**Analysis of the Relationship Between the Number of Fast Food Restaurants**

**And Average Obesity Rate by County**

**Data Preparation**

~~Before beginning any analysis, it is important to ensure that the data being used for the analysis is cleaned. If the data being used for the analysis is not properly cleaned and sorted, the resulting analysis could become skewed or may not be able to be performed at all. As datasets become larger and more complex, or as more datasets are included in the analysis, the importance of cleaned and sorted data becomes even more critical (Piegorsch, 2015).~~ For this project, the analysis of the data was performed using R Studio but the cleaning of the data was done using a combination of Excel and R Studio. Many of the larger data preparation steps, such as removing unwanted columns or renaming columns, was done in Excel as this was more efficient for these particular datasets. Once the data had been prepared and formatted with Excel, it was imported into R Studio to be further cleaned, sorted, manipulated and analyzed.

This project utilized multiple datasets for the analysis. One dataset provided location information for fast food restaurants such as city, state and zip code, and was imported into R Studio as *df\_ff*. Another dataset included obesity information by state and county; this was imported as *df\_obesity*. Since these two datasets did not share county, city, or zip code information, a third dataset was required that included geographical information for states such as state, city, zip code, and county, imported as *dfUS*.

For these datasets to be used for an analysis, they had to cleaned, sorted and there needed to be consistency among the data types and formatting for all city, state, and county names. Due to some datasets having state names listed out and others listed as abbreviations, state names that were listed out were converted to abbreviations for simplicity. Additionally, one dataset listed county names with “County” after the name of the county (i.e.; “Johnson County”). This had to be removed to provide consistency between datasets. Zip code information was also inconsistent among datasets and was converted to character data types to provide consistency. The character data type was chosen due to the potential for zip codes to be hyphenated, which would cause issues if zip codes were set as integers or other numeric data type.

Once all of the data was consistent, the datasets could be combined to associate appropriate county information with the *df\_ff* dataset based off of matching city and state names and zip codes. This operation was done using R Studio by performing an inner join of the *df\_ff* and *dfUS* datasets, matching the fast food restaurants to the correct county using correlated state, city and zip code information. This created a new dataset called *df* which would become the main dataset for the analysis.

However, before analysis could be performed, it was preferred to have all of the data into once dataset to ensure all values matched up with the correct state and county. This meant that the the average obesity rate needed to be included into *df.* However, the average obesity first needed to be calculated using the values for both female and male obesity rates provided by the *df\_obesity* dataset. Once calculated, these values were merged into the *df* dataset using corresponding state and county information. All counties without obesity or restaurant information were provided with NA values and later removed. Once the dataset was properly prepared, it was ready for analysis.

**Analysis**

With all data properly cleaned, ordered and combined into a single dataset, statistical analysis could be more easily performed on the data. However, prior to analysis, the alternative hypothesis must be declared as well as the significance value. The significance value for this particular analysis is 0.05. The alternative hypothesis is that there is a correlation between the number of fast food restaurants and the average rate of obesity for a given county while the null hypothesis states that there is no correlation between the two variables.

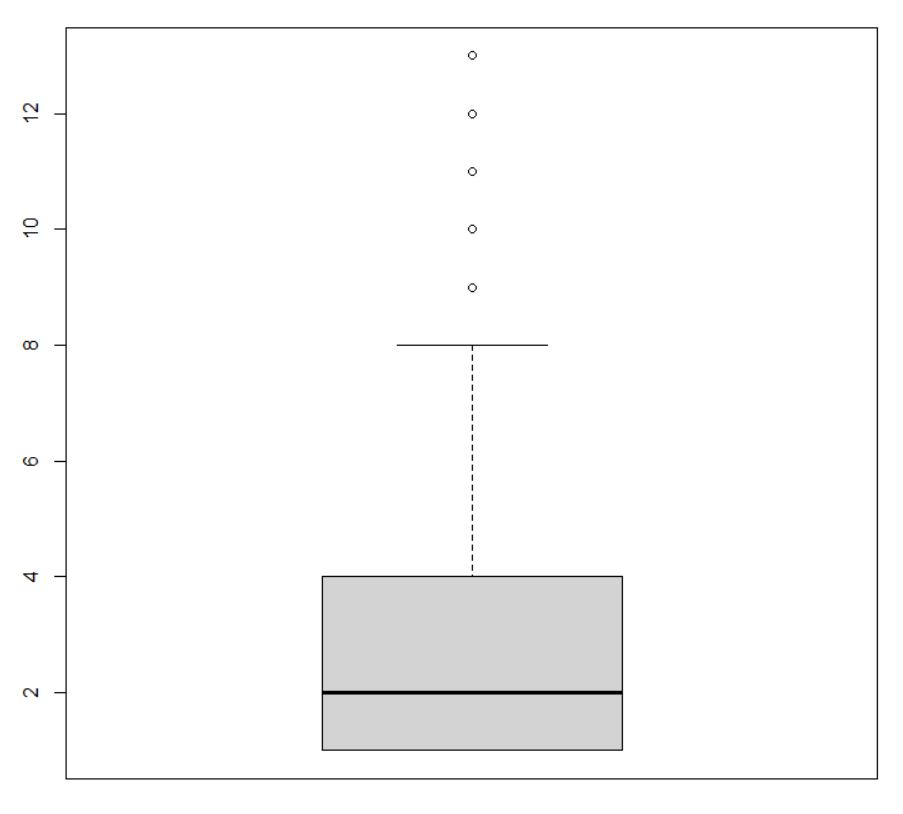
To begin the analysis, a box plot was created for the number of fast food restaurants to determine what outliers may exist within the data. From this, it was discovered that several outliers existed in the dataset that could potentially impact the analysis. As a result, these outliers were removed from the dataset but this is not believed to have negatively impacted the analysis. This can be seen below in *Figure 1* and *Figure 2*.

