Demystifying 'Healthier' Fast Food: Comparative Analysis of Fast Food Chains

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Abstract— Fast food often referred as "junk food" has now been a part of average human's diet for decades, especially trendy fast food chains has seen a profit boost in recent years. Growing cravings for junk food and its increased consumption has made our world prone to various health risks, degrading the quality of life of individuals. Despite of known detrimental health properties, many fast food chains were found claiming their products to be "healthier" alternatives. Since junk food is widely accepted without much concern of its negative impact [2], and major fast food chains insisted about "healthiness" of the food they serve, this study was conducted to find the statistical significance of claims made by five currently dominating franchises, which let their product's nutritional information publically accessible and find weather there is a significant difference between nutritional values between chosen fast food chains.

Keywords- *Data analysis; fast food chains; health; junk food; statistical comparison.*

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I. INTRODUCTION

Health is majorly responsible for determining the value and worth of life. With increased urbanization and globalization the world has seen many new factors severely affecting our health. Some being prevalent such as UV rays exposure are taken care of by suitable preventive measure, but some factors which carries equal potent to degrade health are ignored such as nutrition and exercise. Nutrition is a major aspect of our lives which requires sound decisions when it comes to food consumptions. Many fast food chains serve egregious food items, which gets veiled by deliciousness and fancy named food items. Fast food chains are a continuously expanding business causing serious health impacts [2], [4], mitigating the quality of life that one can achieve by avoiding them. WHO (World Health Organization) is well known for spreading awareness about good nutrition guidelines, suggests inhibiting transfats from diet [1], which is found in most junk foods in high amounts. This study took in account currently major fast food chains namely McDonald's, Foodpanda, KFC, Subway and Taco Bell. Items from menus of these restaurants were compared to find any statically significant difference in nutritional values of foods served. The study conducted excluded any beverages, deserts, extra sauces, limited time offers and extra toppings, keeping only food items served as main dishes in context.

Foods served in most fast food restaurants are not even safe for children as they exceed the limits of calories, saturated fats, fat, and sodium [13], which leads to undernourishment of the child's body. Therefore to compare which major fast food chains have a difference in their nutritional values they were put to a test to find any significant differences.

Nutrition is a complex metric varying significantly according to region and so are the preferred fast food outlets among different geographic regions [11] which caused this study to undertake only some of the currently most popular food chain restaurants. The so called "Modern Diet" has lead to some serious effects on human health [10] deteriorating the quality of life.

II. RESEARCH DESIGN AND HYPOTHESES

The study was conducted by simple random sampling of 20 food items from menus of each of the five groups namely McDonald's, Foodpanda, KFC, Subway and Taco Bell. Due to extremely low micronutrients contents, macronutrients such as protein, carbohydrates, saturated fats, fiber and harmful factors namely sugar, cholesterol, transfats, and sodium were considered according to the WHO recommendations [3], [8]. "Weight watchers" scale was used to rate a food item, where a lower value indicates a better nutritional balance [9]. The null (H_0) and alternative (H_a) hypotheses considered were as follows:

$$H_0: \mu_m = \mu_f = \mu_k = \mu_s = \mu_t \quad (1)$$

$$H_a: \mu_i \neq \mu_j \text{ , for any } i \text{ and } j \quad (2)$$

In (1) μ_m , μ_f , μ_k , μ_s , μ_t are mean nutritional values of McDonald's, Foodpanda, KFC, Subway and Taco Bell respectively. (2) is the alternate hypothesis which states that at least two groups differ in their mean nutritional values. A Krusal-Wallis test was conducted to compare the means of different groups to find and significant difference, and as a post hoc test Dunnett's test was chosen to determine different groups within the samples from different populations. The significance level selected for the test was chosen at $\alpha = 0.05$.

