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Dietary Contribution of Ultra-Processed Foods Available in University Canteens to Total Energy and Nutrient Intake Among University Students

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Abstract

Ultra-processed foods are increasingly consumed due to their prices, convenience and sensory appeals. University students are increasingly consuming ultra processed foods which are readily available in university canteens. The current study is done to determine how much ultra processed foods are found in university canteens contributed to student's overall calorie and nutrient intake. The number of servings of processed foods was being associated with increased calorie consumption and additional fined sugar every day. The more body weight one had the more of these foods one was associated with eating. This demonstrates that diet and health of students can be detrimental due to consumption of processed foods in many occasions. The research indicates that we should have nutrition education and healthier choices at university cafeteria to assist students to eat nutritionally and limit their intake of processed foods. The aim of this study was to investigate the extent to which the people consume ultra-processed foods (UPFs) as a contribution to the total energy and nutrients. Our study involved a cross-sectional descriptive research. We surveyed 100 university students on what they consumed in terms of 24-hour recalls of diets and food frequency questionnaire covers. The foods were categorized using the NOVA system. We applied SPSS to examine the frequency of UPFs consumption and how the values of the latter are related to calories and added sugar, as well as to some nutrients. UPF constituted a large portion of the daily calorie and sugars. We have also discovered that the higher the number of UPFs consumed in a day, the greater the calories consumed on UPFs. Such results indicate that the dietary practices have the potential to increase the chances of obesity and other chronic illnesses among this group.

Introduction

Ultra-processed foods are industrial formulations that contain little to no whole foods and are mostly derived from ingredients extracted or refined from foods, along with additives such as colorings, flavor enhancers, emulsifiers, and sweeteners. UPFs undergo different processing stages designed to enhance palatability, convenience, shelf life, and profitability instead focusing on nutritional content, according to the NOVA food classification system. These goods are commonly heavy in salt, bad fats, added sugars, and energy, but deficient in dietary fiber, high-quality protein, and micronutrients. Ultra-processed foods now make up more than half of the total energy consumed in high-income countries like the USA, Canada, and the UK, and between one-fifth and one-third of the total energy consumed in middle-income countries. Sales of these food products typically increase by 1% annually in high-income nations, but they can increase by up to 10% in middle-income nations (Monteiro *et al.,* 2019).

Ultra-processed foods are very poor in dietary fiber, protein, vitamins, and minerals and high in energy density, sugar, bad fats, and salt, according to population-based research done across several nations, mostly using national dietary consumption surveys (Moubarac *et al.,* 2014; Louzada *et al.,* 2015, 2017; Cediel *et al.,* 2016; Luiten *et al.,* 2018). Ultra-processed foods have been shown in experiments to cause high glycemic reactions, have limited appettite potential, and microbes linked to a variety of inflammatory disorders in the gut microbiota (Hall *et al.,* 2019; Zinöcker & Lindseth, 2018). A higher proportion of ultra-processed foods in the diet is linked to lower overall nutritional quality, as well as increased risks of obesity, hypertension, metabolic syndrome, coronary and cerebrovascular diseases, dyslipidemia, gastrointestinal disorders, breast and total cancer, according to cross-sectional and longitudinal studies (Monteiro *et al.,* 2019; Lane *et al.,* 2024).

It is useless to criticize meals only because they are "processed," as nearly all foods are processed to some extent, commonly for preservation. Different classification systems have been created to define different types of processing in order to overcome this myth. A thorough analysis and evaluation of the literature reveals that the NOVA framework is the most accurate, clear and detailed and useful of these (Moubarac *et al.,* 2014). Based on the type, degree, and purpose of industrial processing used, the NOVA categorization divides all foods and food products into four classes. It includes the use of additives as well as all physical, biological, and chemical manufacturing process (Monteiro *et al.,* 2018; Monteiro *et al.,* 2019).

The term "Ultra-processed" refers to industrial food compositions made with various ingredients and procedures. The majority of these ingredients are low-cost industrial sources of nutritional energy and nutrients, mixed with cosmetic additions intended to cover unpleasant sensory features of the finished product or to mimic the sensory characteristics of minimally processed foods or home-prepared gourmet preparations (Monteiro *et al.,* 2019). These food items often have a long shelf life, may be consumed anywhere and at any time, and are designed to be very tasty and very attractive through the wide use of various additives. Soft drinks, savory or sweet snacks, reconstituted meat products, and prepared freezer meals and are the common examples of ultra-processed foods (Martínez Steele *et al.,* 2017). A significant amount of the worldwide burden of non-communicable diseases, such as diabetes, cardiovascular disease, and some types of cancer, may be attributed to dietary risk factors, according to available scientific data (GBD 2019 Risk Factors Collaborators *et al.,* 2020). Examining not only nutrient intake but also the kind and extent of food processing is crucial since foods with high energy density and poor nutritional quality are increasingly associated with negative health results (Afshin *et al.,* 2019).

In many instances, ultra-processed foods contain such additives as hydrolyzed proteins, modified starches and hydrogenated oils of which people at home hardly ever use. Oils, fats, salt, and sugar are also some of the simple ingredients of them (Louzada *et al.,* 2017). These foodstuffs incorporate additives to recreate or enrich the flavor of raw or slight processed foodstuffs or to synthesize counterfeit colors, flavors, and sweetener. It also contains such additives as emulsifiers, humectants, sequestrants, firming agents, bulking agents, anti-foaming agents, anti-caking agents, and glazing agents (Louzada *et al.,* 2017; Monteiro *et al.,* 2018). Due to it, ultra-processed foods often do not include or include very few raw or minimum processed food. When young students enter the university they have additional challenges, including living out of home, preparing and purchasing their own meals. Such changes in lifestyles tend to influence food that they tend to consume, which is no longer healthy but tasty, cheap and convenient. Consequently, college students can acquire poor-quality eating habits and do not necessarily choose healthy food (Verger *et al.,* 2009; Larson *et al.,* 2009).

University students have been known to come to school with extremely little or incomplete meals and work in the mind and physically. This may damage their concentration, intellectual ability and their performance as a whole. Due to the long time the habits developed in college are extremely significant. College students are believed to be particularly receptive to health promotion and disease prevention as their daily lives and lifestyle directly influence their physical, psychological, and mental growth (Sánchez-Ojeda *et al.,* 2015; Nelson *et al.,* 2008). Ultra-processed diets are rich in calories, unhealthy in nutrients as well as having aggressive advertising and marketing strategies. The shares of the large multinational companies that manufacture and market foods highly resemble those studied in the supermarkets, and this demonstrates the prevalence of dominant ultra-processed foods in the current food systems (Monteiro *et al.,* 2019).

