

A Paper on Problems Generated By Junk Food in India

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ABSTRACT

India “The Land of Rich Heritage and Culture” with its vast food variety is now at the verge of declining its food habits. Moreover, the food which is common among youth is “JUNK FOOD”.

Junk food is a pejorative term for food containing high levels of calories, salts and fats with little protein, vitamins or minerals. They have a significant impact on student’s diet and weight as many students consume more than half of their daily calories as junk food in canteens of schools and colleges. According to WHO (World Health Organization) reports, in India, more than 3% of the population is in the obese category. Obesity is an emerging major public health problem throughout the world among adolescents. Excess consumption of junk food leads to the wide variety of health disorders like obesity, food poisoning, dental diseases and many more included angina pectoris, stroke, depression, diabetes, asthma etc. all of which sometimes contribute to premature death of an individual.

This paper is concern about the obesity crisis in India which can be reduced by developing more and more educated society, implementing strong nutritional standards in schools and colleges, decreasing the advertising rates of junk food and some changes in the government tax policy.

All these points are used as an instrument to discourage consumption of unhealthy foods such as sodas and junk food. This paper uses a basic method of optimization techniques i.e. simplex method to optimize or minimize the consumption of junk food in schools and colleges.

KEYWORDS: Simplex method, data on junk food, some other studies on junk food & analysis by different mathematical methods, etc.

I. INTRODUCTION

India, “the Land of Rich Heritage and Culture” with 27 states and 7 union territories, becomes the world’s the seventh-largest country in area^[1]. The every state or territory of this country is famous for its own history, culture, lifestyle, cuisine, etc. But, with the rapid increase in westernization, urbanization and industrialization, the country is losing its own culture, traditions and food habits. Particularly, due to the change in the food habits, the country is getting more prone to obesity day by day.

India is the second-most populated country in the world with the population over 1.2 billion^[1]. According to World Health Organization (WHO) reports of 2007, the 3% of the total population is under obese category^[2].

So, the population under obese category is

i.e., 3% of total population

i.e., $(0.03) * (1.2 * 10^9)$

i.e., $36 * (10^6)$

i.e., 36 million

Food is any substance consumed to provide nutritional support for the body. It is usually of plant or animal origin, and contains essential nutrients such as proteins, fats, vitamins or minerals. This substance is ingested by an organism and assimilated by the organism's cells to provide energy, maintain life, or stimulate growth^[3].

The different types of food are as follows:-

Fast food: Foods sold in a restaurant or store and are rapidly prepared and quickly served. For example: burgers, pizzas, fries, hamburgers, patties, etc. Indian foods like pakora, samosa, namkeen etc. in a packaged form for take away.

Instant food: Foods that undergo special processing and are ready to be served once dissolved or dispersed in a liquid with low cooking time. For example: noodle, corn flakes, soup powder, etc.

Street foods: Ready to eat foods and beverages which are prepared or sold by hawkers or vendors in streets or other public places. For example: Chaat, gol-guppa, samosa, tikki, noodles, chowmein, burgers, etc.^[4].

But, due to the emerging trend in food culture, the food which is common among youth is Junk Food.

JUNKFOOD is a pejorative term for food containing high levels of calories, salts and fats with little protein, vitamins or minerals^[5]. They have a significant impact on student's diet and weight as many students consume more than half of their daily calories as junk food in canteens of schools and colleges. Excess consumption of junk food leads to the wide variety of health disorders like obesity, food poisoning, dental diseases and many more included like angina pectoris, stroke, depression, diabetes, asthma etc. all of which sometimes contribute to premature death of an individual. Chips, chocolate, ice-cream, soft drinks, burgers, pizzas, etc.

The factors such as home delivery system, easy access, reasonable prices, fascination of eating out, changing lifestyle, taste and cultural impact, etc. enhance the consumption of junk food in India as well.

Junk food consists of following harmful chemicals which are as follows:

Trans-Fats are partially hydrogenized vegetable oils. They increase the shelf life of food and add crisp, texture to food. These trans-fats are worst substances which we consume in name of food. Consumption of trans-fats has shown to increase the risk of coronary heart disease.

Nitrite Salts are added to foods such as preservatives to keep taste, smell and texture for longer time, but these preservatives are carcinogenic and have many more harmful effects. These are added in processed meat, bacon, corned beef, smoked fish, ham and sausages.

Saccharin and Aspartame are sweetening agents which are added to foods, but their consumption may cause cancers of different types. These are added in pasta, bread, etc.

Buttered-flavoured chemical called diacetyl is used in microwave popcorn, margarine, snack foods, baked goods and candies, giving them an appetizing smell and buttery taste. These chemicals increase the risk for Alzheimer's disease.

