

Relationship Between Nutrition Knowledge, Attitude and Practice (NKAP), Self-Efficacy of Healthy Eating with Body Mass Index (BMI) Status Among Undergraduate Students: A Cross-Sectional Study

Adriana Yusni¹, Divya Vanoh^{1*}, Nur Syakirah Mohd Salleh²

¹Dietetics Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan

²Nutrition Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan

*Corresponding author: divyanoh@usm.edu.my

Received: 13th March 2023

Accepted: 27th August 2023

Published: 20th October 2023

Abstract

Healthy eating is an approach to prevent obesity, hypertension, diabetes mellitus, and cardiovascular disease. This study aimed to determine the level of nutrition knowledge, attitude, and practice (NKAP), level of self-efficacy of healthy eating, and their relationship with body mass index (BMI) among undergraduate students. A cross-sectional study was conducted on 107 undergraduate students aged 19 to 28 years old, selected using convenience sampling in Universiti Sains Malaysia (USM) from August 2021 until October 2021. A self-administered questionnaire including the KAP questionnaire and self-efficacy of the healthy eating scale was distributed to the participants via Google Form. The level of good knowledge was 95.3%, good attitude was 79.4% but good practice was only 36.4%. Overall, the prevalence of nutrition knowledge, attitude, and practice (NKAP) was good at 82.2%. The total median score of self-efficacies in healthy eating was 28.0 (7.0). A significant association was found between the availability of healthy and unhealthy foods with practice ($p=0.012$, $p=0.019$). Moreover, a significant association was found between age and awareness of the Malaysian Food Pyramid with NKAP ($p=0.039$, $p=0.005$ respectively). Hence, a significant association was found between NKAP and self-efficacy of healthy eating ($p=0.008$). However, the present study revealed that there was no significant association between NKAP with BMI, and self-efficacy of healthy eating with BMI ($p=0.541$, $p=0.064$). Good nutrition knowledge and attitude alone were insufficient for the changes in individuals' healthy eating practices as most university students had suboptimal eating behaviour in their daily lifestyle. Therefore, strategies were needed to practice healthy eating among university students such as organizing projects which involve the students themselves in preparing healthy meals.

Keywords

Nutrition knowledge, attitude, practice, self-efficacy, healthy eating, body mass index

Introduction

Healthy eating is an approach to prevent obesity, hypertension, diabetes mellitus, and cardiovascular disease. Over the past years, the prevalence of overweight and obesity is continuously increasing at an alarming rate over the world. In the National Health and Nutrition Examination Survey (NHANES), 60.3% of adults aged 20-39 years were overweight and obese^[1]. BMI had increased significantly in 2018 among male and female students. A cross-sectional study conducted among 372 university students in Malaysia revealed that the prevalence of underweight and overweight or obese were 18.3% and 13.2% respectively^[2]. The prevalence of underweight was higher in females at 23.3% as compared to 10% in males. Besides that, the prevalence of overweight and obese was higher in males is 19.3% as compared to females, at 9.5%^[2]. Moreover, during the stage of adulthood, adults aged between 18 to 25 years old are susceptible to weight gain due to the modification of dietary patterns such as skipping breakfast, social activities, and eating outside the home^[3].

Nutrition knowledge consists of diet and health, diet and disease, essential nutrients in foods, and dietary guidelines and recommendations^[4]. Therefore, nutrition knowledge had become an important factor in influencing preferences for healthy and nutritious diets. In addition, nutritional attitudes and practices of individuals play important roles in improving the healthy eating of an individual. According to Kolodinsky and colleagues, increased nutritional knowledge of dietary guidelines was found to be positively correlated to healthier eating practices among university students^[5]. A study conducted among university students in Malaysia reported that students had a good level of knowledge (74.0%), and a good attitude (80.3%) but were poor in practice (78.0%). Another study by University Malaysia, Sarawak (UNIMAS) stated that the level of nutrition knowledge was higher but did not reach a satisfactory level^[6]. The study also stated that students had a satisfactory level of attitude but were poor in practice. Even though, students showed that they have a good level of nutrition knowledge but most of them did not practice healthy eating habits in their daily life. Therefore, to develop the practice of healthy eating among students, they need to change their behaviours.