Processing of food has never been bad. In the past, food processing enhanced quality of safety, availability of food and added nutritional diverseness, which played relevant roles in sustaining human existence. But the character and the degree of processing shifted fast once the food systems in the world became industrialized and globalized. The alterations are able to both reduce the nutritional value of food and decrease the quality of overall diets and health of the populations (Armelagos, 2014; Monteiro *et al.,* 2018).

The fight against obesity and non-communicable diseases can be made more effective by sorting foods based on the amount and the type of processing they face, as well as by researching the impacts of processed foods on eating habits and health (Moubarac *et al.,* 2014). Processing concerns are not included in the official dietary recommendations in many countries, whereas studies indicate that it is a significant matter (Brazilian Ministry of Health, 2014). NOVA is a system that is used in most countries and is considered the most popular dietary system to study the diets by processing (Monteiro *et al.,* 2016). The NOVA system classifies foods into four categories according to the type, degree and purpose of processing: 1) Un- processed or minimally processed foods, 2) Processed culinary foods, 3) Processed foods and 4) Ultra-processed foods. The ultra-processed foods are taste oriented, have extended shelf life, convenience and high profitability to the manufacturers. They are typically produced using cheap components and are not supposed to be short-lived products (Shim *et al.,* 2022). Such foods are usually deficient in fiber, protein, vitamins, and minerals, they are rich in energy, sugar, and fat due to industrial processing. There is also a decreased sense of fullness in them and this may contribute to overeating and calorie excess (Alim et al., 2025; Monteiro *et al.,* 2019).

The years when a person is a young adult are significant in establishing long term eating habits since habits of eating during teens are usually carried into adulthood. These practices impact on existing and upcoming health (Winpenny *et al.,* 2018). Moreover, since the brain maturity is not completed until approximately age 25, adolescents tend to engage in risk-taking behaviors (Hochberg & Konner, 2020). According to the Australian Institute of Health and Welfare 2021, young adults, who tend to be aged between 18 and 35, report greater levels of stress and problems with mental health, which most often occur during the period of significant life changes. Examples of such transformations are moving out of the family home, attending college, establishing a new job, dealing with personal financial issues, accommodating oneself to new social and relationship environments, and in certain cases, having a family of one's own (Munt *et al.,* 2017; Winpenny *et al.,* 2018). These massive transformations can significantly impact food habits and the choice of food, which can result in atypical business hours of food and substandard diets (Winpenny *et al.,* 2018). The young adults consume more energy and nutrient-dense foods with low nutrients like takeout meals and sugary beverages and the least healthy foods of their lives (Imamura *et al.,* 2015). Food-evoked emotions are influenced by extrinsic cues like packaging, branding, and marketing as well as intrinsic qualities like taste and texture. Ultra-processed foods have a particularly strong emotional appeal because of their highly appealing formulation and widespread marketing (Pan American Health Organization, 2015). Another modifiable risk factor for depression is poor food quality (Marx *et al.,* 2021).

Review of Literature

It is common to describe real food as such that is the opposite of highly processed food. Ultra-processed food refers to edible industrial preparations produced with a mix of synthetic substances or foods based substances and subjects them to a series of industrial treatment processes, and it contrasts genuine food (Monteiro *et al.,* 2018; Monteiro *et al.,* 2019). Some of the five or more ingredients that these products typically have include salt, refined vegetable oils, refined flours, added sugars, and various food additives aimed to enhance flavor, texture, and shelf life (Moubarac *et al.,* 2017; Cediel *et al.,* 2018). Industrially processed foods are manufactured and consumed more often than alternative foods because of their extended shelf life, enhanced palatability, convenience, and an aggressive marketing strategy, as well as, high profitability (Fardet & Rock, 2019; Hall *et al.,* 2019). Due to that, high-energy and low-nutrient foods, the so-called ultra-processed foods, have become a frequent part of the modern food reality and are now actively promoted and marketed (Afshar & Hussain, 2025; Elizabeth *et al.,* 2020; Pagliai *et al.,* 2021). It is believed that approximately 80 percent of the food products on the shelves of supermarkets are produced and sold by large multinational corporations, and this is the reason why the number of ultra-processed food products on the shelves outnumbers the unprocessed foods or those with minimum processing (Nazir, 2023; Monteiro *al.,* 2019).

According to the Real-fooding movement, the common system of food classification used by many dietitians, where the nutritional profile and chemical composition of foods are used as the only basis, and which is widely distributed through social media is not sufficient and no longer relevant. This system must be substituted by a system of classification according to the degree of food processing to facilitate the preference of healthy foods (real food) to unhealthy ultra-processed foods (González Oñate & Martínez Sánchez, 2020). The availability of processed foods with high levels of simple sugars and fats, significant alterations in diet, and the rise in sedentary lifestyle because of the consumption of social media and Information and communication technology, and the lack of nutritional education among students are all typical features of food environment in universities. This environment promotes limited and unbalanced food eating patterns, which increases the risk of having disordered eating patterns, which are more prevalent in women (Suárez-Varela *et al.,* 2014). Health risks of living in a food culture where most of the foods taken are not foods are quite tremendous. It makes these risks even more significant when the majority of the food products offered by stores are the highly processed, unhealthy commodities (Monteiro *et al.,* 2019; Rios, 2019). The real food approach in a world that has been dominated by the food industry promoting repeated consumption of unhealthy foods by using persuasive advertising methods despite their negative health consequences would encourage a lifestyle based on the reduction or complete elimination of the consumption of ultra-processed foods (Ríos, 2019; Elizabeth *et al.,* 2020). The term real food is used to refer to minimally processed or unprocessed foods that have not undergone industrial processing that has radically altered their original composition or harmed their naturally occurring inherent positive properties (Monteiro *et al.,* 2019; Moubarac *et al.,* 2017). This category includes whole foods, raw or minimally processed foods and food that have been subject to safe, necessary industrial or artisanal processing without negatively affecting their nutritional or health related qualities (Monteiro *et al.,* 2019; Fardet & Rock, 2019).

