Project Report

On

A STATISTICAL STUDY ON THE EFFECT OF JUNK FOOD CONSUMPTION AND HEALTH AMONG ADULTS

Submitted

in partial fulfilment of the requirements for the degree of

BACHELOR OF SCIENCE

in

MATHEMATICS

by

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Under the Supervision of

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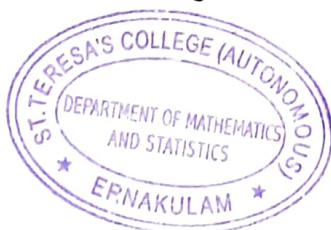
ST. TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM

CERTIFICATE

This to certify that the dissertation entitled, **A STATISTICAL STUDY ON THE EFFECT OF JUNK FOOD CONSUMPTION AND HEALTH AMONG ADULTS** is a bonafide record of the work done by **Ms. SHISMI SHIBU** under my guidance in partial fulfilment of the award of the degree of **Bachelor of Science in Mathematics** at **St. Teresa's College (Autonomous), Ernakulam** affiliated to **Mahatma Gandhi University, Kottayam**. No part of this work has been submitted for any other degree elsewhere.

Date: 16/02/2024

Place: Ernakulam

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DECLARATION

I hereby declare that the work presented in this project is based on the original work done by me under the guidance of Ms. RAHNA BABU, Assistant Professor, Department of Mathematics and Statistics, St. Teresa's College (Autonomous), Ernakulam and has not been included in any other project submitted previously for the award of any degree.

Ernakulam

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ACKNOWLEDGEMENT

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CHAPTER 1

INTRODUCTION

1.1 ABSTRACT

This study aims to assess the effects of junk food consumption on health through a statistical analysis. By examining factors such as physical well-being, mental health, and academic performance, we seek to identify the correlations between junk food habits and overall health outcomes. The findings will contribute insights into the potential impacts of junk food on individuals, allowing for informed recommendations to promote healthier lifestyle choices.

1.2 STATISTICS

Statistics is crucial in investigating the relationship between junk food consumption and health outcomes. It involves collecting, organizing, and analysing data systematically to derive meaningful insights from samples to larger populations. A meticulous study design, careful sample selection, and judicious application of statistical tests are imperative for unravelling the intricate connections between junk food habits and health. Proficiency in statistical methods is indispensable for designing rigorous studies and clinical trials, as errors in this domain may result in misleading conclusions and potentially unethical research practices.

1.2.1 VARIABLES

In the investigation concerning junk food and health, variables represent traits that demonstrate diversity within a given population. Variable is a characteristic that varies from one individual member of population to another individual. Variables, such as calorie intake and BMI, are measured using numerical scales, that conveys quantitative information and are called as quantitative variables. furnishing data suitable for analysis. Variables,

including dietary habits and lifestyle choices, give qualitative information and are called as qualitative variables.

1.2.2 STATISTICS: DESCRIPTIVE AND INFERENTIAL

In the "Junk Food and Health: A Statistical Study" project, descriptive statistics play a vital role in untangling the complex interactions among various factors linked to junk food consumption and health outcomes. These statistics strive to capture the essence of the data by summarizing critical aspects like average calorie intake, frequency of junk food consumption, and overall health indicators. Through measures such as mean, median, and mode, descriptive statistics offer a comprehensive overview of the relationships within the sampled population.

Conversely, inferential statistics derive insights from a random subset of data drawn from the broader population, facilitating generalized conclusions. This method proves invaluable when examining every individual in the entire population is impractical. Through the application of inferential statistics, the study aims to infer broader implications of junk food habits on health, using a representative sample to derive meaningful and applicable conclusions for the entire population.

1.2.3 INFERENTIAL STATISTICS

In the context of our "Junk Food and Health" study, inferential statistics serve as a tool to extend our analysis beyond the sample and make informed estimations about the entire population. Our primary objective is to test hypotheses that elucidate the relationship between junk food consumption patterns and health outcomes. A hypothesis acts as a proposed explanation for observed phenomena. Hypothesis tests are thus procedures for making rational decisions about the reality of observed effects.

In inferential statistics, the term null hypothesis (H0) denotes that there is no relationship(differences) between the population variables in question.

Alternative hypothesis (H1) denotes that a statement between the variables is expected to be true. The p value (or the calculated probability) is the probability of the event occurring by chance if the null hypothesis is true. The p value is less than the arbitrary chosen value (known as the significance level), the null hypothesis (H0) is rejected.

1.2.4 STATISTICAL SURVEY

A statistical survey involves investigating the characteristics of a specific population by gathering data from a sample and using statistical methods to estimate their features. The process follows distinct stages for a systematic approach and reliable results. Key steps in conducting the statistical survey include:

1. Defining the Problem and Determining the Objective:

Clearly outline the problem at hand, specifying the goals and objectives of the survey related to junk food and health. This initial step sets the direction for the entire study.

2. Preliminaries to the Collection of Data:

Plan and prepare for data collection by identifying the target population, selecting an appropriate sample, and ensuring the survey instruments are well-designed for gathering irrelevant information.

3. Collection and Editing of Data:

Execute the data collection process systematically, ensuring accuracy and completeness.
After collecting data, carefully review and edit to rectify any errors or inconsistencies.

4. Classification and Tabulation of Data:

Organise the collected data into meaningful categories and tables. This step involves systematically arranging information to facilitate analysis and interpretation.

5. Analysis and Interpretation of Data:

Employ statistical methods to analyse the data, identifying patterns, trends, and relationships between junk food habits and health outcomes. Interpret the findings to draw meaningful conclusions.

6. Writing the Report:

Summarise the entire survey, incorporating details about the problem, objectives, data collection process, and key findings. Present the statistical analysis and interpretation in a clear and concise manner for a comprehensive report on the study.

By adhering to these sequential steps, the statistical survey on "Junk Food and Health" aims to provide a thorough understanding of the relationship between junk food consumption and health outcomes in the targeted population.

1.3   ABOUT: JUNK FOOD AND HEALTH AMONG ADULTS

In our study titled "Junk Food and Health among adults: A Statistical Study" holds immense relevance in light of the widespread consumption of junk food in modern diets and its consequential health implications. By focusing on the specific effects of these foods on wellbeing, including the development of obesity, cardiovascular issues, and other health challenges, addressing crucial public health concerns.

Much like a detailed health examination, our study seeks to uncover the specific ways in which junk food affects our well-being. Beyond general notions, were examining how these foods might lead to issues such as obesity, cardiovascular problems, and other health challenges over time.

Similar to how some people are more susceptible to certain illnesses, our research aims to identify factors that make individuals more vulnerable to the negative effects of junk food. This includes understanding demographic groups, lifestyle factors, and other elements that may contribute to increased health risks.

In summary, your study holds promise in advancing our comprehension of how junk food consumption influences health outcomes, thereby providing invaluable insights for informing public health interventions and guiding individual decision-making processes.

1.4 OBJECTIVES

1. To identify the negative effects of junk food and the health risks faced by people.

2. To identify the contribution of psychological factors in junk food consumption among different groups of individuals.

3. To determine the frequency and patterns of junk food consumption among different age groups.

4. To analyse the factors influencing the preference of junk food among individuals.

1.5 LITERATURE REVIEW

Reviewing the literature reveals previous studies conducted within the researcher's field, offering insights into their extent. By previewing these studies, researchers gain understanding and specificity for their research problem, drawing upon theories, reports, and records from similar works. This process guides the study's direction and helps narrow down the problem, facilitating a focused approach.

1.5.1 TO IDENTIFY THE NEGATIVE EFFECTS OF JUNKFOOD AND HEALTH RISKS FACED BY PEOPLE.

• Mozaffarian, D., & Ludwig, D. S. (2010). Dietary guidelines in the 21st century—a time for food. JAMA, 304(6), 681-682. This article discusses the importance of revising dietary guidelines to address the prevalence of unhealthy eating habits, such as the excessive consumption of junk food, and their detrimental effects on health.

