Meal Source Preferences (MPS) among Young Adults in Terengganu and Its Association with Sociodemographic Background and Body Weight Status

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Abstract

Obesity is becoming a global health concern in a world defined by rapidly changing lifestyles and eating habits. Young adults, as catalysts of change and advocates for a healthier future, are at the forefront of the struggle against this epidemic. Changes in urbanization and environmental conditions are acknowledged as contributors to shifts in the dietary preferences of young adults, leading to less favorable eating habits. These changes manifest as decreased consumption of fruits, vegetables, whole grains, and legumes, alongside increased consumption of fast food, sugary snacks, and beverages, as well as higher quantities of meat and fish. This cross-sectional study was carried out to determine the association of socio-demographic factors with meal source preferences and body weight status among young adults in Terengganu. A total of 399 young adults aged 18 to 35 years old were recruited as subjects. Participants were asked to complete an online self-administered questionnaire on sociodemographic and Meal Sources Preferences and Frequency Questionnaire. In general, young adults prefer to eat out-of-home meals on occasion basis. The study discovered that females (60.5%) and those who live in semi-urban and urban areas (63.4%) prefer home-cooked meals (HCMs). Education levels, marital status, employment status, and family income had no discernible relationships with the consumption of HCMs ($p>0.05$). Additionally, none of the sociodemographic factors substantially link to outside meals (OMs) ($p>0.05$). However, the study managed to find an association between OMs and body weight status ($p< 0.05$). Most of the young adults prefer to have outside meals three to four times per week, regardless of their body weight status (87.7%). Individuals who were overweight tends to choose outside meals more than home cooked meals. Given the limits of the study, more vigorous data collection would be required to unveil exactly how sociodemographic variables influence meal source preferences and body weight status.

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Introduction

Over the past few decades, there has been a marked increase in the prevalence of overweight and obesity among adults around the world, making it a global health issue that is placing an increasing burden on public healthcare spending [1]. More recent evidence highlights an alarming rise in overweight, obesity, and abdominal obesity prevalence among adults in Malaysia. Today, one in two adults in Malaysia were considered overweight or obese [2]. Obesity, characterised as having Body Mass Index (BMI) above 30 kg/m^2, impacts adults with many serious implications towards health and diseases, such as impaired glucose tolerance and diabetes mellitus, hypertension, heart disease and pulmonary abnormalities, metabolic syndrome, cancer, and much more [3]. For these reasons, it is critical to recognize and manage the variables that influence young adults' weight status in order to curb this trend.

Risk factors for obesity, both hereditary and non-genetic, are numerous and complex [4]. Apart from genetics, social and environmental factors are believed to significantly influence one's weight status and eating patterns [5]. Numerous studies have shown that one of the key factors of food consumption and choice is how people choose their meals [5][6]. Young adults are frequently reported to have negative eating habits, with reduced intake of fruits, vegetables, whole grains and legumes, meats and fish, and a higher intake of fast food, sweets food or beverages [7]. It is becoming more common across the world that young adults prefer eating less home-cooked meals and more food that are prepared out-of-home [8].

In literature, Home-cooked Meals (HCMs) usually refers as practiced behavior of consuming meals prepared at home. It can be a family-shared meal or any other criteria that represent the food being prepared or cooked at home with raw ingredients bought in groceries or markets [9]. One of the well-known advantages of eating at home is that it leads to better nutritional outcomes, which lowers the risk of obesity and overweight in young people [9]. In industrialized nations (United Kingdom, Australia, etc), preparing and eating food at home is often associated with several advantages, such as an increase in certain nutrients like calcium and a decrease in the consumption of others like fat. This increases the consumption of healthier food groups, compliance with dietary recommendations, the likelihood of acquiring a longer lifespan, and a reduction in the risk of non-communicable diseases [10][11].

However, it has become more common for modern people, especially young people, to opt to have meals outside from home. For instance, in 2012, food cooked and consumed outside the home accounted for roughly 10% of the total daily energy intake of UK citizens, with up to an extra 4% coming from takeout food consumed inside the home [8]. Out-of-home food sources include vending machines, convenience stores, takeaways, supermarkets, cafes, and restaurants are considered as outside meals (OM) [12]. Children's consumption of outside meals tends to rise with age, peaking in late adolescence or early adulthood [7]. Despite their popularity, outside meals are typically thought to be less healthy than home-cooked meals since they are generally more calorically dense and include more total fat and sugar [13][14]. Although some studies have found that some meals eaten away from home may be healthier options, the evidence circulating on the negative effects of dining away from home is stronger and more numerous [8][10][15][16].