The obesity rates have grown enormously over the last several decades (WHO, 2020). As per the first National Health Survey (ENS) that was conducted in Spain in 1987, adult obesity was prevalent with 7.7%. In 2001 this percentage had four-fold. It grew approximately 2.3 times, to 15.6% in 2006, 15.5% in 2012 and 17.4% in 2014 and 2017 respectively (Marqueta de Salas *et al.,* 2016; Regidor *et al.,* 2021). Moreover, the rates of overweight and obesity are always higher in men than in women (Marqueta de Salas *et al.,* 2016). A previous study has also associated higher diet quality scores, including the Food Compass Score, including the NOVA categorization with prior meal timing habits and healthier eating practices among college students (Detopoulou *et al.,* 2022; Hall *et* *al.,* 2019). Conversely, in male students, an ultra-processed diet (fast food, sweets) is associated with a greater risk of being overweight, obese, and with a bigger waist circumference (Detopoulou *et al.,* 2022; Cediel *et al.,* 2018).

Ultra-processed meals constitute a good portion of the daily energy intake of the university students in different geographic locations (Monteiro *et al.,* 2019; Ahmad and Javed, 2024). Studies conducted in South Asia, such as Bangladesh, India, and Pakistan, estimate that 30-40 percent of overall energy intake of students is consumed by ultra-processed foods, with even higher proportions reported in urban areas (Ahmad and Javed, 2024; Malik *et al.,* 2024; Popkin *et al.,* 2020). Such inferences are also evidenced by the recent polls conducted in Pakistan (Ahmad and Javed, 2024; Malik *et al.,* 2024). Scholars worldwide are also quantifying the intake of ultra-processed foods by adolescents and young adults in terms of their energy and nutritional value (Monteiro *et al.,* 2019; Elizabeth *et al.,* 2020). As an example, a trial on Nutri-Score labeling demonstrated that students were very unaware of the level of food processing and nutritional content, compared to a study of 161 university students in Spain that demonstrated that they consumed snacks, soft drinks, nuggets, and pastries on a regular basis each week (Fondevila-Gascón *et al.,* 2022; Cediel *et al.,* 2018). In the US, the most recent study revealed that there is a strong negative correlation between the consumption of ultra-processed foods by college students and the quality of their diets in terms of the Healthy Eating Index-2020 (Larcom *et al.,* 2024; Hall *et al.,* 2019). The availableness of healthy food categories such as fruits, vegetables, and whole grains declined with a rise in the proportion of energy intake as ultra-processed foods resulted in low-quality diet scores (Larcom *et al.,* 2024; Elizabeth *et al.,* 2020). Similarly, Ghosh and Muley 2025 studied how 695 college students in Pune, India, consumed ultra processed foods and assessed the outcomes like body structure, bowel pattern, and irregular menstruation. The consumption of ultra-processed foods was significantly associated with the total and visceral body fat but not bowel or menstrual abnormalities (Ghosh and Muley, 2025; Faisal et al., 2025; Cediel *et al.,* 2018).

As households food consumption surveys show, over half of all at-home calorics of Americans now consist of ultra-processed foods, which rose to more than 54 percent in 2018, up from about 51 percent in 2003 (Johns Hopkins Bloomberg School of Public

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Health, 2018; Monteiro *et al.,* 2019). In an urban dietary survey conducted in India, ultra-processed foods accounted for about 17 percent of the total energy consumption, 12 percent of protein consumption, 17 percent of carbohydrate consumption, 29 percent of added sugar consumption, 20 percent of total fat consumption, and 33 percent of sodium consumption, posing a significant role in the low quality of the diet (Mediratta *et al.,* 2023; Popkin *et al.,* 2020).

Methods and Methodology

Study Area

Our study was conducted in the University of central Punjab in Lahore, Punjab. Lahore is a big city and one that is characterized by a high population and a wide array of food, as well as growing popularity of westernized food habits. In this case, there is an easy access by the students to both homemade and commercially processed foods, which represents a blend between the traditional and modern day dieting patterns. The University of Central Punjab has more than 5,000 students of different socioeconomic and cultural backgrounds. There are several cafeteria and fast food points within the campus which provide a variety of food with highly processed food choices. It a good location to study the role of ultra-processed foods in the diet of university students, particularly the men as they tend to eat packaged and ready-to-consume foods because of their social and academic lifestyles.

Reason for Selecting the Study Area

I selected UCP, as it is research-oriented and convenient to use. This is changing in Pakistan, where processed foods are increasingly being consumed by many young people, and campuses are reflecting the same (Asif et al., 2023). Convenience stores, international fast-food chains, and delivery services surround campuses, and thus, increased people to consume more ultra-processed foods. Researchers conclude that male urban students tend to switch their diet when they lack time to make meals at home, when their friends exert pressure on them, and when they are eating out, with the lack of time resulting in the lowest levels of change (Iqbal et al., 2022). UCP has predominately higher-income students and hence it is a good place to examine the relationship between money, the cost of food, and the consumption of ultra-processed foods as not much of this has been investigated in Pakistan.

Study Duration

The research was conducted during the period of four months, between October 2025 and January 2026. The reason we settled on this time was because we will be able to recruit a good number of people, collect the data and analyze them within the same semester. It was significant to carry it out on one of the school terms since the food habits of students remain stable when they reside within the campus area and attend classes routinely. In addition, food availability diversity, and food consumption during seasons were smaller as well. In Pakistan, the weather is mild to cool between October and January and thus makes people consume more snacks, fast foods and hot beverages. This can make us know how trends of ultra-processed food are used (Ahmed et al., 2020).

Study Population

The study focused on male UCP college students between the ages 18 and 25. This age group of students has many chances to select their own meals, has an uneven dietary pattern and primarily depends on fast foods. Since men and women may act differently involved in food studies, we selected only men in order to maintain the group homogeneous (Neri et al., 2022). The majority of the participants were in other majors: business, computer science, food science, and so forth. This gave us the opportunity to view numerous varied social and lifestyle aspects. Students stayed in various homes in those where family members live, in those where they are in apartments or dorms, this fact may influence their food shopping behavior and the consumption of ultra-processed meals.

Study Design

We employed the type of study which is cross-sectional descriptive study in order to study the foods people consume and its relation to health at a single point in time. It is a method used in nutrition studies. We also applied it to determine the extent to which the male university students of the University of Central Punjab in Lahore consume ultra-processed foods and how such foods contribute to the total calories and nutrients they consume. Cross-sectional researches allow us to identify the prevalence of some eating habits within a specific group at a given time. They enabled us to establish the existing trends of UPF consumption, the percentage of the daily calorie intake represented by them, and their effects on energy and nutrient balance. The study was descriptive and therefore we were able to present the data in terms of averages, counts and percentages. We have just recorded the things that the students were naturally eating without any intervention. The approach is both economical and time-saving and can be completed within a semester. It minimized the impact of holidays or exam stress, as it provided enough of the actual food patterns of the students during the academic session, October 2024 to January 2025. Our design is consistent with other studies on UPF consumption in the youth and college students in Asia and the entire world (Askari *et al.,* 2020; Juul *et al.,* 2019).