• Deshpande, G., Mapanga, R. F., & Essop, M. F. (2017). Frequent sugar-sweetened beverage consumption and the onset of cardiometabolic diseases: cause for concern. Journal of Endocrinology, Metabolism and Diabetes of South Africa, 22(1), 4-7. this paper examines the relationship between frequent consumption of sugar-sweetened beverages, a common component of junk food, and the onset of cardiometabolic diseases, highlighting the health risks associated with such dietary habits.

• Ludwig, D. S., Peterson, K. E., & Gortmaker S. L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. The Lancet, 357(9255), 505-508.This study investigates the association between consumption of sugar-sweetened beverages, often considered a type of junk food, and obesity, providing insights into the health risks associated with excessive sugar intake from such sources.

These articles and research papers provide valuable insights into the negative effects of junk food consumption and the health risks faced by individuals who regularly consume such foods.

1.5.2 TO IDENTIFY THE CONTRIBUTION OF PSYCOLOGICAL FACTORS IN COMSUMPTION OF JUNKFOOD AMOUNG DIFFERENT GROUPS OF INDIVIDUALS.

• Khandpur, N., & Blaine, R. E. (2019). Fisher & Kral. Eating Behaviours, 34, 101297. This study investigates the psychological factors, such as stress and emotional eating, that contribute to the consumption of junk food among different groups of individuals. It explores how these psychological factors influence eating behaviours and food choices, particularly in the context of junk food consumption.

• Gearhardt, A. N., Corbin, W. R., & Brownell, K. D. (2009). Preliminary validation of the Yale Food Addiction Scale. Appetite, 52(2), 430-436. This study introduces the Yale Food Addiction Scale, which assesses addictive-like eating behaviours towards specific foods, including junk food. It explores the psychological factors related to addictive-like eating behaviours and their contribution to junk food consumption.

• Herman, C. P., & Polivy, J. (2008). External cues in the control of food intake in humans: the sensory-normative distinction. Physiology & behaviour, 94(5), 722-728.This paper discusses the role of external cues, such as food advertising and environmental factors, in influencing food intake, including the consumption of junk food. It examines how psychological factors related to these external cues contribute to junk food consumption among different groups of individuals.

1.5.3 TO DETERMINE THE FREQUENCY AND PATTERN OF JUNKFOOD CONSUMPTION AMOUNG DIFFERENT AGE GROUPS.

•Smith, K. J., McNaughton, S. A., Gall, S. L., Blizzard, L., Dwyer, T., & Venn, A. J. (2014). Skipping breakfast: longitudinal associations with cardiometabolic risk factors in the Childhood Determinants of Adult Health Study. The American journal of clinical nutrition, 99(2), 436-444. This longitudinal study examines the associations between skipping breakfast and cardiometabolic risk factors among children, exploring patterns of junk food consumption and their implications for health outcomes in this age group.

•Bowman, S. A., Gortmaker, S. L., Ebbeling, C. B., Pereira, M. A., & Ludwig, D. S. (2004). Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. Pediatrics, 113(1), 112-118.This study examines the effects of fast-food consumption on energy intake and diet quality among children in a national household survey, providing insights into the frequency and patterns of junk food consumption among this age group.

1.5.4 TO ANALYSE THE FACTORS INFLUENCING THE PREFERENCE FOR JUNKFOOD AMONG INDIVIDUALS.

•Larsen, J. K., Hermans, R. C., Sleddens, E. F., Engels, R. C., Fisher, J. O., & Kremers, S. P. (2015) how parental dietary behaviour and food parenting practices affect children's dietary behaviour. Interacting sources of influence. Appetite, 89, 246-257. This study investigates how parental dietary behaviour and food parenting practices influence children's dietary behaviour, including

their preference for junk food. It examines the role of family environment and parental influences in shaping food preferences among children and adolescents.

•Konttinen, H., Männistö, S., Sarlio-Lähteenkorva, S., Silventoinen, K., & Haukkala, A. (2010). Emotional eating, depressive symptoms and self-reported food consumption. A population-based study. Appetite, 54(3), 473-479. This research explores the relationship between emotional eating, depressive symptoms, and self-reported food consumption, including preference for junk food. It examines how psychological factors such as emotions and mood influence food preferences and eating behaviours.

1.6 SIGNIFICANCE OF STUDY

The significance of the study lies in understanding and addressing the potential impact of unhealthy dietary habits on overall well-being. Much like the sudden shift to online learning brought about by COVID-19, the widespread consumption of junk food may have profound effects on individuals' health.

Similar to the challenges posed by emergency remote learning, the consequences of poor dietary choices extend beyond physical health to impact mental well-being. Mental health issues are recognised as a significant barrier to academic success, affecting motivation, concentration, and essential social interactions crucial for students in higher education.

Our study aims to thoroughly investigate the multifaceted influences of junk food consumption on factors such as psychological well-being, physical health, and academic performance. Through rigorous statistical analysis, we intend to elucidate the intricate relationships among these variables and overall wellness. This research is pivotal in devising evidence-based interventions and advocating for healthier practices, underscoring the responsibilities of governmental and organizational entities in promoting a healthier environment. Our objective is not only to pinpoint challenges but also to offer insights that can inform strategies aimed at improving the well-being of individuals and communities affected by the adverse effects of junk food on health.

1.7 LIMITATIONS OF STUDY

Even though the study yielded major findings, there were a few limitations in our study. The survey has been restricted to 18 or above age groups. People below the age 18 were not taken into consideration. As the sample size increases, the margin of error decreases. But due to time and other restrictions, the survey was limited to only 412 participants. Since the responses received were the personal choices of the respondents there is a chance that the data may or may not be biased.

CHAPTER 2

METHODOLOGY

2.1 METHODS

The target population for the survey was the population of age 18-24, 25-34, 35-44, 45 and above. Google form was created and circulated among the people of specified age groups to conduct the survey. The questionnaire consisting of 25 questions including age, gender was circulated. Out of 25 questions 24 were marked important. The questionnaire included questions regarding psychological, financial and health issues faced by the people.

2.2 TESTS USED FOR STUDY

2.2.1 CHI-SQUARE TEST

The Chi-Square Test is an important test among the several tests of significance. It was developed by Karl Pearson in 1990. The Chi-square Test, in general, is used to measure the difference between what is observed and what is expected according to an assumed hypothesis. Simply we can say that Chi-Square Test is a relationship between two variables. It is considered as a nonparametric test. It is mostly used to test statistical independence. For this test, the data must meet the following requirements:

- Two categorical variables.
- Relatively large sample size.
- Categories of variables (two or more).
- Independence of observations.

H_0 is the null hypothesis which represents that there is no relationship between the two variables. H_1 is the alternative hypothesis which indicates that there exists a significant relationship between the two variables. The significant level is the probability of rejecting the null hypothesis, when it is true. In most of the cases, we use significant level as 0.05. First, we create the table of observed frequency from obtained data.

$$Expected\ frequencies = \frac{(row\ total \times column\ total)}{grand\ total}$$

Then, we create the table of expected frequency, we can calculate the Chi-square value using the equation:

$$Degrees\ of\ freedom = (column\ \text{-}1) \times (row\text{-}1)$$

$$\chi2 = \frac{(observed\ value - expected\ value)^2}{expected\ value} = \sum \frac{(Oi - Ei)^2}{Ei}$$

Tabular Chi-square value can be obtained by using degrees of freedom and significance level.

Degrees of freedom refers to the maximum number of logically independent values, which are values that have the freedom to vary, in the data sample. If calculated Chi-Square is greater than tabular Chi-Square, then we reject null hypothesis and accept alternate hypothesis. A p-value is a measure of the probability that an observed difference could have occurred just by random chance. The lower the p value the greater the statistical significance of the observed difference. Smaller the p-value, smaller is the probability that we would be making mistakes by rejecting the null hypothesis. The cut-off value often used is 0.05, that is reject the hypothesis when, p-value is less than 0.05.

