

McDonald's Menu Nutritional Analysis



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Introduction

Nowadays, people are more aware of what they eat, especially when it comes to fast food. This report gives a simple look at the nutrition in **McDonald's menu items**. By looking at things like **calories, protein, fats, and carbohydrates**, the aim is to help customers make smarter choices about their food.

Objectives

The main objectives of this analysis are:

- **Understand the nutritional distribution** of menu items, comparing calories, fats, proteins, and carbohydrates across different categories like **breakfast, burgers, and beverages**.
- **Identify healthier options** for customers who want lower-calorie or higher-protein meals.
- **Visualize the nutritional data** using graphs and charts to highlight trends and patterns.

Food categories

Here's a refined breakdown of McDonald's menu categories and their nutritional highlights:

- **Breakfast:** Breakfast items tend to be calorie- and protein-rich, but they often contain high levels of sodium and total fat, which are important when considering their overall health impact.
- **Beef & Pork:** These menu items are excellent sources of protein but also come with high cholesterol and total fat content, making these nutrients crucial in evaluating their nutritional profile.
- **Chicken & Fish:** While great sources of protein with typically lower fat than beef, chicken and fish items should be assessed for their sodium and cholesterol content.
- **Salads:** Generally lower in calories, salads are nutrient-dense, rich in vitamins A and C, calcium, and dietary fiber, offering a healthier option on the menu.
- **Snacks & Sides:** These items often have high carbohydrate and sodium levels, with some sides containing added sugars that impact their nutritional evaluation.

- **Desserts:** Desserts are typically high in sugars, calories, and fats, key nutrients to consider when assessing their effects on diet and overall health.
- **Beverages:** Many beverages are high in sugars and calories, with some also contributing significantly to sodium intake.
- **Coffee & Tea:** Although low in calories, the sugar and fat content in coffee and tea can vary widely based on added ingredients like cream and syrups.
- **Smoothies & Shakes:** These indulgent drinks are usually high in sugars, fat, and calories, making them important items to assess in terms of their nutritional impact.

Key Nutrients in McDonald's Menu Items:

- **Calories:** A measure of the energy provided by the food.
- **Calories from Fat:** The portion of total calories that come from fat content.
- **Total Fat:** The sum of all fats in the item.
- **Total Fat (% Daily Value):** The percentage of the recommended daily fat intake in one serving.
- **Saturated Fat:** A type of fat that can raise cholesterol levels.
- **Saturated Fat (% Daily Value):** The percentage of the daily recommended limit for saturated fats.
- **Trans Fat:** An unhealthy fat that increases the risk of heart disease.
- **Cholesterol:** A substance found in animal products, linked to heart health.
- **Cholesterol (% Daily Value):** The percentage of the daily recommended cholesterol in the item.
- **Sodium:** The salt content, which can influence blood pressure.
- **Sodium (% Daily Value):** The percentage of the recommended daily sodium intake per serving.
- **Carbohydrates:** The primary source of energy, consisting of sugars, starches, and fibers.
- **Carbohydrates (% Daily Value):** The contribution to the recommended daily intake of carbohydrates.
- **Dietary Fiber:** Aids in digestion and promotes a sense of fullness.
- **Sugar:** Simple carbohydrates that can affect blood sugar levels.

- **Protein:** Essential for muscle growth and repair.
- **Vitamin A (% Daily Value):** Supports vision and immune function by contributing to the daily vitamin A intake.
- **Vitamin C (% Daily Value):** Contributes to immune health and skin repair.
- **Calcium (% Daily Value):** Important for bone strength and health.
- **Iron (% Daily Value):** Vital for oxygen transport in the blood.

Knowing about these key nutrients helps McDonald's customers make better choices about their meals, allowing them to balance their diet and manage their health. It also helps McDonald's be more transparent about their menu and encourages healthier options, which can improve the brand's image by focusing on health and well-being.

Serving size:

Weight based serving: These servings are measured in grams or ounces, providing a precise understanding of how much food is being consumed.

- Big Mac: 8.0 oz (227 g)
- French Fries: Medium size: 4.1 oz (116 g)

Volume-based serving sizes: These servings are measured in fluid ounces or milliliters, often used for liquids or foods that can be poured or scooped.

- Beverage(child): 12 fl oz cup
- Jug size: 1 carton (236 ml)

Data Analysis Approach and Methodology

This analysis was performed using Jupyter Notebook, along with Python libraries like Pandas, NumPy, and Matplotlib for data handling and visualization. The process involved the following steps:

- **Data Cleaning:** The dataset was thoroughly checked, confirming that there were no missing values. A careful review of data types ensured the accuracy of the analysis and the reliability of the insights drawn.
- **Exploratory Data Analysis (EDA):**
 - ◆ **Descriptive Statistics:** Key metrics such as count, mean, standard deviation (std), minimum (min), percentiles (25%, 50%, 75%), and maximum (max) were calculated. These statistics helped provide an overview of how each nutritional factor was distributed across the dataset.
 - ◆ **Outlier Detection:** The analysis identified 154 outliers, which could skew the averages. To provide a more accurate representation, the median was used instead of the mean as the measure of central tendency, particularly given the presence of skewed data and extreme values.
- **Visualization:** Several visualizations were generated to illustrate patterns in the nutritional content. Box plots were used to highlight data distribution and outliers, while bar charts allowed for easy comparison across different categories.

Exploratory Data Analysis (EDA)

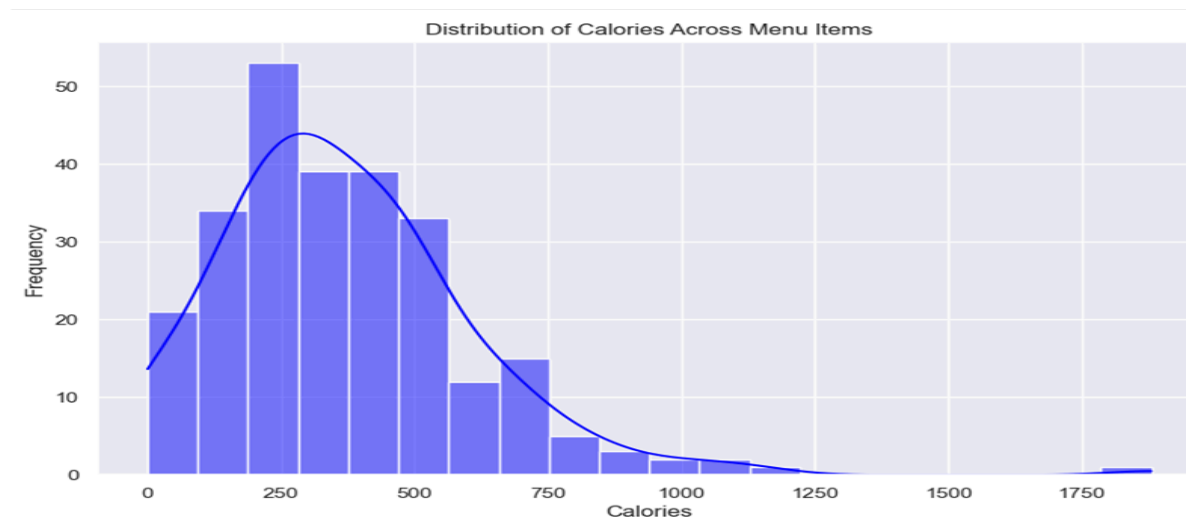
Nutrient	Count	Mean	Std Dev	Min	25%	50%	75%	Max
Calories	260	368.27	240.27	0	210	340	500	1880
Calories from Fat	260	127.1	127.88	0	20	100	200	1060
Total Fat (g)	260	14.17	14.21	0	2.38	11	22.25	118
Total Fat (% Daily Value)	260	21.82	21.89	0	3.75	17	35	182
Saturated Fat (g)	260	6.01	5.32	0	1	5	10	20
Saturated Fat (% Daily Value)	260	29.97	26.64	0	4.75	24	48	102