Young adulthood is a distinct and crucial stage of development where intentional prevention and intervention measures still have the potential to change course and lessen health risks throughout the adult life span [17]. Therefore, it is imperative to better comprehend the social factors connected to choices for meal sources. Since data on young adults in Malaysia is scarce, the paper is determined to understand the association of socio-demographic factors (gender, marital status, location, educational level, employment

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status and family economic status) with meal source preferences and body weight status among young adults in Terengganu.

Materials and Methods

Study Design

This study was a cross-sectional study conducted between January 2021 to January 2022 involving 399 young adults aged 18 to 35 years in Terengganu, Malaysia. It was conducted through online platforms (social media) such as Google Form, Facebook, WhatsApp, Twitter, Instagram, etc. The study obtained ethics approval from Universiti Sultan Zainal Abidin Research Ethics Committee (UniSZA/UHREC/2021/251).

Study population

Study participants involved were selected based on the inclusion criteria that their age at point of data collection was between 18 and 35 years old. Additionally, participants must be a Malaysian citizen, lives in Terengganu and literate in English or Malay. Subjects were excluded if they were foreigners, or those who did not complete the questionnaire, not able to read or write in Malay or English or were present with disability.

Variable and measurement

Variable measured in this study includes sociodemographic factors such as gender, marital status (single, married, divorced, widowed), location Terengganu (urban, semi-urban, rural), educational level (secondary school education, tertiary school education), employment status, family Income, preference of meal sources and their frequencies. Data on body mass index also was measured and classify according to WHO cut off.

Data collection

The study used a modified Meal Source Preferences and Frequency Questionnaire [10][18]. The online self-administrated questionnaire was developed using a 25-item scale that assesses the preference of meal sources and frequency of meal consumption according to type of meal sources for the past seven days. The frequency of both types of consumption in the previous week were categorized into ranges (0–2 times per week, 3–4 times per week, and 5-7 times per week). The scores are calculated and categorized into low, medium, and high criteria according to the stated range. This questionnaire was pilot tested and validated (Cronbach Alpha value, 0.795).

Statistical Analysis

The data were analysed using IBM SPSS version 22.0 for Windows. The results obtained from the analysis was presented in the form of tables and percentages. Significance level was set at $p < 0.05$ with a 95% confidence interval (CI). Descriptive test analysis was used to determine the frequency of consuming home-cooked meals and outside meals.

The association between frequency of consuming home-cooked and outside meal sources with BMI among young adults and the association of consuming home-cooked meals and outside meal sources with sociodemographic characteristics were analysed using Chi-square test. Proportions are presented for categorical variables, while mean and standard deviation (SD) were calculated for continuous variables.

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Results

Socio-demographic Characteristics of Study Participants

This study included 399 qualifying young adults in total. The majority of the participants were females and single, as seen in Table 1. Most of them were tertiary students from families with higher income (RM3500 or more per month). In addition, it is important to note that in Terengganu, over half of the subjects lived in semi-urban areas, followed by urban areas and rural areas. While 26.1% of research participants were overweight and 19.3% were underweight, the majority had a normal Body Mass Index (BMI).

**Table 1: Socio-demographic Characteristics of Study Participants**

Characteristics of subjects	Frequency (N=399)	Percentage (%)
Gender		
Male	65	16.3
Female	334	83.7
Educational Level		
Secondary High School	9	2.3
Foundation/College	84	21.1
Bachelor's Degree	297	74.4
Master's Degree	9	2.3
Marital Status		
Single	378	94.7
Married	20	5
Divorced	1	0.3
Current Employment Status		
Full-time Employment	39	9.8
Self-employed	9	2.3
Unemployed	14	3.5
Housewife	3	0.8
Student	334	83.7
Family Income		
<1000	73	18.3
1000-2500	131	32.8
2500-3500	37	9.3
>3500	158	39.6
Current Living Location		
Rural	18	4.5
Semi-Urban	227	56.9
Urban	154	38.6
Body Mass Index (BMI)		
Underweight	77	19.3
Normal	218	54.6
Overweight	104	26.1

