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Differences in Food Consumption Frequencies and Perceived Lifestyle Behaviors by Accommodation Environment and Gender Among Omani University Students: A Pilot Study

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Abstract

This study aimed to examine the variations in food consumption frequency and perceived lifestyle behaviors based on gender and living arrangements. A cross-sectional descriptive study was carried out from August 2022 to September 2023, including 176 participants from various colleges at A'Sharqiyah University in Oman. Data were collected using a self-administered electronic questionnaire. A notably high percentage of students residing with their families indicated a significant variation in the frequency of consumption of carrots, cucumbers, bell peppers, lettuce, onions, tomatoes, and dates, with respective P-values of 0.002, 0.028, 0.016, 0.048, 0.025, 0.003, and 0.001. Increased consumption of canned tuna, whole milk, milk chocolate, chicken, and falafel sandwiches (P=0.051, 0.006, 0.011, 0.007, and 0.050, respectively) was noted among students residing away from their families. Consumption of fruits such as dates, melon, and oranges were higher among males (53.6, 17.9, and 25%, P=0.016, 0.013, and 0.050, respectively). The majority of males exhibited a greater consumption of Omani coffee, as well as sweet and traditional dishes. Among students residing with their families, a significant proportion reported a sleep duration of 7 to 8 hours per day, accounting for 75% of the respondents (P=0.029). Students living independently reported perceived unhealthy dietary habits (41.7%, P=0.007) along with a decreased frequency of consuming home-cooked meals (35%, P=0.001). Females demonstrated commendable study habits, with 23.6% dedicating more than four hours per day to their studies (P=0.002). In contrast, male students reported a higher

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frequency of dining out, with 46.4% dining out three to six times per week compared to 20.3% of female students (P=0.012). A significant majority of the study participants (86.9%, P=0.023) were not utilizing any dietary supplements. In general, students who resided independently, without family, exhibited a greater tendency to engage in less healthy food choices and lifestyle behaviors.

Introduction

The progression to tertiary education is regarded as an integral phase in an individual's academic journey, as it introduces autonomy alongside the obligation of making informed decisions regarding nutrition and well-being.[1,2] The initial encounter with an unfamiliar environment may lead to an exacerbation of the student's inexperience and inadequacies in making nutritious dietary selections, potentially heightening the likelihood of adverse effects on their overall health and eating habits.[3] In their early years, individuals often develop poor dietary habits characterized by irregular meal patterns, the omission of meals, a limited intake of nutritious foods such as fruits and vegetables, and a heightened consumption of sugary and fried foods.[4] The primary factor recognized as significantly influencing their eating behavior and choices is the alteration in accommodation arrangements.[5,6] Various additional factors contribute to this issue, including the independence in food selection, culinary skills, social circles, time limitations, academic pressure, cultural influences, preferences in taste, and peer influence.[7,8] As a result, this significant transitional phase for young students may result in overweight and obesity, thereby increasing their susceptibility to chronic illnesses such as type 2 diabetes.[9] Research indicates a prevalence of negative lifestyle behaviors among university students globally. Specifically, studies conducted in Saudi Arabia have highlighted poor dietary practices, inadequate sleep, low levels of physical activity, and a sedentary lifestyle. In contrast, findings from Germany and Turkey have emphasized the need for improvements in dietary habits and overall lifestyle behaviors among students.[10-12]

The current generation is dedicating more and more time to screen-related activities. Research has indicated that excessive exposure to screens can negatively impact both sleep quality and academic achievement.[13,14] Gender difference was associated with dietary intake, lifestyle behavior and weight status among university students.[15] A study from Kuwait demonstrated gender-specific dietary patterns with more male consuming protein while female reported regular consumption of potato chips, snacks and sweets.[16] An Italian study has found that younger and male students were following unhealthy eating habits.[17] Over the past several decades, the countries of the Gulf Cooperation Council, including Oman, have experienced remarkably swift socioeconomic changes alongside rapid technological advancements. A significant outcome of this transformation has been a dramatic alteration in dietary habits and lifestyle behaviors. The dietary patterns of the general Omani population, particularly among young students, have increasingly shifted away from traditional foods, largely influenced by Western culinary preferences, resulting in a higher intake of unhealthy food options, such as refined and processed products.[18,19]

Oman is experiencing a significant challenge with non-communicable diseases, characterized by a rising incidence of overweight and obesity (66%), diabetes (11-15%), and hypertension (33%) among its population, including the youth. Furthermore, young adults aged 18 and older, encompassing both Omani and non-Omani individuals, demonstrated a notable prevalence of lifestyle-related risk factors, such as inadequate consumption of fruits and vegetables (61%). The tendency towards sedentary behavior and insufficient physical activity is particularly pronounced among Omani women (51%) compared to men (30%), which may contribute to an elevated risk of metabolic syndrome and obesity.[20,21]

Research conducted in Oman has documented the nutritional habits and lifestyle behaviors of Omani students.[22,23] However, to our knowledge, there are no published studies specifically addressing the food frequency intake and perceived lifestyle behaviors of Omani university students, particularly in relation to accommodation and gender differences. Therefore, this study aims to explore the variations in food intake frequency and perceived lifestyle behaviors, as well as to investigate their associations based on

gender and living arrangements (students residing with or without their families).

