

The Readiness of IPB University Students to Consume Fruit and Vegetables as Recommended by the Health Ministry

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ABSTRACT

This study aims to analyze the readiness of college students in consuming Fruit and Vegetables (F&V) as recommended by the Indonesian Health Ministry (2013). The study used cross-sectional design and was conducted in May–July 2018. There were 60 Community Nutrition (CN) students and 60 non-Community Nutrition (NCN) students aged 20–23 years old who were selected purposively as subjects. Data collected were the subject's and their family's characteristics, preference on F&V, F&V intake, knowledge, attitude, self-efficacy, and readiness on F&V consumption using The Transtheoretical Model (TTM) questionnaire. Univariate and bivariate analyses were applied to the data. Results showed that CN students had better knowledge on the benefit of consuming F&V and were more ($p < 0.05$) in the action-maintenance stage in consuming fruit (20%) and vegetables (41.7%) than NCN students (3.4% and 23.3%, respectively) who were mostly in the precontemplation-contemplation and preparation stage. Daily intake of F&V for both CN and NCN students were far below the recommendation (48.9 g and 43.7 g; 25.9 g and 40.6 g respectively). Subjects' readiness was positively related ($p < 0.05$) to pocket money, knowledge, attitude, and self-efficacy, but negatively related ($p < 0.05$) to family size. It is important to consider the readiness stage and its related factors when designing nutrition education programs to improve F&V intake in Indonesia.

Keywords: college student, fruit and vegetable intake, readiness, self-efficacy, transtheoretical model

INTRODUCTION

The prevalence of Non-Communicable Disease (NCD) is increasing rapidly. Consuming less Fruit and Vegetables (F&V) could be the trigger of several NCDs, while consuming F&V regularly can decrease the risk of cardiovascular disease (Dauchet *et al.* 2010), some kinds of cancer (Büchner *et al.* 2010; Soerjomataram *et al.* 2010); type 2 diabetes (Li *et al.* 2014; Cooper *et al.* 2012), hypertension (Li *et al.* 2016; Borgi *et al.* 2016), stroke (Park 2010), general and abdominal obesity (Bradlee *et al.* 2010; Sudikno *et al.* 2015). F&V contains a lot of fibers, antioxidants, and micronutrients (Nelms *et al.* 2010).

The Ministry of Health of Indonesia (2013) promotes the WHO/FAO (2003) recommendation of five portions (400 grams) of F&V a day. However, the Indonesian Basic Health Research (MoH RI 2013) reported as much as 93.4% of Indonesians over 10 years old did not meet this recommendation. This number reached 96.4% among people in West Java.

Understanding the individual's stage of readiness is the first important step before designing an intervention program (Contento 2011). Nutrition education delivered according to the readiness stage of the client can increase the chance of success since it is more personalized (Rapley & Coulson 2005). Prochaska and Velicer (1997) developed The Transtheoretical Model (TTM) in order to identify the readiness of a person to adopt a healthier lifestyle. They divided readiness into five stages, namely Precontemplation (PC), Contemplation (C), Preparation (P), Action (A), dan Maintenance (M). With regard to F&V, it starts from the stage of not being concerned about F&V at all until the stage of increasing and maintaining F&V consumption (Hazavehei *et al.* 2016; Wyker & Davidson 2010).

Community Nutrition (CN) students were considered to have better knowledge on nutrition, particularly F&V, compared to non-Community Nutrition (NCN) students. Although knowledge is one of the important factors, it may not reflect

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a better practice (Silalahio *et al.* 2016; Al-Otaibi 2014). This study was carried out to analyze the readiness of college students (CN and NCN) in consuming Fruit and Vegetables (F&V) and the factors associated with it.

METHODS

Design, location, and time

This cross-sectional study was carried out at IPB University, a public university located in Bogor, Indonesia. The university has nine faculties, a business school, and 39 study programs. This study was conducted in May–July 2018.

