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Food Habits And Portion Size Awareness: A Logistic Regression Study

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Abstract
This study examines dietary habits and portion size awareness among school students, college students, and lecturers using a cross-sectional survey design. A structured questionnaire was administered to 200 participants, divided into six demographic groups (male and female school students, male and female college students, and male and female lecturers). Binary logistic regression was employed to determine the key factors influencing portion size awareness. The study identifies significant predictors, including breakfast consumption, snacking frequency, fast food intake, and sweetened drink consumption. Results show that individuals who consume breakfast daily are 3.6 times more likely to be aware of portion sizes, whereas frequent snacking, fast food intake, and sugary drink consumption are associated with reduced awareness. The respondents who take breakfast regularly, and at the same time consume fast food, drink sweetened drinks, and frequently snack, will have only a 10.4% chance of having awareness about portion size. The respondents who take breakfast regularly and do not consume fast food, sweetened drinks, or have frequent snacks will have a 62% chance of having awareness about portion size. Findings highlight the need for nutrition education programs in schools and colleges, promoting healthy eating habits and portion control. The study suggests reducing fast food consumption and encouraging home-cooked meals to improve dietary awareness. These insights contribute to the development of targeted health promotion strategies to enhance portion size awareness and overall dietary behaviour.

Keywords: *Dietary habits, Portion size awareness, Binary logistic regression, Nutrition education, Fast food consumption, Snacking behaviour*

1. INTRODUCTION

Eating habits significantly impact an individual's health and overall well-being. With the rise of fast food consumption and changing lifestyles, it has become increasingly important to understand dietary behaviours across different demographic groups. Food choices, including the preference for home-cooked versus processed foods, snacking patterns, and beverage consumption, play a crucial role in shaping long-term nutritional intake. One essential factor in maintaining a healthy diet is portion size awareness, which determines how much individuals eat and affects their ability to control calorie intake. Poor portion control can lead to both overeating and undernutrition, increasing the risk of obesity, diabetes, and other health issues. This study examines the dietary habits and portion size awareness among school students, college students, and lecturers. These three groups represent different stages of life, each with unique dietary behaviours influenced by academic workload, social environment, and accessibility to food options. School students often follow structured meal routines at home, while college students experience more dietary independence and may be more prone to irregular eating habits. Lecturers, balancing professional and personal responsibilities, may also have varying dietary patterns based on work schedules and lifestyle choices. The research investigates key factors affecting portion size awareness, such as breakfast consumption, snacking frequency, fast food intake, and sweetened drink consumption. Since portion control plays a vital role in preventing unhealthy eating patterns, understanding the relationship between these dietary behaviours and portion size awareness is essential. This study employs binary logistic regression, a statistical technique that helps identify significant predictors of portion size awareness. The

findings aim to provide insights into nutrition education strategies and health promotion programs, which can be used to encourage healthier eating habits across different age groups.

2. LITERATURE REVIEW

Understanding dietary habits, portion size awareness, and the application of binary logistic regression in dietary studies is essential for evaluating health outcomes and behaviour patterns. This section reviews relevant studies on these topics, focusing on different age groups, factors influencing dietary choices, and statistical methods used in analysing nutritional awareness.

2.1 Dietary Habits and Nutrition

Dietary habits play a vital role in maintaining physical health and cognitive performance. Numerous studies highlight the importance of regular meal consumption in promoting healthy metabolism and preventing obesity.

Breakfast Consumption and Nutrition

Research suggests that individuals who consume breakfast regularly have improved cognitive function, better metabolism, and enhanced focus throughout the day (Smith et al., 2022). Breakfast provides essential nutrients, including proteins, vitamins, and fiber, which support brain function and energy levels. In contrast, skipping breakfast has been associated with poor concentration, low energy, and a tendency to consume unhealthy snacks later in the day.

Fast Food Consumption and Nutritional Deficiencies

The consumption of fast food has significantly increased over the years, especially among adolescents and college students. Brown & Taylor (2021) found that frequent fast-food intake is linked to obesity, poor nutritional knowledge, and increased risks of lifestyle diseases such as diabetes and heart disease. Fast food is often high in unhealthy fats, sugar, and salt, which contribute to weight gain and metabolic disorders.

