

## Fruits and Vegetables Consumption among Benghazi University Students

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**Abstract:** Research and publications worldwide is in support of increasing scientific evidence that adequate consumption of fruits and vegetables decreases the risk of major chronic diseases. Worldwide nations have diverse availability, accessibility, preferences and cultural considerations for FV consumption. Knowledge of actual consumption of fruits and vegetables among young populations assists in framing intervention to achieve potential health benefits for their future life. This study aimed at assessing fruits and vegetables consumption patterns in a sample of students from the University of Benghazi. A cross sectional study was planned to evaluate fruits and vegetables consumption and attitudes patterns among medical university students through a previously standardized self-administered questionnaire for questions related to their preferences, knowledge of health benefits and frequency of consumption of fruits and vegetables along with height and weight measurements. A total of 410 students (117 males, 293 females), with age ranges from (18-26 years). Mean  $\pm$  standard deviation (SD): 22.69  $\pm$  1.53 years; height: 163.93  $\pm$  5.36 cm; weight: 62.86  $\pm$  10.59 kg; and BMI: 23.93  $\pm$  6.51 kg/m<sup>2</sup>. The percentage of subjects who consume 3 serving of fruits daily is (2.2 %); while the subjects who consumed four servings of daily vegetables is (2 %). Results from this research highlight the importance of early identification of the health behaviour in young population and the requirements to improve healthy dietary interventions and lifestyle.

**Keywords:** Fruits, Vegetables, Consumption, Frequency, Health, Dietary

## INTRODUCTION

Eating a diet high in fruits and vegetables (FV) has been shown to reduce the risk of many chronic diseases, including cardiovascular diseases, diabetes mellitus, and certain cancers and can promote overall health [1,2]. A global prevalence of disease has been estimated at a rate of 2.7 million deaths globally (1.8 % of global disease prevalence) which can be attributed to inadequate consumption of fruits and vegetables [3-5]. Increasing individual consumption of fruits and vegetables would decrease chronic diseases prevalence by 31 % for ischemic disease, 20 % for oesophageal cancers, 19 % for strokes, 19 % for stomach cancer, 12 % for lung cancers and 2 % for colorectal cancers [6-8]. Adequate quantity of fruits and vegetables intake was defined as 400 to 500 grams per day or 5 servings of fruit and/or vegetables [9]. Moreover, evidence suggest that adequate intake of fruits and vegetables during childhood decrease the incidence of chronic diseases in later life [10]. However, several researches indicate that both developing as well as developed nations are not meeting minimum daily recommendation of fruits and vegetables consumption [11]. Several factors can change fruits and vegetables consumption; which differ from persons to by factors such as age, culture, income level, and health knowledge [11]. Arab world is also

facing similar transition lifestyle changes and the World Health Organisation (WHO) stepwise surveys in six Arab countries (Egypt, Jordan, Iraq, Kuwait, Saudi Arabia and Syria) found that the low intake of fresh FV (below 5servings/day) ranged from 57 % in Jordan to 95.7% in Syria, and 93.45 % in Saudi Arabia [12]. Only sparse information are available for Libya. Nevertheless such limited information highlights that the consumption levels for fruits and vegetables for both genders at different ages is well below the minimum 400 g suggested by the expert consultation of WHO and Food and Agriculture Organisation (FAO) in 2005 [13-16]. Previous studies on a similar population and age group, have indicated high prevalence of obesity and significant association between high percent body fat and inadequate consumption of fruits and vegetables [16], bearing in mind this is the first research to be conducted in Benghazi city regarding the eating patterns of FV. Three other studies on Arab university students [16-18] have also evaluated the diet pattern of these students but have stopped short of comparing them with reference dietary guidelines or assessing their dietary quality by using any diet quality index. This study is aiming to describe the fruit and vegetable consumption and eating habits in a sample of Benghazi

medical university students, with relation to students' attitudes toward eating fruits and vegetables.

