Nutritional Analysis of Starbucks Beverages

Introduction

As consumers become increasingly health-conscious, understanding the nutritional composition of popular beverages is essential for making informed dietary choices. Starbucks, a global leader in the beverage industry, offers a wide variety of drinks that vary in calorie count, fat content, sugar levels, caffeine, and other nutrients.

However, this variety can make it challenging for customers to identify which drinks align with their health and dietary preferences.

This project explores the Starbucks nutritional dataset to uncover patterns in fat, sugar, caffeine, and other nutrient levels across different beverage categories and preparation styles. The goal is to highlight trends, reveal high-risk nutritional profiles, and provide data-backed recommendations that benefit both consumers and business stakeholders.

Project Objectives

- **I. Data Exploration and Summary Statistics**
  Understand the structure, types, and completeness of the data. Generate basic descriptive statistics.
- **II. Understanding Nutritional Profiles**
  Analyze key nutrients such as calories, fat, sugar, protein, and caffeine across beverages.
- **III. Analyzing Beverage Categories and Types**
  Compare different beverage categories and preparation styles to see how they influence nutritional values.
- **IV. Exploring Relationships and Correlations**
  Identify relationships between calories, sugar, fat, caffeine, and other nutrients to understand what drives high or low values.
- **V. Summarizing the Findings and Conclusions**
  Wrap up insights, provide consumer-friendly suggestions, and offer business implications.

I. Data Exploration and Summary Statistics

Dataset Overview

The dataset contains nutritional information for Starbucks beverages with the following details:

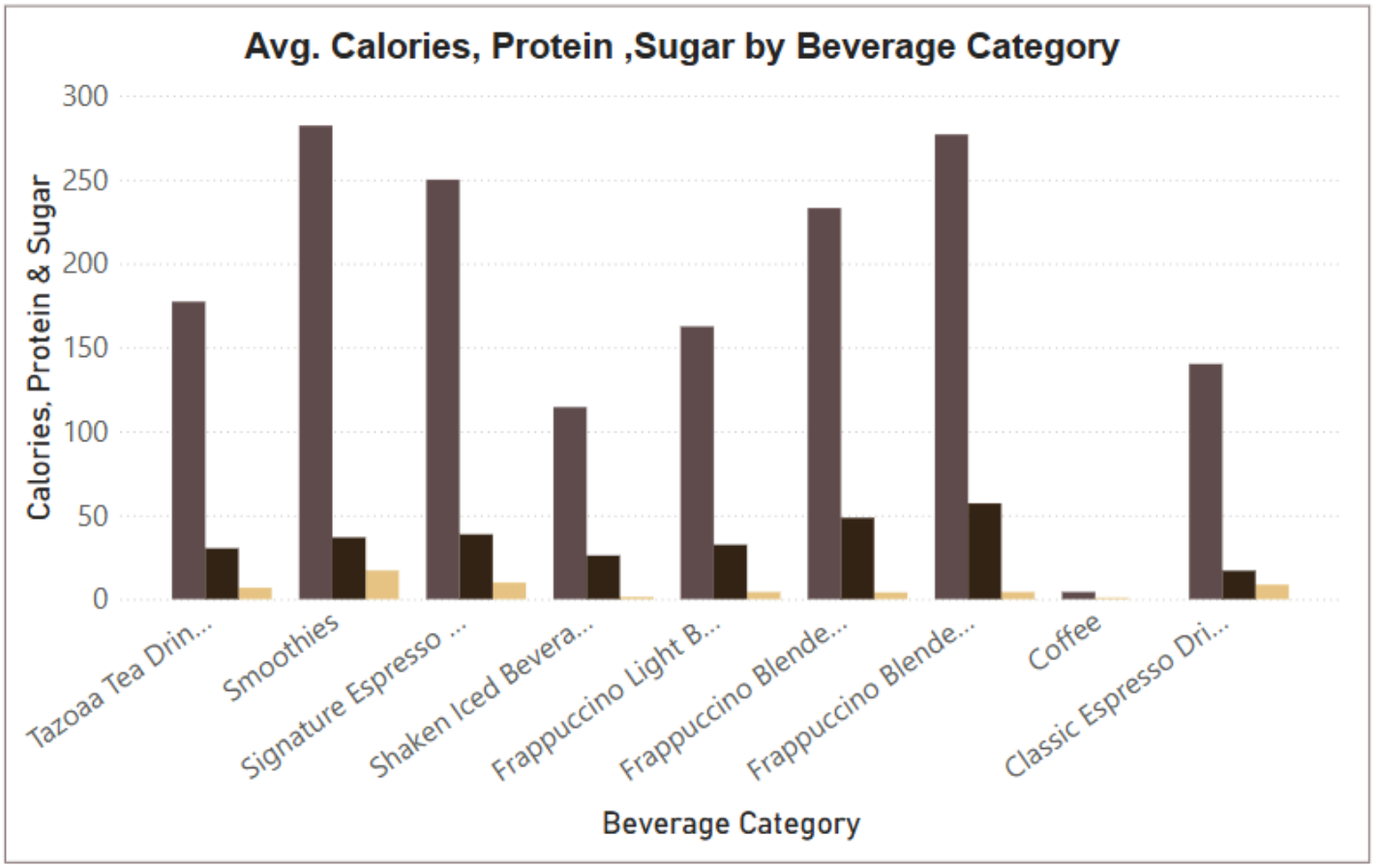
- Beverage categories (Coffee, Classic Espresso Drinks, Signature Espresso Drinks, etc.)
- Beverage types (Brewed Coffee, Latte, Mocha, Frappuccino, etc.)
- Preparation options (different sizes: Short, Tall, Grande, Venti; milk options: Nonfat, 2%, Whole, Soymilk)
- Nutritional content (calories, fats, carbohydrates, protein, etc.)
- Vitamin and mineral content (as % of Daily Value)
- Caffeine content