A theory of health behaviours shows that increasing self-efficacy over time will lead to behavioural change. Self-efficacy would modify their behaviour toward healthy eating and have a low chance to relapse into their previous eating habits^[7]. A study conducted among university students at Nigde University, Turkey, showed that students from the health education department had a higher mean score of self-efficacy which is 26.73 as compared to students from the economics department which is 22.39^[8]. Next, health sciences students were more likely to have higher self-efficacy as compared to arts and sciences students. In addition, students who apply for food and nutrition courses at university tend to have higher self-efficacy than students who had not taken that course^[9].

This study aimed to determine the level of nutrition knowledge, attitude, and practice (NKAP), level of self-efficacy of healthy eating, and their relationship with body mass index (BMI) among undergraduate students in USM Kubang Kerian, Kelantan.

Materials and Methods

A cross-sectional study was conducted on 107 undergraduate students, selected using convenience sampling in USM Kubang Kerian, Kelantan from August 2021 until October 2021. This research included all three schools in Universiti Sains Malaysia, Kubang Kerian which are the School of Medical Sciences, School of Dental Sciences, and School of Health Sciences. Undergraduate students aged 18 years and above, healthy individuals, free from any chronic disease, and Malaysian were selected. Those individuals clinically diagnosed with memory impairment, or mental disorders, who were involved in dietary or weight reduction programmes, and international and postgraduate students were excluded from this study.

Ethical approval had been obtained from the Human Ethical Committee of Universiti Sains Malaysia (USM/JEPeM/21060446).

Study Instruments

The data collection were carried out by a self-administered questionnaire via an online form (Google form) in the English language. Socio-demographic and anthropometry data were collected. Current weight and height were self-reported by participants. Weight was recorded to the nearest kg while height was assessed to the nearest cm. Participants were required to identify their weight and height to assist in the calculation of BMI. Body mass index (BMI) was calculated using self-reported body weight in kg units divided by square height in meter units (kg/m^2). The classification followed BMI cut-off points from World Health Organization (WHO). The classification of BMI was: underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), normal ($\text{BMI} = 18.5\text{--}24.9 \text{ kg/m}^2$), overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$), and obese ($\text{BMI} \geq 30 \text{ kg/m}^2$)^[10].

The knowledge, Attitude and Practice (KAP) questionnaire was used to assess nutrition knowledge among university students^[11]. This self-administered questionnaire was majorly focusing on healthy eating and was adopted from the Ministry of Health (MOH), Lifestyle Campaign 1997 and few questions were developed based on Malaysia Dietary Guidelines 2010 by the MOH, Malaysia. This questionnaire was previously used in another study by Hassan et al. (2015) which used this questionnaire among private university students in Malaysia^[11]. KAP consists of three parts and a total of 34 questions. Score of 1 will be given for the right answer and a score of zero for the wrong answer. The first part was related to the factors that influence healthy eating. The second part was about the knowledge of healthy eating. The third part contained attitude questions and the last part consisted of questions about practice towards healthy eating. Nutrition knowledge was based on Malaysian Dietary Guidelines published in 2010 which consists of 13 statements such as 'rice and bread contain more carbohydrate compared to fruits and vegetables'. Each item in the Nutrition Knowledge section will have three answer options namely "true", "false" or "do not know". Participants are required to choose either one answer. The mark ranges from zero (minimum) to thirteen (maximum). Meanwhile, the attitude part consists of 8 questions and students need to choose whether they "agree", "disagree" or "not sure" for that question. The minimum mark was 0 and the maximum mark was 8. Finally, the practice section consists of 13 questions. The scoring for the KAP was based on the study by Hassan et al (2015)^[11]. A total mark of 50% and above for each part was considered good knowledge, attitude, and practice. Meanwhile, a total mark of less than 50% was considered as poor knowledge, attitude, and practice^[11].

Next, the self-efficacy for healthy eating scale was used to assess the self-efficacy of healthy eating among university students. This scale was developed from the Project EAT-II Survey, consisting of six items^[12]. The self-efficacy healthy eating scale had been previously used in a study involving secondary school students in Malaysia^[13]. In this questionnaire, students were asked either if they were confident that they could change or maintain their eating patterns. All items were scored using a 6-point Likert scale (1-not at all confident to 6-very confident). The total score for this scale was obtained via the summation of the scores of each item. The scores for self-efficacy of healthy eating ranged from 1 to 36. High scores will indicate high self-efficacy for healthy eating^[13].

