

ORIGINAL ARTICLE

Pattern of Fruits and Vegetables Intake Among Health Sciences Students in Public University UiTM Selangor

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Abstract:

World Health Organisation (WHO) recommended public to take at least 400 grams of fruit and non-starchy vegetable or five serving combination of them per day. This study examined total number of fruit and vegetable consumed by Faculty of Health Science students UiTM Selangor, Puncak Alam campus and factors associated with their intake. A cross sectional survey of 266 students from Faculty Health Science, aged 19-25 years were chosen and self-reported questionnaire was conducted. The study included 68 (25.6%) male and 198 (74.4%) female participants. The mean for age was 22.06 ± 1.19 and mean BMI was 22.63 ± 4.33 . Results indicated that consumption of fruit and vegetable consumption was far less compared with the WHO recommendation. Financial status, residency, availability and accessibility were significantly associated with fruit and vegetable consumption ($p < 0.001$). In contrast, level of BMI and awareness were found to be insignificantly associated with fruit and vegetable consumption. In conclusion, this study illustrated that financial source and residency has a major influence on their fruits and vegetables consumption. Student who are self-financed and live with family have higher intake of fruits and vegetables intake compared other students.

Keywords: Fruits intake, vegetables intake, University students

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1. INTRODUCTION

Fruit and vegetable are important component in healthy diet. Different type of fruit and vegetable vary widely in their nutrient content and it is recommended to consume them from diverse group. Fruit and vegetable best to be consume in raw form rather than supplement form based on failure of beta-carotene supplement [1]. World Health Organization (WHO) in 2003 recommended public to take at least 400 grams fruits and non-starchy vegetable per day or at least five servings, two servings of fruit and three servings of vegetable per day. Hartman and colleagues [2] stated that consumption of fruits and vegetables decreased with age in adolescence and particularly low in adolescence age 18 to 25 years old. Transition from adolescence to adulthood is important period to establish eating behavioural pattern that affect long term health [3]. Transition from school to university can make someone's food choice differ due to childhood food consumption pattern, sex and place of living. Small and colleagues [3] stated that developmental change and change in living situation may play important role in nutrition. Otemuyiwa and Adewusi [4] asserted that after young adult left secondary school; enter university, their lifestyle change drastically due to responsibility to live independence, living busy life and social pressure. Alibabic and colleagues [5] also agree that during studying, students settled into new environment, change their lifestyle and dietary habits. Transition from home environment, which routines have been structured by parents to university environment, students had to create new routines and habits

[4]. In study conducted by Alsunni and Badar [6], they found out very few students in Saudi university follow WHO recommendation for fruits and vegetables intake. Worldwide study shown 66 percent to 95 percent students eat less than five servings of fruits and vegetables per day [2].

This research was driven by previous research findings that indicate fruits and vegetables consumption was low in university's students. Food environment in university play important role in shaping eating behaviour as students spent most of their time here and studies shown the environment filled with energy-dense, poor nutrient food than healthy food. Thus, findings from this study will be used to evaluate their intake, factors associated and can be used for interventions to improve their intakes.

2. METHODOLOGY

2.1 Study Design

The University Teknologi Mara (UiTM) Selangor in Puncak Alam campus branch situated in Bandar Puncak Alam, Selangor Darul Ehsan, 60 kilometres from west Kuala Lumpur was used as study settings. A total 266 students out from 1504 students from Faculty Health Science (age 18 to 25 years old randomly selected using convenience sampling method. The population size is 1504 students from Faculty of Health Science. 266 sample sizes were obtained by using Raosoft Sample Calculator. The margin error is 5% with the confidence level 95%. Response distribution was 70 percent so recommended sample size is 266 samples.

2.2 Measurement

A set of validated questionnaire from Malaysian National Nutrition Survey (MANS) that have three sections, components which are demographic information, dietary information and food frequency questionnaire (FFQ) was used. For demographic information component, subject need to fill out their age, gender, course, financial support, residency, amount of budget allocated for buying food every month, weight and height. In this study, students from eight course of Faculty of Health Science involved. These courses are Dietetic, Physiotherapy, Optometry, Environmental Health and Safety, Medical Lab Technology, Medical Imaging, Occupational Therapy and Nursing. For financial support, they need to choose whether they received allowance from a) education loan, PTPTN (Perbadanan Tabung Pendidikan Tinggi Nasional) or Yayasan Negeri or others, b) scholarship or c) self-finance. Residency section consisted of where student live, in a) college hostel, b) rented house or c) family house. Four categories allocated for food budget used every month which are a) less than RM100 b) RM100 to RM300 c) RM300 to RM500 and d) more than RM500 per month. Their weight and height were determined through self-reported. Their BMI been calculated and categorized into four group, a) underweight (BMI < 18.5), b) normal (BMI 18.5 to 24.9), c) overweight (BMI 25 to 29.9) and d) obese (BMI ≥30).