2.2.2 DESCRIPTIVE STATISTICS TEST

Descriptive statistics includes various formulas to calculate different measures. For example, the formula for calculating the mean (average) is the sum of all the values divided by the total number of values. The formula for calculating the median depends on whether the dataset has an odd or even number of values. To calculate the standard deviation, you need to find the difference between each value and the mean, square the differences, find the average of the squared differences, and then take the square root. There are different formulas for other measures like mode, range, and quartiles. Descriptive statistics can be done using software like Excel or statistical calculators. It's a great way to analyse and understand data in a simple and straightforward manner.

2.2.3 CORRELATION ANALYSIS

A correlation test is a statistical method that helps us understand the relationship between two variables. It tells us if there is a connection between the two variables and if so, the strength and direction of that connection. One common type of correlation test is called the Pearson correlation coefficient, or Pearson's r. It measures the linear relationship between two continuous variables. The value of Pearson's r ranges from -1 to +1.

- Positive correlation - Variables move in the same direction
- Negative correlation - Variables move in opposite directions
- Zero correlation - No correlation between the variables

To conduct a correlation test, you need a dataset with paired observations of the two variables you're interested in. You can then use statistical software or tools like Excel to calculate the correlation coefficient. This will give you an idea of how strong the relationship is between the variables. The Karl Pearson correlation coefficient is found out using the following formula

$$\gamma = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2} \times \sqrt{\sum(y - \bar{y})^2}}$$

Where γ = Correlation Coefficient

x and y are variables

$\bar{x}$ = mean of x variable

$\bar{y}$ = mean of y variable

2.2.4 ANOVA TEST

One way classification model

In one-factor analysis of variance, we focus on just one variable or factor that we control, and we observe how it affects the outcome or response of interest. This means we collect data based on only one criterion or aspect.

In one-way analysis of variance (ANOVA), we have independent samples from k populations, each with its own population mean denoted by $\mu 1, \mu 2, \mu 3, ..., \mu k$. This test is designed to evaluate whether the means of these

populations are all equal or not. The null hypothesis typically states that there is no significant difference among the means of the populations. The null hypothesis:

H0: μ1= μ2= μ3 =...= μk

Steps of one way anova test are:

1. Calculate the variance between the samples.

The sum of squares (SS) measures how much the data varies. When we talk about the sum of squares between samples, it's abbreviated as SSC. To calculate the variance between samples, we add up the squares of the differences between the average of each sample and the overall average. Then, we divide this total by the degrees of freedom.

a) Calculate Mean of each sample i.e. $\bar{X_1}=\bar{X_2}=$ ... $\bar{X_k}$

b) Calculate grand average $\bar{\bar{X}}$. Its value is obtained as follows:

$$\bar{\bar{X}} = (\bar{X_1}+\bar{X_2}+...\bar{X_k}) \,/\, (N_1+N_2+...N_k)$$

c) Take the difference between the means of the samples and grand mean.

d) square these deviations and obtain the total which will give sums of squares between the samples, and divide the total obtained by the degrees of freedom, degrees of freedom will be one less than the number of samples. In general *v=k-1*, where *k* is the number of samples.

2. Calculate the variance within the samples

The variance within the samples those inter-sample difference that arise due to chance only. It is denoted by SSE. The steps for calculating the variance within the samples are as follows:

a) Find the deviations of each observation from its sample mean.

b) Square these deviations.

c) Sum up squared deviations to get SSE.

d) Calculate the degrees of freedom $df = N\text{-}k$ (where N is total observations, k is samples).

e) Divide SSE by degrees of freedom to get variance within samples.

3. Calculate the F-ratio

F^* = *Variance between the samples / Variance within the samples*

$F^* = s_1^2 / s_2^2$

4. Compare the calculated value of F

Compare the calculated value of F with the table value of F for the given degrees of freedom at a certain level (generally we take 5% level of significance). If the calculated value of F is greater than the table value, it indicates that the difference in sample means is significant, i.e. it could not have arisen due to fluctuations of random sampling.

THE ANALYSIS OF VARIANCE TABLE

Source of variation	Sum of Squares SS	Degrees of Freedom	Mean Square MS	Variance Ratio F
Between Samples	SSC	c-1	MSC = SSC / c-1	F = MSC / MSE
Between Samples	SSE	n-c	MSE = SSE / n-c	
Total	SST	n-1		

2.3 SOFTWARE USED FOR STUDY

2.3.1 SPSS

SPSS stands for "Statistical Package for the Social Sciences." It is an IBM tool and it is officially known as IBM SPSS Statistics but most users still just refer to it as " SPSS". This tool was first launched in 1968.This is one software package. This package is mainly used for statistical analysis of the data. SPSS is mainly used in the following areas like healthcare, marketing, and educational research, market researchers, health researchers, survey companies, education research, government, marketing organizations, data miners, and many others. It provides data analysis for descriptive statistics, numeral outcome predictions, and identifying groups. This software also gives data transformation, graphing, and direct marketing features to manage data smoothly.

2.3.2 Microsoft Excel

Microsoft Excel, spreadsheet application launched in 1985 by the Microsoft Corporation. Excel is a popular spreadsheet system, which organizes data in columns and rows that can be manipulated through formulas that allow the software to perform mathematical functions on the data. It also has features like graphing tools, pivot tables and a macro programming language called Visual Basic for Applications.

CHAPTER 3

REPRESENTATION OF DATA

3.1 GRAPHICAL REPRESENTATION

Graphical representation of data is a method of showcasing numerical data that help in analysing and representing quantitative data visually using graphs, plots, and charts etc.
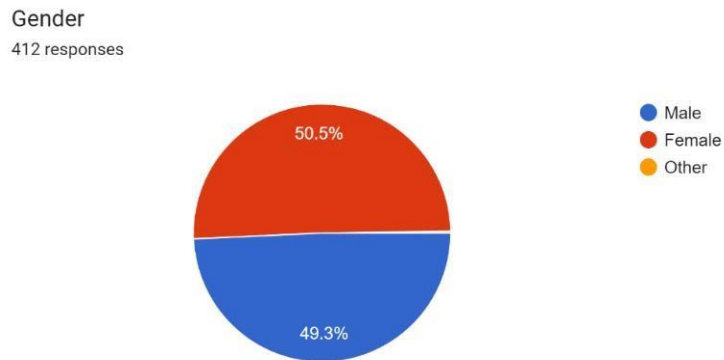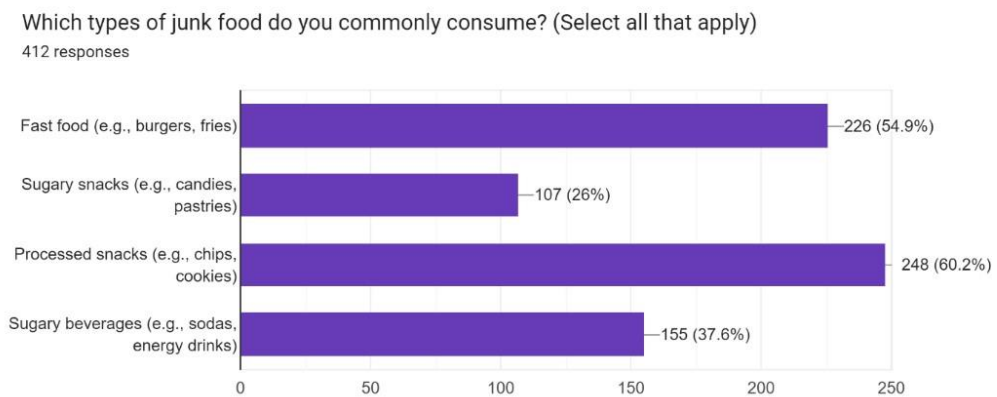

Figure 3.1

Figure 3.2

On average, how many servings of junk food do you consume per week?
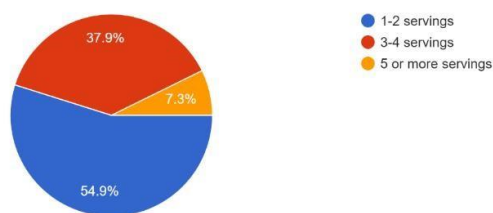412 responses

