HEALTHCARE ANALYTICS

BUSINESS REPORT

PROBLEM STATEMENT

Heart disease remains the **leading cause of mortality globally**, imposing immense personal, social, and economic burdens. Early detection and preventive strategies are essential to mitigate these impacts. However, the ability to **proactively identify high-risk individuals** using population-level health data remains underutilized.

This analysis aims to:

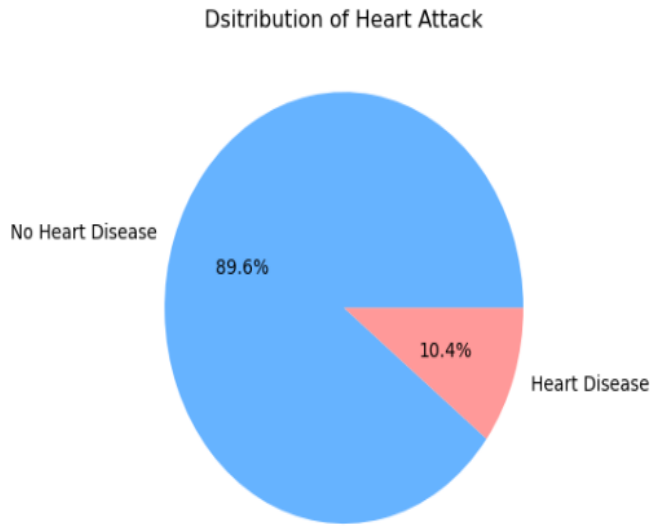
- **Identify the most influential factors** associated with heart disease using exploratory data analysis (EDA).
- Generate **actionable recommendations** for healthcare providers, policymakers, and public health leaders.
- Support the development of **data-driven intervention strategies** for improved cardiac care and prevention.

Objective

Identify key traits and risk factors contributing to heart disease using demographic and health.The analysis of over 230,000 patient records provides compelling evidence of key risk factors for heart disease, such as high blood pressure, high cholesterol, age, gender, low income, and physical health decline.

Heart Disease Prevalence Overview

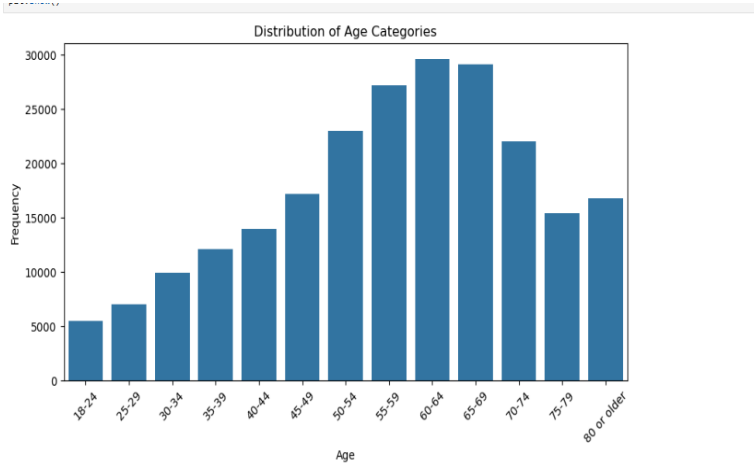
An analysis of the dataset reveals that **approximately 10.4% of the surveyed population has been diagnosed with heart disease or has experienced a heart attack**. This translates to roughly **1 in every 10 individuals**, highlighting a significant burden of cardiovascular conditions within the population.