Trans Fat (g)	260	0.2	0.43	0	0	0	0	2.5
Cholesterol (mg)	260	54.94	87.27	0	5	35	65	575
Cholesterol (% Daily Value)	260	18.39	29.09	0	2	11	21.25	192
Sodium (mg)	260	495.75	577.03	0	107.5	190	865	3600
Sodium (% Daily Value)	260	20.68	24.03	0	4.75	8	36.25	150
Carbohydrates (g)	260	47.35	28.25	0	30	44	60	141
Carbohydrates (% Daily Value)	260	15.78	9.42	0	10	15	20	47
Dietary Fiber (g)	260	1.63	1.57	0	0	1	3	7
Dietary Fiber (% Daily Value)	260	6.53	6.31	0	0	5	10	28
Sugars (g)	260	29.42	28.68	0	5.75	17.5	48	128
Protein (g)	260	13.34	11.43	0	4	12	19	87
Vitamin A (% Daily Value)	260	13.43	24.37	0	2	8	15	170
Vitamin C (% Daily Value)	260	8.53	26.35	0	0	0	4	240

Calcium (% Daily Value)	260	20.97	17.02	0	6	20	30	70
Iron (% Daily Value)	260	7.73	8.72	0	0	4	15	40

The table below offers a detailed overview of the key nutritional statistics for **McDonald's menu** items. It shows the average (mean) values for each nutrient, as well as the standard deviation, which indicates how much the values differ between items. The minimum and maximum values represent the range of nutritional content, while the percentiles (25%, 50%, 75%) provide insight into how the nutrients are spread across the menu. This summary helps to better understand **calorie counts**, **fat content**, **protein levels**, and other **nutrients**, highlighting both common values and extreme outliers.

Analyzing the distribution of calorie counts across menu items



The distribution of calorie counts across menu items shows that:

The average (mean) calorie count is approximately 368. The standard deviation is about 240, indicating variability in calorie counts. The minimum calorie count is 0, while the maximum is 1880. The 25th percentile is 210, the median (50th percentile) is 340, and the 75th percentile is 500.

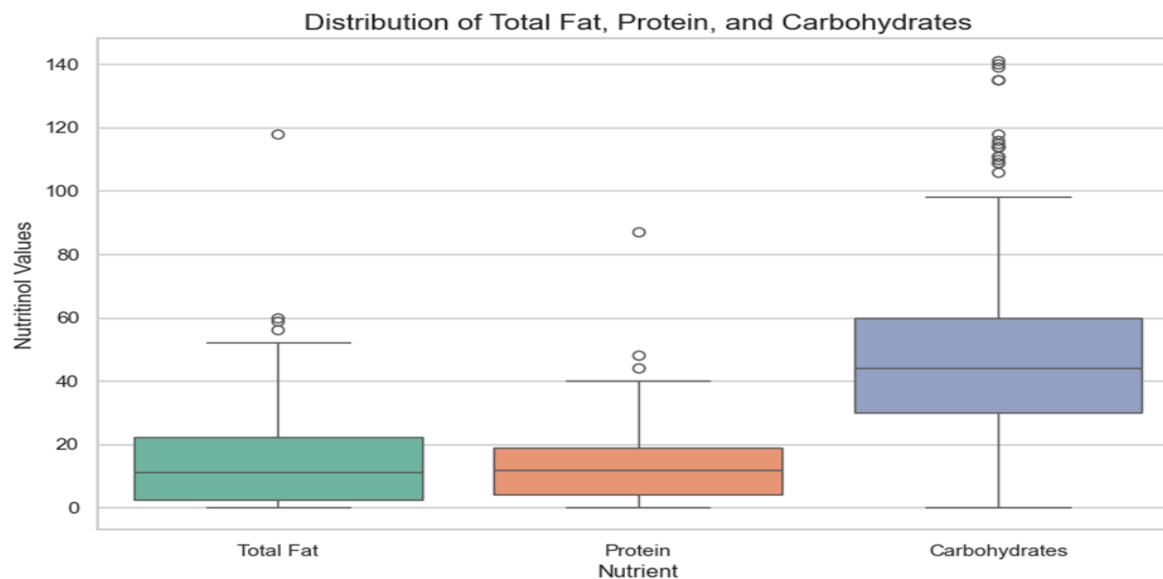
The histogram shows a right-skewed distribution, with most menu items having calorie counts between 200 and 500.

Category	Menu Items per Category	Centerpoint Calories
Beef & Pork	15	500
Beverages	27	100
Breakfast	42	470
Chicken & Fish	27	480
Coffee & Tea	95	270
Desserts	7	250
Salads	6	255
Smoothies & Shakes	28	540
Snacks & Sides	13	260

The table summarizes different food categories from McDonald's menu, showing the number of items in each category and their median calorie values. The Coffee & Tea category has the most items (95) with a median of 270 calories. Breakfast and Chicken &

Fish have a moderate number of items, with 42 and 27 respectively, and median calories around 470-480. **Smoothies & Shakes** have the highest median calorie count at 540, while **Beverages** and **Desserts** offer lower-calorie options, with medians of 100 and 250 calories. **Salads** and **Snacks & Sides** provide lighter meals, with median calories of 255 and 260.

Exploring the nutritional content (e.g. fat, protein, carbohydrates) of different items



