Original Research Article

Impact of Nutrition Education on University Students' Eating behavior among Higher Education Institutions in Malaysia

ABSTRACT

Young adults in Malaysia are suffering from alarmingly high rates of obesity, and more than half of the students do not consume enough essential nutrients, according to Malaysian recommendations. There are indicators of links between nutrition education and eating behavior, but the results are lacking in the body of knowledge. Hence, this study is to ascertain this hypothesis. In terms of methodology, this study was conducted using a quantitative research design and was based on the opinions of 222 university students studying in the faculties or departments of food science or nutrition at two public universities and two private universities. The instrument was modified to measure the students' eating behaviors and a nutrition education program for data collection. Non-parametric statistics, descriptive statistics, the chi-square test, and the t-test were employed in the analysis. Most students were found to "strongly agree" with their nutrition education program, and they exhibited acceptable eating behaviors. There is no statistically significant link between a nutrition education program and eating behaviors in terms of the relationship between the variables. Additionally, the variation in eating behaviors between private and public universities is not noticeably different.

Keywords: Nutrition education; university student; eating behavior; dietary intake.

1. INTRODUCTION

It is becoming more widely acknowledged that the period between adolescence and young adulthood, which is primarily spent in universities, is crucial for promoting health [1]. Beginning university is a crucial time for young people to develop independence and adopt long-lasting healthy behavior patterns [2]. When young adults prepare and choose their meals for the first time, their eating patterns and dietary intake have a significant impact on their health [3]. Although once thought to be a time of the greatest health and well-being, it is well known that today's university students have unhealthy eating behaviors [4]. According to researchers, university students worldwide typically have diets that are categorized as unhealthy [2, 3].

Young people generally skip meals, especially breakfast, consume a lot of snacks, and prefer takeout fast food. They also do not consume enough fruit and vegetables, which results in a limited and unbalanced nutrient diversity [5]. In addition to finding, it difficult to sit through lengthy lectures, skipping breakfast affects students' comprehension abilities, which further contributes to poor academic performance [6]. Therefore, altering dietary practices

has an impact on young people's physical and mental health, which indirectly affects how well they perform in an educational environment [7]. Poor nutritional intake, according to Spanos and Hankey [8], is a major contributor to subpar academic performance. One of the factors would be lacking knowledge about nutritious food options, which could hurt eating behaviors and nutritional status [9].

Health-related policies and education-based social norm-changing directly affect social norms to a certain extent, which in turn influences students' healthy lifestyle behaviors. The World Health Organization (WHO) has acknowledged that the workplace is an important location for implementing population-wide interventions for health promotion [10]. It is essential to increase students' knowledge of nutrition through education to support healthy eating [11].

The potential to deliver thorough behavior modification interventions exists in educational settings, including higher education institutions (HEIs), and giving students the ability to pursue lifelong learning is the most important objective of HEIs that help students get ready for their future [12]. The performance of health promotion strategies over the long term is further supported by the facilities and equipment that are already present in these settings, along with regular opportunities to engage in healthy behaviors, such as active participation during lessons. As a result, it is acknowledged that HEIs as an organization has a significant impact on students' eating behaviors [13].

Organizations like HEIs that offer nutrition programs give students the chance to learn about and put healthy eating habits into practice. They give students the knowledge and skills they need to make decisions about their food intake, which pave the way for lifetime behaviors that promote health. According to Brener and Gowda [14], HEIs that offer nutrition programs are in a unique position to encourage healthy behaviors by making these programs available to students. Since these courses have lecturers who implement nutritional programs for their students, the purpose of selecting the context for this study was to determine whether enrollment in them would correlate with any changes in eating behavior in the students enrolled. This could be accomplished by improving their attitudes toward the subjects or their knowledge of food and nutrition [15].

Due to two factors, this study also focuses specifically on food and nutritional sciences undergraduate students at HEIs. First, students taking these classes may be more aware of the importance of healthy eating, and second, it is difficult to imagine a segment of the population gaining more knowledge about food and nutrition in the next few years. The researcher, therefore, proposed the following hypothesis: if the improved nutritional knowledge and the increased concern for a healthy diet have any effects, then these effects should be most obviously visible in nutrition and food students.

Few studies have looked at how undergraduate nutrition students feel about the courses in nutrition programs. The role of nutrition education lies somewhere between a person's set of perceptions about food and their potential behavior toward that food [16]. Inconsistent findings have been found in studies examining the link between eating behaviors and nutrition education. According to the study, nutrition education has a strong and favorable relationship with how people behave about nutrition [17]. Other researchers, however, discovered no link between nutrition instruction and making healthy food choices [18].

Given this context, it is crucial to establish healthy eating behaviors during this time because they persist into adulthood and can be very challenging to change once they are established. This makes the years spent at university a potential time for intervention [19]. Therefore, it is critical to comprehend the eating patterns of university students to advocate for policies that

will improve eating patterns among this age group. As a result, the primary objective of this study was to ascertain the state of students' eating behaviors and the connection between this program and students' eating behaviors in Malaysia.

