

DETERMINATION OF POPCORN PORTION SIZES  
FROM LOCAL MOVIE THEATERS IN TARRANT COUNTY  
COMPARED TO UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)  
RECOMMENDED SERVING SIZE

by

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TABLE OF CONTENTS

INTRODUCTION .....	1
Research Objectives.....	1
REVIEW OF LITERATURE .....	2
Portion Sizes .....	2
Movie Theater Popcorn.....	3
Obesity .....	5
METHODS .....	6
Statistical Analysis.....	6
RESULTS .....	6
CONCLUSIONS.....	8
REFERENCES .....	9
ABSTRACT.....	11

LIST OF TABLES

COMPARISON OF AVERAGE SERVING SIZES OF POPCORN FROM FIVE  
MOVIE THEATERS TO STANDARD POPCORN SERVING SIZE.....7

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## INTRODUCTION

Increasing portion sizes and their effect on health motivated this research project. The purpose of this research was to determine individual popcorn portion sizes from Fort Worth movie theaters and compare these portion sizes to USDA recommended serving size. This research study used quantitative measures to evaluate possible differences in portion sizes.

Increasing portion sizes are now being investigated as a possible factor in the increasing rates of overweight and obese individuals. The researcher collected the data in this study to explore Tarrant County movie theater portion sizes. The data collected is intended to provide empirical data related to increased popcorn portion sizes at movie theaters. Healthcare professionals and consumers can use the information obtained in this study to gain insight about how portion sizes with increased calories could correlate to weight gain. In order to conduct this research the researcher had to identify an average popcorn serving size in Tarrant County and then compare this to the recommendation from the USDA Dietary Guidelines. The study intended to provide Tarrant County movie patrons with data about the actual portion size served at Cinema Latino, Fort Worth Museum of Science and History Omni IMAX, Hulen Movie Tavern, Ridgmar 13+ Xtreme, and Starplex Hulen Stadium 10.

### **Research Objectives**

The objectives for this research include the following:

1. To determine average popcorn portion size from local Tarrant County Movie theaters,

2. To determine the difference between the USDA serving size for popcorn (3 cups= 1 oz) compared to actual portion sizes from the five movie theaters.

### REVIEW OF LITERATURE

The researcher collected extensive literature related to portion sizes, movie theaters, and obesity to support the development of this research project. The information obtained through background research aided in formulation of research objectives used to evaluate portion sizes at Tarrant County movie theaters. The literature provided the researcher with knowledge that facilitated completion of the study.

#### **Portion Sizes**

A portion size is the amount of food one chooses to consume during a meal or snack. People often confuse a portion size with the recommended serving size for that actual food. The current trend in the United States food industry is to increase the amount of food that consumers can purchase.

The average portion size has continued to increase over the past twenty years. Restaurants use increased portions to increase the value of their product and attract target customers. As a result of restaurants' increasing portion sizes, the American appetite has grown to accommodate and demand larger food portions.<sup>12</sup> The food industry provides large portions of high caloric foods to fill the demand of American society. Research has shown that when consumers are offered lower calorie options from food establishments with reduced portions the items will not perform as well in the market. If American society were to demand smaller, healthier food options the food industry would adapt to fill this need. For example, Ruby Tuesday attempted to offer smaller, healthier portions, experienced a five percent drop in revenue, and quickly abandoned the practice.<sup>7</sup>

Larger portion sizes cause most people to consume more calories of that food item than they may intend.<sup>6</sup> When consumers receive larger portion sizes they tend to consume thirty percent more calories than if given in a smaller portion size. However, when evaluated by the researchers of the study regarding hunger and relative satiety the subjects underreported the amount that they had actually consumed. Environmental cues like portion sizes, availability, and sensory characteristics can easily outweigh the physiological cues regarding satiety. Even though the public has access to information about appropriate serving sizes, most people cannot generally assess the correct amount that they consumed.<sup>4</sup>

The increase in portion sizes offered from the food industry has occurred in unison with increasing body weights.<sup>10</sup> Weight gain is associated with consuming more calories than expended through metabolic processes or exercise.<sup>4</sup> Morgan Spurlock's documentary, *Supersize Me!*, highlights the drastic weight gain that can occur in relation to large portions at fast food establishments. The documentary followed his drastic twenty-five pound weight gain and health complications from one month of eating all large meals from McDonald's.<sup>10</sup>