Materials and Methods

Study Design and Participants

This cross-sectional descriptive study was conducted from August 2022-September 2023. The target population included ASU students. The students were invited to participate in the online questionnaire survey. The study was conducted according to the guidelines laid down in the Declaration of Helsinki and ethical code for web-based research.[24,25] The study design and protocol were conducted following the ethical approval and guideline by the University Research Ethics and Biosafety Committee (UREBC) under the code number (ASU/UREBC/24/12).The study comprised 176 university students (both male and female) aged 18- 35 years from different colleges [CAHS: College of Applied and Health Sciences, CoBA: College of Business Administration, CoE: College of Engineering, and CoAH: College of Arts and Humanities] of ASU, Sultanate of Oman. Inclusion criteria was enrolled university student and consent to participate in the study.

Data Collection and Measurements

An online self-administered food frequency questionnaire was designed using Google forms documentation to assess the consumption pattern among study participants. The questionnaire was adapted and modified from previously tested questionnaire to meet the pattern of Omani food consumption.[26,27] A web URL link was used to distribute e-questionnaires among university students through institutional websites, emails and social networking platforms. The participants were asked to complete an electronic informed consent form before participating in the study. The information was collected anonymously, without indicating personal data, and participants did not receive any reward. For the study, the questionnaire was translated in Arabic language by expert Omani faculty members and revised by more Arabic-speaking colleagues. The questionnaire was piloted for online completion, with an appropriate format and layout. The pilot study was carried out among thirty students from CAHS, to detect any difficulties that may arise while filling out the questionnaire and slight modifications were made to enhance clarity and comprehensibility. The collected data was merged with the final data analysis pool for the final study after completion.

The Questionnaire Consisted of Three Sections

Sociodemographic Characteristics

The Data Includes age, gender, marital status age, gender, marital status, colleges, educational levels (master, bachelor and diploma), parent's educational level, monthly family income [(Omani Riyal (OMR)], number of family members, geographic location and student's accommodation environment [at home with family, A'Sharqiyah University catered dormitory, private dormitory with friends/students and private accommodation alone]. The accommodation environment was finally recorded into two options: stay with family/parents vs all other options (stay without family/parents).

Self-Perceived Lifestyle Behaviors

The participants were also asked to report selected self-observed behavioral and lifestyle habits including: physical activity, weight change (during the previous year), sedentary activities comprising screen time (watching TV, mobile use, computer/ tablet use), sleep time, study time, frequency of eating home cooked meal and outside meal, and question about use of herbal or diet supplement and whether their diet is healthy or not.

Food Consumption Pattern

There were nine (9) different food groups included in the questionnaire: vegetables; fruits; bread; nuts, meat, egg and dairy products; beverage and drinks; sandwiches; dessert; fast food; and traditional Omani dishes. Consumption frequency for each food item was rated on a 7-point scale as "never", "1-2 times per month", "1-2 times per week", "3-4 times per week", "5-6 times per week", "1-3 times per day", ">4 times per day". These 7 categories were collapsed into three categories: high frequency [HF: 5-6 times/week, 1-3 times per day, >4 times per day]; medium frequency [MF: 3-4 times/week]; and low frequency [LF: never, 1-2 times/month, 1-2 times/week].

Statistical Analysis

The answers provided in the Google forms questionnaire were exported to Microsoft Excel 2016. Data were analyzed using the IBM, Statistical Package for Social Sciences (SPSS) Version

29.0.2.0. Frequency and percentage values were used as descriptive statistical methods to evaluate categorical variables. Chi-square tests evaluated the association between various categorical variables. A Cronbach's alpha test was used to check questionnaire reliability (Cronbach's alpha > 0.96). P-value <0.05 was considered statistically significant.

Table 1: Sociodemographic characteristics of study participants

		Frequency (N)	Percent (%)
Gender	Male	28	15.9
	Female	148	84.1
Age	<18 Year	8	4.5
	18-24 Year	148	84.1
	25-30 Year	7	4.0
	31-35 Year	7	4.0
	>35 Year	6	3.4
Marital status	Married	20	11.4
	Unmarried	156	88.6
College	CAHS	20	11.4
	CoBA	16	9.1
	CoE	7	4.0
	CoAH	133	75.6
Type of degree	Master	14	8.0
	Bachelor	154	87.5
	Diploma	8	4.5
Accommodation	Stay with family	56	31.8
	Stay without family	120	68.2
Father's education Level	Master and higher degree	16	9.1
	Bachelor degree	39	22.2
	Diploma degree	50	28.4
	Lower than Diploma	71	40.3
Mother education	Master and higher degree	6	3.4
	Bachelor degree	34	19.3
	Diploma degree	44	25.0
	Lower than Diploma	92	52.3
Family income	<1000 OMR	104	59.1
	>1000OMR	72	40.9
Family members	2-4	13	7.4
	5-7	78	44.3
	>8	85	48.3
Geographic Location	Al-Buraimi	1	0.6
	A'Dakhiliya	25	14.2
	A'Dhahirah	6	3.4
	Al Wusta	5	2.8
	Al Batinah South	17	9.7
	A'Sharqiyah South	23	13.1
	A'Sharqiyah North	55	31.3
	Al Batinah North	22	12.5
	Dhofar	2	1.1
	Muscat	20	11.4

Note: Data represented as N (percentage) for categorical variables.

