Socio-demographic Factors and Fruit and Vegetable Consumption among Tehranian Adolescents: A Cross-sectional Study

Sakineh Rakhshanderou[1], Ali Ramezankhani[2], Mohtasham Ghaffari[3]*, Yadollah Mehrabi[4]

Abstract

Aim: Evidence indicates that demographic factors such as age, gender, and mother's literacy are important predictors of fruit and vegetable consumption among adolescents. So, this study was conducted in order to survey the relation between socio-demographic factors and fruit and vegetable consumption among Tehranian adolescents in 2013.

Methods: This cross-sectional study (descriptive-analytic) was carried out for surveying Tehranian adolescents, socio-demographic factors and fruit and vegetable consumption. The total of 500 adolescents (11-14 years old) was included in the study using multistage random sampling method. Being at the age of 11-14 years, giving informed consent, and voluntary participation were criteria for students' selection. Data were gathered using questionnaire encompass socio-demographic characteristics (11 items) and Frequent Fruit and Vegetable Questionnaire (FFQ). Data were analyzed using statistical software SPSS 18 (descriptive statistics, and tests of independent t and one way ANOVA).

Findings: There was no relationship between age, gender, family size, parent's job, and fruit and vegetable consumption. Based on one way ANOVA test, there was a significant relation between vegetable consumption and mother's and father's literacy, as well as between home size and fruit and vegetable consumption.

Conclusion: The finding that economic factors and parent's education level have a strong association with the adolescents' intake of fruits and vegetables in this sample concurs with other research findings regarding the importance of family environment to promote healthy eating behaviors among adolescents.

Keywords: Adolescent, Socio-demographic factors, Fruit and vegetable consumption

1. Assistant Professor, Department of Public Health, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
Email: s_rakhshanderou@yahoo.com
2. Professor, Department of Public Health, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
Email: aramezankhani@sbmu.ac.ir
3. Associate Professor, Department of Public Health, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
Email: mohtashamg@yahoo.com
4. Professor, Department of Epidemiology, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran
Email: ymehrabi@gmail.com

Introduction

Urbanization, industrialization, economic development, and international trade during the past decade have made rapid changes in people's diet and lifestyle. Consequently, this situation has caused increased incidence of diet-related chronic diseases in the world [1]. This condition is more alarming in low and middle-income countries, because chronic diseases related to diet in these countries occur with more rapid rate than in high-income countries [2]. Moreover, the burden of malnutrition caused by chronic diseases is very high in the health systems of low and middle-income countries [3]. Adequate intake of fruits and vegetables is useful in protecting against chronic diseases such as cancers and cardiovascular diseases (CVDs) [4], and helps to weight control [5]. Low fruit and vegetable intake is among the top 10 selected risk factors for global mortalities [6]. It is considered as a common feature of low and middle-income countries [7]. According to the world health organization (WHO) report, up to 2.7 million lives could be saved annually with sufficient fruit and vegetable consumption [8]. The study of the disease burden in Australia has shown that almost 11% of all cancers (leading to 3000 death) are due to insufficient intake of fruits and vegetables [9]. Based on the report of Iran's Ministry of Health and Medical Education (2009) on non-communicable

diseases' risk factors in Tehran province, the average of daily fruit intake was 1.57 for males and 1.82 for females and at the country level, 1.32 for both sexes. Also the average of daily vegetable consumption was 1.47, 1.59 and 1.45 for males, females and country level, respectively. According to the mentioned report, 84.87% of men and 79.4% of women in Tehran and 88.2% of total population at the country level consume less than 5 servings of fruits or vegetables per day [10]. Several studies have reported low fruit and vegetable consumption among adolescents. Based on the Center for Disease Control and Prevention (CDC) in 2010, the average consumption of fruits and vegetables among the high school students of the United States was 1.2 times per day. Overall, 28.5% and 33.2% of these students consumed, respectively, fruit and vegetables more than one time daily [11]. A cross-sectional study on 812 male and female adolescents in Sao Paulo, Brazil, in 2003 showed that from the total of adolescents interviewed, only 6.4% had consumed the minimum daily-recommended amount (400gr) of fruits and vegetables, and 22% of them did not use any kind of fruits and vegetables [12]. Regarding the effect of low fruit and vegetable consumption in adolescents on the risk of chronic diseases, the issue of fruit and vegetable intake encompasses too importance [13]. Evidence indicates that there is a

relationship between individual and social demographic factors and low fruit and vegetable intake [14], and demographic factors such as age, gender, mother's literacy, etc. are as important predictors of fruit and vegetable consumption among adolescents [15]. The present study aimed to identify association between socio-demographic factors and fruit and vegetable consumption among Tehranian adolescents. It is hoped that the findings of this study could be used by researchers and practitioners in applying effective strategies for promoting adolescents' fruit and vegetable consumption and preventing chronic diseases in adulthood.