Sampling

The population in this study were IPB University students aged 20–23 years old. Subjects had to fulfill the inclusion criteria: 1) students enrolled in the 6th semester; 2) apparently healthy; 3) willing to participate. Subjects were divided into two groups of CN and NCN, where CN were students of Community Nutrition study program, while NCN were students from other study programs. The consideration in choosing subjects in the 6th semester was that they have already received complete information on the benefits of consuming F&V. The minimum sample size was calculated using the Lameshow *et al.* (1997) formula, the confidence level was 95% ($Z_{\alpha}=1.96$), the proportion of subjects with F&V consumption less than the recommendation in West Java Province was based on MoH RI (2013) which was 94.6% ($p=0.946$), and precision (d) of =0.05, resulting in 54 subjects for each group. The final subjects totaled to 120 subjects. The ethical clearance was obtained from Human Research Ethics Committee of LPPM IPB University Number 078/IT3.KEPMSM-IPB/SK/2018.

Data collection

The primary data collected were: a) subject and their family characteristics, including age, sex, amount of pocket money, parent's education, income per capita, and family size through interviews using a questionnaire; b) anthropometry data including weight and height measurements using CAMRY (accuracy of 0.1 kg) and microtoise (accuracy of 0.1 cm); c) nutrition knowledge on F&V through 20 multiple choice questions, which were mainly about the

recommendation of F&V portion size, F&V processing methods, nutrient content of F&V, benefits of consuming more F&V, negative effects of consuming less F&V; d) nutrition attitude on F&V through 8 questions using the Likert Scale (modified from Yen *et al.* (2014)); e) self-efficacy through 11 questions using the Likert Scale (modified from Yen *et al.* (2014)); f) preference on F&V; g) readiness to consume F&V through questions modified from Yen *et al.* (2014) and Duyn *et al.* (1998); h) F&V consumption through 2x24 hour recall (in school and non-school day) and Food Frequency Questionnaire (FFQ) for the past one month. For estimation of F&V consumption, the Food Model Booklet from MoH RI (2014) was used.

Data analysis

F&V consumption obtained from the 2x24 hour recall was converted to gram measurements. The frequency of F&V consumption was analyzed for each F&V and then sorted according to the most frequently consumed F&V. For knowledge, each correct answer was given a score of 1, then summed and presented in percentage form (%), and classified into good, fair, and poor (Khosman 2000). Attitude was rated using the Likert scale 1–4 (1= strongly disagree, 2= disagree, 3= agree, 4= strongly agree) with a cronbach alpha of 0.808. Self-efficacy was rated using the Likert Scale 1–4 (1= strongly hesitant, 2= hesitant, 3= confident, 4 = strongly confident) by a cronbach alpha of 0.713. All scores were summed and classified into positive, neutral, or negative (attitude) and good, fair, or poor (self-efficacy) (Siswati 2017).

A univariate analysis was used to analyze the distribution of the subject's and their family's characteristics, preference on F&V, F&V consumption, knowledge, attitude, self-efficacy, and stage of readiness. Bivariate analysis was used to differentiate variables between CN and NCN and to correlate knowledge, attitude, self-efficacy with stage of readiness in consuming F&V. All data were analyzed using Microsoft Excell 2013 and SPSS 16.0 for Windows.

RESULTS AND DISCUSSION

Subject and family characteristics

The subjects' and their family's characteristics are presented in Table 1. There was no significant difference ($p>0.05$) between

