Original research article

Journal of Public Health Research

Knowledge, attitudes, and practices on fast food consumption among university students in Malaysia

Journal of Public Health Research
2025, Vol. 14(4), 1–13

DOI: 10.1177/22799036251383283
journals.sagepub.com/home/phj
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Abstract

Background: Fast food consumption is a significant public health concern among university students. Despite their awareness of the health risks, including obesity, they continue to exhibit unhealthy eating behaviors. This study aims to assess the knowledge, attitudes, and practices related to fast-food consumption among university students in Malaysia.

Design and methods: A cross-sectional study was conducted from February to September 2024 among 397 local and international university students from both private and public universities. Data were collected using a survey assessing demographic characteristics and knowledge, attitudes, and practices related to fast-food consumption. Data were analyzed using SPSS software, employing Fisher's Exact Test, chi-square test, and multiple logistic regression to identify associations with a *p*-value set at <0.05.

Results: A moderate to high prevalence of fast-food consumption was found, with 375 students (94.4%) regularly consuming fast food. Female students (236 of 397) demonstrated significantly better knowledge about the health impacts of fast food compared to male students (161 of 397, $p<0.001$). Students living in the central region showed better knowledge (142 of 190, $p<0.001$) toward healthy eating than in other regions. Participants aged between 23 and 27 years old had 1.44 times (adjusted OR = 1.44; 95% CI = 1.22–1.85) more likely to have high knowledge on fast food consumption compared to participants aged between 18 and 22 years old.

Conclusions: The study reveals a high prevalence of fast-food consumption among university students, with notable differences in knowledge, attitudes, and practices based on gender, residence type, and academic year.

Keywords

fast food, knowledge, attitude, practice, university student, dietary habits

Received: 3 April 2025; accepted: 8 September 2025

Significance for public health

Fast food consumption is a significant public health concern, particularly among university students, and has attracted a great deal of attention worldwide. It is necessary to explore the knowledge, attitudes, and practices of fast food consumption among university students in the Malaysian context. Addressing the information gaps will provide the higher education sector, public health stakeholders, and government actionable insights to properly plan and implement nutrition policies, as well as encourage healthier eating practices and reduce the prevalence of fast food consumption, ultimately contributing to improved public health outcomes in Malaysia.

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Introduction

Fast food consumption has emerged as a significant public health concern, particularly among university students, due to its implications on health and well-being. The increasing accessibility and affordability of fast food have made it a common dietary choice for this demographic, raising concern about its potential role in the development of non-communicable diseases (NCDs). NCDs, including obesity, diabetes, and cardiovascular diseases (CVDs), are closely linked to unhealthy dietary habits. A study by Isa et al.[1] revealed that 84.5% of Malaysian students consume fast food, highlighting the prevalence of this trend and its potential impact on health outcomes.

Fast food is often associated with high levels of unhealthy fats, sugars, and sodium, contributing to its calorie-dense nature. Excessive consumption can lead to an increased risk of obesity, type 2 diabetes, hypertension, and heart disease. For instance, the frequent use of deep-frying in fast food preparation results in the formation of trans fatty acids (TFAs), which are known to elevate low-density lipoprotein (LDL) cholesterol levels, increasing the risk of atherosclerosis and coronary artery disease.[2] Elevated LDL levels and smaller LDL particle sizes have been identified as critical biomarkers for cardiovascular risk, further emphasizing the health implications of fast food consumption.[3,4]

The rise in global obesity rates, with approximately 5 million noncommunicable disease (NCD) deaths caused by higher-than-optimal body mass index in 2019, underscores the urgent need to address unhealthy eating patterns.[5] University students are a particularly vulnerable group as they often face challenges such as time constraints, financial limitations, and the influence of social and psychological factors that drive their preference for fast food. Convenience, taste, and affordability are common motivators that overshadow considerations of nutritional quality, further exacerbating poor dietary habits.

Nonetheless, not all fast food is nutritionally detrimental. Certain establishments offer healthier options featuring grilled proteins and vegetables, which provide nutrient-dense meals.[3] However, the widespread use of deep-frying, large portion sizes, and excessive sugar and sodium content in many fast-food menus highlight the need for informed dietary choices. Knowledge about the health risks of fast food may shape students' attitudes and perceived control over their eating habits, while attitudes directly reflect their evaluation of fast food consumption and influence actual dietary practices. This framework provides a theoretical basis for interpreting how knowledge may contribute to healthier or riskier dietary behaviors among university students. University students' knowledge of the nutritional content and health implications of fast food is crucial in shaping their eating habits. Studies show that awareness can empower individuals to make healthier food choices, mitigating the risks associated with fast food consumption. This study aims to assess the knowledge, attitudes, and practices of university students in Malaysia regarding fast food consumption. Specifically, it seeks to evaluate their awareness of nutritional content and health risks, determine consumption frequency and patterns, investigate health outcomes related to fast food, and identify the cultural and social factors influencing their choices.

Design and methods

Study design

This cross-sectional study was conducted according to the protocol approved by the Ethics Committee of Management and Science University (Ethics Code: EA-L1-01-FHLS-2024-10-0029). A quantitative cross-sectional design was adopted in this study that was conducted over 8 months from February 2024 to September 2024 with the study instrument being provided electronically across Malaysia. The sample was selected through convenience sampling method which is a non-random sampling approach for collecting data. The subjects were selected according to their availability and accessibility. The data was collected by distributing an online questionnaire using Google Form. The form was shared electronically through various social media platforms including WhatsApp and Telegram.