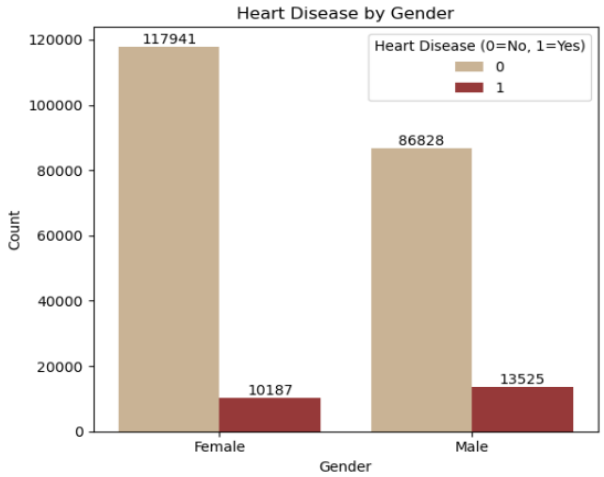


Key Factors associated with heart disease

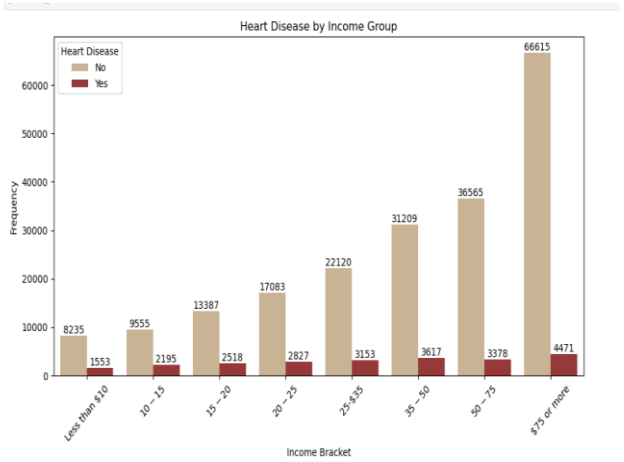
1. Demographic and Lifestyle Insights

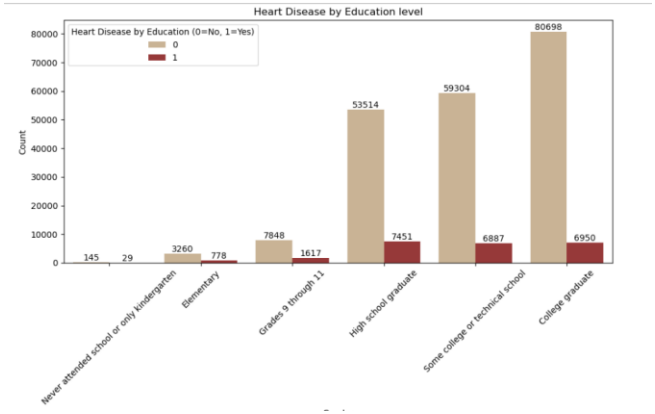
- **Age and Gender**
  - Heart disease prevalence increases sharply after age 50.
  - Highest prevalence was observed in age group **60–74 and then from 80+**.
  - **Men are disproportionately affected (13.5%)** compared to women (8%) — this may be due to behavioural and biological differences.
  - Heart disease prevalence increases significantly after age 45; men are 1.7x more likely to develop heart disease than women.





- **Income and Education**
  - **Heart disease is inversely related to income.** Individuals earning less than $10,000 show a 15.9% prevalence vs. only 6.3% in those earning over $75,000.
  - **Lower educational levels correlate with higher heart disease prevalence**, suggesting reduced health awareness and access.

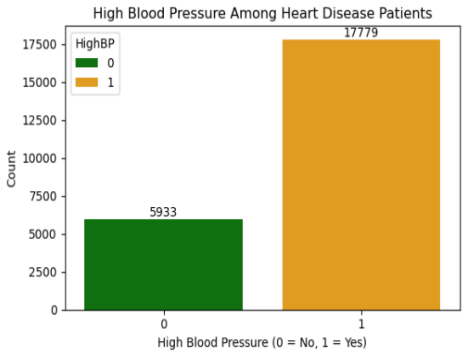


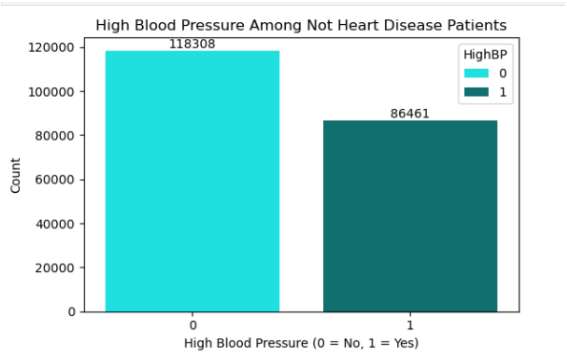


Lower income and lower educational attainment are both strongly associated with higher heart disease rates. Individuals earning <$10,000/year show a 15.9% prevalence versus 6.3% in those earning >$75,000.