Frequency of home-cooked meals and outside meal sources consumptions of study participants

Figure 1 shows the frequency (n) and percentage (%) of eating home-cooked (HCMs) and out-of-home meals (Oms) for each score criterion (low, medium, and high). According to the Kolmogorov-Smirnov test,

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data was not normally distributed (p < 0.001). Therefore, data were presented in median (IQR). The median (IQR) total score of home-cooked meals consumption among study participants was 6 (7) while the median (IQR) total score of outside meals consumption among study participants was 24 (8).

Only 2.0% of participants scored low (0-2 times a week) on eating home-cooked meals, compared to 3.8% of them eating out. Next, just 40.6% of those with a medium score reported eating home-cooked meals (3–4 times per week), compared to 87.7% of those who reported eating out. Last but not least, just 57.4% of participants scored highly frequent for eating home-cooked meals (almost daily), compared to 8.5% of the them voting eating out frequently. If the results were broken down by type, the majority of individuals who consumed home-cooked meals scored in the high consumption (5-7 times a week) category, while most of those who consumed meals from restaurants or out of home meals (OMs) scored in the medium consumption category (3–4 times per week). When both categories are analysed, it becomes clear that the majority of individuals eat out more frequently than they do meals that they cook themselves.
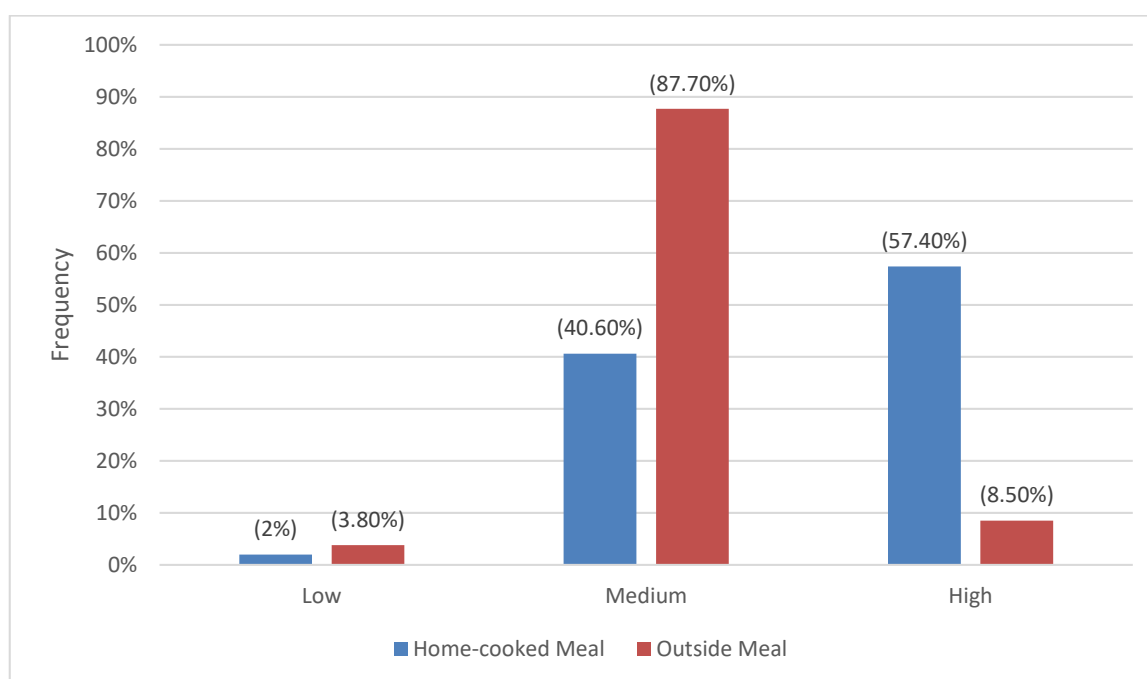
Figure 1: Percentage of Home-Cooked Meals and Outside Meal Sources Consumption

Association between BMI with the frequency of consuming home-cooked and outside meal sources among study participants.
The association between BMI and how frequently participants consumed home-cooked meal sources was determined using Pearson's Chi-Square analysis. The result is summarized in Table 2. The study indicates that there was no significant correlation between BMI and the frequency of eating home-cooked meals.