## METHODOLOGY

### Subjects

A cross sectional survey was planned and conducted to assess fruits and vegetable consumption patterns among a random sample of 410 subjects (117 male, 293 females) chosen randomly at Benghazi Medical University with age range of (18-26 years) during the academic year of 2014 - 2015. According to the data available with the office of the registrar; there were a total of 9659 enrolled students. Based on statistical sampling techniques [20] a sample size of at least 410 students was considered to be enough for this study. Inclusion criteria were current registration with Benghazi Medical University as students, absence of chronic illness, and acceptance of informed consent form. The exclusion criteria included those with less than 18 years and pregnancy or lactation. Initially 500 students were randomly approached between 1<sup>st</sup> September 2012 and 30<sup>th</sup> February 2013 -period of data collection- to participate in the study, out of which 40 students had to be excluded for the presence of an acute or chronic illnesses. Of the remaining 460 university students who were deemed fit to participate in the study, 20 refused to participate in the study and 30 students dropped out from the study or were excluded because of incomplete or implausible data. A total of 410 university students (out of the 500 possible study recruits) comprising 117 males and 293 females, with complete questionnaires with clearly filled entries were finally enrolled in the study giving a response rate of 82 %.

### Data collection

Researchers facilitated distribution and collection of self-reported questionnaires protecting privacy, by allowing for anonymous and voluntary participation in classrooms. The questionnaire was divided into various sub-sections. The first section covered various characteristics like preliminary information: age, gender, nationality, marital status and part-time employment, family information like paternal and maternal education, monthly family income and its self-perceived adequacy to purchase nutritious food. Living conditions include type of housing and questions pertaining to living conditions. The next part of the questionnaire had a detailed section for obtaining academic information like the faculty, study year, specialization.

### Measurements

Height and weight measurements used to calculate Body Mass Index (BMI) were taken in a private area using standard techniques as recommended by the World Health Organisation (WHO) [45]. Weight was measured with a SECA Platform lever scale (Germany) to the nearest 0.25 Kilogram (kg). Height or stature was measured using telescopic height rod

attached to the SECA scale and recorded to the nearest 0.5 Centimetre (cm). BMI (weight in kg/height in m<sup>2</sup>) was used to define weight status. WHO cut off ranges for adults were used to define underweight (< 18.5), normal BMI (18.5-24.9), pre-obese (25 to < 30) or obese ( $\geq$  30). The underweight and the obese were further classified on the bases of the degree of underweight [mildly underweight (17 < 18.5), moderately underweight (16 < 17) and severely underweight (< 16)] and obesity [obese class I (30 < 35), obese class II (35 < 40) and obese class III ( $\geq$  40)] respectively [21].

### Dietary pattern and knowledge

Subjects' eating patterns related to fruit and vegetable consumption were assessed by asking how often over the past one week they had eaten fruits, vegetables including quantity, type and form, using a quantitative food frequency questionnaire. For questions related to serving sizes (1 serving = 50 g) the subjects were explained the approximate serving size for each of the components using validated pictorial representations [22]. Questions related to preference were assessed by asking whether they like fruits, vegetables, greens, in fresh or cooked form (using the basic items, locally grown varieties. Also the questionnaire assessed their knowledge about health benefits related to fruit and vegetables consumption. The questionnaire was adopted from Fruit and Vegetable Screener developed by the National Cancer Institute, (USA) and modifications were done on the questionnaire to be more suitable with the dietary and food patterns of the Libyan students [23].

### Validation of the questionnaire

For content validity (back to back translation), the questionnaire was initially translated into Arabic language and then converted back to English and pre-tested for question accuracy and clarity.

### DATA ANALYSIS

The data set was cleaned and edited for inconsistencies. Missing data were not statistically computed. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS, version 21) software. Descriptive statistics as means and standard deviations (SD) were calculated for the continuous variables and frequencies for qualitative data. Chi-square and ANOVA tests were performed to test the differences among variables. All statistics were analyzed through a two-sided test; a p-value that is less than or equal to 0.05 was considered statistically significant.