Nutritional Content Analysis

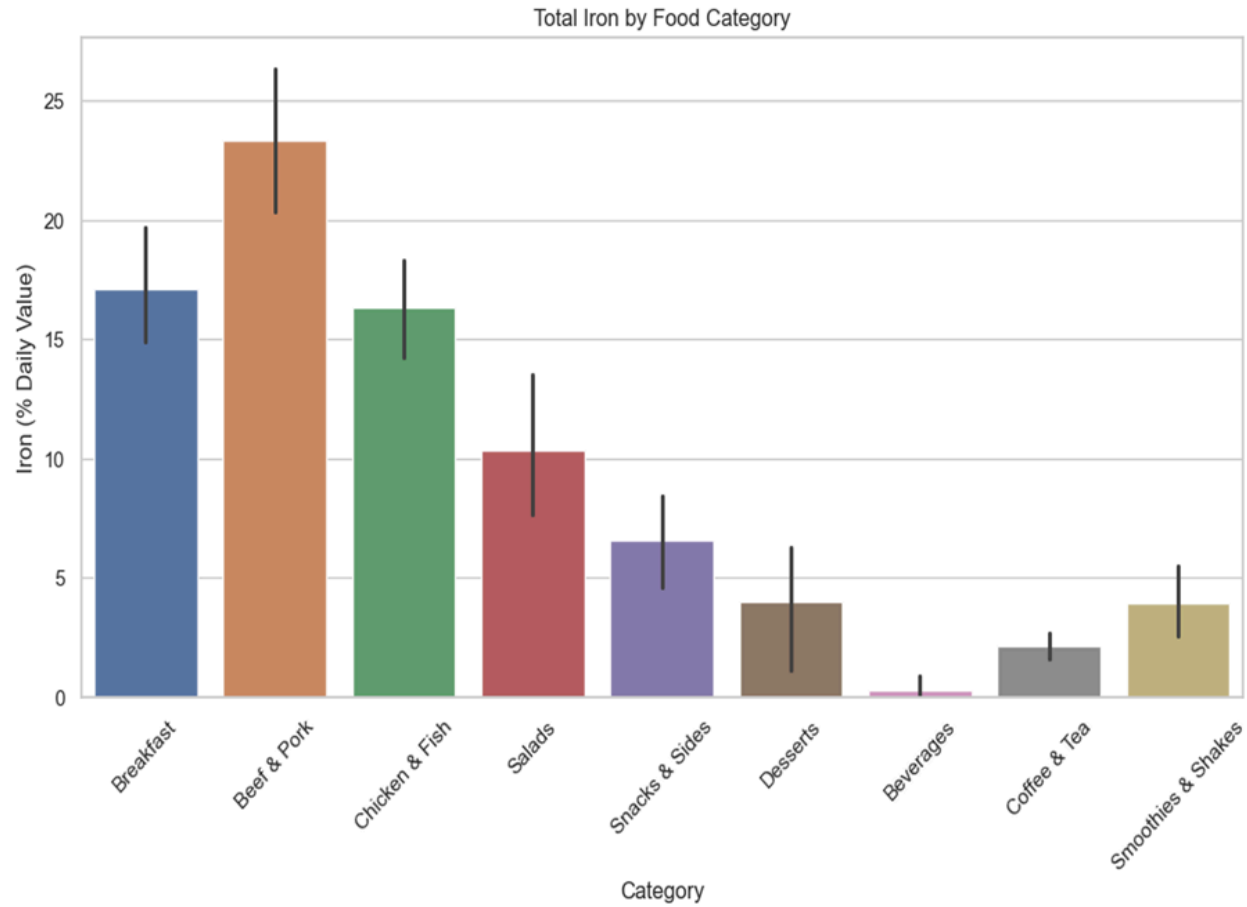
The box plot shows the distribution of total fat, protein, and carbohydrate content in McDonald's menu items:

- **Total Fat:** The median fat content is about 20 grams, with a few outliers having more than 60 grams.
- **Protein:** The median protein content is slightly lower, around 20 grams, though some outliers have higher amounts.
- **Carbohydrates:** Carbohydrate content varies widely, with a median of around 60 grams, and several outliers exceeding 100 grams.

This visualization demonstrates the range of nutritional content, helping customers make more informed dietary decisions.

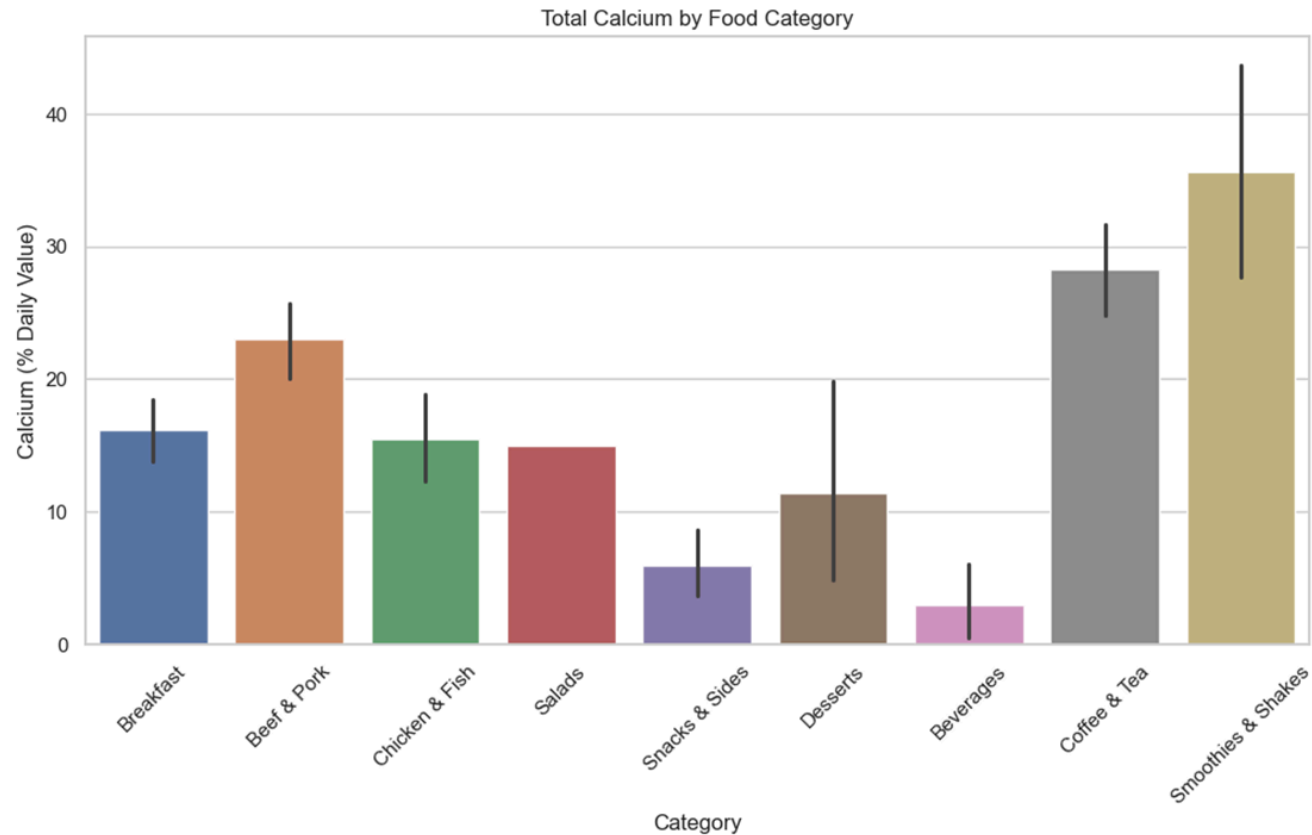
Identify trends and patterns in the dataset

Iron Distribution Analy:



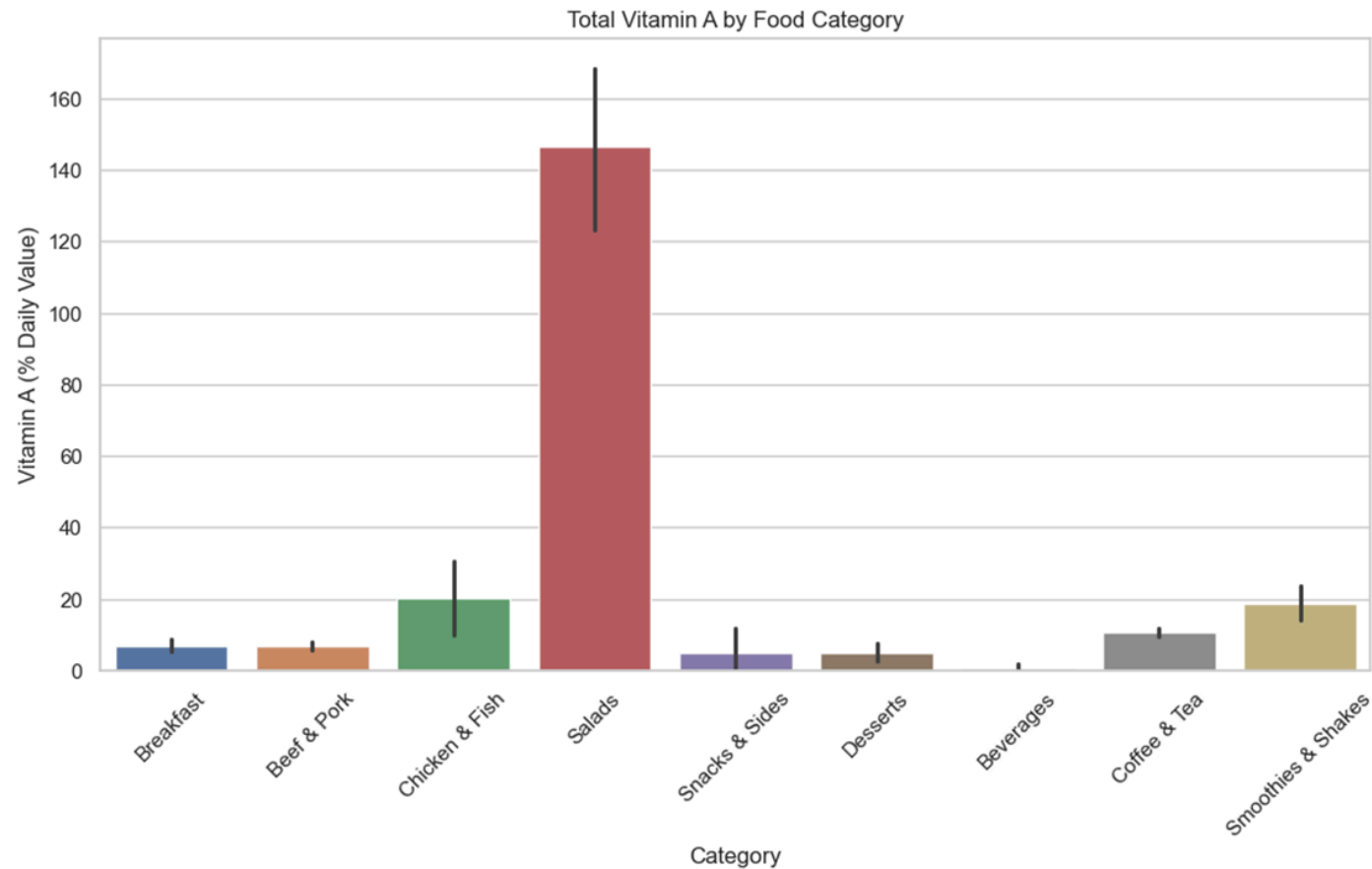
The bar chart reveals that Beef & Pork items have the highest iron content, with Breakfast and Chicken & Fish following closely. Salads provide a moderate amount of iron, while Snacks & Sides, Desserts, and Smoothies & Shakes contain lower levels. Beverages and Coffee & Tea contribute very little to iron intake. There is some variability in iron content within each category, as reflected by the differences in the bar heights.

Calcium Distribution Analysis



The chart shows that Smoothies & Shakes have the highest calcium content, with Coffee & Tea coming in second. Beef & Pork, Breakfast, and Chicken & Fish offer moderate amounts of calcium, while Snacks & Sides and Beverages contain the lowest levels.

Vitamin A Distribution Analysis



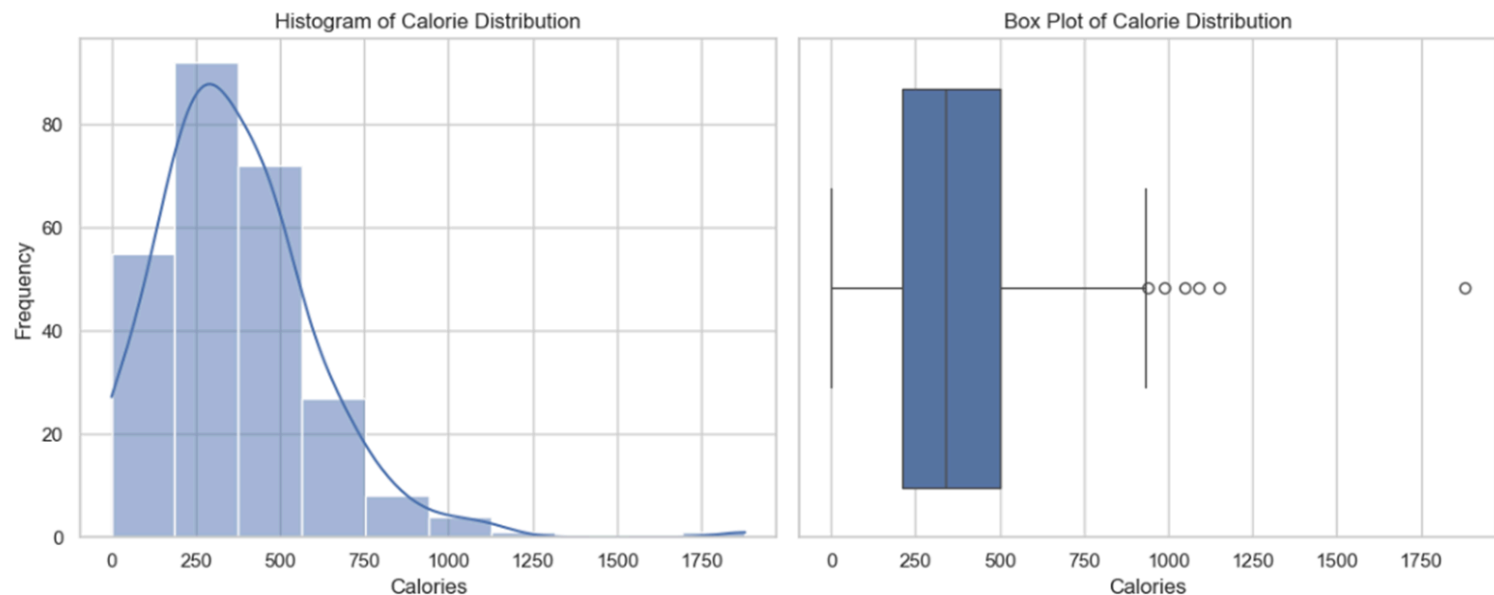
The chart reveals that Salads have the highest Vitamin A content, far surpassing other categories. Chicken & Fish and Smoothies & Shakes provide moderate amounts of Vitamin A, while Beverages, Breakfast, Beef & Pork, and most other categories contain very low levels of this nutrient.

