McDonald's Menu Nutritional Analysis

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https://github.com/PallaviUP/Mcd-Project.git

In [1]:
```
import pandas as pd
```

In [2]:
```
import os
```

Data Loading and Preprocessing:

The dataset provided in the CSV file is loaded into a pandas DataFrame for further analysis. The data is cleaned and preprocessed to ensure consistency and accuracy.

In [3]:
```
path = r"C:\Users\Annu\Desktop\final Project"
```

In [4]:
```
os.getcwd()
```

Out[4]:
```
'C:\\Users\\Annu'
```

In [5]:
```
os.listdir()
```

Out[5]:
```
['.anaconda',
 '.bash_history',
 '.cache',
 '.conda',
 '.condarc',
 '.continuum',
 '.eclipse',
 '.git',
 '.gitconfig',
 '.ipynb_checkpoints',
 '.ipython',
 '.jupyter',
 '.lesshst',
 '.matplotlib',
 '.p2',
 '.vscode',
 '3D Objects',
 'anaconda3',
 'AppData',
 'Application Data',
 'cafe_branch1_menu.md',
 'Contacts',
 'Cookies',
 'Desktop',
 'Documents',
 'Downloads',
 'eclipse',
 'Favorites',
 'IntelGraphicsProfiles',
 'Joe_gitcafe',
 'Library',
 'LifeSave DataSet (1).csv',
 'Links',
 'Local Settings',
 'Music',
 'My Documents',
 'NetHood',
 'NTUSER.DAT',
 'ntuser.dat.LOG1',
 'ntuser.dat.LOG2',
 'NTUSER.DAT{53b39e88-18c4-11ea-a811-000d3aa4692b}.TM.blf',
 'NTUSER.DAT{53b39e88-18c4-11ea-a811-000d3aa4692b}.TMContainer00000000000
000000001.regtrans-ms',
 'NTUSER.DAT{53b39e88-18c4-11ea-a811-000d3aa4692b}.TMContainer00000000000
000000002.regtrans-ms',
 'ntuser.ini',
 'Nutrical Dataset (2).csv',
 'OneDrive',
 'Pallavi',
 'Pallavi Final Project.ipynb',
 'Pictures',
 'PrintHood',
 'Project 1.ipynb',
 'Recent',
 'Saved Games',
 'Searches',
 'SendTo',
 'Start Menu',
 'String_list.ipynb',
 'Templates',
 'Tracing',
```

```
 'untitled',
 'Untitled Folder',
 'Untitled Folder 1',
 'Untitled Folder 2',
 'Untitled.ipynb',
 'untitled.txt',
 'Untitled1.ipynb',
 'untitled1.txt',
 'Untitled2.ipynb',
 'Untitled3.ipynb',
 'Untitled4.ipynb',
 'Untitled5.ipynb',
 'Untitled6.ipynb',
 'Videos']
```

In [6]:
```
Mcd = pd.read_csv('Nutrical Dataset (2).csv')
```

In [7]:
```
Mcd.head(10)
```

Out[7]:

	Category	Item	Serving Size	Calories	Calories from Fat	Total Fat	Total Fat (% Daily Value)	Saturated Fat	Saturated Fat (% Daily Value)	Trans Fa
0	Breakfast	Egg McMuffin	4.8 oz (136 g)	300	120	13.0	20	5.0	25	0.(
1	Breakfast	Egg White Delight	4.8 oz (135 g)	250	70	8.0	12	3.0	15	0.(
2	Breakfast	Sausage McMuffin	3.9 oz (111 g)	370	200	23.0	35	8.0	42	0.(
3	Breakfast	Sausage McMuffin with Egg	5.7 oz (161 g)	450	250	28.0	43	10.0	52	0.(
4	Breakfast	Sausage McMuffin with Egg Whites	5.7 oz (161 g)	400	210	23.0	35	8.0	42	0.(
5	Breakfast	Steak & Egg McMuffin	6.5 oz (185 g)	430	210	23.0	36	9.0	46	1.(
6	Breakfast	Bacon, Egg & Cheese Biscuit (Regular Biscuit)	5.3 oz (150 g)	460	230	26.0	40	13.0	65	0.(
7	Breakfast	Bacon, Egg & Cheese Biscuit (Large Biscuit)	5.8 oz (164 g)	520	270	30.0	47	14.0	68	0.(
8	Breakfast	Bacon, Egg & Cheese Biscuit with Egg Whites (R...	5.4 oz (153 g)	410	180	20.0	32	11.0	56	0.(
9	Breakfast	Bacon, Egg & Cheese Biscuit with Egg Whites (L...	5.9 oz (167 g)	470	220	25.0	38	12.0	59	0.(

10 rows × 24 columns

In [8]:
```
Mcd = Mcd.drop_duplicates()
Mcd
```

Out[8]:

	Category	Item	Serving Size	Calories	Calories from Fat	Total Fat	Total Fat (% Daily Value)	Saturated Fat	Saturated Fat (% Daily Value)	T
0	Breakfast	Egg McMuffin	4.8 oz (136 g)	300	120	13.0	20	5.0	25	
1	Breakfast	Egg White Delight	4.8 oz (135 g)	250	70	8.0	12	3.0	15	
2	Breakfast	Sausage McMuffin	3.9 oz (111 g)	370	200	23.0	35	8.0	42	
3	Breakfast	Sausage McMuffin with Egg	5.7 oz (161 g)	450	250	28.0	43	10.0	52	
4	Breakfast	Sausage McMuffin with Egg Whites	5.7 oz (161 g)	400	210	23.0	35	8.0	42	
...	...	...	...	...	...	...	...	...	...	...
255	Smoothies & Shakes	McFlurry with Oreo Cookies (Small)	10.1 oz (285 g)	510	150	17.0	26	9.0	44	
256	Smoothies & Shakes	McFlurry with Oreo Cookies (Medium)	13.4 oz (381 g)	690	200	23.0	35	12.0	58	
257	Smoothies & Shakes	McFlurry with Oreo Cookies (Snack)	6.7 oz (190 g)	340	100	11.0	17	6.0	29	
258	Smoothies & Shakes	McFlurry with Reese's Peanut Butter Cups (Medium)	14.2 oz (403 g)	810	290	32.0	50	15.0	76	
259	Smoothies & Shakes	McFlurry with Reese's Peanut Butter Cups (Snack)	7.1 oz (202 g)	410	150	16.0	25	8.0	38	

260 rows × 24 columns

In [9]:
```
Mcd.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 260 entries, 0 to 259
Data columns (total 24 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   Category                        260 non-null    object
 1   Item                            260 non-null    object
 2   Serving Size                    260 non-null    object
 3   Calories                        260 non-null    int64
 4   Calories from Fat               260 non-null    int64
 5   Total Fat                       260 non-null    float64
 6   Total Fat (% Daily Value)       260 non-null    int64
 7   Saturated Fat                   260 non-null    float64
 8   Saturated Fat (% Daily Value)   260 non-null    int64
 9   Trans Fat                       260 non-null    float64
 10  Cholesterol                     260 non-null    int64
 11  Cholesterol (% Daily Value)     260 non-null    int64
 12  Sodium                          260 non-null    int64
 13  Sodium (% Daily Value)          260 non-null    int64
 14  Carbohydrates                   260 non-null    int64
 15  Carbohydrates (% Daily Value)   260 non-null    int64
 16  Dietary Fiber                   260 non-null    int64
 17  Dietary Fiber (% Daily Value)   260 non-null    int64
 18  Sugars                          260 non-null    int64
 19  Protein                         260 non-null    int64
 20  Vitamin A (% Daily Value)       260 non-null    int64
 21  Vitamin C (% Daily Value)       260 non-null    int64
 22  Calcium (% Daily Value)         260 non-null    int64
 23  Iron (% Daily Value)            260 non-null    int64
dtypes: float64(3), int64(18), object(3)
memory usage: 48.9+ KB
```

In [10]:
```
Mc=Mcd.drop(['Trans Fat', 'Carbohydrates (% Daily Value)','Vitamin A (% Dai
```

In [11]:
```
Mc.shape
```

Out[11]:
```
(260, 21)
```

Exploratory Data Analysis (EDA):

The EDA involves examining the distribution of calorie counts across menu items, exploring the nutritional content of different items, and identifying trends and patterns in the dataset.