Study instruments

This study utilized a questionnaire published by Azman et al.,[6] with selected items modified to support the generation of relevant items for the current research. Psychometric properties of the questionnaire such as reliability test, face validity, and content validity were assessed before questionnaire distribution. The questionnaire's content validity was evaluated by four expert panels in the field based on four attributes, ambiguity, simplicity, clarity, and relevance. The questionnaire was reviewed and rated, and consensus was achieved among all panel members regarding its content. Each domain of the questionnaire was assessed using the content validity index (CVI).[7] Each item was rated on a four-interval scale (1 = not relevant, 2 = needs some revision, 3 = needs minor revision, and 4 = very relevant).[8,9] These expert ratings were used to compute the CVI. Items receiving scores of 1 or 2 were considered not a relevant item or invalid content, while scores of 3 or 4 were deemed indicative of acceptable content. Face validity was quantitatively assessed by evaluating the clarity and comprehensibility of items within each domain. Each item was rated on a four-interval scale: 1 = not clear and understandable, 2 = somewhat clear and understandable, 3 = clear and understandable, and 4 = very clear and understandable. Ratings of 1 and 2 were interpreted as indicating invalid or irrelevant content, whereas ratings of 3 and

4 were considered to reflect valid and relevant content.[10] Based on panel reviews, modifications were conducted with regard to structure and arrangement of questions.

The set of questions included for CVI calculation was seven items in Section B (knowledge on fast food consumption), six items in Section C (attitude toward fast food consumption), and five items in Section D (practices toward fast food consumption), followed by the assessment of the face validity of the items by the university students from both local and private institutions. A pilot study involving 50 subjects was conducted to assess the face validity and reliability of the questionnaire. The CVI for all items was 0.81, and the face validity index (FVI) was 0.86.

This study was conducted throughout Malaysia, with the study instrument being provided electronically. Participants' consents were obtained electronically before they began filling out the questionnaire. The study objectives, inclusion and exclusion criteria, consent form, and participant involvement were detailed on the first page of the Google Form questionnaire. The questionnaire responses were anonymous, ensuring that the participants' privacy was kept confidential. The questionnaire consisted of five sections and 24 items: Section A – Socio-demographics information (six items), Section B – knowledge on fast food consumption (seven items), Section C – Attitude toward fast food consumption (six items), and Section D – Practices toward fast food consumption (five items). The online survey has fulfilled the criteria in the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).[11] The instrument was developed based on the pilot study with reliability achieving acceptable Cronbach's alpha values ranging from 0.70 to 0.98.

Study population

The study population consisted of university students all across Malaysia, encompassing individuals from both local and private institutions, which included both local and international students. Table 1 shows that the accepted margin of error is 5% (0.05), the confidence level is 95%, the population size in Malaysia is approximately 1.592 million, and response distribution is 50% which concluded that the sample size needed for this study is 385. All students who were currently enrolled and willing to participate were included to ensure a comprehensive representation of the student body. A convenience sampling method and 397 eligible students who consented to participate were included in the study.

Inclusion and exclusion criteria

The subjects were university students aged 18 years old and above, representing both sexes and residing in Malaysia at the time of the study. An additional criterion for inclusion was that respondents had a sufficient understanding of English since the questionnaires were exclusively written in English. Exclusion criteria pertained to characteristics that limit potential individuals from participating in the study. In this context, students enrolled in universities located overseas were excluded from the study.

Table 1. Sample size of university students participated in the study.

Accepted margin of error	5% (0.05)
Confidence level	95%
Population size of university students in Malaysia	1,592,301
Response distribution	50%
Sample size	385

Data analysis

Data analysis was conducted using IBM SPSS Statistics Software (version 27). Descriptive statistics summarized the demographic characteristics and responses of the knowledge, attitudes, and practices among students. Frequencies and percentages were calculated for categorical variables. Knowledge levels were categorized as follows: scores of 0%–33% indicated poor knowledge, 34%–66% indicated moderate knowledge, and scores ≥ 67% indicated high knowledge.[12] Attitude scores were calculated by assigning numerical values to each response (Never/No = 1, Sometimes/Unsure/Maybe = 2, Yes = 3). The total score was converted into a percentage and categorized into poor (0%–33%), moderate (34%–66%), and good (≥67%) levels.[12,13] Each practice item used a 5-point Likert scale ("Never," "Rarely," "Sometimes," "Often," and "Always"), scored from 1 to 5. Total scores were converted to percentage scores and categorized as poor (0%–33%), moderate (34%–66%), and good (≥67%).[12,13] Multiple logistic regression was used to establish the relationship between socio-demographic as independent variables, while knowledge, attitudes, and practices as the outcome variable. Fisher's Exact Tests were used to assess associations between demographic variables and the knowledge, attitudes, and practices of fast food consumption. A significance level of $p < 0.05$ was used to determine statistically significant associations.

Results

Socio-demographic profile

A total of 397 respondents had completed the survey. Male participants made up 40.6% of the sample, while female participants made up the majority (59.4%). Ages 23–27 accounted for the largest age group (35.0%; $n = 139$) followed by 18–22 years, (25.4%; $n = 101$), and 43 years and older (4.3%; $n = 17$) for the smallest percentage of responses. The distribution of ethnic groups comprised Chinese (16.6%; $n = 66$), Indians (25.7%; $n = 102$), Malay/Bumiputras (44.8%; $n = 178$), and a tiny percentage of other ethnicities (13%; $n = 51$).

The educational attainment was varied: the largest group consisted of undergraduates 44.8% ($n=178$), followed by graduates 17.4% ($n=69$) and diploma students 16.9% ($n=67$). Again, the central region consisting of Selangor, Wilayah Persekutuan & Putrajaya became the most common location of educational institutions comprising 47.9% ($n=190$) of the respondents. The least represented were those from East Malaysia at 7.6% ($n=30$). The breakdown according to institutional type consisted of 55.4% ($n=220$) going to private universities and 44.6% ($n=177$) attending public universities. Most participants were Malaysian, at 84.9%, which represents 337 students while 60 were non-Malaysians, at 15.1% (Table 2).