Table 1 Distribution of subject and family characteristics

Subject and Family characteristics	CN		NCN		Total	
	n	%	n	%	n	%
Sex						
Male	8	13.3	16	26.7	24	20
Female	52	86.7	44	73.3	96	80
Age (years)						
20	5	8.3	3	5	8	6.7
21	23	38.3	32	53.3	55	45.8
22	28	46.7	22	36.7	50	41.7
23	4	6.7	3	5	7	5.8
Mean±SD	21.52±0.75		21.42±0.67		21.47±0.71	
Pocket money (IDR/month)**						
≤500,000	0	0	4	6.7	4	3.3
500,000–1 million	18	30	35	58.3	53	44.2
1 million–1,5 million	28	46.7	17	28.3	45	37.5
1,5 million–2 million	8	13.3	2	3.3	10	8.3
>2 million	6	10	2	3.3	8	6.7
Median (min–max)	1,375,000 (650,000–2,500,000) ^a		1,000,000 (430,000–4,000,000) ^b		1,125,000 (430,000–4,000,000)	
Nutritional status						
Underweight	7	11.7	14	23.3	21	17.5
Normal	47	78.3	38	63.3	85	70.8
Overweight	3	5.0	6	10.0	9	7.5
Obese	3	5.0	2	3.3	5	4.2
Mean(kg/m ²)±SD	21.81±2.76		21.28±3.37		21.54±3.08	
Family size***						
Small	28	46.7	23	38.3	51	42.5
Medium	27	45	22	36.7	49	40.8
Large	5	8.3	15	25.0	20	16.7
Mean(person)±SD	4.73±1.33 ^a		5.33±1.78 ^b		5.03±1.56	
Father's education						
No schooling/elementary school	6	10.0	10	16.7	16	13.3
Junior/senior high school	28	46.7	29	48.3	57	47.5
University	26	43.3	21	35.0	47	39.2
Mother's education						
No schooling/elementary school	10	16.7	14	23.4	24	20.0
Junior/senior high school	23	38.3	23	38.3	46	38.3
University	27	45.0	23	38.3	50	41.7
Income per capita (IDR/month)***						
<500,000	7	11.7	12	20.0	19	15.8
500,000–1 million	16	26.7	24	40.0	40	33.3
1 million–3 million	34	56.6	22	36.7	56	46.7
>3 million	3	5	2	3.3	5	4.2
Median (min–max)	1,241,667 (200,000–4,000,000) ^a		945,000 (300,000–5,200,000) ^b		1,030,000 (200,000–5,200,000)	

CN: Community Nutrition student; NCN: Non Community Nutrition student; **Mann-Whitney test; *** Independent t-test
Different superscript letter shows significant difference (p<0.05)

CN and NCN characteristics in term of age, sex, nutritional status, and parent's education; however a significant difference ($p < 0.05$) was found for amount of pocket money received, family size, and income per capita. The pocket money of CN subjects was significantly higher than that of the NCN subjects. This present finding was similar to a previous study of Meriyati and Tanziha (2013) with a similar subject (IPB University students). Pocket money can affect food choices because someone who has less pocket money tends to choose food from carbohydrate sources that gives longer satiety (Patriasih *et al.* 2010, Meriyati & Tanziha 2013). NCN subjects significantly had larger family sizes than CN subjects which can affect income per capita and may later affect their ability to consume diverse food.

Preference on fruit and vegetable

Preference on F&V shows whether the subject likes or dislikes particular F&V and its serving method. Preference is considered as one of the determinant factors in consuming F&V, other than taste, texture, appearance, aroma as well as eating behavior, and even genetics (Pallister *et al.* 2015). The three most preferred fruits for both CN and NCN subjects were watermelon, papaya, and melon; while the three most preferred vegetables were water spinach, spinach, and carrot. These fruits and vegetables are easy to find (not seasonal) in Indonesia, taste good and fresh, and is considered healthy (Mohammad & Madanijah 2014). The most unpreferred fruit for both CN and NCN subjects was durian because it has a distinctive overpowering odor, a mushy flesh texture, and cannot be eaten directly. Unpreferred vegetables for both CN and NCN subjects were bitter melon and papaya leaf, because both taste bitter. These findings were similar to Izzah *et al.* (2012) who conducted a study in Malaysia, and Gustiara (2013) in Pekanbaru. Organoleptic factors such as taste, aroma, and texture greatly influences a person's food choice (Barrett *et al.* 2010).

The most preferred fruit serving method for both groups were served fresh, in juice form, and sliced fruit in sweetened condensed milk water, respectively. Fruit already has a good taste so it was easy to consume it directly as fresh fruit. This finding was similar to the study of Epuru and Alshammari (2014) in Saudi Arabia, which found that female university students preferred

to consume fresh fruit rather than sweetened ones. Juice was also preferred because its taste was sweeter due to added sugar or sweetened condensed milk. Sliced fruit in sweetened condensed milk water was also preferred because of the variation of different fruits. Meanwhile, the most favorite vegetable serving method was sauteeing. An additional spoon of oil can boost the taste of vegetables and give it texture in order to increase its palatability and energy content (Contento 2011).

Knowledge of fruit and vegetable

CN subjects had a significantly higher score ($p < 0.05$) of knowledge about F&V than NCN subjects (Table 2). CN subjects were exposed to health information more often than the NCN subjects through the courses they attended.

