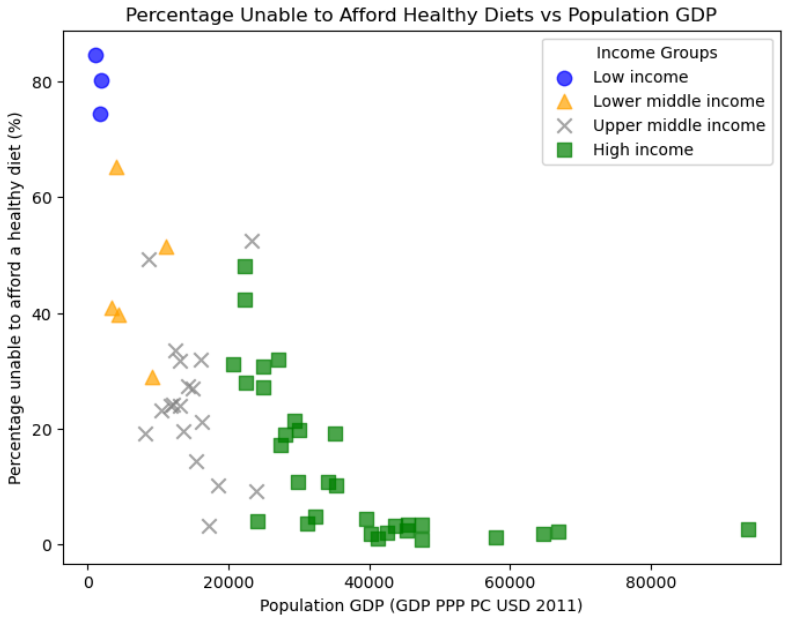
Detailed Analysis by Group 3

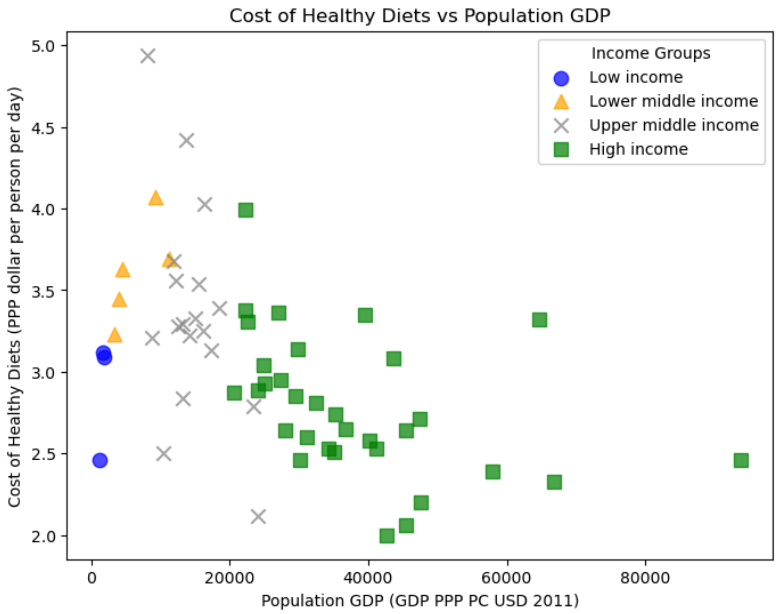
<u>Topic: Impact of Global Income Disparities on the Cost and Affordability of Healthy Diets: An Analysis of Dietary Choices among Income Groups and Their Correlation with Obesity.</u>

1. How does the affordability of healthy diets vary by income group?



This scatter plot shows that as the population's GDP increases, the percentage of the population unable to afford healthy diets decreases. The graph indicates that wealthier countries tend to have fewer people who struggle to afford healthy diets. For instance, only about 5% of the population in high-income countries with a population GDP above 40,000 GDP PPP PC USD 2011 cannot afford it. In low-income countries, most of the population, around 80%, cannot afford a healthy diet, highlighting the critical need for economic growth and targeted interventions to improve food affordability. The computed r^2-value is 0.481, which shows a moderate correlation between population GDP and the percentage of the population unable to afford a healthy diet.