In terms of perceptions of fast food, when asked what age is fine to consume fast food, 31.0% believed it was appropriate to consume fast food between the ages of 12 and 15, while 26.7% thought 16–18-year-olds were suitable. The main reasons for consuming fast food were, in order, taste reasons, 40.6% ($n=161$), and convenience, 34.8% ($n=138$), followed by without time, 15.4% ($n=61$, and cost, 9.3% ($n=37$). Students often consumed fast food when busy (28.2%, $n=112$) or bored (26.7%, $n=106$), and preferred to do so in cafes or restaurants (35.3%, $n=140$; Table 3).

Interestingly, 28.0% ($n=111$) of the respondents consumed fast food although health risks were associated with its consumption simply because they liked it so much. The second causal factor for consuming fast food, as stated by 26.4% ($n=105$) of the respondents, was because they did not have time for meals. A total of 21.4% ($n=85$) favored burgers/sandwiches as a type of fast food, while the highest percentage, 24.7%, favored chicken. As to the beverages, 30.7% ($n=122$) preferred fresh juices, followed by soft drinks at 27.7% (110) and iced coffee or tea at 25.2% ($n=100$; Table 3).

Level of knowledge on fast food consumption among university students

A small portion of students (0.3%; $n=1$) exhibited a lack of knowledge, scoring between 0% and 33%, with a mean score of 20.00 and no variation (SD = 0). Most students were categorized in the moderate knowledge group, which composed 44.8% ($n=178$) of the sample. These students scored 34%–66%, with a mean score of 57.64 ± 6.16. The maximum number of students (54.9%; $n=218$) displayed high knowledge scoring between 67% and 100% with an average score of 83.42 ± 9.96. The data revealed that most university students have at least moderate to high knowledge ($n=396$, 99.7%) regarding fast food, with the largest group falling into the high knowledge category.

The data reveals that a significant proportion of students (62.2%) acknowledge the health risks associated with fast food, with 32.7% strongly agreeing that fast food

Table 2. Socio-demographic characteristics of respondents ($n=397$).

Variables	*n*	%
Gender		
Female	236	59.4
Male	161	40.6
Age		
18–22 years old	101	25.4
23–27 years old	139	35.0
28–32 years old	49	12.3
33–37 years old	42	10.6
38–42 years old	49	12.3
43 years old and above	17	4.3
Ethnicity/nationality		
Australian	25	6.3
Bahraini	2	0.5
Chinese	66	16.6
Egyptian	1	0.3
Filipino	19	4.8
Indian	102	25.7
Khmer	2	0.5
Malay/Bumiputera	178	44.8
Seychellois	1	0.3
Sikh	1	0.3
Educational level		
Diploma/certificate	67	16.9
Undergraduate	178	44.8
Graduate	69	17.4
Postgraduate	62	15.6
Doctorate	21	5.3
Location of educational institution		
Northern region – Perlis, Kedah, Pulau Pinang & Perak	44	11.1
Central region – Selangor, Wilayah Persekutuan & Putrajaya	190	47.9
Eastern region – Pahang, Terengganu & Kelantan	74	18.6
Southern region – Melaka, Johor & Negeri Sembilan	59	14.9
East Malaysia – Sabah, Sarawak & Wilayah Persekutuan Labuan	30	7.6
Type of institution		
Public university	177	44.6
Private university	220	55.4
Nationality		
Malaysian	337	84.9
Non-Malaysian	60	15.1
Country of origin for international students		
Australia	25	41.0
Bahrain	2	3.3
China	12	19.7
Egypt	1	1.6
Philippines	19	31.1
Seychelles	1	1.6
USA	1	1.6

Table 3. Consumption patterns of respondents ($n = 397$).

Consumption patterns	*n*	%
At what age do you think is fine to consume fast food?		
Never	45	11.3
Under 12 years old	44	11.1
12–15 years old	123	31.0
16–18 years old	106	26.7
Over 18 years old	79	19.9
What is the main reason for consuming fast food?		
Convenience	138	34.8
Inexpensive	37	9.3
Lack of time	61	15.4
Taste	161	40.6
When do you prefer to consume fast food?		
When I am bored	106	26.7
When I am busy	112	28.2
When I am hungry	76	19.1
When I'm working with assignments	103	25.9
Which place do you prefer to consume fast food?		
At home/friend's house	127	32.0
Cafe/restaurant	140	35.3
Public area	51	12.8
Workplace	79	19.9
What makes you consume fast food even if you are aware of the health risks of fast food?		
I am addicted	102	25.7
I am unable to stop due to a busy schedule	105	26.4
I like it a lot	111	28.0
I think there are more benefits compared to the risks	79	19.9
What type of fast food do you prefer most?		
Burgers/sandwiches	85	21.4
Chicken	98	24.7
Desserts	32	8.1
French fries	61	15.4
Pizza	73	18.4
Others	47	11.8
What type of drink would you prefer to have with fast food?		
Fresh juice (e.g.: fresh orange, fresh mango)	122	30.7
Iced coffee/Tea (e.g.: iced lattes, cappuccinos)	100	25.2
Plain water	65	16.4
Soft drink	110	27.7

is unhealthy. There is a slight gap in students' nutritional awareness, with 42.4% agreeing or strongly agreeing that they understand the nutritional content of fast food. Based on the data, it is shown that there is a substantial understanding of the long-term consequences of regular consumption, with over half of the respondents agreeing that frequent consumption leads to weight gain and obesity. Importantly, a majority of students (67%) believe that knowing the nutritional information of fast food is crucial to making healthier food choices.