Results

Table 1 represents the general sociodemographic characteristics of our study population. The proportion of study participants of male vs female were (15.9 vs 84.1%), respectively. The proportion of 18-24 age group students was higher (84.1%) compared to other age groups. The proportion of unmarried students was quite higher than married group (88.6 vs 11.4%), respectively. More than 75 % of students who participated in the study were from CoAHS, followed by CAHS (11.4%) and CoBA (9.1%). Total 87.5% of the students registered in bachelor programs followed by master's and diploma degrees. About 31.8 % students were staying with their families and 68.2% were away from their family. The majority of the study participants belong to A'Sharqiyah North (31.3%) followed by A'Dakhiliya (14.2%) region.

Table 2 represents the gender-based frequency of food intake among study participants within accommodation environment. Overall, our results showed that most of the students living in various accommodation environment consumed low vegetables and fruits. However, students living at home with family reported higher vegetable consumption.

A significant association was demonstrated for the consumption of carrots, cucumbers, bell pepper, lettuce, onions and tomato (P=0.002; 0.028, 0.016, 0.048, 0.025 and 0.003), respectively, within various accommodation arrangements. The consumption of carrots, cucumber, bell pepper, lettuce, onion, and tomatoes in the students staying their families was observed 23.2, 35.7, 30.4, 30.4, 48.2, and 50%, respectively, which was higher than the other group. As far as gender preferences were concerned, bell pepper consumption was significantly higher in males (28.6%, P=0.037). No other significant difference was reported among students for vegetable items such as cabbage, chili, eggplant, okra, mixed veg, potato, spinach, and olive within different accommodation arrangements and gender. The consumption of dates was significantly associated with different accommodation environment (P =0.001) as well as gender (P =0.016). Majority of the students living with family (51.8%) reported high consumption of dates than those living in other accommodation and the intake was higher among males than females (53.6 vs 26.4%), respectively. The consumption of fruits such as melons and oranges was significantly high among males (17.9, and 25%, P =0.013, and 0.050), respectively, than their female counterparts. The intake of other fruits such as apple, banana, grapes, guava, kiwi, mango, papaya, peach, pear, pomegranate, and watermelon was higher among those living with family, though, the difference was statistically non-significant. It is important to mention that a high proportion of males reported to consume majority of fruit and vegetable than females (non-significant). The consumption of brown and white bread was non-significant among gender and different accommodation environment. Although, the overall consumption of food items from nuts, meat, egg and dairy products (such as almonds, cashew, peanuts, pistachio, fish, mutton, chicken, cream cheese, sliced cheese, yogurt natural, and eggs) was very low among students, a significant association was observed between accommodation and consumption of food items such as canned tuna, whole milk and milk chocolate (P=0.051, 0.006, and 0.011), respectively. It was noted that students staying away from the family were consuming more canned and packed food items compared to the ones staying with family.

For the beverages, the consumption of Omani coffee (Qahwa) was shown to be higher among majority of the male students than female (50 vs 13.5%, P=0.001), respectively. While, consumption of other beverages and drinks such as instant coffee, tea with and without milk, soft drink, and fruit juice were non-significant for all groups. Females (8.1%, P=0.044) reported a high frequency of egg sandwich consumption while proportion of the students living without family (11.7, and 5.8%, P=0.007, and 0.050), reported high intake of chicken and falafel sandwich, respectively. About 9.2% (P=0.025) of the students living without family reported to consume pancake, while a comparatively high proportion of females expressed their interest in consuming sponge cake than males (4.1 vs 3.6%, P =0.040), respectively. The intake of cheesecake, croissant, custard, donuts, sweets and candy was insignificant among participants. On the other hand, high proportion of males preferred consuming Luqaimat (7.1%, P =0.032) and Omani halwa (7.1%, P =0.014) than females. The consumption frequency of fast foods including KFC, MacDonald, and Pizza Hut were non-significant among gender and accommodation environment.

