



# D-BIAS Analysis Report

cached\_dataset.csv

Generated on 11/16/2025

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## Executive Summary

Fairness Score

**0/100**

Bias Risk

**Critical**

Fairness Label

**Critical**

Reliability

**High**

## Dataset Information

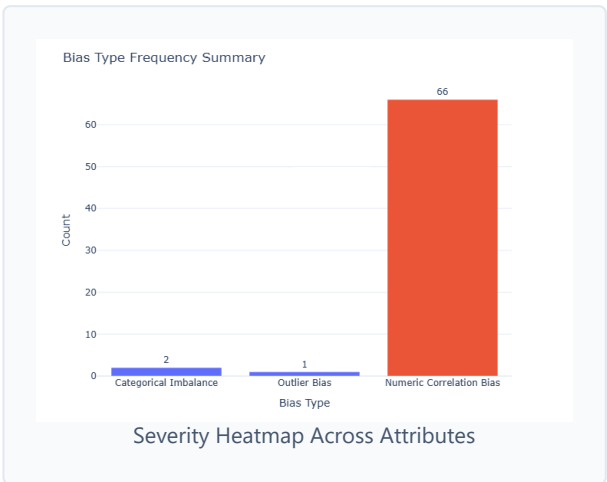
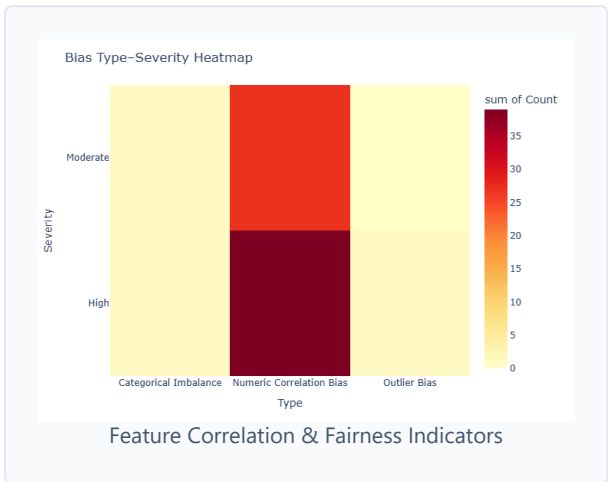
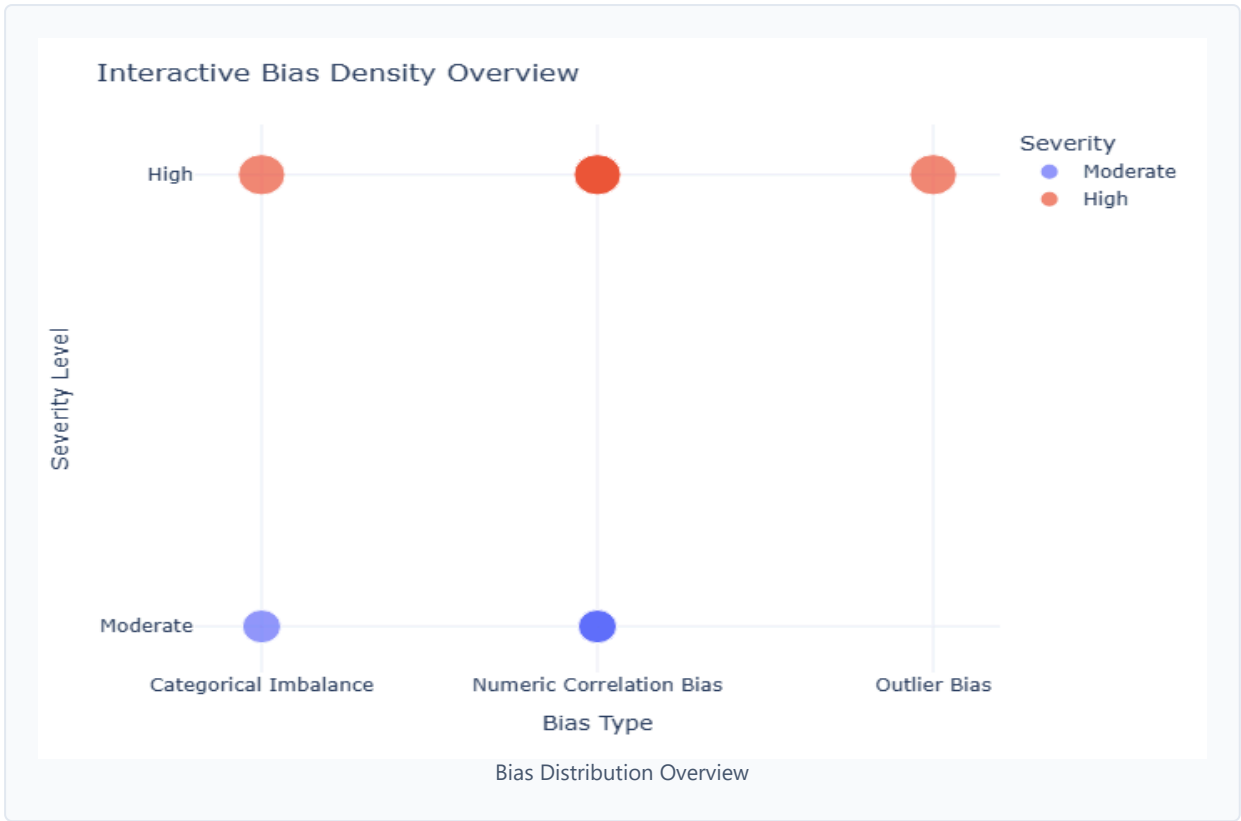
Rows: 20,000