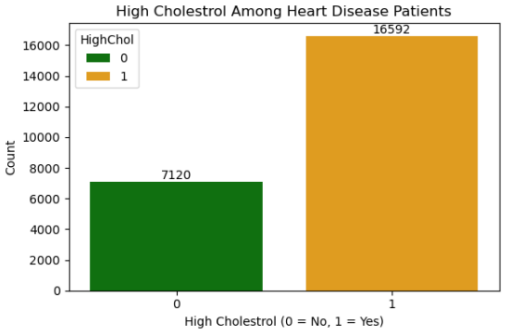
2. Health Conditions and Behaviours

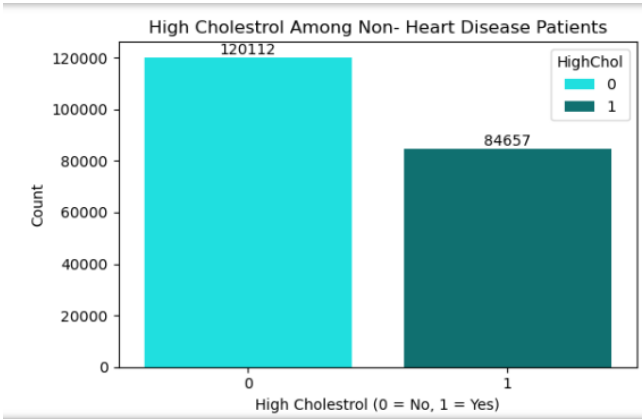
- **High Blood Pressure**
  - Among the **23,712 individuals diagnosed with heart disease or a history of heart attack**, approximately **74% are also affected by high blood pressure.**
  - In contrast, within the **204,769 individuals without heart disease**, **42% report having high blood pressure**.
  - Strongest categorical predictor; must be monitored and managed as a priority.



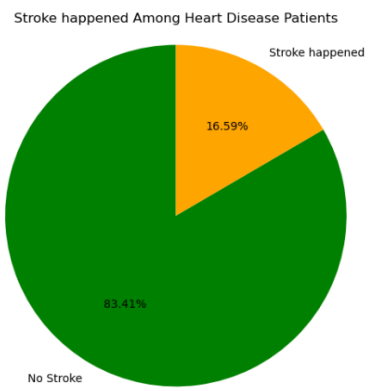


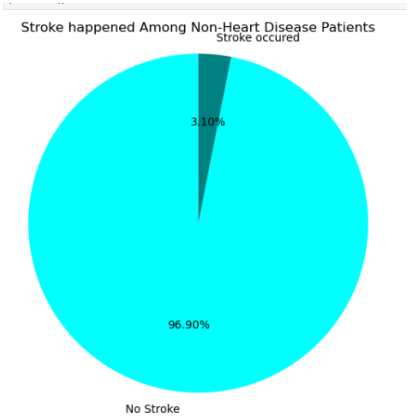
- **High Cholesterol**
  - **70% of heart disease patients** report high cholesterol, compared to only 41% of non-heart disease individuals.
  - Suggests a major link between lipid profile and cardiac events.





