CGMACROS DATASET

Datathon June 2025

Data Extraction

Data Cleaning

Data Analysis

Data Visualization

Team 4

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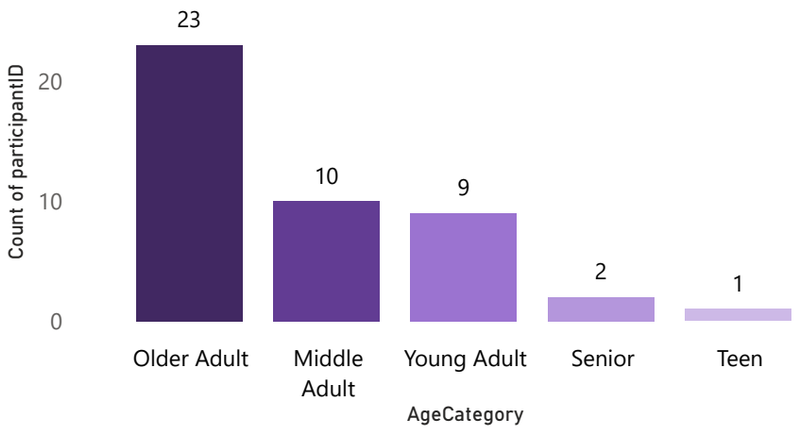
Participant Demographics & BMI Distribution

45

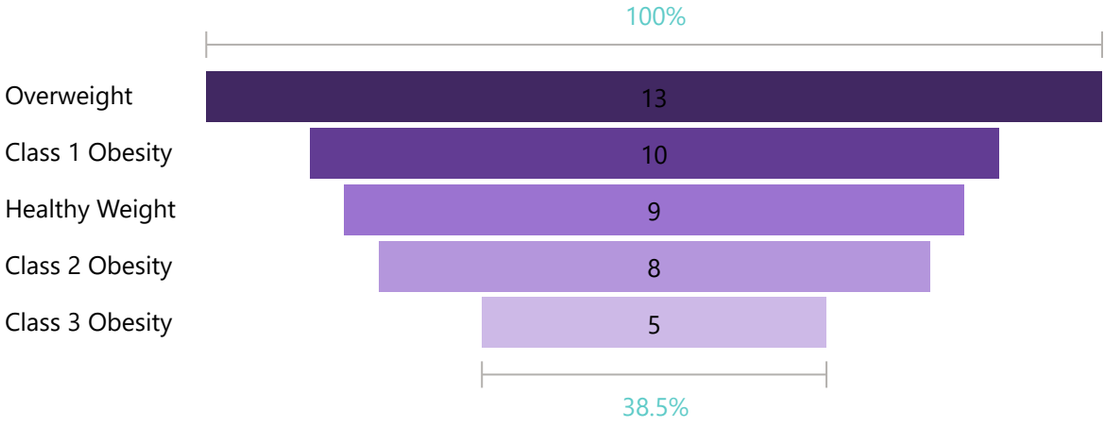
Total Participants

Age wise distribution



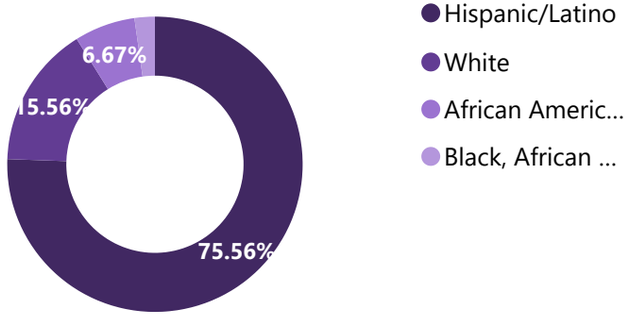
23 participants are Older adult, 10 are middle adult, 9 are young adult, 2 pare senior and 1 participant is of teen age.

BMI Categories distribution



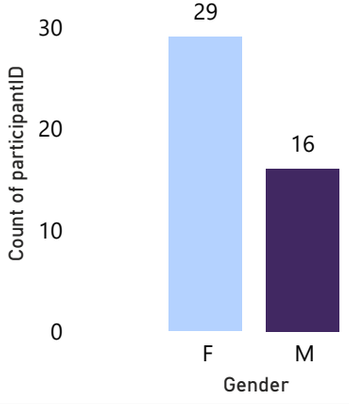
29% are overweight, 22% have Class 1 obesity, 20% are in the healthy weight range, 18% have Class 2 obesity, and 11% have Class 3 obesity, showing that most participants are above a healthy