Sodium Benzoate, Potassium Benzoate and Butylated Hydroxyanisole (BHA): These preservatives are added to foods to increase the shelf life but all these have harmful effects.

Monosodium glutamate (MSG) used as flavour enhancer of the food, but consumption of this chemical can have serious harmful effects on chemistry of brain.

High Fructose Corn Syrup (HFCS) increases triglycerides, boosts fat storing hormones and leads to obesity.

Food Colouring agents are certain chemicals which give colour and tasty look to food. These chemicals are by-products of coal tar and other chemicals that can increase the risk of certain cancers^[6].

Because of the high consumption junk food, we are facing with different problems which are as follows:

1. Some extra calories are added to body's daily requirement and the amount of essential nutrients decreases day by day.
2. A meal rich in carbohydrates increases the blood sugar levels.
3. A rise in blood sugar means more insulin is needed to process it. So, junk food makes body insulin resistant.
4. Excess salt present in junk food may increase the blood pressure.
5. Salt makes the cells to retain water and can be responsible for bloating and puffiness.
6. Recent study shows that the more junk food you eat, the more likely you develop depression.
7. High sugar content creates cavities in mouth and other dental diseases.
8. Food with high amount of carbohydrates, unhealthy fats, and sugars leads to overweight.
9. Junk foods can raise your bad cholesterol (LDL) while lowering the good cholesterol (HDL).
10. Junk food often contains ingredients that contribute to headaches^[16].

FORMULATION OF THE PROBLEM

Since high availability of junk food enhances the consumption of junk food and as a result, increases the probability of diseases. So, here is the problem which consists of the most widely consumed three different types of junk food with their types and quantities are given in Table 1.

Table 1: Three different type of junk foods with their quantity^[7]

| S.No. | Junk Food | Type | Quantity |
|-------|--------------|-------------------------|-----------|
| 1 | Burger | Simple | 294 grams |
| 2 | Potato Chips | Cream and Onion Flavour | 100 grams |
| 3 | Noodles | Masala Flavour | 100 grams |

For an average adult (ages 18 and older), the calorie recommendation based on age and activity level is given in table 2.

Table 2: Calorie Recommendation as per USDA ^[8]

| S.No. | Activity Level | Calorie per day (Cal) | |
|-------|-------------------|-----------------------|-------------|
| | | Men | Women |
| 1 | Sedentary | 2000 - 2600 | 1600 – 2000 |
| 2 | Moderately Active | 2200 - 2800 | 1800 – 2200 |
| 3 | Active | 2400 - 3000 | 2000 – 2400 |

The food contains carbohydrates, proteins, sugar, salt, fat and saturated fat as its nutrients. But our body requires the nutrients in a particular amount as a daily intake. The balance diet of an average adult is made up of following nutrients each day:

Table 3: The reference value for nutrients for an average adult according to FSC ^[9]

| S.No. | Nutrient | Quantity per day |
|-------|---------------|------------------|
| 1 | Energy | 8700 KJ |
| 2 | Carbohydrates | 310 g |
| 3 | Proteins | 50 g |
| 4 | Sugar | 90 g |
| 5 | Salts | 2.3 g |
| 6 | Total fats | 70 g |
| 7 | Saturated fat | 24 g |
| 8 | Dietary Fibre | 30 g |

In this problem, we are analysing only three nutrients i.e., carbohydrates, salt and fats. The maximum and minimum requirement of these nutrients for an average adult whose activity level is moderate and consumes nearly 2200 calories per day is given in Table 4.

Table 4: Intake of the nutrients by an average adult per day ^[10, 11, and 12]

| Intake | Nutrients | | |
|---------|---------------|-------|------------|
| | Carbohydrates | Salt | Total Fats |
| Minimum | 130 g | 1.5 g | 44g |
| Maximum | 325 g | 2.3 g | 78 g |

So, it is desired to limit the maximum amount of these nutrients so that the rate of diseases will be decreased while satisfying the conditions of minimum requirement of them. There is an unlimited supply of each type of junk food. The amounts of nutrients present in the given junk foods are given below:

Table 5: The amount of nutrients present in three widely consumed junk foods ^[7]

| Junk Food | Nutrients | | |
|-----------------|---------------|--------|------------|
| | Carbohydrates | Salt | Total Fats |
| Burger | 66 g | 2.02 g | 10.5 g |
| Potato Chips | 52.7 g | 1.2 g | 33 g |
| Instant Noodles | 72 g | 4.2 g | 14 g |

Here, we have solved the problem by making the mathematical model of it with the help of optimization technique i.e., Simplex method.