2. LITERATURE REVIEW

Nutrition is an essential part of life. A clear connection between diet and nutrition and health can also be seen in the role that nutrition plays in day-to-day healthcare. The science of nutrition and health is known as nutrition knowledge. It has a significant impact on healthy eating behaviors that ensure nutrient needs are met throughout the life cycle [20].

Eating behaviors are important since they can influence long-term health outcomes because unhealthy eating behaviors like skipping meals, consuming foods low in nutrients, and failing to eat on time are known to cause several problems [21]. Eating behaviors combine food knowledge and skills and turn learned food knowledge and skills into routine behaviors. More specifically, the frequency with which one manages, plans, selects, prepares, and consumes food is referred to as the concept of food behavior [22]. Thus, having a basic understanding of nutrition can help people make better food choices.

According to Şanlıer et al. [23], one factor contributing to inadequate and unbalanced nutrition during adolescence is a lack of knowledge. It has been shown that despite being poorly informed about eating guidelines, people cannot prioritize nutrition when making food choices. As a result, raising people's level of education about nutrition raises their standard of living.

To convey messages about proper nutrition that should result in behavior modification, nutrition education can be provided through the organization of curricula in the classroom, in groups, or verbally to everyone, as well as the distribution of resource materials such as posters, pamphlets, and charts [24]. Food preparation, meal planning, eating a balanced diet, reading food labels, drinking healthy beverages, and snacking on healthy foods are all included in nutrition education [25]. It significantly contributes to raising public awareness and, ultimately, society's health. Therefore, offering nutritional education is intended to support and enhance healthy dietary intake within a given community or population, such as HEI students. According to recent research, increasing nutritional knowledge through education has a positive impact on eating behaviors and food preferences [26].

Improving students' nutritional knowledge, attitudes, and practices is one of the main goals of educational institutions like HEIs. Thus, considering the importance of nutritional education for individual health, raising societal awareness of this issue is crucial for overall health [27].

The community can benefit from nutritional education for students because they are more likely to make positive changes [28]. According to Contento [29], the goal of nutrition education is to help people develop the abilities, knowledge, attitudes, and behaviors that make it easier for them to make healthy food choices. It's ideal because it allows students to participate in initiatives that promote healthy eating and reinforce nutrition education messages [30].

Matvienko et al. [31] determined that taking a nutritional science course aided students in applying their knowledge of nutrition to altering their diets. In addition, Nani et al. [32] investigated how a nutrition course affected students' knowledge of nutrition and food intake. The mean knowledge score of students who had not taken a nutrition course was

significantly lower than that of students who had. This study demonstrated how better nutritional knowledge influences university students' food preferences and dietary intake.

It would seem essential for HEIs to design and suggest beneficial activities for the overall learning of the students because they are social organizations and centers of learning. Organizations have traditionally been responsible for educating students academically, but in the modern world, globalization, learning styles, knowledge society, and innovative pedagogy appear to have changed how organizations operate [33]. The organization's role as a social institution and academic organization is envisioned to be more expansive than ever. Instead of just providing academic education for students, it entrusts organizational learning with their overall well-being. Social skills and a positive outlook are developed through health education, which includes eating behaviors taught in workplaces, and are crucial for achieving optimal health. According to this theory, students who are in better health make for better learners, and students who are in poor health perform worse academically and learn less [34].

According to Rathi et al. [35], the focus of future nutrition interventions to improve nutritional knowledge among university students should include encouraging organizations to suggest nutrition courses to all students. The growing body of research suggests that to promote young people's healthy eating behaviors, nutrition and food curricula must be improved.

There is a challenge in determining the nature and strength of the correlation between eating behaviors and education among HEI students, particularly those who are studying food/nutrition sciences, despite some research showing positive correlations between healthy eating behaviors and nutrition education.

3. METHODOLOGY

The researcher can ascertain whether there is a relationship between students' eating behaviors and nutrition education programs through the quantitative design adopted for the study. In this study, information was acquired using Google Forms from a survey that was sent to students at the chosen HEIs. There was also usage of a descriptive cross-sectional quasi-experimental approach.

This study focused on the population of university students, a group typically composed of young people who are confronted by a variety of external and internal stimuli at a critical developmental time for eating behavior. The inclusion criteria required participants to be willing to participate in the study regardless of gender, nation, race, or socioeconomic background. The sample consisted of everyone who complied with the conditions. The study would exclude students who did not follow a special diet or who declined to keep taking part. Stratified sampling was used as the methodology to get the pertinent data required for this investigation. The HEIs in Malaysia that offer programs in food and nutrition sciences were the study's specific emphasis. After that, questions regarding their opinions of their nutrition education and eating behaviors were forwarded to a chosen set of students majoring in food and nutrition sciences.