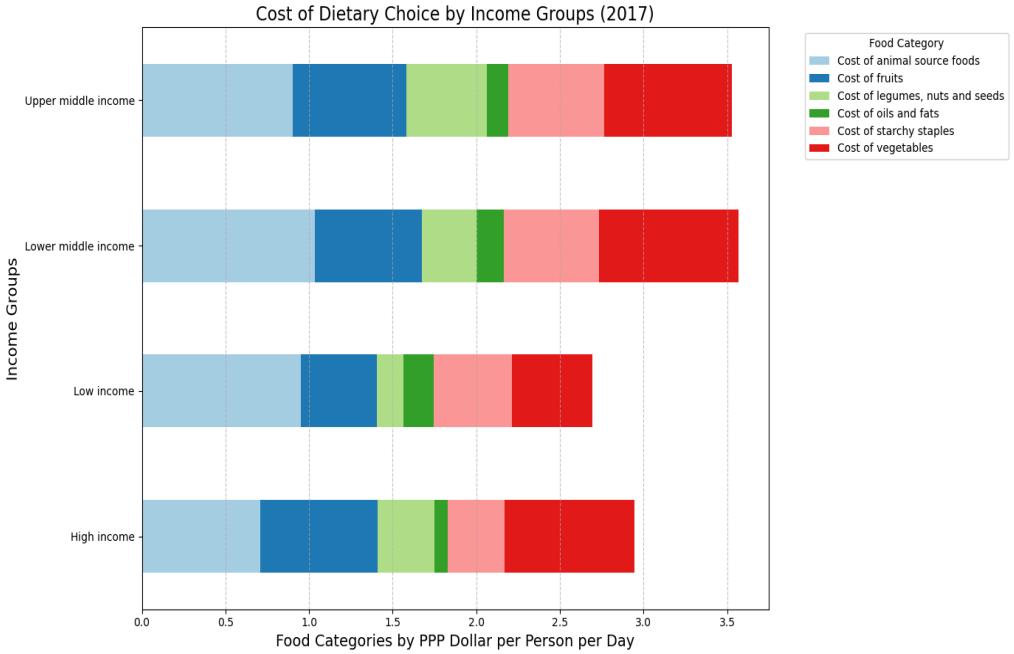
2. What is the relationship between global income levels and the cost of healthy diets?



This scatter plot shows that higher-income countries tend to have a lower cost of healthy diets. This aligns with results in the first scatter plot, suggesting greater affordability or better infrastructure for food distribution in wealthier countries, leading to more accessible healthy diets.

There is considerable variation in the cost across different countries, even within the same income group. For instance, some low-income countries have diet costs similar to those of upper-middle-income countries, and the spread of the cost is the greatest among upper-middle-income countries, but there are also outliers. Notably, diet costs in high-income countries are more concentrated between 2.5 to 3.5 PPP dollar per day per person, suggesting a lower cost variability compared to lower-income groups and that the cost of healthy diets takes up a relatively smaller part of people's income in high-income countries. The computed r^2-value is 0.277, which shows a weak correlation between population GDP and the cost of a healthy diet.

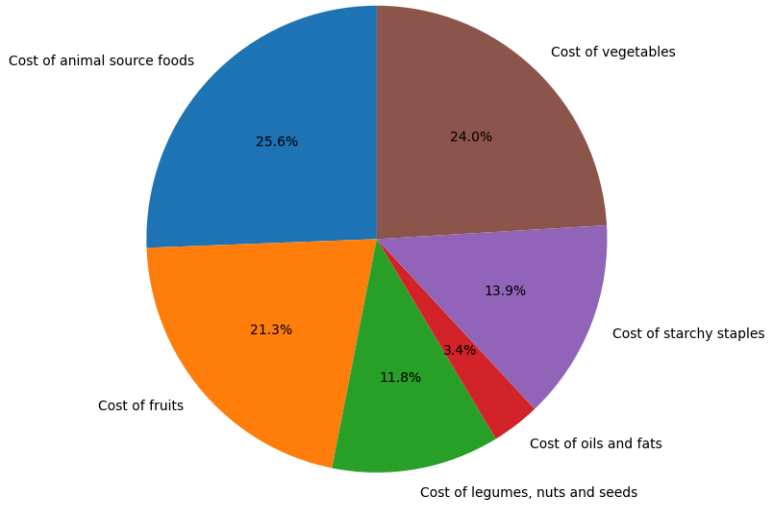
3. How do the costs of different dietary choices vary among high, middle, and low-income populations in 2017?