### **Movie Theater Popcorn**

The movie theater portion size changes are just one example of the widespread portion size changes in America. Twenty years ago a large serving of popcorn was five cups, but the serving size now has increased to 11 cups.<sup>2, 13</sup> The fast food industry has created even larger sizes, which these establishments refer to as “jumbo” or “king” servings.<sup>13</sup> Not only are these portion sizes drastically larger but they also contain an increased number of calories. Large popcorn containers with butter contain three-fourths



of the recommended 2,000-calorie limit for an average healthy, adult. The popcorn also contains 174% of the recommended daily fat limit of 65 grams. Sodium levels have also greatly increased, ranging from 436 to 2,038 milligrams, accounting for 89% of daily limit. The calories from a large popcorn and large soda could supply the average, healthy adult with his or her entire daily calorie recommendations.<sup>9</sup>

The amount of popcorn that one consumes during a movie is especially sensitive to environmental cues like portion sizes and distractions from the film. One study evaluated whether the amount of popcorn one eats depends on taste quality of that food or on the container size. The results showed that when moviegoers received fresh popcorn in a large container, they consumed 45.3% more popcorn than when served fresh popcorn in a medium container. Moviegoers who received stale popcorn that they evaluated as bad still consumed 33.6% more when given popcorn in a large container compared to a medium container. The results showed that people will consume increased amounts of food when they receive it in a large container, independent of taste. Adults and children both increased consumption of food between 18-25% when given a container that was doubled in size.<sup>8</sup> One possible explanation for the increased consumption when given the larger portions is that the larger portion containers causes people to have a skewed idea of consumption norms.<sup>5</sup> The research highlights that people will consume more even when they do not like the taste of the food. This finding has important health implications because adjusting the portion sizes of healthy fruits and vegetables could increase their consumption.<sup>8</sup>

## **Obesity**

The major health and financial consequences that are secondary to obesity makes reducing the high prevalence a central public health priority. According to data obtained from the 2011-2012 National Health and Nutrition Examination Survey, more than one-third (34.9%) or 72 million United States adults were obese.<sup>1, 11</sup> The researcher of this study based this data on a scale that considered calculated BMI and considered adults that are 5'4" and greater than 174 pounds or 5'9" and greater than 203 pounds obese. The presence of obesity in the United States has not significantly changed since data collection in the 2009-2010 survey. The percent of obese adults continues to remain above the Healthy People 2020 national goal to reduce obesity rates to 30.5% or below.<sup>1</sup>

Many developed countries are now facing the same issues with overeating and obesity. Individuals and society are affected by the significant health consequences related to obesity that affect individuals and society.<sup>3</sup> Obesity increases the risk of many serious health consequences that can cause decreased quality of life. These health conditions include coronary heart disease, stroke, high blood pressure, Type II Diabetes Mellitus, cancers, high cholesterol, liver and gallbladder disease, sleep apnea, osteoarthritis, reproductive issues, and mental health conditions. In the United States, the researchers estimated that the total medical costs related to obesity to be approximately \$147 billion. Obese adults reported spending \$1429 more dollars annually on medical costs when compared to healthy adults. The current culture in the United States encourages physical inactivity and increased consumption of high caloric foods that have contributed to the widespread obesity problem.<sup>11</sup>

## METHODS

The researcher of this project identified five local Tarrant County movie theaters owned by different brands or companies to collect an average popcorn portion. The movie theaters that were visited included Hulen Movie Tavern, Starplex Hulen Stadium 10, Fort Worth Museum of Science and History Omni IMAX, Cinema Latino, and Rigdmar 13+ Xtreme.

The researcher purchased individual, medium size popcorn bags that did not contain any additional toppings. The research labeled the popcorn bags and enclosed in plastic wrap to prevent loss or contamination of data. Next, the individual popcorn servings were transported back to the Texas Christian University Nutritional Science food laboratory to be analyzed using a scientific metric scale. Each of the five individual weights was recorded by the researcher in ounces and measured into cups. Average weights of medium size popcorn purchased at five movie theaters were compared by the researcher with USDA serving size (3 cups= 1 oz) to determine possible statistical difference between weights and difference in cup sizes.

