



**GROUP 14**

# **VITAL SIGNS DATA ANALYSIS REPORT**

**DATA SCIENCE FOR THE HEALTH  
SCIENCES**

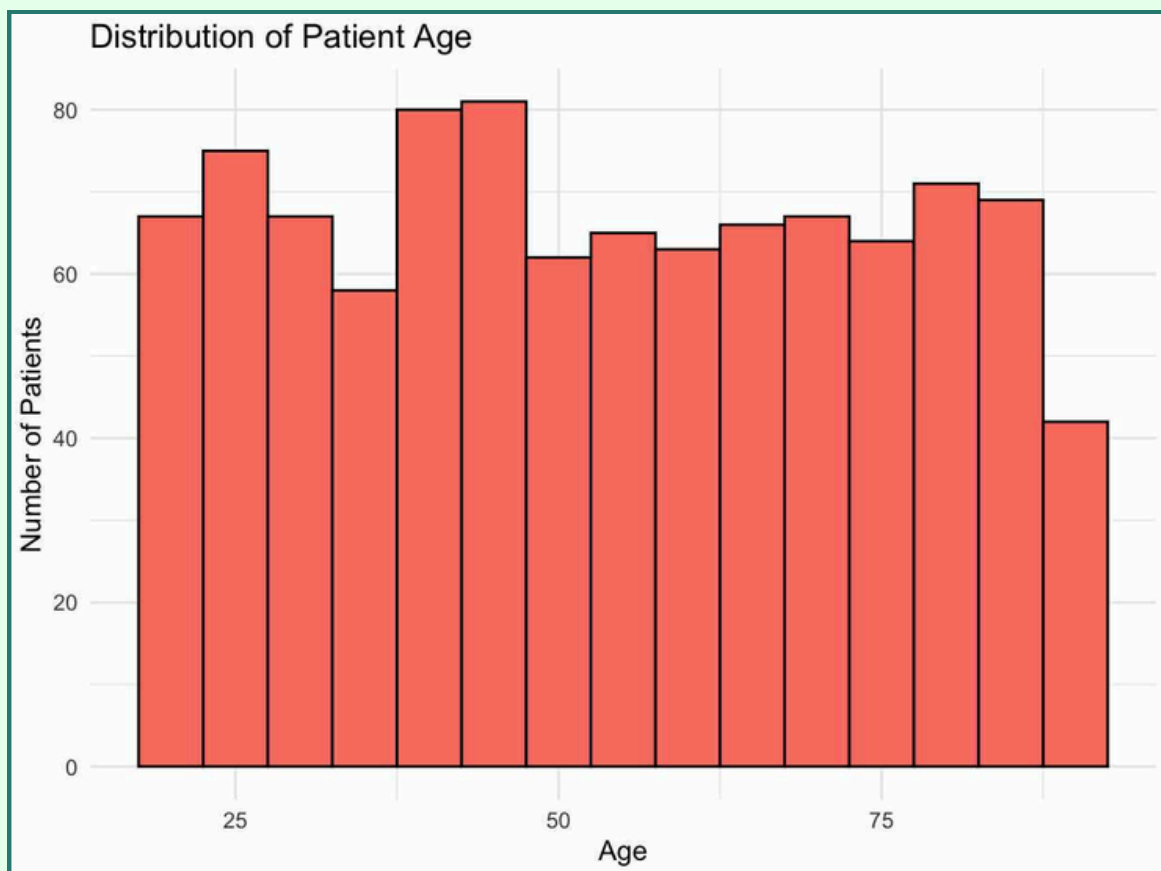
# INTRODUCTION

Vital signs, such as blood pressure, temperature, pulse, oxygen saturation, and respiratory rate, are thought to be crucial for hospitalized patient monitoring. Vital sign changes before clinical deterioration are well-documented, and prompt care depends on early identification of avoidable consequences. (Brekke et al., 2019).