Data analysis

In this research, IBM SPSS Statistic version 26.0 was used for data analysis. Descriptive statistics were used to summarise the socio-demographic characteristics of participants. Based on their normality distribution, numerical data were presented as mean (SD) or median (IQR). Categorical data were presented as frequency (percentage). Association between one numerical and one categorical variable was tested using the independent t-test if normally distributed or the Mann-Whitney test if not normally distributed. Next, the association between two numerical variables was tested using Pearson correlation if normally

distributed or Spearman correlation if not normally distributed. The significance level is set at a p-value of less than 0.05.

Results

Socio-demographic characteristics

A total of 107 undergraduate students in USM Kubang Kerian, Kelantan participated in this study. The mean age was 21.8 ± 1.4 years. The majority of participants were females (84, 78.5%) and the remaining were males (23, 21.5%). For school, most of the participants were from Health Sciences school (76, 71.0%), 15.0% were from Medical Sciences and 14.0% were from Dental Sciences. Anthropometric measurements of the students showed that the median BMI was 21.6 (4.6) kg/m² (Table 1).

Table 1: Socio-demographic characteristics of participants

Socio-demography		Total, N=107	
		Frequency (N)	Percentage (%)
Age (years)	Mean (SD) 21.8 (1.4)		
Gender	Male	23	21.5
	Female	84	78.5
Ethnicity	Malay	85	79.4
	Chinese	11	10.3
	Indian	3	2.8
	Others	8	7.5
Schools	Medical Sciences	16	15.0
	Dental Sciences	15	14.0
	Health Sciences	76	71.0
Current living status	At home	73	68.2
	On campus	32	29.9
	Living alone	2	1.9
Household income (MYR)	< RM 3,000	38	35.5
	RM 3,000-RM 10,000	46	43.0
	> RM 10,000	23	21.5
Current financial assistance	Loan	44	41.1
	Scholarship	42	39.3
	Own money	21	19.6
BMI (kg/m²)	Underweight	18	16.8
	Normal	68	63.6
	Overweight	15	14.0
	Obese	6	5.6

Level of Nutrition Knowledge, Attitude, and Practice

The majority of students can be categorized into good nutrition knowledge (95.3%). Female students showed a higher number of having good nutrition knowledge (n=82, 97.6%) as compared to male students (n=20, 87%). Moreover, a total of 79.4% of participants showed a good attitude toward healthy eating where 81.0% from female, and 73.9% from male students. However, the practice of healthy eating among undergraduate students in USM Kubang Kerian was poor where majority (63.6%) of students have a poor practice of healthy eating. In addition, 82.2% (n=88) of the participants have a good level of nutrition knowledge, attitude, and practice as compared to 17.8% (19 students) with poor levels of nutrition knowledge, attitude, and practice (Table 2).

There was a significant difference between age and nutrition knowledge, attitude, and practice (NKAP), tested using the independent t-test ($p=0.039$). The mean age was higher at a good level of NKAP than at a poor level of NKAP with a mean difference of 0.74 years (95% CI of mean difference: -1.44, -0.04). However, there was no significant difference between the level of NKAP and gender, tested using Fisher's exact test ($p=0.759$).

Table 2: Level of nutrition knowledge, attitude, and practice

Indicators	Gender		X ² (df)		p-value
	Male (n= 23)	Female (n= 84)	Total (N=107)		
Level of nutrition knowledge, n (%)					
Good	20(87.0)	82(97.6)	102(95.3)		0.065 ^b
Poor	3(13.0)	2(2.4)	5(4.7)		
Level of attitude, n (%)					
Good	17(73.9)	68(81.0)	85(79.4)		0.561 ^b
Poor	6(26.1)	16(19.0)	22(20.6)		
Level of practice, n (%)					
Good	9(39.1)	30(35.7)	39(36.4)	0.091(1)	0.763 ^a
Poor	14(60.9)	54(64.3)	68(63.6)		
Level of nutrition knowledge, attitude, and practice, n (%)					
Good	20(87.0)	68(81.0)	88(82.2)		0.759 ^b
Poor	3(13.0)	16(19.0)	19(17.8)		

^b Tested using Fisher's exact test

^a Tested using Pearson's Chi-square test

Besides that, there was a significant association between the availability of healthy foods with the practice of healthy eating, tested using Pearson's Chi-square test ($p=0.012$, $p=0.016$). In addition, it was reported that there was a significant association between the availability of unhealthy foods with the practice of healthy eating, tested using Pearson's Chi-square test ($X^2=5.512$, $p=0.019$). Furthermore, there was a significant association between the awareness of the Malaysian Food Pyramid with NKAP, tested using the Fisher exact test ($p=0.005$) (Table 3).

