Original Research Article

Impact of Nutrition Education on University Students' Eating Behaviour 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 did not consume enough of the essential nutrients according to Malaysian recommendations. There are indicators of links between nutrition education and eating behaviour, 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, 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 behaviours and nutrition education programme 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 be "Strongly Agree" with their nutrition education programme, and they exhibited acceptable eating behaviours. There is no statistically significant link between a nutrition education programme and eating behaviours in terms of the relationship between the variables. Additionally, the variation in eating behaviours between private and public universities is not noticeably different.

Keywords: Nutrition education; university student; eating behaviour; 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 behaviour patterns [2]. When young adults prepare and choose their own 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 greatest health and wellbeing, it is well known that today's university students have unhealthy eating behaviours [4]. According to researchers, university students worldwide typically have diets that are categorised as unhealthy [2, 3].

Young people generally skip meals, especially breakfast, consume a lot of snacks, and prefer take-out 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 practises has an impact on young people's physical and mental health, which indirectly affects how well they perform in 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 have a negative impact on eating behaviours 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 behaviours. The World Health Organisation (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 behaviour modification interventions exists in educational settings, including higher education institutions (HEIs). 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 behaviours, such as active participation during lessons. As a result, it is acknowledged that HEIs as an organisation have a significant impact on students' eating behaviours [12].

Organisations like HEIs that offer nutrition programme give students the chance to learn about and put healthy eating behaviours into practise. They give students the knowledge and skills they need to make decisions about their food intake, which pave the way for lifetime behaviours that promote health. According to Brener and Gowda [13], HEIs that offer nutrition programmes are in a unique position to encourage healthy behaviours by making these programmes available to students. Since these courses have lecturers who implement nutritional programmes 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 behaviour in the students enrolled. This could be accomplished by improving their attitudes toward the subjects or their knowledge of food and nutrition [14].

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/food students.

Few studies have looked at how undergraduate nutrition students feel about the courses in nutrition programmes. The role of nutrition education lies somewhere between a person's set of perceptions about a food and their potential behaviours in relation to that food [15]. Inconsistent findings have been found in studies examining the link between eating behaviours and nutrition education. According to study, nutrition education has a strong, favourable relationship with how people behave in relation to nutrition [16]. However, other researchers discovered little link between nutrition instruction and making healthy food choices [17].

Given this context, 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 behaviours and the connection between this programme and students' eating behaviours in Malaysia.

2. LITERATURE REVIEW

Eating behaviours are important since they can influence long-term health outcomes because unhealthy eating behaviours like skipping meals, consuming foods low in nutrients, and failing to eat on time are known to cause several problems [18]. Eating behaviours combine food knowledge and skills and turn learned food knowledge and skills into routine behaviours. More specifically, the frequency with which one manages, plans, selects, prepares, and consumes food is referred to as the concept of food behaviours [19]. Thus, having a basic understanding of nutrition can help people make better food choices.

In a study, Şanlıer et al. [20] suggested that lack of knowledge is one factor contributing to inadequate and unbalanced nutrition during the adolescent period. It has shown that despite being poorly informed about eating guidelines, people cannot prioritise 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 behaviour modification, nutrition education can be provided through the organisation 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 [21]. 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 [22]. It significantly contributes to raising public awareness and ultimately, society's health. Therefore, by offering nutritional education, it 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 behaviours and food preferences [23].

Improving students' nutritional knowledge, attitudes, and practises 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 [24].

The community can benefit from nutritional education for students because they are more likely to make positive changes [25]. According to Contento [26], the goal of nutrition education is to help people develop the abilities, knowledge, attitudes, and behaviours 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 [27].