Starbucks beverages show significant variation in nutritional content. On average, drinks contain high sugar levels (~33g)—exceeding WHO's daily limit—posing a health concern. Caffeine levels vary widely, with some drinks reaching up to 410mg, which may be risky for sensitive individuals. Protein content is generally moderate, with a few beverages offering up to 20g, appealing to fitness-conscious consumers. These insights highlight the need for healthier, low-sugar options.

Starbucks beverages show a **wide variation in calorie content**, with an average of **~194 kcal per drink**, and some items reaching up to **510 kcal**, making them as energy-dense as a small meal. Most beverages fall within the **150–200 kcal range**, indicating a **moderate calorie profile** for the majority. However, the presence of **zero-calorie drinks (like brewed coffee or tea) to high-calorie options like** (frappuccinos, sweet lattes) highlights diverse offerings, catering to both health-conscious and indulgent consumers.

II. Understanding Nutritional Profiles

Analyze key nutrients such as calories, fat, sugar, protein, and caffeine across beverages.



Summary of Insights and Findings

1. **High Sugar & Calorie Categories**:
    - **Smoothies**, **Signature Espresso**, and **Frappuccino Blended beverages** (both Coffee and Crème) are the **highest in sugar and calories**—approaching or exceeding 250–280 kcal and 50g of sugar on average.
    - These categories pose a **significant nutritional concern**, especially for sugar-conscious consumers.

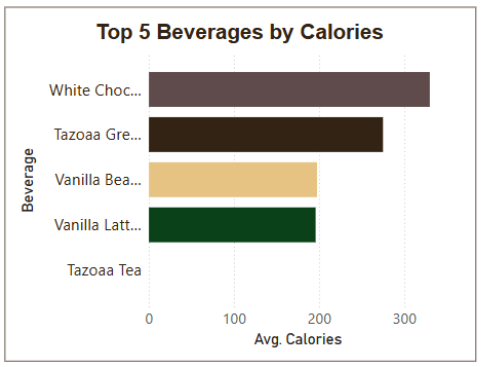
2. **Moderate to High Protein**:
    - **Smoothies** and **Frappuccino Blended beverages** (especially Coffee-based) show **relatively higher protein content** (~8–10g), which may appeal to fitness-conscious consumers.