Materials & Methods

The present cross-sectional study (descriptive-analytic) was conducted to survey association between socio-demographic factors and fruit and vegetable consumption. 500 Tehranian adolescents (11-14 years old) participated in this study in 2013. After formal permission from Shahid Beheshti University of Medical Sciences and Tehran's General Office of Education and then referring to the selected regions and accomplishing the related coordination, the target schools were selected for the study. Students in each class were chosen for filling in the questionnaires after coordination with the managers and teachers. In this research, we used multi-stage random sampling method. At first,

Tehran was divided into 4 parts, and then one region of each part was selected by cluster random sampling (Regions 2, 4, 10, and 16 were selected for the research). In each region, we determined one public elementary and middle school for both males and females (sum of 16 schools). Also one non-governmental/private elementary and middle school was selected among all Tehran schools by cluster random sampling that was placed in region 6 (sum of 4 schools). Students were selected randomly based on sample size; thus, among elementary schools, a sixth grade class was selected, and among middle schools, one grade II and one grade III classes were chosen. We selected 17 students of each grade randomly based on the students list. The age of 11-14 years, informed consent, and voluntary participation were criteria for selection of the samples. Data were gathered using a questionnaire encompassing demographic characteristics (11 variables including age, gender, grade of education, family size, birth order, parental occupation, parental literacy, housing status, and household size). A fruit and vegetable frequency questionnaire encompassing 36 fruit items and 39 vegetable items with standard serving size was used to assess the amount of fruit and vegetable intake. List of fruits and vegetables was extracted from a questionnaire that has been validated by Mohammadi Fard et al. and, had a relatively good criterion validity, reproducibility,

sensitivity and specificity [16]. The students were asked to report the frequency (time) of each item's consumption (regarding standard serving size) during the past year. Finally, all amounts and frequencies were converted into daily intake; thus, daily fruit and vegetable intake of each adolescent was accounted based on serving. Before completing the questionnaires, necessary explanations were given to the students by the researcher, and they were assured that all questionnaires are anonymous and all data will be analyzed overall. Completion of each questionnaire lasted on average 40 minutes. Data were analyzed using the SPSS 18 software (descriptive statistics and tests of independent-t and one way ANOVA).

Results

In this present study that was conducted on 500 male and female adolescents (11-14 years old) in Tehran, the mean age of participants was 1.1 ± 12.61 year. Number of boys and girls participated was the same (250 for each). Family size of the subjects was in the range of 2- 9. Birth order of 224 adolescents (44.8%) was first, and 38.8% had second birth order. In terms of father's occupational status, the highest and the lowest frequency were related to non-government job and unemployment option (48.4% and .8%, respectively). Concerning the mother's occupational status, the highest frequency was 73.8%, related to housekeeping. Fathers of 148 (29.6%) individuals had at least bachelor's degree and 39 (7.8%) had basic literacy or were illiterate. On mothers' literacy level (n=486), the highest and the lowest frequency (32.6 and 7%, respectively) were related to high school education/diploma and primary education/ illiteracy. Among the 492 students, 348 (69.6%) had private house, and 144 (28.8%) cited that they are tenant.

Table 1: Mean and standard deviation of adolescents' fruit & vegetable intake under demographic variables

Variable		n	Fruit & Vegetable (Serving) SD± Mean	P	Fruit SD± Mean	P	Vegetable SD± Mean	P
Gender	Boy	250	1.27 ± 4.38	0.415	0.82 ± 2.69	0.302	0.79 ±1.72	0.609
	Girl	250	1.30 ±4.30		0.85± 2.61		0.74 ±1.68	
Home situation	Personal	348	1.32 ±4.38	0.267	0.85 ± 2.68	0.332	0.70 ±1.73	0.282
	Rent	144	1.19 ±4.23		0.79 ± 2.59		0.73 ±1.64	
Father's job	Employed	184	1.25±4.30	0.613	0.80 ± 2.60	0.429	0.74 ±1.70	0.982
	Unemployed	313	1.31±4.35		0.86 ± 2.67		0.72 ±1.70	
Mother's job	Housekeeper	369	1.28 ±4.30	0.187	0.82 ± 2.61	0.111	0.75 ±1.70	0.617
	Employed	128	1.30 ±4.47		0.88 ± 2.75		0.74 ±1.73	

