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SOCIODEMOGRAPHIC VARIABLES AS PREDICTORS OF DIETARY PATTERNS AMONG YOUNG ADULTS

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ABSTRACT
This study aimed to investigate the role sociodemographic variables as predictors of dietary patterns. It was hypothesized that demographic variables (gender, body mass index (BMI), cumulative grade point average, parents' Education, family type and family size) would strongly predict food preference categories (vegetables, fruits, meat/fish, dairy, snacks, starches). A purposive sample of 400 undergraduate students (200 males, 200 females) with an age range of 19-25 years was selected from public universities in Lahore. All research participants were requested to fill out the demographic form along with a Food Preferences questionnaire developed by (Smith, 2016) for young adults to measure the food preferences of adults. Results indicated that BMI significantly predicts three categories of food preferences scale (meat, dairy, and starches) CGPA significantly predicted vegetables, whereas it negatively predicted starches categories. Family size positively predicted vegetables, snacks, and starches categories. The family system positively predicted snack categories. Conclusively these findings might help develop food-based dietary guidelines in young adults.
Keywords: Dietary patterns, Sociodemographic Variables, Gender, Young Adults

INTRODUCTION
Diet is one of the main factors affecting health, and it has been repeatedly shown that healthy dietary intake prevents disease and improves health. (Hu-Fb, 2oo2., Imamura & Jacques, 2011). People frequently consume foods high in essential micronutrients and non-nutrients, and dietary pattern analysis can consider various dietary exposures' subtle and complex interactive effects.

Comparing dietary pattern studies to individual food intakes can reveal how a person's food preferences which are influenced by cultural, health, social, environmental, lifestyle, and economic factors, are perceived (Hu-Fb, 2oo2). Studies on dietary patterns in western people may not be extrapolated to developing countries due to differences in genetic makeup, environmental exposures, and substantial dietary differences between western and non-western nations (Yakub & Iqbal 2010). Indeed, several individuals, lifestyles, and sociodemographic factors have been linked to dietary patterns: Age, Education, and socio-economic status are related to a healthy diet characterized primarily by more consumption of vegetables, fruits, meat/ fish (Arruda et al., 2014 & Kesse-Guyot et al., 2009) Whereas male is typically associated with unhealthy patterns characterized by consuming more red meat, fat, and convenience foods (Arruda et al., 2014). Muller et al.(2003) reported that a diet rich in vegetables and fruits, whole grains, low-fat dairy, low fast food, red and processed meat, and soda is associated with lower waist circumference gains and BMI. The participants who followed a healthy diet had more intake of foods like high-fiber cereal, low-fat dairy, nonwhite bread, whole grains, beans and legumes, fruit, and vegetables, as well as a minimum BMI increase. These foods were high in fiber, which may aid in weight loss by increasing satiety and satiation via reduced gastric acid secretion, increased colonic transit, and reduced insulin response. Earlier Kimm(1995) hypothesized that fiber's role might extend to the glycemic index. Jenkins et al. (2002) postulated that many healthy foods pattern has a low glycemic load, resulting in lower insulin response and, as a result, less hunger and energy intake (Ludwig, 2002). Low-energy-density foods (fruits and vegetables) were also included in the

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healthy dietary pattern, which might be responsible for mediating caloric intake rather than dietary composition. (Rolls & Bell, 1999) The vast majority of data on dietary patterns and associated factors comes from epidemiological research in developed nations. (Safder et al., 2014). Dietary patterns studies are scarce in developing countries, particularly in South Asia (Yakub & Iqbal, 2010). In addition, scarcity of research data on dietary patterns and their relationship to numerous lifestyle attributes in Asian and south Asian populations.

Musaiger (1999) claimed that a variety of circumstances determined dietary preferences. Religion, gender, age, physiological changes, psychological considerations, symbolic food use, taboos, social status, and economic issues all influence food choices among cultures (Musaiger & Abuirmeileh, 1999). Kurz (1994) postulated that statistically significant correlations were found between dietary patterns, SES, age, and BMI. According to findings, the following variables contribute to adolescents' malnutrition in developing countries: poor household economic conditions, periodic food scarcity, and most underweight students from low socio-economic status families. A few studies have been conducted on dietary habits in Pakistan. Most researchers have relatively small, nonrepresentative samples and are limited to specific diseases (Yakub & Iqbal, 2010). Furthermore, there is a knowledge gap regarding the characteristics and variations in Pakistani dietary patterns. The primary goal of this study was to predict distinct sociodemographic variables, i.e., gender, socio-economic status, parents' Education, family type, and family size, concerning the dietary patterns of young adults.