### RESULTS

A total of 410 students (117 males, 293 females), with age ranges from (18-26 years). Mean  $\pm$  standard deviation (SD): 22.69  $\pm$  1.53 years; height: 163.93  $\pm$  5.36 cm; weight: 62.86  $\pm$  10.59 kg; and BMI: 23.93  $\pm$  6.51 kg/m<sup>2</sup>. More than half of subjects

(57.3%) from the medicine faculty and almost the same percentage about (22%) come from first, second and third year from different faculties. Regarding to family income, nearly half of students had family income of more than 500 Libyan dinars (LD) or 350-500 LD. The majority of students had normal weight status, representing (62%) of the sample, followed by overweight students being (21.7%) of the whole sample. Demographic and anthropometric profile of the study subjects (n= 410) is represented in table 1. (28%) of students have fruit juice 1-3 times per month, and (20%) reporting never consuming fruit juice, while only (8.8%) have consumption once daily. (28%) had fruit juice 1-2 times per week and [19].5%) had fruit juice 3-4 times per week. (40%) of students reported consuming ¾ to 1.25 cup serving size of fruit juice. More than half of subjects would have one medium fruit each serving. Only (5.6%) of students consume vegetables 5-6 times per week, while (25.9 %) consumed vegetables 1-2 times per week. Regarding serving size (39.8 %) of students consumed half to one cup of vegetables per serving. Food preferences and

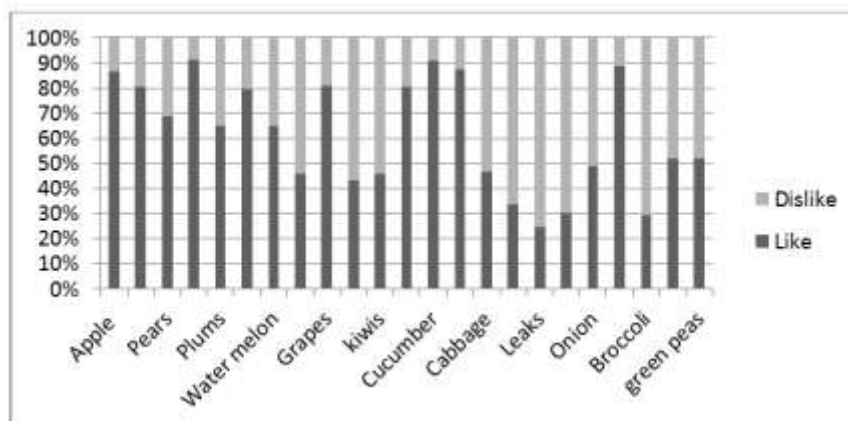
practices of the study population in regard to fruits juices, fruits and vegetables consumption are shown in Table 2. Figure (1) shows different fruits and vegetables preference; orange is the most preferred fruit with (91.2%) and sweet lemon the least (43.4%). Regarding vegetables; cucumber is the most preferred vegetable with (90.7%) and leaks the least (24.4%). (89.5%) of subjects like to eat fruits and vegetables daily; however, only (73.9%) can purchase and consume them on daily basis. (96.9%) of students reported that eating fruits and vegetables make them feeling healthy, while (89.5%) considered fruits and vegetables as having a good taste. (92.7%) of the students believe that eating fruits and vegetables give them more energy. (91.2%) believe it is healthier to eat fruits than juices, while (37.1%) don't believe that avoiding fruits and vegetables would make them unhealthy, (10%) don't believe that fruits and vegetables reduce chronic disease risk. (61.2) don't believe potatoes give the same calories as cabbage and cucumber. Statistical tests did not reveal any significant differences.

**Table-1: Subjects' characteristics in a sample selected from Benghazi University**

Variables	Frequency	Percentage
Gender		
Male	117	28.5
Female	293	71.5
Age (Years)		
18-21	178	43.4
22-25	208	50.7
≥26	24	5.9
Faculty		
Medicine	235	57.3
Pharmacy	89	21.7
Public Health	86	21
Academic Year		
First	93	22.7
Second	91	22.2
Third	90	22
Fourth	89	21.7
Fifth	47	11.5
Income		
<200	11	2.7
200-350	77	18.8
350-500	137	33.4
>500	185	45.1
Family member		
2-10	325	79.3
11-19	85	20.7
BMI		
Underweight	37	9
Normal	254	62
Overweight	89	21.7
obese	30	7.3