Table 3: Factors associated with nutrition knowledge, attitude, and practice (NKAP)

Indicators	Yes (%)	No (%)	Level of practice		X ²	p-value
			Good	Poor		
Availability of healthy food						
Q1: Is healthy food like fruits, vegetables, less fat, salt, and sweet food sufficient in or near your campus?	71(66.4)	36(33.6)	20	51	6.245	0.012 ^a
Q2: Is it easy to find healthy food like fruits and vegetables, less fat, less salty, and less sweet food in or near your campus?	68(63.6)	39(36.4)	19	49	5.829	0.016 ^a

Availability of unhealthy food						
Q3: Are there many restaurants and shops that sell fast food and junk food in or near your campus?	98(91.6)	9(8.4)	38	60		0.151 ^b
Q4: Do you buy fast or junk food in or near your campus?	91(85.0)	16(15.0)	29	62	5.512	0.019 ^a
	Yes (%)	No (%)	Level of NKAP		X²	p-value
			Good	Poor		
Awareness factor						
Q8: Do you know about the Malaysian Dietary Guidelines?	66(61.7)	41(38.3)	58	8	3.746	0.053 ^a
Q9: Do you know about the Malaysian Food Pyramid?	104(97.2)	3(2.8)	88	16		0.005 ^b
	Level of NKAP		Mean diff (95% CI)		t-stats (df)	p-value
	Good	Poor				
Age (years) Mean (SD)	21.9 (1.4)	21.2 (1.2)	0.74 (-1.44, -0.04)		-2.10 (105)	0.039 ^c

NKAP; Nutrition Knowledge, Attitude, and Practice.

In all of the analyses, a p-value of <0.05 was considered significant.

^b Tested using Fisher's exact test

^a Tested using Pearson's Chi-square test

^c Tested using Independent t-test

Level of self-efficacy of healthy eating

A total median score of self-efficacies of healthy eating of 107 undergraduate students was 28.0 (7.0). Male students showed a high level of self-efficacy in healthy eating with a median score of 29.0 (7.0) as compared to female students with a median score of 28.0 (7.0). However, there was no significant difference in the level of self-efficacy of healthy eating between gender, as tested using the Mann-Whitney U test ($p = 0.651$). From analysis, there was a significantly different level of self-efficacy of healthy eating between the three schools, tested using the Kruskal Wallis test ($p = 0.035$). Dental sciences school has a significantly higher self-efficacy of the healthy eating score (30.0, IQR 5.0) compared to medical sciences school (25.0, IQR 8.0). However, there is no significant difference in scores between medical and health sciences schools, and dental and health sciences schools (Table 4).

Table 4: Level of self-efficacy of healthy eating

Indicators	Maximum possible score	Median (IQR)	Median (IQR)	Median (IQR)	Z statistic	P value
Self-efficacy of Healthy Eating		Male (n= 23)	Female (n= 84)	Total (N=107)		
Median total score	36	29.0 (7.0)	28.0 (7.0)	28.0 (7.0)	0.452	0.651 ^a
Self-efficacy of Healthy Eating		Medical sciences (n=16)	Dental sciences (n=15)	Health sciences (n=76)		

Median total score	36	25.0 (8.0)	30.0 (5.0)	28.0 (6.0)	0.035 ^b
---------------------------	----	------------	------------	------------	--------------------

^a Mann Whitney U test, ^b Kruskal Wallis Test

*Post Hoc with Bonferroni's correction

Medical vs dental, P=0.05, Medical vs health, P=0.36, Dental vs health, P=0.1

Relationship between level of nutrition knowledge, attitude, and practice (NKAP), self-efficacy of healthy eating, and body mass index (BMI)

There was no significant relationship between body mass index and level of nutrition knowledge, attitude, and practice ($p=0.541$), tested using Mann-Whitney test. Moreover, there was no significant relationship between self-efficacy of healthy eating and BMI, tested using Spearman's rank correlation ($p=0.064$, $r = -0.180$).