3.1 Instrument

In this study, the instrument has three different subscales, including the respondents' demographics, the nutrition education program, and the eating behaviors of students. Based on previous related studies and a literature review, it was modified and developed. The respondents' demographic data included details on their gender, age, ethnicity, the field of study, and year of study. This gives background data on the students who were recruited for

the study. Based on Poobalan [36] with some modifications, the participants were asked about nutrition education in their organizations. Each of these constructs was evaluated using a 5-point Likert scale that ranged from strongly agree to strongly disagree. The EAT-II and EAT-III instruments by Neumark-Sztainer et al. [37, 38, 39, 40] were chosen to study eating behavior and meal schedules in students. Each of these constructs is estimated using a 5-point Likert scale, ranging from always to never. The survey only contained questions related to the study objectives because the questionnaires are quite long and contain variables that are not important to this research.

The validity and reliability of the instrument were also examined. Cronbach's Alpha Coefficient evaluated the instrument's reliability. A pilot study was conducted with 33 undergraduate students in the food science/nutrition department of a university in Malaysia prior to the main data collection. Students who were like the sample in the final study were chosen to participate in the pilot study. The results of the data analysis for the pilot study revealed that the nutrition education program's Cronbach's alpha was.894 and that students' eating behaviors were.784. The researcher concluded that the instrument created for this research displayed a very good level of internal consistency considering the results of this reliability test.

3.2Data Analysis

In the current study, descriptive statistics were employed to highlight the key features of the data. Descriptive statistics compute the response frequency, mean, and standard deviation for each variable. Additionally, Chi-Square tests were employed to look at the connection between the nutrition education program and students' eating patterns. A T-test was conducted to see if there are any differences in students' eating behaviors between private and public institutions.

4. RESULTS

4.1Demographic Characteristics of Participants

The participants were undergraduate students who were studying food science/nutrition courses from 2 public and 2 private universities. Of the 246 returned, 24 students had a special diet that was rejected, which left 222 responses suitable for the final analysis. All the questionnaires were returned and completed.

All genders (males and females) were represented in the research sample. According to frequency analysis, there were 192 women and 30 men among the respondents in this study who were enrolled in programs. The increased number of women attending tertiary institutions may be responsible for the higher rate of female participation [41]. According to a recent report from Malaysia, the ratio of female to male students has risen to a current value of 65:35 [42], and the same pattern is thought to exist in other nations.

Most of the respondents who studied as undergraduate students were between the ages of 21 and 25. According to the analysis, respondents included students from various ethnic backgrounds. Many of them (44.14%) were Malay and Chinese, followed by others (9.46%) and Indian (2.25%). Additionally, the students ranged in a year from first to fourth. According to the data, 50 respondents (22.52%) were first-year respondents; 75 respondents (33.78%) were second-year respondents; 63 respondents (28.38%) were third-year respondents; 31 respondents (13.96%) were fourth-year respondents; and the remaining three respondents (1.35%) were higher-than-fourth respondents.

Moreover, the findings revealed that 62.61% of students live off-campus with their parents, 8.56% live off-campus without their parents, and 28.38% of students live on campus. 0.4% of students chose the other as their place to live. Tables 1 and 2 show the questionnaire used in this study.

Table 1. Nutrition education

Variable	Items
Nutrition Education	N1. I learned from my lecturers how to eat a healthy diet. N2. I learned from my lecturers to cut down on processed/ salty/added sugar/fatty foods. N3. I learned from my lecturers to eat more fruits/vegetables/whole grains/water. N4. I learned from my lecturers that unhealthy eating leads to disease (cancer, blood pressure, diabetes, etc.). N5. The courses of food/nutrition have not changed my attitudes about healthy foods in my daily life. N6. I learned from my lecturers that healthy eating is good for my health. N7. More information on how to eat a healthy diet would help me to buy more healthy food. N8. More opportunities to learn how to cook would help me to buy more healthy food. N9. I learned from my lecturers how to interpret the nutritional information on food labels. N10. Knowing the nutritional information of the foods I consume affects what I eat. N11. I learned from my lecturers how to use nutrition knowledge in actual life. N12. I am satisfied with the quality of my nutrition education.

Table 2. Students' eating behavior

Variable	Items
Students Eating Behavior	E1. How often do you eat breakfast? E2. How often do you eat lunch? E3. How often do you eat dinner? E4. How often do you eat something from a fast-food restaurant (like McDonald's, Burger King, etc.)? E5. How often do you eat at least two servings of fruit? E6. How often do you eat at least three servings of vegetables? E7. How often do you eat at least three servings of dairy products (e.g., milk, cheese, yogurt)? E8. How often do you eat at least three servings of whole grains (e.g., whole wheat bread, cereals, etc.)? E9. How often do you cook or eat a self-prepared meal? E10. How often do you eat regular meals (breakfast, lunch, and dinner) at about the same time? E11. How often do you eat snacks (e.g., Potato chips/other

	snack foods)? E12. How often do you drink soda drinks (e.g., Coke, etc.)? E13. How often do you drink 100% fruit juices such as orange juice, apple juice, etc. (Do not count sports drinks or other fruit-flavored drinks.)? E14. How often do you eat processed foods?