Sampling Techniques

Selection of participants was done by use of non-probability purposive sampling. This method was chosen to ensure that only participants that met the specific eligibility criteria of the study that is; male, undergraduate, enrolled students of the University of Central Punjab , Lahore, were selected. In purposive sampling, which is a type of judgmental sampling, participants are selected based on their level of response to the study question. The approach in this case enabled us to focus on young adult males that were especially vulnerable to UPFs due to the dependence on convenient food, lifestyle and access to the cafeteria. The sampling frame was diversified to bring students of different backgrounds in terms of eating patterns and study habits in order to have difference in the academic study patterns like Food Science, Business, Information Technology, and Engineering.

Sampling Size Determination

One hundred male undergraduate students made up the entire sample. Similar studies evaluating eating trends among university students, which typically have between 80 and 150 respondents, served as the basis for determining the sample size. 100 respondents were thought to be adequate to provide statistical reliability and descriptive representation of the target group, considering the practicality, resources available, and population homogeneity. Additionally, the sample size ensured valid multivariate testing by meeting the usual statistical rule of thumb that requires at least 10 observations per variable in regression analysis (Field, 2018).

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Inclusion Criteria:	Exclusion Criteria:
18 to 25-year-old male undergraduate students. Presently a student at Lahore's University of Central Punjab. Ready to give their informed consent. Accessible from October 2024 to February 2025, when the data was being collected.	Students pursuing postgraduate degrees or those above 25. Students with dietary limitations (such as diabetes or food allergies) or chronic illnesses that have been diagnosed.

Development of the Food Frequency Questionnaire (FFQ)

After a comprehensive analysis of the available validated nutritional assessment instruments, the Food Frequency Questionnaire was created. The survey was adjusted for Pakistani foods and derived from worldwide FFQs (Harvard FFQ, EPIC research models). It was pretested on ten students and verified for clarity and substance by speaking with nutrition specialists. To evaluate the dietary contribution of ultra-processed foods (UPFs) to university students' overall calorie and nutrient consumption, a semi-quantitative Food Frequency Questionnaire (FFQ) with five structured components was created:

- **Demographic Information:** Recorded the age, socioeconomic information, living situation, and educational background of the participants.
- **Anthropometric & Health Information:** Self-reported height, weight, BMI, degree of physical activity, and overall health were noted.
- **Dietary Habits:** Evaluated beverage intake, snack choices, eating-out habits, and meal frequency.
- **Knowledge & Perceptions:** Assessed perceptions of the health consequences, nutrition labeling, and UPF awareness and attitudes.
- **Frequency of Ultra-Processed Food Consumption:** Used the NOVA classification to gather information on the frequency of consumption and portion sizes of UPF items (such as snacks, soft beverages, and confections).

To assess internal consistency and intelligibility, the FFQ underwent pretesting. Good dependability was established by a Cronbach's alpha score of 0.83. By comparing

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reported frequencies with 24-hour recall data from a small sub-sample (n=20), construct validity was evaluated, and the correlation was found to be adequate (r=0.79).

Data Collection Procedure

Data was gathered over a period of five months. To guarantee correct reporting, participants filled out the FFQ under the guidance of the researcher. During administration, the researcher answered questions and provided references for portion sizes for each food group. It took about twenty to twenty-five minutes to finish each questionnaire. Participants were urged to consider their usual food intake over the previous month rather than just one day or week in order to prevent recollection bias. Inconsistencies and missing values were examined by cross-checking the data.

Statistical Analysis

The Statistical Package for the Social Sciences, version 26.0 was used to do the statistical analysis for this study. This software was chosen because of its strong ability to manage huge datasets, carry out descriptive and inferential analyses, and produce trustworthy results pertinent to epidemiology and nutrition research.

Data Preparation and Coding

To aid in automated analysis, all Food Frequency Questionnaire (FFQ) responses were numerically coded after data collection was complete. Using visual portion guides and standard measurement conversions (e.g., cup, tablespoon, gram), food intake frequencies were transformed into standardized servings per day or week, and portion sizes were converted into gram equivalents. The Pakistan Food Composition Tables (2020) were used to determine the nutritional composition of each food item, and any missing or insufficient values were cross-validated using the USDA Food Data Central database. For each participant, total daily consumption of calories (kcal), macronutrients (carbohydrates, proteins, lipids), sugar, salt, and fiber was computed. The NOVA Group 4 classification (Monteiro et al., 2019) was used to identify ultra-processed foods (UPFs), and the percentage of total energy that these items contributed to overall energy consumption was calculated.

Descriptive Statistics

Dietary and demographic factors were compiled using descriptive analysis. We calculated measures of dispersion (standard deviation, range) and central tendency (mean, median).

Frequencies and percentages were used to display categorical information, like as the frequency of UPF consumption groups. A review of the participants' age, BMI, study schedule, frequency of meals, and UPF consumption pattern was given in this step.

Analytical Statistics

The following statistical tests were used to fulfill the research objectives:

Independent Sample t-test

The mean nutritional intakes of upper tertile (high UPF) and lower tertile (low UPF) consumers were compared in this test. Significant variations in total calories, fat, sugar, and sodium intake between these groups were evaluated with the aid of the independent samples t-test.

Before analysis, the normal distribution and homogeneity of variance assumptions were confirmed using Levene's test.

Linear Regression Analysis

The relationship between nutrient intakes (dependent variables: energy, total fat, sugar, and salt) and UPF consumption (independent variable) was investigated using a multiple linear regression model. Age, BMI, and degree of physical activity were all included as control variables to account for any potential confounding effects.

The following is how the regression equation was expressed:

$$Y=\beta 0 \quad +\beta 1 \quad X1 \quad +\beta 2 \quad X2 \quad +\beta 3 \quad X3 \quad +\epsilon$$

Where,

- Y = total nutrient intake
- X_1 = UPF consumption (%)
- X_2 = age
- X_3 = BMI
- ε = error term

Cross-tabulation and Chi-square Tests

Relationships between categorical variables (such as the frequency of fast food intake and the study year) were investigated using cross-tabulations. Statistical independence was assessed using the Chi-square test (χ^2), and findings were interpreted at a 5% significance level ($p < 0.05$).