Matvienko et al. [28] determined that taking a nutritional science course aided students in applying their knowledge of nutrition to altering their diets. In addition, Nani et al. [29] 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 organisations and centres of learning. Organisations have traditionally been responsible for educating students academically, but in the modern world, globalisation, learning styles, the knowledge society, and innovative pedagogy appear to have changed how organisations operate [30]. The organisation's role as a social institution and academic organisation is envisioned to be more expansive than ever. Instead of just providing an academic education for students, it entrusts organisational

learning with their overall wellbeing. Social skills and a positive outlook are developed through health education, which includes eating behaviours 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 [31].

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

3. METHODOLOGY

The researcher can ascertain whether there is a relationship between students' eating behaviours and nutrition education programme 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 behaviour. 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. To get the pertinent data required for this investigation, stratified sampling used as the methodology. The HEIs in Malaysia that offer programmes in food/nutrition sciences were the study's specific emphasis. After that, questions regarding their opinions of their nutrition education and eating behaviours 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 respondents' demographics, nutrition education programme, and eating behaviours of students that 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, field of study, and year of study. This gives background data on the students who were recruited for the study. Based on Poobalan [32] with some modifications, the participants were asked about the nutrition education in their organisations. 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., [33, 34, 35, 36] were chosen to study eating behaviour 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 programme's Cronbach's alpha was .894 and that

students' eating behaviours 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.

3.2 Data Analysis

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

4. RESULTS

4.1 Demographic Characteristics of Participants

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

All genders (males and females) were represented in the research sample, according to a frequency analysis, there were 192 women and 30 men among the respondents in this study who were enrolled in programmes. The increased number of women attending tertiary institutions may be responsible for the higher rate of female participation [37]. According to a recent report from Malaysia, the ratio of female to male students has risen to a current value of 65:35 [38], and the same pattern is thought to exist in other nations.

Most of the respondents, who studied undergraduate students, were between the ages of 21 and 25. According to analysis, respondents included students from various ethnic backgrounds. Many of them (44.14%) were Malay and Chinese, followed by other (9.46%) and Indian (2.25%). Additionally, the students ranged in 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 student chose the other as their place to live. Tables 1 and 2 show the questionnaire that used in this study.

Table 1. Nutrition education

Variable	Items
Nutrition Education	N1. I learned from my lecturers how to eat 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 behaviour

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-flavoured drinks.)? E14. How often do you eat processed foods?

4.2 Nutrition Education Programme

4.2.1 Descriptive Statistics

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

Table 3. Descriptive statistics of nutrition education programme

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
PU2 (N=35)	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
	N6	1.00	2.00	1.31	0.47
	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*

4.2.2 The State of Nutrition Education Programme

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

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

Nutrition Education Programme						
Item	**University**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
N1	GU1	49.0	39.8	8.2	3.1	0.00
	PU1	32.4	50.0	11.8	2.9	2.9
	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
N2	GU1	53.1	37.8	7.1	2.0	0.00
	PU1	44.1	44.1	5.9	2.9	2.9
	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
N3	GU1	57.1	33.7	7.1	2.0	0.00
	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*

4.3 Students' Eating Behaviour

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 favour 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 behaviour

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 Behaviours

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 behaviours.

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

		Students' Eating Behaviour				
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

	GU1	4.1	20.4	41.8	33.7	0.00
	PU1	5.9	17.6	41.2	35.3	0.00
E11	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
	GU1	1.0	4.1	25.5	57.1	12.2
	PU1	0.00	11.8	23.5	58.8	5.9
E12	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
	GU1	1.0	10.2	32.7	51.0	5.1
	PU1	0.00	8.8	47.1	35.3	8.8
E13	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
	GU1	5.1	24.5	53.1	17.3	0.00
	PU1	5.9	35.3	50.0	8.8	0.00
E14	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*