Most subjects for both CN and NCN had a fair level of knowledge on F&V (61.7% and 53.3%, respectively). There were a few CN subjects (3.3%) with less knowledge, but the number was more than ten fold for NCN subjects (43.3%). The topics with the lowest percentage of right answers were portion size (55% for CN and 22.1% for NCN) and the negative effect of consuming less F&V (54% for CN and 42.5% for NCN).

Attitude towards fruit and vegetable

Attitude in this study shows agreement on the perceived benefit and barriers in consuming F&V. Perceived benefits were: 1) F&V are good for health (100% for CN and 98% for NCN); 2) F&V helps digestion (100% for both groups); 3) consuming F&V makes someone feel healthier (100% for CN and 96% for NCN); 4) F&V helps to avoid sprue and sore throat (93% for CN and 83% for NCN); 5) F&V helps in losing/maintaining weight (97% for CN and 87% for NCN); and 6) F&V improves diversity of diet (98% for CN and 91% for NCN). Whereas the perceived barriers were: 1) chemicals in F&V (11% for both groups); 2) F&V gives less satiety (50% for CN and 68% for NCN); 3) F&V are perishable so that the students can not afford to store (73% for CN and 78% for NCN); 4) F&V are expensive (41% for CN and 60% for NCN); 5) have to spend time to peel/wash/cut F&V before eating (26% for CN and 31% for NCN); and 6) F&V are tasteless (8% for NCN). Subject attitudes on F&V were categorized into three groups, namely positive,

Table 2. Knowledge, attitude, and self-efficacy on fruit and vegetable

Intrapersonal factors	CN		NCN		Total	
	n	%	n	%	n	%
Knowledge*						
Poor	2	3.3	26	43.3	28	23.3
Fair	37	61.7	32	53.3	69	57.5
Good	21	35.0	2	3.3	23	19.2
Score mean±SD	77.3±10.6 ^a		60.2±11.3 ^b		68.8±13.9	
Attitude*						
Negative	7	11.7	22	36.7	29	24.2
Neutral	45	75.0	33	55.0	78	65.0
Positive	8	13.3	5	8.3	13	10.8
Score mean±SD	70.4±9.4 ^a		63.2±9.5 ^b		66.8±10.0	
Self-efficacy in consuming fruit						
Poor	40	66.7	44	73.3	84	70.0
Fair	18	30.0	16	26.7	34	28.3
Good	2	3.3	0	0.0	2	1.7
Score mean±SD	55.0±12.2		51.5±13.6		53.2±13.1	
Self-efficacy in consuming vegetables						
Poor	39	65.0	36	60.0	75	62.5
Fair	17	28.3	24	40.0	41	34.2
Good	4	6.7	0	0.0	4	3.3
Score mean±SD	55.6±15.1		53.6±15.5		54.5±15.2	

CN: Community Nutrition student; NCN: Non Community Nutrition student

*: Independent t-test; Different superscript letter shows significant difference ($p < 0.05$)

neutral, and negative. Most subject attitudes were neutral in both groups, but the percentage of having a negative attitude was higher among NCN subjects (Table 2). The independent t-test showed that CN subjects had a higher score of positive attitude than NCN subjects ($p < 0.05$).

Self-efficacy in consuming fruit and vegetables

Self-efficacy is defined as how confident a subject is to adopt a healthier lifestyle by consuming more F&V. The readier a person is to change, the more confident they are (Prochaska & Velicer 1997; Rapley & Coulson 2005). In this study, subjects would have higher self-efficacy if the F&V were available and ready to eat. There was no significant difference between CN and NCN in relation to self-efficacy (Table 2). It was assumed that self-efficacy was influenced by many factors such as F&V availability, price, purchasing power, as well as preference.

Stage of readiness to consume more fruit and vegetables

The Transtheoretical Model (TTM) is a behavior change theory that is used to analyze the level of readiness of someone to live a healthy life. Based on this theory, behavior change is a dynamic process that can be divided into five levels, namely Precontemplation (PC), Contemplation (C), Preparation (P), Action (A), and Maintenance (M). Someone who is still at the PC level has no intention to consume more F&V and does not care about it. Someone at the C level has started to have the intention of consuming F&V but does not implement it in the form of action. Whereas a person at the P level has taken a definite step to consume more F&V and is ready to change within a month. Someone at the A stage has actually adopted the behavior to consume more F&V but has not been checked for at least six months. If the behavior can last for six

months or more, then the person has reached the M stage (Prochaska & Velicer 1997).