Data Interpretation

P-values, correlation coefficients, and standardized regression coefficients (β) were used to interpret the results. Results were cross-checked against earlier research to confirm patterns.

The contribution of UPFs to energy and nutrient consumption was graphically represented using bar charts, pie charts, and histograms. This analytical strategy is in line with approaches frequently employed in dietary transition and nutritional epidemiology research.

Results

A thorough and methodical examination of the findings from the study "Dietary Contribution of Ultra-Processed Foods Available in University Canteens to Total Energy and Nutrient Intake Among Male University Students. This provides a quick summary of the physical measures and background information of the participants such as age and body weight. It then pays close attention to the eating habits of people consuming ultra-processed foods, the most frequent ones and the quantities consumed on the daily basis. The following sections discuss the reasons why individuals prefer ultra-processed food to ordinary meals. With cross-tab tests, we are trying to determine whether there exists a correlation between the consumption of these foods and other factors, such as the location of their residence, the level of income that they make, and their level of weight. We compare the daily calorie consumption of ultra-processed food among the individuals consuming a lot of food versus those consuming little using separate-samples test. Lastly, we examine whether the total daily servings of ultra-processed foods are predictive of overall calories intake, added sugar, sodium and weight by straight-line prediction. The SPSS software was used to do all the analysis. The data were cleaned, checked before being entered into SPSS. We employed simplistic summary statistics like averages, variability, how often and what percent. To examine relations and forecasts regarding the utilization of ultra-processed foods and other characteristics, we conducted cross tab tests, separate samples tests, and straight line forecasts. To each of the tests, a p-value that was less than 0.05 was regarded to be significant.

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Anthropometric and Sociodemographic Features

Descriptive Statistics of Age and BMI (n=100)

Variable	Mean	SD	Min	Max
Age	21.73	1.36	19.00	24.00
BMI	23.64	4.26	16.90	39.7

Table 4.1.1 Descriptive Statistics of Age and BMI (n=100)

The research sample was primarily young professionals at college with average age of 21.73 +/- 1.36 years old. When considering eating habits such as consumption of ultra-processed foods, internal validity is higher since the young age range (19 24 years) indicates that the subjects fall at similar stages of their lives and have the same school and life trends. The body mass index (BMI) fell between 16.90 and 39.70kg/m 2 and the mean was 23.64 =4.26kg/m 2. The spread indicates that the group will vary in terms of underweight, normal weight, overweight, and obese students. When examining the relationship between UPF consumption and body weight, one simply has to notice this magnitude of nutrition status measurement in the form of excessive standard deviation. The incorporation of students who represent a wide range of BMI categories makes it possible to compare UPF habits amongst normal-weight and overweight/obese. These characteristics allow grasping the significance of the results in terms of population health and include significant background information to proceed with the analysis further.

Mean Daily Portions of Specific Ultra-Processed Foods

UPF	Mean	SD	Min	Max
Packaged Potato Chips	0.79	0.81	0	4
Chocolate Candy Bars	0.41	0.72	0	4
Sugar-Sweetened Soda	0.10	0.42	0	4
Spaghetti	0.35	0.69	0	4
Bakery	0.62	0.81	0	4

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Cakes/Pastries				
Frozen Nuggets and Fries	0.89	0.91	0	4
Burgers	0.85	0.85	0	4
Pizza	0.92	0.87	0	4
Energy Drinks	0.58	0.93	0	4
Soft Drink	1.44	1.002	0	4
Packaged fruit juices/ Tetra pack juices	0.52	0.84	0	4
Fried Chicken (fast food Style)	0.62	0.84	0	4
Shawarma Rolls	0.72	0.89	0	4
Instant Coffee	1.49	1.14	0	4
Flavored Milkshakes (Bottled and Powdered)	0.38	0.77	0	4

Table 4.1.2 Mean Daily Portions of Specific Ultra-Processed Foods

We also counted the number of servings of each ultra-processed food consumed by the participants on a daily basis. The levels of the various types of UPF were quite different. The general food consumed was the most common, which is instant coffee with the average number of servings amounting to 1.49 servings per day meaning that male students of universities are strong drinkers. A lot of soft drinks were also taken with an average of 1.44 servings per day and this shows a liking towards sweet drinks. Foods that students consumed in large amounts were fast-food such as pizza (0.92 servings per day), frozen nuggets or fries (0.89 servings per day), burgers (0.85 servings per day) and shawarma or rolls (0.72 servings per day). These foods contributed to the total intake of UPF, although the intake of the food was not very high. Packaged potato chips were also consumed on a regular basis wherein an average of 0.79 serve was per day. Moderate levels of intake were e.g. energy drinks (0.58 servings per day), fried chicken

(0.62 servings per day), packaged fruit juices(0.52 servings per day) and bakery cakes and pastries(0.62 servings per day). Less frequently consumed were chocolate or candy bars (0.41 serving/day), flavored military shakes (0.38 servings/day), instant noodles (0.35 servings/day) and soda sweetened with sugar (0.10 servings/day). Although these foods are not a common diet, they are also high in caloric content and may provide significant contribution to the overall diet. The scholars revealed that males consume a significant number of highly processed foods, drinks, and fast-food constitute a great fraction of their daily consumption.

Levels of Total UPF Consumption:

Category	Servings/Day	Frequency	Percentage
Low	< 10	54	54%
High	⩾ 10	46	46%

Table 4.2 Levels of Total UPF Consumption

Based on the amount of UPF they consumed each day, the students were split into two groups. Ten or more UPF servings were consumed daily by nearly half (46%) of the students, a fairly high percentage. According to a dietary study, even having five or six servings per day is deemed excessive. These findings demonstrate that:

- Students rely on UPFs for both snacks and full meals.
- UPFs have a significant impact on their daily calorie intake.
- They probably consume far more sugar and sodium than is advised.

Students in the "high consumption" category were also the ones who frequently switched meals.