Figure 3.3

Have you been diagnosed with any health conditions?
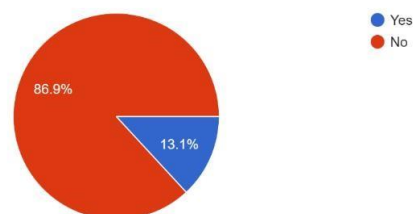412 responses

Figure 3.4

If yes, please specify the health conditions.
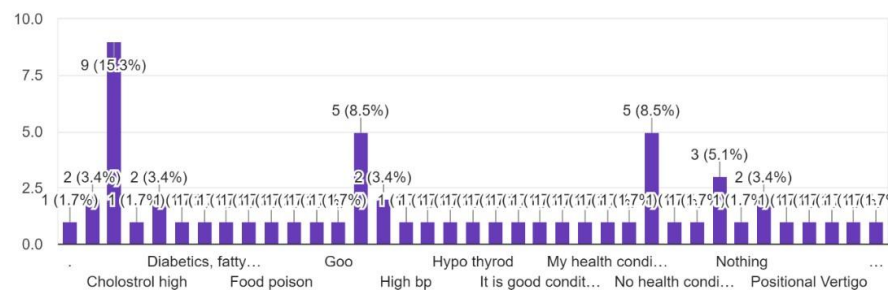59 responses

Figure 3.5

Do you believe your current health is negatively affected by your diet?
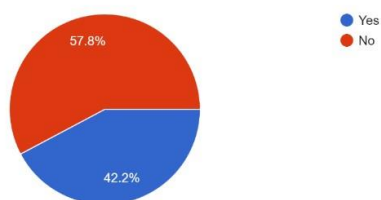412 responses

● Yes
● No

57.8%

42.2%

Figure 3.6

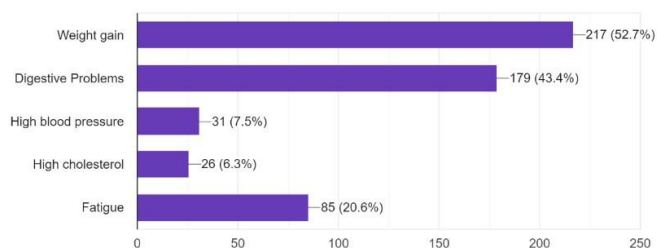Have you experienced any of the following health issues recently? (Select all that apply)
412 responses

Weight gain — 217 (52.7%)
Digestive Problems — 179 (43.4%)
High blood pressure — 31 (7.5%)
High cholesterol — 26 (6.3%)
Fatigue — 85 (20.6%)

Figure 3.7

How would you describe your overall health status?
412 responses

● Excellent
● Good
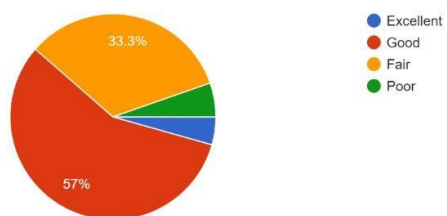● Fair
● Poor

33.3%

57%

Figure 3.8

Have you ever sought medical advice regarding your diet and its impact on your health?
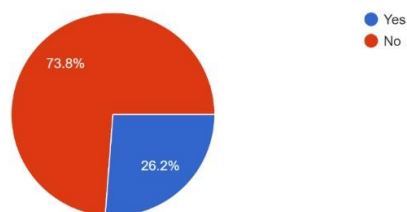412 responses

Figure 3.9

Do you think there is a link between your junk food consumption and your health?
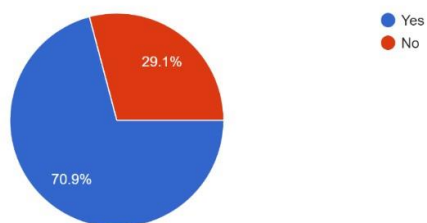412 responses

Figure 3.10

Do you have a preferred time of day for consuming junk food?
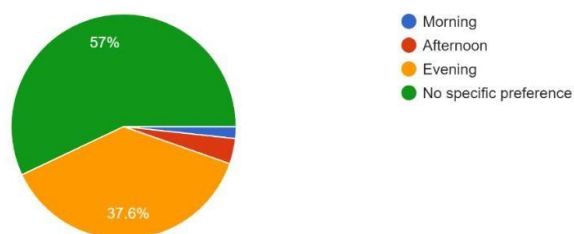412 responses

Figure 3.11

How would you rate the overall frequency of your junk food consumption?
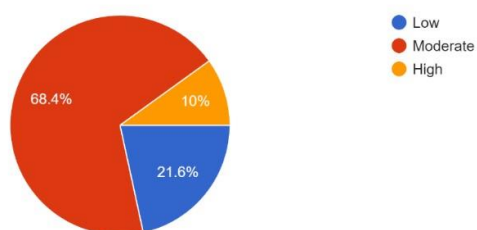412 responses

Figure 3.12

Please estimate the number of days in a week that you consume junk food.
412 responses
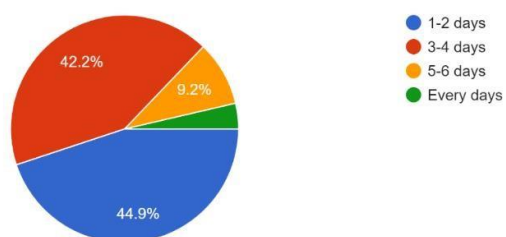
Figure 3.13

On average, how many different types of junk food do you consume in a week?
412 responses
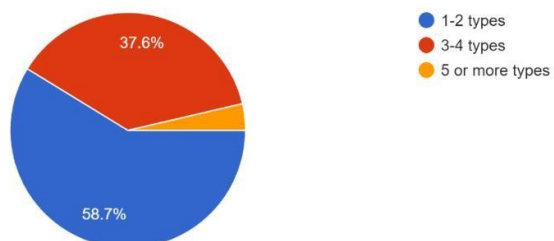
Figure 3.14
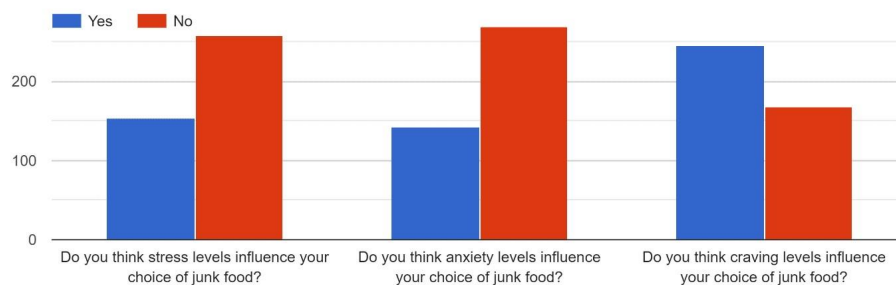
Figure 3.15

How often do you consume Junk food ?
412 responses
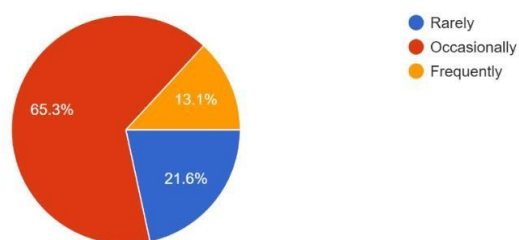
Figure 3.16

What is your annual income level?
412 responses
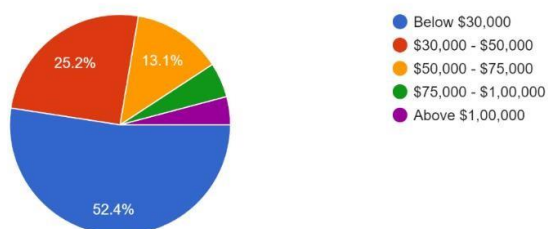
Figure 3.17