*Figure 1.*

*![Chart

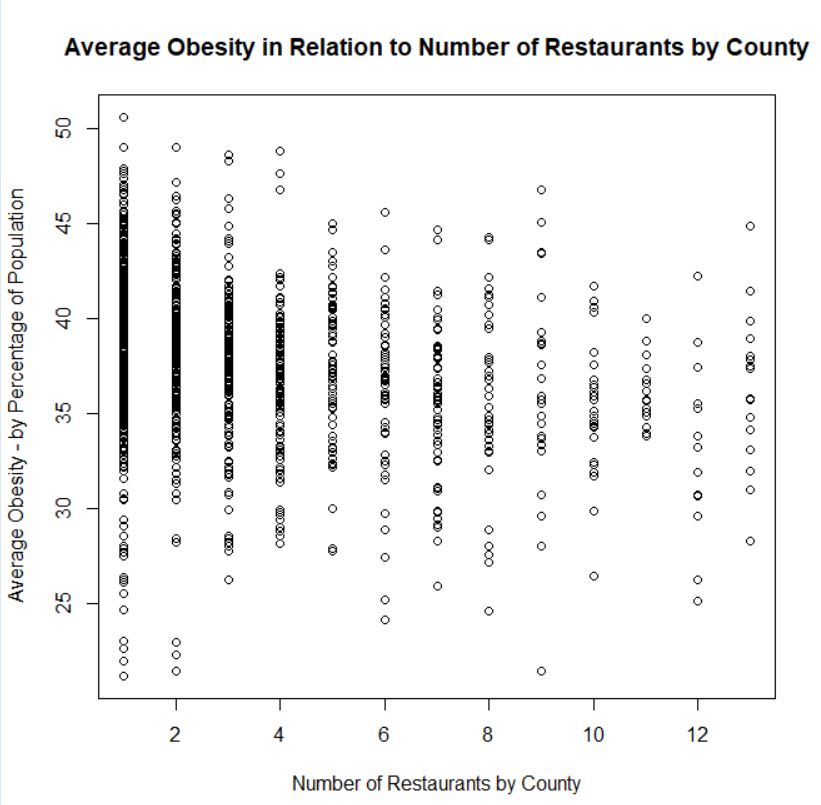
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CiiigArlPhl/yT2x/663P/AKUSV1dcp8Mv+Se2P/XW5/8ASiSgDq6KKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigDkLz/ktGk/8AYDu//R0FdfXIXn/JaNJ/7Ad3/wCjoK6+gAooooAKKKKACiiigAooooAK5T4Zf8k9sf8Arrc/+lEldXXKfDL/AJJ7Y/8AXW5/9KJKAOrooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAOQvP+S0aT/2A7v/ANHQV19chef8lo0n/sB3f/o6CuvoAKKKKACiiigAooooAKKKKACuU+GX/JPbH/rrc/8ApRJXV1ynwy/5J7Y/9dbn/wBKJKAOrooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAOQvP+S0aT/wBgO7/9HQV19chef8lo0n/sB3f/AKOgrr6ACiiigAooooAKKKKACiiigArlPhl/yT2x/wCutz/6USV1dcp8Mv8Akntj/wBdbn/0okoA6uiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooA5C8/5LRpP/YDu/8A0dBXX1yF5/yWjSf+wHd/+joK6+gAooooAKy/EeuweG9BuNUuY3lSHaBGhAZ2YhQBnjkkCtSs3X9GtNf0O407UGdIJgMujAMhBBBBPGQQDUyvbQcbX1MKC68f3lulzDa+H7aOUb0iuJJjIgPQMVyM/SptE8Tai/iSTw74jtIINRWA3Ecto5MMsYIBxu+YEbhnNcY3jG+0pjYL8R/C223PlqLnT5GkAHTcRKAT7gCum8F2Vrqt+/iebXrfW9QeM23m2aeXBGmQSFQksDkDOWNaKzd1t/ViZXSt1/q521FFFSMK5T4Zf8k9sf8Arrc/+lEldXXKfDL/AJJ7Y/8AXW5/9KJKAOrooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAOQvP+S0aT/2A7v/ANHQV19chef8lo0n/sB3f/o6CuvoAKKKKACub+IGm3ur+CL+z0yMyzyBT5SkAyKGBZOeOQCPxrpKxvFniBPDHhu51R4vNMW1ETOMszBVyfTJFTOzjZlRvzKxz+k+PfCmm6Ra2TLc2DQRiNrb+zZz5RHUZVCDz6E1B4fT+2Pidc+ItIs5YNKexMMlzJEYvtUm5SDtbDfKAeoHWpJdQ8a3Mlnpt0ttbLqS7hqemxMRaLgHBDlhu54JGParOhajqek+NG8L6pqMurq9obuK8nRFkXDKCrbAFx8wxx2rRXc79dfydzN2ULLbT89Ds6oaxaaheWPlaTqQ0243g+ebdZuO42kgfjV+ipKOU/sDxh/0Oy/+CiL/AOKpnwtV0+G+mrK/mOr3AZ9uNx8+TJx2rrq5T4Zf8k9sf+utz/6USUAdXRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAchef8lo0n/sB3f/o6CuvrkLz/AJLRpP8A2A7v/wBHQV19ABRRRQAVW1HTrXVtOmsdQhWa3nUq6N3FWaKNwTtqUtK0yPSNMisYZp5o4RtRp33MB2GfbpVfTvDljpuq3WpIZZ726OHnnfcwXsg9FHpWrRR1uHSwUUUUAFcp8Mv+Se2P/XW5/wDSiSurrlPhl/yT2x/663P/AKUSUAdXRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAchef8AJaNJ/wCwHd/+joK6+uQvP+S0aT/2A7v/ANHQV19ABRRRQAUUUUAFFFFABRRRQAVynwy/5J7Y/wDXW5/9KJK6uuU+GX/JPbH/AK63P/pRJQB1dFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByF5/yWjSf+wHd/wDo6CuvrkLz/ktGk/8AYDu//R0FdfQAUUUUAFFFFABRRRQAUUUUAFcp8Mv+Se2P/XW5/wDSiSurrlPhl/yT2x/663P/AKUSUAdXRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAchef8AJaNJ/wCwHd/+joK6+uQvP+S0aT/2A7v/ANHQV19ABRRRQAUUUUAFFFFABRRRQAVynwy/5J7Y/wDXW5/9KJK6uuU+GX/JPbH/AK63P/pRJQB1dFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQByF5/yWjSf+wHd/wDo6CuvrkLz/ktGk/8AYDu//R0FdfQAUUUUAFFFFABRRRQAUUUUAFcp8Mv+Se2P/XW5/wDSiSurrlPhl/yT2x/663P/AKUSUAdXRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAchef8AJaNJ/wCwHd/+joK6+uQvP+S0aT/2A7v/ANHQV19ABRRRQAUUUUAFFFFABRRRQAVynwy/5J7Y/wDXW5/9KJK6uuU+GX/JPbH/AK63P/pRJQB1dFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFF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Note: *Figure 1* shows the boxplot representing the number of restaurants by county.

*Figure 2.*

Note: *Figure 2* shows the boxplot representing the number of restaurants by county with outliers removed. In part, the outliers were removed in order to allow for a more focused analysis and graphical representations of the data and the relationships between variables.