A model may be defined as an idealized representation of a real life system. It makes the problem more meaningful and clarifies important relationships among the variables. It also tells as to which of the variables are more important than others.

Optimization is the technique of obtaining best results under the given conditions. Models are very important for optimization of the programming problems.

In general, **Linear Programming** deals with the optimization (i.e., maximization or minimization) of a function of variables known as *objective function*, subject to a set of linear equalities and/or inequalities known as *constraints* ^[13].

Here, linear programming deals with the minimization of excessive nutrients which includes carbohydrates, salts and fats (i.e., variables) present in each of the three junk food (i.e., function). A junk food is a function of nutrients known as objective function. When these nutrients are bound to some maximum or minimum limit, these are known as constraints.

The objective function is a measure of effectiveness, which is to be obtained in the best possible or optimal manner. Here, the term linear indicates a mathematical expression in which the variables do not have powers. In this problem, we are using the Simplex Method which provides an optimal vertex in a finite number of steps in such a manner that the objective function at the next vertex is better than the preceding vertex ^[14].

Mathematical model of the problem

STEP1: Here, we have assumed three variables as per Table 5
 x_1 = the amount of carbohydrates present in junk food in grams
 x_2 = the amount of salt present in junk food in grams
 x_3 = the amount of sugar present in junk food in grams

STEP2: Objective is to minimize or limit the nutrients (i.e., carbohydrates, salts and fats) amount in order to reduce the probability of diseases.

By using Table 4,

$$\text{Minimize } Z = 325x_1 + 2.3x_2 + 78x_3 \quad \dots (1)$$

STEP3: With reference to Table 4, following are the constraints

- a) Daily intake of carbohydrates must be greater than 130 g.

By using table 5,

$$\text{Therefore } 66 x_1 + 52.7 x_2 + 72 x_3 \geq 130$$

On simplifying, we get

$$660 x_1 + 527 x_2 + 720 x_3 \geq 1300 \quad \dots (2)$$

- b) Daily intake of salts must be greater than 1.5 g.

By using table 5,

$$\text{Therefore } 2.02 x_1 + 1.2 x_2 + 4.2 x_3 \geq 1.5$$

On simplifying, we get

$$202 x_1 + 120 x_2 + 420 x_3 \geq 150 \quad \dots (3)$$

- c) Daily intake of total fats must be greater than 44 g.

By using table 5,

$$\text{Therefore } 10.5 x_1 + 33 x_2 + 14 x_3 \geq 44$$

On simplifying, we get

$$105 x_1 + 330 x_2 + 140 x_3 \geq 440 \quad \dots (4)$$

STEP4: Since all the nutrients (i.e., carbohydrates, salt and fats) are present in the junk food in excess amount. Therefore,

$$x_1 \geq 0, x_2 \geq 0 \text{ and } x_3 \geq 0 \quad \dots (5)$$

STEP5: The model of the problem is

$$\text{Minimize } Z = 325 x_1 + 2.3 x_2 + 78 x_3$$

Subject to constraints:

$$660 x_1 + 527 x_2 + 720 x_3 \geq 1300$$

$$202 x_1 + 120 x_2 + 420 x_3 \geq 150$$

$$105 x_1 + 330 x_2 + 140 x_3 \geq 440$$

Non-negative constraints:

$$x_1 \geq 0, x_2 \geq 0 \text{ and } x_3 \geq 0$$

STEP 6: From the given model, we defined matrices C, A, b, X as

$$C = [325 \quad 2.3 \quad 78], A = \begin{bmatrix} 660 & 527 & 720 \\ 202 & 120 & 420 \\ 105 & 330 & 140 \end{bmatrix}, b = \begin{bmatrix} 1300 \\ 150 \\ 440 \end{bmatrix} \text{ and } X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \quad \dots (6)$$

As we know that, for every linear programming problem there is a related unique another linear programming problem involving the same data which also describes the original problem. The given original problem is called the Primal Problem. This problem can be solved by transposing or reversing the rows and columns of the algebraic statement of the problem. On inverting the problem in this way, results in a Dual Problem. A solution to the dual problem may be found in a manner similar to that used for the primal. The two problems have very closely related properties so that optimal solution of the dual gives complete information about the optimal solution of the primal and vice-versa.

Primal problem is given as

$$\text{Min } Z = C X$$

$$A X = b$$

$$X \geq 0$$

and the dual problem is given by

$$\text{Max } Z' = b^T w \quad \dots (7)$$

$$A^T w = C^T \quad \dots (8)$$

$$w \geq 0 \quad \dots (9)$$

Note: If primal is in maximum then dual is in minimum and vice-versa.