4.2Nutrition Education Program

4.2.1 Descriptive Statistics

Table 3 shows descriptive statistics of the nutrition education program. From the results in Table 3, overall, the findings indicate that students believed their nutrition education program to be appropriate because they are consistent across all four universities and are equivalent to responses of "stronglyagree" on the Likert scale.

Table 3. Descriptive statistics of nutrition education program

University	Item	Minimum	Maximum	Mean	SD
GU1 (N=98)	N1	1.00	4.00	1.65	0.76
	N2	1.00	4.00	1.58	0.72
	N3	1.00	4.00	1.54	0.72
	N4	1.00	4.00	1.38	0.62
	N5	1.00	5.00	3.10	1.33
	N6	1.00	4.00	1.40	0.62
	N7	1.00	4.00	1.59	0.73
	N8	1.00	4.00	1.66	0.73
	N9	1.00	5.00	1.36	0.63
	N10	1.00	3.00	1.46	0.56
	N11	1.00	4.00	1.48	0.65
	N12	1.00	4.00	1.70	0.72
PU1 (N=34)	N1	1.00	5.00	1.94	0.92
	N2	1.00	5.00	1.76	0.92
	N3	1.00	5.00	1.71	0.97
	N4	1.00	5.00	1.65	0.95
	N5	1.00	5.00	3.32	1.09
	N6	1.00	4.00	1.62	0.78
	N7	1.00	4.00	1.68	0.77
	N8	1.00	4.00	1.79	0.84
	N9	1.00	4.00	1.59	0.70
	N10	1.00	4.00	1.65	0.69
	N11	1.00	3.00	1.71	0.58
	N12	1.00	3.00	1.71	0.68
GU2 (N=55)	N1	1.00	3.00	1.53	0.60
	N2	1.00	3.00	1.45	0.54
	N3	1.00	3.00	1.33	0.51
	N4	1.00	3.00	1.33	0.51
	N5	1.00	5.00	3.35	1.22
	N6	1.00	3.00	1.40	0.53

	N7	1.00	3.00	1.75	0.67
	N8	1.00	3.00	1.69	0.66
	N9	1.00	4.00	1.38	0.59
	N10	1.00	3.00	1.42	0.57
	N11	1.00	2.00	1.44	0.50
	N12	1.00	4.00	1.71	0.81
	N1	1.00	4.00	1.54	0.78
	N2	1.00	3.00	1.60	0.69
	N3	1.00	2.00	1.29	0.46
	N4	1.00	3.00	1.40	0.60
	N5	1.00	5.00	3.49	1.40
PU2	N6	1.00	2.00	1.31	0.47
(N=35)	N7	1.00	3.00	1.63	0.73
	N8	1.00	4.00	1.71	0.86
	N9	1.00	4.00	1.49	0.78
	N10	1.00	3.00	1.46	0.61
	N11	1.00	2.00	1.43	0.50
	N12	1.00	3.00	1.71	0.79

**GU1 and GU2: Public Universities; PU1 and PU2: Privat Universities*

4.2.2The State of Nutrition Education Program

Table 4 displays the responses from students regarding the program of nutrition education. Table 4 shows that in four universities, most students chose "strongly agree" as their response to each of the nutrition education program's questions, followed by "agree."

Table 4. The state of nutrition education program (%)

		Nutrition Education Program				
Item	**University**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
	GU1	49.0	39.8	8.2	3.1	0.00
	PU1	32.4	50.0	11.8	2.9	2.9
N1	GU2	52.7	41.8	5.5	0.00	0.00
	PU2	60.0	28.6	8.6	2.9	0.00
	Total	49.1	40.1	8.1	2.3	0.5
	GU1	53.1	37.8	7.1	2.0	0.00
	PU1	44.1	44.1	5.9	2.9	2.9
N2	GU2	56.4	41.8	1.8	0.00	0.00
	PU2	51.4	37.1	11.4	0.00	0.00
	Total	52.3	39.6	6.3	1.4	0.5
	GU1	57.1	33.7	7.1	2.0	0.00
N3	PU1	52.9	32.4	8.8	2.9	2.9
	GU2	69.1	29.1	1.8	0.00	0.00