### **Statistical Analysis**

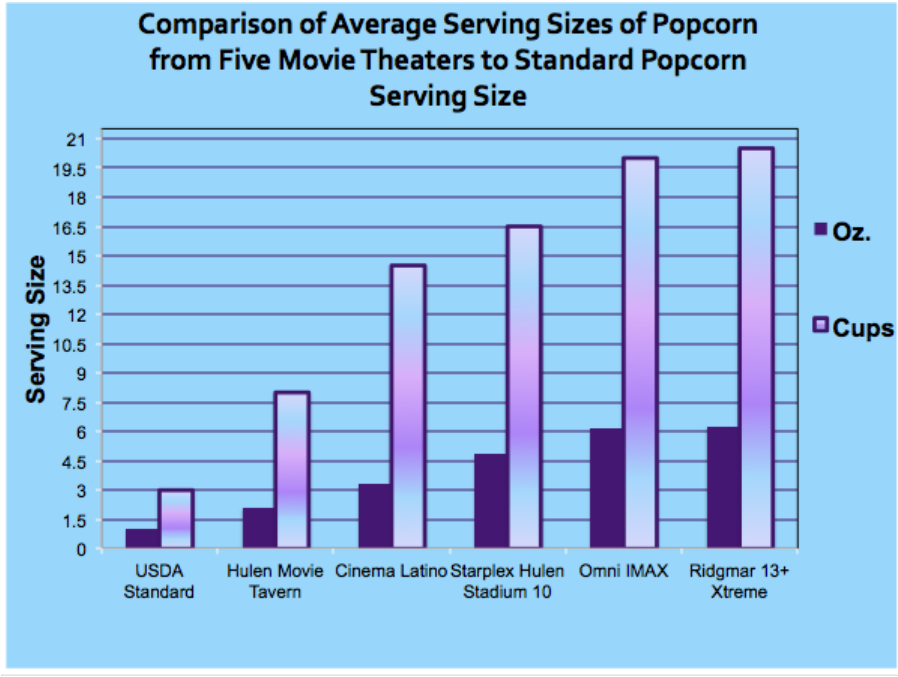
The weights and sizes were recorded and analyzed to determine if research objectives were met. Statistical tests included descriptive analyses, t-tests, and one-way ANOVA. A  $p < 0.05$  was considered significant.

## RESULTS

Individual popcorn portions (cups) from each of the five movie theaters ranged from 8.0 – 20.5 cups, and had a mean of 4.539 oz., 15.9 cups. Portions purchased were significantly greater ( $p < 0.01$ ) than USDA standard serving size (3 cups= 1 oz). The

results from the present study suggest that average popcorn servings from Fort Worth movie theaters are significantly greater than the amount (3 cups= 1 oz) recommended by the USDA. The tables below illustrate the statistical difference between all the Tarrant County movie theaters and USDA serving size.

**Comparison of Average Serving Sizes of Popcorn from Five Movie Theaters to Standard Popcorn Serving Size**



Comparison of Average Serving Sizes of Popcorn from Five Movie Theaters to Standard Popcorn Serving Size				
Movie Theater	Weight (oz.)	Serving Size (cups)	Standard Serving Size (oz.)	Standard Serving Size (cups)
Cinema Latina	3.300	14.5	1	3
Omni IMAX	6.195	20.0	1	3
Hulen Movie Tavern	2.100	8.0	1	3
Ridgmar 13+ Xtreme	6.245	20.5	1	3
Starplex Hulen Stadium	4.855	16.5	1	3

## CONCLUSIONS

The results from this study allow the researcher to draw several conclusions regarding association between increased portion sizes and weight gain. The data compiled through this research study further support the needs for education regarding portion sizes and health management. Many individuals lack the education or skill set to determine an appropriate portion size. This research data provides evidence that these five Tarrant County movie theaters are offering patrons with average popcorn servings that is significantly higher than the USDA recommendation.

This present study and research from Wansik and Junyong's study provide evidence that supports further widespread education regarding portion sizes.<sup>8</sup> Health conscious consumers, individuals on weight loss or weight management regimens, and consumers with chronic diseases may need to decrease or restrict consumption of popcorn served from these five Fort Worth movie theaters. Dietitians and nutritionists should educate consumers regarding correct serving sizes to ensure correct amounts of food and energy is consumed.

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## ABSTRACT

For many foods, portion sizes have increased over the past twenty years. Consumption of larger portions is associated with increase rates for obesity and many chronic diseases. The purpose of this research was to determine individual popcorn portion sizes from Fort Worth movie theaters and compare to USDA recommended /serving size. Samples of medium popcorn bags were purchased at five movie theaters in Fort Worth and weighed on a scientific metric scale in the TCU Nutritional Sciences Laboratory. Each weight (5) was recorded in ounces and measured into cups. Average weights of medium size popcorn purchased at five movie theaters were compared with USDA serving size (3 cups= 1 oz) to determine possible statistical difference between weights and difference in cup sizes. Statistical tests included descriptive analyses, t-tests, and one-way ANOVA. A  $p < 0.05$  was considered significant. Individual popcorn portions (cups) from each of the five movie theaters ranged from 8.0 – 20.5 cups, and had a mean of 4.539 oz., 15.9 cups. Portions purchased were significantly greater ( $p < 0.01$ ) than USDA standard serving size (3 cups= 1 oz). The results from the present study suggest that average popcorn servings from Fort Worth movie theaters are significantly greater than the amount (3 cups= 1 oz) recommended by the USDA. Health conscious consumers, individuals on weight loss management programs, and consumers with chronic diseases may need to decrease or restrict consumption of popcorn served by Fort Worth movie theaters.