Columns: 54

Mean: 2,213,282,454,643,703,800

Median: 39.865

# Visualizations



## Detected Biases

### Categorical Imbalance

Moderate

Column: gender

**Description:** 'Female' dominates 50.1% of 'gender' values (entropy=1.00).

#### AI Explanation

Type: Categorical Imbalance; Feature: gender; 'Female' dominates 50.1% of 'gender' values (entropy=1.00); Severity: Moderate

**Definition:** Categorical Imbalance

### Categorical Imbalance

High

Column: meal\_name

**Description:** 'Other' dominates 100.0% of 'meal\_name' values (entropy=-0.00).

#### AI Explanation

Type: Categorical Imbalance; Feature: meal\_name; 'Other' dominates 100.0% of 'meal\_name' values (entropy=-0.00); Severity: High

**Definition:** Categorical Imbalance

### Numeric Correlation Bias

High

Column: weight\_kg ↔ fat\_percentage

**Description:** Strong correlation  $r=0.779$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ fat\_percentage; Strong correlation  $r=0.779$ ; Severity: High

**Definition:** Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ bmi

**Description:** Strong correlation  $r=0.856$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ bmi; Strong correlation  $r=0.856$ ; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ calories

**Description:** Strong correlation  $r=0.978$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ calories; Strong correlation  $r=0.978$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ bmi\_calc

**Description:** Strong correlation  $r=0.856$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ bmi\_calc; Strong correlation  $r=0.856$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ protein\_per\_kg

**Description:** Strong correlation  $r=-0.727$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ protein\_per\_kg; Strong correlation  $r=-0.727$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ cal\_balance

**Description:** Strong correlation  $r=0.737$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ cal\_balance; Strong correlation  $r=0.737$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: weight\_kg ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.982$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: weight\_kg ↔ lean\_mass\_kg; Strong correlation  $r=0.982$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: height\_m ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.477$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: height\_m ↔ lean\_mass\_kg; Strong correlation  $r=0.477$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: max\_bpm ↔ pct\_hrr

Description: Strong correlation  $r=-0.512$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: max\_bpm ↔ pct\_hrr; Strong correlation  $r=-0.512$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: max\_bpm ↔ pct\_maxhr

Description: Strong correlation  $r=-0.559$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: max\_bpm ↔ pct\_maxhr; Strong correlation  $r=-0.559$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: avg\_bpm ↔ pct\_hrr

Description: Strong correlation  $r=0.857$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: avg\_bpm ↔ pct\_hrr; Strong correlation  $r=0.857$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: avg\_bpm ↔ pct\_maxhr

Description: Strong correlation  $r=0.842$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: avg\_bpm ↔ pct\_maxhr; Strong correlation  $r=0.842$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: session\_duration\_hours ↔ calories\_burned