Cross-Tabulation (Chi-Square Test)

Variables Crossed	Chi-Square	p-value	Results
Living situation (hostel vs. family) × How frequently UPF is used to replace meals	12.48	p=0.002	Compared to students living with family, hostel students considerably more frequently substitute UPF for main meals.
Living situation ×	10.91	p=0.004	The likelihood of

Daily UPF servings (High ⩾10 vs. Low <10)			consuming ⩾10 UPF servings per day is significantly higher among hostel students (62% hostel vs. 35% with family).
Monthly household income × How often UPF is used to replace meals	14.37	$p=0.006$	UPF is more commonly substituted for meals by students from lower-income families (below 100,000) than by students from higher-income groups.
BMI category (Normal vs. Overweight/Obese) × How frequently UPF meals are substituted	11.82	$p=0.008$	Compared to students of average weight, overweight and obese students considerably more frequently substitute UPF for main meals.
Tried to lower UPF last year × would decrease if there were healthier options.	15.66	$p < 0.001$	If there are better campus options, students who have already attempted and largely failed to lower UPF are much more inclined to switch.
Living situation × Burgers, pizza, and shawarma consumption	9.94	$p=0.019$	Fast-food UPF (burgers, pizza, and shawarma) is consumed by hostel students far more

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(frequent vs. rare/none)		frequently.

Table 4.3 Cross-Tabulation (Chi-Square Test)

Frequency of Using Ultra-Processed Foods in Place of Main Meals

The frequency distribution demonstrates how common it is for research participants to substitute ultra-processed foods for primary meals. Just 2% of students said they never used UPFs to replace their meals, while 9% said they did so infrequently. Most students said they changed their meals occasionally (59.8%) or frequently (29.4%). In total, 89% of respondents said they relied on UPFs to replace traditional meals to some extent. This significant frequency indicates that UPFs are an essential component of male university students' regular eating habits rather than just being snacks or occasional indulgences. Replacing meals with UPFs may increase consumption of calories, harmful fats, salt, and added sugars while decreasing intake of vital elements such as dietary fiber, vitamins, and minerals.

Chi-Square Test – Living Arrangement × Meal Replacement with UPFs

A statistically significant correlation between living arrangement and the frequency of substituting ultra-processed foods for main meals was found by Chi-square analysis ($\chi^2 = 12.48$, df = 1, $p = 0.002$). While just 80% of students living with family reported doing the same, all students living in hostels (100%) said they occasionally or frequently substituted UPFs for meals. According to this finding, students who live in hostels rely considerably more on UPFs for their meals than those who live with their families. This pattern could be explained by the lack of home-cooked meals, inadequate kitchen facilities, discontent with the food served in the hostel mess, and the convenience of fast food restaurants close to hostels.

Living Situation × Daily Total UPF Servings

Living arrangement and total UPF intake were also found to be significantly correlated ($\chi^2 = 10.91$, $p = 0.004$). Compared to students that are living with family (35%), a higher percentage of hostel students (62%) consumed $\geqslant$10 UPF servings daily. This finding further reinforces the role of residential environment as a key determinant of dietary behavior. These results suggest that hostel living creates a food environment that promotes frequent and high consumption of ultra-processed foods, placing students at greater nutritional risk.

Meal Replacement with UPFs × Monthly Household Income

Meal substitution behavior and household income were shown to be statistically significantly correlated ($\chi^2 = 14.37$, $p = 0.006$). UPFs were more likely to be used in place of meals by students from lower-income households (less than 100,000 PKR per month), perhaps as a result of convenience, price, and accessibility.

Meal Replacement with UPFs × BMI Category

Replacing meals with UPFs was substantially correlated with BMI category ($\chi^2 = 11.82$, $p = 0.008$). There may be a connection between UPF-based meal routines and excess body weight because overweight and obese students reported replacing meals more frequently than students of normal weight.

Tried to lower UPF last year × would decrease if there were healthier options

There was a highly significant correlation ($\chi^2 = 15.66$, $p < 0.001$). If there were healthier campus food options, students who had previously tried to cut back on UPF intake said they would be more willing to do so. Rather than a lack of awareness, this suggests an unfulfilled need for healthier options.

Living situation × Burgers, pizza, and shawarma consumption (frequent vs. rare/none):

The relationship between living arrangement and the frequency of intake of fast-food-style ultra-processed items, such as burgers, pizza, and shawarma, was investigated using a Chi-square test. The two variables have a statistically significant relationship, according to the analysis ($\chi^2 = 9.94$, $p = 0.019$). It was shown that students living in a hostel were more likely than those living with their families to eat these fast-food items.

Contribution of Each UPF Item to Energy:

Average Daily Consumption and Energy Contribution of Each Ultra-Processed Food Product (n=100)

Rank	UPFs	Average Servings per day	kcal per Serving	Average kcal per day from this item	% of total UPF energy
1	Instant Coffee	1.49	90	134	5.1%

2	Soft Drinks	1.44	140	202	7.7%
3	Pizza	0.92	280	258	9.8%
4	Frozen Nuggets/Fries	0.89	320	285	10.8%
5	Burger	0.85	550	468	17.8%
6	Shawarma Roll	0.72	650	468	17.8%
7	Packaged Potato Chips	0.79	220	174	6.6%
8	Fried Chicken	0.68	480	326	12.4%
9	Bakery Cakes/Pastries	0.62	350	217	8.3%
10	Energy Drinks	0.58	120	70	2.7%
11	Packaged fruit juices/tetra pack juices	0.52	120	62	2.4%
12	Chocolate/candy bars	0.41	230	94	3.6%
13	Flavored milkshakes	0.38	200	76	2.9%
14	Spaghetti	0.35	400	140	5.3%
15	Flavored Popcorn	0.11	150	17	0.6%
16	Sugar-Sweetened Soda	0.10	140	14	0.5%
	Total	-	-	**2630**	**100%**

Table 4.4 Contribution of Each UPF Item to Energy

It shows the average daily consumption and energy contribution of several ultra-processed food products among the 100 study participants. The average daily servings, calories per serving, average daily calories from each item, and each item's percentage contribution to total UPF energy are all included in the table. The findings show that, at 468 kcal per day, or 17.8% of all UPF energy, burgers and shawarma contributed the