People may be served with variety of options of food types and spending since outside meals (OMs) are known to be characterized by many ways of eating outside, including dining in a restaurant, ordering takeout, purchasing ready-made food at the convenience store, or ordering food delivery through an online app. The Pearson Chi-square test was used to determine the relationship between research participants' BMI and how frequently they consumed outside meal sources. According to Table 3, there was a substantial

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correlation between BMI and how frequently people consumed meals from outside sources (p-value <0.0.5).

Overall, majority of people who were underweight, normal weight, and overweight consumed outside meals (OMs) three to four times a week at rates of 80.5%, 88.5%, and 91.3%, respectively. Smaller groups of underweight participants (10.4%) had their out of home meals less than two times per week and 9.1% had their OMs almost every day (5-7 times a week). Minority of normal BMI participants, 1.8% had low outside meal consumption (less than twice a week) and only 9.6% of them had OMs almost daily. Smaller populations of overweight participant whose BMI were more than 25kg/m^2, had low consumption (2.9%) while some had OMs five to seven times per week (5.8%).

Table 2: Association between the BMI with the frequency of consuming Home-Cooked Meal Sources

Variable		Total (N=399)	Home-Cooked Meals (N=399)			x2	p-value
			Low N=8	Medium N=162	High N= 229		
Body Mass Index (BMI)	Underweight	77	3 (3.9)	33 (42.9)	41 (53.2)	5.71	0.222
	Normal	218	2 (0.9)	94 (43.1)	122 (56.0)		
	Overweight	104	3 (2.9)	35 (33.7)	66 (63.5)		

Pearson' Chi-Square test was applied, significant p-value <0.05.

Table 3: Association between the BMI with the frequency of consuming Outside Meals Sources

Variable		Total (N=399)	Outside Meals (N=399)			x2	p-value
			Low N= 15	Medium N=350	High N=34		
Body Mass Index (BMI)	Underweight	77	8 (10.4)	62 (805)	7 (9.1)	13.26	0.010
	Normal	218	4 (1.8)	193 (88.5)	21 (9.6)		
	Overweight	104	3 (2.9)	95 (91.3)	6 (5.8)		

Pearson' Chi-Square test was applied, significant p-value <0.05.

Association between sociodemographic characteristics (gender, educational level, marital status, employment status, family economic status and location) with the frequency of consuming home-cooked meals and outside meal sources among study participants

The result is summarized in Table 4 for HCMs and Table 5 for OMs. With a p-value less than significant value 0.05 (0.009), it was demonstrated in the first sociodemographic category (gender) that there is a significant relationship between gender and the frequency of consuming home-cooked meals. While most women prefer to prepare or eat their meals at home practically every day, men tend to prefer dining at home occasionally (around 3–4 times per week). Interestingly, there is no significant correlation found between gender and eating out, although both male and female scored more in eating out occasionally (3-4 times a week).

Further analysis revealed yet another important link between consuming home-cooked meals (HCMs) and geographical location. The majority of participants (66.7%) who resided in rural Terengganu ate meals at home three to four times each week. Few of them rarely eat meals prepared at home or consume them

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every day. The survey found that 63.4% and 52.6%, respectively, of residents living semi-urban and urban locations consumed their daily meals mostly at homes (5-7times a week).

Table 4: Association between sociodemographic characteristic and frequency of home-cooked meals sources consumption

