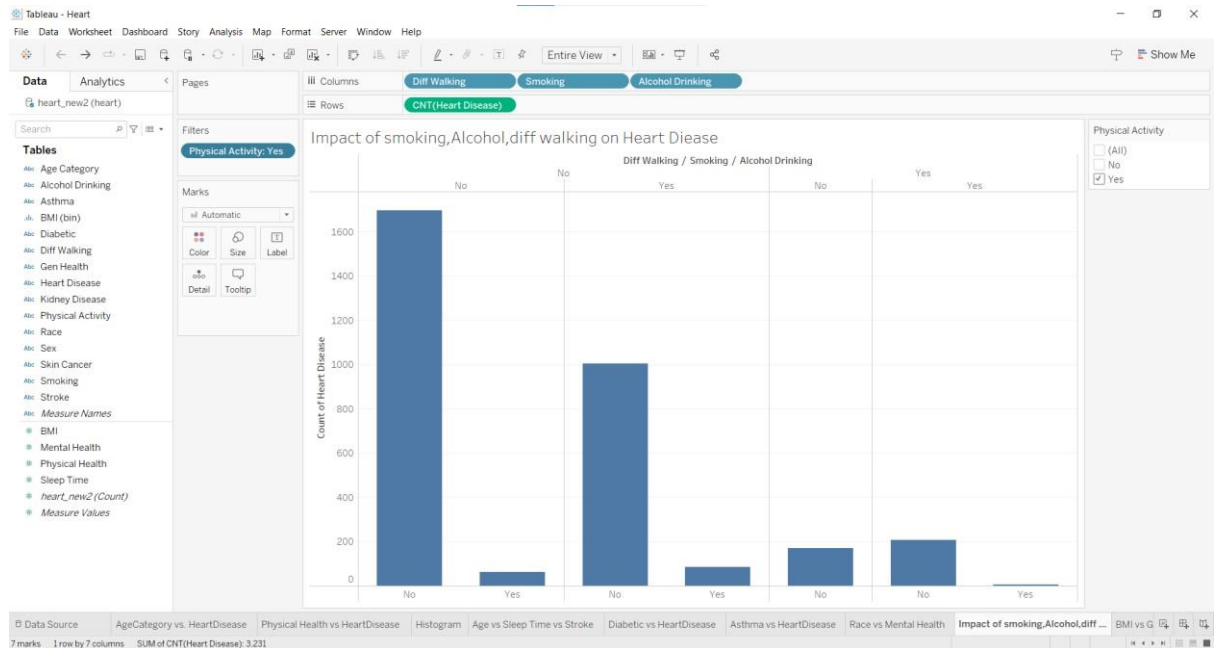


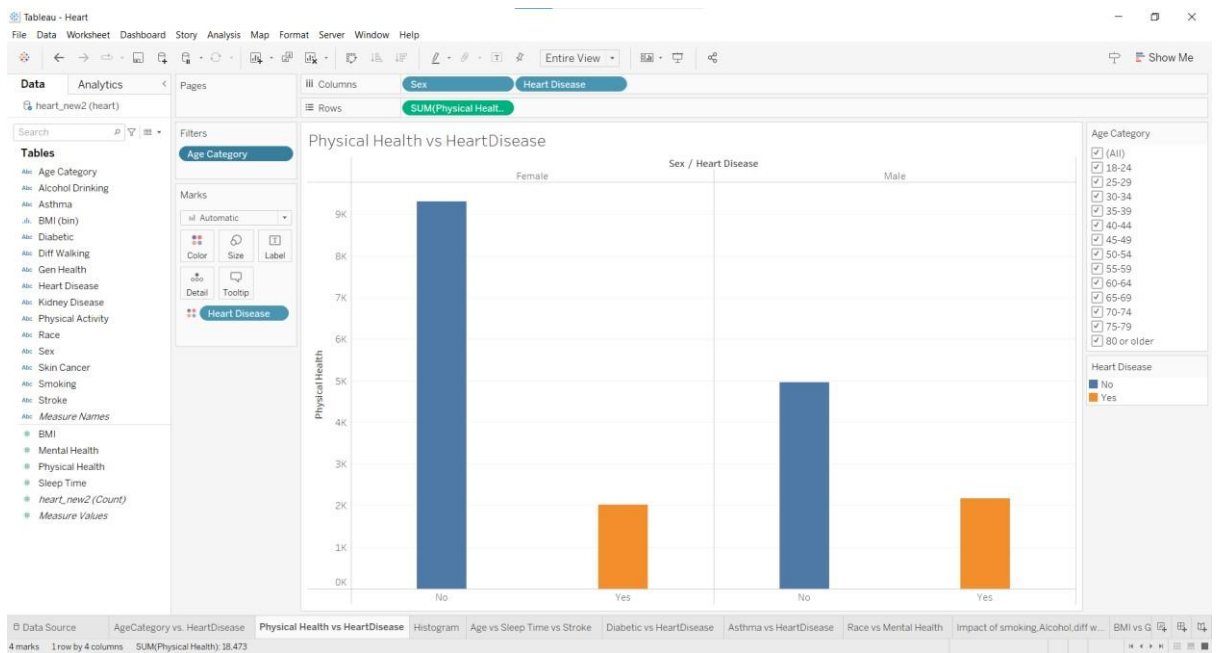