Keeping in view, it was hypothesized that the demographic variables (gender, BMI, CGPA, parents' Education, family type, and family size) would be strong predictors of food preferences categories (vegetables, fruits, meat/fish, dairy, snacks, starches)

METHODS

Sample: The sample consisted of 400 undergraduate students with a distribution of 200 males and 200 females with an age range of 19-24 years, conveniently drawn from public universities in Lahore. **Inclusion /exclusion criteria:** Only undergraduate students were selected from the public universities of Lahore. Students going gym and following any dieting schedule were not included in this study. Students suffering from any physical or mental ailment were also not selected.

Demographics Showing Sample Characteristics (N=400)

Variables	*F*	*%*
Gender		
Male	200	50
Female	200	50
BMI		
Underweight	96	24
Normalweight	229	57
Overweight	75	18
Family size		
Small	43	10.8
Median	165	41.3
Large	192	48
Family type		
Nuclear	243	60.8
Joint	157	39.3
SES		
Lower class	181	45.3
Middle class	146	36.5
Upper middle	35	8.8
Upper class	38	9.5
Father education		
Illiterate	12	3
Matric	127	31.8
Graduation	157	39.3
Masters	104	26
Mother education		

Illiterate	31	7.8
Matric	171	42.8
Graduation	151	37.8
Masters	47	11.8

Measures

Demographic information

Primary demographic information name, gender, age, CGPA, weight, height, monthly income, family system, family size, mother education, and father education was taken from the participants. All gathered information was later entered into SPSS and excluded participants' names for confidentiality.

Food preference questionnaire for adolescents and adults (FFQ)

A translated and adaptive version of the self-report food preference questionnaire was used to assess the food preferences of young adults. Smith et al. (2016) originally developed this self-report food preferences questionnaire. This self-report measure consisting of 62 food items was divided into six categories: 1. Vegetables (18 items) 2. Fruit (7 items) 3. Meat/fish (12 items) 4. Dairy (10 items) 5. Snacks (9 items) 6. Starches (6 items). Food preferences are ranked from 1-5 (1 for dislike, 5 for like). A higher score indicates more liking. The mean of the test-retest food preferences scale ranges from 0.61 to 0.95, indicating a fairly stable test. Internal reliability (Cronbach's) of full scale and six food categories are (62 items $\alpha = 0.95$) 1. Vegetables (18 items $\alpha = 0.94$) 2. Fruit (7 items $\alpha= 0.85$) 3. Meat/fish (12 items $\alpha = 0.89$) 4. Dairy (10 items $\alpha =0.89$) 5. Snacks (9 items $\alpha =0.86$) 6. Starches (6 items $\alpha = 0.88$).

Procedure

After the approval of the topic from the academic studies and research board(AS&RB) of Government College University (GCU), Lahore. Permission was sought from the author of the original scale. Considering inclusion and exclusion criteria, the young adults were approached in their public universities in Lahore through the purposive sampling technique. The data was collected personally at the time and from settings convenient for the participants after briefing them about the purpose of the study and getting their informed consent.

The participants were ensured confidentiality of their information. A demographic and food questionnaire was administered to the participants. A total of 450 participants completed the questionnaire booklet. Fifty participants did not fully complete the questionnaires till the end, and these were discarded, bringing the final count of the completed form to 400. A participant took 15-20 minutes on average to complete the questionnaire. IBM SPSS (statistical package for social sciences – version 26) was used to analyze the data.

Ethical Considerations

Participants' welfare and dignity were protected
Confidentiality of the data was ensured
Informed consent was taken from the participants
The right to withdraw from the study at any time was protected.

RESULTS

The present study aimed to investigate the demographic variables as predictors of food preference categories(vegetables, fruits, meat/fish, dairy, snacks, and starches). Multiple regression analysis was applied to determine socio demographic variables as predictors of food preference categories (vegetables, fruits, meat/fish, dairy, snacks, and starches)