**Table-2: Fruit Juices and Fruit and Vegetables Consumption among sample selected from Benghazi University**

Fruit Juice Frequency	Students (%)
Never	20
1-3 times monthly	28
1-2 weekly	15.4
3-4 weekly	14.6
5-6 weekly	3.7
1 time daily	8.8
2 times daily	5.6
3 times daily	3.4
4 times daily	2
5 times daily	0
Fruit Juice Amount	Students (%)
Never	17.3
< ¾ cup	23.4
¾ - 1.25 cup	40
1.25 – 2 cups	16.6
>2 cups	2.7
Fruit Frequency	Students (%)
Never	0.1
1-3 times monthly	13.4
1-2 weekly	28
3-4 weekly	19.5
5-6 weekly	4.9
1 time daily	21.5
2 times daily	7.8
3 times daily	2.2
4 times daily	1.2
5 times daily	5
Fruit Amount	Students (%)
<1 medium (<1/2 Cup)	10.2
1 medium (1/2 Cup)	53.2
2 medium (1 Cup)	28.8
>2 medium (>1 Cup)	7.1
Never	7
Vegetables Frequency	Students (%)
Never	2.91
1-3 times monthly	19.3
1-2 weekly	25.9
3-4 weekly	18.8
5-6 weekly	5.6
1 time daily	13.7
2 times daily	3.2
3 times daily	1.7
4 times daily	2
5 times daily	7
Vegetables Amount	Students (%)
<1/2 Cup	36.1
½ -1 Cup	39.8
1-1.5 cup	12.7
>1.5	2
Never	9.5



**Fig-1: Fruit Juices and Vegetables Preference**

**Table-3: Attitudes, practices and Knowledge Regarding Fruits and Vegetables Consumption among sample selected from Benghazi University**

Attitudes, practices	Yes	No	Do not know
Like to eat fruits and vegetables daily	89.5	10.5	-
Fruits and vegetables taste good	96.9	3.4	-
Eating fruits and vegetables make me feel good/healthy	92.7	7.3	-
Eating fruits and vegetables give me more energy	73.9	26.1	-
It is difficult to eat fruits every day	38.8	61.2	-
It is difficult to eat vegetables every day	37.8	62.2	-
It is difficult to buy and eat fruits and vegetables every day	73.9	26.1	-
Usual availability of different fruits and vegetables at home	89.3	10.7	-
Usual availability of likes fruits and vegetables at home	81.2	18.8	-
Usual availability of different fruits and vegetables at leisure time	24.6	75.4	-
It is healthier to eat fruits rather than fruit juices	91.2	8.8	-
Eating less fruits and vegetables make you unhealthy	52.2	37.1	10.7
Fruits and vegetables reduce the chronic diseases risks	82.7	10.5	6.8
Fruits and vegetables have antioxidants properties	81.5	2.2	16.3
Eating fried potato give me too many calories	81.2	7.3	11.5
Potato give the same amount of energy like cabbage and cucumber	10.7	61.2	28
Fruits and vegetables are good sources of protein	35.6	54.1	10.2
Fruits and vegetables are good sources of vitamins and minerals	93.9	3.4	2.7
Fruits and vegetables are good sources of calcium and iron	30.2	56.6	13.2
Fruits and vegetables are good sources of fiber	92	2.7	5.4

**DISCUSSION**

In this cross-sectional study, we found that Libyan students clearly consume less than the recommended amounts of fruits and vegetables despite the apparently good knowledge of their health benefits.

The findings provide entry points for promoting healthy eating among university students in Benghazi Libya and call for further investigation toward causes for such low consumption.

Only (2.2%) consume three fruits a day with serving size of “1 medium fruit”. And (2%) consume four vegetables a day. Though consumption is remarkably low it is not surprising when comparing to other studies, adolescents and college students in general are even less likely to consume the recommended levels of fruits and vegetables [24]. Furthermore, the nutrition knowledge is usually higher

in health profession university students than other disciplines [25] and it is generally related to the field of study [26,27].

Not long ago low intake of fruits and vegetables was considered the main problem in the developing world including Libya [13-16]. It has been reported that less than half of college students consume the minimum recommended level of fruits and vegetables on a regular basis [25]. A study showed that the average combined intake of FV was 4.2 servings per day, and (69.4%) consumed less than five servings of FV per day [26].

In Costa Rican adolescents, mean daily serving of fruits was (1.7 servings); which is not fairly far from the minimum recommendation of two fruits daily servings [27]. In agreement with previous studies [28], (89.5 %) of subjects likes fruits and vegetables.