Step 7: Constructing a dual problem

$$C = [325 \quad 2.3 \quad 78] \quad \Rightarrow \quad C^T = \begin{bmatrix} 325 \\ 2.3 \\ 78 \end{bmatrix}$$

$$A = \begin{bmatrix} 660 & 527 & 720 \\ 202 & 120 & 420 \\ 105 & 330 & 140 \end{bmatrix} \quad \Rightarrow \quad A^T = \begin{bmatrix} 660 & 202 & 105 \\ 527 & 120 & 420 \\ 720 & 420 & 140 \end{bmatrix}$$

$$b = \begin{bmatrix} 1300 \\ 150 \\ 440 \end{bmatrix} \quad \Rightarrow \quad b^T = [1300 \quad 150 \quad 440]$$

$$w = \begin{bmatrix} w_1 \\ w_2 \\ w_3 \end{bmatrix}$$

Using equation (7), we get

$$\text{Max } Z' = [1300 \quad 150 \quad 440] \begin{bmatrix} w_1 \\ w_2 \\ w_3 \end{bmatrix}$$

On simplifying, we get

$$\text{Max } Z' = 1300 w_1 + 150 w_2 + 440 w_3 \quad \dots (10)$$

Using equation (8), we get

$$\begin{bmatrix} 660 & 202 & 105 \\ 527 & 120 & 330 \\ 720 & 420 & 140 \end{bmatrix} \begin{bmatrix} w_1 \\ w_2 \\ w_3 \end{bmatrix} = \begin{bmatrix} 325 \\ 2.3 \\ 78 \end{bmatrix}$$

On simplifying, we get

$$660 w_1 + 202 w_2 + 105 w_3 \leq 325 \quad \dots (11)$$

$$527 w_1 + 120 w_2 + 330 w_3 \leq 2.3 \quad \dots (12)$$

$$720 w_1 + 420 w_2 + 140 w_3 \leq 78 \quad \dots (13)$$

Using equation (9), we get

$$w_1, w_2, w_3 \geq 0 \quad \dots (14)$$

STEP8: The positive variables which are added to left hand side of the constraints to convert them into equalities are called slack variables (i.e., w_4, w_5, w_6). Now, equation becomes

$$\text{Max } Z' = 1300 w_1 + 150 w_2 + 440 w_3 + 0 w_4 + 0 w_5 + 0 w_6 \quad \dots (15)$$

$$660 w_1 + 202 w_2 + 105 w_3 + w_4 = 325 \quad \dots (16)$$

$$527 w_1 + 120 w_2 + 330 w_3 + w_5 = 2.3 \quad \dots (17)$$

$$720 w_1 + 420 w_2 + 140 w_3 + w_6 = 78 \quad \dots (18)$$

$$w_1, w_2, w_3, w_4, w_5, w_6 \geq 0 \quad \dots (19)$$

Here,

$$[A] = \begin{bmatrix} 660 & 527 & 720 & 1 & 0 & 0 \\ 202 & 120 & 420 & 0 & 1 & 0 \\ 105 & 330 & 140 & 0 & 0 & 1 \end{bmatrix}$$

Now applying simplex method,

Table 6: First simplex table

| | | | | C_j | 1300 | 150 | 440 | 0 | 0 | 0 | Min Ratio b/Y1 |
|--------------|-------|-------|-----|-------|------|------|-----|----|----|----------|-------------------|
| C_B | B | w_B | b | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | | |
| 0 | B_4 | w_4 | 325 | 660 | 202 | 105 | 1 | 0 | 0 | 0.492 | |
| 0 | B_5 | w_5 | 2.3 | 527 | 120 | 330 | 0 | 1 | 0 | 0.0043 • | |
| 0 | B_6 | w_6 | 78 | 720 | 420 | 140 | 0 | 0 | 1 | 0.108 | |
| $Z'_j - C_j$ | | | | -1300 | -150 | -440 | 0 | 0 | 0 | | |
| | | | | • | | | | | | | |

Table 7: Second simplex table

| | | | | C_j | 1300 | 150 | 440 | 0 | 0 | 0 | Min Ratio |
|------------------|-------|-------|--------|-------|---------|----------|-----|--------|----|---|-----------|
| C_B | B | w_B | b | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | | |
| 0 | B_4 | w_4 | 322.16 | 0 | 51.718 | -313.836 | 1 | -1.188 | 0 | - | |
| 1300 | B_1 | w_1 | 0.0043 | 1 | 0.2277 | 0.6346 | 0 | 0.0018 | 0 | - | |
| 0 | B_6 | w_6 | 74.904 | 0 | 256.056 | -316.912 | 0 | -1.296 | 1 | - | |
| $Z'_j - C_j$ | | | | 0 | 146.01 | 384.98 | 0 | 2.34 | 0 | | |
| All are positive | | | | | | | | | | | |