How would you categorize your lifestyle in terms of physical activities and movement?
412 responses
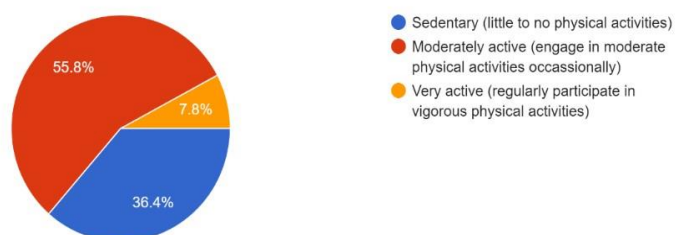
Figure 3.18

How often do you engage in intentional excercise and physical activities?
412 responses
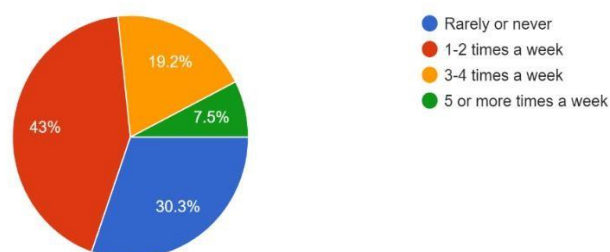
Figure 3.19

How would you describe the intensity of your typical excercise sessions?
412 responses
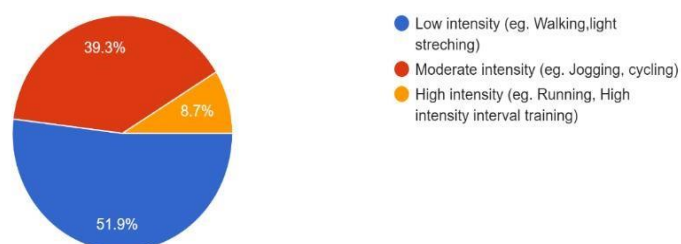
Figure 3.20

On average,how long do your exercise sessions last?
412 responses

- Less than 30 minutes
- 30 to 60 minutes
- 60 minutes or more

31.8%

13.8%

54.4%
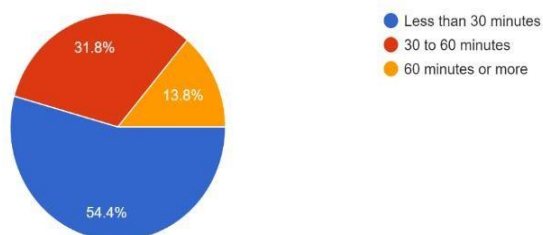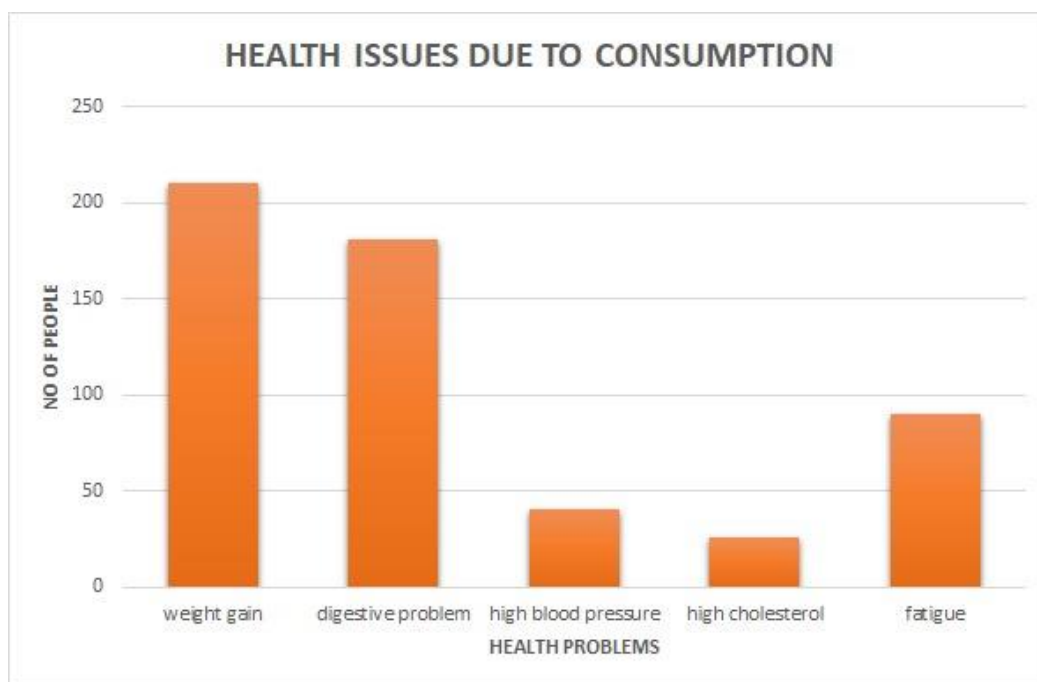
Figure 3.21

Figure 3.22

Figure 3.22 shows that weight gain and digestive problems appear to affect the highest number of individuals, followed by fatigue. High blood pressure and high cholesterol affect a smaller portion of the population but are still noteworthy.
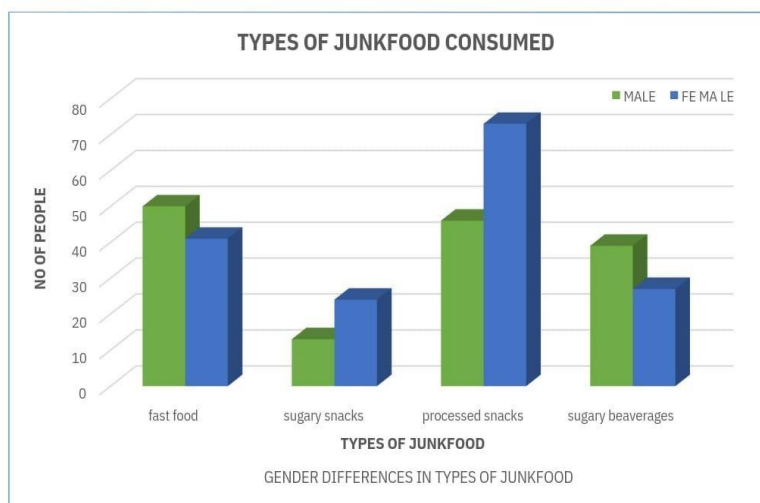
Figure 3.23

Figure 3.23 shows that both genders consume fast food and processed food at relatively high levels, females show a higher preference for sugary snacks and processed snacks compared to males.
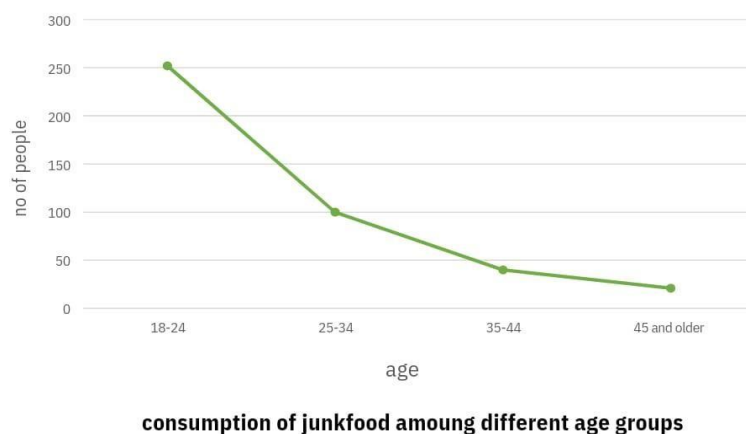
Figure 3.24

Figure 3.24 shows that younger adults, particularly those between 18 to 24, demonstrate the highest prevalence of junk food consumption, while consumption decreases progressively among older age groups.
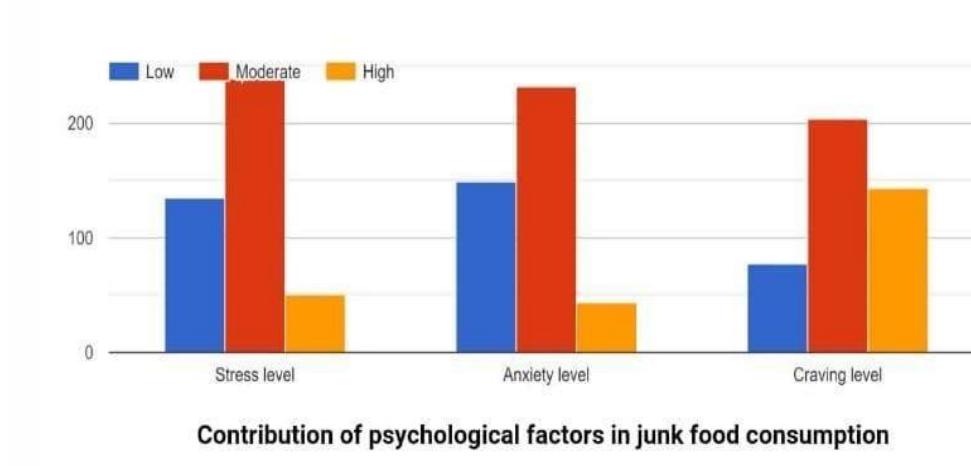
Figure 3.25

Figure 3.25 shows that stress and anxiety, particularly in moderate amounts, influence a substantial portion of individuals' junk food choices. Cravings also play a significant role, with a considerable number of individuals perceiving a high impact on their consumption behaviour.