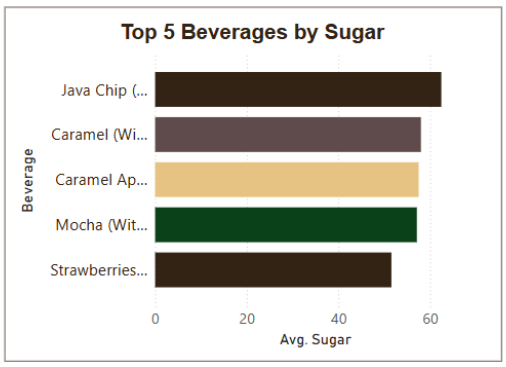
3. **Low-Calorie, Low-Sugar Categories**:
    - **Tazo Tea Drinks**, **Shaken Iced Beverages**, and **Coffee** offer **lower calories and sugar**, making them **healthier alternatives** for daily consumption.

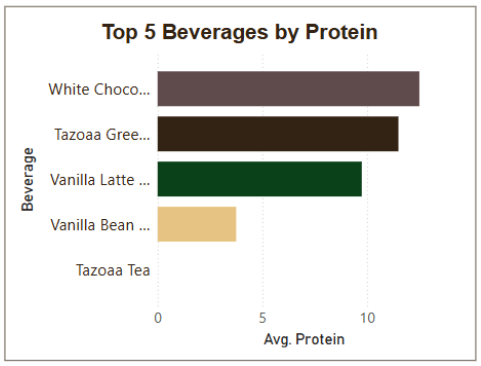
4. **Category Gaps**:
    - **Classic Espresso Drinks** and **Coffee** have **minimal sugar and calorie content**, which could appeal to minimalists but may be seen as less satisfying to others

III. Analyzing Beverage Categories and Types

Compare different beverage categories and preparation styles to see how they influence nutritional values.







Top 5 Beverages by Calories, Sugar and Protein

Summary of Insights and Findings

Top 5 Beverages by Calories

White Chocolate Mocha is the highest in calories among all beverages analyzed, with an average **above 300 kcal per serving**.

Tazo Green Tea Latte follows closely behind, also having a **high calorie content** (around 280–290 kcal)

Vanilla Bean Crème and **Vanilla Latte** are in the mid-to-high calorie range (~200–250 kcal), often consumed as sweet treats or comfort beverages.

Top 5 Beverages by Sugar

1. **Java Chip Frappuccino** leads with the highest sugar content (~60g), followed closely by **Caramel (with whipped cream)**, **Caramel Apple Spice**, and **Mocha (with whipped cream)**.

2. These beverages all contain **more than 50g of sugar**, which **exceeds the daily recommended sugar intake** for adults (WHO recommends ~25g/day).

3. **Strawberries & Crème** is also sugar-heavy despite being marketed as fruity and lighter.

Insight:
These drinks are **more like desserts than beverages**, posing a risk for consumers who regularly consume them, especially without realizing their sugar load.

Top 5 Beverages by Protein

1. **White Chocolate Mocha**, **Tazo Green Tea Latte**, and **Vanilla Latte** rank highest in protein (~10g), likely due to their **milk-based content**.

2. **Vanilla Bean Crème** and **Tazo Tea** trail with moderate-to-low protein, indicating variability even within the milk-based drinks.