Results

Correlations for Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender		-.81	.04	-.08	-.11*	-.26**	.01	-.045	.04	.00	-.03	-.02	.09	.16**
2. BMI			-.05	.18**	-.08	.00	.16**	.13**	.04	.08	.17**	.12*	.06	.08
3. CGPA				.14**	-.08	-.01	.07	.15**	.17**	.07	.02	.08	.04	.12
4.SES					-.14**	.10	.13**	.32**	.03	.03	.06	.02	-.04	.04
5. Familysys						.04	-.07	-11*	-.06	-.08	-.08	-.09	-.17**	-.12*
6. Familsize							-.08	-.06	.12*	.03	.02	.09	.08	.07
7.Motheredu								.43**	.032	-.01	.11*	.01	.07	.02
8.FatherEdu									-.03	.03	.05	.02	.03	.02
9. Vegetable										.39**	.21**	.43**	.32**	.54**
10. Fruit											.28**	.28**	.29**	.35**
11. Meat												.46**	.26**	.34**
12. Dairy													.53**	.48**
13. Snack														.44**
14. Starches														

**P<,.05, ** p<.01, ***p<.001;* BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, median, large); mother's Edu; mother's education, father's Edu: father's education

Pearson's product-moment correlation coefficient between the study variables is run on the table above. Gender showed a significant negative relationship between the family system and family size. *(r =.-.11*, r= -.26**,p<.01)*Whereas gender depicted significant relationship with starches. (r =.-.16**). Males consumed more starches as compared to females. BMI had a significant positive relationship between SES, mother education, father education, meat, and dairy products. (r =.18**, r=16**, r=.13**, r=.17**, r=.12**,p<.01)respectively. CGPA showed a significant relationship between SES, Father education, vegetables, and starches. (r = .14**, r= .15**, r= .17**). SES had a significant negative relationship between a family system and a positive relationship between mother and father education. (r = -.14**, r= .13**, r= .32**). The family system had a significant negative relationship between the father's Education, snacks, and starches. (r = -.11**, r= -.17**, r= -.12**). Family size showed a significant relationship only with vegetables (r= .12*). Mother education had a significant relationship between father education and meat. (r= .43**, r= .11*). Father education did not show any relationship with study variables. A significant strong relationship was found in each category of the Food frequency questionnaire (vegetables, fruits, meat, dairy, snacks, and starches).

Gender, BMI Family System, Family Size, And Parents' Education as Predictors of Food Preferences Category Vegetables

	Vegetables				
Predictors	B	SE	T	p	99% CI
Gender	1.82	1.34	1.35	.17	-1.66, 5.30
BMI	.16	.155	1.08	.28	-.23, .56
CGPA	6.87	1.97	3.48	.00	1.77, 11.98
SES	.24	.73	.33	.73	-1.65, 2.15
Family System	-1.16	1.34	-.86	.38	-4.63, 2.30
Family Size	2.82	.99	2.84	.00	.25, 5.39
Mother Education	.92	.89	1.03	.30	-1.39, 3.25
Father Education	-1.48	.91	-1.62	.10	-3.83, .87
R^2				.06	
ΔR^2				.04	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father's Edu: father's Education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category vegetables. The R^2 value of .06 revealed that the predictors explained a 6% variance in the outcome variable with *F (8,391) = 3.21, p.,001*. The findings revealed that CGPA and family size positively predicted vegetable category (β = .175, p< .01; β = .145, p< .01), respectively.

Gender, BMI Family System, Family Size, and Parents' Education as Predictors of Food Preferences Category fruits

		Fruits			
Predictors	B	SE	T	p	99% CI
Gender	.08	.37	.22	.82	-.89, 1.06
BMI	.07	.04	1.60	.11	-.04, .18
CGPA	.75	.55	1.35	.17	-.68, 2.19
SES	-.00	.20	-.02	.98	-.54, .53
Family System	-.51	.37	-1.35	.17	-.14, .46
Family Size	.20	.28	.74	.45	-.51, .93
Mother Education	-.19	.25	-.78	.43	-.85, .45
Father Education	.13	.25	.52	.60	-.52, .79
R^2				.02	
ΔR^2				.00	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father's Edu: father's Education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category fruits. The R^2 value of .02 revealed that the predictors explained a 2% variance in the outcome variable with *F (8,391) = 1.01, p.,001*.