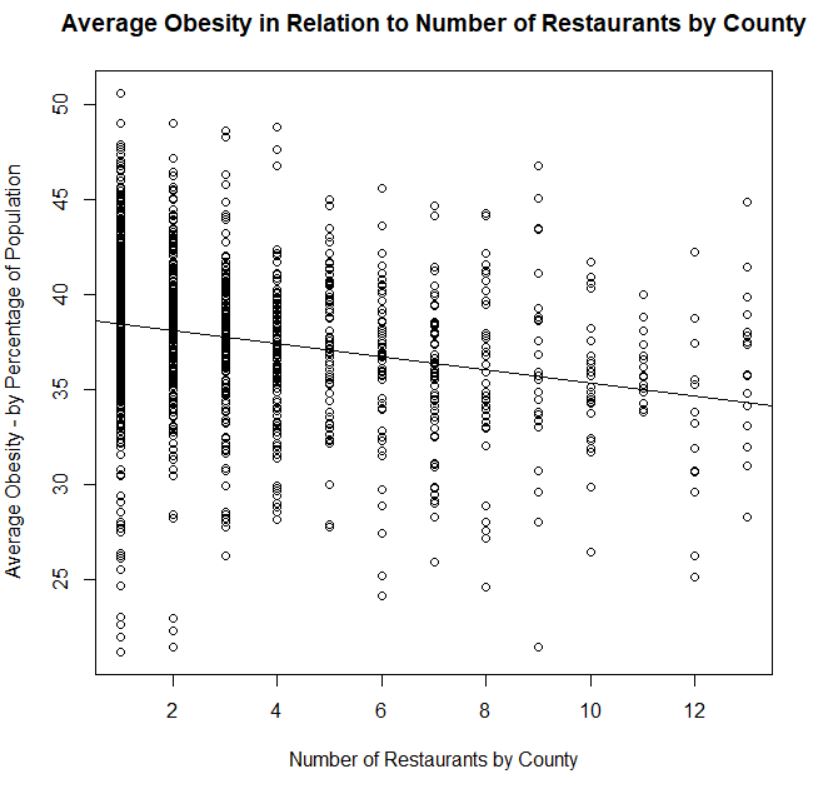
Once outliers were removed from the dataset, a proper correlation analysis could be performed. The first step in performing this analysis was to generate a scatter plot for the average obesity rate in relation to the number of fast food restaurants. The scatter plot can be seen below in *Figure 3.*

*Figure 3.*

Note: *Figure 3* shows the scatterplot representing the average obesity rate as a percentage of population in relation to the number of restaurants by county.

From the above scatter plot, it can be estimated that there is a strong, slightly negative linear relationship between the average rate of obesity and the number of restaurants for a given county. To further confirm this, a regression analysis is performed and a regression line is created for the dataset and added to the plot. This regression line can be used to visualize the trend of the data as well as predict values for the dataset (Salem Press, 2014). This can be seen below in *Figure 4* & *Figure 5*.

*Figure 4.*

**

Note: *Figure*  shows the scatter plot with a regression line for the average obesity rate in relation to the number of restaurants for a given county.

*Figure 5.*

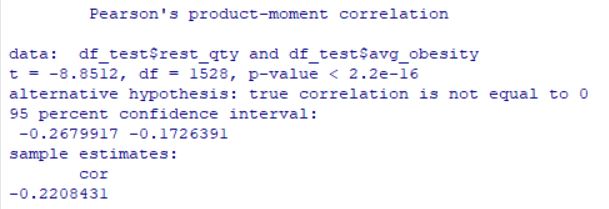
Text

Description automatically generated

Note: *Figure 5* shows the intercept and slope of the regression line shown in the plot above in *Figure 4.*

As predicted, the regression line has a slightly negative slope indicating a very linear negative relationship between the average obesity rate and number of fast food restaurants by county. To further determine the strength of this relationship it is necessary to run a correlation analysis to determine the t-value, p-value, and confidence intervals of the dataset (Myers & Well, 2003). This analysis can be seen below in *Figure 6*.

*Figure 6.*

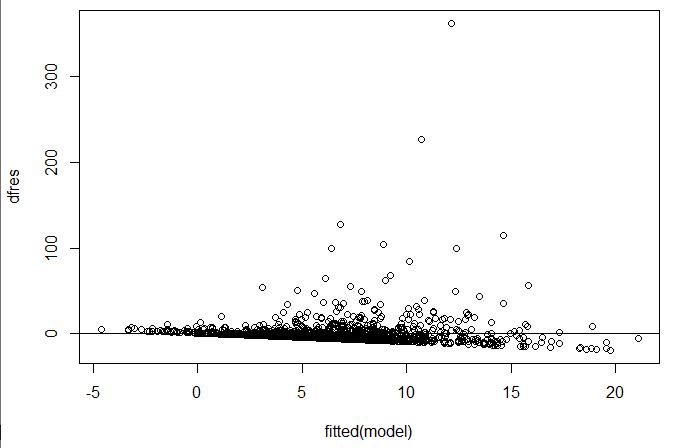


Note: *Figure 6* shows the correlation analysis between the average obesity rate and the number of fast food restaurants by county.