So, $w_1 = 0.0043, w_2 = w_3 = w_4 = w_5 = w_6 = 0$

Putting these values in equation (10), we get

Max $Z' = 1300 * 0.0043$

Max $Z' = 5.59$

Therefore, the value of nutrients present in three widely used junk foods is minimized by

$x_1 = x_3 = 0$ and $x_2 = 2.34$

Putting these values in equation (1), we get

Min $Z = 2.3 * 2.34$

So, Min $Z = 5.382$

Hence, the problem is minimized.

STATISTICAL ANALYSIS

The statistical data is collected for analysing the impact of junk food on society. A survey is conducted on 30 youngsters of age group 15-27 years who were pursuing their careers in different streams and 8 different questions were asked from them. Then, the collected data is statistically analysed.

1. Kind of junk food preferred

Table 8: Preference and their respondents

| Preference | Respondents | Percentage |
|--------------|-------------|------------|
| Burger | 10 | 33 % |
| Potato Chips | 11 | 37 % |
| Noodles | 9 | 30 % |

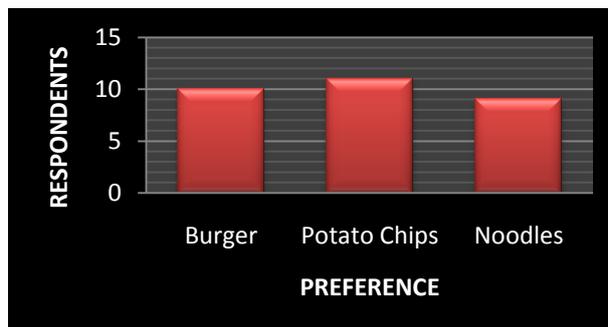


Fig 1: Preference v/s Respondents

From the above Table 8, it is referred that the majority 37% of the respondents prefer potato chips followed by burger 10% and noodles 9%.

2. Price of junk food

Table 9: Price of junk food and their respondents

| Price | Respondents | Percentage |
|------------|-------------|------------|
| Affordable | 15 | 50% |
| Reasonable | 6 | 20% |
| Expensive | 9 | 30% |

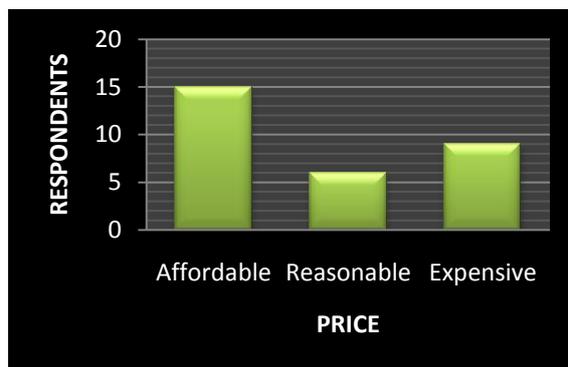


Fig2: Price v/s Respondents

From the above Table 9, it is referred that the majority 50% of the respondents think that price of the junk food is affordable.

3. Impact on diet

Table 10: Impact on diet and respondents

| Impact | Respondents | Percentage |
|--------|-------------|------------|
| Yes | 23 | 77 % |
| No | 7 | 23 % |

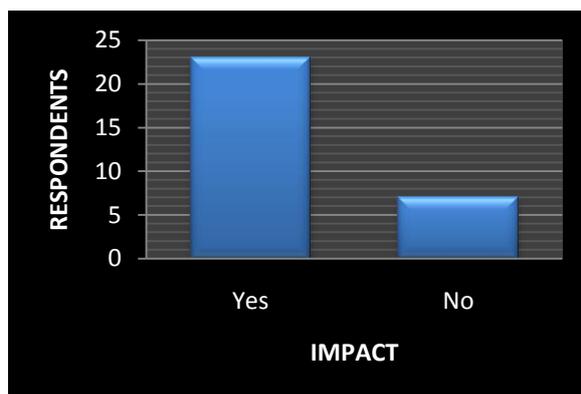


Fig3: Impact v/s Respondents

From the above Table 10, it is referred that the majority 77% of the respondents think that junk foods have impact on diet.