Table 2: Frequency of food intake among university students by their accommodation environment and gender

		Accommodation								Gender							
		Stay with family		Stay with out Family		Total				Male		Female		Total			
		N	%	N	%	N	%	χ2	P	N	%	N	%	N	%	χ2	P
Vegetable																	
Carrot	HF	13	23.2	15	12.5	28	15.9	19.232	**0.002**	5	17.9	23	15.5	28	15.9	0.233	0.890
	MF	17	30.4	11	9.2	28	15.9			5	17.9	23	15.5	28	15.9		
	LF	26	46.4	94	78.3	120	68.2			18	64.3	102	68.9	120	68.2		
Cucumber	HF	20	35.7	26	21.7	46	26.1	7.176	**0.028**	8	28.6	38	25.7	46	26.1	2.75	0.253
	MF	13	23.2	19	15.8	32	18.2			2	7.1	30	20.3	32	18.2		
	LF	23	41.1	75	62.5	98	55.7			18	64.3	80	54.1	98	55.7		
Bell Pepper	HF	17	30.4	18	15.0	35	19.9	8.286	**0.016**	8	28.6	27	18.2	35	19.9	6.599	**0.037**
	MF	11	19.6	16	13.3	27	15.3			0	0.0	27	18.2	27	15.3		
	LF	28	50.0	86	71.7	114	64.8			20	71.4	94	63.5	114	64.8		
Lettuce	HF	17	30.4	24	20.0	41	23.3	6.057	**0.048**	6	21.4	35	23.6	41	23.3	0.12	0.942
	MF	12	21.4	15	12.5	27	15.3			4	14.3	23	15.5	27	15.3		
	LF	27	48.2	81	67.5	108	61.4			18	64.3	90	60.8	108	61.4		
Onion	HF	27	48.2	36	30.0	63	35.8	7.349	**0.025**	12	42.9	51	34.5	63	35.8	1.137	0.566
	MF	8	14.3	13	10.8	21	11.9			2	7.1	19	12.8	21	11.9		
	LF	21	37.5	71	59.2	92	52.3			14	50.0	78	52.7	92	52.3		
Tomato	HF	28	50.0	32	26.7	60	34.1	11.532	**0.003**	10	35.7	50	33.8	60	34.1	0.081	0.960
	MF	10	17.9	18	15.0	28	15.9			4	14.3	24	16.2	28	15.9		
	LF	18	32.1	70	58.3	88	50.0			14	50.0	74	50.0	88	50.0		
Fruits																	
Dates	HF	29	51.8	25	20.8	54	30.7	19.291	**0.001**	15	53.6	39	26.4	54	30.7	8.284	**0.016**
	MF	8	14.3	15	12.5	23	13.1			2	7.1	21	14.2	23	13.1		
	LF	19	33.9	80	66.7	99	56.3			11	39.3	88	59.5	99	56.3		
Melon	HF	4	7.1	8	6.7	12	6.8	0.127	0.939	5	17.9	7	4.7	12	6.8	8.637	**0.013**
	MF	5	8.9	9	7.5	14	8.0			0	0.0	14	9.5	14	8.0		
	LF	47	83.9	103	85.8	150	85.2			23	82.1	127	85.8	150	85.2		

Orange	HF	11	19.6	14	11.7	25	14.2	2.221	0.329	7	25.0	18	12.2	25	14.2	5.743	**0.050**
	MF	7	12.5	20	16.7	27	15.3			1	3.6	26	17.6	27	15.3		
	LF	38	67.9	86	71.7	124	70.5			20	71.4	104	70.3	124	70.5		
Nuts, Meat, Egg and Dairy products																	
Tuna caned	HF	1	1.8	4	3.3	5	2.8	5.937	**0.051**	1	3.6	4	2.7	5	2.8	0.459	0.795
	MF	0	0.0	11	9.2	11	6.3			1	3.6	10	6.8	11	6.3		
	LF	55	98.2	105	87.5	160	90.9			26	92.9	134	90.5	160	90.9		
Whole Milk	HF	12	21.4	27	22.5	39	22.2	10.143	**0.006**	3	10.7	36	24.3	39	22.2	4.022	0.134
	MF	2	3.6	26	21.7	28	15.9			3	10.7	25	16.9	28	15.9		
	LF	42	75.0	67	55.8	109	61.9			22	78.6	87	58.8	109	61.9		
Milk chocolate	HF	2	3.6	17	14.2	19	10.8	9.048	**0.011**	2	7.1	17	11.5	19	10.8	0.565	0.754
	MF	0	0.0	8	6.7	8	4.5			1	3.6	7	4.7	8	4.5		
	LF	54	96.4	95	79.2	149	84.7			25	89.3	124	83.8	149	84.7		
Beverage and Drinks																	
Omani Coffee (Qahwa)	HF	15	26.8	19	15.8	34	19.3	4.286	0.117	14	50.0	20	13.5	34	19.3	20.163	**0.001**
	MF	7	12.5	10	8.3	17	9.7			2	7.1	15	10.1	17	9.7		
	LF	34	60.7	91	75.8	125	71.0			12	42.9	113	76.4	125	71.0		
Sandwich																	
Egg Sandwich	HF	6	10.7	7	5.8	13	7.4	1.643	0.440	1	3.6	12	8.1	13	7.4	6.243	**0.044**
	MF	2	3.6	7	5.8	9	5.1			4	14.3	5	3.4	9	5.1		
	LF	48	85.7	106	88.3	154	87.5			23	82.1	131	88.5	154	87.5		
Chicken sandwich	HF	1	1.8	14	11.7	15	8.5	9.941	**0.007**	2	7.1	13	8.8	15	8.5	1.011	0.603
	MF	1	1.8	13	10.8	14	8.0			1	3.6	13	8.8	14	8.0		
	LF	54	96.4	93	77.5	147	83.5			25	89.3	122	82.4	147	83.5		
Falafel sandwich	HF	0	0.0	7	5.8	7	4.0	6.01	**0.050**	1	3.6	6	4.1	7	4.0	0.077	0.962
	MF	0	0.0	5	4.2	5	2.8			1	3.6	4	2.7	5	2.8		
	LF	56	100.0	108	90.0	164	93.2			26	92.9	138	93.2	164	93.2		