Ethinicity wise distribution



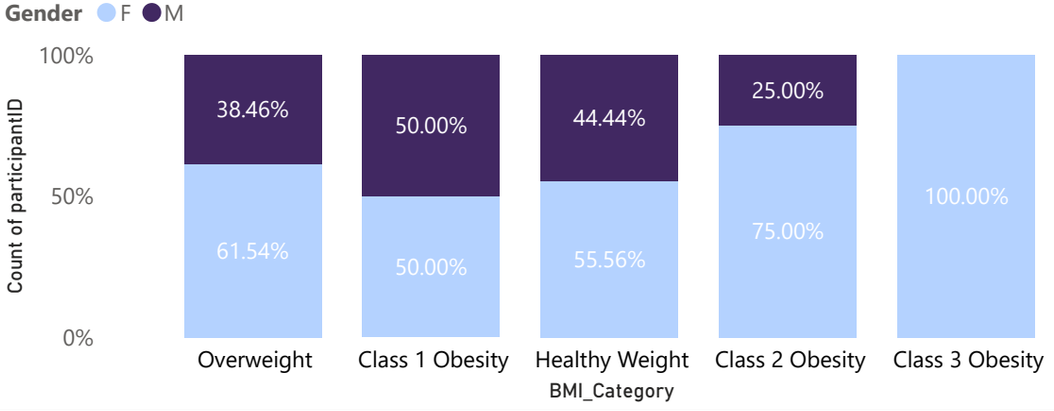
Among the participants, 75% are Hispanic, 16% are White, 7% are African American, and 3% are Black African, reflecting a predominantly Hispanic study population.

Gender wise distribution



No. of female participants are more compared to Male participants

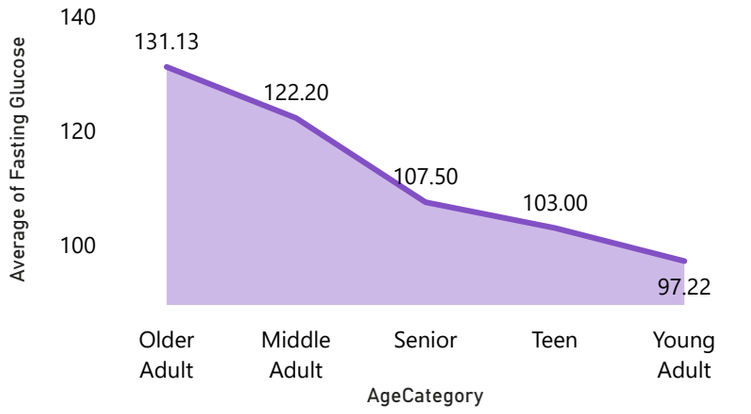
Gender wise BMI categorization



Overall Female participants are more under higher range of weight categories compared to male participants.

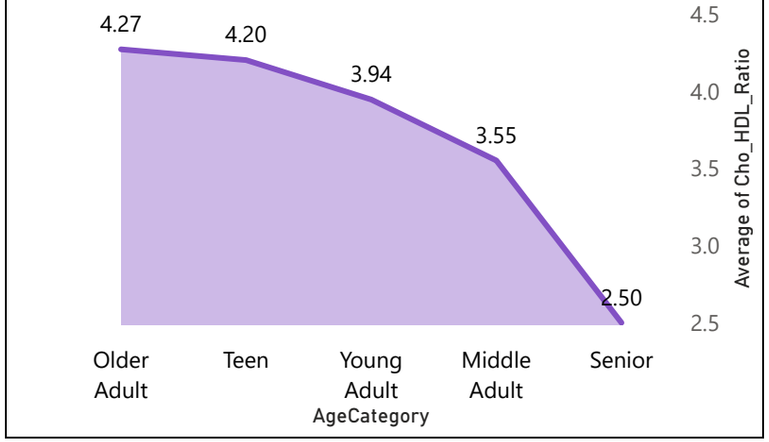
Glucose_Chol_HDL Ratio

Average of Fasting Glucose by AgeCategory



Older participants tend to have higher average fasting glucose levels, indicating a potential age-related impact on glucose metabolism.

Average of Cho_HDL_Ratio by AgeCategory



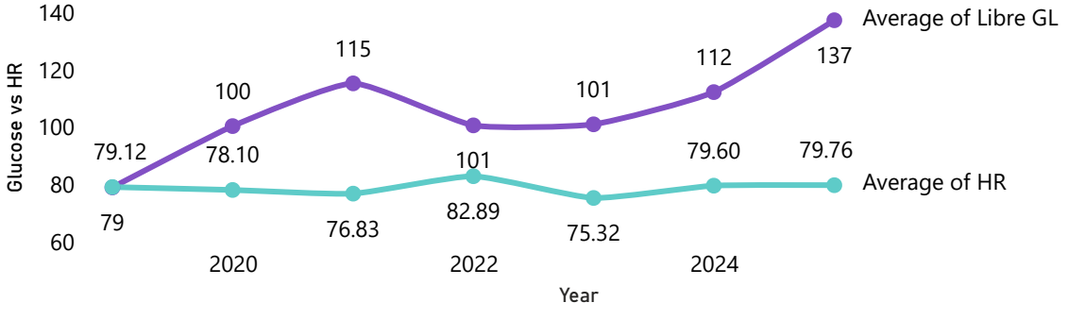
Cholesterol-HDL ratios tend to be higher among older participants, averaging around 4.27. Interestingly, one teen participant also shows an elevated ratio of 4.2, while younger groups—Young Adults (3.94), Middle Adults (3.55), and Seniors