In [12]:
```
import matplotlib.pyplot as plt
```

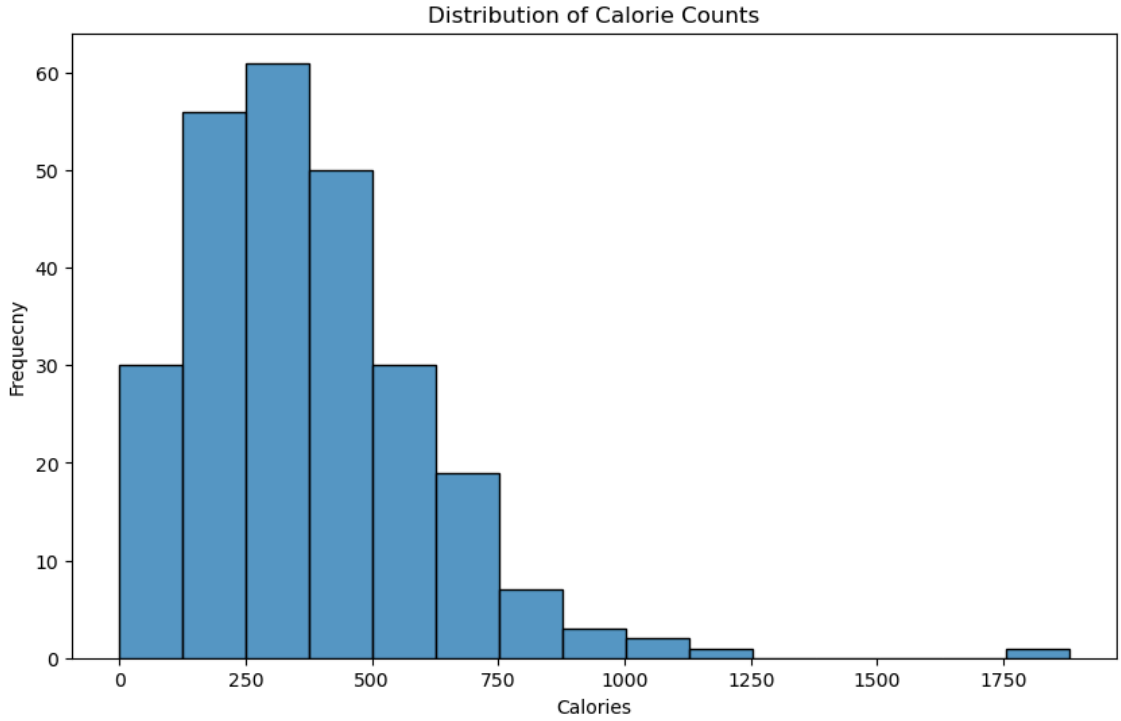
In [13]:
```
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
```

In [14]:
```
import seaborn as sns
```

In [15]:
```
Calories=Mcd['Calories'].describe()
Calories
```

Out[15]:
```
count     260.000000
mean      368.269231
std       240.269886
min         0.000000
25%       210.000000
50%       340.000000
75%       500.000000
max      1880.000000
Name: Calories, dtype: float64
```

In [16]:
```
plt.figure(figsize=(10, 6))
sns.histplot(data=Mcd, x='Calories',bins=15)
plt.title('Distribution of Calorie Counts')
plt.xlabel('Calories')
plt.ylabel('Frequecny')
plt.show()
```

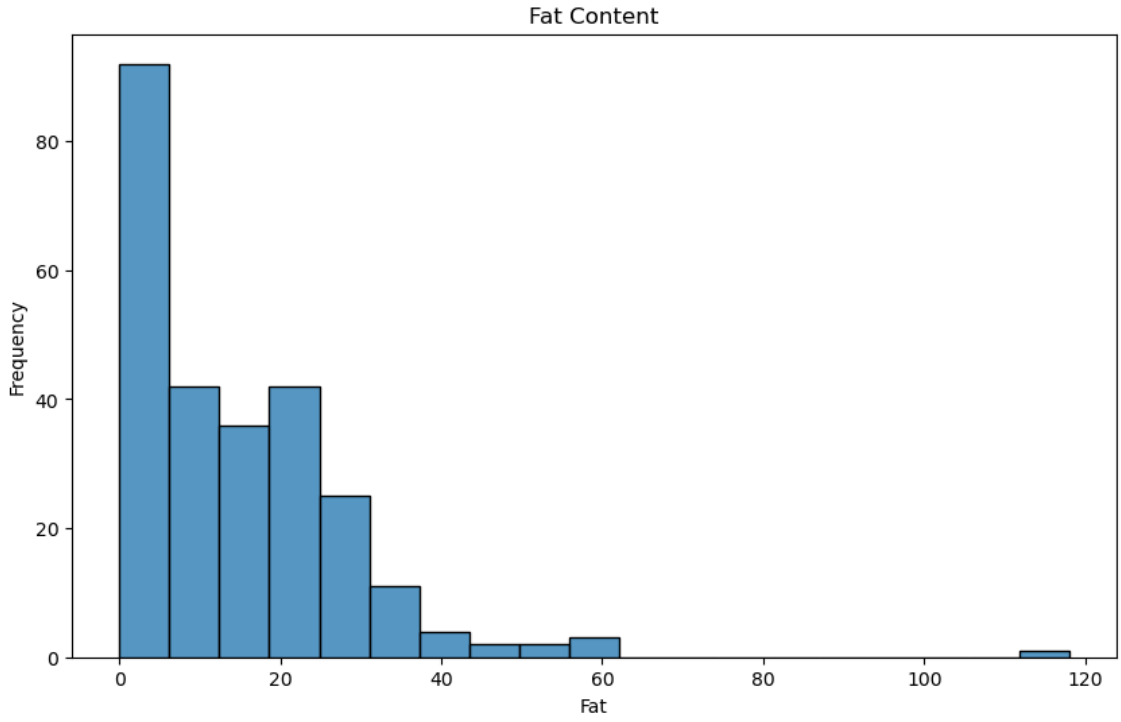


Calorie Distribution:

The calorie counts across the menu items show a wide range, with some items having significantly higher calorie content than others. The distribution of total calories is skewed to the right, indicating that most items have relatively low calorie counts, but there are a few outliers with much higher calorie counts.

