MAPÚA UNIVERSITY

E-Report for Nutritional Dietary Data

Data Science Laboratory for Health Sciences | A Github Portfolio July 28, 2025

SCHOOL OF HEALTH SCIENCES

In collaboration with Arizona State University®

Nutritional Patterns and Body Composition

Introduction to the Dataset

This dataset includes dietary and physiological variables from patients such as BMI, physical activity (hours per week), macronutrient intake (protein, fat, carbohydrates), daily caloric intake, water intake, body fat percentage, and muscle mass. These variables were chosen for their central role in influencing body composition, energy metabolism, and physical health. The objective of this experiment was to investigate how nutritional factors and physical activity are associated with key body composition indicators, particularly body fat percentage and muscle mass.

Methods

The dataset was first cleaned by removing invalid or missing values, especially in critical columns like BMI, caloric intake, macronutrients, and water intake. BMI categories were derived based on standard WHO thresholds, and physical activity levels were categorized into low, moderate, and high. Descriptive statistics were calculated to summarize central tendencies and variation for BMI, muscle mass, body fat, and nutritional intake. Four main visualizations were produced: scatter plots, violin plots, and box plots to explore distributions and relationships. Advanced statistical methods such as Pearson's and Spearman's correlation, multiple linear regression, and ANOVA were used to assess strength and significance of associations.

- Key statistical tests conducted were:
    - Pearson's correlation between physical activity and body fat %
    - Spearman's correlation between water intake and muscle mass
    - Multiple linear regression predicting body fat %
    - One-way ANOVA comparing caloric intake across BMI categories

---

Key Results and Figures

1. **Physical Activity vs. Body Fat %** – A scatter plot with regression line showed a moderate negative correlation (r = -0.57), indicating that increased physical activity is associated with lower body fat percentage.

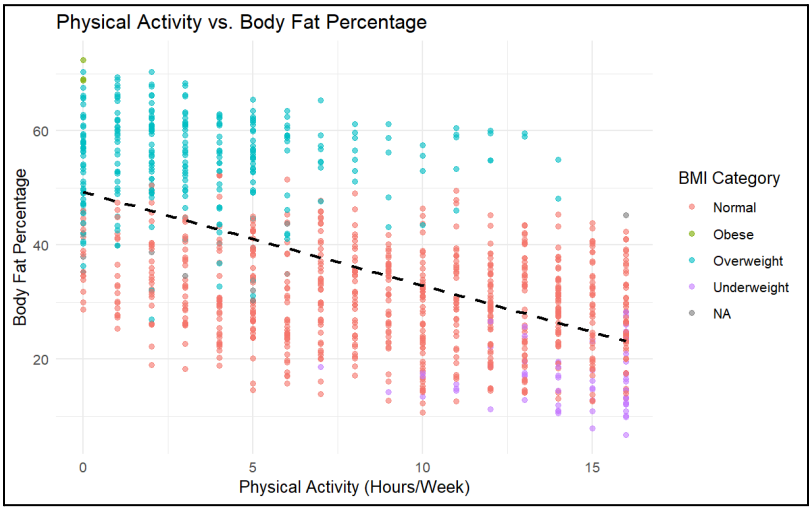

Figure 1. Scatter Plot of Physical Activity vs. Body Fat %

2. **Macronutrient Intake Distribution** – Violin and box plots showed carbohydrates had the highest median intake, followed by protein and fat, highlighting imbalance in dietary proportions.

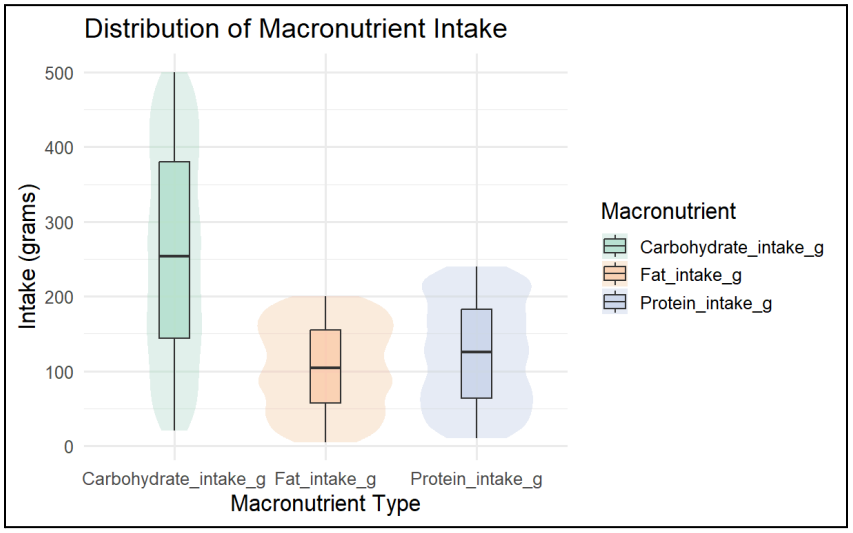

Figure 2. Box + Violin Plot of Macronutrient Intake Distribution

3. **Predictors of Body Fat % (Multiple Linear Regression)** – The regression model (R^2 = 0.955) showed that higher physical activity, protein, and fat intake predicted lower body fat, while caloric intake was a strong positive predictor.