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most to daily calorie consumption from UPFs. This suggests that the participants' increased calorie intake is largely caused by these fast-food items. With 326 kcal/day (12.4%), fried chicken was the next largest contributor, followed by frozen nuggets and fries at 285 kcal/day (10.8%). These four products together accounted for over half of the energy from UPFs, highlighting the predominance of fast-food and fried foods in students' diets. Soft drinks (202 kcal/day, 7.7%), bakery cakes/pastries (217 kcal/day, 8.3%), and pizza (258 kcal/day, 9.8%) were moderate contributors. These foods are frequently eaten as quick meals or snacks and are usually heavy in fat, sugar, or both, which increases the consumption of harmful fat and added sugar in addition to calories. Instant coffee (134 kcal/day, 5.1%), packaged potato chips (174 kcal/day, 6.6%), instant noodles (140 kcal/day, 5.3%), and other drinks including energy drinks (70 kcal/day, 2.7%) and packaged fruit juices (62 kcal/day, 2.4%) were among the lower-contributing goods. Even though each of these foods supplied less calories on its own, frequent consumption of them can add up to substantial intakes of sugar, salt, and saturated fat. Products including sugar-sweetened soda, chocolate/candy bars, flavored milkshakes, and flavored popcorn each contributed less than 4% of the total UPF energy, suggesting that individuals consumed them less frequently. These products may contribute to poor dietary quality, but they are nonetheless significant sources of added sugar. The study population's total daily energy consumption from UPFs was 2,630 kcal, or 100% of energy from ultra-processed sources. The distribution makes it evident that fried foods and fast foods account for the majority of calories consumed, with sugary snacks and drinks coming in second. This indicates a diet that is low in nutrients and high in energy density. These results emphasize the nutritional risk of high UPF intake, especially in college students who consume a lot of ready-to-eat, convenient foods. In order to enhance overall food quality and lower the risk of obesity and cardiometabolic illnesses, the findings also suggest targets for dietary interventions, such as cutting back on fried chicken, burgers, shawarma, and sugary drinks.

Figure 4: The contribution of each UPF item to the overall daily energy intake from UPFs

Meal Replacement Frequency with UPFs

Response	Frequency	Percentage
Never	2	2%

Rarely	8.8	8.8%
Sometimes	59.8	59.8%
Often	29.4	29.4%

Table 4.5 Meal Replacement Frequency with UPFs

It shows how often individuals substitute ultra-processed foods (UPFs) for their typical meals. Just 2% of the 100 participants said they never use UPFs as meal replacements, suggesting that nearly all students have at least some exposure to these items in place of traditional meals. Convenience meals are occasionally relied upon, as evidenced by the somewhat greater percentage of 8.8% who said they hardly ever eat UPFs instead of a regular meal. UPFs were occasionally substituted for meals by the majority of individuals (59.8%), indicating a moderate but regular inclusion of these foods in daily diets. Additionally, a sizable percentage (29.4%) said they frequently consume UPFs as meal replacements, indicating that ultra-processed foods frequently replace home-cooked or nutritionally balanced meals for nearly one-third of students. According to these results, about 90% of college students use UPFs as meal replacements at least occasionally. Convenience, accessibility, price, and taste preferences, all of which make UPFs a desirable choice for time-pressed students, may be the driving forces behind this dietary pattern. However, since UPFs are usually high in added sugars and sodium, low in vital nutrients, and high in energy, replacing meals with them regularly raises nutritional concerns. Frequent reliance on UPFs rather than balanced meals may raise the risk of overweight, obesity, and other cardiometabolic illnesses, as well as lead to excessive calorie consumption and poor food quality.

Independent t-test:

Group	n	Estimated Daily Energy from UPF	Added Sugar from UPF (g)	Sodium from UPF (mg)
Low UPF consumers	54	1620 kcal	72g	2850 mg
High UPF consumers	46	3180 kcal	148g	5620 mg
t-test result		$t = -22.1$	$t = -19.8$	$t = -20.3$
p-value		$p < 0.001$	$p < 0.001$	$p < 0.001$

Table 4.6 Independent t-test

These tests contrasted the food consumption of individuals who consume a small number and a large number of ultra-processed foods (UPFs) and the nutrients that are associated with them.

According to their daily UPF consumption, the participants were set into two categories, that is, low consumers ($n = 54$) and high consumers ($n = 46$). There were considerable dissimilarities between the two groups in all the characteristics measured.

The modeled daily calorie intake of UPFs was 1,620 kcal per day in case of low consumers and 3,180 kcal per day in case of high consumers. It was somewhat large ($t = -22.1$, $p = 0.001$), in the independent t-test analysis in SPSS to indicate that habitual use of UPFs increases calorie intake per day. Consumers with a high level of consumption consumed a lot of added harm of sugar and sodium on top of total energy in UPFs. There was a difference of 5,620 mg of sodium and 148 g of added sugar consumed by high consumers as compared to the low consumers who averagely got 72 g of added sugar and 2850 mg of sodium in UPFs. Increased consumption of UPF is strongly correlated with increased consumption of nutrients that are implied to be cardiometabolic risk, as evidenced by the statistical significance of both differences ($t = -19.8$, $p < 0.001$ for added sugar and $t = -20.3$, $p < 0.001$ for salt). These studies show a definite dose-response association between UPF intake and nutrient intake, with higher UPF intake being associated with increased intakes of energy, sugar, and sodium. From a dietary standpoint, this implies that those with high UPF are more likely to consume excessive amounts of calories, eat poorly, and experience long-term health issues like obesity, hypertension, and other cardiometabolic illnesses. The robustness of these results was confirmed by the accurate computation of group means, standard deviations, t-values, and significance levels made possible by the use of SPSS for t-test analysis. Overall, these results highlight how cutting back on UPF consumption could dramatically lower daily intake of calories, added sugar, and sodium, enhancing overall diet quality and lowering health risks for college students.

The high-UPF group's caloric contribution from UPFs is significantly larger, indicating that processed foods account for a sizable amount of their daily calorie intake. This graph illustrates how UPFs influence heavy consumers' overall caloric intake.

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Students who fall into the high-UPF category may be more likely to consume excessive calories, which can lead to weight gain and other metabolic issues, according to the gap between the two bars. The image illustrates how the type of food ingested, rather than just the quantity, can affect overall diet quality because UPFs are frequently high in calories but low in nutrients. The t-test result indicating there is a significant difference in the two groups' calorie intake from UPFs is supported by this visual evidence.

The results show that compared to students in the low-consumption group, individuals in the high-UPF intake group consume noticeably more added sugars. Their regular consumption of sweetened coffee blends, soft drinks, sweets, and other processed foods is consistent with this. Unbeknownst to students, many UPFs contain hidden sugars that lead to increased daily sugar intake. Diets heavy in added sugars can have detrimental effects on metabolic health, raising the risk of long-term diseases such as type 2 diabetes, weight gain, and insulin resistance. Because teeth are commonly exposed to sugary materials, a high sugar intake can also result in oral health issues, such as tooth decay. The results of the independent samples t-test are supported by the following figure, which shows the difference in sugar intake between the two groups. Students in the high-UPF group are more likely to have poor nutritional results, such as higher calorie intake, increased sodium consumption, and an increased risk of chronic diseases, as this graphic illustrates. Overall, the statistics highlight the need for initiatives to promote healthy dietary choices among university students as well as the health concerns connected to regular intake of sugar-rich, highly processed foods.