In [17]:
```
plt.xticks?
```

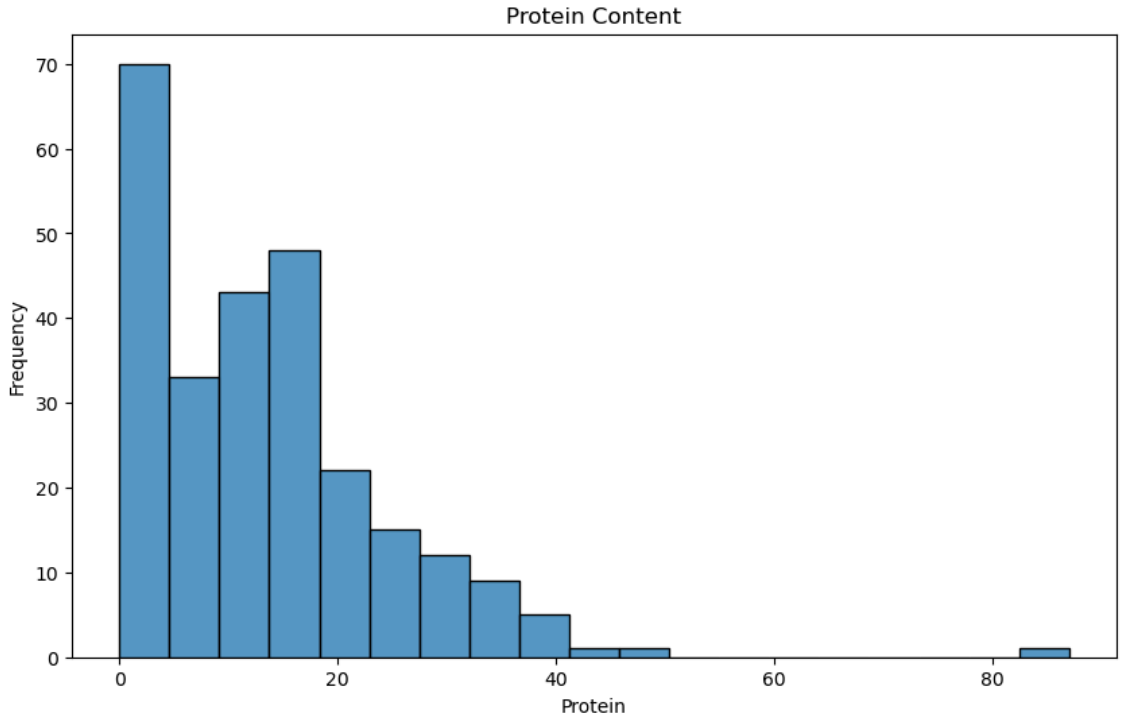
In [18]:
```
plt.figure(figsize=(10,6))
sns.histplot(data=Mcd, x='Total Fat')
plt.title('Fat Content')
plt.xlabel('Fat')
plt.ylabel('Frequency')
plt.show()
```



Total Fat

the analysis reveals a wide range of total fat content across the McDonald's menu.This information can be useful for customers to make more informed choices based on their dietary preferences and health goals. Mean Total Fat: The mean total fat content across all menu items is approximately 21.8 grams. This descriptive analysis provides insights into the distribution and range of total fat content in the McDonald's menu items, helping to understand the fat content variation and make informed choices based on dietary preferences and nutritional goals.

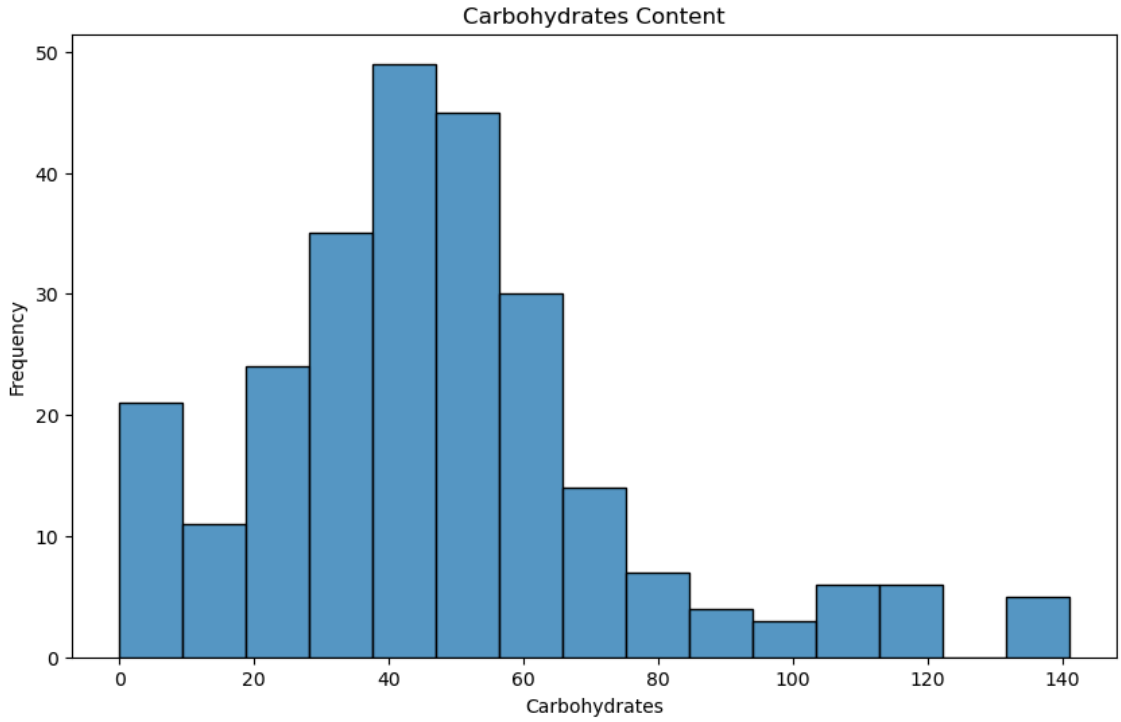
In [19]:
```
plt.figure(figsize=(10,6))
sns.histplot(data=Mcd, x='Protein')
plt.title('Protein Content')
plt.xlabel('Protein')
plt.ylabel('Frequency')
plt.show()
```



Protein Content

the McDonald's menu, with the breakfast, beef, and pork items generally containing the highest amounts of protein. This information can be useful for customers looking to make more protein-focused choices when dining at McDonald's.

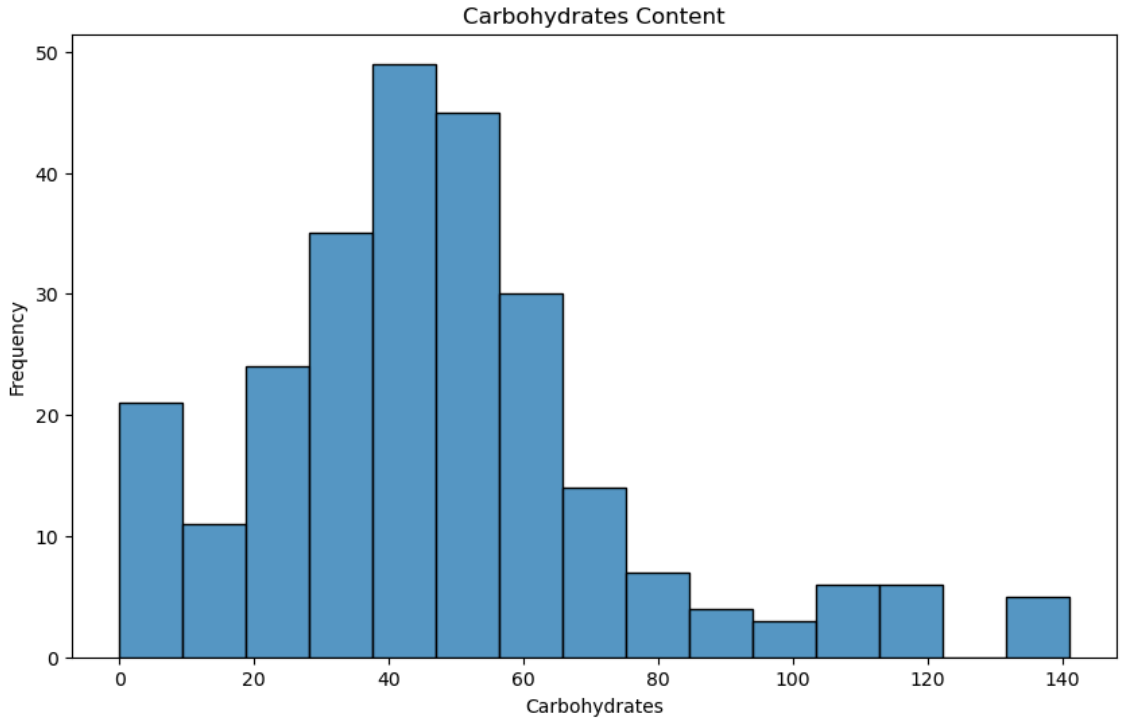
In [20]:
```
plt.figure(figsize=(10,6))
sns.histplot(data=Mcd, x='Carbohydrates')
plt.title('Carbohydrates Content')
plt.xlabel('Carbohydrates')
plt.ylabel('Frequency')
plt.show()
```



Carbohydrate Content

This brief analysis provides an overview of the carbohydrate content in the McDonald's menu items, highlighting the variation in carbohydrate levels and helping customers make informed choices based on their dietary preferences and nutritional needs.