Data Visualization

To gain insights into the calorie distribution and nutritional content of these items, I will create several data visualizations. First, I will generate a histogram and a box plot to visualize the distribution of calorie counts across the menu items. This will allow us to understand the range of calorie values, identify any outliers or skewness in the data, and get a sense of the overall calorie distribution. Next, I will create a series of bar charts to compare the nutritional characteristics (total fat, saturated fat, carbohydrates, and protein) of different food categories, such as burgers, salads, and desserts. This will help identify any significant differences in the nutrient profiles of these food groups. Through these visualizations, we can gain a comprehensive understanding of the calorie and nutrient composition of the menu items, which can inform consumer choices and guide menu development efforts.

A. Distribution of Calories

The histogram and boxplot for the said distribution can be plotted together with the help of a subplot, so that we can compare both the visuals side by side to get more comprehensive insights about the distribution as well as the outliers.



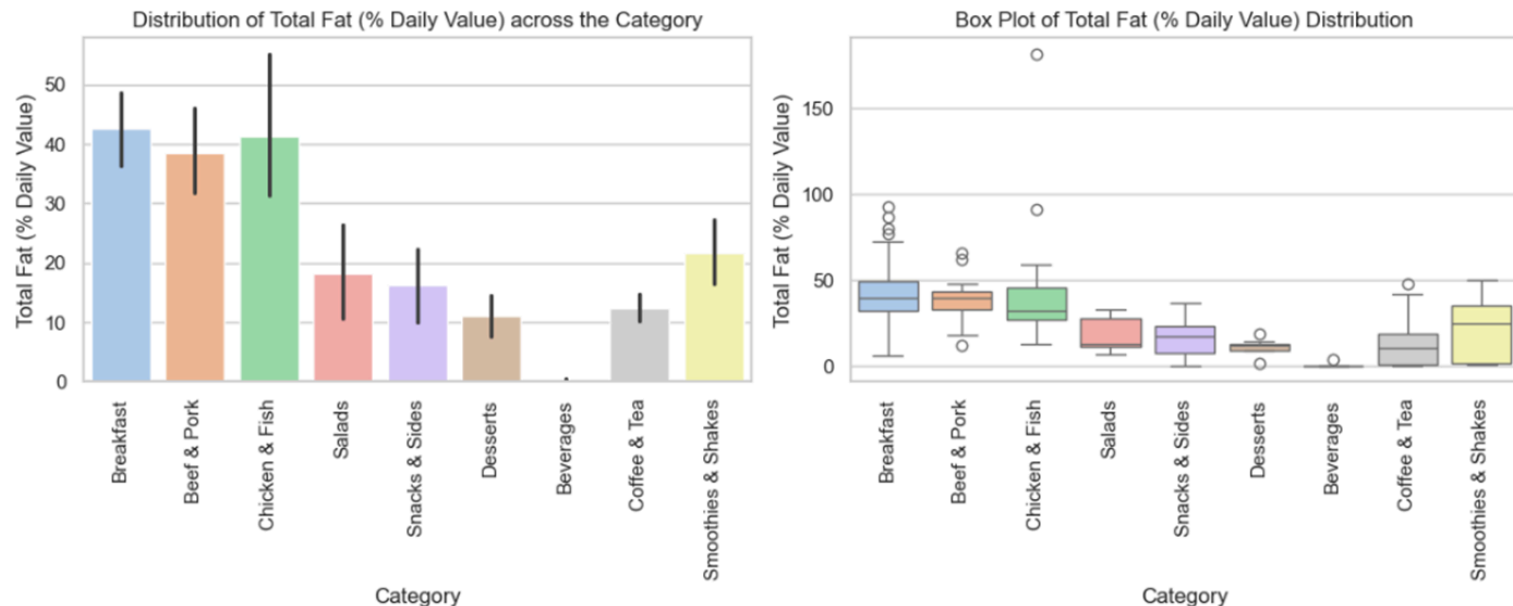
The shape of the histogram is right-skewed, with a peak at approximately 125-500 calories and a long tail towards the higher values of calories. The majority of menu items fall on the lower end of the calorie count, and there are only a few high-calorie outliers. The observations are confirmed by the box plot, where the median is approximately 340 calories and the 25th and 75th percentiles are 210 and 500, respectively. The box plot reveals the presence of several outliers, some of which are associated with high calories, starting from the "McFlurry with Reese's Peanut Butter Cups (Medium)" at 810 calories.

B. Nutritional Content Comparison

With the help of several bar-charts and box plots we compare the nutritional characteristics of different food categories. As the count of nutrients is 22(which will not be as feasible), we create the visualizations for 4 selected list of nutrients namely,

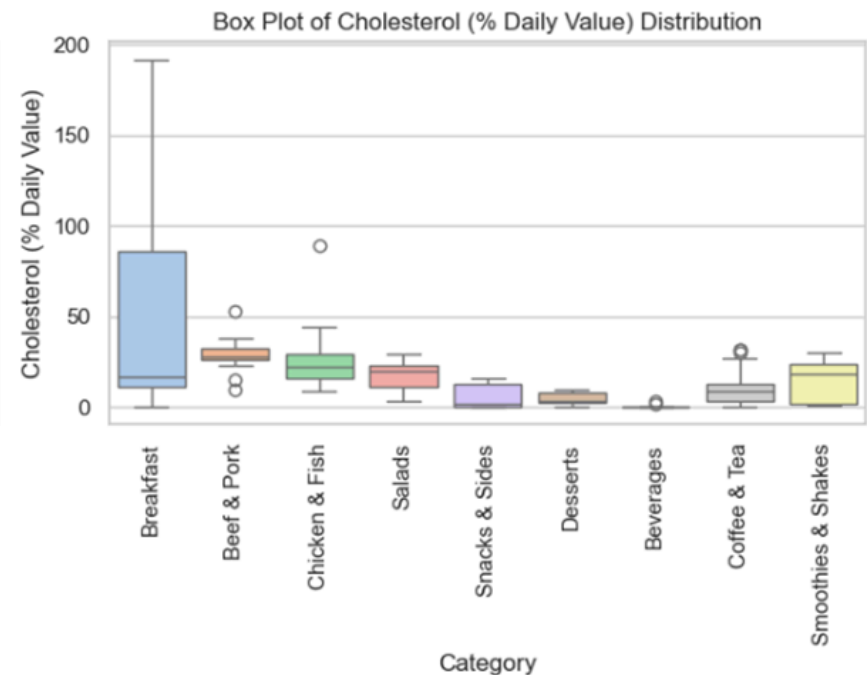
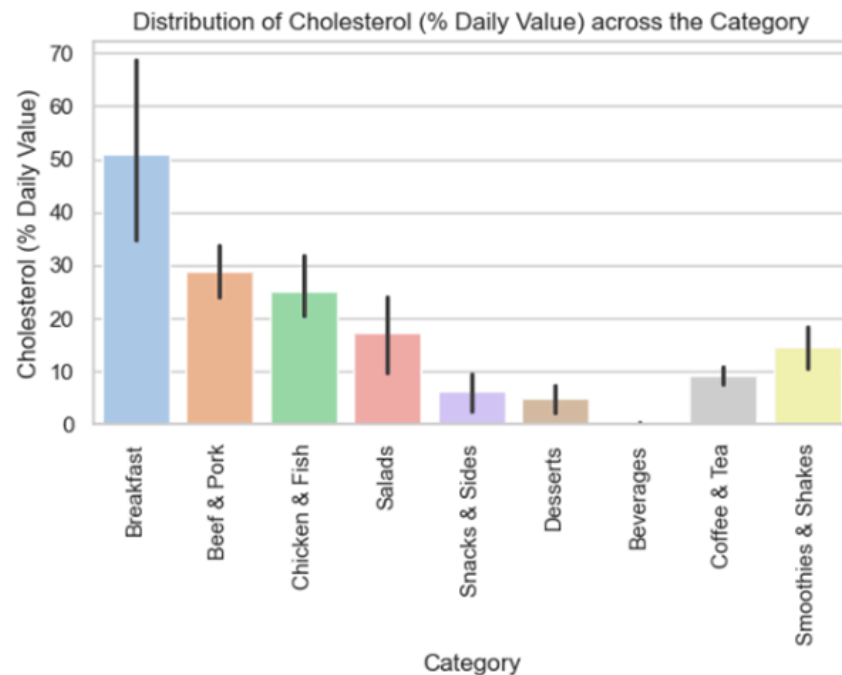
1. Total Fat (% Daily Value)
2. Cholesterol (% Daily Value)
3. Sugars
4. Protein