4. Consumption of junk food among different age groups

Table 11: Age-group and consumption

| Age Group | Consumption | Percentage |
|----------------|-------------|------------|
| 5 -12 yrs | 0 | 0% |
| 13-19 yrs | 14 | 46.67% |
| 20-29 yrs | 15 | 50% |
| 30 yrs & above | 1 | 3.33% |

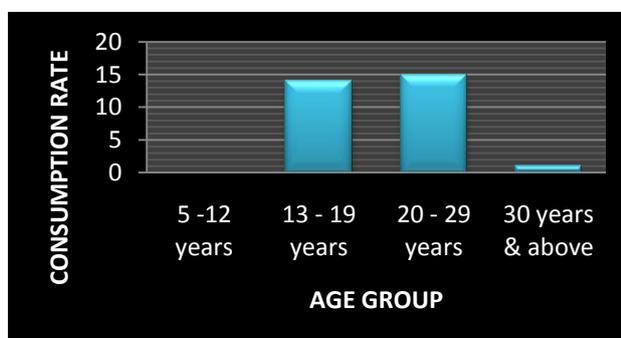


Fig 4: Age - group v/s Consumption

From the above Table 11, it is referred that the majority 50% of the respondents think that 20 – 29 years age - group consume more of junk foods than others.

5. Consumption of junk food nowadays

Table 12: Consumption and frequency

| | Frequency | Percentage |
|------------------|-----------|------------|
| Increased | 20 | 67 % |
| Decreased | 6 | 20 % |
| No Impact | 4 | 13 % |

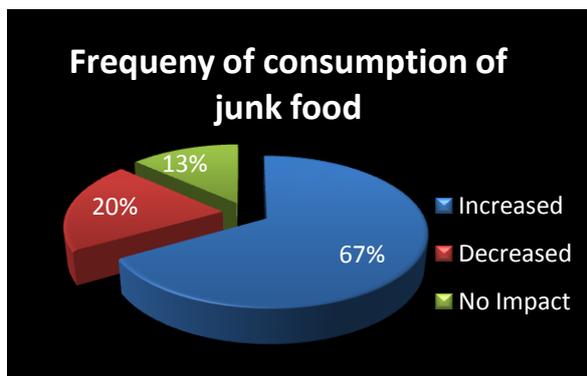


Fig5: Consumption of junk food

From the above Table 12, it is referred that the majority 67% of the respondents think that consumption of the junk food is increased.

6. Diseases caused by junk food

Table 13: Diseases and their frequency

| Diseases | Frequency | Percentage |
|---------------------|-----------|------------|
| Obesity | 23 | 77 % |
| Cancer | 3 | 10 % |
| Heart Attack | 4 | 13 % |

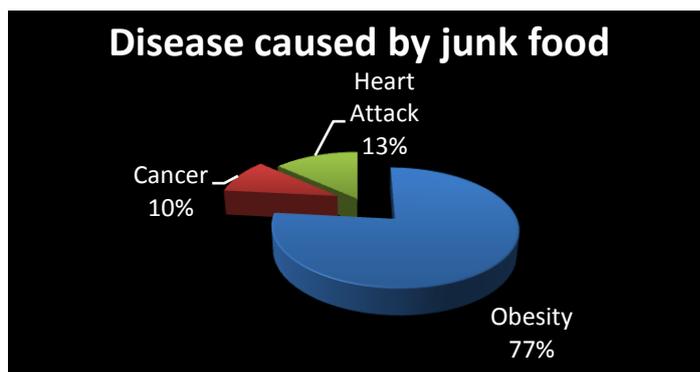


Fig 6: Diseases and their frequency

From the above Table 13, it is referred that the majority 77% of the respondents think that obesity is the main problem due to consumption of the junk food.

7. Food addiction

Table 14: Food addiction and frequency

| Food Addiction | Frequency | Percentage |
|-------------------------|-----------|------------|
| Traditional Food | 21 | 70 % |
| Junk Food | 9 | 30 % |

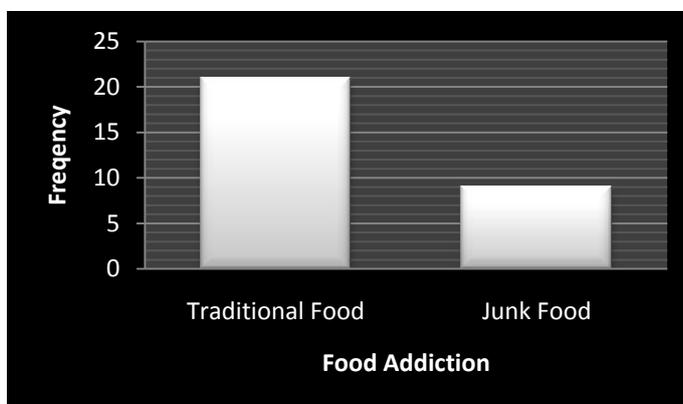


Fig 7: Type of food v/s Frequency

From the above Table 14, it is referred that the majority 70% of the respondents like traditional food.