In [21]:
```
plt.figure(figsize=(10,6))
sns.histplot(data=Mcd, x='Carbohydrates')
plt.title('Carbohydrates Content')
plt.xlabel('Carbohydrates')
plt.ylabel('Frequency')
plt.show()
```



In [22]:
```
drop_columns=['Category', 'Item', 'Serving Size']
Mcd_New=Mcd.drop(drop_columns, axis=1)
Mcd_New.head()
```

Out[22]:

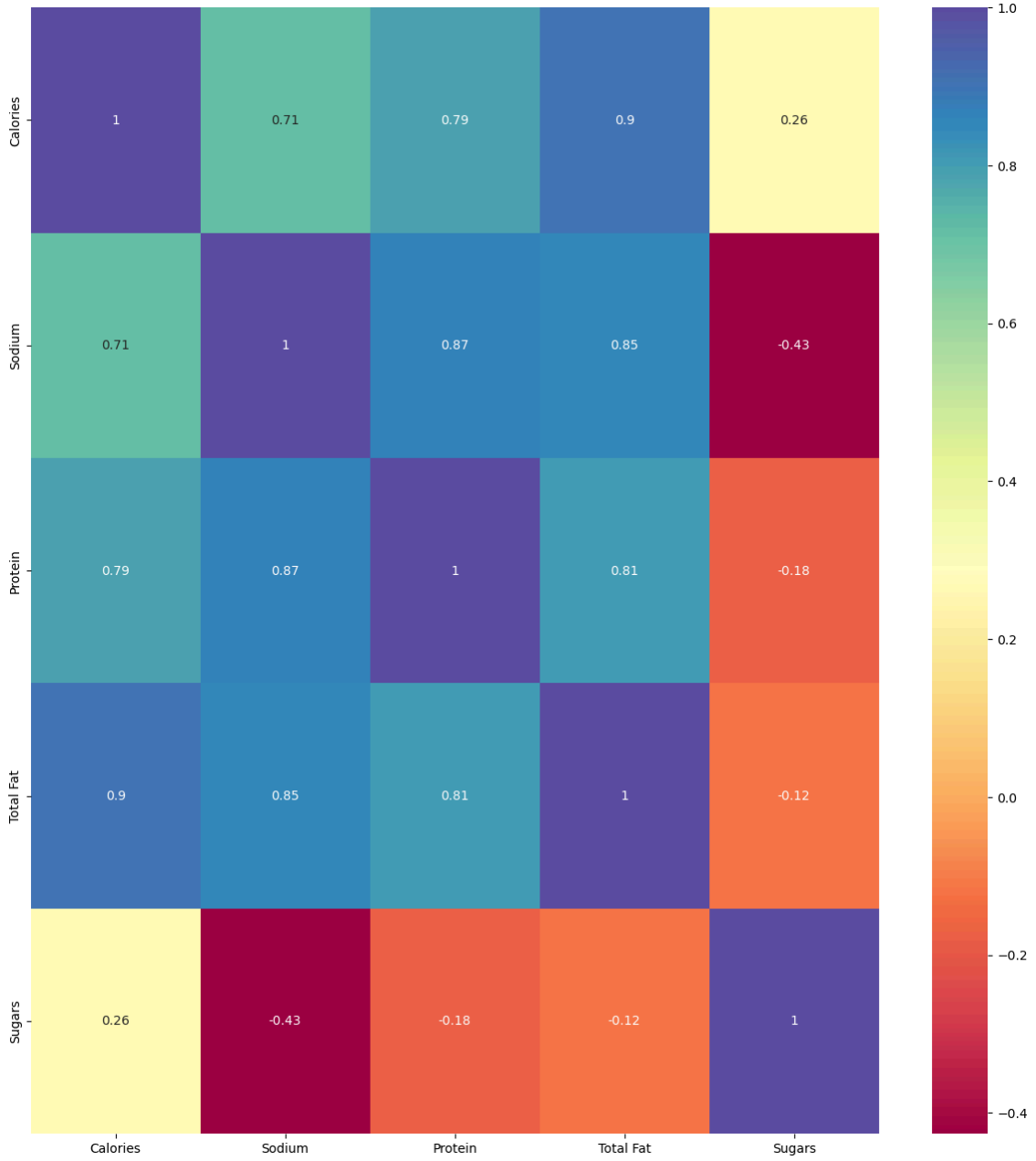
	Calories	Calories from Fat	Total Fat	Total Fat (% Daily Value)	Saturated Fat	Saturated Fat (% Daily Value)	Trans Fat	Cholesterol	Cholesterol (% Daily Value)	S
0	300	120	13.0	20	5.0	25	0.0	260	87	
1	250	70	8.0	12	3.0	15	0.0	25	8	
2	370	200	23.0	35	8.0	42	0.0	45	15	
3	450	250	28.0	43	10.0	52	0.0	285	95	
4	400	210	23.0	35	8.0	42	0.0	50	16	

5 rows × 21 columns

In [23]:
```
Corr_matrix=Mcd[['Calories', 'Sodium', 'Protein', 'Total Fat', 'Sugars']].c
print(Corr_matrix)
```

```
            Calories    Sodium   Protein  Total Fat    Sugars
Calories    1.000000  0.712309  0.787847   0.904409  0.259598
Sodium      0.712309  1.000000  0.869802   0.846158 -0.426536
Protein     0.787847  0.869802  1.000000   0.807773 -0.179940
Total Fat   0.904409  0.846158  0.807773   1.000000 -0.115446
Sugars      0.259598 -0.426536 -0.179940  -0.115446  1.000000
```

In [24]:
```
plt.figure(figsize=(15,16))
sns.heatmap(Corr_matrix, annot=True, cmap='Spectral')
plt.show()
```

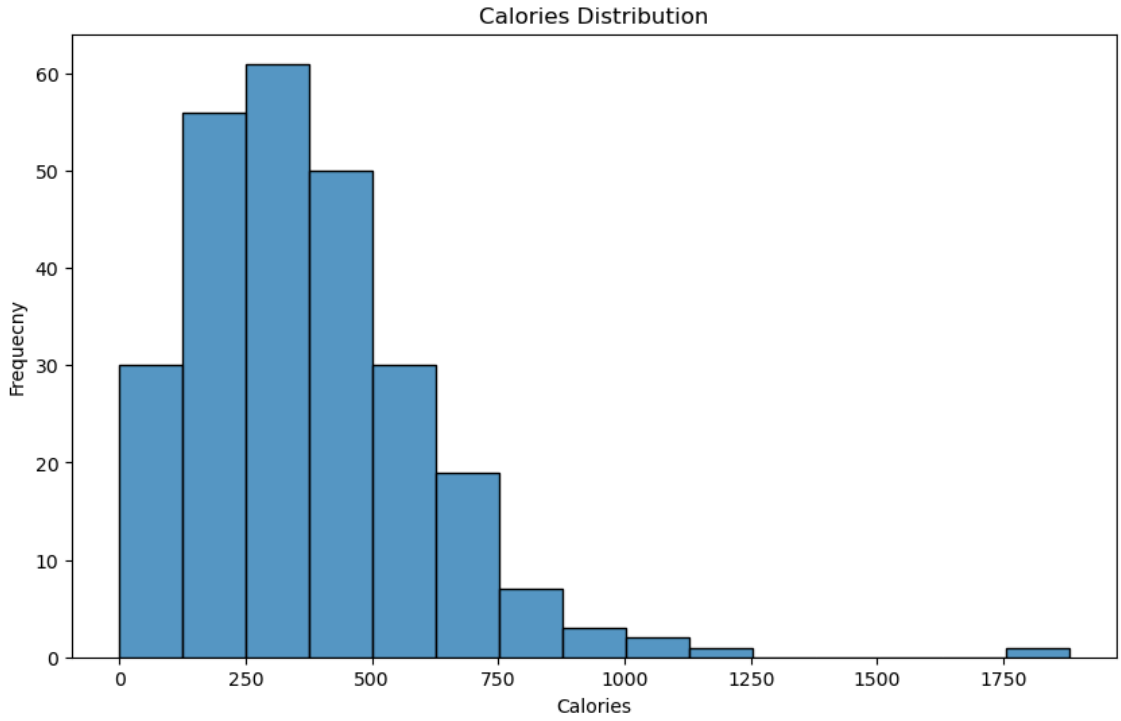


Visualizations:

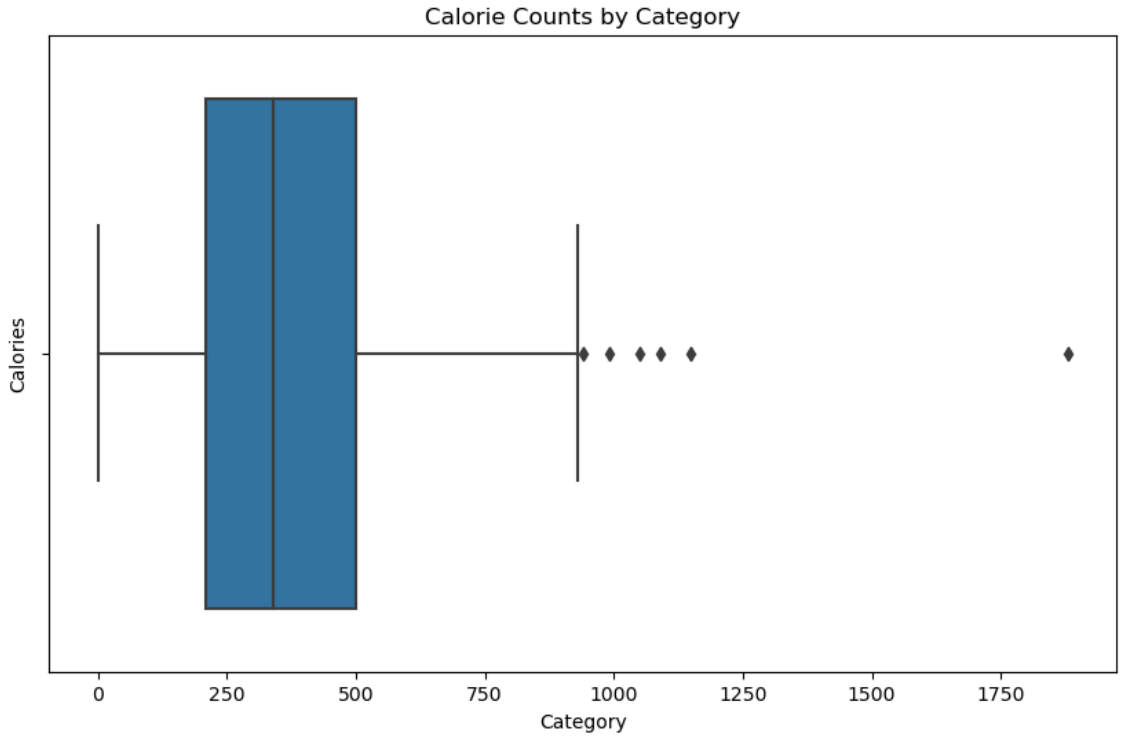
Visualizations such as histograms, box plots, and bar charts are used to depict the nutritional information, including calorie counts, total fat, saturated fat, cholesterol, sodium, carbohydrates, dietary fiber, sugars, and protein.

Data Visualization

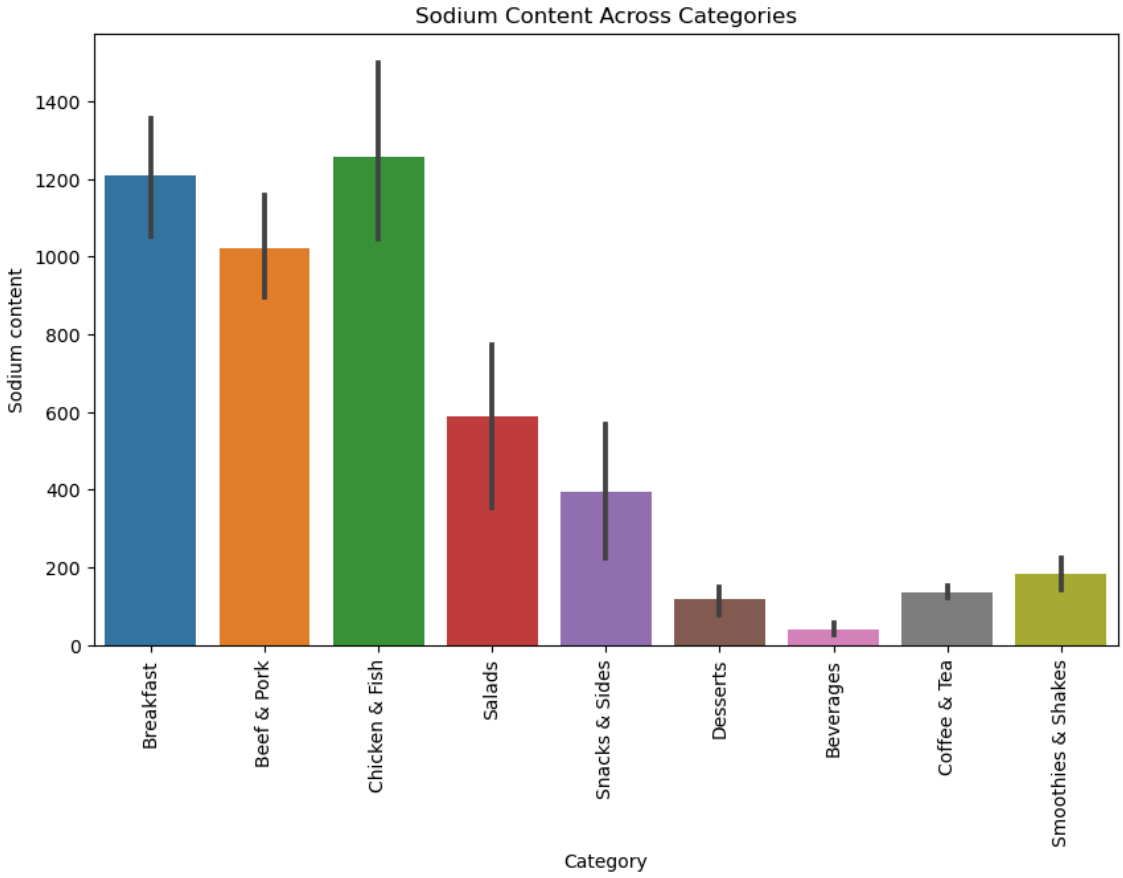
In [25]:
```
plt.figure(figsize=(10, 6))
sns.histplot(data=Mcd, x='Calories',bins=15)
plt.title('Calories Distribution')
plt.xlabel('Calories')
plt.ylabel('Frequecny')
plt.show()
```