This horizontal stacked bar chart shows dietary choices by Income groups using the Purchasing Power Parity [PPP] Dollar per Person per day factor. Each bar shows the proportion of costs associated with various food categories. The cost of animal source foods accounts for a significant portion of people's income in low-middle-income countries. Vegetables have a relatively small share of dietary costs in lower-income countries than other income groups. High-income populations can afford more diverse diets, which might suggest a healthier diet, while poorer populations may be restricted to a less-balanced diet.

4. How does a person's income level influence the types and amounts of food they typically consume?

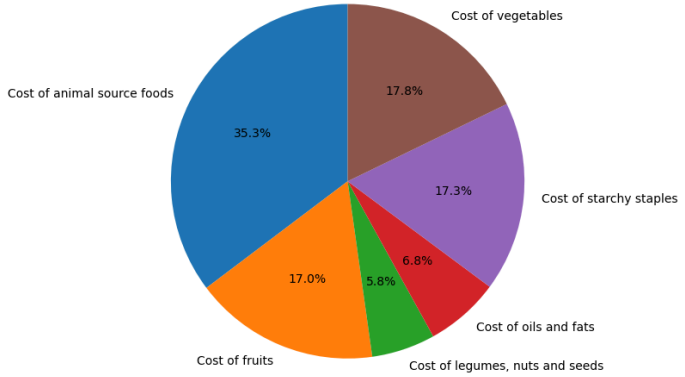
General Food Costs 2017 Worldwide



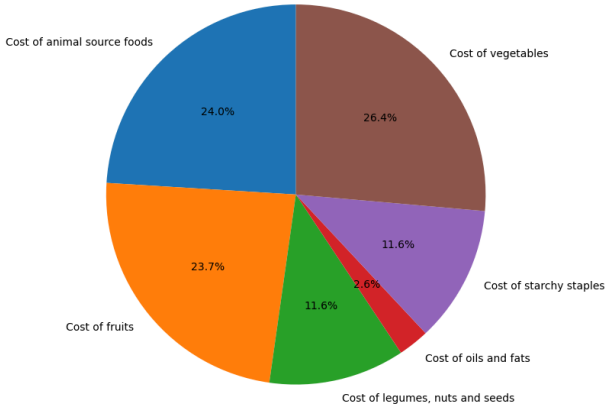
According to this pie chart, the most expensive foods worldwide are those derived from animals, followed by fruits and vegetables. The comparatively higher proportions of foods derived from animals suggest that they are more expensive than plant-based substitutes.

The cost impact of animal-based foods on household food budgets worldwide is also highlighted by this data, along with the significance of a balanced diet on a global scale.

Low-income



High-income



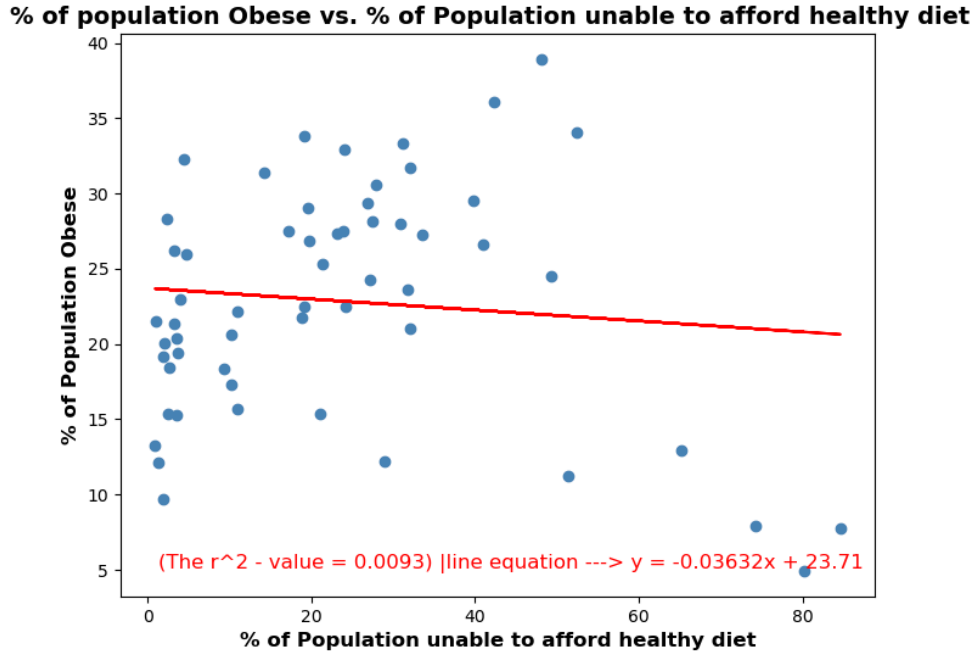
Four pie charts were created in total, one per income group (high, upper-middle, lower-middle, low-income).