This study explores the dataset **"1\_Vital\_signs\_diagnosis\_data\_Group\_014.csv"**, which contains data on patient demographics, body composition (weight, height, and BMI). Its clinical data such as Blood Pressure (Systolic and Diastolic), Hypertension, Heart rate. Smoking status, Physical activity, Stress level and Daily sleeping hours. Also its nutrition intake glucose and cholesterol. Elevated Risk containing pre-diabetes, Type 2 diabetes, Normal/ No Major Risk, Obesity, Insulin Resistance, and Pheochromocytoma, Cardiovascular Disease.

Analyzing the dataset, we aim to find patterns that can aid in personalized diet planning and public health initiatives. It looks at the distribution of important variables, the link between physical activity and diet, and tracks macronutrient trends using statistical methods and visualizations. The goal is to understand general eating habits, identify key nutritional gaps, and recognize potential health risks.

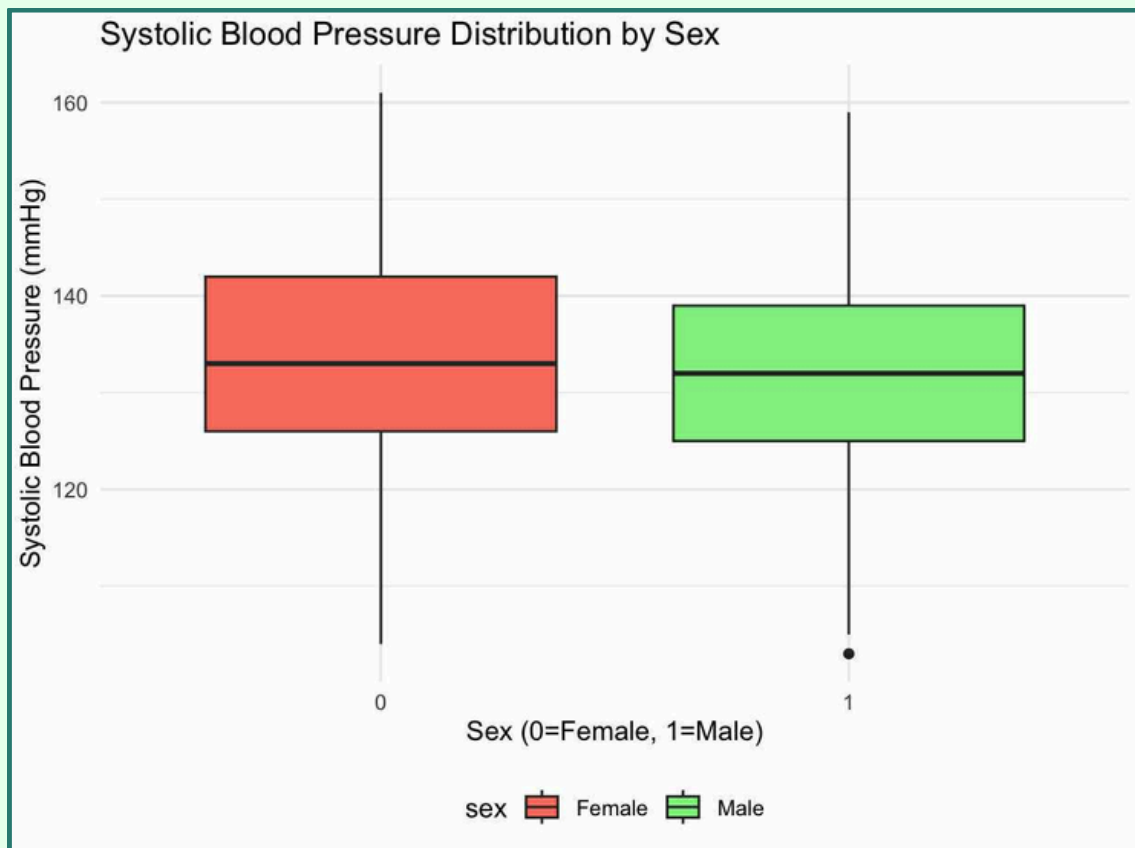
# RESULTS AND FIGURES



## Distribution of Patient Age

The histogram shows that the most dominant age range are approximately between 40 and 50 years old. Looking at each bars represent number of patients, we can see that at number of patients values around 80 to 82 have the highest concentration of patients.