Variable	Total (N=399)	Home-Cooked Meals (N=399)			x2	p-value
		Low N=8	Medium N= 162	High N=229		
Gender						
Male	65	3 (4.6)	35 (53.8)	27 (41.5)	9.39	0.009
Female	334	5 (1.5)	127 (38.0)	202 (60.5)		
Educational Level						
Secondary High School	9	0 (0.0)	5 (55.6)	4 (44.4)		
Foundation/College	84	1 (1.2)	40 (47.6)	43 (51.2)	4.94	0.551
Bachelor's Degree	297	7 (2.4)	115 (38.7)	175 (58.9)		
Master's Degree	9	0 (0.0)	2 (22.2)	7 (77.8)		
Marital Status						
Single	378	8 (2.1)	156 (41.3)	214 (56.6)	2.36	0.671
Married	20	0 (0.0)	6 (30.0)	14 (70.0)		
Divorced	1	0 (0.0)	0 (0.0)	1 (100.0)		
Employment Status						
Full-time Employment	39	2 (5.1)	18 (46.2)	19 (48.7)		
Self-employed	9	0 (0.0)	3 (33.3)	6 (66.7)		
Unemployed	14	0 (0.0)	7 (50.0)	7 (50.0)	6.20	0.625
Housewife	3	0 (0.0)	0 (0.0)	3 (100)		
Student	334	6 (1.8)	134 (40.1)	194 (58.1)		
Family Income						
<1000	73	1 (1.4)	33 (45.2)	39 (53.4)		
1000-2500	131	5 (3.8)	52 (39.7)	74 (56.5)	6.29	0.391
2500-3500	37	0 (0.0)	11 (29.7)	26 (70.3)		
>3500	158	2 (1.3)	66 (41.8)	90 (57.0)		
Current Living Location						
Rural	17	2 (11.1)	12 (66.7)	4 (22.2)		
Semi-Urban	227	5 (2.2)	78 (34.4)	144 (63.4)	21.47	0.001
Urban	154	1 (0.6)	72 (46.8)	81 (52.6)		

Pearson' Chi Square test was applied, significant p-value <0.05.

However, the analysis failed to identify any significant correlation between the other sociodemographic characteristics with how people prefer to source their meals. P-values greater than 0.005 show that none of these variables, including educational level, marital status, employment status and family income differences was statistically significant for home-cooked meals (HCMs). For the category of outside meals (OMs), sociodemographic profile of the individuals was found to be not statistically significant for all variables (Pearson Chi-Square test, $x2$=2.35, P=0.309 for gender , $x2$ = 4.58, P=0.598 for educational level, $x2$ = 0.37, P=0.849 for marital status, $x2$ = 8.21, P=0.414 for employment status, $x2$ = 6.95, P=0.326 for family income, and $x2$ = 6.45, P=0.168 for living location).

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Table 5: Association between sociodemographic characteristic and frequency of outside meals sources consumption

Variable	Total (N=399)	Outside Meals (N=399)			x2	p-value
		Low N= 15 (%)	Medium N= 350 (%)	High N=34 (%)		
Gender						
Male	65	1 (1.5)	56 (86.2)	8 (12.3)	2.35	0.309
Female	334	14 (4.2)	294 (88.0)	26 (7.8)		
Educational Level						
Secondary High School	9	0 (0.0)	8 (88.9)	1 (11.1)		
Foundation/College	84	1 (1.2)	73 (86.9)	10 (11.9)	4.58	0.598
Bachelor's Degree	297	14 (4.7)	261 (87.9)	22 (7.4)		
Master's Degree	9	0 (0.0	8 (2.3)	1 (2.9)		
Marital Status						
Single	378	15 (4.0)	330 (87.3)	33 (8.7)	1.37	0.849
Married	20	0 (0.0)	19 (95.0)	1 (5.0)		
Divorced	1	0 (0.0)	1 (100.0)	0 (0.0)		
Employment Status						
Full-time Employment	39	0 (0.0)	32 (82.1)	7 (17.9)		
Self-employed	9	0 (0.0)	9 (100)	0 (0.0)	8.21	0.414
Unemployed	14	1 (7.1)	12 (85.7)	1 (7.1)		
Housewife	3	0 (0.0)	3 (100.0)	0 (0.0)		
Student	334	14 (4.2)	294 (88.0)	26 (7.8)		
Family Income						
<1000	73	3 (4.1)	64 (87.7)	6 (8.2)		
1000-2500	131	7 (5.3)	113 (86.3)	11 (8.4)	6.95	0.326
2500-3500	37	2 (5.4)	35 (94.6)	0 (0.0)		
>3500	158	3 (1.9)	138 (87.3)	17 (10.8)		
Current Living Location						
Rural	18	2 (11.1)	13 (72.2)	3 (16.7)		
Semi-Urban	227	10 (4.4)	200 (88.1)	17 (7.5)	6.45	0.168
Urban	154	3 (1.9)	137 (89.0)	14 (9.1)		

Pearson' Chi Square test was applied, significant p-value <0.05.