Although more precise measurements, details analysis and large study sample are needed to determine whether students are meeting the daily requirements, according to their responses, students consume less than the recommended amounts of vegetables, with (3.2%) having vegetables twice a day, and about (2%) would have 3-4 vegetables servings a day.

The current trend has been seen in other studies where only 64 % of medical university students had daily consumption of fruits and vegetables [29]. Even among those who did consume fruits and vegetables daily their intake was less than the recommended servings in as many as 80 % [30] to 88 % [31] of medical students.

Fruit and vegetable intake among medical university students has been found to be favourably related to intake of dietary fiber, calcium, magnesium, potassium, Folate, and vitamins C, E, A, B1 and B6, and inversely related to saturated and trans fatty acids and cholesterol [32].

Data from 196,373 adult participants from 52 countries taking part in the World Health Survey (2002–2003) were analyzed in the summer of 2008. Low fruit and vegetable consumption was defined according to the WHO guidelines of a minimum of five servings of fruits and/or vegetables daily. Fruit and vegetable consumption prevalence ranged from 36.6% (Ghana) to 99.2% (Pakistan) for men and from 38.0% (Ghana) to 99.3% (Pakistan) for women. Frequent consumption of unhealthy items was common. Polish students reported the least frequent consumption of vegetables and a low consumption of fruits [33-37] Our findings are much pretty in parallel with similar studies on the same age group in Kuwait [38] and in the developing world in Sudan [39] and in the developed world in Japan [40]. Low intake of fruits and vegetables is a common well known worldwide behaviour, which was and still is a risk factor for a bundle of chronic diseases [13,16,22]. The results suggest that a great proportion of the youth are at a risk for lower fruits and vegetables intake than the recommended [41].

Although we did not investigate for possible reasons for the limited consumption, responses from participants suggest that economic burden could be the explanatory reason as (73.9) reported not being able to purchase fruits and vegetables and (24.6) reported the availability of FV at leisure time [42]. The food supply of Libya includes a wide variety of seasonal fruits and vegetables [43] but Libya has undergone economical changes and the Libyan economy continue to suffer from recession [44] and its quite possible that the consumption was further affected by such changes during the time proceeding the publication of this study. A need to inculcate healthy eating habits as per the specific Food Guide recommendations in accordance with current situation and availability is urgent.

As an endnote, additional studies covering more varied socio-economic, academic, physical activity and dietary characteristics need to be carried out among medical university students in Benghazi. It has to be mentioned that some limitation may hinder the high accuracy of the current study. First, the study sample size is not large enough to represent the whole age group in the Libyan population. Second, the research design is cross-sectional, a fact that is linked to less identification of real causalities of the reduced fruits and vegetables intake among the investigated group. Finally, further research in the form of (cause-and-effect) is called for in order to describe the exact causes, in addition to establishing a number of awareness and education campaigns directed towards the youth, about the healthy eating habits and the role and proper number of servings of fruits and vegetable they need on daily basis. And most importantly the relationship between healthy eating and protection against diseases, maintaining healthy weight and better quality of their overall life in the future.

## REFERENCES

1. Abolfazl F, Sadegh F, Fariba N, Alef N. Self-Efficacy and Fruits and Vegetables Consumption among College Students: By Using the Transtheoretical Model (TTM). *World of Sciences Journal*. 2013;1(13):49-55.
2. AL-Otaibi, H. The Pattern of Fruit and Vegetable Consumption among Saudi University Students. *Global Journal of Health Science*. 2013, 6(2), 156-164
3. Al Othaimen AI, Al Nozha M, Osman AK. Obesity: an emerging problem in Saudi Arabia. Analysis of data from the National Nutrition Survey.
4. Blanchard CM, Kupperman J, Sparling PB, Nehl E, Rhodes RE, Courneya KS, Baker F. Do ethnicity and gender matter when using the theory of planned behavior to understand fruit and vegetable consumption?. *Appetite*. 2009 Feb 28;52(1):15-20.
5. Cullen KW, Baranowski T, Rittenberry L, Cosart C, Hebert D, de Moor C. Child-reported family and peer influences on fruit, juice and vegetable consumption: reliability and validity of measures. *Health Education Research*. 2001 Apr 1;16(2):187-200.
6. Dauchet L, Amouyel P, Hercberg S, Dallongeville J. Fruit and vegetable consumption and risk of coronary heart disease: a meta-analysis of cohort studies. *The Journal of nutrition*. 2006 Oct 1;136(10):2588-93.
7. Eperu S, Eideh AA, Shamsuddeen SB, Al Shamarry SA. Self-reported weight patterns and perceptions among female students of Saudi Arabia: a cross sectional survey. *Int. J. Nutr. Food Sci*. 2013;2:360-5.