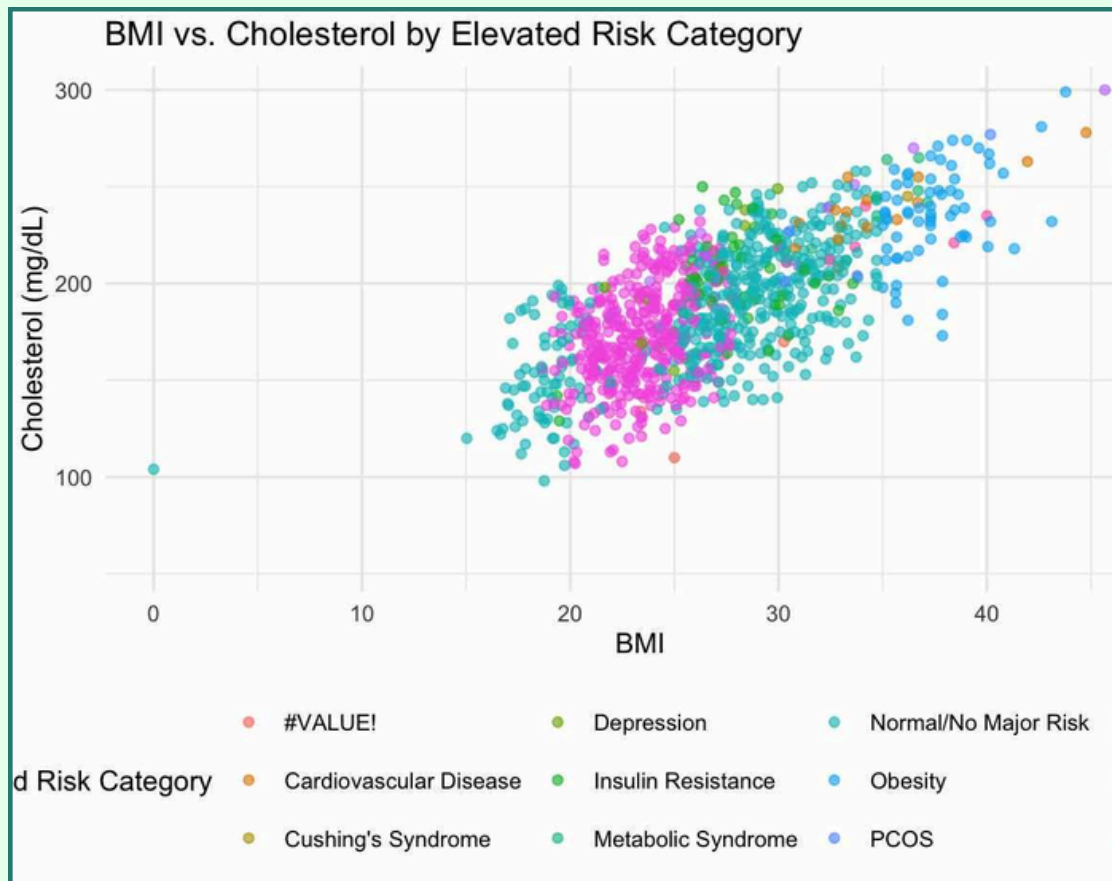
# RESULTS AND FIGURES



## Distribution of Systolic Blood Pressure by Sex

The box plot shows a distribution of Systolic blood pressure levels between female (red box) and male (green box). Both sexes show similar total range of systolic blood pressure. but their median have a difference for female appears slightly higher than for males. The spread of their SBP values is slightly wider for female than for males.