Dessert																	
Sponge cake	HF	1	1.8	6	5.0	7	4.0	1.524	0.467	1	3.6	6	4.1	7	4.0	5.323	**0.040**
	MF	0	0.0	1	0.8	1	0.6			1	3.6	0	0.0	1	0.6		
	LF	55	98.2	113	94.2	168	95.5			26	92.9	142	95.9	168	95.5		
Luqaimat	HF	1	1.8	6	5.0	7	4.0	1.034	0.596	2	7.1	5	3.4	7	4.0	6.878	**0.032**
	MF	1	1.8	2	1.7	3	1.7			2	7.1	1	0.7	3	1.7		
	LF	54	96.4	112	93.3	166	94.3			24	85.7	142	95.9	166	94.3		
Omani Halwa	HF	2	3.6	5	4.2	7	4.0	0.375	0.829	2	7.1	5	3.4	7	4.0	8.54	**0.014**
	MF	1	1.8	4	3.3	5	2.8			3	10.7	2	1.4	5	2.8		
	LF	53	94.6	111	92.5	164	93.2			23	82.1	141	95.3	164	93.2		
Pancake	HF	1	1.8	11	9.2	12	6.8	7.418	**0.025**	4	14.3	8	5.4	12	6.8	4.008	0.135
	MF	2	3.6	15	12.5	17	9.7			1	3.6	16	10.8	17	9.7		
	LF	53	94.6	94	78.3	147	83.5			23	82.1	124	83.8	147	83.5		
Traditional Omani dishes																	
Arsiya	HF	1	1.8	2	1.7	3	1.7	0.003	0.955	2	7.1	1	0.7	3	1.7	5.878	**0.015**
	LF	55	98.2	118	98.3	173	98.3			26	92.9	147	99.3	173	98.3		
Harees	HF	0	0.0	3	2.5	3	1.7	3.08	0.214	1	3.6	2	1.4	3	1.7	1.248	0.536
	MF	2	3.6	1	0.8	3	1.7			0	0.0	3	2.0	3	1.7		
	LF	54	96.4	116	96.7	170	96.6			27	96.4	143	96.6	170	96.6		
Makboos	HF	5	8.9	13	10.8	18	10.2	1.236	0.539	2	7.1	16	10.8	18	10.2	0.821	0.663
	MF	7	12.5	22	18.3	29	16.5			20	71.4	109	73.6	129	73.3		
	LF	44	78.6	85	70.8	129	73.3			6	21.4	23	15.5	29	16.5		
Saloona	HF	10	17.9	9	7.5	19	10.8	5.214	0.074	3	10.7	16	10.8	19	10.8	0.16	0.923
	MF	12	21.4	21	17.5	33	18.8			6	21.4	27	18.2	33	18.8		
	LF	34	60.7	90	75.0	124	70.5			19	67.9	105	70.9	124	70.5		
Thareed	HF	2	3.6	2	1.7	4	2.3	0.799	0.671	1	3.6	3	2.0	4	2.3	7.808	**0.020**
	MF	2	3.6	3	2.5	5	2.8			3	10.7	2	1.4	5	2.8		
	LF	52	92.9	115	95.8	167	94.9			24	85.7	143	96.6	167	94.9		
White rice	HF	18	32.1	24	20.0	42	23.9	8.97	**0.011**	7	25.0	35	23.6	42	23.9	0.06	0.970
	MF	16	28.6	20	16.7	36	20.5			6	21.4	30	20.3	36	20.5		
	LF	22	39.3	76	63.3	98	55.7			15	53.6	83	56.1	98	55.7		

Data expressed as a count (percentage) for categorical variables. Pearson's-chi-square test was used for categorical variables significant at the P -value < 0.05 and for the difference within various accommodation environment and gender.

Increased consumption of traditional dishes such as white rice was reported by students living with family (32.1%, P =0.011). The traditional Omani dish such as Thareed (3.6%, P =0.020) and Arsiya (7.1%, P =0.015) was consumed more among the male participants.