Dietary information section consist of questions whether they are vegetarian or not, knowledge about benefits consuming fruits and vegetables, awareness about number of daily fruit and vegetable servings recommended by WHO and questions about availability and accessibility of fruit and vegetable. Knowledge on awareness of current recommendation was assessed via question asking subject to indicate number of recommended serving fruit and vegetable per day. Response categories were 1-3 servings, 3-4 servings, 5 servings and more than 5 servings. In last section, food frequency questionnaire component, consists of 10 items of vegetable, 20 items of fruits, required participant to note their number of serving fruit and vegetable consumption per day, per week, per month or never. They also need to noted number of servings each time they ate the food. However for food consumed on seasonal basis, the subject asked to respond to the frequency of that time and duration of intake. Each food item listed was given a standard serving size based on list of food item weight in household measure (Atlas Makanan 2015 and Food Portion Size of Malaysian Album 2002/2003). The responses then converted into fruits and vegetables servings respectively.

One serving for fruit defined as a whole fruit, three-fourth cup (178 ml) or one and half cup of cut fruit. For vegetable, one serving equal to one cup raw leafy vegetable and one and half cup other vegetable. For conversion of food frequency to the amount of food intake, this formula was used:

Amount of food (g) per day = frequency of intake (conversion factor) x serving size x total number of servings x weight food in one serving (Table 1).

Table 1: Conversion factor

| Frequency of intake | Frequency | Conversion factor |
|---------------------|-----------|-------------------|
| Per Day | 1X | 1 |
| | 2X | 2 |
| | 3X | 3 |
| Per week | 1X | 0.4(1/7) |
| | 2X | 0.29(2/7) |
| | 3X | 0.43(3/7) |
| Per month | 1X | 0.03 (1/30) |
| | 2X | 0.07 (2/30) |
| | 3X | 0.10 (3/30) |

(Malaysian Adult Nutrition Survey, 2003)

Descriptive analysis was calculated for demographic and other key variable. Frequency of fruit and vegetable obtained by means of questionnaire. Statistical Package for Social Science (SPSS) version 22 was used for data analysis with statistical significance, p set at < 0.05.

3. RESULT AND DISCUSSION

Present results show that 26.7 % students were aware of WHO recommendation for fruit and vegetable consumption, whereas 3.3% participants were not aware of the WHO recommendations for fruit and vegetable (Figure 1). There were 68 males (25.6%) and 198 females (74.4%) in the total of 266 randomly sampled students. The mean age of participants was 22.06±1.19 while the mean BMI was 22.63±4.33. The results was in agreement with Norimah and colleagues [14] who found that adults who know the daily fruit and vegetable intake recommendation are more likely to consume high amount of fruit and vegetable. In study conducted by Hartman and colleagues [2], they found that only 79 % students aware the recommended intake of fruit and vegetable. Some individuals feel the nutritional guideline unrealistic, not personally relevant, and do not perceive any greater health benefit of consuming more fruit and vegetable daily [7].

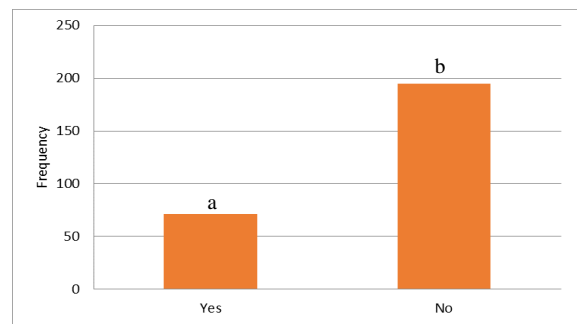


Figure 1: Students awareness on WHO recommendation for fruit and vegetable.

*Note: Values with different letter are significantly different at p<0.05.

3.1 Availability and accessibility to Fruit and Vegetable

Availability healthful choice is crucial for individuals to meet current dietary recommendations. Personal food preference are largely affected by availability food choices within one’s environment and mediated by numerous individual and social factors[8]. Our study found that 65.8% find they have difficulty in finding available fruits and vegetables sold and accessibility to the store (Figure 2).