Level of attitude of fast food consumption among university students

Only a small percentage of the student population (0.8%; $n = 3$) exhibited an unfavorable disposition toward fast food consumption, achieving scores that fell within the range of 0%–33%, with a mean score of 30.00 and no variation (SD = 0.00). With scores ranging from 34% to 66%, the majority of students (52.9%, $n = 210$) exhibited a moderate attitude. Their mean score of 54.26 ± 9.14 indicates

that there is a moderate amount of variability in their perceptions. According to this demographic subset, more than half of the students polled had opinions on fast food consumption that could be described as neutral or balanced rather than very favorable or negative. Conversely, a substantial cohort of students (46.3%; $n=184$) displayed a markedly positive attitude, scoring between 67% and 100%. Their mean score of 82.12 ± 9.06 indicates a consistent pattern of favorable attitudes, albeit with some minor fluctuations among individuals.

Level of practice toward fast food consumption among university students

A small proportion of students (5.5%; $n=22$) displayed poor practices regarding fast food consumption, scoring between 0% and 33%. This group had a mean score of 29.82 ± 3.43. Most of the students (51.1%; $n=203$) were in the moderate practice category, with their scores ranging from 34% to 66%. The mean score for this group was 53.46 ± 8.34, suggesting some variability in their fast food consumption habits. This showed that more than half of the students had a moderate fast food consumption level which is neither frequent nor infrequent. Nearly half of the students by 43.3% ($n=172$) showed high fast food consumption practice with scores between 67% and 100%.

Association between sociodemographic characteristics and knowledge of fast food consumption

As observed in Table 4, There was a strong relationship between gender and knowledge of fast food consumption ($\chi^2=13.820$, $p<0.001$). The majority of female students reported higher levels of knowledge (62.3%; $n=147$) and equivalently a portion had poor/moderate knowledge (37.7%; $n=89$). Among the male students, 55.9% ($n=90$) had poor/moderate knowledge but fewer had a share of high knowledge (44.1%; $n=71$). Multiple logistic regression analysis showed that females (adjusted OR=1.5; 95% CI=1.25–2.13) were more likely to have a high knowledge toward fast food consumption compared to males. Age is a major factor ($\chi^2=88.698$, $p<0.001$) with respect to knowledge. Students aged 28–32 and 33–37 years mostly had poor/moderate knowledge, but a substantial portion of those aged 38–42 years had poor/moderate (83.7%; $n=41$) compared to high knowledge; only a small number of them had high knowledge (16.3%; $n=8$). There was only one student aged 18–22 years who fell in the category of poor knowledge. In the multiple logistic regression analysis, participants aged between 23 and 27 years old had 1.44 times (adjusted OR=1.44; 95% CI=1.22–1.85) more likely to have high knowledge on fast food consumption compared to participants aged between 18 and 22 years old.

The level of education has an impact on knowledge ($\chi^2=53.616$, $p<0.001$). The highest knowledge was demonstrated by undergraduate students (71.9%, $n=128$), followed by diploma/certificate holders (56.7%, $n=38$). Graduate students provided a larger percentage within the high knowledge (39.1%, $n=27$) category, while doctorate holders constituted lower level in both the poor/moderate (71.4%, $n=15$) and high (28.6%, $n=6$) knowledge categories. Only one student with a diploma/certificate had poor knowledge. Knowledge had strong significance with the location of the educational institution ($\chi^2=61.064$, $p<0.001$). The proportion of high knowledge for students from the central region (Selangor, Wilayah Persekutuan, and Negeri Sembilan) was the highest (74.7%, $n=142$) whilst poor/moderate knowledge was found among eastern regions of Malaysia (64.9%, $n=48$). Students from the northern and southern regions showed lower levels of high knowledge. There was no student from northern, eastern, southern, and east Malaysia with poor knowledge.

Association between sociodemographic characteristics and attitude toward fast food consumption

As shown in Table 5, gender was not significantly associated with attitude toward fast food consumption ($\chi^2=0.651$, $p=0.772$). Both male and female students have nearly similar distributions in terms of moderate and high attitudes with the majority falling under the poor/moderate category for both genders. There is no relationship between age and attitude ($\chi^2=13.994$, $p=0.217$). Overall, most age groups tend more moderate in attitude. Age 23–27 has the highest proportion (58.3%, $n=81$) of students with a poor/moderate attitude profile across all clusters. The prevalence of high attitudes was more common in the younger age categories (18–22, and 23–27-year-old) than in older age groups; however, no statistically significant pattern was observed.

The type of institution whether it is a public or private university does not exhibit a significant relationship with students' attitudes ($\chi^2=0.903$; $p=0.608$). Both public and private university students show the same pattern with nearly equal distributions between attitude levels with a slight tendency toward poor/moderate attitudes. There is only one variable significantly associated with attitudes toward fast food intake, based on nationality ($\chi^2=7.875$, $p=0.012$). In comparison, most of the Malaysian students scored poor/moderate attitudes (56.4%, $n=190$) followed by high attitudes (43.6%, $n=147$). On the other hand, non-Malaysian students were found to have higher attitude (61.7%, $n=37$) than poor/moderate (38.3%, $n=23$).

Association between sociodemographic characteristics and practices on fast food consumption

There was an important relationship between gender and the practices related to fast food consumption ($\chi^2=10.553$, $p=0.005$). Female students have a higher percentage of

Table 4. Association between sociodemographic characteristics with knowledge of fast food consumption among university students ($n = 397$).