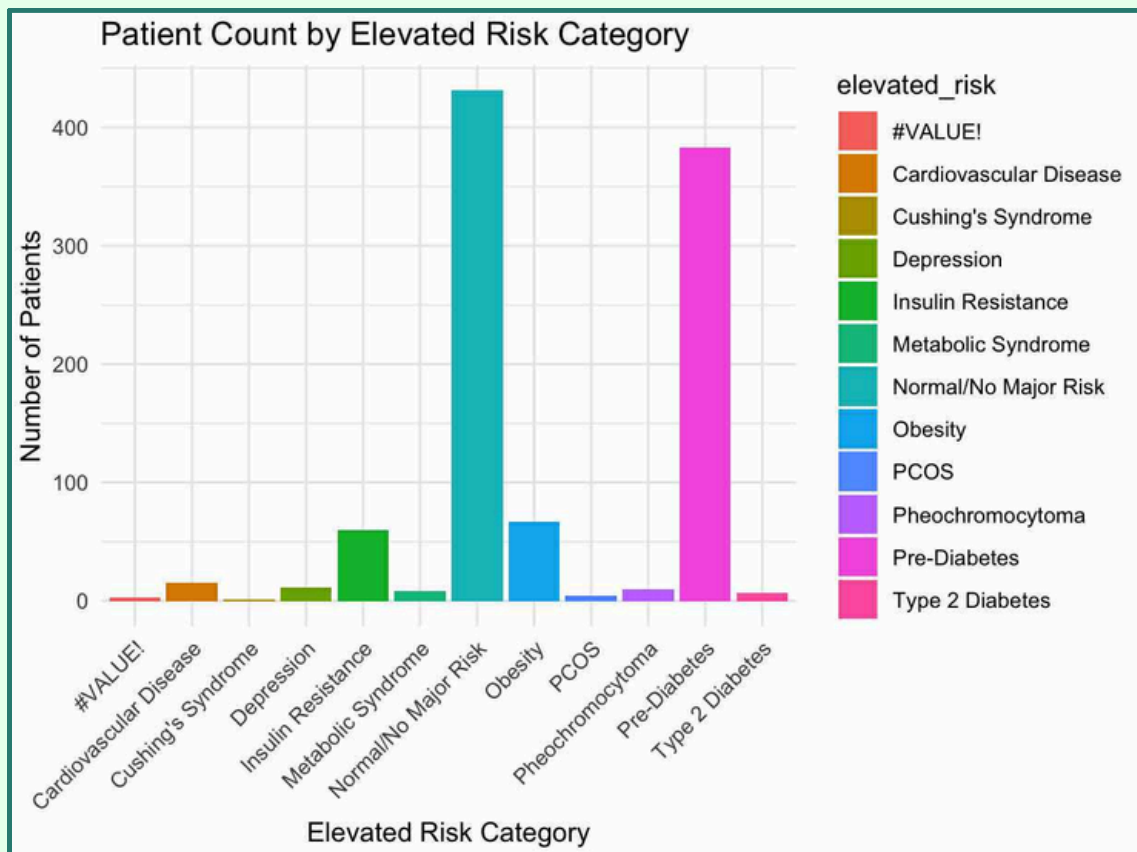
# RESULTS AND FIGURES



## BMI vs. Cholesterol by Elevated Risk Category

The scatter plot shows a positive correlation between BMI and Cholesterol. As BMI increases, cholesterol levels also increase, forming an upward-sloping cloud of points. Higher BMI and cholesterol tend to have increased health risk, particularly conditions like obesity, cardiovascular disease and diabetes.

# RESULTS AND FIGURES



## Patient Count by Elevated Risk Category

The bar graph shows the health risk distribution among the patient population, emphasizing that although a significant portion falls within the normal range, a notable number are classified as pre-diabetic, and various other specific conditions are observed in small proportions.

# KEY FINDINGS

## Most Frequent Elevated Risk:

1. **Normal / No Major Risk (teal):** Approximately 420-430 patients shows that a significant portion of the population not classified under a major health risk.

1. **Pre-Diabetes (Pink)** rounding to 380-390 patients is that considering number of patients is at risk of developing diabetes