Availability and accessibility significantly associated with total fruit and vegetable intake. In study by Borrelli [9], lack or limited supply fruit and vegetable include lack of variety of them in café and poor qualities have been shown to become barrier to the consumption these food. Moreover, Shearer and colleagues [8] reported that food location availability and accessibility is greater for urban than suburban and rural adolescents. Location did influenced the fruit and vegetable purchase as low-resourced inhabitants in disadvantaged communities less likely have healthy food choice available. Puncak Alam is suburban area, have capacity of citizens approximately 1000 people [10].

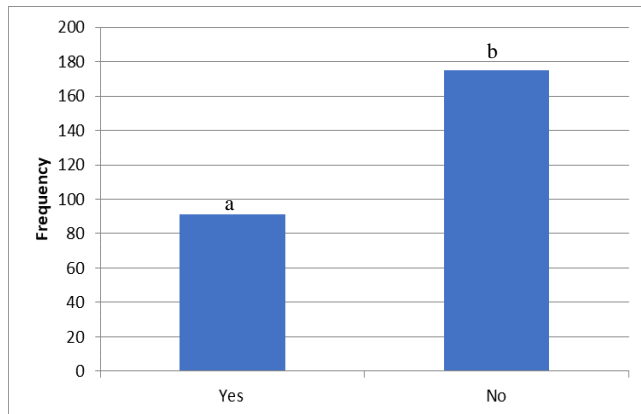


Figure 2: Frequency of availability and accessibility to fruit and vegetable.

*Note: Values with different letter are significantly different at $p < 0.05$.

Figure 3 indicated the total budget spend on food every month. Most of students (68.8%) spend RM 100 to RM300 per month for food, with average minimum RM 3 to RM10 maximum spent per day. Fruit and vegetable was not a priority when it comes to food purchasing. It's been considered as condiment or add-on. Battiston and colleagues [11] found that lower income students consume less fruit and vegetable due to higher cost of them at university salad and fruit bars. Aceijas and colleagues [12] study indicated that healthy eating practice become challenge in students due to high price of food in campus competing with variety cheap fast food out of the campus. Pereira [7] stated although people have more money available, it did not directly result increase fruit and vegetable consumption because sometimes people would rather choose to spend their money on take-away or eating out than buying more fruits and vegetable.

3.2 Comparison Fruit and Vegetable Intake with Malaysian Food Pyramid

Fruits and vegetables are placed in second level in Malaysian food pyramid. Malaysian Dietary Guideline for Children and Adolescence (2013) suggest adolescence to consume at least 5 servings of fruits and vegetables. Results shows that 81.6% student does not meet requirement which is at least two servings per day for fruits and only 18.4% of them meet requirement. For vegetable, 54.1% does not meet the requirement which is at least three servings of vegetable per day.

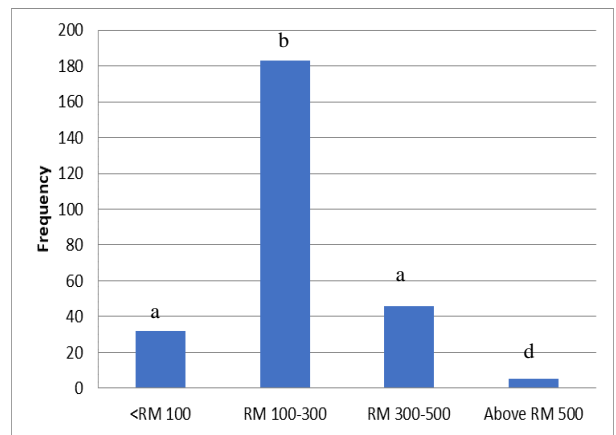


Figure 3: Total budget spend on food monthly.

*Note: Values with different letter are significantly different at $p < 0.05$.

Worldwide study shown 66% to 95% students eat less than five serving fruit and vegetable per day [2]. In contrast, Wahida and colleagues [13], found fruit and vegetable serving consumed by adult population in Malaysia meet the recommended servings with the mean frequency intake was 6.34 for both fruit and vegetable. Table 2 shows mean frequency number of fruits and vegetables consumed by students per day. Mean frequency intake for fruit was 1.39 and mean frequency for vegetables consumed was 1.55 which both not meets Malaysian Food Pyramid recommendation, at least 2 servings for fruits and 3 servings for vegetables per day parallel to findings from Malaysian Adult Nutrition Survey [14]. The mean serving size of fruits among participants 18 years and above was 1.40 servings per day and 1.51 servings per day for vegetable, respectively.