	PU2	71.4	28.6	0.00	0.00	0.00
	Total	61.7	31.5	5.0	1.4	0.5
N4	GU1	68.4	26.5	4.1	1.0	0.00
	PU1	55.9	32.4	5.9	2.9	2.9
	GU2	69.1	29.1	1.8	0.00	0.00
	PU2	65.7	28.6	5.7	0.00	0.00
	Total	66.2	28.4	4.1	0.9	0.5
N5	GU1	16.3	17.3	22.4	27.6	16.3
	PU1	5.9	23.5	8.8	55.9	5.9
	GU2	12.7	10.9	18.2	45.5	12.7
	PU2	11.4	17.1	14.3	25.7	31.4
	Total	13.1	16.7	18.0	36.0	16.2
N6	GU1	66.3	28.6	4.1	1.0	0.00
	PU1	52.9	35.3	8.8	2.9	0.00
	GU2	61.8	36.4	1.8	0.00	0.00
	PU2	68.6	31.4	0.00	0.00	0.00
	Total	63.5	32.0	3.6	0.9	0.00
N7	GU1	54.1	33.7	11.2	1.0	0.00
	PU1	47.1	41.2	8.8	2.9	0.00
	GU2	38.2	49.1	12.7	0.00	0.00
	PU2	51.4	34.3	14.3	0.00	0.00
	Total	48.6	38.7	11.7	0.9	0.00
N8	GU1	48.0	38.8	12.2	1.0	0.00
	PU1	41.2	44.1	8.8	5.9	0.00
	GU2	41.8	47.3	10.9	0.00	0.00
	PU2	51.4	28.6	17.1	2.9	0.00
	Total	45.9	40.1	12.2	1.8	0.00
N9	GU1	69.4	27.6	2.0	0.00	1.0
	PU1	50.0	44.1	2.9	2.9	0.00
	GU2	65.5	32.7	0.00	1.8	0.00
	PU2	62.9	31.4	0.00	5.7	0.00
	Total	64.4	32.0	1.4	1.8	0.5
N10	GU1	57.1	39.8	3.1	0.00	0.00
	PU1	44.1	50.0	2.9	2.9	0.00
	GU2	61.8	34.5	3.6	0.00	0.00
	PU2	60.0	34.3	5.7	0.00	0.00
	Total	56.8	39.2	3.6	0.5	0.00
N11	GU1	59.2	34.7	5.1	1.0	0.00
	PU1	35.3	58.8	5.9	0.00	0.00

	GU2	56.4	43.6	0.00	0.00	0.00
	PU2	57.1	42.9	0.00	0.00	0.00
	Total	54.5	41.9	3.2	0.5	0.00
N12	GU1	43.9	42.9	12.2	1.0	0.00
	PU1	41.2	47.1	11.8	0.00	0.00
	GU2	49.1	32.7	16.4	1.8	0.00
	PU2	48.6	31.4	20.0	0.00	0.00
	Total	45.5	39.2	14.4	0.9	0.00

**GU1 and GU2: Public Universities; PU1 and PU2: Privat Universities*

4.3Students' Eating Behavior

4.3.1 Descriptive Statistics

The descriptive summary for the responses to the variable items was calculated, as shown in Table 5, to determine the mean and standard deviation. The findings show that participants received a suitable diet because it is clear from the data that they favor healthy foods over unhealthy ones. Based on a Likert scale, it displays "always" and "often" for healthy foods.

Table 5. Descriptive statistics of students' eating behavior

University	Item	Minimum	Maximum	Mean	SD
GU1 (N=98)	E1	1.00	4.00	1.92	1.00
	E2	1.00	4.00	1.33	0.64
	E3	1.00	4.00	1.54	0.83
	E4	2.00	4.00	3.14	0.57
	E5	1.00	4.00	2.69	0.85
	E6	1.00	4.00	2.33	0.95
	E7	1.00	5.00	2.82	1.00
	E8	1.00	5.00	2.34	1.00
	E9	1.00	5.00	2.49	1.15
	E10	1.00	5.00	2.32	1.06
	E11	1.00	4.00	3.05	0.84
	E12	1.00	5.00	3.76	0.76
	E13	1.00	5.00	3.49	0.79
	E14	1.00	4.00	2.83	0.77
PU1 (N=34)	E1	1.00	4.00	2.18	1.03
	E2	1.00	3.00	1.26	0.57
	E3	1.00	4.00	1.59	0.96
	E4	2.00	5.00	3.35	0.69
	E5	1.00	4.00	2.68	0.98
	E6	1.00	4.00	2.50	0.83
	E7	1.00	4.00	2.53	0.86

	E8	1.00	4.00	2.41	0.99
	E9	1.00	5.00	2.24	1.05
	E10	1.00	4.00	2.65	0.98
	E11	1.00	4.00	3.06	0.89
	E12	2.00	5.00	3.59	0.78
	E13	2.00	5.00	3.44	0.79
	E14	1.00	4.00	2.62	0.74
GU2 (N=55)	E1	1.00	4.00	1.96	0.90
	E2	1.00	3.00	1.27	0.49
	E3	1.00	4.00	1.62	0.80
	E4	2.00	4.00	3.16	0.69
	E5	1.00	4.00	2.60	0.76
	E6	1.00	4.00	2.33	0.90
	E7	1.00	5.00	2.91	0.93
	E8	1.00	4.00	2.55	1.07
	E9	1.00	5.00	2.27	1.15
	E10	1.00	5.00	2.60	1.06
	E11	1.00	4.00	3.16	0.76
	E12	2.00	5.00	3.98	0.73
	E13	1.00	5.00	3.56	0.96
	E14	1.00	4.00	2.78	0.71
PU2 (N=35)	E1	1.00	4.00	1.89	0.96
	E2	1.00	3.00	1.23	0.55
	E3	1.00	3.00	1.34	0.59
	E4	2.00	4.00	3.34	0.54
	E5	1.00	4.00	2.29	0.96
	E6	1.00	5.00	2.23	0.97
	E7	1.00	5.00	2.74	1.04
	E8	1.00	5.00	2.37	1.06
	E9	1.00	4.00	2.23	1.06
	E10	1.00	5.00	2.23	1.14
	E11	1.00	4.00	3.11	0.83
	E12	2.00	5.00	3.94	0.80
	E13	1.00	5.00	3.49	1.04
	E14	2.00	4.00	3.09	0.70