Description: Strong correlation  $r=0.814$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: session\_duration\_hours ↔ calories\_burned; Strong correlation  $r=0.814$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: session\_duration\_hours ↔ workout\_frequency\_daysweek

Description: Strong correlation  $r=0.638$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: session\_duration\_hours ↔ workout\_frequency\_daysweek; Strong correlation  $r=0.638$ ;  
Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: session\_duration\_hours ↔ experience\_level

**Description:** Strong correlation  $r=0.758$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: session\_duration\_hours ↔ experience\_level; Strong correlation  $r=0.758$ ; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: session\_duration\_hours ↔ cal\_balance

**Description:** Strong correlation  $r=-0.529$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: session\_duration\_hours ↔ cal\_balance; Strong correlation  $r=-0.529$ ; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: session\_duration\_hours ↔ expected\_burn

**Description:** Strong correlation  $r=0.944$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: session\_duration\_hours ↔ expected\_burn; Strong correlation  $r=0.944$ ; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: calories\_burned ↔ workout\_frequency\_daysweek

**Description:** Strong correlation  $r=0.583$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories\_burned ↔ workout\_frequency\_daysweek; Strong correlation  $r=0.583$ ; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories\_burned ↔ experience\_level

Description: Strong correlation  $r=0.697$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories\_burned ↔ experience\_level; Strong correlation  $r=0.697$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories\_burned ↔ cal\_balance

Description: Strong correlation  $r=-0.661$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories\_burned ↔ cal\_balance; Strong correlation  $r=-0.661$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories\_burned ↔ expected\_burn

Description: Strong correlation  $r=0.774$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories\_burned ↔ expected\_burn; Strong correlation  $r=0.774$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: fat\_percentage ↔ bmi

Description: Strong correlation  $r=0.902$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ bmi; Strong correlation  $r=0.902$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: fat\_percentage ↔ calories

**Description:** Strong correlation  $r=0.760$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ calories; Strong correlation  $r=0.760$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: fat\_percentage ↔ bmi\_calc

**Description:** Strong correlation  $r=0.902$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ bmi\_calc; Strong correlation  $r=0.902$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: fat\_percentage ↔ protein\_per\_kg

**Description:** Strong correlation  $r=-0.603$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ protein\_per\_kg; Strong correlation  $r=-0.603$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: fat\_percentage ↔ cal\_balance

**Description:** Strong correlation  $r=0.594$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ cal\_balance; Strong correlation  $r=0.594$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: fat\_percentage ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.659$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fat\_percentage ↔ lean\_mass\_kg; Strong correlation  $r=0.659$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: water\_intake\_liters ↔ calories

Description: Strong correlation  $r=0.412$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: water\_intake\_liters ↔ calories; Strong correlation  $r=0.412$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: water\_intake\_liters ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.435$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: water\_intake\_liters ↔ lean\_mass\_kg; Strong correlation  $r=0.435$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: workout\_frequency\_daysweek ↔ experience\_level

Description: Strong correlation  $r=0.836$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: workout\_frequency\_daysweek ↔ experience\_level; Strong correlation  $r=0.836$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: workout\_frequency\_daysweek ↔ expected\_burn

Description: Strong correlation  $r=0.619$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: workout\_frequency\_daysweek ↔ expected\_burn; Strong correlation  $r=0.619$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: experience\_level ↔ cal\_balance

Description: Strong correlation  $r=-0.420$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: experience\_level ↔ cal\_balance; Strong correlation  $r=-0.420$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: experience\_level ↔ expected\_burn

Description: Strong correlation  $r=0.736$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: experience\_level ↔ expected\_burn; Strong correlation  $r=0.736$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: bmi ↔ calories

Description: Strong correlation  $r=0.838$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi ↔ calories; Strong correlation  $r=0.838$ .; Severity: High

Definition: Numeric Correlation Bias

## Numeric Correlation Bias

High

Column: bmi ↔ bmi\_calc

**Description:** Strong correlation  $r=1.000$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi ↔ bmi\_calc; Strong correlation  $r=1.000$ ;  
Severity: High

Definition: Numeric Correlation Bias

## Numeric Correlation Bias

Moderate

Column: bmi ↔ protein\_per\_kg

**Description:** Strong correlation  $r=-0.635$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi ↔ protein\_per\_kg; Strong correlation  $r=-0.635$ ;  
Severity: Moderate