One-way ANOVA results showed that there was a significant difference between mean the fruit and vegetable intake of adolescents and their home size (P=0.011). This difference was

also significant in terms of vegetables mean intake versus fruit consumption. Scheffe post hoc test showed that there was a significant difference (with a mean difference of 0.65 and P=0.026) between the mean of fruit and vegetable consumption among the adolescents living in houses below 61 meters and those who live in houses over 120 meters. On the other hand, the adolescents living in houses over 120 meters consume more fruits and vegetables than those who live in houses below 61 meters. The same condition was existed on vegetable consumption in adolescents living in houses below 61 meters and adolescents who live in houses over 120 meters, and also between adolescents living in houses below 90 meters and adolescents who live in houses over 120 meters (with mean difference=0.43, P=0.001). According to the research results, there was a significant difference between mean of vegetable consumption in adolescents who live in houses below 120 meters and those living in houses over 120 meters (with mean difference of 0.31, P=0.027), as adolescents who live in houses over 120 meters consume more vegetables daily (Table 2).

Table 2: Mean and standard deviation of fruit & vegetable intake among adolescents under home size

Home size	Fruit & Vegetable (Serving)	Fruit	Vegetable
	SD± Mean	SD± Mean	SD± Mean
61<	1.34 ± 4.06	0.84 ± 2.56	0.76 ± 1.54
90-61	1.23 ±4.23	0.75± 2.66	0.72 ±1.58
120-91	1.21 ±4.31	0.80 ± 2.61	0.72 ±1.71
120 >	1.34 ±4.71	0.10 ± 2.72	0.63 ±2.01
P	0.011*	0.649	0.001*<

One-way ANOVA showed no significant difference between the mean fruit and vegetable consumption of adolescents (generally and separately) under different ages. Also fruit and vegetable consumption was not correlated with the number of family members. In other words, there was no significant difference in the intakes of adolescents (generally and separately) who live in families with 2 and 9 people. The findings showed significant relationship between the mean vegetable consumption of adolescents and their fathers' (P=0.047) and mothers' (P=0.002) education (Table 3). However, these differences were not significant in terms of fruit and vegetable consumption. Scheffe's post hoc test indicated a significant deference between the average vegetable consumption of adolescents with fathers under graduate diploma and those with college-educated fathers (mean difference=0.21, P=0.049), as students who have college-educated parents consume more vegetables than

others. Likewise, Scheffe test showed a significant difference between the average daily consumption of vegetables in adolescents with under diploma and diploma mothers (with mean difference of 0.28 and P=0.01) and between the mean daily vegetable consumption of adolescents with under diploma and college-educated mothers (mean difference=0.29, P=0.004). Thus, students with diploma and college-educated mothers consumed more vegetables compared with students that have under diploma mothers.

Table 3: Mean and standard deviation of fruit & vegetable intake in adolescents under parents' literacy

Variable		Fruit & Vegetable (Serving)	Fruit	Vegetable
		SD ±Mean	SD ±Mean	SD ±Mean
Father's education	Low literate	1.23 ± 4.33	0.82± 2.79	0.72 ± 1.57
	Diploma	1.27 ± 4.20	0.76 ±2.53	0.75 ± 1.68
	Collegiate	1.33 ± 4.39	0.88 ±2.63	0.74 ± 1.78
	P	0.452	0.059	0.047[*]
Mother's education	Low literate	1.26 ±4.15	0.84 ±2.67	0.69 ± 1.48
	Diploma	1.24 ± 4.36	0.78 ±2.63	0.76 ± 1.76
	Collegiate	1.32 ±4.41	0.87 ±2.65	0.73 ± 1.77
	P	0.257	0.923	0.002[*]

Discussion

The present research findings showed no correlation between the consumption of fruits and vegetables among Tehranian adolescents and variables such as age, gender, number of family members, and parents' occupation. Consistent with these results, in Rasmussen and colleagues' review on the determinants of fruit and vegetable consumption in children and adolescents, 18 out of 49 articles hadn't reported difference between boys' and girls' fruit and vegetable consumption [17]. Also fruit and vegetable consumption of male and female adolescents in Lytle and collogues' research was equal [18]. In a systematic review study conducted on the relation between the consumption of fruits and vegetables and age among children and adolescents, 9 out of 22 articles reported no correlation [17]. As seen, the findings of present study have conformity with the results of the above-mentioned studies. Regarding the importance of adolescence period in both genders developmentally, equal intake of fruit and vegetable consumption in boys and girls could be considered a positive point; however, educational interventions must consider gender-specific needs such as more need of girls to consume high-iron vegetables. The results indicated no association in terms of family size. Samuelson and colleagues in their study on eating behavior, energy, and nutrient intake in Swedish adolescents reported that