## Moderate Frequent of Elevated Risk:

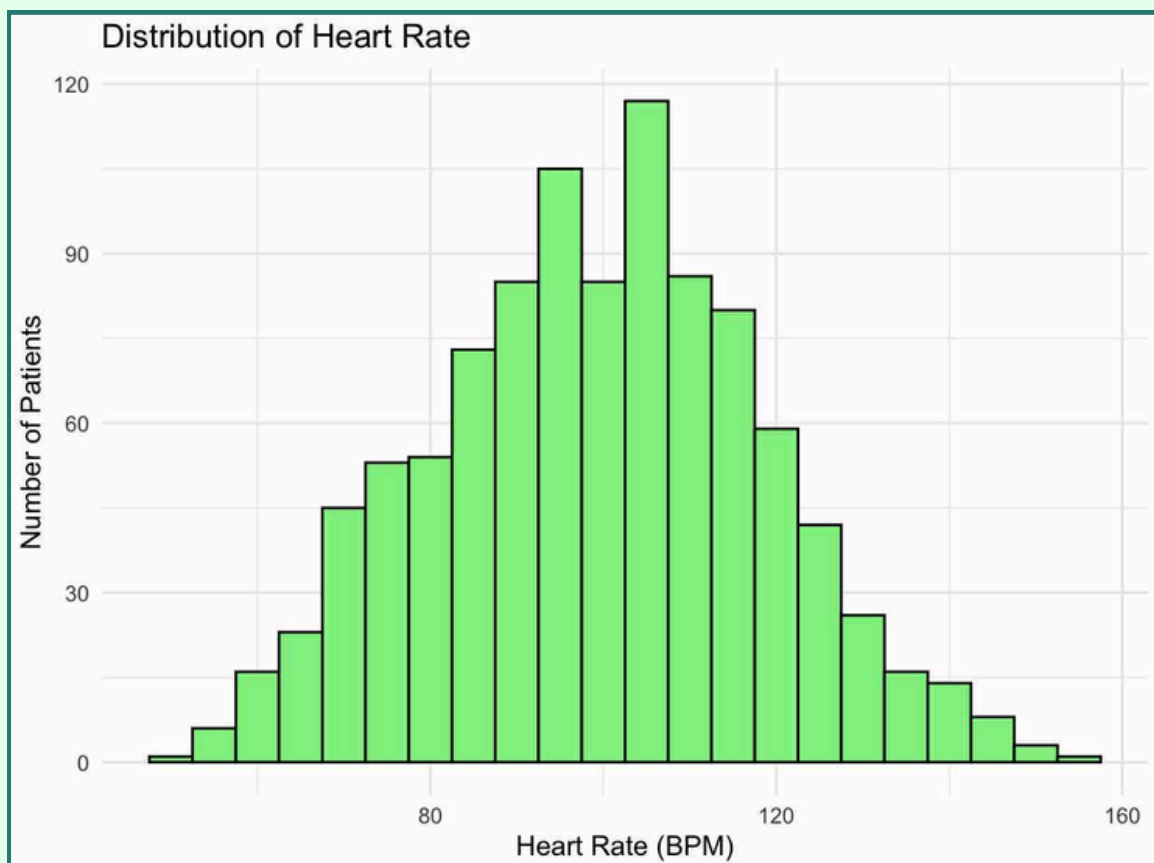
1. **Insulin Resistance (dark green):** have approximately 60-70 notable number of patients.

1. **Obesity (Light blue bar):** 70 - 80 patients that are obese.

## Less Frequent of Elevated Risk:

1. **Other Category** have fewer patients that is ranging from about 20-30 patients