8. Favourite Restaurant

Table 15: Restaurant and their respondents

| Restaurant | Respondents | Percentage |
|-------------|-------------|------------|
| KFC | 4 | 13 % |
| Pizza Hut | 8 | 27 % |
| Mc Donald's | 11 | 37 % |
| Dominos | 7 | 23 % |

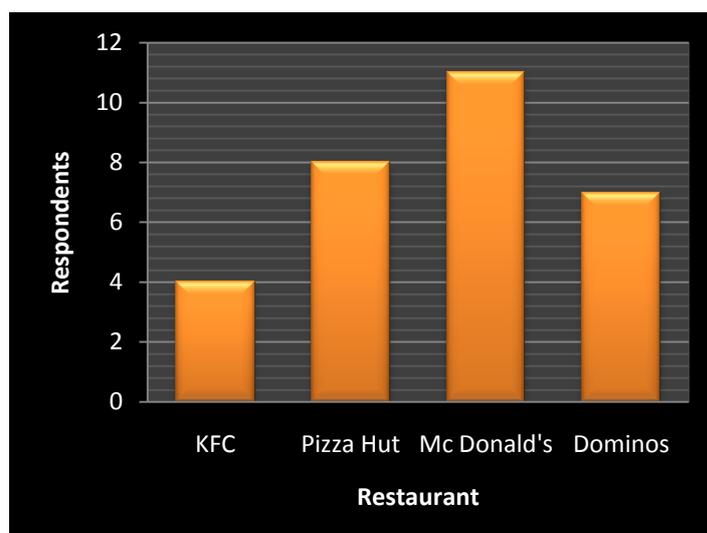


Fig 8: Restaurant v/s respondents

From the above Table 15, it is referred that the majority 37% of the respondents choose Mc Donald's for eating out.

FINDINGS

From the survey, we found out that majority of the people like traditional food along with that they also know that it has great impact on their diet. But, majority prefers potato chips because of its reasonable price and their favorite restaurant is Mc Donald's. Since, there is a high increase in consumption of junk food between the age group 20 -29 years due to this a major disease comes into existence known as Obesity.

OBESITY is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems. Obesity increases the various diseases like heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis. Obesity is most commonly caused by a combination of excessive food energy intake, lack of physical activity, and genetic susceptibility, although a few cases are caused primarily by genes, endocrine disorders, medications, or psychiatric.

Dieting and exercising are the main treatments for obesity.

Obesity is a leading preventable cause of death worldwide with increasing rates in adults and children ^[18].

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population.

Due to genetic tendency of Indians towards abdominal obesity and its associated risk of related lifestyle diseases like Diabetes & Heart Disease, Ministry of Health & Family Welfare along with the Indian Council of Medical Research released updated guidelines in 2012 that a BMI over 23 kg/m² is considered overweight.

Here is a list of the states of India ranked in order of percentage of people who are overweight or obese, based on data from the 2007 National Family Health Survey.

Table 15: List of the states of India ranked in order of percentage of people who are overweight or obese ^[2].

| States | Males (%) | Males rank | Females (%) | Females rank |
|----------------|-----------|------------|-------------|--------------|
| India | 12.1 | 14 | 16 | 15 |
| Punjab | 30.3 | 1 | 37.5 | 1 |
| Kerala | 24.3 | 2 | 34 | 2 |
| Goa | 20.8 | 3 | 27 | 3 |
| Tamil Nadu | 19.8 | 4 | 24.4 | 4 |
| Andhra Pradesh | 17.6 | 5 | 22.7 | 10 |
| Sikkim | 17.3 | 6 | 21 | 8 |
| Mizoram | 16.9 | 7 | 20.3 | 17 |