socioeconomic factors are of lesser importance than others in adolescents' eating behaviors. In addition, they did not observe any relationship between family size and fruit and vegetable consumption [19]. The results also indicated that adolescents' fruit and vegetable consumption does not depend on the parents' job and education. But the results were different about vegetable consumption, and vegetable intake was significantly associated with parental education. Thus, adolescents whose parents have college degrees consume more vegetables than other adolescents do. However, unlike the results of this study, Pearson and colleagues in a review study on the relationship between family environment and adolescents' fruit and vegetable consumption in 2009 found that there are positive association between the parental employment status and education level, and adolescents' fruit and vegetable consumption [20]. In the study of Samuelson and colleagues, a positive relationship between mothers' educational level and adolescents' vegetable consumption was reported [19]. Namakin's research showed a significant relationship between the daily consumption of fruits and vegetables in Birjandian girls and parents' education level [21]. Rasmussen's survey on the adolescent's fruit and vegetable consumption showed that from 6 articles derived on the effect of father's education on adolescents' fruit and vegetable consumption, only one paper found a positive correlation in this regard. Also 4 out of the 8 article that had examined the impact of mothers' education on adolescent's consumption of fruit and vegetables, reported positive effect of mothers' education on more fruit and vegetables consumption in adolescents. Furthermore, in the longitudinal study conducted in China, there was no significant association between the mothers' education level and adolescents' fruit and vegetable consumption [17]. Thus, according to the results of the present study, it could be stated that daily consumption of fruits and vegetables is more desirable in parents with higher education level. Higher education directly increases the awareness of family's health issues and indirectly affects the family's income. Today, diverse media and information coming from various sources have affected the real education, as well as the gap between educational evidence and literacy level of individuals, especially in large cities like Tehran, and this may explain significant findings in the field of fruit and vegetable consumption.

Another variable in the present study was the size of home that is one of indicators showing the economic situation in a family. The results showed significant differences between the mean intake of fruit and vegetable in adolescents depending on the home size. Adolescents, who live in houses over 120 meters compared with those living in homes

with an area of less than 61 meters, consume more fruit and vegetable. Many studies have indicated relationship between the family income and consumption of fruits and vegetables, and that low-income groups tend to have lower intake of fruits and vegetables rather than higher income groups [22]. Low incomes and high costs may have a negative impact on the level of fruit and vegetable consumption [23]. The results of Bijio and colleagues' survey on determinants of fruit and vegetable consumption in adolescents, the per capita household income and education level of householder were positively associated with fruit and vegetable consumption [12]. In general, it can be concluded that economic factors and parents' education level are affecting factors on fruit and vegetable consumption in Tehranian adolescents. This shows the importance of family environment to promote healthy eating behaviors among adolescents. Researchers and practitioners can address family status indicators such as parent education and family economics. These activities can focus on the families' empowerment for appropriate economic management for meet their nutritional needs.

The present study had some limitations. First, the impact of other variables on the consumption of fruits and vegetables in adolescents (such as psychological concepts) has not been studied. Also, despite that the

pilot study was conducted; the accuracy of fruit and vegetable frequency questionnaire may be a weakness of the present research because of the possibility of recall bias. The strong points in this study are multistage random sampling method, and using a reliable and valid questionnaire to measure demographic variable, and fruit and vegetable consumption in adolescents.

Conclusion

In conclusion, prevention of diet-related chronic diseases through increasing fruit and vegetable consumption is a complex issue. Our findings indicated that economic factors and parents' education level have a strong association with the adolescents' intake of fruits and vegetables; this is consistent with the findings of other researches regarding the importance of family environment to promote healthy eating behaviors among adolescents. However, dietary change must also be supported by other determinants, including personal factors and other environment factors. Further research needs to be done on the determinants of fruit and vegetable consumption in adolescents.

Acknowledgment

participated in this study.

References

[1] World Health Organization. Diet, nutrition and the prevention of chronic diseases: Report of a Joint WHO/FAO Expert Consultation. Geneva, Switzerland: World Health Organization; 2003. Available at: http://www.who.int/nutrition/publications/obesity.

[2] Popkin BM. The shift in stages of the nutritional transition in the developing world differs from past experiences. Public Health Nutr 2002; 5(1): 205-14.