**GU1 and GU2: Public Universities; PU1 and PU2: Privat Universities*

4.3.1 The State of Students' Eating Behaviors

Table 6 shows the eating patterns of students at each of the four universities. Inferring from the data in Table 6 that students in four universities chose "always" and "often" when asked to choose healthy foods, it can be said that they have acceptable eating behaviors.

Table 6. The State of students' eating behavior (%)

Students Eating Behavior

Item	University	Always	Often	Sometimes	Rarely	Never
E1	GU1	44.9	27.6	18.4	9.2	0.00
	PU1	35.3	20.6	35.3	8.8	0.00
	GU2	36.4	36.4	21.8	5.5	0.00
	PU2	45.7	25.7	22.9	5.7	0.00
	Total	41.4	28.4	22.5	7.7	0.00
E2	GU1	75.5	17.3	6.1	1.0	0.00
	PU1	79.4	14.7	5.9	0.00	0.00
	GU2	74.5	23.6	1.8	0.00	0.00
	PU2	82.9	11.4	5.7	0.00	0.00
	Total	77.0	17.6	5.0	0.5	0.00
E3	GU1	63.3	23.5	9.2	4.1	0.00
	PU1	67.6	11.8	14.7	5.9	0.00
	GU2	54.5	32.7	9.1	3.6	0.00
	PU2	71.4	22.9	5.7	0.00	0.00
	Total	63.1	23.9	9.5	3.6	0.00
E4	GU1	0.00	10.2	65.3	24.5	0.00
	PU1	0.00	8.8	50.0	38.2	2.9
	GU2	0.00	16.4	50.9	32.7	0.00
	PU2	0.00	2.9	60.0	37.1	0.00
	Total	0.00	10.4	58.6	30.6	0.5
E5	GU1	7.1	34.7	39.8	18.4	0.00
	PU1	14.7	23.5	41.2	20.6	0.00
	GU2	7.3	34.5	49.1	9.1	0.00
	PU2	25.7	28.6	37.1	8.6	0.00
	Total	11.3	32.0	41.9	14.9	0.00
E6	GU1	21.4	36.7	29.6	12.2	0.00
	PU1	11.8	35.3	44.1	8.8	0.00
	GU2	20.0	36.4	34.5	9.1	0.00
	PU2	25.7	34.3	34.3	2.9	2.9
	Total	20.3	36.0	33.8	9.5	0.5
E7	GU1	11.2	24.5	37.8	24.5	2.0
	PU1	11.8	35.3	41.2	11.8	0.00
	GU2	7.3	21.8	47.3	20.0	3.6
	PU2	8.6	34.3	40.0	8.6	8.6
	Total	9.9	27.0	41.0	18.9	3.2
E8	GU1	22.4	36.7	26.5	13.3	1.0
	PU1	20.6	32.4	32.4	14.7	0.00

	GU2	21.8	23.6	32.7	21.8	0.00
	PU2	25.7	25.7	37.1	8.6	2.9
	Total	22.5	31.1	30.6	14.9	0.9
E9	GU1	25.5	25.5	25.5	21.4	2.0
	PU1	26.5	38.2	23.5	8.8	2.9
	GU2	32.7	25.5	27.3	10.9	3.6
	PU2	28.6	37.1	17.1	17.1	0.00
	Total	27.9	29.3	24.3	16.2	2.3
E10	GU1	24.5	36.7	24.5	11.2	3.1
	PU1	11.8	35.3	29.4	23.5	0.00
	GU2	14.5	34.5	32.7	12.7	5.5
	PU2	34.3	22.9	34.3	2.9	5.7
	Total	21.6	33.8	28.8	12.2	3.6
E11	GU1	4.1	20.4	41.8	33.7	0.00
	PU1	5.9	17.6	41.2	35.3	0.00
	GU2	1.8	16.4	45.5	36.4	0.00
	PU2	2.9	20.0	40.0	37.1	0.00
	Total	3.6	18.9	42.3	35.1	0.00
E12	GU1	1.0	4.1	25.5	57.1	12.2
	PU1	0.00	11.8	23.5	58.8	5.9
	GU2	0.00	5.5	10.9	63.6	20.0
	PU2	0.00	8.6	8.6	62.9	20.0
	Total	0.5	6.3	18.9	59.9	14.4
E13	GU1	1.0	10.2	32.7	51.0	5.1
	PU1	0.00	8.8	47.1	35.3	8.8
	GU2	3.6	10.9	21.8	52.7	10.9
	PU2	5.7	8.6	31.4	40.0	14.3
	Total	2.3	9.9	32.0	47.3	8.6
E14	GU1	5.1	24.5	53.1	17.3	0.00
	PU1	5.9	35.3	50.0	8.8	0.00
	GU2	1.8	32.7	50.9	14.5	0.00
	PU2	0.00	20.0	51.4	28.6	0.00
	Total	3.6	27.5	51.8	17.1	0.00