Table 2: A comparison between recommended servings to be taken per day and actual servings consumed by students.

| Food group | Food pyramid recommendation (no. of servings per day) | No of servings consumed per day | Meet Food pyramid recommendation |
|------------|-------------------------------------------------------|---------------------------------|----------------------------------|
| Fruits | 2 | 1.39 | No |
| Vegetables | 3 | 1.55 | No |

Researchers have pointed out many factors that influence their dietary habit. Taste becomes the most determinant factor in fruit and vegetable consumption followed by satiety, digestibility, appearance and texture [6]. Other factors affect their consumption are level of nutritional knowledge, availability, self- efficacy, cost and level of food preparatory skill [6]. Food preferences among adolescences primarily influenced by hunger, food craving, food appeal, convenience, food availability, media, parental influence and cost [7].

4. CONCLUSION

Fruits and vegetables consumption in the students of University Teknologi Mara Selangor is far less than the five serving a day recommended by the WHO and Malaysian Food Pyramid. This study illustrated that financial source and residency has a major influence on their fruits and vegetables consumption. There is a dire need to educate Malaysian youth as well as families about the importance of fruits and vegetables in their diet to ensure healthy nation. In

addition, findings from this study can be used for interventions to improve their intakes.

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REFERENCES

- [1] Horwath, Caroline C., Claudio R. Nigg, Rob W. Motl, Kristen T. Wong, and Rod K. Dishman. "Investigating fruit and vegetable consumption using the transtheoretical model." *American Journal of Health Promotion* 24, no. 5 (2010): 324-333.
- [2] Hartman, Hilde, Daniel P. Wadsworth, Suzi Penny, Patricia van Assema, and Rachel Page. "Psychosocial determinants of fruit and vegetable consumption among students in a New Zealand university. Results of focus group interviews." *Appetite* 65 (2013): 35-42.
- [3] Small, Meg, Lisa Bailey-Davis, Nicole Morgan, and Jennifer Maggs. "Changes in eating and physical activity behaviors across seven semesters of college: living on or off campus matters." *Health Education & Behavior* 40, no. 4 (2013): 435-441.
- [4] Otemuyiwa, Israel O., and Steve RA Adewusi. "Food choice and meal consumption pattern among undergraduate students in two universities in Southwestern Nigeria." *Nutrition and health* 21, no. 4 (2012): 233-245.
- [5] Alibabić, Vildana, Ibrahim Mujić, Dušan Rudić, Marino Golob, Edina Šertović, Melisa Bajramović, and Stela Jokić. "Assessment of Diet Quality and Nutritional Risks Representation of University of Bihać." *Procedia-Social and Behavioral Sciences* 116 (2014): 2137-2140.
- [6] Alsunni, Ahmed A., and Ahmed Badar. "Fruit and vegetable consumption and its determinants among Saudi university students." *Journal of Taibah University Medical Sciences* 10, no. 2 (2015): 201-207.
- [7] Marlatt, Kara L., Kian Farbakhsh, Donald R. Dengel, and Leslie A. Lytle. "Breakfast and fast food consumption are associated with selected biomarkers in adolescents." *Preventive medicine reports* 3 (2016): 49-52.
- [8] Shearer, Cindy, Daniel Rainham, Chris Blanchard, Trevor Dummer, Renee Lyons, and Sara Kirk. "Measuring food availability and accessibility among adolescents: Moving beyond the neighbourhood boundary." *Social Science & Medicine* 133 (2015): 322-330.
- [9] Borrelli, Rosa Cinzia. "Sustainability of well-being: are we really choosing fruit and vegetables for our health?." *Agriculture and agricultural science procedia* 8 (2016): 419-425.
- [10] Jabatan Perancangan Bandar dan desa. Malaysia, 2017.
- [11] Battiston, Diego, Guillermo Cruces, Luis Felipe Lopez-Calva, Maria Ana Lugo, and Maria Emma Santos. "Income and beyond: Multidimensional poverty in six Latin American countries." *Social Indicators Research* 112, no. 2 (2013): 291-314.
- [12] Aceijas, Carmen, Sabrina Waldhäusl, Nicky Lambert, Simon Cassar, and Rafael Bello-Corassa. "Determinants of health-related lifestyles among university students." *Perspectives in public health* 137, no. 4 (2017): 227-236.
- [13] Farah Wahida, Z., M. T. Mohd Nasir, and A. S. Hazizi. "Physical activity, eating behaviour and body image perception among young adolescents in Kuantan, Pahang, Malaysia." *Malaysian journal of nutrition* 17, no. 3 (2011).
Norimah, Jr AK, M. Safiah, K. Jamal, Siti Haslinda, H. Zuhaida, S. Rohida, S. Fatimah et al. "Food Consumption Patterns: Findings from the Malaysian Adult Nutrition Survey (MANS)." *Malaysian Journal of Nutrition* 14, no. 1 (2008): 25-39.