[3] Abegunde DO, Mathers CD, Adam T, Ortegon M, Strong K. The burden and costs of chronic diseases in low income and middle-income countries. Lancet 2007; 370(9603): 1929-38.

[4] He FJ, Nowson CA, McGregor GA. Fruit and vegetable consumption and stroke: Meta-analysis of cohort studies. Lancet 2006; 367(9507): 320-6.

[5] Rolls BJ, Ello-Martin JA, Carlton Tohill B. What can intervention studies tell us about the relationship between fruit and vegetable consumption and weight management? Nutr Rev 2004; 62(1): 1-17.

[6] World Health Organization (WHO). Global strategy on diet, physical activity and health. Available at: http//www.who.int/ dietphysicalactivity/fruit/en/index2.html

[7] Nago ES, Verstraeten R, Lachat CK, Dossa RA, Kolsteren PW. Food safety is a key determinant of fruit and vegetable consumption in urban Beninese adolescents. J Nutr Educ Behav 2012; 44(6): 548-55.

[8] World Health Organization (WHO). Preventing non-communicable diseases. Available at: http://www.wpro.who.int/ nr/rdonlyres

[9] Ibiebele T, Coyne T, Clintock C. Trends in reported fruit and vegetable consumption among Queensland adults. Queensland Government, Information Circular, 2006. Available at: http://www.health.qld.gov

[10] Iran's Ministry of Health and Medical Education. Province repot of non-communicable risk factor survey in Tehran. Available at: http://www.ncdinfobase.ir. [In Persian]

[11] Centers for Diseases Control and prevention. Fruit and vegetable consumption among high school students-United States, 2010. Morbidity and Mortality Weekly Report. MMWR 2011; 60(46). Available at: www.cdc.gov/mmwr/ index2010.html

[12] Bigio RS, Verly Junior E, Castro MA, César CL, Fisberg RM, Marchioni DM. Determinants of fruit and vegetable intake in adolescents using quantile regression. Rev Saude Publica 2011; 45(3): 448-56.

[13] Gholipour T, Anoosheh M, Ahmadi F. The effect of participation of girl students on consumption of fruit and vegetable in family. IJN 2008; 21(54): 51-60. [In Persian]

[14] Bere E, Lenthe F, Klepp KI, Johannes Brug J. Why do parents' education level and income affect the amount of fruits and vegetables adolescents eat? Eur J Public Health 2008; 18(6): 611-5.

[15] Cooke LJ, Wardle J, Gibson EL, Sapochnik M, Sheiham A, Lawson M. Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. Public Health Nutr 2004; 7(2): 295-302.

[16] Mohammadifard N, Omidvar N, Houshiarrad A, Neyestani T, Naderi GA, Soleymani B.Validity and reproducibility of a food frequency questionnaire for assessment of fruit and vegetable intake in Iranian adults. J Res Med Sci 2011; 16(10):1286-97.

[17] Rasmussen M, Krolner R, Klepp KI, Lytle L, Brug J, Bere E, Due P. Determinants of fruit and vegetable consumption among children and adolescents: A review of the literature. Part I: quantitative studies. Int J Behav Nutr Phys Act 2006; 3: 22.

[18] Lytle LA, Varnell S, Murray DM, Story M, Perry C, Birnbaum AS, Kubik MY. Predicting adolescents' intake of fruits and vegetables. J Nutr Educ Behav 2003; 35(4): 170-5.

[19] Samuelson G, Bratteby LE, Enghardt H, Hedgren M. Food habits and energy and nutrient intake in Swedish adolescents approaching the year 2000. Acta Paediatr Suppl 1996; 85(11): 415-9.

[20] Pearson N, Biddle SJ, Gorely T. Family correlates of fruit and vegetable consumption in children and adolescents: A systematic review. Public Health Nutr 2009; 12(2): 267-83.

[21] Namakin K, Moasheri N, Khosravi S. Studying nutritional pattern of Birjand secondary schools' girls. Modern Care J 2012; 9(3): 264-72. [In Persian]

[22] Dibsdall LA, Lambert N, Bobbin RF, Frewer LJ. Low-income consumers' attitudes and behavior towards access, availability and motivation to eat fruit and vegetables. Public Health Nutr 2003; 6(2): 159-68.

[23] World Health Organization. Effectiveness of interventions and programs promoting fruit and vegetable intake. WHO: Geneva, Switzerland. 2005. Available at: www.who.int/dietphysicalactivity/publications/f&v_promotion_effectiveness. [Accessed Sep 2013]