Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Investigation 5: **How Many Calories?**

**Worksheet 5.1 Guess the Calories**

**Scenario**

*Attacking the Obesity Epidemic: The Potential Health Benefits of Providing Nutrition Information in Restaurants*

By Scot Burton, PhD, Elizabeth H. Creyer, PhD, Jeremy Kees, PhD, and Kyle Huggins, MBA

From <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1551968/>

Results. Survey results showed that levels of calories, fat, and saturated fat in less-healthful restaurant items were significantly underestimated by consumers. Actual fat and saturated fat levels were twice consumers’ estimates and calories approached 2 times more than what consumers expected. In the subsequent experiment, for items for which levels of calories, fat, and saturated fat substantially exceeded consumers’ expectations, the provision of nutrition information had a significant influence on product attitude, purchase intention, and choice.

Conclusions. Most consumers are unaware of the high levels of calories, fat, saturated fat, and sodium found in many menu items. Provision of nutrition information on restaurant menus could potentially have a positive impact on public health by reducing the consumption of less-healthful foods.

Sixty-four percent of American adults are either overweight or obese, and the obesity epidemic shows few signs of weakening. Although the precise number of deaths attributable to obesity is difficult to estimate, obesity is clearly a major cause of preventable death. Not surprisingly, improving the healthfulness of the American diet has become a national health priority. The increasing prevalence of obesity-related diseases has been blamed, in part, on the increased consumption of foods prepared outside the home. Restaurant expenditures have increased consistently in recent decades; consumers now spend more than $400 billion annually.

Results. Survey results showed that levels of calories, fat, and saturated fat in less-healthful restaurant items were significantly underestimated by consumers. Actual fat and saturated fat levels were twice consumers’ estimates and calories approached 2 times more than what consumers expected. In the subsequent experiment, for items for which levels of calories, fat, and saturated fat substantially exceeded consumers’ expectations, the provision of nutrition information had a significant influence on product attitude, purchase intention, and choice.

Conclusions. Most consumers are unaware of the high levels of calories, fat, saturated fat, and sodium found in many menu items. Provision of nutrition information on restaurant menus could potentially have a positive impact on public health by reducing the consumption of less-healthful foods.

**Statistical Question**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Candy Item – Fun Size | | Actual | Guess? |  |  |  |
| Snickers |  |  |  |  |  |  |
| Skittles |  |  |  |  |  |  |
| Butterfinger |  |  |  |  |  |  |
| Kit Kat |  |  |  |  |  |  |
| M&M’s Plain |  |  |  |  |  |  |
| M&M’s Peanut |  |  |  |  |  |  |
| Reese’s Peanut Butter Cup |  |  |  |  |  |  |
| Starburst |  |  |  |  |  |  |
| Whoppers |  |  |  |  |  |  |
| Twizzlers |  |  |  |  |  |  |
| Jolly Ranchers  (3 Pieces) |  |  |  |  |  |  |

**Collect Appropriate Data**

1. Fill in the “Guess?” column with your guesses for the number of calories in each fun size candy item.
2. Fill in the “Actual” column with the actual number of calories in each fun size candy item.

**Analyze the Data**

1. How might you decide who is the best guesser in the class? Justify your answer.
2. Create a scatterplot of your data on graph paper, plotting the actual calories on the x-axis and your guess on the y-axis.
3. Describe the relationship between your guesses and the actual calories in each candy item.
4. What would the scatterplot look like if someone had guessed the correct actual calories in each candy item?
5. Describe the type of guesser your scatterplot shows. Explain.
6. On your scatterplot draw the y=x line. Then draw the vertical distances representing the “errors” on your scatterplot.

1. On the table of guesses and actual number of calories, add a third column labeled “Errors” and calculate the errors (guess minus actual) for each candy item. Find the sum of the errors.
2. On the table of guesses and actual number of calories, add a fourth column labeled Absolute Value and complete the column. Find the sum of the absolute values.
3. On the table of guesses and actual number of calories, add a fifth column labeled Squares and complete the column. Find the sum of the squares.

**Interpret the Results in the Context of the Original Question**

In groups of four, answer the following questions:

1. Compare your results from question 11 with the other students in your group. Who in your group was the best guesser of calories? Justify your answer.
2. Using the scatterplots and analysis of the errors, answer the statistical question: What is the typical error made by students in estimating the number of calories in bite size candies?
3. How do these results relate to the study results?
4. Why might finding errors be important when looking at data?