Discussion

In this cross-sectional study, we observed factors influencing food preferences and body weight status among young adults in Terengganu, Malaysia. The study begins by examining socio-demographic characteristics of study participants. Overall, most of the subjects enrolled in this study were female, single, have tertiary education and higher income, lived in semi urban, and have normal BMI. Without taking sociodemographic characteristics into account, most individuals prefer eating outside of the home (OMs). This confirms earlier findings in the literature that showed a rise in 'eating out' practices among the 2000 Malaysian survey participants [18].

The study also discovered that the majority of the individuals, whether they were underweight, overweight, or of normal weight, prefers to sometimes (3–4 times per week) eat outside meals, regardless of their body

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weight status or body mass index. Of the three groups, overweight individuals are more likely to eat meals outside the house. Researchers have been studying the relationship between eating habits and obesity up to this point. According to one study, dining out more frequently is positively correlated with BMI, however the evidence leans more towards males than females [22]. Similar research among young adults in China demonstrates that eating habits outside the house are significantly correlated with greater BMI [23].

This study looked for strong correlations between sociodemographic variables and preferences for food sources in order to generate useful data. From the analysis, the study discovered that female eat more frequently at home, compared to male. This conforms with findings from another cross-sectional analysis in which female had significantly lower frequency of consuming each of the main meal types from out of home sources and a higher frequency of consuming home cooked meals [10]. Data from economist in Malaysia showed that Malaysian spend a share of their household expenditures for 'food away from home', and this has increased significantly between year 1973 and 1999, pointing to a continuous increase in out-of-home diet spending [19]. Women may dine at home more frequently since they are typically more cost-conscious and have slightly superior cooking and food preparation abilities [20][21].

A growing amount of research shows that urbanization is the primary reason why individuals are eating out more frequently. In 2008, a demographic survey found a significant positive association between Malaysia's high rate of food consumption outside the house and its degree of urbanization [24]. The chances for Malaysians to dine out have greatly risen with rising urbanization, and meal rates are sometimes less expensive than those of home-cooked meals [18]. The Malaysian Adult Nutrition Survey (MANS) published in 2014 found that dining out often and levels of urbanization were strongly positively correlated [25]. In contrast to individuals living in rural areas, our research indicates that people who live in urban and semi-urban areas prefer to eat meals that they have prepared themselves (HCMs). Interestingly, this is in good agreement with one study that reveals the majority of individuals in metropolitan areas live healthy lifestyles and embrace healthy eating habits, whereas just a tiny fraction of people in rural areas practice healthy meal habits [26].

The study was unable to demonstrate a relationship between levels of education, marital status, working status and family income with people's preferences for eating in home versus eating out of home. Similar findings were obtained in other research where there were no significant variations in the frequency of dining out based on racial, marital, or smoking status [27]. The causes of this outcome are not well known. The study, however, has some shortcomings. Obviously, the respondents provided the information online, which raises the possibility that reporting bias has an impact on the findings. The results from such studies should, therefore, be handled with the utmost care because our findings are based on a small number of samples and methodology. To produce data that is comparable across borders, more research is needed. Consistent methodologies, such as face-to-face interviews, bigger sample sizes, and in-depth questionnaires, should be used in future.

Conclusion

The study has presented data on correlations of socio-demographic factors with frequency of meal source preferences and body weight status, using data from young adults' population in Terengganu. In general, young adults prefer to eat out-of-home meals on occasion basis. We found that Home Cooked Meals (HCMs) are preferred by female and those living in semi urban and urban area. Unfortunately, there was no significant association between levels of education, marital status, working status and family income with HCMs. None of the sociodemographic variables correlates significantly with Outside Meal (OMs) either. However, the study managed to find association between OMs and body weight status. Most of the young

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adults prefer to have outside meals three to four times per week, regardless of their body weight status. Study also concluded that individuals who were overweight tends to choose outside meals more than home cooked meals. Given the limitations of our study, more extensive data collection would be required to pinpoint exactly how sociodemographic characteristics influence meal source preferences and body weight status.

Conflict of Interest Disclosure
None to declare.

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