3.2 DATA ANALYSIS

3.2.1 CHI-SQUARE TEST

3.2.1.1 JUNK FOOD V/S HEALTH RISK

1. JUNK FOOD CONSUMPTION V/S HEALTH STATUS

Health status	Excellent	Fair	Good	Poor	Total
Frequently	1	20	26	7	54
Occasionally	8	94	156	11	269
Rarely	9	23	53	4	89
Total	18	137	235	22	412

Table 3.1: Observed frequency

H_0: There is no significant association between junk food consumption and health status.

H_1: There is a significant association between junk food consumption and health status.

Significance level, α: 0.05

Health status	Excellent	Fair	Good	Poor	Total
Frequently	2.4	18.0	30.8	2.9	54.0
Occasionally	11.8	89.4	153.4	14.4	269.0
Rarely	3.9	29.6	50.8	4.8	89.0
Total	18.0	137.0	235.0	22.0	412.0

Table 3.2: Expected frequency

P value = 0.006<0.05

H_0 is rejected.

Hence there is association between junk food consumption and health status.

1. KIND OF JUNK FOOD V/S TYPES OF HEALTH ISSUE

	Weight gain	Digestive problems	High blood pressure	High cholesterol	Fatigue	Total
Fast food	42	26	3	2	14	87
Sugary snacks	28	29	5	8	10	80
Processed snacks	74	60	10	6	39	189
Sugary beverages	25	14	4	4	9	56
Total	169	129	22	20	72	412

Table 3.3: Observed frequency

H_0: There is no significant association between type of junk food consumption and the presence of certain types of health issue

H_1: There is a significant association between type of junk food consumption and the presence of certain types of health issue.

Significance level, α: 0.05

	Weight gain	Digestive problems	High blood pressure	High cholesterol	Fatigue	Total
Fast food	35.7	27.2	4.6	4.2	15.2	87.0
Sugary snacks	33.8	25.0	4.3	3.9	14.0	80.0
Processed snacks	77.5	59.2	10.1	9.2	33.0	189.0
Sugary beverages	23.0	17.5	3.0	2.7	9.8	56.0
Total	169.0	129.0	22.0	20.0	72.0	412.0

Table 3.4: Expected frequency

P value = 0.001<0.05

H_0 is rejected

Hence there is association between type of junk food consumption and the presence of certain types of health issue

3. JUNK FOOD CONSUMPTION V/S TYPES OF HEALTH ISSUE

	Weight gain	Digestive problems	High blood pressure	High cholesterol	Fatigue	Total
Frequently	12	19	7	3	13	54
Occasionally	101	75	18	18	58	270
Rarely	33	19	8	7	21	88
Total	146	113	33	28	92	412

Table 3.5: Observed frequency

H_0: There is no significant association between junk food consumption and the presence of certain types of health issues

H_1: There is a significant association between junk food consumption and the presence of certain types of health issues

Significance level, α: 0.05

	Weight gain	Digestive problems	High blood pressure	High cholesterol	Fatigue	Total
Frequently	19.1	14.8	4.3	3.6	12.1	54.0
Occasionally	95.7	74.1	21.6	18.4	60.3	270.0
Rarely	31.2	24.1	7.0	6.0	19.7	88.0

Table 3.6 Expected frequency

 P value = 0.002<0.05

H_0 is rejected.

Hence there is association between junk food consumption and the presence of certain types of health issues.

4. JUNK FOOD CONSUMPTION V/S PRESENCE OF HEALTH RISK

	No	Yes	Total
Frequently	19	35	54
Occasionally	168	101	269
Rarely	51	38	89
Total	238	174	412

Table 3.7: Observed frequency

H_0: There is no significant association between junk food consumption and presence of health risks

H_1: There is a significant association between junk food consumption and presence of health risks.

Significance level, α: 0.05

	No	Yes	Total
Frequently	31.2	22.8	54.0
Occasionally	155.4	113.6	269.0
Rarely	51.4	37.6	89.0
Total	238.0	174.0	412.0

Table 3.8: Expected frequency

P value = 0.01<0.05

H_0 is rejected.

Hence there is association between junk food consumption and presence of health risks.

3.2.1.2 AGE V/S PSYCHOLOGICAL FACTORS

1. AGE V/S ANXIETY LEVELS

Age	High	Low	Moderate	Total
18-24 years	29	96	126	251
25-34 years	6	31	63	100
35-44 years	5	10	25	40
45 and above	1	7	13	21
Total	41	144	227	412

Table 3.9: Observed frequency

H_0: There is no association between Anxiety levels within different age groups.

H_1: There is a significant association.

Significance level, α: 0.05

Age	High	Low	Moderate	Total
18-24 years	25.0	87.7	138.0	251.0
25-34 years	10.0	35.0	55.1	100.0
35-44 years	4.0	14.0	22.0	40.0
45 and above	2.1	7.3	11.6	21.0
Total	41.0	144.0	227.0	412.0

Table 3.10: Expected frequency

P = 0.222>0.05

H_0 is accepted

Hence there is no association between age and anxiety levels.

2. AGE V/S STRESS LEVELS

Age	High	Low	Moderate	Total
18-24 years	31	84	136	251
25-34 years	9	27	64	100
35-44 years	6	11	23	40
45 and above	1	8	12	21
Total	47	130	235	412

Table 3.11: Observed frequency

H_0: There is no association between stress levels within different age groups.

H_1: There is a significant association.

Significance level, α: 0.05

Age	High	Low	Moderate	Total
18-24 years	28.6	79.2	143.2	251..0
25-34 years	11.4	31.6	57.0	100.0
35-44 years	4.6	12.6	22.8	40.0
45 and above	2.4	6.6	12.0	21.0
Total	47.0	130.0	235.0	412.0

Table 3.12: Expected frequency

P value= 0.593>0.05

H_0 is accepted

Hence there is no association between stress levels within different age groups.

3. AGE V/S CRAVINGS LEVELS

Age	High	Low	Moderate	Total
18-24 years	88	46	117	251
25-34 years	36	14	50	100
35-44 years	13	8	19	40
45 and above	3	6	12	21
Total	140	74	198	412

Table 3.13: Observed frequency

H_0: There is no association between cravings levels within different age groups.

H_1: There is a significant association.

Significance level, α: 0.05

Age	High	Low	Moderate	Total
18-24 years	85.3	45.1	120.6	251.0
25-34 years	34.0	18.0	48.1	100.0
35-44 years	13.6	7.2	19.2	40.0
45 and above	7.1	3.8	10.1	21.0
Total	140.0	74.0	198.0	412.0

Table 3.14: Expected frequency

P value= 0.484>0.05

H_0 is accepted

Hence there is no association between cravings levels within different age groups.

4. AGE V/S TYPES OF JUNK FOOD

Age	Fast food	Processed snacks	Sugary beverages	Sugary snacks	Total
18-24 years	81	119	26	25	251
25-34 years	38	41	11	10	100
35-44 years	15	13	6	6	40

45 and above	6	11	2	2	21
Total	140	184	45	43	412

Table 3.15: Observed frequency

H_0: There is no association between preferences for specific types of junk food within different age groups.