120.69
Avg_Glucose

46K
Total Steps

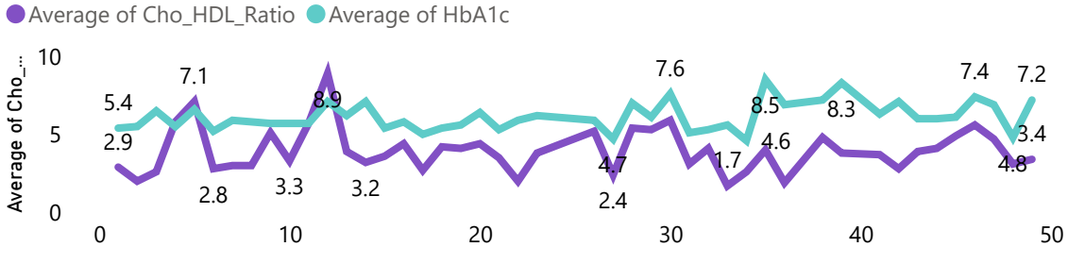
6.12
Avg_HbA1c

Glucose vs Heart Rate Over Time



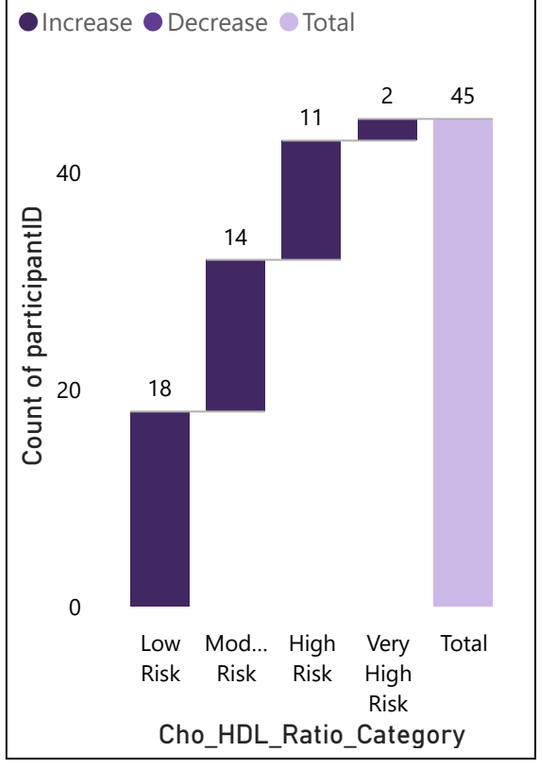
Between 2019 and 2025, the average glucose level has steadily increased, indicating potential metabolic decline or reduced glycemic control. Heart rate, however, has remained stable, suggesting no direct short-term cardiovascular response.

Co-relation of Cho_HDL_Ratio and Average of HbA1c by participantID



The chart shows that participants with higher HbA1c levels often also have elevated Chol_HDL ratios, indicating a link between poor blood sugar control and increased cardiovascular risk. Key participants like 13, 30, and 38–40 show high values for both, suggesting the need for closer health monitoring.

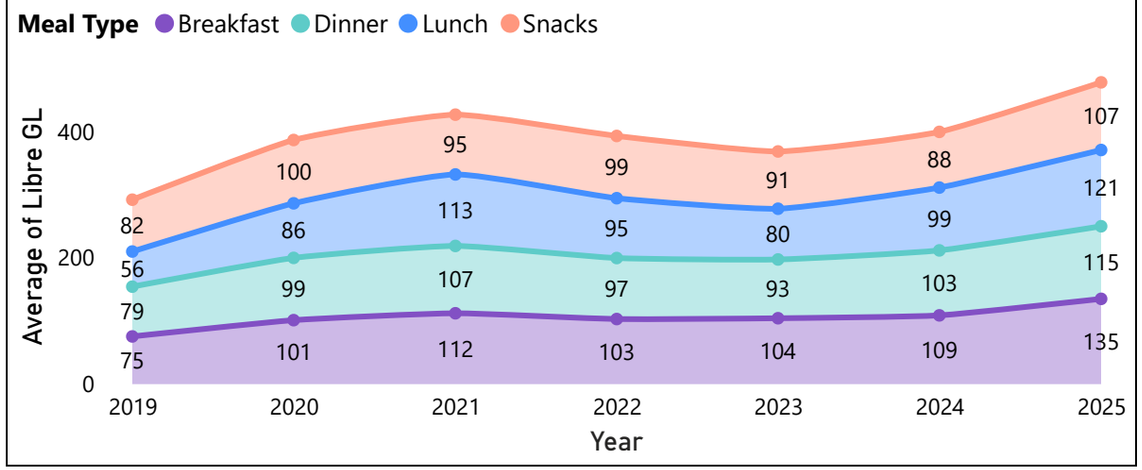
Count of participantID by Cho_HDL_Ratio_Category



Waterfall chart highlights Chol/HDL risk levels—40% Low, 31% Moderate, and 29% High/Very High—showing their impact on total participants.