Variables	Knowledge (*n*, %)						
	Poor/ moderate	High	χ^2	df	*p*-Value	Adjusted OR (95% CI)	*p*-Value
Gender							
Female	89 (37.7)	147 (62.3)	13.820	2	<0.001	1.5 (1.25–2.13)	0.02
Male	90 (55.9)	71 (44.1)				1	
Age							
18–22 years old	21 (23.1)	70 (76.9)	88.698	10	<0.001	1	
23–27 years old	34 (24.5)	105 (75.5)				1.44 (1.22–1.85)	0.04
28–32 years old	31 (63.3)	18 (36.7)				1.55 (0.89–2.53)	0.47
33–37 years old	29 (69.0)	13 (31.0)				0.54 (0.23–2.51)	0.33
38–42 years old	41 (83.7)	8 (16.3)				1.56 (0.96–1.83)	0.51
43 years old and above	13 (76.5)	4 (23.5)				1.12 (0.77–2.26)	0.34
Education level							
Diploma/certificate	29 (43.3)	38 (56.7)	53.616	8	<0.001	1	
Undergraduate	50 (28.1)	128 (71.9)				1.31 (0.70–2.60)	0.24
Graduate	42 (60.9)	27 (39.1)				0.63 (0.50–1.22)	0.12
Postgraduate	43 (69.4)	19 (30.6)				1.05 (0.40–2.31)	0.21
Doctorate	15 (71.4)	6 (28.6)				1.08 (0.66–1.76)	0.73
Location of educational institution							
Northern region – Perlis, Kedah, Pulau Pinang & Perak	26 (59.1)	18 (40.9)	61.064	8	<0.001	1	
Central region – Selangor, Wilayah Persekutuan & Negeri Sembilan	48 (25.3)	142 (74.7)				1.84 (0.52–2.91)	0.63
Eastern region – Pahang, Terengganu & Kelantan	48 (64.9)	26 (35.1)				1.04 (0.30–2.51)	0.93
Southern region – Melaka & Johor	36 (61.0)	23 (39.0)				1.3 (0.40–2.31)	0.63
East Malaysia – Sabah, Sarawak & Wilayah Persekutuan Labuan	21 (70.0)	9 (30.0)				1.05 (0.50–1.71)	0.24
Type of institution							
Public university	84 (47.5)	93 (52.5)	1.871	2	0.384	1	
Private university	95 (43.2)	125 (56.8)				0.54 (0.14–1.37)	0.26
Nationality							
Malaysian	133 (39.5)	204 (60.5)	28.986	2	<0.001	1	
Non-Malaysian	46 (76.6)	14 (23.3)				0.96 (0.64–2.06)	0.42

$p < 0.05$ is considered statistically significant. The percentages represent the knowledge levels corresponding to each row category.

poor/moderate (51.3%, $n = 121$) and high practices (48.7%, $n = 115$) than male students, which are lesser in the high practice category (35.4%, $n = 57$). Age showed a significant association with practices ($\chi^2 = 18.556$, $p = 0.052$). In this study, the pattern of practice of 18–22-year-old students varied from poor/moderate (52.5%, $n = 53$), and high (47.5%, $n = 48$; Table 6).

Education level does show a significant association ($\chi^2 = 14.933$ $p = 0.046$). Although undergraduate students embody a large portion of those with poor/moderate (51.1%, $n = 91$) and high (48.9%, $n = 87$) practices, they also account for the majority in the low/moderate practice category, suggesting that education level may influence dietary patterns, with students potentially having inconsistent or insufficient knowledge or behaviors related to practices toward fast food consumption.

Discussion

Consumption of fast food among university students has garnered significant attention in recent years, across various demographic factors such as gender, age, and educational level.[14] Studies indicate that fast food consumption is prevalent among both male and female students, but there are notable differences in consumption patterns based on these demographic variables.

Our study found that gender, age, and nationality significantly influence the knowledge, attitude, and practices on fast-food consumption among university students, whereas education level, type of institution, and location of educational institution were less significant. However, analysis of multiple logistic regression showed that gender and age significantly influence the knowledge on fast food

Table 5. Association between sociodemographic characteristics and attitude on fast food consumption among university students ($n = 397$).

Variables	Attitude (*n*, %)						
	Poor/ moderate	High	χ^2	df	*p*-Value	Adjusted OR (95% CI)	*p*-Value
Gender							
Female	123 (52.1)	113 (47.9)	0.651	2	0.772	1.7 (0.51–3.43)	0.63
Male	90 (55.9)	71 (44.1)				1	
Age							
18–22 years old	57 (56.4)	44 (43.6)	13.994	10	0.217	1	
23–27 years old	81 (58.3)	58 (41.7)				1.14 (0.59–2.34)	0.61
28–32 years old	20 (40.8)	29 (59.2)				0.59 (0.37–0.68)	0.07
33–37 years old	21 (50.0)	21 (50.0)				1.76 (0.68–2.17)	0.65
38–42 years old	24 (49.0)	25 (51.0)				1.74 (0.56–2.67)	0.24
43 years old and above	10 (58.8)	7 (41.2)				1.21 (0.70–2.92)	0.69
Education level							
Diploma/certificate	38 (56.7)	29 (43.3)	2.653	8	0.985	1	
Undergraduate	92 (51.7)	86 (48.3)				1.67 (1.59–2.18)	0.09
Graduate	38 (55.1)	31 (44.9)				0.68 (0.25–1.78)	0.60
Postgraduate	34 (54.8)	28 (45.2)				1.75 (0.79–2.76)	0.17
Doctorate	11 (52.4)	10 (47.6)				0.63 (0.34–1.43)	0.25
Location of educational institution							
Northern region – Perlis, Kedah, Pulau Pinang & Perak	27 (61.4)	17 (38.6)	10.493	8	0.206	1	
Central region – Selangor, Wilayah Persekutuan & Negeri Sembilan	103 (54.2)	87 (45.8)				0.8 (0.52–1.71)	0.43
Eastern region – Pahang, Terengganu & Kelantan	34 (45.9)	40 (54.1)				0.76 (0.43–1.54)	0.15
Southern region – Melaka & Johor	31 (52.5)	28 (47.5)				0.62 (0.29–1.50)	0.34
East Malaysia – Sabah, Sarawak & Wilayah Persekutuan Labuan	18 (60.0)	12 (40.0)				0.6 (0.43–1.30)	0.22
Type of institution							
Public university	98 (55.4)	79 (44.6)	0.903	2	0.608	1	
Private university	115 (52.3)	105 (47.7)				1.6 (0.54–3.21)	0.22
Nationality							
Malaysian	190 (56.4)	147 (43.6)	7.875	2	0.012	1	
Non-Malaysian	23 (38.3)	37 (61.7)				0.56 (0.35–1.26)	0.28