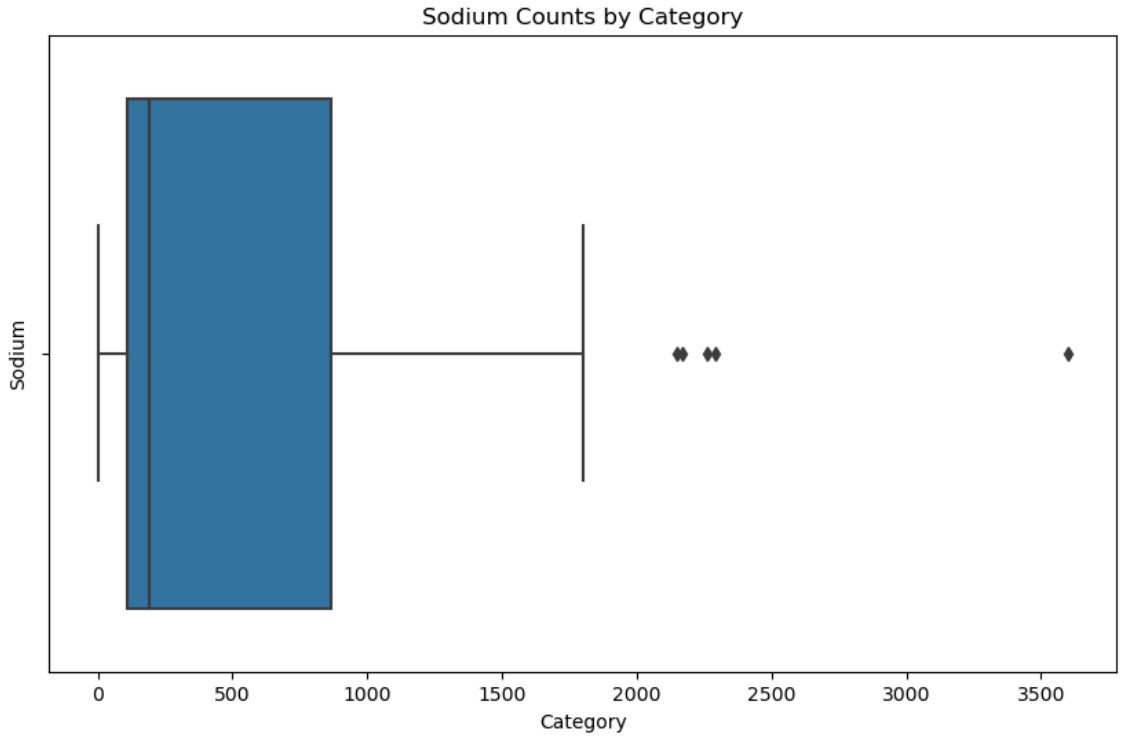
In [26]:
```
plt.figure(figsize=(10, 6))
sns.boxplot(data= Mcd, x= 'Calories')
plt.title('Calorie Counts by Category')
plt.xlabel('Category')
plt.ylabel('Calories')
plt.show()
```



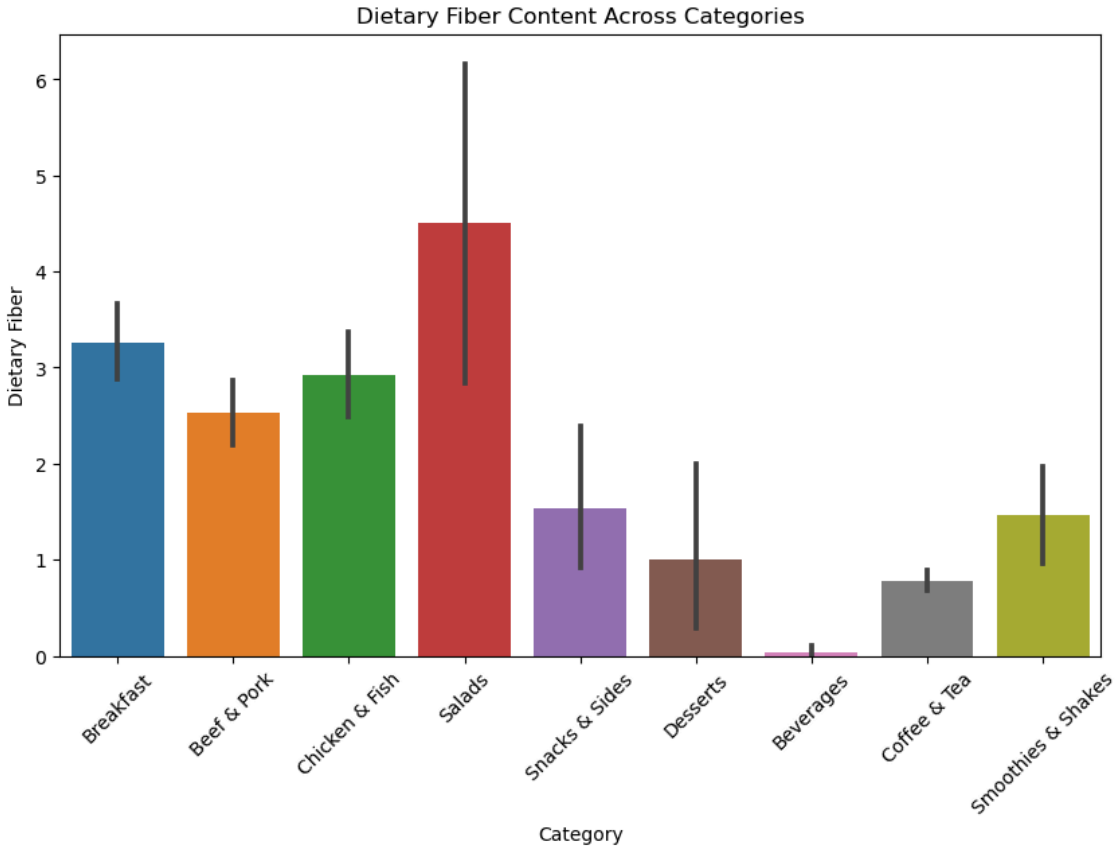
In [27]:
```
plt.figure(figsize=(10, 6))
sns.barplot(data=Mcd, x='Category',y='Sodium')
plt.title('Sodium Content Across Categories')
plt.xlabel('Category')
plt.ylabel('Sodium content')
plt.xticks(rotation=90)
plt.show()
```



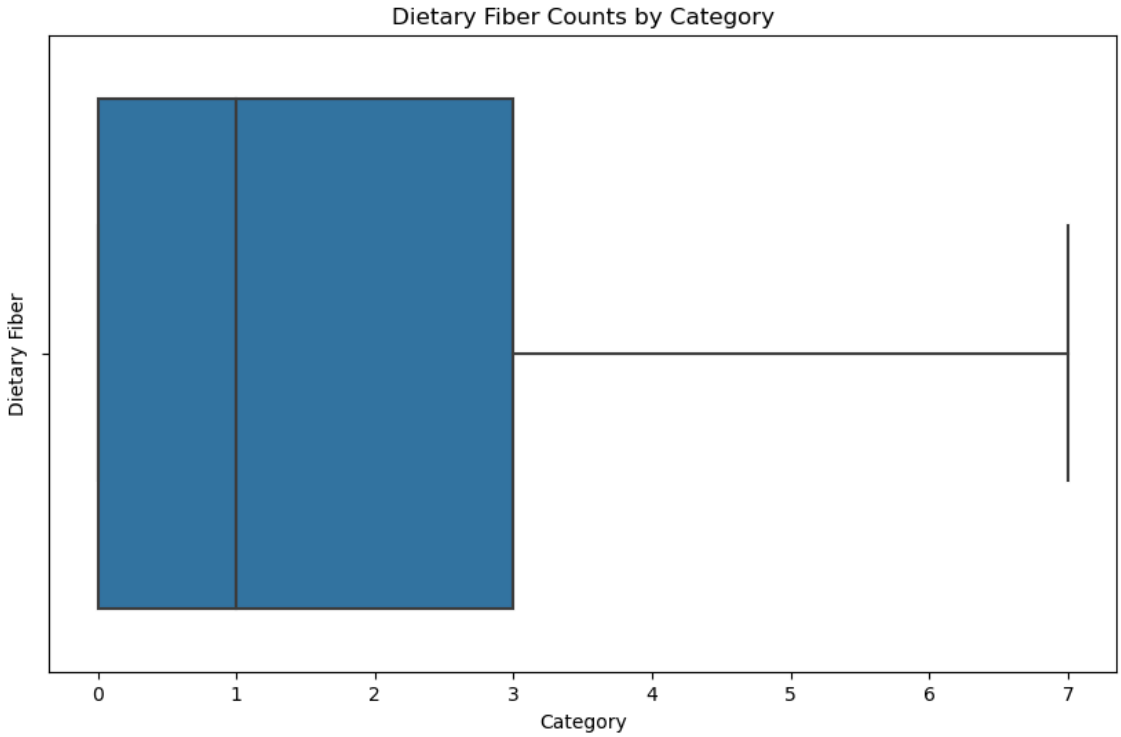
In [28]:
```
plt.figure(figsize=(10, 6))
sns.boxplot(data= Mcd, x= 'Sodium')
plt.title('Sodium Counts by Category')
plt.xlabel('Category')
plt.ylabel('Sodium')
plt.show()
```