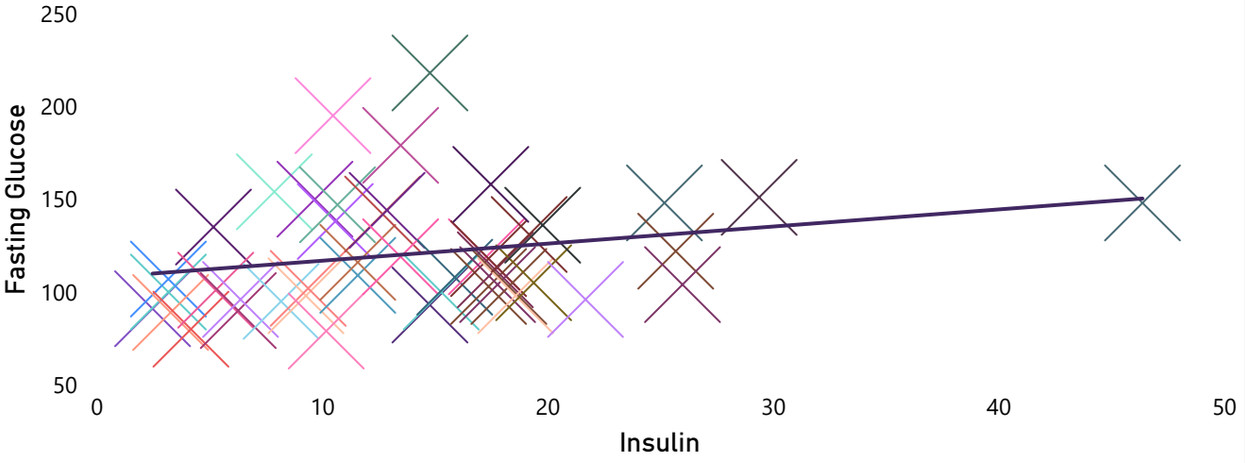
Meal Type & Glucose ResponseRatio

Average Glucose by Meal Type and Year



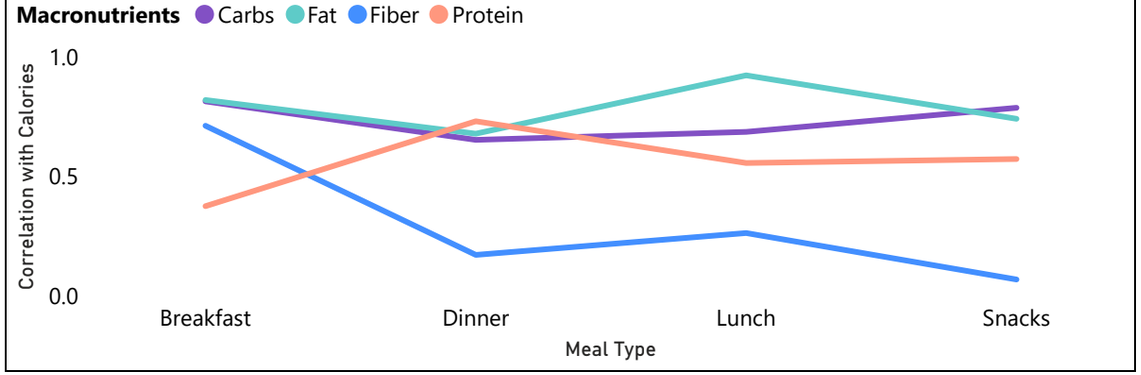
Each colored band represents a meal type's average glucose level for the year. The growing Orange section (Snacks) after 2023 indicates rising glucose responses, possibly due to dietary or behavioral changes.