Gender, BMI Family System, Family Size, and Parents' Education as Predictors of Food Preferences Category Meat

		Meat/fish			
Predictors	B	SE	T	P	99% CI
Gender	-.36	.83	-.43	.66	-.2.52,1.80
BMI	.29	.09	3.05	.00	.045, .54
CGPA	.62	1.22	.50	.61	-2.54,3.79
SES	.17	.45	.37	.70	-1.01,1.35
Family System	-1.03	.83	-1.23	.21	-3.18,1.12
Family Size	.33	.61	.53	.59	-1.26, 1.92
Mother Education	.88	.55	1.59	.11	-.55,2.33
Father Education	-.18	.56	-.32	.74	-1.64,1.27
R^2				.21	
ΔR^2				.04	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father's Edu: father's Education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category meat/fish. The R^2 value of .21 revealed that the predictors explained a 21% variance in the outcome variable with *F (8,391) = 2.32, p.,001*. The findings revealed that BMI positively predicted the meat/fish category (β = .157, p< .01)

Gender, BMI Family System, Family Size, And Parents' Education as Predictors of Food Preferences Category Dairy

		Dairy			
Predictors	B	SE	T	p	99% CI
Gender	-.04	.70	-.06	.94	-1.88, 1.78
BMI	.20	.08	2.50	.01	-.00, .41
CGPA	1.89	1.03	1.83	.06	-.78,4.57
SES	-.16	.38	-.41	.67	-1.16,.83
Family System	-1.11	.70	-1.58	.11	-2.94,.70
Family Size	.94	.52	1.81	.07	-.42,2.30
Mother Education	-.01	.47	-.03	.97	-1.23,1.20
Father Education	-.05	.47	-.11	.91	-1.29,1.18
R^2				.19	
ΔR^2				.02	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father's Edu: father's Education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category dairy. The R^2 value of .19 revealed that the predictors explained 19% variance in the outcome variable with *F (8,391) = 2.01, p.,001*. The findings revealed that BMI positively predicted the dairy category ($\beta = .129$, $p < .01$).

Gender, BMI Family System, Family Size, and Parents' Education as Predictors of Food Preferences Category Snacks

		Snacks			
Predictors	B	SE	T	P	99% CI
Gender	1.13	.58	1.96	.05	-.36, 2.64
BMI	.08	.06	1.22	.22	-.09, .25
CGPA	.68	.85	.80	.41	-1.51, 2.89
SES	-.51	.31	-1.61	.10	-1.33, .30
Family System	-1.96	.57	-.3.3	.00	-3.46, -.46
Family Size	1.07	.42	2.49	.01	-.04, 2.18
Mother Education	.46	.38	1.19	.23	-.54, 1.46
Father Education	.06	.39	.16	.86	-.95, 1.08
R^2				.25	
ΔR^2				.04	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father Edu: father education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category snacks. The R^2 value of .25 revealed that the predictors explained 25% variance in the outcome variable with *F (8,391) = 3.42, p.,001*. The findings revealed that gender family system and family size positively predicted snacks category ($\beta = .101$, $p < .01$; $\beta = -.170$, $p < .01$; $\beta = .127$, $p < .01$)

Gender, BMI Family System, Family Size, and Parents' Education as Predictors of Food Preferences Category Starches

		Starches			
Predictors	B	SE	T	p	99% CI
Gender	1.62	.44	3.65	.00	.47, 2.78
BMI	.10	.05	1.99	.04	-.03, .23
CGPA	1.49	.65	2.29	.02	-.19, 3.18
SES	.04	.24	.20	.84	-.58, .67
Family System	-.77	.44	-1.73	.08	-1.91, .37

Family Size	.81	.32	2.47	.01	-.03, 1.66
Mother Education	-.21	.29	-.06	.94	-.79, .74
Father Education	-.00	.30	-.01	.98	-.78, .77
R^2				.27	
ΔR^2				.05	

Note CI= Confidence interval. BMI; body mass index; CGPA; grade point average; SES; socio-economic status; family sys: family system, family size (small, medium, large); mother's Edu; mother's Education, father's Edu: father's Education

Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences category starches. The R^2 value of .27 revealed that the predictors explained 27% variance in the outcome variable with *F (8,391) = 3.86, p.,001*. The findings revealed that BMI, CGPA, and Family Size, positively predicted starches category ($\beta = .101$, $p < .01$, $\beta = .114$, $p < .01$, $\beta = .125$, $p < .01$)