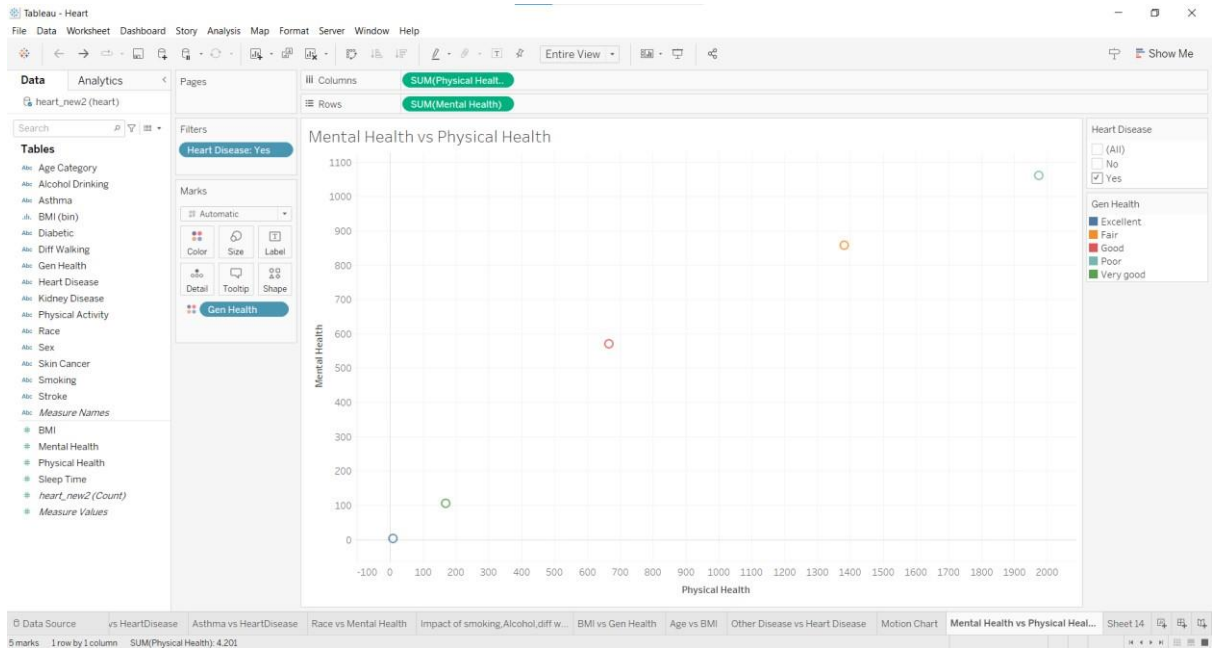