CN subjects were significantly in a higher stage of readiness ($p < 0.05$) to consume both F&V than NCN subjects. Most CN subjects were in the P stage in consuming F&V, while NCN subjects were still in the PC-C stage. The percentage of subjects in the A-M stage was higher for vegetables than for fruit (Figure 1). This finding was similar with previous studies which found that the majority of subjects were still in the PC-C stage (Rapley & Coulson 2005, Hazavehei *et al.* 2016) and P-stage (Yen *et al.* 2014) to consume F&V; however in another study the majority of subjects were in the A-M stage (Duyn *et al.* 1998). Some subjects stated they were in a higher stage of readiness in the past but had reversed because they were no longer living with their parents which made F&V not readily available. Some of them were final year students who did not have any regular lecture schedules, so it was quite difficult for them to access F&V that are usually easy to find in the campus area. Varela-Mato *et al.* (2012) conducted a study on university students in Spain that found that people who attend health-related courses practiced healthier behavior than those attending non health-related courses. They also tend to smoke less and be more physically active.

Fruit and vegetable consumption according to stage of readiness

The fruit consumption of CN subjects was higher ($p < 0.05$) than that of NCN subjects, while vegetable consumption was not significantly different ($p > 0.05$). Subjects in the A-M stage consumed more F&V than the other stages. Although the subjects may have stated that they had eaten more F&V, the amount was still far below the recommended portion (Table 3). CN subjects consumed 48.9 g of fruit and 25.9 g of vegetables, while NCN subjects consumed 43.7 g of fruit and 40.6 g of vegetables. It is recommended to consume at least five portions (400 g) of F&V daily to maintain health (MoH RI 2013). These findings were similar to previous studies (Yen *et al.* 2014, Horwath *et al.* 2010). CN subjects' fruit consumption were significantly higher ($p < 0.05$) than NCN subjects' but their vegetable intakes were not much different ($p > 0.05$).

Factors associated with stage of readiness in the consumption of fruit and vegetables

In this study, there were positive correlations between knowledge, attitude, self-efficacy, and pocket money with the stage of readiness to consume more F&V ($p < 0.05$). Similar to other studies (Yen *et al.* 2014; Hazavehei *et al.* 2016; Rapley & Coulson 2005), we found that subjects

Table 3. Consumption of fruit and vegetable according to stage of readiness

Stage of readiness	Consumption (g/day)					
	CN			NCN		
	School day	Non-school day	$\bar{x} \pm SD$	School day	Non-school day	$\bar{x} \pm SD$
Fruit						
PC-C	12.6±27.1	37.4±54.9	25.1±12.4	20.0±46.1	9.9±24.8	14.9±37.4
P	55.8±71.9	40.2±68.9	47.9±70.9	42.9±63.4	41.9±60.8	42.4±62.1
A-M	81.7±76.2	89.2±87.2	85.4±82.0	80.0±80.0	30.0±0.0	55.0±61.8
Vegetable						
PC-C	11.9±10.6	19.4±14.7	15.6±13.3	26.8±18.9	20.9±20.0	23.9±19.9
P	35.7±28.1	38.9±33.6	37.3±31.0	42.8±21.6	35.0±29.2	38.9±26.1
A-M	62.4±49.4	56.8±40.9	59.6±45.4	71.1±39.8	78.9±47.5	75.0±44.1

CN: Community nutrition student; NCN: Non-community nutrition student; PC: Pre-contemplation; C: Contemplation; P: Preparation; A: Action; M: Maintenance