3. These beverages can offer some **nutritional value**, particularly for consumers seeking protein on the go.

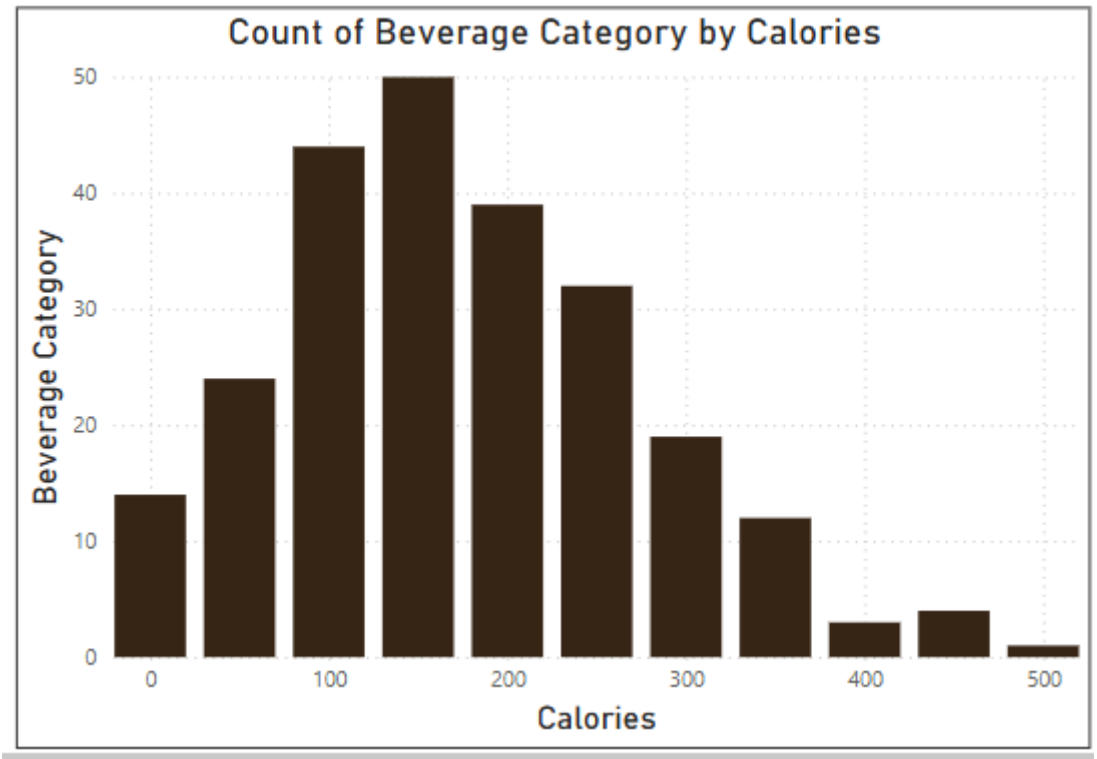
Insight:
While some high-calorie drinks do offer **a modest protein benefit**, it doesn't outweigh the **excessive sugar and calorie** content in most cases.

Overall Consumer Context

- Many high-protein beverages are also **high in sugar and calories**, which may **mislead health-conscious consumers**.

- Sugar-heavy drinks dominate popular categories like **Frappuccinos and flavored lattes**, making regular consumption a concern for **weight gain, blood sugar levels**, and **long-term health**.

Distribution of Starbucks Beverages by Calorie Count



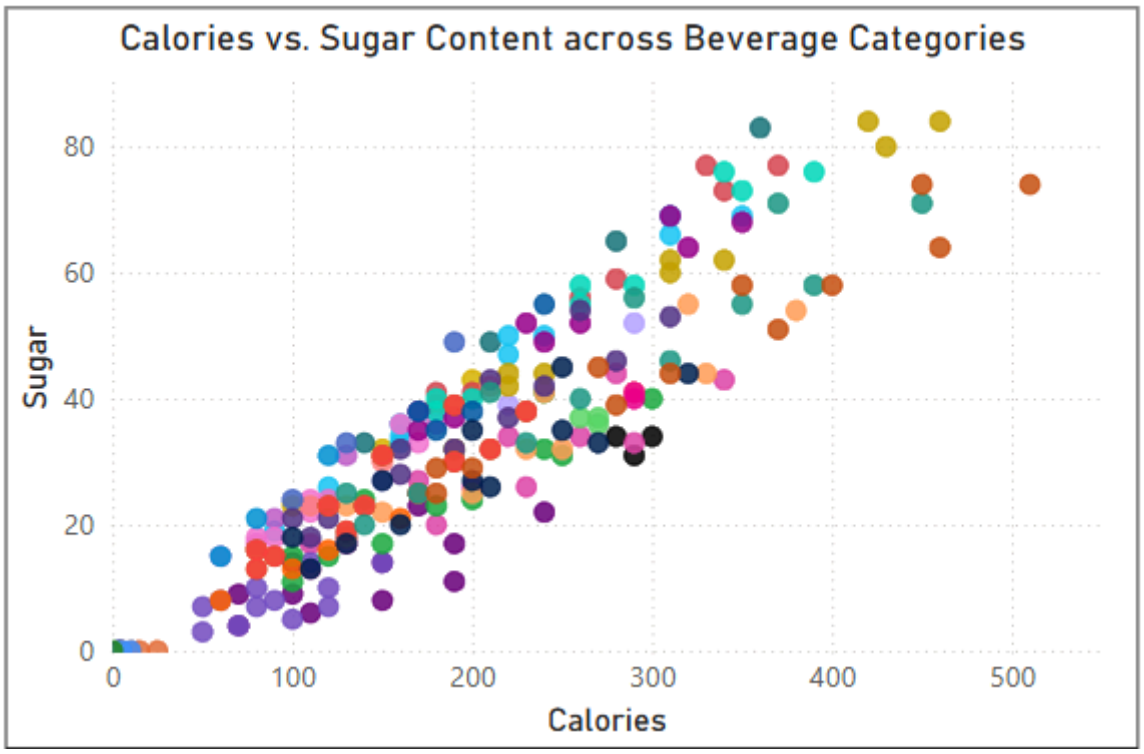
Key Insights:

- The distribution is **right-skewed** (positively skewed), meaning **most beverages are lower in calories**, and only a few have very high calorie content.
- The **highest concentration** of beverages falls in the **100–200 calorie range**, with the **peak at 150–200 calories** (50+ beverages).
- As calorie count increases **beyond 250 calories**, the number of beverage options **rapidly declines**.
- **Lower-calorie beverages dominate** the menu — likely reflecting rising health consciousness and dietary awareness among consumers.

IV. Exploring Relationships and Correlations

Identify relationships between calories, sugar, fat, caffeine, and other nutrients to understand what drives high or low values.

Correlation between Calories vs. Sugar Content



Trend Analysis

- There is a **strong positive linear correlation** between **calories and sugar**.
- As calories increase, sugar content also increases almost proportionally.

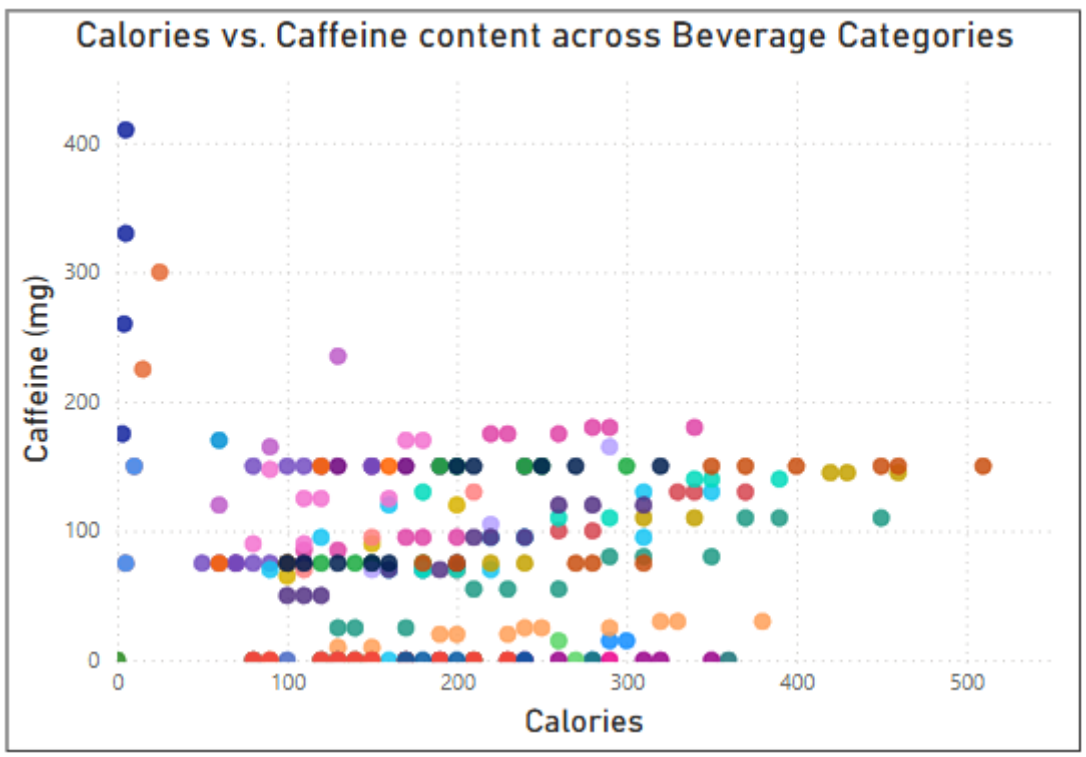
🔍 Pattern Observations

1. **Linear Cluster:**
    - A dense cluster is observed from **0 to 350 calories** and **0 to 60 grams of sugar**.
    - The slope suggests that **approximately every 50 calories contribute to about 8–12g of sugar**, which is significant.
2. **High-Calorie Zone (>350 cal):**
    - These drinks almost always exceed **60g of sugar**, reaching up to 80–90g.
    - These could include **frappuccinos or seasonal specialty drinks**.
3. **Low-Calorie, Low-Sugar Zone:**
    - A few beverages exist with both **low calories (<100)** and **low sugar (<10g)** — likely unsweetened teas, brewed coffee, or cold brews.