4.4 Normality 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 significant, 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
Lecturer Transformational Leadership	.052	222	.200*	.975	222	.001
Idealised Influence	.102	222	.000	.960	222	.000
Inspirational Motivation	.080	222	.001	.962	222	.000
Intellectual Stimulation	.107	222	.000	.945	222	.000
Individualised consideration	.103	222	.000	.945	222	.000
Nutrition education Programme	.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_ Lecturer Transformational Leadership	.085	222	.001	.967	222	.000
log_ Idealised Influence	.128	222	.000	.965	222	.000
log_ Inspirational Motivation	.087	222	.000	.957	222	.000
log_ Intellectual Stimulation	.151	222	.000	.954	222	.000
log_ Individualised consideration	.142	222	.000	.929	222	.000
log_ Nutrition education Programme	.103	222	.000	.970	222	.000

a. Lilliefors Significance Correction

4.5 The Relationship between Eating Behaviour and Nutrition Education Programme

Table 9 presents the results of a Chi-Square test that was used to examine the relationship between eating behaviour (the dependent variable) and the nutrition education programme (the independent variable). Table 9 shows that no correlation between nutrition education programme and eating behaviours 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.

4.6 The Difference between Universities (Public and Private)

A T-test was conducted to determine whether there are any differences in eating behaviours 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 concluded that the variance in eating behaviour 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 behaviours [39, 40]. As such, a study on the assessment of fruit and vegetable consumption among university students was conducted in Malaysia by Ahmad Sirfan et al. [41]. Most students consumed less than what the Malaysian Dietary Guidelines advise.

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 need to be stressed on campuses as study in HEI is a golden time for learning and can affect the development of nutritional knowledge, attitude, and behaviours of students. This study fills a knowledge gap in the literature by explaining how nutritional education and eating behaviour relate to one another. It also answers the question of whether university students can apply their nutrition knowledge to a diet that adheres to current dietary recommendations.

This study found out nearly 90% of food science/nutrition students agreed that knowing the nutritional facts of the foods and having knowledge on how to eat a healthy diet would help them to 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 [42] that was carried out in a university in the southwest of the 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 Bayr et al. [43], which examined the impact of a nutrition course on students' lifestyle behaviours from various departments of the faculty of health sciences in Turkey, showed, most students agreed that the food/nutrition courses had changed their attitudes toward healthy foods in their daily lives.

According to researchers [44], nutrition education improves students' general nutrition knowledge, which further demonstrates the improvement of awareness of appropriate food selections and a great way to change eating behaviours. 96.4 percent of students thought that their lecturers had successfully imparted practical application of nutrition knowledge.

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

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 behaviours [45, 46]. Recent studies on students studying nutrition and dietetics were done by Rusli and Harith [47] and Güneş-Bayir and Alban [48]. 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 behaviour such as eating fast-food, snacks, and processed foods 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 relationship between nutrition information and eating behaviour, various studies produced varying results. Numerous studies have found that students majoring in nutrition science at HEI are more likely to engage in unhealthy eating behaviours than students majoring in other fields [45, 46, 49], 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 [50, 51]. Additionally, according to some research [23, 24, 29], education-based improvements in nutritional knowledge have been linked to better eating behaviours 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 behaviour, 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. [52], several variables affected students' eating behaviours. Students' dietary intake and eating behaviours should be taken into consideration based on several factors, including personal (knowledge and perceptions) and organisational (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 behaviours. It is clear from the current study that many students were knowledgeable about food science and nutrition programmes; a positive finding was that the nutritional status of the students was considered good; however, these notions are not always translated into their actual choices or practises, because students' eating practises included some unhealthy eating patterns, like engaged 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 [53]. Thus, overcoming these obstacles and fulfilling nutritional needs continues to be difficult, even for students. The ideal environment to promote these healthy eating behaviours is a university setting. Institutions should offer students a learning environment where their health behaviours 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 response to aid alterations in students' diet consistent with dietary recommendations.

CONSENT

I would like to invite you to take part in a research study on exploring lecturers' transformational leadership on students' eating behaviour among selected higher education institution (HEIs) in Malaysia.

This study is targeted towards undergraduate students who are studying in Food/Nutrition programs.

First, you should know 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 through email or by phone.

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

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