| States | Males (%) | Males rank | Females (%) | Females rank |
|-------------------|-----------|------------|-------------|--------------|
| Himachal Pradesh | 16 | 8 | 19.5 | 12 |
| Maharashtra | 15.9 | 9 | 18.1 | 13 |
| Gujarat | 15.4 | 10 | 17.7 | 7 |
| Haryana | 14.4 | 11 | 17.6 | 6 |
| Karnataka | 14 | 12 | 17.3 | 9 |
| Manipur | 13.4 | 13 | 17.1 | 11 |
| Uttarakhand | 11.4 | 15 | 14.8 | 14 |
| Arunachal Pradesh | 10.6 | 16 | 12.5 | 19 |
| Uttar Pradesh | 9.9 | 17 | 12 | 18 |
| Jammu and Kashmir | 8.7 | 18 | 11.1 | 5 |
| Bihar | 8.5 | 19 | 10.5 | 29 |
| Nagaland | 8.4 | 20 | 10.2 | 22 |
| Rajasthan | 8.4 | 20 | 9 | 20 |
| Meghalaya | 8.2 | 22 | 8.9 | 26 |
| Orissa | 6.9 | 23 | 8.6 | 25 |
| Assam | 6.7 | 24 | 7.8 | 21 |
| Chhattisgarh | 6.5 | 25 | 7.6 | 27 |
| West Bengal | 6.1 | 26 | 7.1 | 16 |
| Madhya Pradesh | 5.4 | 27 | 6.7 | 23 |
| Jharkhand | 5.3 | 28 | 5.9 | 28 |
| Tripura | 5.2 | 29 | 5.3 | 24 |

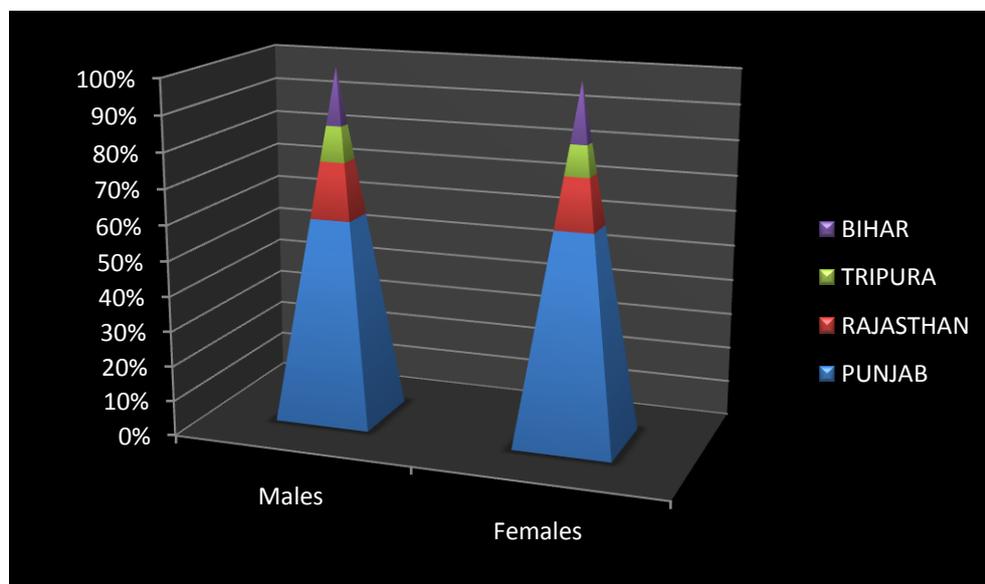


Fig 9: Comparison of obesity among four states in males and females

Punjab is at the 1st position in case of obesity in both men and women followed by Kerala at rank 2 and Tripura at 29th position in males and Bihar at 29th position in females.

RECOMMENDATIONS

From the survey, we found out that the impact of junk food on society is quite high. We have to stop this or else it will be a great difficulty to maintain a good health.

1. We should substitute the junk food by the tasty food made at home. Junk food made at home is less harmful for health.
2. Government should increase the tax on junk food so that less consumption of junk food takes place.
3. Banning of junk food in schools and colleges.
4. Education is a best tool to reduce the consumption of junk food.
5. Advertising of junk food should be banned so that they do not inspire young generation.
6. If we consume junk foods by giving time gap then it can reduce the impact on health.

CONCLUSION

In the summary, junk food contains high levels of carbohydrates, sugars, salt and fats. High levels of nutrients are a public health concern due to its association with different diseases. The provision of nutritional information is currently not a legal requirement unless a claim is made. None of the takeaway foods like pizzas burgers, fries, and potato chips provide nutritional information on the product packs. The absence of nutritional data per 100g makes comparisons between products difficult. So, there should be mandatory labeling at least for serving size, trans-fats, saturated fats, sugars and salts along with already mandatory labeling nutritional information for all processed foods including takeaway foods. As the junk food industry targets children and youth, it is important to ban junk food from places where children and youth have easy access to these foods. Thus, there is a need to come forward for developing more and more educated society, implementing strong nutritional standards in schools and colleges, decreasing the advertising rates of junk food and significant changes in the government tax policy regarding junk food.

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