Some drinks have **relatively high calories with lower sugar**, suggesting **added fats or other calorie sources** (e.g., dairy or whipped cream).

Customization (less syrup, skim milk, no whipped cream) is key in managing sugar intake in high-calorie beverages.

Correlation between Calories vs. Caffeine Content



Trend Analysis

- **No clear correlation** between calorie and caffeine content — the relationship is **nonlinear and scattered**.
- This indicates that **caffeine is independently distributed**, regardless of calorie content.

🔍 Pattern Observations

1. **Horizontal Clustering (Caffeine Bins):**
    - Many caffeine levels appear as **horizontal lines**, suggesting standard caffeine dosages (e.g., 75mg, 150mg, 200mg, 330mg).
    - This reflects Starbucks' use of standardized espresso shots or brewing sizes.

2. **Low-Calorie, High-Caffeine Drinks:**
    - Some drinks with **0–50 calories** offer **>200 mg caffeine** — likely **unsweetened cold brews or brewed coffees**.
    - Excellent choices for those seeking **energy without sugar or calorie intake**.

3. **High-Calorie, Low-Caffeine Drinks:**
    - Drinks over **300 calories** often have **<100 mg caffeine**, implying that many **high-calorie beverages prioritize sweetness and creaminess over caffeine** —

e.g., blended frappuccinos.

4. **Middle Zone Saturation:**
    - Between **100–200 calories**, caffeine values vary widely — suggesting this range includes both **mild lattes and stronger espresso-based drinks**.

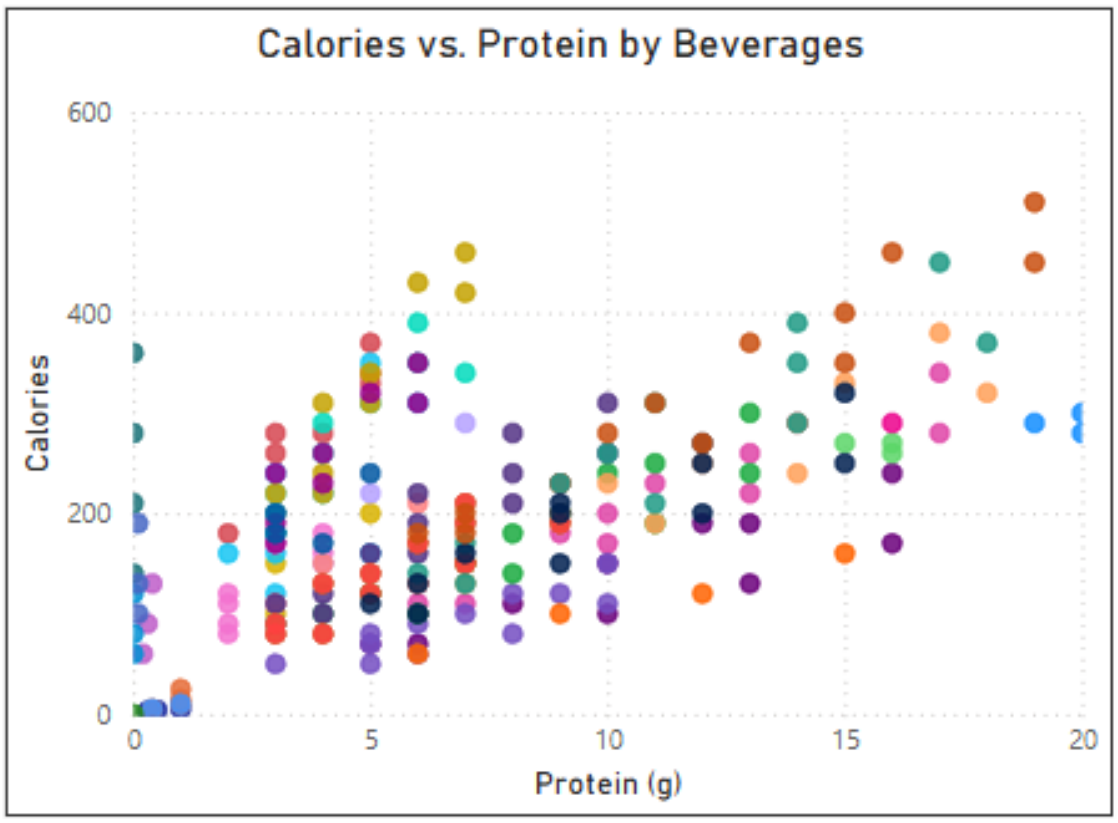
Beverages with **>300mg caffeine** and **low calories** stand out — probably **cold brews, blond roasts, or espresso shots** in large sizes.