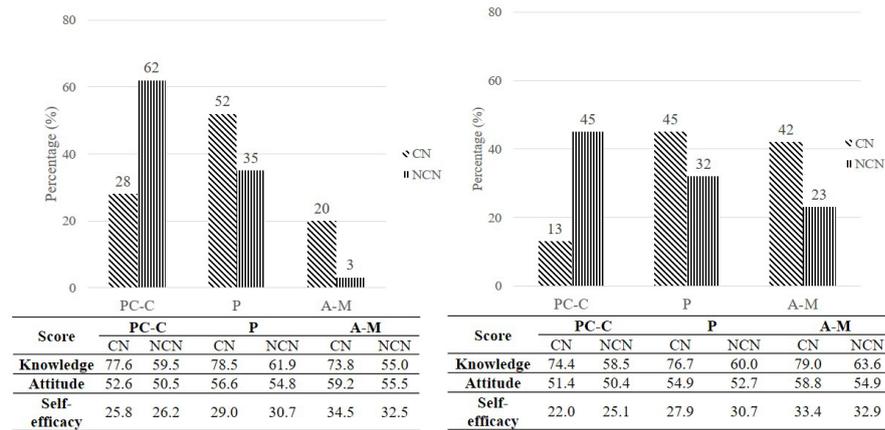


Figure 1. Stage of readiness and factors associated for fruit (left) and vegetables (right)

who had better knowledge, a positive attitude, and a good level of self-efficacy tend to be in a higher stage of readiness. In this study, both CN and NCN subjects in the A-M and P stage tend to have higher scores of knowledge, attitude, and self-efficacy compared to subjects in the PC-C stage (Figure 1).

Knowledge and stage of readiness had a significant positive correlation ($p < 0.05$ for both fruit and vegetables). Subjects who were in the A-M stage had better knowledge than the prior stages. The knowledge level of a person would determine the attitude and practice in food choice, which in turn could affect the nutritional status, as found in a study by Oldewage-Theron and Egal (2010) in South Africa. Another study mentioned that the urban citizens of North Nigeria who had good nutritional knowledge still consumed less F&V due to its high price and seasonal availability (Banwat *et al.* 2012).

Attitude and stage of readiness had a significant positive correlation ($p < 0.05$ for both fruit and vegetables). Subjects who were in the PC-C stage had scored more in perceived barriers than perceived benefit. They had found many obstacles in consuming F&V and thought that it was not worth the benefit they gained.

Self-efficacy and stage of readiness had a significant positive correlation ($p < 0.05$ for both fruit and vegetables). Subjects who were in the PC-C stage were not quite sure if they should consume more F&V, while subjects in the higher stages stated the opposite. This was in accordance with previous studies that mentioned subjects in the A-M stage would have a higher score of self-

efficacy (Yen *et al.* 2014; Hazavehei *et al.* 2016; Rapley & Coulson 2005).

Pocket money had a significant positive correlation with stage of readiness ($p < 0.05$ for both fruit and vegetables). Subjects who received more pocket money tend to be in a higher stage of readiness. On the other hand, subjects who receive less pocket money consumed less F&V. An increase of pocket money is related to the improvement in consumption quality. This finding was similar to Bihan *et al.* (2010) in France who discovered that low-income subjects had difficulties in accessing and affording F&V. However this finding differs to Wardhani (2015) who did research on IPB University students and found that subjects who receive more pocket money tend to eat in cafes or restaurants and consume junk food, fast food, and soft drinks more often. These foods had higher prices than F&V.

Family size had a significant negative correlation to stage of readiness ($p < 0.05$ for fruit). We found that the smaller the family size, the higher the stage of readiness, since preparing food for a small family was easier than preparing for a big family. This finding was different to Ramadhani and Hidayati (2017), who studied adolescents in Surakarta and found that family size was not related to F&V consumption because there were many factors affecting F&V intake such as the availability of F&V.

CONCLUSION

Daily consumption of fruit and vegetables for both CN and NCN students were far below

the recommendation (48.9 g and 43.7 g; 25.9 g and 40.6 g respectively). The subject's readiness was positively related ($p < 0.05$) to pocket money, knowledge, attitude, and self-efficacy, but negatively related ($p < 0.05$) to family size.

It is important to consider the readiness stage and related factors when designing nutrition education programs to improve fruit and vegetable consumption in Indonesia. Future nutrition education studies based on stages of readiness are needed to confirm its role in developing successful intervention programs.

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AUTHOR DISCLOSURES

All authors have stated no conflict of interest.

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