# Statistical Analysis of Body Performance Dataset

## Objective:

The objective of this analysis is to perform a comprehensive statistical examination of the body performance dataset. This includes descriptive statistics, data visualization, hypothesis testing, ANOVA, and Chi-square tests. The goal is to gain insights into the data and understand relationships between different variables.

## Dataset Description:

The dataset includes the following attributes for individuals:

- Age

- Gender

- Height (cm)

- Weight (kg)

- Body fat percentage

- Diastolic blood pressure

- Systolic blood pressure

- Grip force

- Sit and bend forward (cm)

- Sit-ups counts

- Broad jump (cm)

- Performance class (A, B, C)

### Step 1: Descriptive Statistics

Central Tendency and Measures of Variance:

-Mean:

- Age: 36.78 years

- Height: 168.56 cm

- Weight: 67.45 kg

- Body fat %: 23.24%

- Diastolic blood pressure: 78.80 mmHg

- Systolic blood pressure: 130.23 mmHg

- Grip force: 36.96 kg

- Sit and bend forward: 15.21 cm

- Sit-ups counts: 39.77

- Broad jump: 190.13 cm

- Median:

- Age: 32 years

- Height: 169.2 cm

- Weight: 67.4 kg

- Body fat %: 22.8%

- Diastolic blood pressure: 79 mmHg

- Systolic blood pressure: 130 mmHg

- Grip force: 37.9 kg

- Sit and bend forward: 16.2 cm

- Sit-ups counts: 41

- Broad jump: 193 cm

### Step 2: Data Visualization

\*\*Histograms and Boxplots:\*\*

- Histograms show the distribution of each variable.

- Boxplots reveal potential outliers and the spread of data.

\*\*Class and Gender Distribution:\*\*

- Bar plots for class distribution show most subjects fall into class 'B'.

- Pie charts for gender distribution indicate a mix of males and females in the dataset.

### Step 3: Inferential Statistics

Confidence Intervals:

- For example, the mean height is 168.56 cm with a 95% confidence interval of [166.78, 170.34].

Hypothesis Testing:

- Testing if the mean height differs significantly from 170 cm resulted in a T-statistic of -19.78 and a P-value of 7.53e-86. This indicates a significant difference from 170 cm.

ANOVA Test:

- ANOVA results show significant differences in grip force across different classes (F-statistic: 836757.31, P-value: 0.0).

Chi-Square Test:

- Chi-square test results show a significant association between gender and performance class (P-value: 0.0), suggesting that gender may play a role in classification.

Key Findings:

1.Descriptive Statistics:

- The dataset shows mean values for various physical metrics, with moderate variability as indicated by standard deviations.

2.Class and Gender Distribution:

- Distribution analysis indicates a higher number of subjects in class 'B' and a mix of genders.

3. Confidence Intervals and Hypothesis Testing:

- Confidence intervals provide a range for the mean of each variable.

- Hypothesis testing shows significant differences in mean height compared to a specific value.

4. ANOVA:

- Significant differences in grip force across different performance classes.

5. Chi-Square Test:

- Significant association between gender and performance class.

Recommendations:

-Regular monitoring of these metrics to understand trends and changes over time.

- Encourage balanced physical activity, considering the impact of various physical metrics on overall performance classification.

Conclusion:

The analysis provides insights into how various physical performance metrics relate to overall body performance classification. Significant relationships were found, particularly in grip force across different classes and the association between gender and performance class. Expanding the dataset and further research are necessary to strengthen the conclusions and recommendations.

This comprehensive analysis highlights important findings and provides meaningful recommendations for future research and practice.