DISCUSSION

This study aimed to investigate the role of demographic variables in developing the food preferences of young adults. Firstly correlation was run to see the relationship among the study variables. These findings supported significant relationships among some study variables for subsequent regression analysis. Multiple regression analysis was run to assess the predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education with food preferences categories (vegetables, fruits, meat/fish, dairy, snacks, starches. The findings revealed that BMI significantly predicts four categories of food preferences scale (meat, dairy, and starches) CGPA significantly predicted vegetables, whereas it negatively predicted starches categories. Family size positively predicted vegetables, snacks, and starches categories. The family system positively predicted snack categories. These findings are consistent with the current literature**.** Simmonds et al. (2016) study indicated that meat contributes to increased fat mass in adolescents and young adults. Shay et al. (2012) postulated that eating foods high in nutrient-dense carbohydrates while low in animal protein and saturated fat was linked to decreased total energy consumption, better micronutrient consumption, and lower BMI. Lower BMI was associated with more fresh fruit, rice, and pasta consumption and lower intakes of meat. In both sexes, lower urinary sodium levels, dietary cholesterol, animal protein, saturated fats, and iron intake were linked to lower BMI. According to study findings, BMI significantly predicted the dairy category of the food preferences scale. Dairy products naturally have a high content of many essential nutrients, especially protein, calcium, potassium, phosphorus, and vitamin B-2. (Solomons, 2008) Therefore, dairy is often advised to be part of each individual's diet. (FAO, 2013).

Study findings also revealed that BMI significantly predicted the food preferences for the meat and starches categories. Kachurak et al. (2019) viewed that the intake of snack frequency was associated with increased risks of overweight and abdominal obesity in young children. Tripicchio et al. (2019) proposed that snack size consumed by adolescents' daily intake snacks' frequency has implications for weight status. According to the analysis, gender also significantly predicted the snacks category of the food preferences scale. Previous literature revealed that gender differences in fast food and snack consumption and the prevalence of obesity revealed that the relationship was significant among boys but not girls. Taveras et al. (2005) conducted a study after controlling for gender, age, and all other aspects, eating snacks and fast food was found to have a significant independent association with the risk of being overweight and higher BMI. According to findings, male gender, family size, and family system were all significant predictors of snack consumption. Higher nutrition knowledge among girls due to their deep concern with self-perception of body image (McElhone et al., 1999) and the sociocultural matrix in South Asia that prioritizes boys in feeding practices could explain the gender disparity. Because the ideal male body shape is larger and more muscular, parents are less likely to encourage sons to lose weight. As precious literature supported study findings, male, urban children and those from a higher social class (high SES, high-income, high parental education, both parents working, fewer siblings, and less crowded housing) consumed more fast food and snacks (Taveras et al., 2005 & Putty, 2014; Ricciardelli, 2001).

Gomez-Pinilla (2008) viewed that diets high in trans fats and saturated fats have a detrimental effect on cognition. Most junk food and fast food contain these trans fats. Through these trans fats, Junk food impacts learning and memory-related molecules and the brain. Synapses can be strengthened, and

cognitive benefits can be obtained from a diet high in Omega-3 fatty acids and low in trans fats (Wolpert & Wheeler, 2008). Wood cited Kretsch et al. (2001) for additional evidence that diet influences cognitive ability. Research on school-aged children has found an association between malnutrition and lower academic proficiency. Ghosh & Saha (2013) reported that numerous studies provided sufficient evidence of the significance of balance nutrition to an individual's cognitive development, which impacts their academic success.

According to study findings, family size (large families) positively predicted the categories of vegetables and starches. Family system (joint family) positively predicted starches categories. Hunt, G. et al. (2011) examined the three main types of households blended single parents extended families distinguished based on their dietary habits. The buying and eating of food vary among these households. An association was found between non-kin and extended family members.According to findings eating alone can be a sign of independence from one's family of origin or can be the result of family strife at the dinner table.

CONCLUSION

Young adults' dietary patterns were maintained and changed by various socio-economic and cultural factors. This study aimed to look into the most important factors influencing young adults' dietary patterns. Multiple regression analysis was carried out to assess the significant predictive relationships of gender, BMI, SES, family system, family size, mother education, and father education on food preferences categories (vegetables, meat/fish, fruits, dairy, snacks, and starches). Results indicated that BMI significantly predicts four categories of food preferences scale (meat, dairy, and starches) CGPA significantly predicted vegetables, whereas it negatively predicted starches categories. Family size positively predicted vegetables, snacks, and starches categories. The family system positively predicted snack categories. Conclusively these findings might help develop food-based dietary guidelines in young adults.

Implications of the study

These findings could be useful in developing food-based dietary guidelines for this population and designing interventions to prevent obesity and other risk factors for chronic disease. Along with students, parents and teachers must emphasize the importance of consuming adequate food containing all essential nutrients in optimum amounts for better cognitive functioning.

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