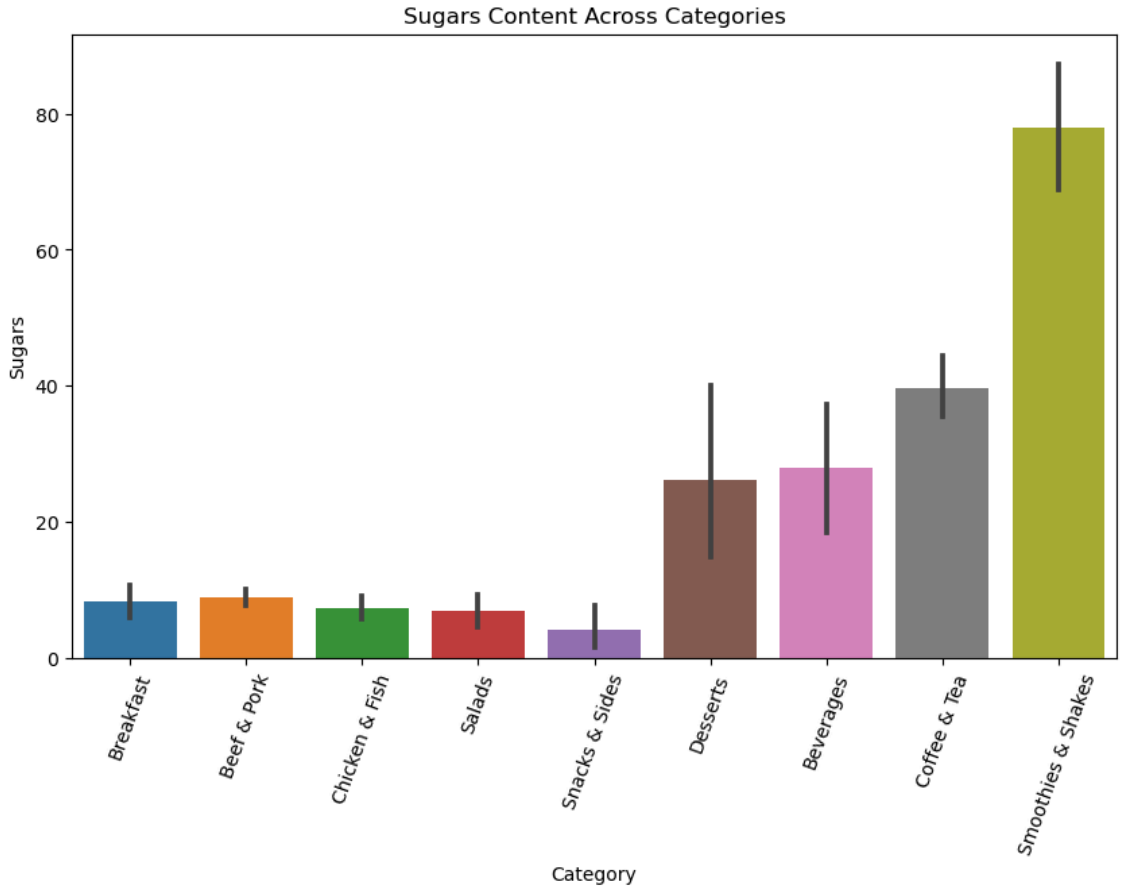
In [29]:
```
plt.figure(figsize=(10, 6))
sns.barplot(data=Mcd, x='Category',y='Dietary Fiber')
plt.title('Dietary Fiber Content Across Categories')
plt.xlabel('Category')
plt.ylabel('Dietary Fiber')
plt.xticks(rotation=45)
plt.show()
```



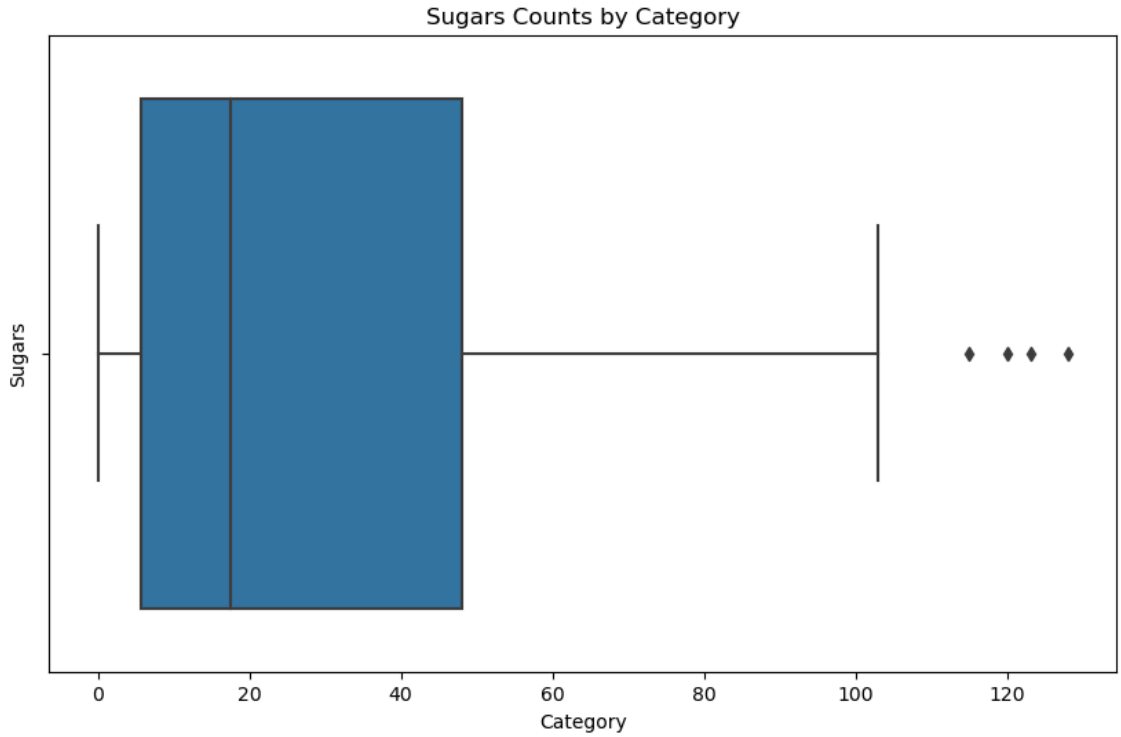
In [30]:
```
plt.figure(figsize=(10, 6))
sns.boxplot(data= Mcd, x= 'Dietary Fiber')
plt.title('Dietary Fiber Counts by Category')
plt.xlabel('Category')
plt.ylabel('Dietary Fiber')
plt.show()
```



In [31]:
```
plt.figure(figsize=(10, 6))
sns.barplot(data=Mcd, x='Category',y='Sugars')
plt.title('Sugars Content Across Categories')
plt.xlabel('Category')
plt.ylabel('Sugars')
plt.xticks(rotation=70)
plt.show()
```



In [32]:
```
plt.figure(figsize=(10, 6))
sns.boxplot(data= Mcd, x= 'Sugars')
plt.title('Sugars Counts by Category')
plt.xlabel('Category')
plt.ylabel('Sugars')
plt.show()
```



In [33]:
```
highest_Calorie_Item=Mcd.loc[Mcd['Calories'].idxmax()]
highest_Calorie_Item
print(f"The Item with Highest Calorie Count:\n\t Item Name- {highest_Calori
```

```
The Item with Highest Calorie Count:
         Item Name- Chicken McNuggets (40 piece)
         Calorie Count- 1880
```

Highest Calorie Count:

The menu item with the highest calorie count is Chicken McNuggets 1880 calories.