8. Fairfield KM, Hankinson SE, Rosner BA, Hunter DJ, Colditz GA, Willett WC. Risk of ovarian carcinoma and consumption of vitamins A, C, and E and specific carotenoids. *Cancer*. 2001 Nov 1;92(9):2318-26.
9. Alshammari E. Assessing obesity, body fatness and dietary behaviors among adult college students in Hail, Saudi Arabia. 2014
10. Galal O. Nutrition-related health patterns in the Middle East. *Asia Pacific journal of clinical nutrition*. 2003 Sep 1;12(3).
11. Howarth NC, Saltzman E, Roberts SB. Dietary fiber and weight regulation. *Nutrition reviews*. 2001 May 1;59(5):129-39.
12. Ha EJ, Caine-Bish N. Effect of nutrition intervention using a general nutrition course for promoting fruit and vegetable consumption among college students. *Journal of nutrition education and behavior*. 2009 Apr 30;41(2):103-9.
13. Hung HC, Joshipura KJ, Jiang R, Hu FB, Hunter D, Smith-Warner SA, Colditz GA, Rosner B, Spiegelman D, Willett WC. Fruit and vegetable intake and risk of major chronic disease. *Journal of the National Cancer Institute*. 2004 Nov 3;96(21):1577-84.
14. Omar M, Nouh F, Younis M, Barasi F, Elzwei M, and Nagi A. "Nutritional status of Adolescents in Benghazi." *Scholars Journal of Applied Medical Sciences*. 2017; 5(5B):1851-1859.
15. Omar M, Nouh F, Younis M, Alshukri A, Elmabsout A. The Influence of Socioeconomic Factors and Physical Activity Level on Adolescent Weight Status in Benghazi, Libya. 2017; 5(6E):2439-2451.
16. Elmabsout A, Nouh F. Body Weight among Medical Students at Benghazi University in Relation to BMI Based Weight Status and Socioeconomic Factors. 2016; 4(3A):653-663
17. Pandey D, Suneetha E, Nouh F, Al-Fakhry R, Al-Agouri A. Diet Quality Assessment of Benghazi Medical Students using the Healthy Eating Index a chapter in *Public Health Research in Libya; Innovations and Methodologies. "Book"* - Scholar's Press. 2016; PP;159-169-
18. Yahia N, Achkar A, Abdullah A, Rizk S. Eating habits and obesity among Lebanese university students. *Nutr J*. 2008; 7(1): 32-40.
19. Bakr M, Ismail NA, Mahaba HM. Impact of lifestyle on the nutritional status of medical students at Ain Shams university. *J Egypt Pub Health Assoc*. 2002; 22(1-2): 29-49.
20. Musaiger AO, Radwan HM. Social and dietary factors associated with obesity in university female students. *J R Soc Health*. 1995; 115(2): 96-99.
21. Rate ER. Sample size calculator. *Population*. 2016;11(12):13.
22. World Health Organisation. Physical status: The use and interpretation of anthropometry. Report of the WHO Expert Committee. Geneva: WHO Technical Research Series no 854, 1995.
23. NIH/NHLBI. Food Exchange Lists, based on American Dietetic Association Exchange Lists: USA. 2012
24. National Cancer Institute. Eating at America ' s Table Study: Quick food Scan.2000
25. Neumark-Sztainer D, Story M, Resnick MD, Blum RW. Correlates of inadequate fruit and vegetable consumption among adolescents. *Preventive medicine*. 1996 ;1;25(5):497-505.
26. Azizi M, Aghae N., Ebrahimi M., Ranjbar K. Nutrition Knowledge, The Attitude And Practices Of College Students Physical Education and Sport, 2011; 9(3), 349 - 357
27. Azizi M, Rahmani-Nia F, Malaee M, Malaee M, Khosravi N. A study of nutritional knowledge and attitudes of elite college athletes in Iran. *Brazilian Journal of Biomotricity*. 2010;4(2).
28. Georgia S, Guldan YW, Lin Y, Zhao M, Xiang DP, Yang L, Long F. Evaluation of a nutrition education activity for medical student in china. *Asia Pacific Journal of Clinical Nutrition*. 1993;2(8):71-6.
29. Anding JD, Suminski RR, Boss L. Dietary intake, body mass index, exercise, and alcohol: are college women following the dietary guidelines for Americans?. *Journal of American College Health*. 2001 Jan 1;49(4):167-71.
30. Huang TT, Harris KJ, Lee RE, Nazir N, Born W, Kaur H. Assessing overweight, obesity, diet, and physical activity in college students. *Journal of American College Health*. 2003 Sep 1;52(2):83-6.
31. Branum AM. Fruit and vegetable intake in US children and adolescents: Measurement error and determinants. The Johns Hopkins University; 2011.
32. Lock K, Pomerleau J, Causer L, Altmann DR, McKee M. The global burden of disease attributable to low consumption of fruit and vegetables: implications for the global strategy on diet. *Bulletin of the World Health Organization*. 2005 Feb;83(2):100-8.
33. Kolarzyk E, Kwiatkowski J, Lang-Mlyarska D. Nutritional model and nutritional behaviour depending upon BMI value among students of the Collegium Medium of Jagiellonian university in Cracow. *Przegl Lek*. 2003; 60(Suppl 6): 43-47.
34. Libyan Arab Jamahiriya Nutrition Profile – Food and Nutrition Division, FAO, 2005.
35. Spencer EH, Frank E, Elan LK, Hertzberg VS, Serdula MK, Galuska DA. Predictors of nutrition counseling behaviour and attitudes in US medical students. *Am J Clin Nutr*. 2006; 84: 655-662.