Correlation between fasting glucose and Insulin



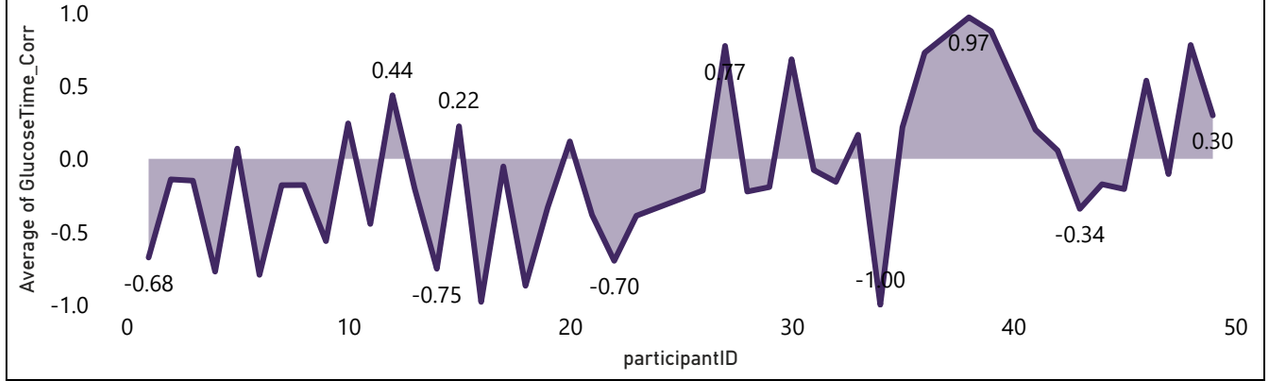
Insulin helps cells absorb glucose from the blood. In healthy individuals, fasting insulin and glucose levels are tightly regulated and usually remain stable. Their correlation is generally weak to moderate due to these homeostatic controls.

Correlation of Macronutrients with Calories by Meal Type



Meals affect glucose differently: breakfast and snacks cause sharp spikes, lunch leads to prolonged rises, and dinner helps control levels. Adding fiber and prioritizing protein can improve glucose response.

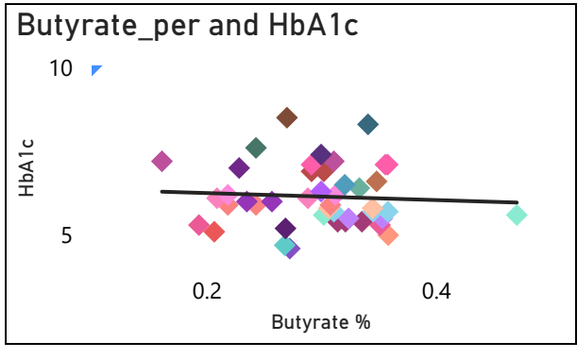
Glucose-Time Correlation by Participant ID

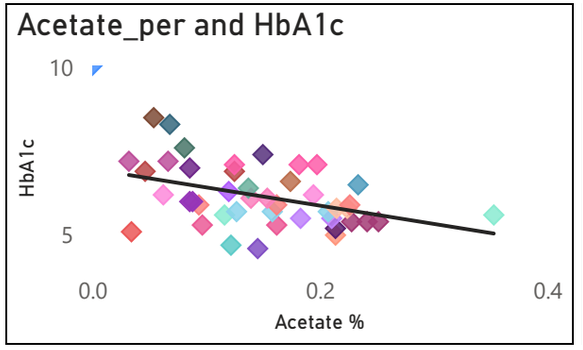


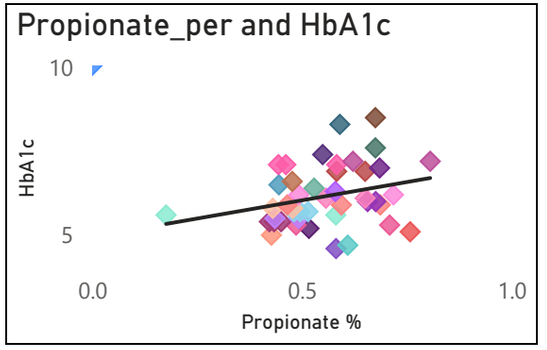
Strong negative correlation indicates good insulin function and lower complication risk; strong positive correlation suggests impaired insulin response and higher risk of hyperglycemia.