The data is used to analyze the distribution of consumption for the food types above. Each pie chart shows the distribution of food costs for each economic class.

According to the result of the four pie charts we can conclude that the trend is that all the income groups spend more than 50% of their food on Animal Source and Vegetables, on the other hand oils and starchy staples decreases.

As we can appreciate in the low-income group, the consumption of animal source foods increased to 35% but at the same time the vegetable consumption decreased, being the money factor the motive for this abatement on the vegetables due to high prices. However, what it increases for groceries in the low income group is ultra-refined sausages and meat because it is economic.

5. Is there a significant correlation between the unaffordability of healthy diets and the prevalence of obesity rates in different countries?



The scatter plot compares the percentage of the population unable to afford a healthy diet against the percentage of the population that is obese. The R-squared (r^2) value for the regression line is 0.009.

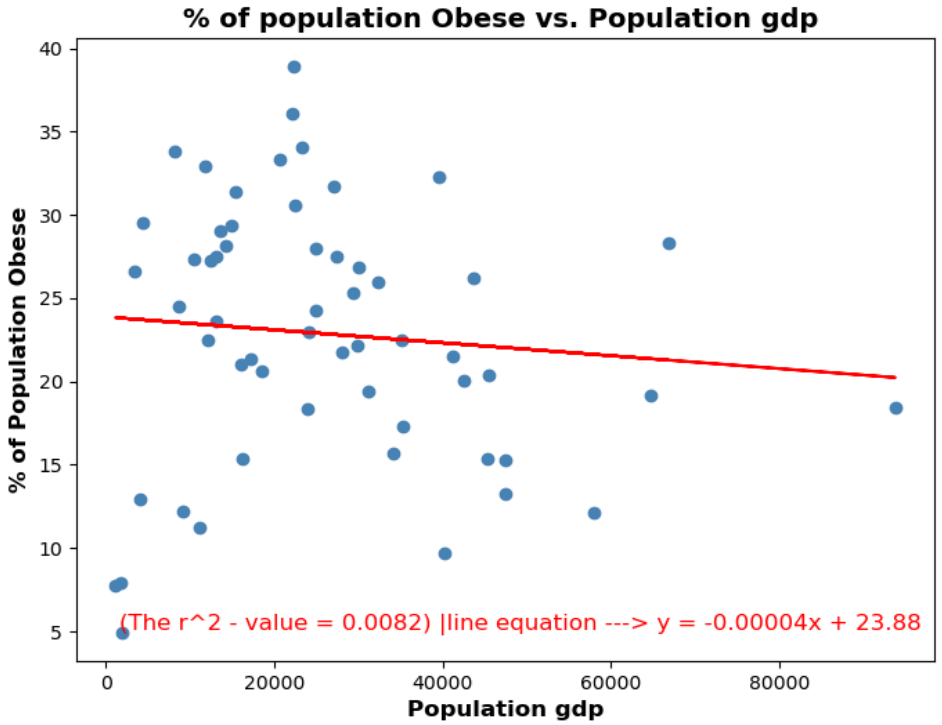
An r^2 value indicates the proportion of the variance in the dependent variable (obesity rate) that is explained by the independent variable (unaffordability of healthy diets). In this case, an r^2 value of 0.009 means that only 0.9% of the variance in obesity rates is explained by the unaffordability of healthy diets.

Key Points:

1. Very Low Correlation: An r^2 value of 0.009 suggests there is no significant correlation between the two variables. The affordability of healthy diets explains almost none of the variability in obesity rates across different countries.
2. Insufficient Evidence: Based on this regression analysis, the unaffordability of healthy diets does not seem to be a strong predictor of obesity rates. Other factors (e.g., cultural, lifestyle, socioeconomic conditions) are likely playing more dominant roles in influencing obesity.
3. Further Investigation Needed: Since this analysis does not show a significant relationship, it might be necessary to consider additional variables (like physical activity levels, fast food consumption, healthcare access) or explore non-linear relationships that could be more revealing.