$p < 0.05$ is considered statistically significant. The percentages represent the attitude levels corresponding to each row category.

consumption among university students. Research showed that male students tend to consume fast food more frequently than female counterparts. This finding is consistent with the study conducted at the University of Cyberjaya, which reported a higher fast-food consumption rate among male students.[15] This trend aligns with other studies that suggested that males are generally more inclined toward fast food due to factors like taste and convenience.[15,16] Conversely, female students often express greater awareness of health implications associated with fast food which may contribute to lower consumption rates in this particular group.[17]

In terms of knowledge, our study found that female students displayed higher levels of knowledge (62.3%) compared to male students who showed poor/moderate levels of knowledge (55.9%) on fast food consumption. This finding is supported by Gaikwad et al.[18] who reported that 77.6% of female students showed adequate knowledge of fast food consumption compared to 62.2% of male students. Similarly, Didarloo et al.[19] also revealed that female students have greater knowledge of the impact of fast food than male students, with greater health literacy and awareness of nutrition among females. This suggests that gender-based educational strategies might bring benefits to improve knowledge of fast food consumption. However, a study in Iran showed an association between gender and intake of fast food, in which female students consumed fast food at 2.9 times more than male students ($p = 0.008$).[20]

Despite the contrast in knowledge, both male and female students displayed similar attitudes and practices

Table 6. Association between sociodemographic characteristics with practice on fast food consumption among university students ($n = 397$).

Variables	Practice (n/%)						
	Poor/ moderate	High	χ^2	df	p-value	Adjusted OR (95% CI)	p-value
Gender							
Female	121 (51.3)	115 (48.7)	10.553	2	0.005	0.52 (0.29–1.67)	0.17
Male	104 (64.6)	57 (35.4)				1	
Age							
18–22 years old	53 (52.5)	48 (47.5)	18.556	10	0.052	1	
23–27 years old	72 (51.8)	67 (48.2)				0.33 (0.19–1.76)	0.12
28–32 years old	30 (61.2)	19 (38.8)				0.67 (0.34–2.31)	0.56
33–37 years old	29 (69.0)	13 (31.0)				1.14 (0.54–2.21)	0.34
38–42 years old	31 (63.3)	18 (36.7)				1.92 (0.45–2.61)	0.41
43 years old and above	10 (58.8)	7 (41.2)				0.52 (0.31–1.79)	0.33
Education level							
Diploma/certificate	43 (64.2)	24 (35.8)	14.933	8	0.046	1	
Undergraduate	91 (51.1)	87 (48.9)				0.35 (0.12–0.56)	0.08
Graduate	43 (62.3)	26 (37.7)				0.45 (0.22–1.51)	0.23
Postgraduate	33 (53.2)	29 (46.8)				1.24 (0.17–2.51)	0.31
Doctorate	15 (71.4)	6 (28.6)				0.77 (0.37–1.51)	0.44
Location of educational institution							
Northern region – Perlis, Kedah, Pulau Pinang & Perak	26 (59.1)	18 (40.9)	12.722	8	0.117	1	
Central region – Selangor, Wilayah Persekutuan & Negeri Sembilan	98 (51.6)	92 (48.4)				0.45 (0.13–1.11)	0.20
Eastern region – Pahang, Terengganu & Kelantan	48 (64.9)	26 (35.1)				0.63 (0.31–1.32)	0.33
Southern region – Melaka & Johor	37 (62.7)	22 (37.3)				1.41 (0.22–1.74)	0.12
East Malaysia – Sabah, Sarawak & Wilayah Persekutuan Labuan	16 (53.3)	14 (46.7)				0.5 (0.16–1.31)	0.14
Type of institution							
Public university	107 (60.5)	70 (39.5)	2.338	2	0.308	1	
Private university	118 (53.6)	102 (46.4)				1.32 (0.72–2.14)	0.12
Nationality							
Malaysian	184 (54.6)	153 (45.4)	4.298	2	0.117	1	
Non-Malaysian	41 (68.3)	19 (31.7)				0.42 (0.13–1.15)	0.29

$p < 0.05$ is considered statistically significant. The percentages represent the practice levels corresponding to each row category.

toward fast food. This result is further supported by Azman et al.[6] who found that the attitudes and practices between genders among IIUM Malaysia students are not significantly different even though female students generally reported higher knowledge levels.[6] In the present study, it was found that there was no significant association between gender and attitude toward fast food consumption ($p = 0.63$). This finding aligns with a study conducted by Parvin et al.,[14] who showed that gender has no significant effect on fast food consumption or enjoyment ($p > 0.05$). Similar to another previous study conducted in Malaysia by Husin et al.[21] who found that gender has no significant association with the frequency of fast food intake among University of Cyberjaya medical students ($p = 0.2$). This is also parallel with another previous study done in Egypt by El-Gilany et al.,[22] who found there were no differences between genders in fast food consumption ($p = 0.200$). Another study performed in Malaysia by Hatta et al.[23] also showed consistent findings, who revealed that gender did not significantly influence the consumption of fast food ($p = 0.834$). Similarly, Manoharan and Vanoh[24] also reported that there is no statistically significant association between gender and the prevalence of fast food consumption ($p = 0.642$), suggests that unlike the general population where this factor may play a role in shaping fast food preferences, the population in our study may not exhibit the same patterns. This inconsistency could be associated with the unique lifestyle and demands of university students which might overshadow the influence of gender on dietary choices.[24]