Gut Glucose SCFA

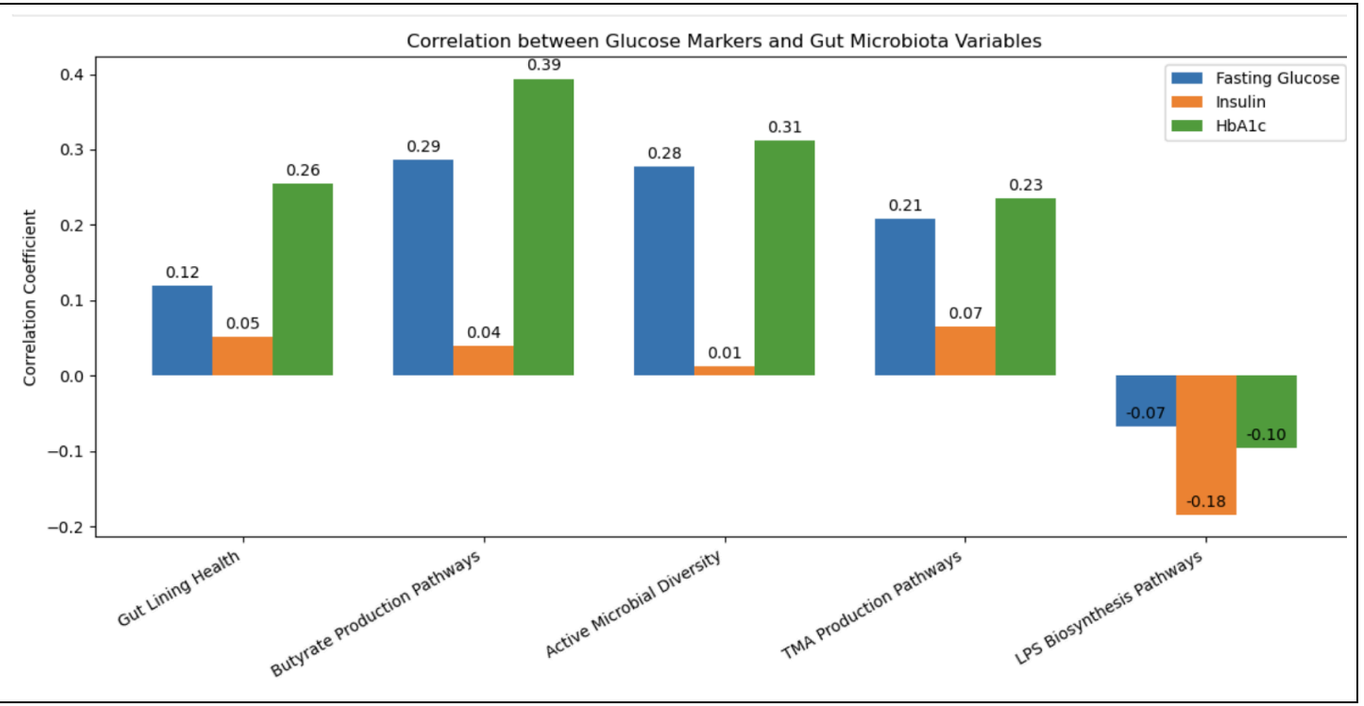
The Role of SCFAs in Glucose control and Chronic disease





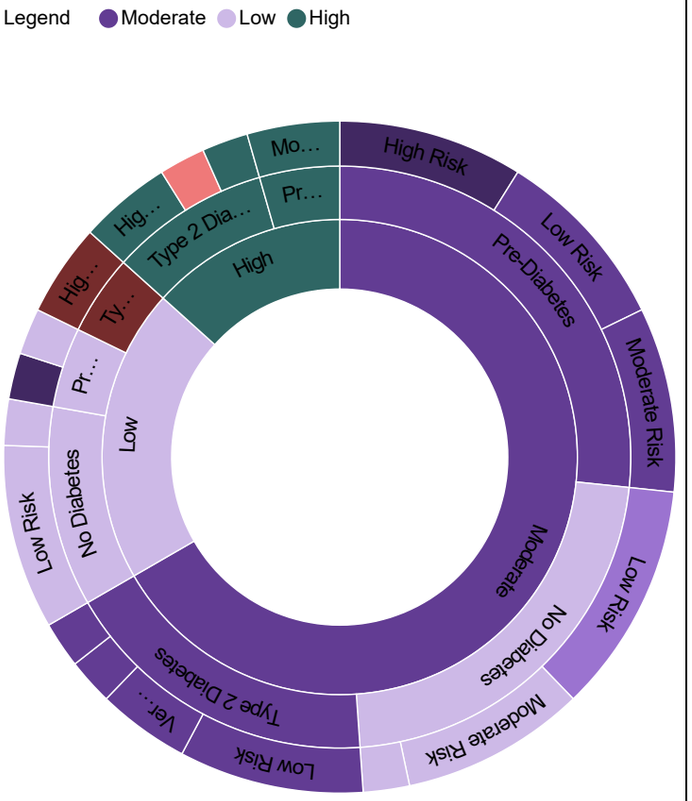


Short-chain fatty acids (SCFAs) like butyrate, propionate, and acetate are produced when gut bacteria ferment dietary fiber. They support gut health, regulate blood sugar, and reduce inflammation, helping prevent conditions like type 2 diabetes. Increased SCFA levels from fiber-rich diets may help manage T2D.



A healthy, diverse gut microbiome—especially with butyrate producers—supports better glucose control and lowers diabetes risk. In contrast, inflammatory pathways like LPS increase insulin resistance, stressing the need for gut-friendly diet and lifestyle choices.