The analysis indicates that there is no significant correlation between the unaffordability of healthy diets and the prevalence of obesity rates in different countries based on the r^2 value of 0.009. This suggests that other factors might be more important in explaining obesity prevalence, and further investigation with a more comprehensive set of variables is needed to better understand this relationship.

6. Is there a correlation between global income levels (represented by GDP) and obesity rates?



A scatter plot comparing the percentage of the population that is obese against the population's GDP (a proxy for income levels). The R-squared (r^2) value for the regression line is 0.008.

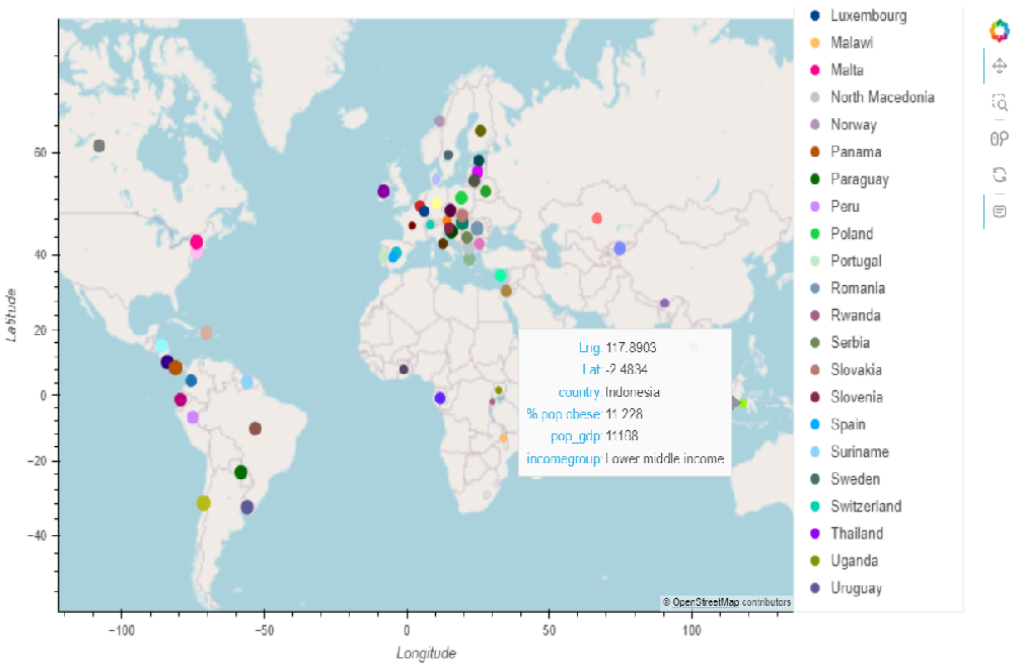
An r^2 value of 0.008 indicates that 0.8% of the variation in obesity rates can be explained by variations in GDP across different countries.

Key Points:

1. Very Weak Correlation: The r^2 value of 0.008 is extremely low, suggesting that there is no significant correlation between income levels (GDP) and obesity rates. This implies that variations in a country's income levels do not meaningfully explain the differences in obesity rates.
2. Other Contributing Factors: Since income levels (GDP) explain less than 1% of the variance in obesity rates, it suggests that other factors, such as diet, lifestyle, healthcare systems, cultural norms, and access to recreational facilities, may play a more important role in determining obesity levels in a population.
3. Income Levels and Obesity: While it's common to hypothesize that higher income levels might lead to better access to healthy foods and healthcare (potentially reducing obesity), or conversely, lead to more sedentary lifestyles and unhealthy food consumption (increasing obesity), this analysis shows that income (GDP) alone does not capture this complex relationship.
4. Need for Additional Variables: Given the low r^2 value, it would be prudent to investigate other variables that could be more directly tied to obesity, such as food consumption patterns, urbanization rates, or lifestyle factors, to get a clearer picture of the determinants of obesity.