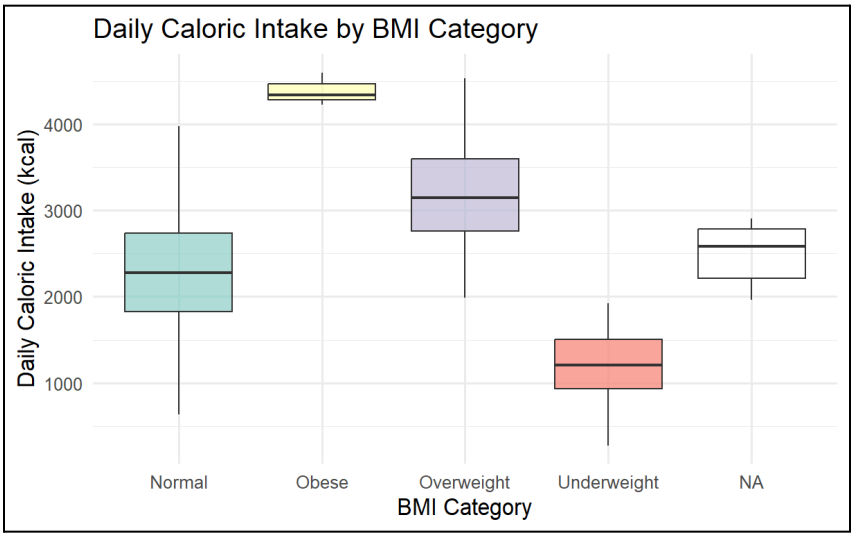

Figure 3. Predictors of Body Fat % (Multiple Linear Regression)

4. **Caloric Intake by BMI Category (ANOVA)** – Box plots revealed significant differences ($p < 0.001$) in caloric intake across BMI groups, with higher intake linked to overweight and obesity.

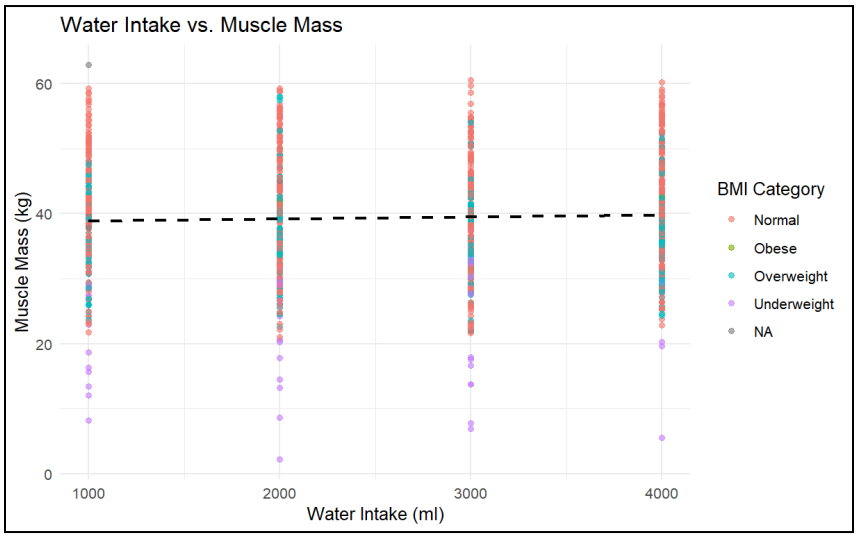

Figure 4. Caloric Intake by BMI Category (ANOVA)

Interpretation and Brief Conclusion

Physical activity remains a strong determinant of lower body fat, reinforcing its role in metabolic health. While caloric intake is necessary for energy, excessive intake, especially with imbalanced macronutrients, contributes to higher BMI and fat levels. Protein and fat intake showed benefits in reducing fat percentage when coupled with activity. Water intake, however, did not show a meaningful link to muscle mass.

> *# These findings highlight how lifestyle modifications—specifically increased activity and balanced intake—can be crucial in managing body composition and preventing obesity-related complications.*