H_1: There is a significant association.

Significance level, α: 0.05

Age	Fast food	Processed snacks	Sugary beverages	Sugary snacks	Total
18-24 years	85.3	112.1	27.4	26.2	251.0
25-34 years	34.0	44.7	10.9	10.4	100.0
35-44 years	13.6	17.9	4.4	4.2	40.0
45 and above	7.1	9.4	2.3	2.2	21.0
Total	140.0	184.0	45.0	43.0	412.0

Table 3.16: Expected frequency

P value= 0.838>0.05

H_0 is accepted

Hence there is no association between preferences for specific types of junk food within different age groups.

3.2.2 DISCRIPTIVE STATISTICS

1.Mean =25.822

The mean represents the average frequency of junk food consumption across all age groups. In this case, the mean frequency is approximately 25.822. This suggests that, on average, individuals in your study consume junk food about 25.822 times every month.

2.Median =22

The median is the middle value of the dataset when arranged in ascending order. In this context, the median frequency of 22 indicates that half of the individuals in the study consume junk food less than 22 times, while the other half consumes it more than 22 times every month. This statistic is less affected by extreme values than the mean.

3.Mode =20

The mode represents the most frequently occurring value in the dataset. In your case, the mode is 20, indicating that the most common frequency of junk food consumption is 20 times per month. This can provide insights into the typical behaviour within the population.

4.Standard Deviation =0.43795

The standard deviation measures the amount of variation or dispersion in a set of values. A low standard deviation (0.43795 in this case) suggests that the values are closely clustered around the mean. This indicates that there is relatively little variability in the frequency of junk food consumption across different age groups.

Overall interpretation: The descriptive statistics suggest that, on average, individuals in your study consume junk food approximately 25.822 times in a month. The distribution is relatively symmetric and cantered around 22, as indicated by the median. The most common frequency of consumption is around 20 times in a month, and there is minimal variability in the data, as reflected by the low standard deviation.

3.3.2 CORRELATION ANALYSIS

1. AGE V/S TYPE OF JUNK FOOD CONSUMPTION

	Age	Type of junk food
Age	1	0.118288952
Type of junk food	0.118288952	1

Table 3.17

r = 0.118288952

There is a weak positive relationship between age and type of junk food consumption.

2. AGE V/S FREQUENCY OF JUNK FOOD CONSUMPTION

	Age	Frequency of junk food
Age	1	0.15153
Frequency of junk food	0.15153	1

Table 3.18

r = 0.15153

There is a weak positive relationship between age and frequency of junk food consumption.

3. AGE V/S AVERAGE SERVINGS OF JUNK FOOD PER WEEK

	Age	Average Servings
Age	1	0.097392142
Average Servings	0.097392142	1

Table 3.19

r = 0.097392142

There is a weak positive relationship between age and average servings of junk food per week.

4. AGE V/S PREFERRED TIME OF DAY FOR CONSUMING JUNK FOOD

	Age	Preferred Time
Age	1	-0.075663689
Preferred Time	-0.075663689	1

Table 3.20

r = -0.075663689

There is weak negative relationship between age and preferred time of day for consuming junk food.

3.2.4 ANOVA Test

1. JUNKFOOD COMSUMPTION V/S HEALTH CONDITIONS

H_0: There is no significant difference between consumption of junk food and being diagnosed with health conditions.

H_1: There is significant difference between consumption of junk food and being diagnosed with health conditions.

Anova: One way

SUMMARY				
Groups	Count	Sum	Average	Variance
Rarely Consume	80	15	0.1875	0.154272
Occasionally Consume	263	30	0.114068	0.101443
Frequently Consume	69	10	0.144928	0.125746

Table 3.21

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.341596	2	0.170798	1.476373	0.22967987	3.017782
Within Groups	47.31617	409	0.115687			
Total	47.65777	411				

Table 3.22

P- Value = 0.230

0.230 > 0.05

H_0 is accepted

Hence, there is no significant relation between junk food consumption and being diagnosed with health conditions.

2.JUNKFOOD COMSUMPTION V/S LIFESTYLE

H_0: There is no significant difference between the junk food consumption and lifestyle in terms of physical activities.

H_1: There is significant difference between the between the junk food consumption and lifestyle in terms of physical activities.

Anova: One way

SUMMARY

Groups	Count	Sum	Average	Variance
Rarely Consume	89	145	1.629213	0.485955
Occasionally Consume	269	473	1.758364	0.310797
Frequently Consume	54	88	1.62963	0.388539

Table 3.23

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.553566	2	0.776783	2.166406	0.115901842	3.017782
Within Groups	146.6503	409	0.358558			
Total	148.2039	411				

Table 3.24

P- Value = 0.116

0.116 > 0.05

H_0 is accepted

Hence there is no significant relation between junk food consumption and lifestyle in terms of physical activities.

3. JUNKFOOD CONSUMPTION V/S INTENSITY OF EXERCISE

H_0: There is no significant difference between the junk food consumption and intensity of physical exercise.

H_1: There is significant difference between the between the junk food consumption and intensity of physical exercise.

Anova: One way

SUMMARY

Groups	Count	Sum	Average	Variance
Rarely Consume	89	127	1.426966	0.520174
Occasionally Consume	269	433	1.609665	0.350802
Frequently Consume	54	86	1.592593	0.585604

Table 3.25

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.2699	2	1.13495	2.717334	0.067243265	3.017782
Within Groups	170.8272	409	0.41767			
Total	173.0971	411				

Table 3.26

P- Value = 0.067

0.067 > 0.05

H_0 is accepted

Hence there is no significant relation between junk food consumption and intensity of physical exercise.

4. JUNK FOOD CONSUMPTION V/S DURATION OF PHYSICAL EXERCISE

H_0: There is no significant difference between the junk food consumption and duration of physical exercise.

H_1: There is significant difference between the junk food consumption and duration of physical exercise.

Anova: One way

SUMMARY

Groups	Count	Sum	Average	Variance
Rarely Consume	89	128	1.438202	0.476251
Occasionally Consume	269	450	1.672862	0.534373
Frequently Consume	54	79	1.462963	0.441999

Table 3.27

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	4.760318	2	2.380159	4.66792	0.009897807	3.017782
Within Groups	208.5479	409	0.509897			
Total	213.3083	411				

Table 3.28

P- Value = 0.010

0.010 < 0.05

H_0 is rejected.

Hence there is significant relation between junk food consumption and duration of physical exercise.

CHAPTER 4
RESULT AND CONCLUSION

4.1 RESULT

- The graph which shows the health issues due to the consumption of junk food illustrates the prevalence of various side effects associated with junk food consumption. Weight gain and digestive problems appear to affect the highest number of individuals, followed by fatigue. High blood pressure and high cholesterol affect a smaller portion of the population but are still noteworthy. This distribution highlights the significant health concerns associated with junk food consumption and the importance of promoting healthier dietary choices to reduce the health effects associated with excessive junk food consumption.

- The double bar graph showing gender differences in types of junk food highlights distinct patterns of junk food consumption between males and females. While both genders consume fast food and processed food at relatively high levels, females show a higher preference for sugary snacks and processed snacks compared to males. These findings emphasize the importance of addressing gender-specific dietary habits and promoting healthier food choices

- The graph showing the consumption of junk food among different age groups reflects a trend of decreasing junk food consumption with increasing age. Younger adults, particularly those between 18 to 24, demonstrate the highest prevalence of junk food consumption, while consumption decreases progressively among older age groups. These findings emphasize the importance of promoting healthier dietary habits, especially among younger adults, to reduce the potential health risks associated with excessive junk food consumption.

- The triple bar graph showing the contribution of psychological factors in junk food consumption illustrates that psychological factors such as stress, anxiety, and cravings contribute significantly to junk food consumption patterns. Stress and anxiety, particularly in moderate amounts, influence a substantial portion of individuals' junk food choices. Cravings also play a significant role, with a considerable number of individuals perceiving a high impact on their

consumption behaviour. These findings emphasize the importance of addressing psychological factors in promoting healthier dietary habits and reducing excessive junk food consumption.