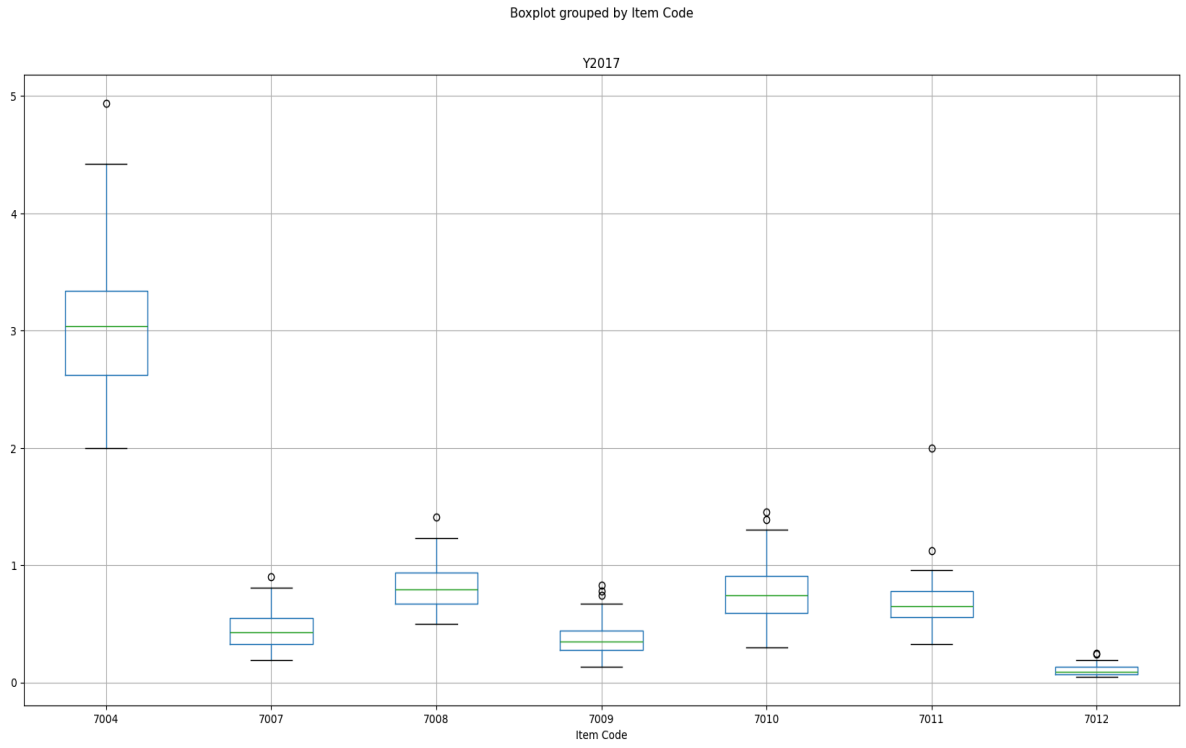
The scatter plot analysis yields an r^2 value of 0.008, indicating no significant correlation between global income levels (GDP) and obesity rates. This suggests that income alone is not a strong predictor of obesity, and a more nuanced analysis that includes additional factors is needed to understand the relationship between economic conditions and obesity.

Prevalence of obesity around the globe:
The Longitude and Latitude for each country in our dataset was obtained by doing a GET request to the Geoapify API.



An interactive map to show the prevalence of obesity around the globe was plotted. We can hover over each country, represented by colored dots, to view their detailed information. The size of each dot is proportional to the percentage of the population affected by obesity.

ANOVA Test Results Analysis:



We conducted a one-way ANOVA test comparing the following groups:

- Group 7004: Cost of a healthy diet (PPP dollar per person)
- Group 7007: Cost of starchy staples
- Group 7008: Cost of animal source foods
- Group 7009: Cost of legumes, nuts, and seeds

- Group 7010: Cost of vegetables
- Group 7011: Cost of fruits
- Group 7012: Cost of oils and fats

The result of the ANOVA test is:

- F-statistic = 727.28
- p-value = 1.0984e-213 (extremely close to zero)

Interpretation of the ANOVA Results:

1. F-statistic:
    - The F-statistic of 727.28 is very large, indicating that the variation between the groups (different food costs) is much greater than the variation within each group. This suggests that there are substantial differences in the average costs of the different food types under consideration.
2. p-value:
    - The p-value of 1.0984e-213 is extremely small (essentially 0), which is far below the commonly accepted significance level (e.g., 0.05). A p-value this small indicates that the differences between the groups are statistically significant.

The ANOVA test result suggests that there are significant differences in the average costs between the various food groups studied (healthy diet, starchy staples, animal source foods, legumes/nuts/seeds, vegetables, fruits, oils, and fats). The extremely small p-value provides strong evidence that the cost of these different food groups is not the same, and these differences are not due to random chance. In practical terms, it means that the cost structure of the components of a healthy diet varies widely across different types of food, and these variations are statistically significant.