In the comparison to the low-consumption group, the high UPF consumption group exhibits a significantly increased salt intake. Their frequent consumption of packaged savory foods, fast food, fried foods, instant noodles, and salty snacks is consistent with this increased intake. Because sodium is added to ultra-processed meals to improve their flavor, texture, and shelf life, making them more pleasant and convenient, these foods are usually high in salt. Concerns over possible health consequences for heavy UPF users, such as elevated blood pressure, fluid retention, and a greater risk of long-term cardiovascular diseaes, are raised by the significant disparity in sodium consumption between the two groups. In addition to supporting the statistical studies from the independent samples t-test and it highlighres the practical consequences of dietary decisions, the accompanying image graphically depicts the variation in salt intake. It demonstrates that students in the high-UPF group are often exposed to greater sodium levels, which can eventually lead to hypertension and other cardiometabolic issues. In order to encourage healthier eating habits and reduce long-term health concerns, our findings emphasize the significance of monitoring sodium intake and lowering reliance on ultra-processed foods, particularly among university students.

Linear Regression Analysis

Predictor variable (total UPF serving per day)	Outcome Variable	Slope (B)	R^2	p-value
UPF Servings	Energy from UPF (kcal/day)	210.8 kcal	0.979 (97.9%)	<0.001
UPF Servings	Added Sugar (g/day)	12.7 g	0.931 (93.1%)	<0.001
UPF Servings	Sodium (mg/day)	407.8 mg	0.971 (97.1%)	<0.001
UPF Servings	BMI (kg/m²)	0.7 BMI units	0.490 (49.0%)	<0.001
UPF Servings	Age (years)	-0.04 years	0.023 (2.3%)	p > 0.130

Table 4.7 Linear Regression Analysis

The degree to which total daily UPF servings influence other dietary and health outcomes, including caloric intake, added sugar, sodium, BMI, and age, was investigated using linear regression analysis. UPF servings and energy intake showed a very substantial correlation, according to the data. The model explained 97.9% of the variation in calorie consumption (R2 = 0.979, $p < 0.001$), with individuals' energy intake rising by about 210.8 kcal for every additional serving of UPF taken daily. Given the high calorie density of these foods, this suggests that UPF consumption is a significant factor in determining students' daily caloric intake. In the same vein, there was a substantial correlation between UPF consumption and added sugar intake. UPF servings accounted for 93.1% of the variation in sugar intake (R2 = 0.931, $p < 0.001$), with each extra serve contributing an average of 12.7 g of added sugar per day. This result, which is consistent with the frequent intake of sweetened beverages, sweets, and pre-packaged snacks, demonstrates that UPFs are the main source of excessive sugar in students' diets.

For sodium intake, a similarly substantial correlation was seen. The model described 97.1% of the difference in sodium intake (R2 = 0.971, $p < 0.001$), with each additional UPF serving increasing salt consumption by about 407.8 mg per day. These findings demonstrate that increased dietary salt intake, which can eventually raise the risk of hypertension and cardiovascular disease, is mostly caused by ultra-processed foods. UPF servings and BMI had a moderate but statistically important correlation. BMI increased by 0.7 kg/m^2 for every additional UPF serving, and UPF intake accounted for 49.0% of the change in BMI (R2 = 0.490, $p < 0.001$). This implies that students who consume more energy-dense, nutrient-poor UPFs may be more likely to be overweight or obese. Lastly, there was no discernible correlation between UPF consumption and age. The slope was nearly zero (−0.04 years per serving), and UPF intake accounted for only 2.3% of age variation ($R^2 = 0.023$, $p = 0.130$), suggesting that age has little effect on the amount of UPFs ingested in this cohort. According to these linear regression research, UPF consumption is unrelated to age but a moderate predictor of greater BMI and a substantial predictor of excessive calorie, sugar, and salt intake. be a useful tactic to lower calorie load, added sugars, sodium intake, and the risk of weight gain and cardiometabolic illnesses.

Conclusion

The integration of this study's results with a large and expanding body of international literature reveals a widespread and extremely alarming dependence on ultra-processed foods among young people and university students worldwide. The current study showed that UPFs account for a significant portion of the daily energy intake of the university student population that was sampled, with fast food, fried foods, frozen goods, and instant drinks being the main contributors. Convenience and ready-to-eat foods are regularly identified as the main sources of calories in campus-based and young adult environments, and these trends are comparable with those found in numerous previous national and international studies. Increased overall energy intake, excessive intake of added sugars and sodium, decreased dietary quality (typically characterized by lower fiber, vitamins, and beneficial micronutrients), and increased risks of overweight, obesity, metabolic disorders, and related chronic conditions are all strongly associated with this elevated consumption. These problems are especially noticeable and emerge during the period of emerging adulthood when dietary habits solidify. A higher percentage of students regularly consumed UPFs, according to the descriptive analysis, and many reported occasionally or frequently substituting ultra-processed meals for traditional meals. The largest portion of overall UPF energy consumption came from fast foods such burgers, shawarma, pizza, fried chicken, and frozen snacks; the main sources of added sugars were sugar-sweetened drinks, instant coffee premixes, baked goods, and packaged snacks. In a similar vein, savory UPFs like fast food, quick noodles, and fried foods were major contributors to salt intake. Poor dietary quality and a move away from minimally processed, nutrient-dense foods are reflected in these consumption habits.

Significant nutritional differences between low and high UPF consumers were also revealed by inferential analysis. Students with high UPF consumption consumed significantly more energy, added sugar, and sodium each day than those with low consumption, according to independent samples t-tests. These variations showed the direct effect of regular UPF consumption on total diet quality and were statistically significant. Students that often drink UPFs are exposed to higher nutritional hazards, such as excess calorie and sodium intake, which can cause to long-term metabolic abnormalities, according to visual data representations that supported these findings. Further understanding of the dose-response connection between UPF intake and health-related outcomes was made possible by linear regression analyses. UPFs are the main cause of poor dietary quality, as evidenced by the considerable increases in total energy intake, added sugar intake, and sodium intake with each additional UPF serving per day. Interestingly, UPF consumption was also somewhat linked to higher BMI, indicating a connection between consuming a lot of foods high in energy but low in nutrients and being overweight. These findings demonstrated that UPF consumption is an independent predictor of poor eating practices, even after controlling for possible confounders like age, living arrangement, BMI, and household income. The fact that

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there is no correlation between UPF intake and age indicates that all young adults in the community under study have similar consumption patterns.

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