36. Bertsias G, Linardakis M, Mammias I, Kaftos A. Fruit and vegetable consumption in relation to health and diet of medical students in Crete, Greece. *Int J Vitam Nutr Res.* 2005; 75(2): 107-117.
37. United Nations. Libyan Arab Jamahiriya nutrition profile. Rome: Food and Nutrition Division, Food and Agriculture Division, 2005.
38. Hall JN, Moore S, Harper SB, Lynch JW. Global variability in fruit and vegetable consumption. *American journal of preventive medicine.* 2009;31;36(5):402-9.
39. Yahia N, Achkar A, Abdallah A, Rizk S. Eating habits and obesity among Lebanese university students. *Nutrition journal.* 2008;30;7(1):32.
40. Sakamaki R, Toyama K, Amamoto R, Liu CJ, Shinfuku N. Nutritional knowledge, food habits and health attitude of Chinese university students—a cross sectional study—. *Nutrition journal.* 2005 Feb 9;4(1):4.
41. El Ansari W, Stock C, Mikolajczyk RT. Relationships between food consumption and living arrangements among university students in four European countries—a cross-sectional study. *Nutrition journal.* 2012 Apr 24;11(1):28.
42. Dehghan M, Al Hamad N, Yusufali A, Nusrath F, Yusuf S, Merchant AT. Development of a semi-quantitative food frequency questionnaire for use in United Arab Emirates and Kuwait based on local foods. *Nutrition Journal.* 2005, 27;4(1):18.
43. Saeed HA, Hamid HH. Bacteriological and parasitological assessment of food handlers in the Omdurman area of Sudan. *Journal of Microbiology, Immunology and Infection.* 2010, 1;43(1):70-3.
44. Galanis DJ, Kolonel LN, Lee J, Nomura A. Intakes of selected foods and beverages and the incidence of gastric cancer among the Japanese residents of Hawaii: a prospective study. *International journal of epidemiology.* 1998, 1;27(2):173-80.
45. Ratha D, De S, Plaza S, Schuettler K, Shaw W, Wyss H, Yi S. Migration and Development Brief April 2016: Migration and Remittances-Recent Developments and Outlook. World Bank Publications; 2016 Apr 14.