**GU1 and GU2: Public Universities; PU1 and PU2: Privat Universities*

4.4Normality Test

Compare the p-value to the significance level to see if the data do not follow a normal distribution. Typically, a significance level (also known as alpha) of 0.05 is effective. A significance level of 0.05 means that there is a 5% chance that the data will be interpreted as not following a normal distribution when in fact they do. The results are shown in Tables 7–8.

The decision to reject the null hypothesis and draw the conclusion that the data do not follow a normal distribution is based on Table 7, which shows that overall, at a 5 percent significance, all the variables are significant.

Table 7. Tests of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Eating Behavior	.069	222	.011	.987	222	.044
Nutrition Education Program	.138	222	.000	.918	222	.000

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on Table 8, the researcher rejects the hypothesis that these data are significantly different from normal because the probabilities in the SPSS output above are less than 0.05 (the typical alpha level). The researcher decided to conduct a Chi-Square test as a non-parametric test considering the results of the normality test.

Table 8. Tests of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
log_ Eating Behavior	.074	222	.005	.991	222	.175
log_ Nutrition Education Program	.103	222	.000	.970	222	.000

a. Lilliefors Significance Correction

4.5The Relationship between Eating Behavior and Nutrition Education Program

Table 9 presents the results of a Chi-Square test that was used to examine the relationship between eating behavior (the dependent variable) and the nutrition education program (the independent variable). Table 9 shows that no correlation between nutrition education programs and eating behaviors exists (p-value: 0.999 > 0.05).

Table 9. Chi-Square tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	545.449[a]	650	.999
Likelihood Ratio	372.198	650	1.000
Linear-by-Linear Association	8.573	1	.003
N of Valid Cases	222		

a. 702 cells (100.0%) have expected count less than 5. The minimum expected count is .00.

4.6The Difference between Universities (Public and Private)

A T-test was conducted to determine whether there are any differences in eating behaviors between students attending public and private universities. Tables 10 and 11 show the outcomes.

The p-value for Levene's test is printed as ".565" (p > 0.05) based on Tables 10 and 11. Therefore, the researcher cannot reject the null of Levene's test and conclude that the variance in eating behavior between public universities and private universities is not significantly different. Additionally, not statistically significant (0.482>0.05) are the group means.

Table 10. Group statistics

	Type of University	N	Mean	Std. Deviation	Std. Error Mean
Eating Behavior	Public Universities	153	2.5924	.34509	.02790
	Private Universities	69	2.5569	.35410	.04263

Table 11. Independent samples test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.332	.565	.704	220	.482	.03550	.05045	-.06393	.13493
Equal variances not assumed			.697	128.203	.487	.03550	.05095	-.06530	.13631

5. DISCUSSION

Internationally disseminated studies revealed that university students' varsity years were marked by unhealthful eating behaviors [43, 44]. As such, a study on the assessment of fruit and vegetable consumption among university students was conducted in Malaysia by Ahmad Sirfan et al. [45]. Most students consumed less than the Malaysian Dietary Guidelines.

The evaluation of students' attitudes toward nutrition education has received little research. The importance of nutrition education in various HEI curricula and the development of the learning environment related to nutrition needs to be stressed on campuses as studying in HEI is a golden time for learning and can affect the development of nutritional knowledge, attitudes, and behaviors of students. This study fills a knowledge gap in the literature by explaining how nutritional education and eating behavior relate to one another. It also answers the question whether university students can apply their nutrition knowledge to a diet that adheres to current dietary recommendations.

According to this study, nearly 90% of food science/nutrition students agreed that knowing the nutritional facts of foods and how to eat a healthy diet would help them consume more healthy foods. This shows that these students understand the value of nutrition education. Additionally, the students are generally pleased with the standard of nutrition instruction being offered at this time. This result corroborated a study by Coakley and Pribis [46] that was carried out at a university in the southwest United States and discovered undergraduate nutrition students believed a variety of classroom-based activities were beneficial to learning. In addition, the findings of the study by Bayır et al. [47], which examined the impact of a nutrition course on students' lifestyle behaviors from various departments of the faculty of health sciences in Turkey, showed that most students agreed that the food/nutrition courses had changed their attitudes toward healthy foods in their daily lives.