Table 3 shows the self-reported behavioral and lifestyle habits among study participants. No significant association was observed either by accommodation environment or gender with self-reported physical activity, weight change in previous year, spending time in watching TV and computer or tablet use. Most of the students living with family (75%, P =0.029) reported their sleep duration as 7-8 hr/day, but 38.3% of students living without family reported lesser sleep hours (≤6hr/day). Moreover, female participants (23.6%, P =0.002) spend more time for their study (>4hr/day) than their male counterpart. Although most study participants (48.9%) were unaware about the question that their "diet habit is healthy or not"?, the proportion of students living without family think that their diet habit is not healthy (41.7%, P =0.007). The frequency of eating at home cooked meals among those living without family was significantly low as compared to those living at home (67.9 vs 35%, P =0.001), respectively. On gender basis, females used to eat outside meals less frequently than males (1-2 times/week), while male students reported to consume outside meals more frequently 3-6 times/week than their female counterparts (46.4 vs 20.3%, P =0.012). Overall, the number of participants using dietary supplements was very low (13.1%). However, most of the students living without family reported higher use of herbal or dietary supplements than those living with family (13.3 vs 12.5%, P =0.023), respectively.

Discussion

The current pilot study indicated a reduced frequency of food consumption, encompassing vegetables, fruits, nuts, meat, egg, and dairy products, alongside a reduced intake of traditional dishes among most participants. Conversely, there was a higher prevalence of sandwich and dessert consumption among the participants. Students residing with their families demonstrated healthier dietary choices and lifestyle habits in comparison to those living independently. When analyzed by gender, a significant number of males reported higher consumption of fruits, vegetables, cakes, and traditional dishes, as well as a greater tendency to eat out compared to females. Additionally, the use of dietary supplements was found to be low among the participants.

Fruits and Vegetables

Previous study by Ansari and colleagues, reported an overall lower consumption of fruits and vegetables (including salads) among students living away from their parents.[28] In addition, same study shows that Greek students living away from home exhibited lower consumption of fresh fruits, and vegetables. Other similar studies also confirm that students living at home consume more fruit and vegetables than those living away from home.[6,29] Our study is in line with these findings showing an overall low consumption of healthy foods like fruits and vegetables among study participants. However, students living at home with family consumed more fruit and vegetables than those living outside. Raw vegetables should be included in the meal and snack as salad.[30] In our research, the significant intake of vegetables, including carrots, cucumbers, bell peppers, lettuce, onions, and tomatoes, may be attributed to their availability in the form of salads, which are often pre-prepared and readily accessible at home during mealtimes or snacks. Furthermore, the healthy dietary choices made by students at home could be influenced by the assistance they receive from family members in purchasing and preparing food, a support system that may not be present for those living independently. Prior studies have indicated that females tend to follow healthier dietary patterns, consuming a greater quantity of fruits and vegetables compared to their male counterparts.[31,32] The findings of our study revealed conflicting outcomes, indicating that males exhibited a higher intake of fruits and vegetables compared to females. This observation aligns with earlier research, which also noted that male students had a greater consumption of fruits and vegetables than their female counterparts.[33,34] The consumption patterns of brown and white bread showed no significant differences based on gender or varying accommodation environments.

Table 3: Self-observed behavioral and lifestyle characteristics among university students by their accommodation environment and gender

		Accommodation								Gender							
		Stay with family		Stay with out Family		Total				Male		Female		Total			
		N	%	N	%	N	%	χ2	P	N	%	N	%	N	%	χ2	P
Mobile use/day	<60 min	3	5.4	3	2.5	6	3.4	3.145	0.370	5	17.9	1	0.7	6	3.4	23.358	**0.002**
	61-120 min	16	28.6	29	24.2	45	25.6			8	28.6	37	25.0	45	25.6		
	121-240 min	22	39.3	41	34.2	63	35.8			10	35.7	53	35.8	63	35.8		
	>240 min	15	26.8	47	39.2	62	35.2			5	17.9	57	38.5	62	35.2		
Sleeping hour/day	≤6 hr	11	19.6	46	38.3	57	32.4	7.101	**0.029**	5	17.9	52	35.1	57	32.4	4.416	0.110
	7-8 hr	42	75.0	65	54.2	107	60.8			22	78.6	85	57.4	107	60.8		
	>8 hr	3	5.4	9	7.5	12	6.8			1	3.6	11	7.4	12	6.8		
Study time duration/day	<2 hr	23	41.1	45	37.5	68	38.6	0.538	0.764	18	64.3	50	33.8	68	38.6	12.558	**0.002**
	2-4 hr	21	37.5	52	43.3	73	41.5			10	35.7	63	42.6	73	41.5		
	>4 hr	12	21.4	23	19.2	35	19.9			0	0.0	35	23.6	35	19.9		
Do you think your diet habit is healthier	Yes	13	23.2	17	14.2	30	17.0	9.886	**0.007**	5	17.9	25	16.9	30	17.0	1.389	0.499
	No	10	17.9	50	41.7	60	34.1			12	42.9	48	32.4	60	34.1		
	Don't know	33	58.9	53	44.2	86	48.9			11	39.3	75	50.7	86	48.9		
Eating home cooked meals / week	1-2 times	5	8.9	39	32.5	44	25.0	20.99	**0.001**	7	25.0	37	25.0	44	25.0	2.672	0.445
	3-6 times	13	23.2	32	26.7	45	25.6			4	14.3	41	27.7	45	25.6		
	Daily	38	67.9	42	35.0	80	45.5			16	57.1	64	43.2	80	45.5		
	Never	0	0.0	7	5.8	7	4.0			1	3.6	6	4.1	7	4.0		
Eating outside meals/week (delivery, restaurants, takeaway)	1-2 times	40	71.4	63	52.5	103	58.5	6.146	0.105	9	32.1	94	63.5	103	58.5	10.972	**0.012**
	3-6 times	10	17.9	33	27.5	43	24.4			13	46.4	30	20.3	43	24.4		
	Daily	3	5.4	16	13.3	19	10.8			4	14.3	15	10.1	19	10.8		
	Never	3	5.4	8	6.7	11	6.3			2	7.1	9	6.1	11	6.3		