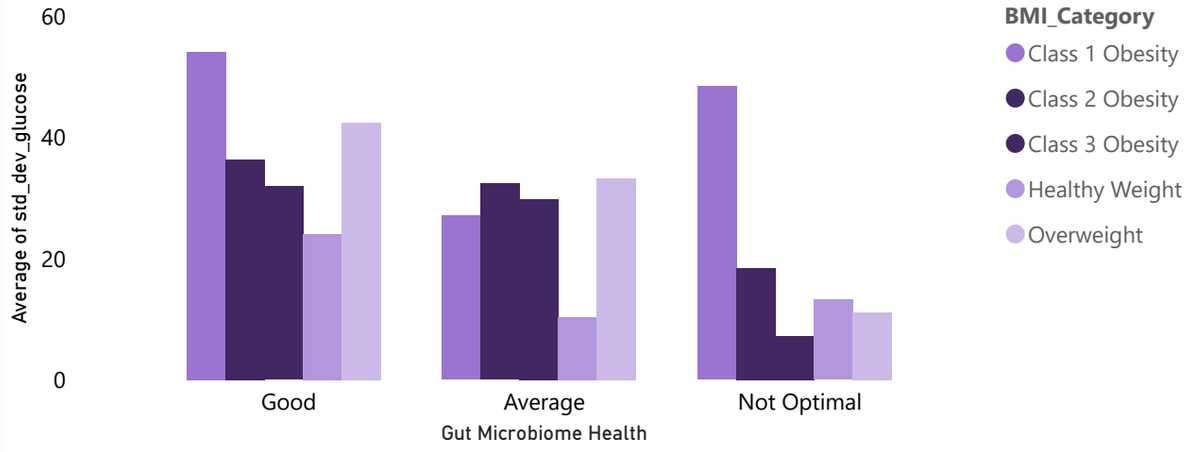
Co-relation of Gut_Score_Category, HbA1c_Category and Cho_HDL_Ratio_Category



Most participants have a Moderate Gut Score, mainly with No Diabetes or Pre-Diabetes, and Low to Moderate Cholesterol Risk. Those with a Low Gut Score are more likely to have Type 2 Diabetes and High Cholesterol Risk — indicating higher health risks. This suggests a strong link between poor gut health, diabetes, and cardiovascular risk.

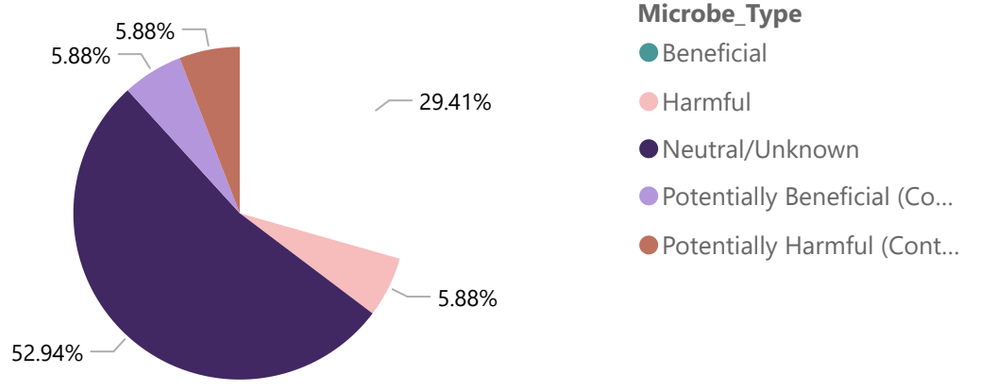
Gut Health & Glucose Variability

Glucose Variability by Gut Health and BMI



This chart shows that gut microbiome health influences glucose variability across BMI groups. Individuals with Class 1 Obesity and good gut health had lower glucose fluctuations (12.89%), while those with poor gut health and high BMI showed the highest variability. Even in healthy-weight individuals, gut health still played a role.

Distribution of Gut Microbes by Functional Role

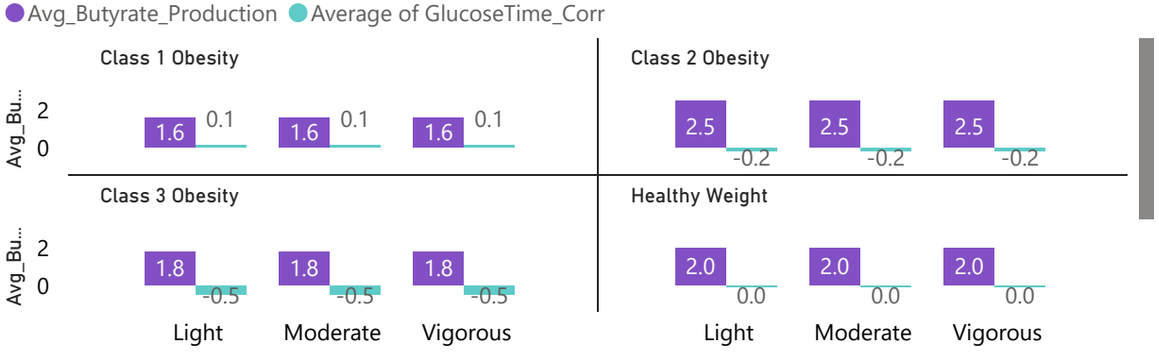


Over half (52.94%) of gut microbes are Neutral/Unknown, highlighting how much remains unknown. Beneficial species make up 29.41%, while harmful ones account for just 5.88%. Context-dependent microbes represent 11.76%, underscoring the need for individual interpretation.