According to researchers [48], nutrition education improves students' general nutrition knowledge, which further demonstrates the improvement of awareness of appropriate food selections and is a great way to change eating behaviors. 96.4 percent of students believed their lecturers had successfully imparted practical nutrition knowledge.

This study also aims to contribute to the quantitative body of literature on the eating behaviors of HEI students, specifically those majoring in food science/nutrition. Eating behaviors were examined based on the frequency of meals, snacking, fast-food consumption, and the different foods from the food groups.

There is conflicting evidence regarding whether students studying food science and nutrition have eating disorders more frequently or not. Numerous studies have demonstrated that HEI students studying nutrition science frequently engage in unhealthy eating behaviors [49, 50]. Recent studies on students studying nutrition and dietetics were done by Rusli and Harith [51] and Güneş-Bayir and Alban [52]. 15.1% of dietetics students, according to Rusli and Harith's research, eat fast food more than three days a week. Güneş-Bayir and Alban's research also found that 94% of students eat snacks. They discovered that 21% of the students ate fast food at least three times per week. The results of the current study in some cases are in agreement with others regarding unhealthy eating behaviors such as eating fast food, snacks, and processed foods. They show that the students consumed fast foods (58.6%), snacks (42.3%), and processed foods (51.8%) on a sometimes basis. On the other hand, it's encouraging to see that a healthy proportion of students—30.6%, 35.1%, and 17.1%—rarely ate fast food, snacks, and processed foods. This result also demonstrates

how nutritional education might reduce a university student's daily consumption of unhealthy foods.

In terms of the relationship between nutrition information and eating behavior, various studies have produced varying results. Numerous studies have found that students majoring in nutrition science at HEI are more likely to engage in unhealthy eating behaviors than students majoring in other fields [49, 50, 53], or that there is no difference between students majoring in nutrition science and students majoring in other health-related fields or non-health-related fields [54, 55]. Additionally, according to some research [26, 27, 32], education-based improvements in nutritional knowledge have been linked to better eating behaviors and food choices. This correlation between knowledge and diet quality may be explained by the fact that students who had taken a nutrition course understood the fundamentals of nutrition more thoroughly than those who had not. According to the current study's findings, 69.8% of students eat breakfast every day or nearly every day, and none of them skip it at all. In addition, most students—94.6% and 87%, respectively—eat lunch and dinner regularly. The same is true for nutritious foods like fruits, vegetables, etc.

Even though students who had received nutrition education had a suitable diet quality—possibly because of learning about the advantages of including healthy foods in their diets, which may have inspired them to eat more of them—they still did not receive a "good" grade for diet quality, and they are still falling short of the suggested diet intakes. There are other undiscovered factors that contribute to the change in eating behavior, and more research is needed to identify these factors, which may be internal or external to the participants. As a result, the subject is a novel area for discovery among Malaysian students. According to Kabir et al. [56], several variables affected students' eating behaviors. Students' dietary intake and eating behaviors should be taken into consideration based on several factors, including personal (knowledge and perceptions) and organizational (influence of teachers and education) factors.

6. CONCLUSION

The goal of this study was to learn more about the connection between nutrition education and university students' eating behaviors. It is clear from the current study that many students were knowledgeable about food science and nutrition programs; a positive finding was that the nutritional status of the students was considered good. However, these notions were not always translated into their actual choices or practices, because students' eating practices included some unhealthy eating patterns, like engaging in snacking, fast-food consumption, and the consumption of processed foods that can affect the health and wellbeing of individuals. Lack of time to buy food and prepare meals, as well as financial constraints, are obstacles that students face in maintaining a healthy diet [57]. Thus, overcoming these obstacles and fulfilling nutritional needs continues to be difficult, even for students. The ideal environment to promote these healthy eating behaviors is a university setting. Institutions should offer students a learning environment where their health behaviors can be changed by receiving nutrition education.

It is necessary to increase the awareness of appropriate nutrition in students taking food science/nutrition-orientated subjects who, in the future, will be responsible for promoting public health. Nutrition education and interventions ought to be strategies implemented to elicit positive responses to aid alterations in students' diets consistent with dietary recommendations.

CONSENT

I would like to invite you to take part in a research study on the relationship between nutrition education and students' eating behaviors among selected higher education institutions (HEIs) in Malaysia.

This study is aimed at undergraduate students enrolled in food/nutrition programs.

First, you should know that your participation in this study is completely voluntary. You are not obliged to take part in this study if you do not want to. You may withdraw from the research at any point if you feel you are no longer comfortable with the process. Second, all information collected by this survey will be kept confidential and will be used in this study only.

It is important that you complete this questionnaire by yourself and complete all sections.

This survey would take approximately 15 minutes to complete.

If you have questions, you may contact us through email or by phone.

Thank you for your time and for participating in this study.

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