As can be seen in *Figure 6*, the p-value for the dataset is 2.2^-16, which is very close to zero and below the initially declared significance level of 0.05. As a result, it can be concluded that there is a statistically significant relationship between the average obesity rate and number of fast food restaurants. Additionally, the absolute t-value of 8.85 further supports the statistical significance of the relationship between the two variables. When compared to the value of 1.96 provided by the t-value distribution table, the t-value provided by the dataset is greater providing sufficient evidence to reject the null hypothesis.

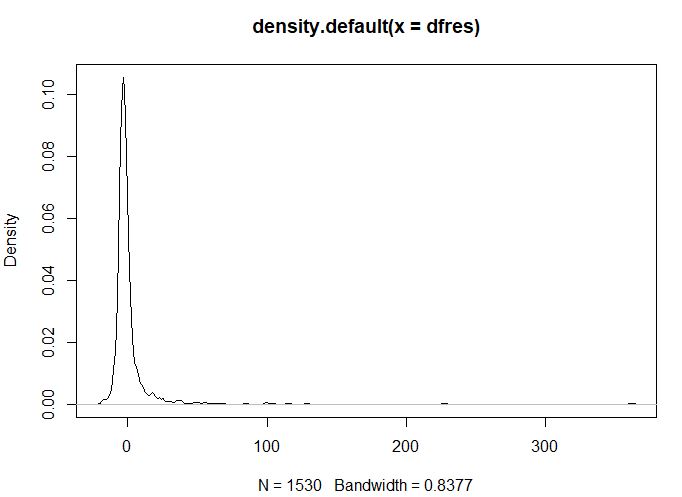
However, while this relationship is statistically significant, and there is sufficient evidence to reject the null hypothesis, evidence provided by the -0.22 correlation coefficient, or R value, suggests that the relationship between the two variables is not very strong, being that the correlation coefficient is closer to zero than -1 or 1. To further test the strength of the correlation between the variables and the regression line, the residuals should be analyzed as well as the R and R2 values for the dataset. *Figure 7* and *Figure 8* below show the residual plots for the data.

*Figure 7.*

**

Note: *Figure 7* shows the residual plot showing the difference between the observed values of the average obesity data and the regression line values.

*Figure 8.*

**

Note: *Figure 8* shows the density of the residual values.

As can be seen above in *Figure 8*, with the exception of the outlier values, the residual values appear to be normally distributed, indicating that the regression line is appropriate for the model. Additionally, the R and R2 values for the dataset should be considered as well. In *Figure 9* below, it can be observed that the R2 value for the dataset is 0.48. This means that 48% of the variance in obesity can be explained by the number of fast food restaurants within a given county, further supporting the evidence to reject the null hypothesis.

*Figure 9.*

![Text

Description automatically generated](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAeAB4AAD/4RDmRXhpZgAATU0AKgAAAAgABAE7AAIAAAAJAAAISodpAAQAAAABAAAIVJydAAEAAAASAAAQzOocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAHRqYnJhc2hlAAAABZADAAIAAAAUAAAQopAEAAIAAAAUAAAQtpKRAAIAAAADODAAAJKSAAIAAAADODAAAOocAAcAAAgMAAAIlgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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Note: *Figure 9* shows the summary statistics for the dataset including the R2 values.

Based on the above analysis, there is sufficient evidence to reject the null hypothesis and conclude that there is a relationship between the average rate of obesity and the number of fast food restaurants for a given county. However, the relationship appears to be a negative linear relationship, which was contrary to what was expected by the author. Considerations for this analysis include variations in people moving from county to county and state to state, as well as inconsistencies or inaccuracies in restaurant data. Additional considerations include difference in rural and metropolitan areas as well as levels of activity and common transportation methods for various counties, cities and states.

**Conclusion**

While statistical analysis provides a great number of insights into datasets, it is important to ensure that the data being used is properly prepared before beginning the analysis. Once prepared, the data can be analyzed at which point it becomes critical to know how to read the results of the analysis and what each variable means as it relates to the dataset. Statistical analysis is a set of invaluable methods and tools that enable analysts to turn data into insights and makes sense of the growing, complex datasets they find themselves immersed in.

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