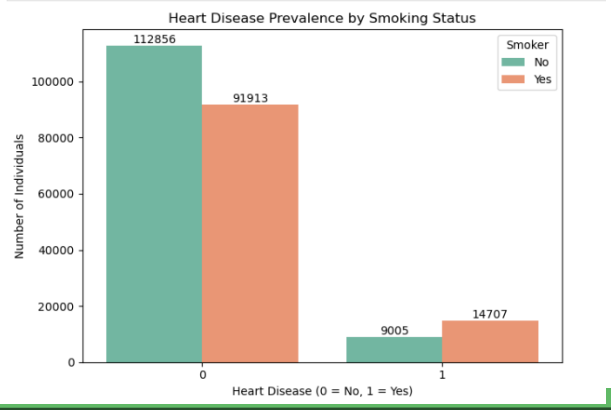
- **Stroke**
  - Heart disease patients are **5 times more likely to have had a stroke**.
  - Indicates shared risk factors (e.g., hypertension, vascular damage) and need for integrated monitoring.



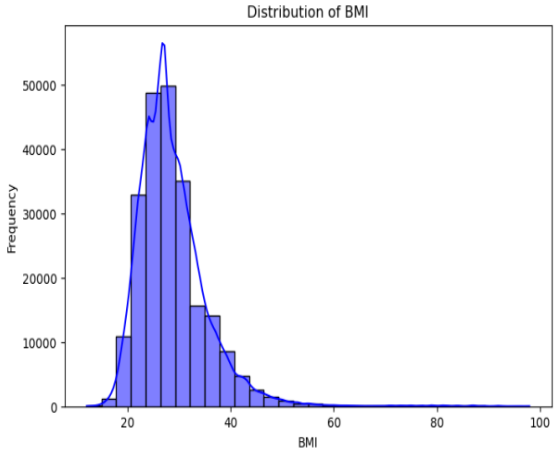


- **Smoking**
  - Almost **47% of respondents are smokers**, evenly split among heart disease and non-heart disease groups.
  - Among those with heart disease, **62% are smokers**, while **only 44.9% of** non-heart disease individual's smoke

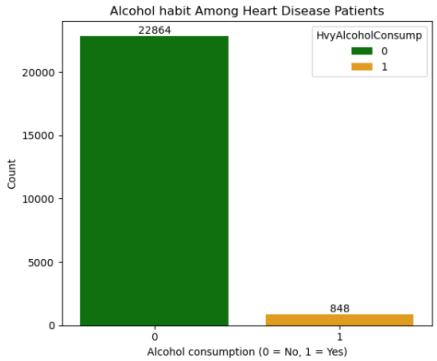
This indicates a strong positive correlation between smoking and heart disease.



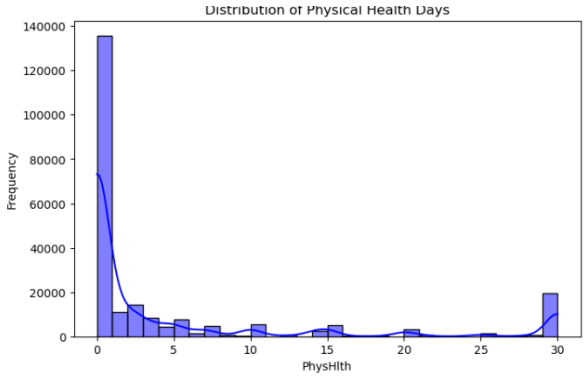
- **BMI**
  - Overweight range (BMI 25–30) dominates both groups, but heart disease patients show slightly higher averages.
  - High BMI is a contributing but not standalone predictor.

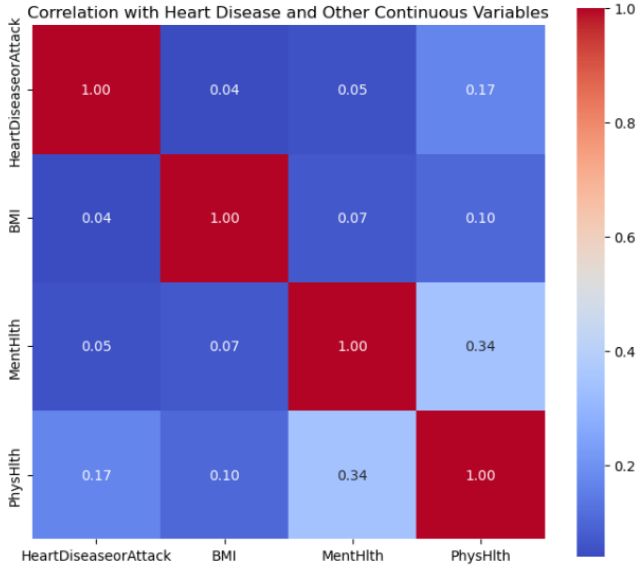


- **Alcohol Consumption**
  - Surprisingly, **heavy drinking is slightly lower among heart disease patients (3.6%)**.
  - This may be due to underreporting or behavioural changes post-diagnosis.