Gut lining health by calories

Calorie intake influences gut lining health—moderate intake may lead to long-term weakening, lower intake supports repair and balance, while high intake can increase inflammation and gut permeability.

Impact of Exercise Intensity on Gut Health Across Obesity Classes With Glucose corr



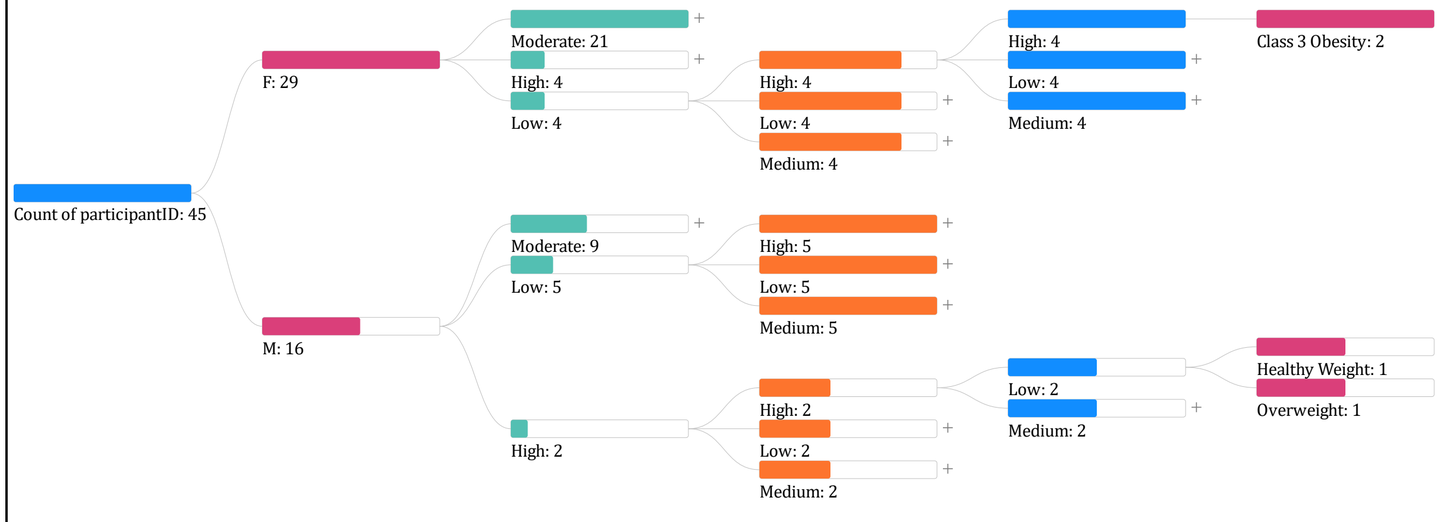
Class 1 Obesity benefits from light to moderate activity for glucose control. In Class 2 and 3 Obesity, glucose control is poor despite high butyrate levels, indicating metabolic resistance. Healthy weight individuals

Decomposition Tree BMI & Chronic Disease

Decomposition_Tree_BMI

tree height | tree width | show on bar click: Children / Descendants | data label position: Under / Start / End | bar height | bar width

Participants----------->Gender---------->Gut Score---------->Carbs---------->Fiber---------->BMI



Females: Mostly have moderate gut scores. Those with low fiber and high carb intake show higher rates of Class 1–3 obesity. Males: More variation in gut scores. Low fiber intake is linked to overweight and obesity, while healthy weight appears with moderate fiber and high gut score.Low Fiber intake and High Gut Scores are consistently linked to obesity (Class 1 to 3) in both genders. Males and females with better gut scores and moderate fiber tend to have healthier weights.

Decomposition Tree Chronic disease

tree height | tree width | show on bar click: Children / Descendants | data label position: Under / Start / End | bar height | bar width

Participants---------->Gender---------->BMI---------->HbA1C---------->Chol_HDL_Ratio---------->MET_Activity_Intensity

Both males and females show a clear link between higher BMI, diabetes (HbA1c), and cholesterol risk with moderate or poor gut scores. Even individuals with a healthy BMI may still have metabolic issues and suboptimal gut health, indicating that gut health is influenced by more than just weight—it's closely tied to overall metabolic risk.