# RESULTS AND FIGURES

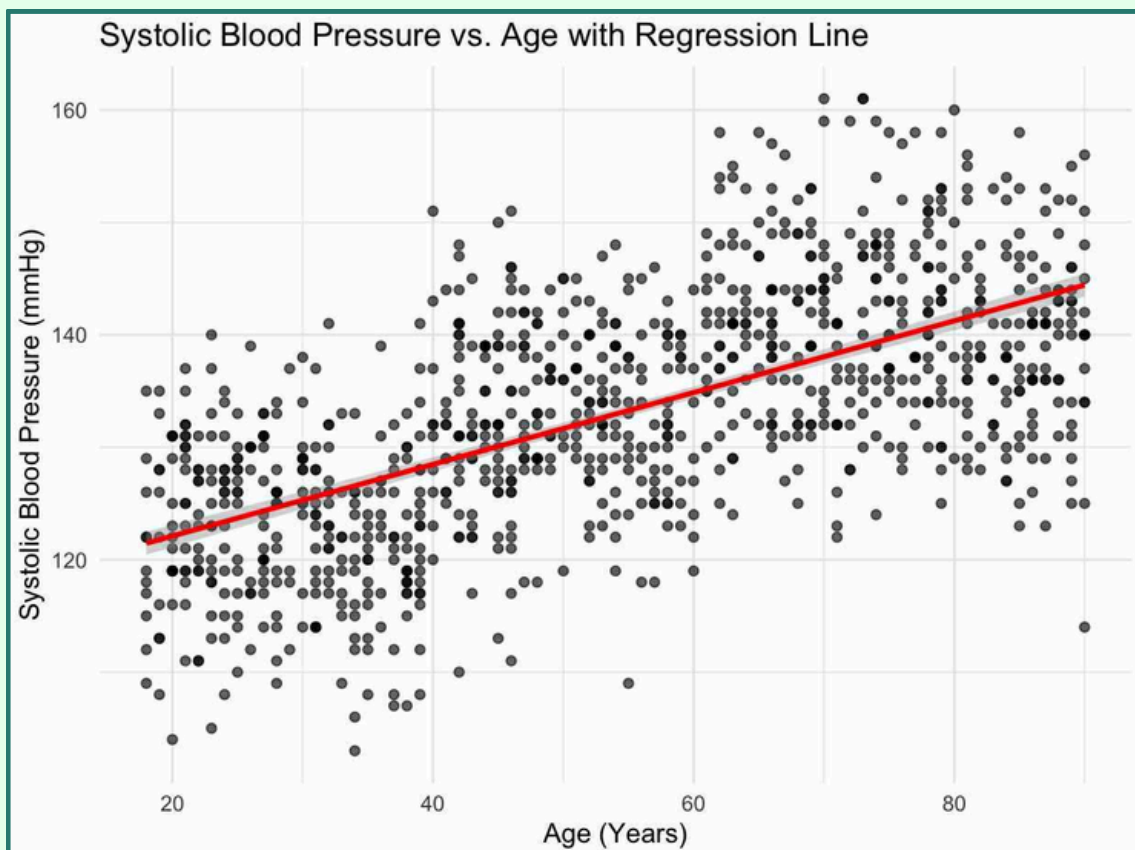


## Distribution of Heart Rate

The histogram shows that the most dominant age range are approximately between 40 and 50 years old. Looking at each bars represent number of patients, we can see that at number of patients values around 80 to 82 have the highest concentration of patients.



# RESULTS AND FIGURES



## Systolic Blood Pressure vs. Age with Regression Line

The scatter plot clearly shows a **positive linear correlation** between age and systolic blood pressure by looking at the red regression line. Approximately 20 years to over 80 years old patients are more likely to have higher systolic blood pressure as shown from the SBP value range from around 110mmHg to over 160mmHg. This finding is consistent with medical knowledge that blood pressure generally increases with age due to natural physiological changes. However, the data shows that high blood pressure can also affect younger people, while some older individuals may still have low blood pressure.

# CONCLUSION

This analysis of patient data reveals several key health trends. The distribution of patient age shows a concentration between 40 and 50 years old, while systolic blood pressure generally increases with age, as expected. Interestingly, females exhibit a slightly higher median and wider spread in systolic blood pressure compared to males. A notable positive correlation exists between BMI and cholesterol levels, indicating that higher values in both are associated with increased health risks like obesity and cardiovascular disease.

The elevated risk categories highlight that while a significant portion of patients fall into the "Normal / No Major Risk" category, a substantial number are classified as "Pre-Diabetes." Other conditions like "Insulin Resistance" and "Obesity" are also present in smaller but notable proportions. Finally, the heart rate distribution appears largely normal, with the most common heart rates falling between 100 and 110 BPM, which is slightly above the typical healthy range, suggesting a potential area for further investigation.

# REFERENCE

1. Brekke, I. J., Puntervoll, L. H., Pedersen, P. B., Kellett, J., & Brabrand, M. (2019). The value of vital sign trends in predicting and monitoring clinical deterioration: A systematic review. PloS one, 14(1), e0210875. <https://doi.org/10.1371/journal.pone.0210875>