B.1 Total Fat (% Daily Value)



1. From bar plot - The bar plot indicates that the Breakfast category has the highest average Total Fat (% Daily Value) at approximately 43%, followed closely by the Chicken & Fish category at approx. 40%. The Beverages category has the lowest average Total Fat (% Daily Value) showing a negligible set of value.
2. From boxplot(For the top two categories having highest average Total Fat (% Daily Value)) -
 - Breakfast: The box plot shows a relatively even distribution of Total Fat (% Daily Value) across the breakfast items, with a median of 43%. The 25th percentile is around 30%, and the 75th percentile is 50%. There are several outliers with higher Total Fat (% Daily Value) values.
 - Chicken & Fish: The box plot shows a skewed distribution of Total Fat (% Daily Value) across the chicken & fish items, with a median of around 40%. The 25th percentile is roughly around 28%, and the 75th percentile is about 48%. There are a few outliers with higher Total Fat (% Daily Value) values

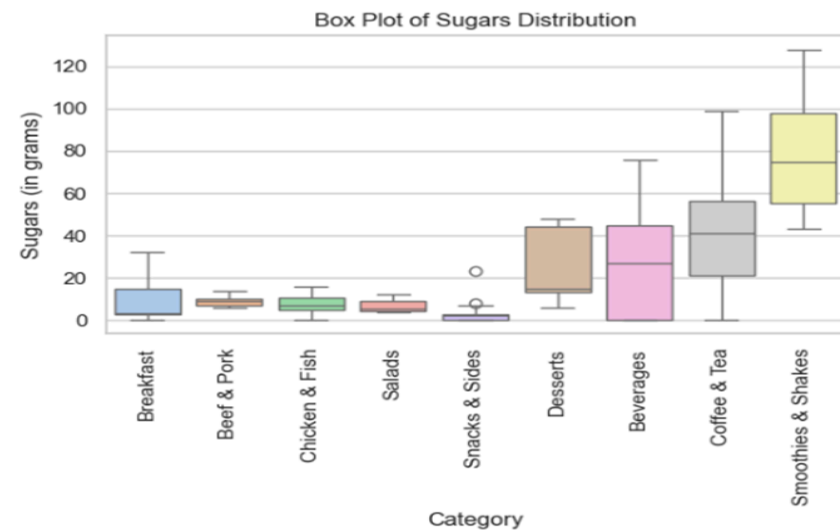
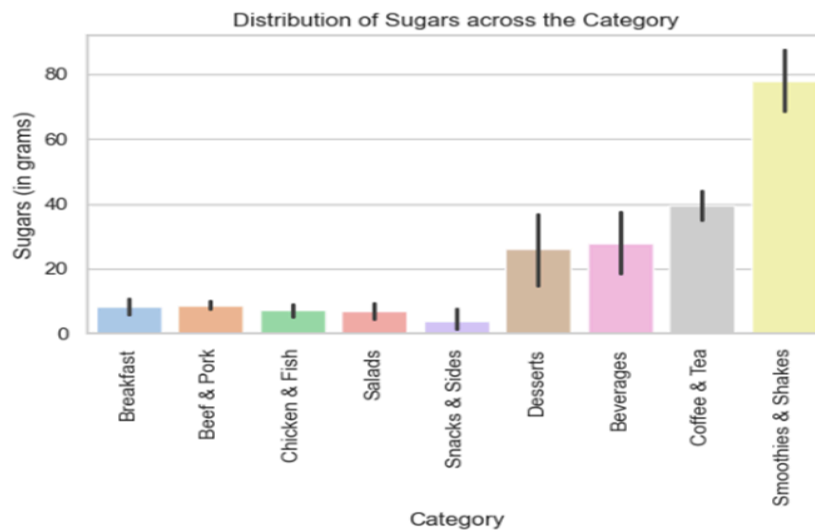
B.2 Cholesterol (% Daily Value)



1. From bar plot- The Breakfast category has the highest average Cholesterol (% Daily Value) at around 50%, followed by the Beef & Pork category at around 30%, and the Chicken & Fish category at around 25%. The Beverages category again stands out to be the category with lowest cholesterol content with a very deniable cholesterol value.
2. From boxplot(For the top two categories having highest average Cholesterol (% Daily Value))-
 - Breakfast: A more considerable range of cholesterol values is provided in the Breakfast category – some items reach approximately 90% of the daily value. Additionally, the median cholesterol level is also higher in comparison with the other categories.
 - Beef & Pork: The Beef & Pork category has a more compact distribution, as the majority of data falls between 25-35% of the daily cholesterol value.

In addition, there are a few outliers in the Chicken & Fish and Beef & Pork categories, indicating that some items in these categories have exceptionally high cholesterol content.