There was a significant relationship between practice and self-efficacy in healthy eating ($p=0.010$). The median self-efficacy of the healthy eating score of participants with good practice (30.0,5.0) was significantly higher compared to scores of those with poor practice (27.0,8.0). In addition, there was a significant relationship between NKAP and self-efficacy of healthy eating ($p=0.008$). The median self-efficacy of the healthy eating score for participants with good NKAP (29.0,6.0) was significantly higher as compared to their counterpart (24.0,7.0) (Table 5).

Table 5: Relationship between level of nutrition knowledge, attitude and practice (NKAP), self-efficacy of healthy eating, and body mass index (BMI)

Variable	BMI (kg/m ²) Median (IQR)	p-value	Self-efficacy of healthy eating Median (IQR)	p-value
Level of Nutrition Knowledge ^a				
Good (n=102)	21.6 (4.7)	0.953	29.0 (6.0)	0.270
Poor (n=5)	20.6 (4.3)		25.0 (11.0)	
Level of Attitude ^a				
Good (n=85)	21.6 (4.5)	0.646	29.0 (7.0)	0.215
Poor (n=22)	21.6 (5.3)		27.0 (7.0)	
Level of Practice ^a				
Good (n=39)	21.2 (4.1)	0.267	30.0 (5.0)	0.010*
Poor (n=68)	21.7 (6.1)		27.0 (8.0)	
Level of Nutrition Knowledge, attitude, and practice ^a				
Good (n=88)	21.6 (4.5)	0.541	29.0 (6.0)	0.008*
Poor (n=19)	22.0 (6.2)		24.0 (7.0)	
Self-efficacy of healthy eating ^b		0.064		

*p value <0.05 was considered significant.

^a Mann Whitney U test

^b Spearman's rank correlation

Discussion

The main finding of this study revealed that undergraduate students in USM Kelantan had a good level of knowledge (95.3%), and a good attitude (79.4%) but poor practice (63.6%). The finding of the KAP level was similar to a previous study in Selangor^[11]. Nevertheless, a study among university students in Sarawak showed a good level of attitude but poor knowledge and practice^[6]. The study by Aung and colleagues found the level of nutrition knowledge, attitude, and practice was higher among health sciences students as compared to medical and dental students (82.9%, 81.3%, and 80.0% respectively)^[6]. They also suggested that health sciences students have good knowledge of healthy eating than those from the main campus due

to these students were more exposed to information on healthy eating from various sources such as lectures, seminars, and reading materials in the school.

A previous study of KAP among university students in Selangor reported that there is a significant association between knowledge and gender in which female students had good knowledge of healthy eating as compared to male students^[11]. Even though our study reported that the level of nutrition knowledge was higher among female students than male students, it was not significantly associated with their knowledge, attitude, and practice. This might be due to the large gap between female and male participants in this current study.

Besides that, a significant difference in NKAP was found in the age ($p=0.039$) in which students with a median age of 21.90 years old had a good level of NKAP as compared to their counterparts. Other than that, there was a significant association between awareness of the Malaysian Food Pyramid with NKAP ($p=0.005$). Therefore, it was concluded that students who were aware of the Malaysian Food Pyramid had a good level of NKAP as compared with others. Moreover, it was reported that there was a significant association between the availability of healthy foods with the practice of healthy eating ($p=0.012$, $p=0.016$). This result showed that the availability of healthy foods had significantly influenced the practice of healthy eating among undergraduate students at USM Kubang Kerian. Given that there is sufficient healthy food supply near or in the campus area, it will be easy for students to buy healthy foods every day and thus, they can practice a healthy lifestyle in their daily diet better. The environment on the campus also plays an important role for the students such as providing sufficient sources of healthy foods on the campus so that students can practice healthy food purchasing habits^[9]. In addition, it was reported that there was a significant association between the availability of unhealthy foods with the practice of healthy eating ($p=0.019$). Students who bought fast or junk food near or on the campus had a poor level of practice on healthy eating than those students who did not buy the foods. This indicates that the availability of unhealthy foods near the campus area had a great impact on unhealthy eating habits among university students.