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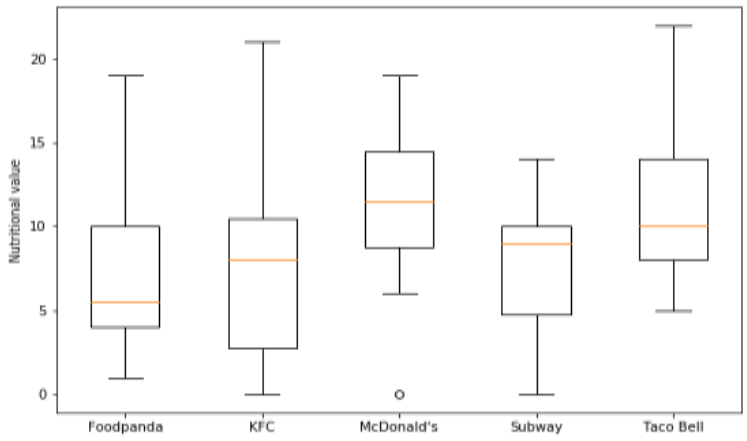

Figure 1. Boxplot of samples from fast food chains

TABLE 1. SUMMARY STATISTICS OF SAMPLES

	Foodpanda	KFC	McDonald's	Subway	Taco Bell
count	20	20	20	20	20
mean	6.9	7.8	11.4	7.6	11.5
std	4.53	6.07	4.76	4.19	5.1
min	1	0	0	0	5
median	5.5	8	11.5	9	10
max	19	21	19	14	22

III. ANALYSIS AND FINDINGS

Samples of size 20 were collected from selected from different fast food chains, and further statistical tests were carried out to get an overview of the populations the samples came from and to test the hypothesis.

A. Descriptive analysis

Preliminary analysis of data and visualization were vague to see any significant differences as show in Figure 1, which shows a boxplot of various samples collected. The inherently divided data was individually analyzed and results shown in Table 1 were obtained showing descriptive statistics of five samples obtained.

Table 1 shows observed summary statistics of the acquired samples, and includes number of observations in each sample, sample mean, sample standard deviation, median of sample, minimum and maximum values of the sample.

B. Inferential analysis

To find the statistical significance of the null hypothesis a non-parametric test namely Kruskal-Wallis test was conducted and following results were observed:

$$H = 14.3168 \quad (3)$$

$$p = 0.00635 \quad (4)$$

The H is the H-statistic observed for the samples, and p value obtained is less than the predetermined significance level which led to rejection of null hypothesis. Therefore to locate the groups which were significantly different Dunnett's test was chosen as a post hoc test. The Dunnett's test conducted resulted in following D value:

$$D = 3.986347 \quad (5)$$

The groups where difference observed was greater than obtained D value were as recorded in Table 2 along with other groups and differences in their respective means.

C. Results

The p value obtained provides strong evidence against the null hypothesis thus we rejected the null hypothesis in favor of the alternate hypothesis. Thus the groups with significant difference between them were those with an entry greater that D value in Table 2 and rest pairs of groups shown no significant difference from each other. The groups with observed significant differences are Foodpanda - MacDonald's and Foodpanda - Taco Bell.

IV. CONCLUSION

In this paper we statistically tested five major food chain restaurants according to nutritional values of their served foods. We found significant differences in some groups and shown a comparative study amongst them to better understand relative nutritional differences. This paper shown some restaurants had better nutritional value than other with enough statistical significance, but this evidence in no way proves that food served in those groups is indeed an ideal diet. WHO provides legitimate guidelines for intake of various essential food components [7] for sustaining a better healthy lifestyle. Comparative studies conducted between non-fast food restaurants and fast food restaurants [14] shown significant differences in their macronutrient contents.

In future we plan to take in account every nutritional aspect of the food items, taking under consideration both macro and micro-nutrients and find their relative nutritional imbalance compared to standardized nutrition values recommended for average human, and acknowledging the excess proportions of harmful contents above recommended safe levels.

TABLE.2 DIFFERENCES OF MEANS BETWEEN GROUPS

	Foodpanda	KFC	McDonald's	Subway	Taco Bell
Foodpanda	0	0.9	4.5	0.7	4.6
KFC	-0.9	0	3.6	-0.2	3.7
McDonald's	-4.5	-3.6	0	-3.8	0.1
Subway	-0.7	0.2	3.8	0	3.9
Taco Bell	-4.6	-3.7	-0.1	-3.9	0

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