Use of herbal /dietary supplements	Yes	7	12.5	16	13.3	23	13.1	0.023	0.879	2	7.1	21	14.2	23	13.1	1.029	0.310
	No	49	87.5	104	86.7	153	86.9			26	92.9	127	85.8	153	86.9		

Data expressed as a count (percentage) for categorical variables. Pearson's-chi-square test or F test was used for categorical variables significant at the P-value < 0.05 and for difference within various accommodation environment and gender.

Nuts, Meat, Egg and Dairy Products

Previous studies indicated that students residing away from their parents exhibited a low intake of nuts and seeds, alongside a heightened consumption of processed foods, milk, fast food, ready-to-eat meals, sweets, and carbonated beverages. In contrast, students living with their families demonstrated a greater consumption of fish and meat.[35-37] Study performed by Gresse and colleagues shows that living at home with parents and family may improve the student's consumption of fruit and vegetables but not of milk and other dairy products.[38] Our research aligns with this observation, indicating that students residing independently from their families exhibited a notably higher intake of canned tuna (ready to eat), whole milk, and milk chocolate. In contrast, those living with their families demonstrated a greater consumption of fish, although this difference was not statistically significant. Nevertheless, our study presents a contradiction to the aforementioned finding by revealing a higher consumption of meat among students living without family, which also did not reach statistical significance. Insignificant differences were observed among the participants in our study regarding the consumption of nuts, meat, egg, and dairy products when analyzed by gender.

Beverages and Drinks, Sandwiches, Dessert

One of our previous study among Omani university student demonstrated significantly high consumption of beverages like Nescafe and coffee among males while females exhibited high consumption of tea.[39] The current research supports the aforementioned finding, indicating a notably higher percentage of males (50%, P = 0.001) consuming Omani coffee, whereas females exhibited a preference for tea with milk, which was not statistically significant.

Students residing away from their families exhibit greater independence in their food selections and tend to consume a higher number of meals and snacks compared to their counterparts living with parents. Our findings indicate that a larger percentage of females are consuming a diverse range of sandwiches, including egg, cheese, chicken, falafel, and cheeseburgers.[40] Ansari and colleagues noted a rise in sugar consumption and a significant intake of cake among students residing away from their homes.[28] Saudi students living in dormitories exhibited a higher consumption of sweets and fatty foods than students living at home.[41]

Our study matches the above findings showing a higher proportion of students living away from family consume different types of cakes and majority was being consumed by high proportion of females than males.[28,41]

The consumption of traditional Omani sweets, such as Omani halwa and Luqaimat (Arabic sweet dumplings), was notably higher among male students. These delicacies are not only traditional welcome treats but also carry substantial cultural significance in Oman. Omani Halwa, in particular, plays a vital role in weddings, festivals, and various ceremonies.[42] Several factors may contribute to the increased consumption of these sweets among males, including greater social freedom, larger social circles, and more frequent engagement in cultural events, occasions, sports, and extracurricular activities compared to their female peers.

Traditional Omani Dishes

The pattern related to food consumption frequency of traditional food by living arrangements were not uniform. An erratic pattern of traditional food consumption frequency in the students (both male and female) living in various accommodation setup was observed. However, a significantly higher proportion of students living at home were consuming traditional white rice than those living away from home. It is obvious that students living with a family will have easy availability and accessibility to home prepared traditional dishes such as white rice than those living away from home. Other traditional Omani dishes such as Thareed and Arsiya were more favorite choices among males than their female counterparts.

Self-Observed Behavioral and Lifestyle Characteristics

Significant higher proportion of Saudi female students living at university dormitories perceived themselves as obese than those living at home with family.[43] In alignment with the aforementioned findings, participants in our current study who reside away from home indicated a perceived increase in body weight, although this change was not statistically significant. Nomophobia, defined as the anxiety of being without a mobile phone was observed among 99.3% of Omani students.[44] A recent study demonstrated higher risk of mobile phone dependency among females compared to males.[45] In line with the above finding, the present study revealed that more females (38.5%, P=0.002) used their mobile phone for >4 hour per day compared to males.

