



D-BIAS Analysis Report

lifestyle.csv

Generated on 11/16/2025

Executive Summary

Fairness Score

0/100

Bias Risk

Critical

Fairness Label

Critical

Reliability

High

Dataset Information

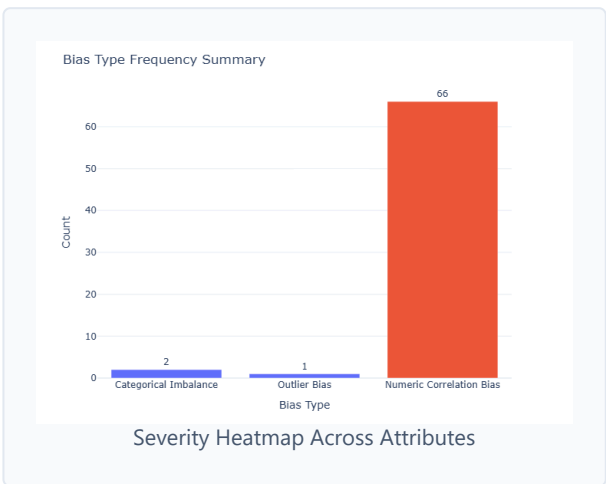
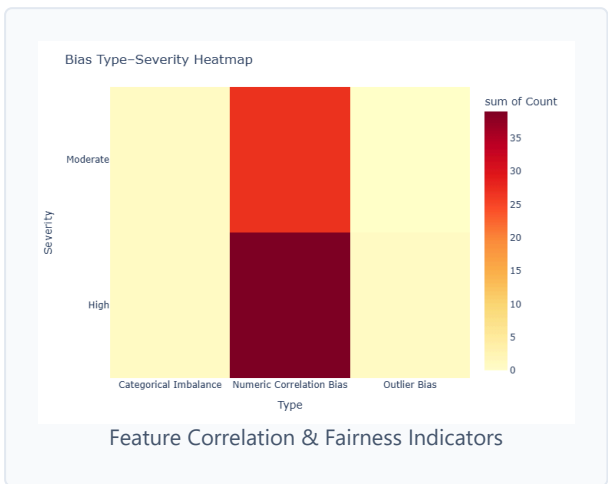
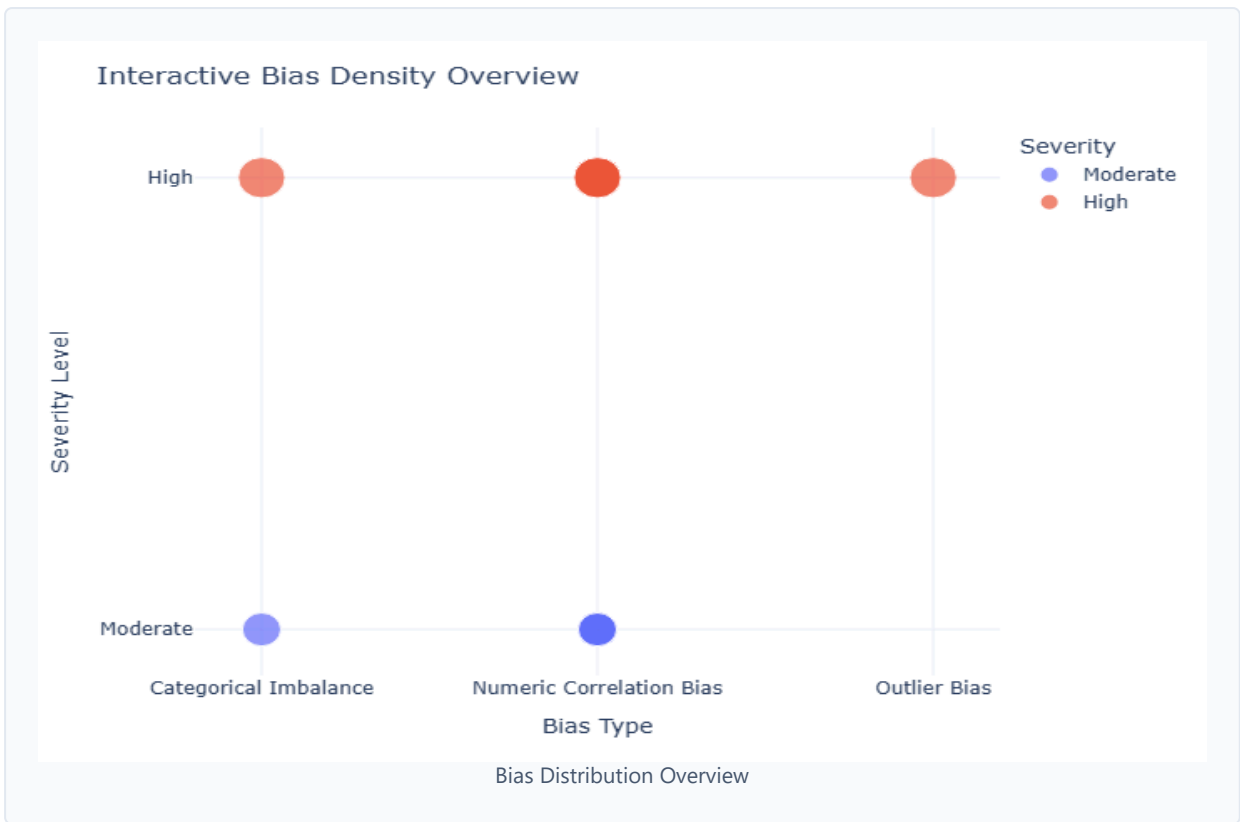
Rows: 20,000

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. ###