B.3 Sugars (in grams)



1. From barplot-

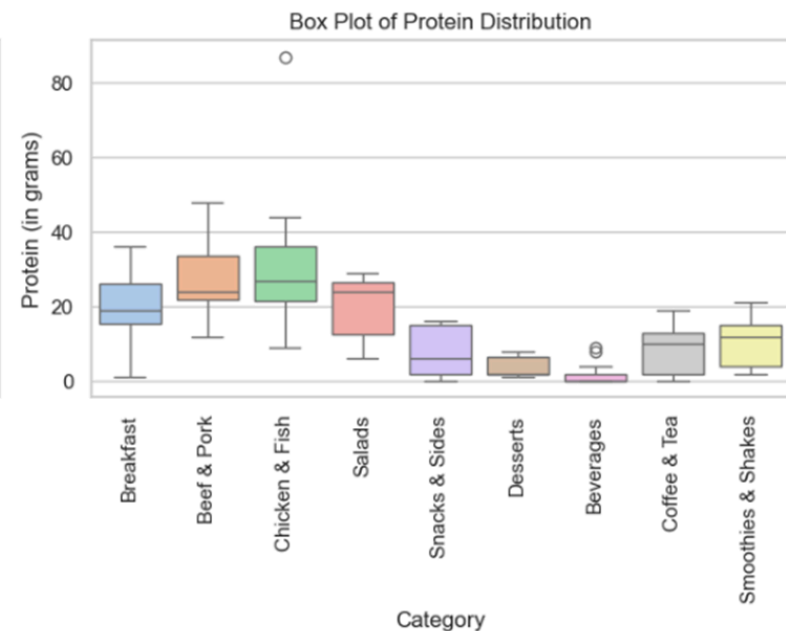
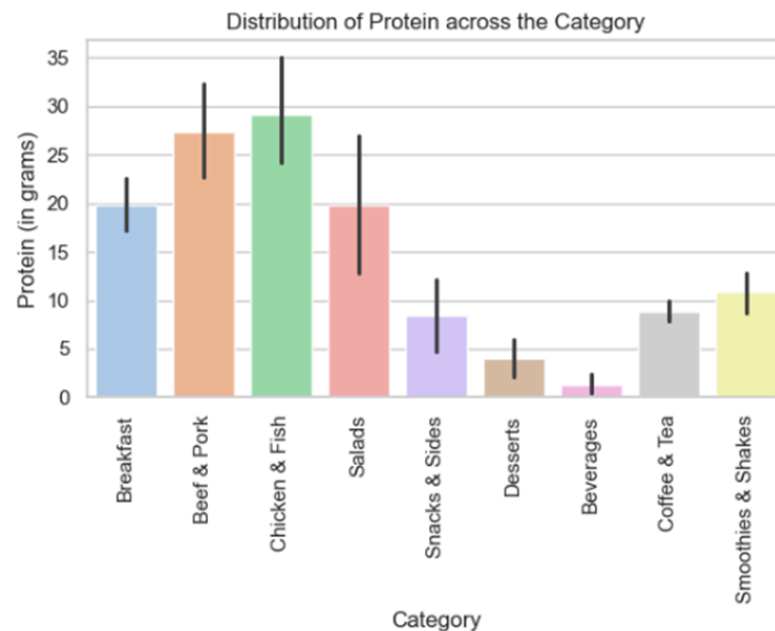
- The Smoothies & Shakes category has the highest average Sugars content, with around 80 grams of sugar per serving.
- The Coffee & Tea category has the second-highest average Sugars content, with around 40 grams of sugar per serving.
- The Snacks & Sides has the lowest average Sugars content, with around 8 grams of sugar per serving.

2. From boxplot(For the top two categories having highest average Sugars(in grams))-

- The Smoothies & Shakes category has the widest range of Sugars content, with some items reaching up to 100 grams of sugar per serving.
- The Coffee & Tea category also has a wide range of Sugars content, with some items reaching up to 60 grams of sugar per serving.

Apart from the Snacks & Sides category which ironically happen to be the category with the lowest Sugars content, there are no major outliers for the sugars content throughout all categories.

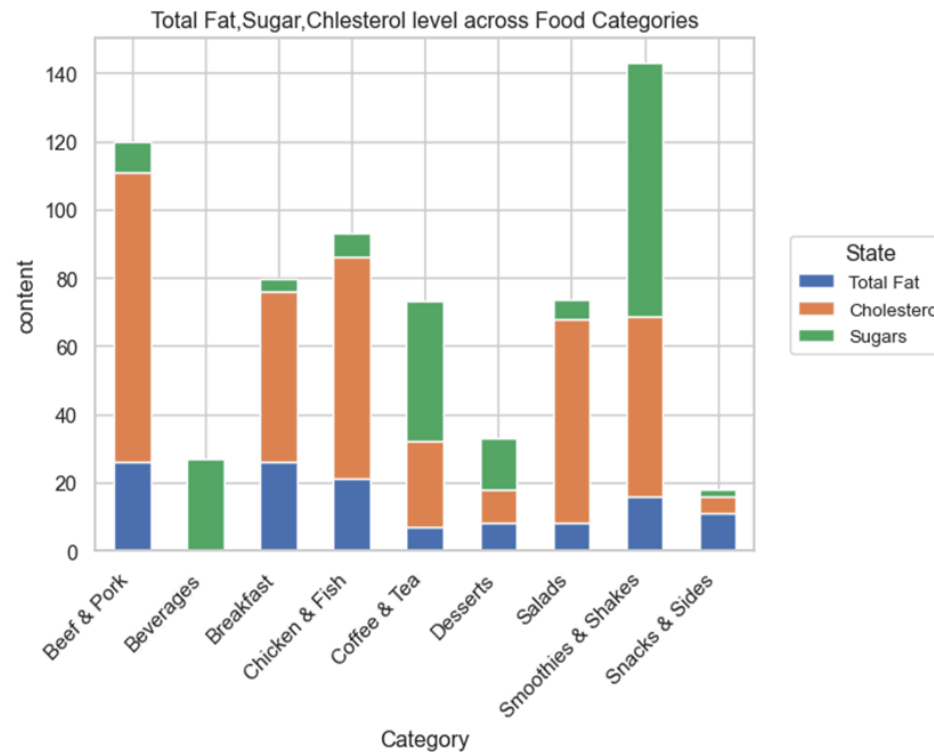
B.4 Protein (in grams)



- There isn't really a huge set of noted outliers within the range of categories that necessarily indicate very high protein levels across the menu items. Although there is a very small portion of outliers in the Chicken & Fish category and Beverages category showing only a limited count of menu items with spiked protein levels.