On average, the recommended sleep duration for adults from age 14-17 is about 8-10 hrs. while for age 18-25 is 7-9 hrs. Zahoor and colleagues demonstrated that the odds of getting bad sleep were twice as high, with students living in a hostel and sleeping in a noisy room.[46] Our results largely agrees with this finding showing enough sleep (7-8 hr/day) among most of the students living with family than those living without family (75 vs 54.2%), respectively.

The university students should be encouraged to develop effective study habits skills because the study time is positively related to academic performance. Moreover, gender-based study demonstrated that female shows better study habits as compared to males.[47,48] Our research aligns with the aforementioned findings, indicating that a significant number of females dedicate more than four hours per day to their studies in comparison to their male counterparts. Additionally, students residing in university dormitories exhibited a greater likelihood of experiencing adverse changes in their dietary habits.[43] Our study further supports this observation, revealing that a substantial proportion of participants living independently from their families reported engaging in unhealthy dietary practices.

The ability to cook and prepare meals at home is an important skill that could affect the student's life while they are away from their home. An inverse association is shown between the skill and behavior of preparing meals at home and the consumption of excessively processed food.[49] Moreover, students living away from home avoid the primary responsibility of grocery shopping and food preparation leaving them with unhealthier food choices.[50] In this context, male gender was shown to be associated with a higher frequency of consumption for all out-of-home meal types than females.[51] Our results are parallel with these findings showing the low frequency of eating home-cooked meals among those residing without a family (35%), while high proportion of male than female was consuming all type of outside prepared meals (delivery, restaurants, and takeaway).

There is a notable increase in the consumption of herbal and dietary supplements among the youth in Middle Eastern countries, particularly among university students.[52] Research indicates that students pursuing medical or health-related fields exhibit a higher rate of dietary supplement usage compared to their peers in other academic areas.[53] Contrary to prevailing assumptions, our study reveals that only a small percentage of participants (13.1%) reported using any herbal or dietary supplements. This finding may be attributed to the relatively small sample size of the study, which included only 176 students. Furthermore, as the majority of our participants are from non-health-related disciplines, with only 11.4% from the CAHS, the overall frequency of supplement use among the participants was notably low.

Conclusion

The research provides valuable information regarding the dietary practices and lifestyle choices of university students residing in various living arrangements. Collectively, the limited intake of nutritious foods and the prevalence of unhealthy lifestyle behaviors among students living independently highlight a pressing necessity for the introduction of nutritional intervention and promotional initiatives at the university level. Regardless of their living situation or gender, students must enhance their skills, knowledge, and self-awareness to effectively tackle nutritional challenges.

Future Recommendation

The research offers insights that can inform future longitudinal studies aimed at enhancing educational programs and interventions at the university level, which encourage students to adopt healthier lifestyles and improve their dietary habits. This study did not investigate the actual conditions regarding food availability and accessibility in university dormitories or residential and cooking facilities for students living independently from their families. Subsequent research could be structured to delve into these issues, thereby gaining a comprehensive understanding of the obstacles and constraints that affect healthy dietary choices and lifestyle practices among university students living away from their parental homes.

Strength and Limitations

This pilot study has several strengths such as: this is the first cross-sectional study to examine and highlight the difference about perceived lifestyle behaviors, and frequencies of food intake based on gender and accommodation environment among Omani students. In addition, the study provides baseline data enabling other researchers to replicate it with future studies. It is essential to acknowledge various limitations inherent in this study. Firstly, the limited number of participants, particularly males, does not adequately reflect the entire Omani student population, which may lead to biased and non-generalizable results. Secondly, despite being validated, the reliance on a self-report questionnaire may result in inaccuracies stemming from respondent bias or errors. Lastly, the cross-sectional design of the study precludes the establishment of causal relationships.

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Conflict of Interest

The author(s) declares no conflict of interest.

Data Availability Statement

The data used in this study and those not shown (statistically non-insignificant) are available from the corresponding author upon request.

Ethics Statement

The study design and protocol were conducted following the ethical approval and guideline by the University Research Ethics and Biosafety Committee (UREBC) of ASU under the code number (ASU/UREBC/24/12).

Informed Consent Statement

All procedures were carried out in accordance with the principles established in the Declaration of Helsinki and the ethical standards for online research. Participants were briefed on the study's procedures and objectives, as well as the confidentiality of their provided information. Prior to their involvement in the study, participants were required to complete an electronic informed consent form. Data was collected anonymously, without any personal identifiers, and participants did not receive any form of compensation.

Clinical Trial Registration

This research does not involve any clinical trials.

Permission to Reproduce Material from other Sources

Not Applicable

Author Contributions

- **Nasiruddin Khan:** Conceptualization, study design, data analysis and manuscript writing.
- **Said Al-Ghenaimi:** Google form questionnaire design, translation in Arabic language, and data collection.
- **Mostafa Ibrahim Waly and Ayat Abdullah Zawateieh:** Critical revision of the manuscript.

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