Definition: Numeric Correlation Bias

## Numeric Correlation Bias

Moderate

Column: bmi ↔ cal\_balance

**Description:** Strong correlation  $r=0.633$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi ↔ cal\_balance; Strong correlation  $r=0.633$ ;  
Severity: Moderate

Definition: Numeric Correlation Bias

## Numeric Correlation Bias

High

Column: bmi ↔ lean\_mass\_kg

**Description:** Strong correlation  $r=0.769$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi ↔ lean\_mass\_kg; Strong correlation  $r=0.769$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: physical\_exercise ↔ carbs

**Description:** Strong correlation  $r=0.644$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: physical\_exercise ↔ carbs; Strong correlation  $r=0.644$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: physical\_exercise ↔ proteins

**Description:** Strong correlation  $r=0.644$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: physical\_exercise ↔ proteins; Strong correlation  $r=0.644$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: physical\_exercise ↔ fats

**Description:** Strong correlation  $r=0.644$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: physical\_exercise ↔ fats; Strong correlation  $r=0.644$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: physical\_exercise ↔ cal\_from\_macros

**Description:** Strong correlation  $r=0.644$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: physical\_exercise ↔ cal\_from\_macros; Strong correlation  $r=0.644$ .; Severity: Moderate

**Definition:** Numeric Correlation Bias

## Numeric Correlation Bias

High

Column: carbs ↔ proteins

**Description:** Strong correlation  $r=1.000$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: carbs ↔ proteins; Strong correlation  $r=1.000$ ;; Severity: High

**Definition:** Numeric Correlation Bias

## Numeric Correlation Bias

High

Column: carbs ↔ fats

**Description:** Strong correlation  $r=1.000$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: carbs ↔ fats; Strong correlation  $r=1.000$ ;; Severity: High

**Definition:** Numeric Correlation Bias

## Numeric Correlation Bias

High

Column: carbs ↔ cal\_from\_macros

**Description:** Strong correlation  $r=1.000$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: carbs ↔ cal\_from\_macros; Strong correlation  $r=1.000$ ;; Severity: High

**Definition:** Numeric Correlation Bias

## Numeric Correlation Bias

Moderate

Column: carbs ↔ protein\_per\_kg

**Description:** Strong correlation  $r=0.623$ .

### AI Explanation

Type: Numeric Correlation Bias; Feature: carbs ↔ protein\_per\_kg; Strong correlation  $r=0.623$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: proteins ↔ fats

**Description:** Strong correlation  $r=1.000$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: proteins ↔ fats; Strong correlation  $r=1.000$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: proteins ↔ cal\_from\_macros

**Description:** Strong correlation  $r=1.000$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: proteins ↔ cal\_from\_macros; Strong correlation  $r=1.000$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: proteins ↔ protein\_per\_kg

**Description:** Strong correlation  $r=0.623$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: proteins ↔ protein\_per\_kg; Strong correlation  $r=0.623$ .; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: fats ↔ cal\_from\_macros

**Description:** Strong correlation  $r=1.000$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fats ↔ cal\_from\_macros; Strong correlation  $r=1.000$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: fats ↔ protein\_per\_kg

Description: Strong correlation  $r=0.623$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: fats ↔ protein\_per\_kg; Strong correlation  $r=0.623$ ;  
Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories ↔ bmi\_calc

Description: Strong correlation  $r=0.838$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories ↔ bmi\_calc; Strong correlation  $r=0.838$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories ↔ protein\_per\_kg

Description: Strong correlation  $r=-0.701$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories ↔ protein\_per\_kg; Strong correlation  $r=-0.701$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories ↔ cal\_balance

Description: Strong correlation  $r=0.718$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories ↔ cal\_balance; Strong correlation  $r=0.718$ ;  
Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: calories ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.963$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: calories ↔ lean\_mass\_kg; Strong correlation  $r=0.963$ ;; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: sets ↔ burns\_calories\_per\_30\_min

Description: Strong correlation  $r=0.465$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: sets ↔ burns\_calories\_per\_30\_min; Strong correlation  $r=0.465$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: burns\_calories\_per\_30\_min ↔ burns\_calories\_per\_30\_min\_bc