In addition, a study conducted by Didarloo et al.[19] in Iran also showed that gender has no significant association with knowledge ($p = 0.27$) and attitudes ($p = 0.63$) on fast food consumption. Although, it was found that female

students tend to have higher levels of nutritional awareness and health literacy than male counterparts. However, the lack of significant differences in attitude and practices suggests that awareness alone may not always translate to adopting a healthier behavior as both male and female students continue to consume fast food at similar rates due to social and environmental factors. In another study conducted in India by Prajapati,[25] it was concluded that male students were more likely to consume fast food compared to female students.

Age also plays a crucial role in fast food consumption patterns. In this study, adult learners showed higher knowledge compared to younger ones. Knowledge levels slightly decline in adult learners with most of them having poor/moderate knowledge. Only a small portion of students aged 38–42 show high knowledge. However, there is no significant association between age (28–32, 33–37, 38–42, and 43 years old and above), and attitude as most of the age groups maintain poor/moderate attitudes toward fast food with younger students showing slightly higher prevalence of high attitudes. On the other hand, as students age, high practice rates decline which suggests that younger students may be more conscious of their fast-food consumption practices than older age groups. This implies that while age impacts knowledge and practices, attitudes may not shift significantly across age groups. According to the study conducted by Arslan et al.[26] and Halim et al.,[27] younger university students, particularly those in their first years, are more likely to consume fast food, which may be due to lifestyle changes and increased independence from parental guidance. However, as students progress in age and academic level, there is a slight increase in awareness of the health risks associated with fast food although it does not necessarily translate to reduced consumption. While older students may possess greater knowledge regarding the adverse health effects, the pressure of academic commitments and the lack of time as university students often lead to unchanged eating practices. This observation suggests that there is a disconnection between knowledge and practice that is consistent across age groups, particularly in environments with easy access to fast food.

A study conducted by Manoharan and Vanoh[24] found that there was no significant association between age and prevalence of fast food consumption ($p = 0.246$). Similarly, Hatta et al.[23] also found that age did not have a significant influence on fast food consumption among young adults in Malaysia. However, a cross-sectional survey done by Man et al.[28] shown that there is a correlation between age and fast food intake ($p = 0.008$) as the study revealed that older age adolescents ranging from 16 to 18 years old were less likely to consume fast food compared to younger adolescents. This may be due to older age adolescents experiencing physical changes due to puberty causing them to encounter body shape problems preventing them from participating in unhealthy dietary food patterns.[28]

The educational level of university students appears to influence fast food consumption. In this study, it was found that educational level influences the knowledge of fast food consumption but not necessarily practices. Our study demonstrated that undergraduates showed the highest knowledge levels (71.9%) with a significant association between educational level and knowledge ($p < 0.001$). This supports the observation that undergraduate students often have a solid understanding of the risks of consuming fast food, though the practice of healthier eating does not always follow. A similar trend can be found in a study conducted by Didarloo et al.,[19] where first-year students had satisfactory knowledge of fast food consumption yet only several still maintained good fast-food practices. Another observation with similar trends was conducted by Dowarah et al.,[29] who reported that younger students usually start with higher enthusiasm to practice healthy eating which tends to diminish as time passes by due to the increased academic pressures and time limitation to prepare homemade meals. Additionally, Mohammadbeigi et al.[20] found that there is a relationship between education level and fast food consumption among students in Iran ($p = 0.040$).

In the present study, it was found that there were no significant associations between education levels on attitudes or practices which differs from other previous studies, suggesting that diploma and undergraduate students consume more fast food than postgraduate students due to academic pressures.[18] In a study done in India by Gaikwad et al.,[18] undergraduate nursing students, for instance, often turn to fast food as a quick and affordable meal option amongst busy schedules and peer influence. In contrast, postgraduate students generally showed a higher level of knowledge in terms of the health risks of fast food. Despite the awareness, these students may not necessarily adopt healthier eating practices due to academic constraints. A similar finding can be seen in a study done in Egypt by El-Gilany et al.,[22] who showed that fast food consumption was more statistically frequent among clinical students than pre-clinical students ($p < 0.001$).

The geographical location of educational institutions within Malaysia, whether urban, suburban, or rural plays a crucial role in influencing knowledge, attitudes, and practices of fast-food consumption among university students. In this study, the results did not reveal a significant association between location and levels of knowledge, attitude, and practices ($p > 0.05$). However, students from the central region and eastern region which are urban areas and rural areas, respectively showed comparable moderate and high knowledge and practice levels, suggesting that location may not be as influential as previously thought. This finding is in contrast with other studies, who assuming that urban students would have higher access and therefore would be more inclined to consume fast food due to urban lifestyle factors. In a study conducted on university students in the northern area of Malaysia, it was found that

students in urban regions had a higher prevalence of fast-food consumption compared to those in rural areas due to the proximity and density of fast-food outlets.[27] Urban students are more exposed to fast food marketing and have easier access to fast food outlets, which significantly influence their dietary habits, whereas students attending universities in more rural or less developed areas typically have less access to fast food which reduces their overall consumption.[15]

Students in the Central Region were found to have a higher level of knowledge on fast food consumption compared to their counterparts in East Malaysia. This disparity may be attributed to better access to infrastructure in the Central Region, including healthcare facilities, educational institutions, and consistent internet and media connectivity. Such access facilitates more frequent exposure to public health campaigns and nutrition-related education. In contrast, students in East Malaysia may face infrastructural limitations, such as less frequent healthcare outreach and restricted access to digital information, which can hinder their exposure to current health education, including the risks associated with fast food consumption. In addition, students in the Central Region are more likely to interact with fast food due to urban lifestyle factors such as convenience, time constraints, and the influence of global food trends, which may further contribute to their heightened awareness of its health implications.