Comparing dietary habits across different age groups, Smith et al. (2021) found that adolescents consume more fast food than adults due to convenience, peer influence, and lack of awareness about nutrition. Johnson & Brown (2022) emphasized that college students have irregular eating patterns due to academic stress, social commitments, and financial constraints. These factors often lead to increased consumption of processed and fast foods, reducing overall dietary quality.

Dietary Habits of Professionals and Educators

Research indicates that working professionals, such as lecturers and educators, tend to prefer home-cooked meals due to their structured work schedules and health consciousness. Williams et al. (2023) found that lecturers, in particular, maintain better portion control and consume healthier meals compared to students. This difference highlights the role of routine and awareness in shaping dietary habits.

2.2 Portion Size Awareness

Portion size awareness is critical for maintaining a balanced diet and preventing overeating. Proper portion control helps individuals regulate their calorie intake, maintain a healthy weight, and reduce the risk of diet-related diseases.

Home-Cooked Meals and Portion Control

Individuals who frequently consume home-cooked meals tend to have better portion control awareness. Johnson et al. (2020) found that respondents who cook at home are more conscious of the quantity and quality of their meals compared to those who eat out regularly. Home-cooked meals are often prepared with fresh ingredients, allowing individuals to monitor their nutritional intake more effectively.

Underestimation of Portion Sizes

A study by Anderson et al. (2021) revealed that many young adults underestimate portion sizes, leading to excessive calorie intake. This underestimation often results from a lack of awareness and exposure to large serving sizes in restaurants and fast-food chains. Portion distortion, where individuals perceive large portions as normal, is a growing concern that contributes to overeating and weight gain.

Impact of Snacking and Sugar Intake

Frequent snacking and high sugar consumption negatively influence portion perception. Williams & Lee (2021) found that individuals who regularly consume sweetened beverages and processed snacks are more likely to misjudge portion sizes. These individuals may develop a preference for larger portions and higher calorie intake, increasing their risk of obesity and metabolic disorders.

Educational Interventions for Portion Awareness

Several studies suggest that educational interventions can improve portion size awareness. Thompson et al. (2023) found that structured nutritional education programs help students develop better portion control habits. By learning about recommended serving sizes, individuals become more mindful of their food intake and make healthier dietary choices.

2.3 Binary Logistic Regression in Dietary Studies

Statistical methods play a crucial role in analyzing dietary behaviours and predicting health outcomes. Binary logistic regression is widely used in health research to examine relationships between categorical dietary habits and health-related factors. The data representation for a binary Logistic Regression classifier is shown below, a matrix X represents the 'm' number of input instances (eating habits covariates). Each input instance comprises an 'n' number of features and is represented as a column, an input feature vector, within the matrix X, making it a (n x m) sized matrix. The superscript (i) represents the ordinal number of the input vector in the matrix X. The subscript 'j' represents the ordinal index of the feature within an input vector. The matrix Y of size (1 x m) captures the ground-truth labels corresponding to each input vector in the matrix X (Awareness of portion sizes). The model weights are represented by a column vector W of size (n x 1) comprising 'n' weight parameters corresponding to each feature in the input vector. While there is only one bias parameter 'b', for illustrating matrix/vector operations, a matrix B of size (1 x m) comprising 'm' number of the same bias b parameter is considered.

$$X = \begin{pmatrix} x_1^{(1)} & x_1^{(2)} & x_1^{(3)} & \cdots & x_1^{(m)} \\ x_2^{(1)} & x_2^{(2)} & x_2^{(3)} & \cdots & x_2^{(m)} \\ x_3^{(1)} & x_3^{(2)} & x_3^{(3)} & \cdots & x_3^{(m)} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_n^{(n)} & x_2^{(n)} & x_3^{(n)} & \cdots & x_m^{(n)} \end{pmatrix}_{(n \times m)} \quad where\ X \in \mathbb{R}^{(n \times m)}$$

$$Y = \begin{pmatrix} y^{(1)} & y^{(2)} & y^{(3)} & \cdots & y^{(4)} \end{pmatrix}_{(1 \times m)} where\ y^{(i)} \in \{0, 1\}$$