- **Mental and Physical Health**
  - Those with more physically unhealthy days show higher prevalence of heart disease.
  - Physical health has the **highest continuous correlation (0.17)** with heart disease.
  - Mental health shows right-skewed data with some chronic stress cases, aligning with literature on stress-heart disease connections.
  - A **long tail** exists — a smaller group reports poor mental health for **more than 20 days**, indicating chronic or severe mental health issues.
  - The presence of **a high frequency at 30 days** may indicate a subset suffering from chronic physical illness.
  - The majority experience **low frequency of poor physical health**, yet a substantial number have **multiple physically unwell days**, possibly aligning with high BMI, lack of exercise, or existing health conditions.

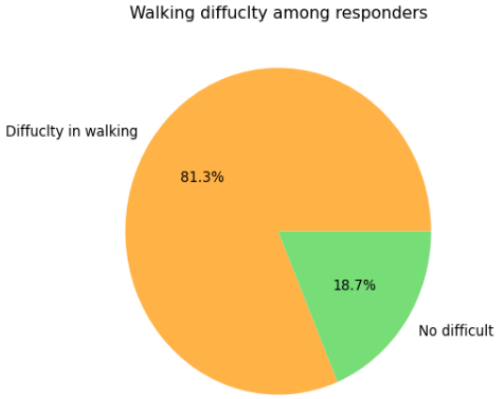




- **Mobility (Walking Difficulty)**

  - Individuals with **walking difficulties** show increased heart disease risk.
  - **18.7% of total respondents report difficulty in walking**, which may reflect underlying mobility limitations or chronic health conditions.

  - Notably, among individuals diagnosed with heart disease, **42% experience walking difficulties**, compared to only **16% of those without heart disease**.


Walking diffuclty among responders
Diffuclty in walking
81.3%
18.7%
No difficult

RECOMMENDATION AND STRATEGIC INSIGHTS

Prevention & Screening

- **High BP and cholesterol screening** must be prioritized, especially in males over 50, and in lower-income or less-educated populations.
- Prioritize screening in **geographically underserved and low-income regions**.
- Design **gender-sensitive educational campaigns** focusing on modifiable behaviors like smoking cessation, weight management, and physical activity.
- Launch **community health literacy programs** using simple language and visuals targeting smoking, diet, and stress.
- Offer **free check-ups** for those with income <$25k or less educated people.

For Clinical Care Providers

- Build emergency healthcare dashboards that flag patients with multiple risk factors (e.g., male, >50, high BP, high BMI).
- Refer eligible patients to **structured exercise programs**, smoking cessation workshops, and mental health support services.
- Individuals with **stroke history, walking difficulty, and physical illness** should be flagged for cardiac evaluation.
- Set up **integrated care units** combining cardiology, nutrition, and mental health for patients with obesity, hypertension, or post-stroke.
- Offer **counseling** for patients with multiple physically unwell days or chronic stress, as these indirectly impact heart health.

For Researchers and Healthcare Data Teams

- Train machine learning models using the key predictors identified (age, sex, BP, cholesterol, BMI, education) to estimate heart disease risk in real time.
- Conduct deep dives into why **men and low-income groups** are at higher risk—quantify cultural, behavioral, or access-to-care issues.

For Health Insurers

- Design **insurance plans** that adjust premiums based on modifiable risk factors (e.g., smoking status, BMI) but **incentivize preventive actions** with lower premiums or wellness credits.
- Offer **free annual screenings** for high-risk customers and track compliance digitally (e.g., via health apps or smart device).

Thank you