The finding of this study revealed that the score of self-efficacies of healthy eating among undergraduate students in USM was 28.0. In this current study, the level of self-efficacy of healthy eating had no significant difference between gender. Our finding was in contrast with other studies which reported that female students had a higher level of healthy eating self-efficacy as compared to males^[1,14]. In addition, this study found that there was a significant association between the level of self-efficacy of healthy eating and the area of study. It was revealed that dental sciences students had a higher score of self-efficacy of healthy eating (30.0) as compared to medical sciences (25.0), and health sciences students (28.0). The study also indicated that most the students had a higher level of self-efficacy toward healthy eating. This finding was in line with a study by Matthews in 2016 which stated that health sciences students had significantly higher levels of self-efficacy in healthy eating as compared to the art and social sciences students^[9]. Health sciences students were thought to have a higher level of healthy eating self-efficacy because they are confident to consume more vegetables and fruits and avoid high-calorie foods as compared with arts and social science schools.

The overall findings of this study reported that undergraduate students in USM Kubang Kerian, Kelantan has normal weight with a median BMI of 21.60 kg/m². The median BMI among USM students in Kelantan was slightly higher than the mean BMI among USM students in Penang which were 20.81 kg/m² but lower than the mean BMI among Universiti Putra Malaysia (UPM) students which were 22.17 kg/m² ^[15]. Apart from that, almost half of the participants have normal BMI ($n=68$, 63.6%), while 19.6% of the participants were overweight and obese and the remaining participants (16.8%) were underweight.

In the present study, there was no significant association between the level of nutrition knowledge, attitude, and practice with BMI. This study was similar to a previous study among university students in Selangor, which reported no significant association between BMI and KAP^[11]. This showed that even though undergraduate students in USM reported a good level of nutrition knowledge, attitude, and practice but they did not apply their nutrition knowledge and attitude to their diet and daily lifestyle which in turn is not translated into their nutrition status. This statement was supported by Hassan and colleagues, which reported students from all BMI groups have low awareness of the importance of healthy eating and never practiced healthy lifestyles in their daily life^[11]. A similar finding could be seen in the other studies where BMI status was higher even though these individuals had a good level of nutrition knowledge^[16,17]. Next, based on current findings, there was no significant association between self-efficacy of healthy eating and BMI. This finding was similar to a study by Stephen et al., which reported that BMI was not associated with self-efficacy for healthy eating as individuals with high self-efficacy scores were related to better eating habits^[1].

Apart from that, our study also revealed that there was a significant association between NKAP and self-efficacy in healthy eating. It found that students with a good level of NKAP had higher scores of self-efficacies in healthy eating. A high level of nutrition knowledge will contribute to good attitudes and practices in healthy eating. In order, to continue practicing healthy eating in our daily life, self-efficacy of healthy eating is needed to motivate individuals to consume healthy foods^[18].

Conclusion

It was undeniable that nutrition knowledge, attitude, and practice and self-efficacy of healthy eating were important factors for influencing preferences for healthy diet among university students. Moreover, it also played important role in improving the healthy diet of an individual. However, we found that having good nutrition knowledge and attitude among university students was not satisfactory for the changes in individuals' food behaviour as most of them did not have good practices of healthy eating in their daily lifestyle. Moreover, existing health and nutrition education to the students and the inclusion of healthy eating in nutrition courses alone was not sufficient to motivate them to practice healthy eating in their daily life. The practice of healthy eating was mostly followed by their desire, taste, and preferences instead of choosing food for health purposes. Therefore, strategies were needed to improve practice of healthy eating among university students such as organizing healthy cooking demonstration and competition which allows students to be involved in preparing healthy meals. Besides, entrepreneur projects for preparing and selling healthy food can be another strategy for involving students in practicing healthy meal preparation.

Acknowledgements

Our sincere appreciation and gratitude are extended to all participants from Universiti Sains Malaysia, Kelantan for their cooperation throughout this study.