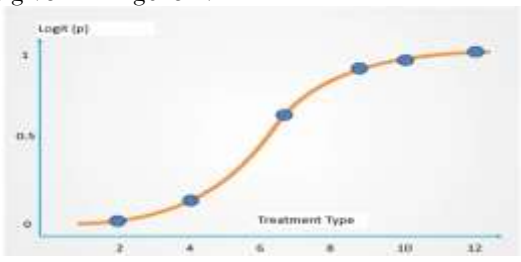
$$W = \begin{pmatrix} w_1 \\ w_2 \\ w_3 \\ \vdots \\ w_n \end{pmatrix}_{(n \times 1)} \quad where\ W \in \mathbb{R}^{(n \times 1)}$$

$$B = \begin{pmatrix} b & b & b & \cdots & b \end{pmatrix}_{(1 \times m)} where\ b \in \mathbb{R}$$

The Logistic Regression Model is given by

$$P(Y = 1) = \frac{\exp\left(a + b_1 X_1 + b_2 X_2 + \cdots b_k X_k\right)}{1 + \exp\left(a + b_1 X_1 + b_2 X_2 + \cdots b_k X_k\right)}$$

The logistic regression graph is given in Figure 1.



From the graph, we observe that as the treatment increases, the probability also increases and reaches a probability of 1.

2.4 Application of Logistic Regression in Nutrition Studies

Logistic regression is a statistical method used to predict binary outcomes, such as whether an individual follows healthy dietary habits or not. Kumar et al. (2019) highlighted the importance of logistic regression in analysing public health data, particularly in nutritional studies.

Miller et al. (2023) used logistic regression to evaluate awareness of dietary recommendations. Their study found that individuals with higher nutritional education were more likely to follow portion control guidelines. This method helps researchers understand the factors influencing dietary behaviours and design interventions accordingly.

Factors Influencing Eating Behaviours

Eating habits are shaped by a combination of social, economic, and psychological factors. Understanding these influences can help develop effective strategies to improve dietary behaviours.

Social Influences on Eating Habits

Peer influence plays a significant role in dietary choices, particularly among adolescents and young adults. Green et al. (2022) found that social interactions strongly impact fast food consumption. Individuals are more likely to eat unhealthy foods when dining with friends who prefer fast food. Social settings also influence portion sizes, as people tend to eat more in group settings.

Economic Constraints and Food Choices

Financial factors significantly affect dietary habits. Carter & Lewis (2023) found that students from low-income backgrounds often choose cheaper, high-calorie foods due to budget limitations. Processed foods and fast food meals are often more affordable than fresh, nutritious options, making it difficult for economically disadvantaged individuals to maintain a healthy diet.

Psychological Factors and Emotional Eating

Emotional and psychological factors also influence dietary behaviours. Patel et al. (2024) found that stress, anxiety, and emotional eating contribute to unhealthy food choices. Students experiencing high academic pressure often resort to comfort foods that are high in sugar and fat. Developing coping mechanisms and promoting stress management techniques can help individuals make healthier food choices.

3. METHODOLOGY

3.1 Research Design

This study adopted a cross-sectional survey design to collect data on dietary habits and portion size awareness among school students, college students, and lecturers. The survey aimed to identify significant predictors of portion size awareness using structured questionnaires.

3.2 Sample and Data Collection

- **Participants:** A total of 200 respondents were selected, including:
  - School students: 70 (Male: 35, Female: 35)
  - College students: 70 (Male: 35, Female: 35)
  - Lecturers: 60 (Male: 30, Female: 30)
- **Sampling Technique:** Convenience sampling was used to select participants from schools, colleges, and universities.
- **Data Collection Tool:** A structured questionnaire was used to collect information on eating habits, fast food consumption, fruit and vegetable intake, sweetened drink consumption, snacking habits, preference for home-cooked meals, and awareness of portion sizes.