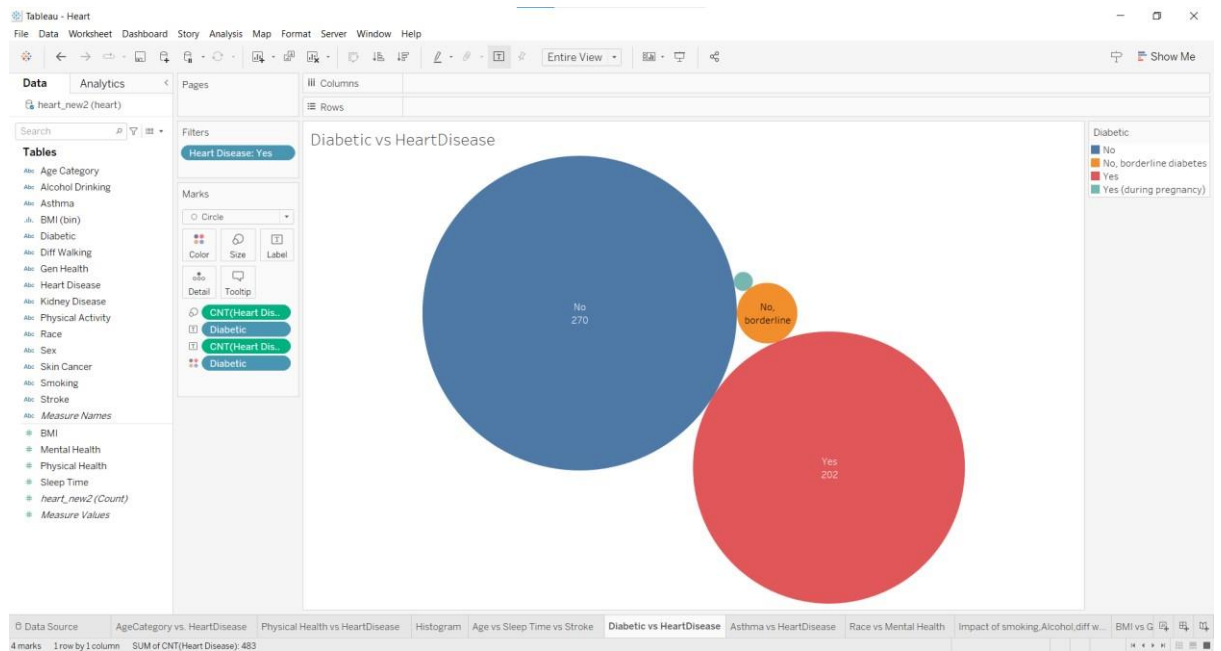
- **Performance Testing**
Amount of Data Rendered to DB:



Utilization of Data Filters:







No of Calculation Fields:

In this analysis we have not created any new column using calculation filed as data found in dataset was clean and sufficient for analysis.

No of Visualizations/ Graphs:


1. Age Category vs. Heart Disease
2. Physical Health vs Heart Disease
3. Histogram
4. Age vs Sleep Time vs Stroke
5. Diabetic vs Heart Disease
6. Asthma vs Heart Disease
7. Race vs Mental Health
8. Impact of smoking, Alcohol, diff walking on Heart Disease
9. BMI vs Gen Health
10. Age vs BMI
11. Other Disease vs Heart Disease
12. Motion Chart
13. Mental Health vs Physical Health

- **Web integration:**

Publishing helps us to track and monitor key performance metrics and to communicate results and progress. help a publisher stay informed, make better decisions, and communicate their performance to others.

Publishing dashboard and reports to tableau public:

Step 1: Go to Dashboard/story, click on the share button on the top ribbon



Give the server address of your tableau public account and click on connect.

Step 2: Once you click on connect it will ask you for the tableau public username and password



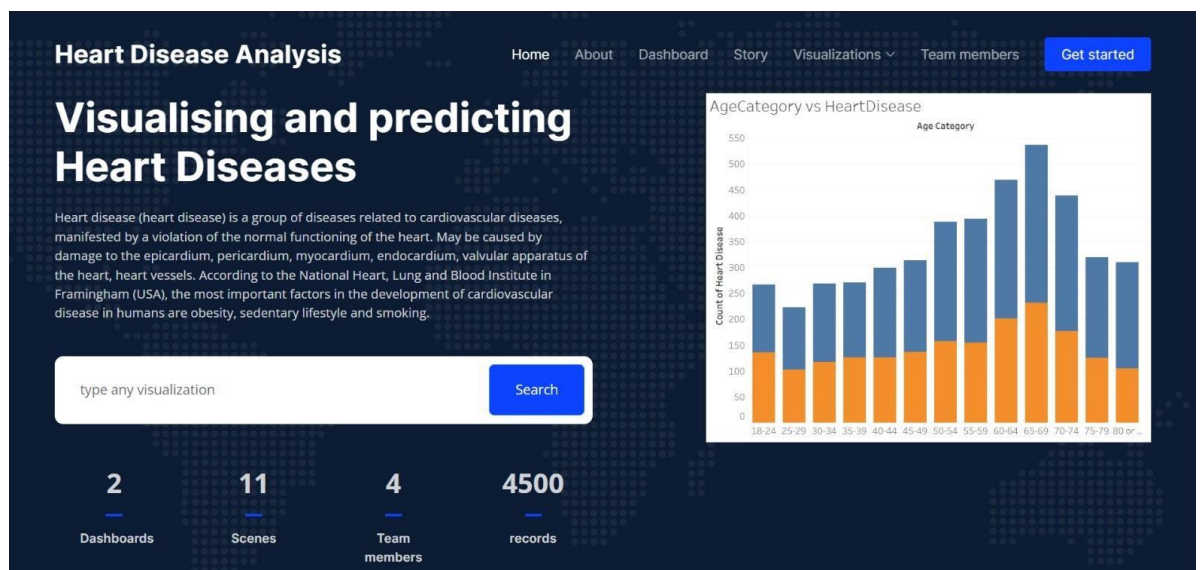
Once you login into your tableau public using the credentials, the particular visualization will be published into the tableau public