Calories and nutritional content across food Categories

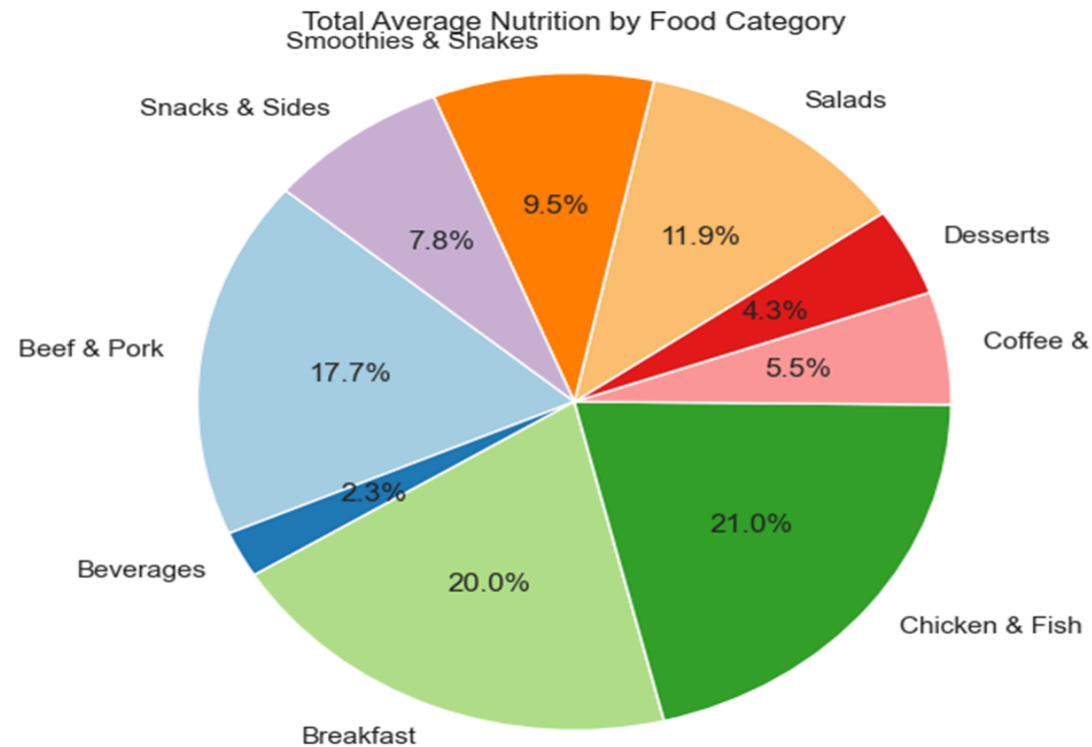
Category	Calories	Carbohydrates	Dietary Fiber	Protein	Vitamin A (% Daily Value)	Vitamin C (% Daily Value)	Calcium (% Daily Value)	Sodium	Iron (% Daily Value)
Beef & Pork	500	20	10	50	10	10	10	1050	10
Beverages	100	10	10	10	10	10	10	50	10
Breakfast	480	20	10	50	10	10	10	1350	10
Chicken & Fish	480	20	10	50	10	10	10	1350	10
Coffee & Tea	280	20	10	10	10	10	10	150	10
Desserts	250	20	10	10	10	10	10	150	10
Salads	250	20	10	10	100	10	10	700	10
Smoothies & Shakes	550	50	10	10	10	10	10	200	10
Snacks & Sides	250	20	10	10	10	10	10	300	10



The stacked bar charts and tables provide a clear comparison of both beneficial and less desirable nutrients across various food categories, helping consumers make informed dietary choices. Categories like Salads and Chicken & Fish stand out for their high protein content, along with essential vitamins and minerals such as Vitamin A, Vitamin C, and iron, while Smoothies & Shakes are a good source of calcium.

On the other hand, less desirable nutrients like total fat, cholesterol, and sugars are notably higher in categories like Beef & Pork, Smoothies & Shakes, and Beverages, indicating that these items should be eaten in moderation due to their higher levels of fat, cholesterol, and sugar. This information helps individuals better manage their nutritional intake in line with their health goals.

Determine the average nutritional content of popular menu categories



The values shown in the pie chart and table highlight which foods provide better nutritional content. These visuals make it easier to identify healthier options, helping customers choose foods that align with their dietary needs.

Average Nutritional Content of Popular Menu Categories

Breakfast: The Breakfast category is popular for its convenience and balanced nutrition, making it a great start to the day. Many customers enjoy pairing their breakfast with Coffee & Tea.

Lunch: The Chicken & Fish category is well-liked, as it provides essential nutrients and is rich in calories, carbohydrates, vitamins, and sodium. Combining this category with Salads and Smoothies & Shakes boosts nutritional value.

Dinner: The Beef & Pork category is a favorite for dinner, offering options like burgers and wraps. Many people pair these meals with Beverages, Desserts, and Snacks & Sides. However, these meals can be high in fat, cholesterol, and sugar, which may not be ideal for a healthy diet.

Benefits of Nutritional Analysis for McDonald's Customers and Organization

For McDonald's Customers

Conducting a detailed nutritional analysis can greatly benefit McDonald's customers in several ways:

- **Informed Choices:** Customers can make better meal decisions by understanding the calorie count and nutritional content of different items. This helps them choose meals that fit their dietary goals, whether they want low-calorie, high-protein, or balanced options.
- **Healthier Eating Habits:** By identifying food categories with high levels of beneficial nutrients like Protein, Dietary Fiber, and Vitamins, customers can plan meals that include more nutritious items, promoting healthier eating habits.
- **Customization:** The analysis highlights menu items that may have excessive fat, sodium, or sugar. This helps customers who need to manage these nutrients due to medical conditions like hypertension or diabetes, allowing them to customize their meals accordingly.
- **Dietary Preferences:** Customers can easily find options that meet specific dietary preferences or restrictions. For example, identifying high-protein items like Chicken & Fish or low-calorie beverages can help those focused on weight management or muscle gain.

For McDonald's Organization

McDonald's can use this nutritional analysis to enhance customer satisfaction and drive business growth:

- **Menu Optimization:** By understanding the nutritional distribution of their menu, McDonald's can adjust portion sizes, ingredient combinations, or create new items that meet the demand for healthier options while still being tasty.
- **Targeted Marketing:** Nutritional insights provide valuable data for targeted marketing campaigns. McDonald's can promote healthy options like Salads, Smoothies & Shakes, or low-calorie beverages to attract health-conscious customers and create personalized promotions for different consumer groups.
- **Improved Customer Loyalty:** Providing transparent nutritional information builds trust and strengthens the brand's relationship with customers. By helping them make informed decisions, McDonald's can foster long-term loyalty, especially among health-conscious consumers.
- **Compliance with Regulations:** Many regions require businesses to provide detailed nutritional information. This analysis helps McDonald's stay compliant with local laws and industry standards, avoiding legal issues and maintaining transparency.
- **New Product Development:** Insights from the analysis can help McDonald's create new products that meet the growing demand for healthier fast food. This can attract a wider audience, including those who previously avoided fast food due to health concerns.

Overall, this nutritional analysis not only promotes healthier choices for customers but also allows McDonald's to innovate, optimize their menu, and maintain a competitive edge in the fast-food industry.

Recommendations on how McDonald's could improve the nutritional profile of their menu

Recommendations for Improving McDonald's Nutritional Profile:

McDonald's can improve the nutritional quality of its menu by following these strategies:

- Lower sodium, saturated fat, and added sugars in popular menu items to encourage healthier choices.
- Introduce leaner protein options like grilled chicken or plant-based alternatives to offer more balanced meals.
- Add more fresh vegetables and whole grains to increase the nutritional value of meals.
- Offer smaller portion sizes to help customers better manage their calorie intake.
- Increase ingredient transparency so customers can make more informed, health-conscious choices.

- Use healthier cooking methods, such as baking instead of frying, to reduce fat content in certain items.

By making these changes, McDonald's can promote healthier eating habits while meeting the growing demand for more nutritious and balanced meals.

Conclusion:

This analysis offers helpful insights into the nutritional content of different food categories at McDonald's, allowing customers to make more informed choices based on their dietary needs. Categories like Chicken & Fish and Salads provide a good balance of proteins, vitamins, and minerals, while options like Beef & Pork and Smoothies & Shakes tend to be higher in fat, cholesterol, and sugars, which may need to be consumed in moderation. By understanding the nutritional profiles of these items, customers can better tailor their meals to meet their dietary goals and encourage healthier eating habits.

GitHub Link : <https://github.com/surbhi0422/McDonald-s-Menu-Nutritional-Analysis>