Description: Strong correlation  $r=0.815$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: burns\_calories\_per\_30\_min ↔ burns\_calories\_per\_30\_min\_bc; Strong correlation  $r=0.815$ ;; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: bmi\_calc ↔ protein\_per\_kg

Description: Strong correlation  $r=-0.635$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi\_calc ↔ protein\_per\_kg; Strong correlation  $r=-0.635$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: bmi\_calc ↔ cal\_balance

Description: Strong correlation  $r=0.633$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi\_calc ↔ cal\_balance; Strong correlation  $r=0.633$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: bmi\_calc ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.769$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: bmi\_calc ↔ lean\_mass\_kg; Strong correlation  $r=0.769$ ;; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: cal\_from\_macros ↔ protein\_per\_kg

Description: Strong correlation  $r=0.623$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: cal\_from\_macros ↔ protein\_per\_kg; Strong correlation  $r=0.623$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: protein\_per\_kg ↔ cal\_balance

Description: Strong correlation  $r=-0.502$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: protein\_per\_kg ↔ cal\_balance; Strong correlation  $r=-0.502$ ;; Severity: Moderate

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: protein\_per\_kg ↔ lean\_mass\_kg

Description: Strong correlation  $r=-0.722$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: protein\_per\_kg ↔ lean\_mass\_kg; Strong correlation  $r=-0.722$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: pct\_hrr ↔ pct\_maxhr

Description: Strong correlation  $r=0.988$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: pct\_hrr ↔ pct\_maxhr; Strong correlation  $r=0.988$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

High

Column: cal\_balance ↔ lean\_mass\_kg

Description: Strong correlation  $r=0.708$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: cal\_balance ↔ lean\_mass\_kg; Strong correlation  $r=0.708$ .; Severity: High

Definition: Numeric Correlation Bias

### Numeric Correlation Bias

Moderate

Column: cal\_balance ↔ expected\_burn

Description: Strong correlation  $r=-0.482$ .

#### AI Explanation

Type: Numeric Correlation Bias; Feature: cal\_balance ↔ expected\_burn; Strong correlation  $r=-0.482$ .; Severity: Moderate

## Outlier Bias

High

Column: physical\_exercise

**Description:** 23.5% of 'physical\_exercise' values are outliers (right-skewed).

### AI Explanation

Type: Outlier Bias; Feature: physical\_exercise; 23.5% of 'physical\_exercise' values are outliers (right-skewed); Severity: High

**Definition:** Outlier Bias

## Recommendations

- **Data Cleaning:** - **Remove Duplicate/Useless Columns:** Immediately drop `meal\_name`, `bmi\_calc`, and one of each pair of perfectly or near-perfectly correlated features (e.g., drop `pct\_maxhr`, keep `pct\_hrr`). - **Investigate Macronutrients:** Determine the source of the perfect correlation between `carbs`, `proteins`, and `fats`. If it cannot be fixed, these columns must be removed or repurposed with extreme caution. - **Investigate Suspect Correlations:** Deeply analyze the negative correlation between `lean\_mass\_kg` and `protein\_per\_kg`. This is a red flag that may point to a fundamental flaw in the data.
- **Feature Engineering:** - **Address Multicollinearity:** For strongly correlated but non-duplicate features (e.g., `weight\_kg`, `fat\_percentage`, `lean\_mass\_kg`), select the single most relevant feature for your model or use a dimensionality reduction technique like PCA. - **Handle Outliers:** Apply a log transform to `physical\_exercise` or use robust modeling techniques to mitigate the skew. - **Create Ratio Features:** To analyze diet, create features for macronutrient percentages (e.g., `% calories from protein`) once the underlying data issue is resolved.
- **Modeling and Validation:** - After cleaning, split the data and train a baseline model. - Pay close attention to feature importance and model coefficients to ensure they make logical sense. - Thoroughly validate the model's performance on different user segments (e.g., beginners vs. advanced) to ensure it provides fair and reasonable predictions for all groups.

## Conclusion

The dataset's "fairness health score" is low. While not biased along demographic lines like gender, it suffers from critical data quality issues that undermine its integrity. The extreme correlations, redundancies, and outliers mean that any model trained on this data as-is would be unstable, difficult to interpret, and likely to produce unreliable or even nonsensical predictions. The dataset requires significant intervention before it can be trusted for any serious analysis. ###