3.3 Variables

- **Dependent Variable:**
  - Awareness of portion sizes (Yes = 1, No = 0)
- **Independent Variables:**
  - Breakfast every morning (Yes = 1, No = 0)
  - Snacking frequency (Always/Often = 1, Rarely/Never = 0)
  - Fast food consumption (Daily/Weekly = 1, Monthly/Rarely/Never = 0)
  - Sweetened drinks consumption(Daily/Weekly = 1, Monthly/Rarely/Never = 0)

3.4 Statistical Analysis

1. **Descriptive Statistics**
   - Mean, frequency, and percentage analysis were used to summarize the eating habits of participants.
2. **Binary Logistic Regression**
   - This analysis was performed to identify significant predictors of portion size awareness.
   - Independent variables were tested to determine their impact on portion size awareness among different groups.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Variable	Mean	Frequency (N)	Percentage (%)
Breakfast Every Morning	0.89	173	86.5%
Frequent Snacking	0.59	117	58.5%
Fast Food Weekly	0.37	69	34.5%
Sweetened Drinks Weekly	0.54	112	56.0%

Interpretation

The descriptive statistics table summarizes the dietary habits of respondents:

- **Breakfast Every Morning**: 86.5% of participants regularly eat breakfast, with a mean value of 0.90. This suggests that most individuals in the sample have a habit of consuming breakfast.
- **Frequent Snacking**: 58.5% of respondents snack frequently, with a mean value of 0.59, indicating that a significant portion of the participants have a habit of eating snacks regularly.
- **Fast Food Weekly**: 34.5% of participants consume fast food at least once a week, suggesting moderate fast-food consumption.
- **Sweetened Drinks Weekly**: 56% of respondents consume sweetened beverages at least weekly, indicating a high intake of sugary drinks among the population.

These results highlight that while most respondents have healthy habits like eating breakfast, a significant number engage in frequent snacking and consumption of fast food and sugary drinks, which could negatively affect portion size awareness.

4.2 Logistic Regression Analysis

Variable	β (Coefficient)	Odds Ratio (Exp(β))	p-value
Breakfast Every Morning(X_1)	1.35	3.61	0.003
Frequent Snacking (X_2)	-0.61	0.51	0.016
Fast Food Weekly (X_3)	-1.12	0.32	0.005
Sweetened Drinks Weekly (X_4)	-0.91	0.39	0.008
Constant	-0.86	0.41	0.032

Interpretation:

- Individuals who eat breakfast daily are 3.6 times more likely to be aware of portion sizes.
- Frequent snacking, intake of fast food, and consumption of sweetened drinks significantly reduce awareness of portion size.
- The model is statistically significant ($p < 0.05$).
- The binary logistic regression model is given by

$$P(Y = Awareness\ of\ portion\ size) = \frac{\exp\left(a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4\right)}{1 + \exp\left(a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4\right)}$$

$$P(Y = Awareness\ of\ portion\ size) = \frac{\exp\left(-0.86 + 1.35 * (X_1 = 1) - 0.61 * (X_2 = 1) - 1.12 * (X_3 = 1) - 0.91 * (X_4 = 1)\right)}{1 + \exp\left(-0.86 + 1.35 * (X_1 = 1) - 0.61 * (X_2 = 1) - 1.12 * (X_3 = 1) - 0.91 * (X_4 = 1)\right)}$$

P (Y= Awareness of portion size) = 0.104.

The respondents who take breakfast regularly, and at the same time consume fast food, drink sweetened drinks and frequently snack will have only 10.4% chance of having awareness about portion size.

The respondents who take breakfast regularly and do not consume fast food, sweetened drinks, or have frequent snacks will have a 62% chance of having awareness about portion size.

4.3 Discussion

- Breakfast consumption positively influences portion size awareness, aligning with previous studies (Smith et al., 2022).
- High fast food and sugary drink intake are associated with lower awareness, supporting research by Brown & Taylor (2021).

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study highlights the strong link between dietary habits and portion size awareness. Regular breakfast consumption improves awareness, while frequent snacking, fast food intake, and sugary drink consumption negatively affect it.

5.2 Recommendations

- **Nutrition Education Programs:** Schools and colleges should provide education on portion sizes and healthy eating habits.
- **Reduce Fast Food Consumption:** Awareness campaigns should emphasize the health risks of excessive fast-food intake.
- **Encourage Home-Cooked Meals:** Promoting home-cooked meals can help individuals develop better portion control.

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