In [34]:
```
Lowest_Calorie_Item=Mcd.loc[Mcd['Calories'].idxmin()]
Lowest_Calorie_Item
print(f"The Item with Lowest Calorie Count:\n\t Item Name- {Lowest_Calorie_
```

```
The Item with Lowest Calorie Count:
         Item Name- Diet Coke (Small)
         Calorie Count- 0
```

Lowest Calorie Count:

The menu item with the lowest calorie count is Diet Coke 0 calories.

In [35]:
```
drop_columns_2=['Item', 'Serving Size']
Mcd_2=Mcd.drop(drop_columns_2, axis=1)
Mcd_2.head()
```

Out[35]:

	Category	Calories	Calories from Fat	Total Fat	Total Fat (% Daily Value)	Saturated Fat	Saturated Fat (% Daily Value)	Trans Fat	Cholesterol	Cho (
0	Breakfast	300	120	13.0	20	5.0	25	0.0	260	
1	Breakfast	250	70	8.0	12	3.0	15	0.0	25	
2	Breakfast	370	200	23.0	35	8.0	42	0.0	45	
3	Breakfast	450	250	28.0	43	10.0	52	0.0	285	
4	Breakfast	400	210	23.0	35	8.0	42	0.0	50	

5 rows × 22 columns

In [36]:
```
average_nutritional_content = Mcd_2.groupby('Category').mean()
average_nutritional_content
```

Out[36]:

Category	Calories	Calories from Fat	Total Fat	Total Fat (% Daily Value)	Saturated Fat	Saturated Fat (% Daily Value)	Trans Fat	C
Beef & Pork	494.000000	224.666667	24.866667	38.600000	10.466667	52.000000	1.100000	
Beverages	113.703704	0.740741	0.092593	0.148148	0.055556	0.296296	0.000000	
Breakfast	526.666667	248.928571	27.690476	42.666667	10.654762	53.428571	0.107143	1
Chicken & Fish	552.962963	242.222222	26.962963	41.333333	6.166667	31.111111	0.129630	
Coffee & Tea	283.894737	71.105263	8.021053	12.357895	4.921053	24.368421	0.142105	
Desserts	222.142857	64.285714	7.357143	11.142857	4.285714	21.285714	0.000000	
Salads	270.000000	108.333333	11.750000	18.333333	3.750000	18.500000	0.000000	
Smoothies & Shakes	531.428571	127.678571	14.125000	21.714286	8.375000	41.785714	0.535714	
Snacks & Sides	245.769231	94.615385	10.538462	16.230769	2.692308	13.384615	0.000000	

9 rows × 21 columns

In [37]:
```
print("\nAverage Nutritional Content by Menu Category:")
print(average_nutritional_content)
```

```
Average Nutritional Content by Menu Category:
                     Calories  Calories from Fat  Total Fat  \
Category
Beef & Pork         494.000000         224.666667  24.866667
Beverages           113.703704           0.740741   0.092593
Breakfast           526.666667         248.928571  27.690476
Chicken & Fish      552.962963         242.222222  26.962963
Coffee & Tea        283.894737          71.105263   8.021053
Desserts            222.142857          64.285714   7.357143
Salads              270.000000         108.333333  11.750000
Smoothies & Shakes  531.428571         127.678571  14.125000
Snacks & Sides      245.769231          94.615385  10.538462

                    Total Fat (% Daily Value)  Saturated Fat  \
Category
Beef & Pork                         38.600000      10.466667
Beverages                            0.148148       0.055556
Breakfast                           42.666667      10.654762
```

Data Analysis and Insights:

The data is analyzed to identify menu items with the highest and lowest calorie counts, and to determine the average nutritional content of popular menu categories like breakfast, beef & pork, and chicken & fish.

Average Nutritional Content of Popular Menu Categories:

Breakfast Category: Average Calories:

- The average calorie count for breakfast items is approximately 526 calories. Average Total Fat:
- The average total fat content for breakfast items is around 46 grams. Average Protein:
- The average protein content for breakfast items is about 19.85 grams. Average Carbohydrates:
- The average carbohydrate content for breakfast items is roughly 49 grams.
- These insights provide a snapshot of the menu items with the highest and lowest calorie counts, as well as the average nutritional content within popular menu categories at McDonald's.

Calorie Analysis:

- The menu items vary significantly in calorie content, with breakfast items like the Big Breakfast with Hotcakes having the highest calorie counts.
- Healthier options like the Fruit & Maple Oatmeal without Brown Sugar offer lower calorie alternatives. Total Fat Content:
- The total fat content ranges widely across menu items, with beef and pork items generally containing higher fat levels.
- Chicken and fish items tend to have lower fat content compared to beef and pork options. Protein Content:

- Protein content varies among menu items, with breakfast items like the Steak & Egg McMuffin having higher protein levels.
- Chicken and fish items provide moderate protein content, offering healthier alternatives. Carbohydrate Content:
- Carbohydrate content varies across menu categories, with breakfast items like the Big Breakfast with Hotcakes having high carbohydrate levels.
- Healthier options like the Fruit & Maple Oatmeal provide lower carbohydrate content.

Benefits of Nutritional Analysis:

For Customers: Informed Choices: Customers can make informed decisions based on their dietary preferences and nutritional needs. Healthier Options: Access to nutritional information helps customers choose healthier menu items, promoting better eating habits. Allergen Awareness: Nutritional analysis can assist customers in identifying allergens and making suitable food choices.

Benefit For McDonald's Organization:

- Menu Development: Insights from nutritional analysis can guide the development of healthier menu options to cater to health-conscious customers.
- Marketing Strategies: Highlighting nutritional information can attract customers looking for healthier alternatives and enhance transparency.
- Customer Satisfaction: Providing detailed nutritional data can improve customer satisfaction and loyalty by meeting diverse dietary needs.

Benefit For Customers:

- Informed Choices: Customers can make informed decisions based on their dietary preferences and nutritional needs.
- Healthier Options: Access to nutritional information helps customers choose healthier menu items, promoting better eating habits.
- Allergen Awareness: Nutritional analysis can assist customers in identifying allergens and making suitable food choices

Insights should highlight healthy and less healthy food options.

Informed Choices:

The detailed nutritional information on calories, total fat, saturated fat, cholesterol, sodium, carbohydrates, dietary fiber, sugars, and protein for each menu item allows customers to make informed decisions based on their dietary preferences and health goals.

Healthier Options:

Access to the nutritional content of the menu items enables customers to identify and choose healthier options, such as the Egg White Delight, Premium Grilled Chicken Classic Sandwich, and Fruit & Maple Oatmeal without Brown Sugar, which have lower calorie, fat, and sodium levels. This promotes better eating habits and supports customers in maintaining a balanced diet.

Allergen Awareness:

The nutritional analysis provides information on the presence of potential allergens, such as cholesterol and sodium, which can assist customers with dietary restrictions or food allergies in making suitable menu choices. This helps ensure customers can enjoy their meals while avoiding ingredients that may cause adverse reactions.

Recommendations to Improve McDonald's Menu Nutritional Profile:

1.Increase Healthy Options:Introduce more low-calorie, low-fat, and low-sodium menu items to cater to health-conscious customers.

- Expand the selection of salads, grilled chicken options, and fruit-based sides to provide healthier alternatives. 2.Nutritional Information Transparency:
- Enhance transparency by prominently displaying nutritional information on menus and packaging to help customers make informed choices.
- Include allergen information to assist individuals with dietary restrictions or food allergies. 3.Reduce Added Sugars:
- Decrease the amount of added sugars in menu items, especially in beverages, desserts, and breakfast items, to align with dietary guidelines 4.Promote Balanced Meals:
- Create meal deals that include balanced options like lean protein, whole grains, and vegetables to encourage healthier eating habits.
- Offer combo meals with side salads or fruit instead of fries to increase the availability of nutritious choices.

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