If you're looking for a caffeine kick, you don't need to go for high-calorie options — many low-cal drinks provide more than enough caffeine.

Those sensitive to caffeine should not assume lower calories mean safer caffeine levels — they can still pack a punch.

Starbucks' caffeine content seems to be product-driven (brew method, roast type), not tied to sugar or calorie levels.

Correlation between Calories vs. Protein Content



Trend Analysis

- There is a **moderate positive correlation** between **protein and calorie content**.
- As **protein increases**, **calories also increase**, though the pattern is more spread out compared to sugar and caffeine.
- However, there is **noticeable vertical dispersion** — meaning that **drinks with the same protein content can have vastly different calorie levels**.

Pattern Observation

0–5g protein range: Most common; includes **low-nutrition, high-calorie** drinks.

5–10g range: Mid-protein drinks with **variable calories**; often include milk or alt-milks.

10–20g protein: High-protein drinks, often **calorie-dense** due to added sugars/fats.

It also shows that Not all protein drinks are healthy

V. Summarizing the Findings and Conclusions

📊 **Summary**

Through a detailed analysis of the Starbucks beverage dataset, I explored key nutritional and categorical insights across 242 drink variants. The data revealed clear trends in calorie content, sugar levels, and caffeine concentration across different beverage categories and preparation types.

Classic Espresso and Frappuccino drinks were among the highest in calories and sugars, while brewed coffee and teas offered low-calorie, low-fat alternatives.

The analysis also reveals that the most significant factors influencing the nutritional content of Starbucks drinks are:

1. Beverage category (coffee vs frappuccino vs tea)
2. Size selection (Short through Venti)
3. Milk type (nonfat, 2%, whole, soy)
4. Addition of flavorings and syrups

Additionally, **caffeine content** varied widely, with brewed coffee and espresso drinks showing the highest levels. These findings can guide health-conscious consumers and inform product positioning and menu optimization strategies for Starbucks.

Nutritional Analysis of Starbucks Beverages

Beverages	Beverages Category	Avg. Calories	Avg. Protein	Avg. Caffeine	Avg. Sugar	Avg. Fat
33	9	193.87	6.98	81.62	32.96	2.90

Nutritional profile of drink

Beverages

- Banana Chocolate Smoothie
- Brewed Coffee
- Caffee Americano
- Caffee Latte
- Caffee Mocha (Without Whi...
- Cappuccino
- Caramel
- Caramel (Without Whipped ...
- Caramel Apple Spice (With...
- Caramel Macchiato
- Coffee
- Espresso
- Hot Chocolate (Without Wh...
- Iced Brewed Coffee (With ...

Brewed Coffee

Calories	Sugar	Carbohydrates	Protein
4.25	0.00	8.75	0.70