- The study of first objective by doing chi square test revealed significant links between junk food consumption and health risks, highlighting the need for healthier dietary choices to reduce negative health impacts.

- The study second objective using chi square test showed no significant associations between psychological factors (anxiety, stress, cravings) and junk food consumption across different age groups. Additionally, there was no significant association between age groups and preferences for specific types of junk food. Therefore, psychological factors may not be significant contributors to junk food consumption among various demographic groups.

- The study of third objective using descriptive statistics and correlation analysis indicates that individuals consume junk food approximately 25.822 times per month on average, with a common frequency of 20 times monthly. The distribution is relatively symmetric and cantered around 22, as indicated by the median. Minimal variability exists across age groups in junk food consumption. Weak correlations suggest age's influence on junk food type, frequency, servings per week, and preferred time. These findings imply that while age may play a role, other factors likely contribute significantly to consumption patterns.

- The Anova test results for the fourth objective suggest that health conditions, lifestyle, and intensity of physical exercise do not significantly influence junk food consumption. However, there is a notable impact on junk food consumption concerning the duration of physical exercise. Individuals with longer durations of physical exercise show different patterns of junk food consumption compared to those with shorter exercise durations.

4.2 CONCLUSION

The statistical study on the effect of junk food consumption and health among adults" yielded diverse findings from various tests and graphs. Chi-square tests revealed significant associations between junk food consumption and health risks, underlining the necessity for healthier dietary choices. Meanwhile, the chi-square test on

psychological factors indicated no significant associations across different age groups, suggesting that demographic factors may not heavily influence junk food consumption. Descriptive statistics and correlation analysis suggested that while age may shape junk food consumption patterns, other factors likely play significant roles. The Anova test results implied that demographic factors such as health conditions, and lifestyle minimally influenced junk food consumption, with notable impact observed in the duration of physical exercise. Graphs depicting health issues associated with junk food consumption highlighted prevalent side effects like weight gain, digestive problems, fatigue, high blood pressure, and high cholesterol, emphasizing the urgency for healthier dietary choices. Gender-specific consumption patterns were evident, with females showing a higher preference for sugary snacks and beverages compared to males. Age-wise consumption trends showcased a decline in junk food consumption with increasing age, stressing the importance of promoting healthier dietary habits, especially among younger adults. A triple bar graph illustrated the significant contribution of psychological factors such as stress, anxiety, and cravings to junk food consumption patterns, underlining the need to address these factors in promoting healthier eating habits. In summary, the study provided valuable insights into the complex relationship between junk food consumption, health risks, psychological factors, and demographic influences among adults, highlighting the need for comprehensive strategies to promote healthier dietary choices and mitigate adverse health effects.

4.3 SUGGESTIONS

Based on the conclusion of "The statistical study on the effect of junk food consumption and health among adults," here are some suggestions for further exploration and action:

Deep Dive Analysis: Delve deeper into the reasons behind the significant links between junk food consumption and health risks. Investigate specific dietary components and lifestyle factors contributing to adverse health outcomes.

Longitudinal Studies: Conduct long-term studies to monitor changes in junk food consumption patterns and health outcomes over time. This approach can provide valuable insights into the cumulative effects of dietary choices on overall health.

Intervention Programs: Develop comprehensive intervention campaigns aimed at educating adults about the importance of making healthier dietary choices.

Policy Advocacy: Advocate for policy initiatives that support healthy eating habits and discourage the consumption of unhealthy junk foods. This may include advocating for regulations on food marketing, improving access to nutritious foods, and implementing nutrition education programs.

Gender-aware Approaches: Tailor intervention strategies to address gender-specific dietary patterns and preferences identified in the study. Consider factors such as cultural norms, social influences, and personal preferences in designing targeted interventions.

Age-tailored Strategies: Develop age-specific intervention programs that cater to the unique needs and preferences of different age groups. Provide age-appropriate information and resources to promote healthier dietary habits across the lifespan.

Community Engagement: Foster partnerships with local organizations, healthcare providers, and community stakeholders to promote community-wide efforts to improve dietary habits. Engage community members through collaborative initiatives, workshops, and outreach events.

Behavioural Interventions: Design behavioural intervention strategies to address psychological factors such as stress, anxiety, and cravings that influence unhealthy eating behaviours. Incorporate techniques for stress management, mindfulness, and behaviour modification to promote healthier eating habits.

By implementing these suggestions, the project can contribute to efforts aimed at promoting healthier dietary choices and improving the overall health and well-being of adults in the community.

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ANNEXURE

JUNKFOOD AND HEALTH AMONG ADULTS : A STATISTICAL STUDY

Welcome to our research project on "Study on junkfood and health among adults". We the students of 3rd year B.Sc Mathematics of St. Teresa's College(Autonomous) Ernakulam is conducting a Statistical Survey. We invite you to participate in this study, which aims to gain deeper understanding about the perspectives of people and their food choices.

Name *

Your answer

Gender *

○ Male

○ Female

○ Other

Age *

Your answer

Which types of junk food do you commonly consume? (Select all that apply) *

☐ Fast food (e.g., burgers, fries)

☐ Sugary snacks (e.g., candies, pastries)

☐ Processed snacks (e.g., chips, cookies)

☐ Sugary beverages (e.g., sodas, energy drinks)

How often do you consume junk food in a typical week? *

○ Rarely

○ Occasionally

○ Frequently

On average, how many servings of junk food do you consume per week? *

○ 1-2 servings

○ 3-4 servings

○ 5 or more servings

Have you been diagnosed with any health conditions? *

○ Yes

○ No

If yes, please specify the health conditions.

Your answer

Do you believe your current health is negatively affected by your diet? *

○ Yes

○ No

How would you describe your overall health status? *

○ Excellent

○ Good

○ Fair

○ Poor

Have you experienced any of the following health issues recently? (Select all that apply) *

☐ Weight gain

☐ Digestive Problems

☐ High blood pressure

☐ High cholesterol

☐ Fatigue

Have you ever sought medical advice regarding your diet and its impact on your health? *

○ Yes

○ No

Do you think there is a link between your junk food consumption and your health? *

○ Yes

○ No

Do you have a preferred time of day for consuming junk food? *

○ Morning

○ Afternoon

○ Evening

○ No specific preference

Please estimate the number of days in a week that you consume junk food. *

○ 1-2 days

○ 3-4 days

○ 5-6 days

○ Every days

How would you rate the overall frequency of your junk food consumption? *

○ Low

○ Moderate

○ High

On average, how many different types of junk food do you consume in a week? *

○ 1-2 types

○ 3-4 types

○ 5 or more types

Rate the following factors in your consumption *

	Low	Moderate	High
Stress level	○	○	○
Anxiety level	○	○	○
Craving level	○	○	○

*

	Yes	No
Do you think stress levels influence your choice of junk food?	○	○
Do you think anxiety levels influence your choice of junk food?	○	○
Do you think craving levels influence your choice of junk food?	○	○

How often do you consume Junk food ? *

○ Rarely

○ Occasionally

○ Frequently

What is your annual income level? *

○ Below $30,000

○ $30,000 - $50,000

○ $50,000 - $75,000

○ $75,000 - $1,00,000

○ Above $1,00,000

How would you categorize your lifestyle * in terms of physical activities and movement?

○ Sedentary (little to no physical activities)

○ Moderately active (engage in moderate physical activities occassionally)

○ Very active (regularly participate in vigorous physical activities)

How would you describe the intensity of * your typical excercise sessions?

○ Low intensity (eg. Walking,light streching)

○ Moderate intensity (eg. Jogging, cycling)

○ High intensity (eg. Running, High intensity interval training)

How often do you engage in intentional * excercise and physical activities?

○ Rarely or never

○ 1-2 times a week

○ 3-4 times a week

○ 5 or more times a week

On average,how long do your exercise * sessions last?

○ Less than 30 minutes

○ 30 to 60 minutes

○ 60 minutes or more