When it comes to types of institutions whether public or private universities have an impact on the consumption of fast foods among university students, the present study found no significant association on the knowledge, attitudes, and practices among university students. In both public and private institutions, students exhibited similar levels of poor/moderate and high practices of fast-food consumption, indicating that institutional type does not necessarily influence consumption behavior. This result contradicts with the findings done by Mohammadbeigi et al.,[20] who showed that there is an association between the type of institutions and fast food consumption ($p = 0.001$). This finding suggests that while accessibility might differ, institutional type alone does not determine fast food consumption patterns among university students, which may instead be influenced by other personal habits or external factors affecting fast food intake such as convenience or affordability beyond the institution type. Studies indicate that students from private universities may have different consumption patterns compared to those from public institutions, possibly due to varying socio-economic backgrounds and accessibility to fast food outlets.[16,17]

The students' nationality also contributes to fast food consumption trends. Malaysian students may have different dietary habits compared to international students, which influenced by cultural perceptions of food and health.[17] Non-Malaysian students might be more inclined to try local fast-food options, which can lead to increased consumption rates among this demographic.[17] In this current study, Malaysian students showed higher levels of knowledge and more poor/moderate attitudes toward fast food consumption in comparison to international students. This study found a statistically significant association between nationality and knowledge or attitudes with Malaysian students representing the largest share of high knowledge and poor/moderate attitude levels when it comes to fast food consumption. This particular finding is in line with other studies suggested Malaysian students might have greater familiarity and accessibility to fast food potentially leading to increased knowledge and more balanced attitudes.

Limitations and recommendation for future research

This study was accessed using convenience sampling, which might contribute to multiple forms of bias. The effects and associations found with a convenience sample might not be generalized to a target population. Despite its limitations, convenience sampling remains a cost-effective, time-efficient, and simpler approach compared to other sampling techniques. In addition, this study was only able to access self-report data, which might contribute to response bias. In-depth interviews of knowledge, attitudes, and practices related to fast-food consumption among university students should be explored using qualitative studies, in the future. Furthermore, this study is limited with the relatively small sample size, which may limit the generalizability of the findings. A small sample size can also reduce the statistical power of the analysis and limit the ability to detect significant associations or differences. Future studies with larger sample populations are recommended to validate and expand this result. Moreover, this study employed a cross-sectional design, which limits the ability to establish causal relationships between the variables studied. Longitudinal follow-up studies are recommended for future research to confirm causality.

Conclusion

The consumption of fast food among university students is a multifaceted issue influenced by various demographic and socio-economic factors. Gender, age, and nationality emerged as significant factors shaping students' knowledge, attitudes, and practices of fast food consumption, while educational level, type of institution, and location showed less pronounced effects. The findings revealed that male students generally consume more fast food than females, with females displaying higher levels of knowledge and awareness on the health risks associated with such consumption. However, both genders exhibited similar attitudes and practices, indicating that knowledge does not always correlate with healthier eating behaviors. This suggests that factors such as socio-economic background, convenience, cost, peer influence, and personal habits may play a more significant role in shaping students' eating

patterns than the educational environment itself. While age influences knowledge levels, it does not significantly impact students' attitudes or consumption practices, with younger students showing more conscientious eating habits. This disconnects between awareness and actual food choices suggest the need for more effective strategies to encourage the adoption of healthy eating practices, particularly among older students. Nationality also plays a role in shaping dietary habits, with Malaysian students demonstrating greater familiarity with and poor/moderate attitudes toward fast food. Furthermore, this study challenges assumptions about the influence of institutional type and location on fast food consumption, as no significant differences were found between public and private universities or urban and rural institutions. Addressing the information gaps will provide the higher education sector, public health stakeholders, and government actionable insights to properly plan and implement nutrition policies, as well as encourage healthier eating practices and reduce the prevalence of fast food consumption, ultimately contributing to improved public health outcomes in Malaysia. Overall, the study underscores the importance of considering a range of socio-demographic factors when developing interventions aimed at promoting healthier eating behaviors. Tailored strategies that address the unique cultural, social, and environmental influences on university students' dietary choices can improve efforts to curb excessive fast food consumption.

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Ethical considerations

Ethical approval was granted by the Research Ethics Committee of Management and Science University (Ethics Code: EA-L1-01-FHLS-2024-10-0029).

Consent to participate

Written informed consent was obtained from a legally authorized representative(s) for anonymized participant information to be published in this article.

Consent for publication

Written informed consent was obtained from the participants for anonymized participant information to be published in this article.

Author contributions

SZHSHH collected the data, conducted the statistical analysis, and interpretation of the findings. BLT conceptualized, designed, performed validation and reliability of the questionnaire, formal Analysis, wrote the original draft, and wrote and edited the manuscript. MEN reviewed and edited the manuscript. All authors read and approved the final manuscript.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: We would like to thank the MSU Publication Grant (MPG) under MSU Research Grant Scheme (MRGS) Phase 02-2025 (MPG-007-022025) for financial support. In addition, we would like to acknowledge all volunteers for spending their valuable time to participate in the study.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability statement

All the data supporting our findings have been presented in the manuscript; the datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Supplemental material

Supplemental material for this article is available online.

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