References

1. Stephens JD, Althouse A, Tan A, Melnyk BM. The Role of Race and Gender in Nutrition Habits and Self-Efficacy: Results from the Young Adult Weight Loss Study. *J Obes.* 2017;2017. doi:10.1155/2017/5980698
2. Abdul N, Kutty M, Ru TY, Hwang V, Chiang Q, Zhi WY. Association of Dietary Habits and Body Mass Index among University Students in Malaysia. *IOSR J Nurs Heal Sci Ver I.* 2015;4(5):2320-1940. doi:10.9790/1959-04517885
3. Poobalan AS, Aucott LS, Clarke A, Smith WCS. Diet behaviour among young people in transition to adulthood (18–25 year olds): a mixed method study. *Heal Psychol Behav Med.* 2014;2(1):909-928. doi:10.1080/21642850.2014.931232

4. Priya R, Sinha M. Nutritional knowledge and nutritional status amongst university students. *IP J Nutr Metab Heal Sci*. 2020;3(1):22-25. doi:10.18231/J.IJNMHS.2020.005
5. Kolodinsky J, Harvey-Berino JR, Berlin L, Johnson RK, Reynolds TW. Knowledge of current dietary guidelines and food choice by college students: better eaters have higher knowledge of dietary guidance. *J Am Diet Assoc*. 2007;107(8):1409-1413. doi:10.1016/J.JADA.2007.05.016
6. Aung P, Fong CS, Azman K, Zulkifeli NA, Hong YS. Knowledge, Attitude, and Practice of Healthy Eating Among the 1st and 2nd Year Students of Universiti Malaysia Sarawak (UNIMAS). *Int Conf Nutr Food Sci*. 2012;39:188-294.
7. Fitzgerald A, Heary C, Kelly C, Nixon E, Shevlin M. Self-efficacy for healthy eating and peer support for unhealthy eating are associated with adolescents' food intake patterns. *Appetite*. 2013;63:48-58. doi:10.1016/J.APPET.2012.12.011
8. Yilmaz G. The correlation between nutrition and university students' self-efficacy. *Int J Acad Res*. 2014;6(1):232-239. doi:10.7813/2075-4124.2014/6-1/B.33
9. Matthews JI, Doerr L, Dworatzek PDN. University Students Intend to Eat Better but Lack Coping Self-Efficacy and Knowledge of Dietary Recommendations. *J Nutr Educ Behav*. 2016;48(1):12-19.e1. doi:10.1016/J.JNEB.2015.08.005
10. WHO. A healthy lifestyle - WHO recommendations. Published May 6, 2010. Accessed March 13, 2023. <https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle---who-recommendations>
11. Hassan MR, Ghazi HF, Umar NS, et al. Knowledge, attitude and practice of healthy eating and associated factors among university students in Selangor, Malaysia. *Pakistan J Nutr*. 2015;14(12):892-897. doi:10.3923/PJN.2015.892.897
12. Neumark-Sztainer D, Wall M, Haines J, Story M, Eisenberg ME. Why does dieting predict weight gain in adolescents? Findings from project EAT-II: a 5-year longitudinal study. *J Am Diet Assoc*. 2007;107(3):448-455. doi:10.1016/J.JADA.2006.12.013
13. Rezali FW, Chin YS, Shariff ZM, Mohd Yusof BN, Sanker K, Woon FC. Evaluation of diet quality and its associated factors among adolescents in Kuala Lumpur, Malaysia. *Nutr Res Pract*. 2015;9(5):511. doi:10.4162/NRP.2015.9.5.511
14. Xu X, Pu Y, Sharma M, Rao Y, Cai Y, Zhao Y. Predicting Physical Activity and Healthy Nutrition Behaviors Using Social Cognitive Theory: Cross-Sectional Survey among Undergraduate Students in Chongqing, China. *Int J Environ Res Public Health*. 2017;14(11). doi:10.3390/IJERPH14111346
15. Huda N, Ahmad R. Preliminary survey on nutritional status among university students at Malaysia. *Pakistan J Nutr*. 2010;9(2):125-127. doi:10.3923/PJN.2010.125.127
16. Pandit-Agrawal D, Khadilkar A, Chiplonkar S, Khadilkar V. Knowledge of nutrition and physical activity in apparently healthy Indian adults. *Public Health Nutr*. 2018;21(9):1743-1752. doi:10.1017/S1368980017004268
17. Yu J, Han X, Wen H, Ren J, Qi L. Better Dietary Knowledge and Socioeconomic Status (SES), Better Body Mass Index? Evidence from China—An Unconditional Quantile Regression Approach. *Nutr* 2020, Vol 12, Page 1197. 2020;12(4):1197. doi:10.3390/NU12041197
18. Nastaskin RS, Fiocco AJ. A survey of diet self-efficacy and food intake in students with high and low perceived stress. *Nutr J*. 2015;14(1):1-8. doi:10.1186/S12937-015-0026-Z/FIGURES/2