These are the dashboard and story links which we have Published:

[Heart dashboard | Tableau Public](#)

[Heart Diseases Visualisation & Prediction Story | Tableau Public](#)

Embed Dashboard and Story with Flask:



About Us

By promoting awareness, prevention, equitable healthcare access, and research advancements, heart disease analysis plays a crucial role in improving the well-being of individuals and society as a whole.



Social Impact

Analyzing heart disease has profound social impacts, ranging from individual-level health outcomes to community empowerment and public health initiatives.



Business Impact

It creates market opportunities, drives innovation, and influences policy and advocacy efforts in the fight against heart disease.



OUR DASHBOARD

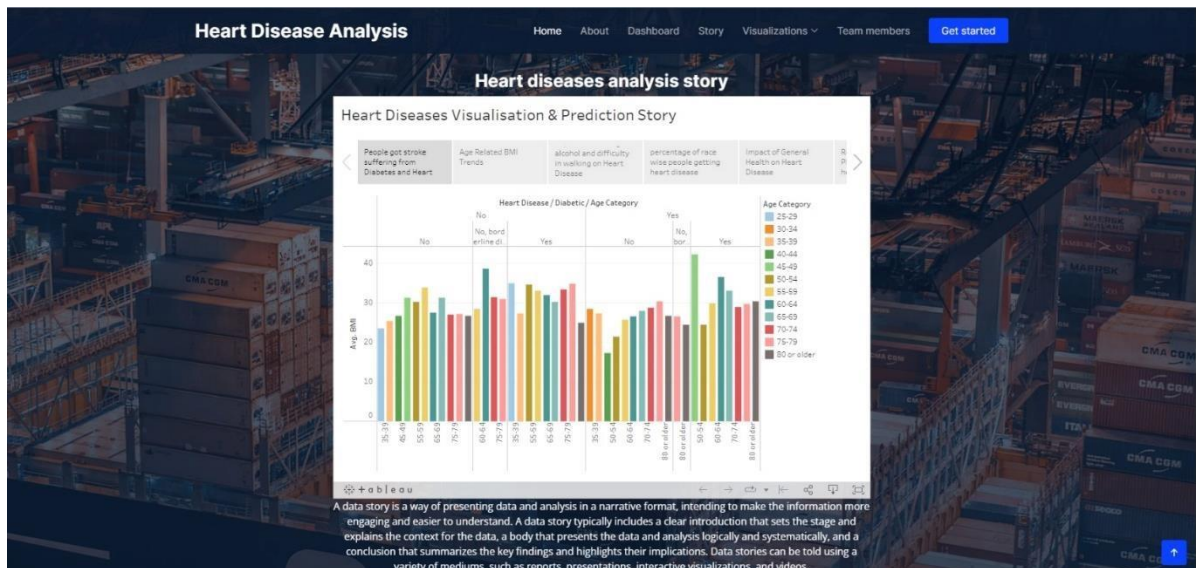


OUR DASHBOARD



Heart Disease Analysis





← → ↻ 127.0.0.1:8000 🔍 📄 ☆ ⚙️ 🔄 🖨️ 🌐

Heart Disease Analysis Home About Dashboard Story Visualizations Team members [Get started](#)

OUR TEAM MEMBERS

Manasa	▼
Chaitra	▼
Madhu Murali	▼
Sriram Pavan	▼

Heart disease analysis

In this project we are trying to analyze the Heart disease related data and be able to extract some insights from the data using Business Intelligence tools. To Extract the Insights from the data and put the data in the form of visualizations, Dashboards and Story we employed Tableau tool.

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Useful Links

- Home
- About our team
- Dashboard
- Story
- Visualizations

Team Members

- MANASA
- Chaitra
- Madhu Murali
- Sriram Pavan

Contact Us

VIT University, INDIA

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Designed by team 591217

Bootstrap Link: <http://127.0.0.1:8000/>