



**UNIVERSITI PUTRA MALAYSIA**

***ASSOCIATIONS BETWEEN SOCIO-DEMOGRAPHIC, DIETARY INTAKE,  
PHYSICAL ACTIVITY AND PSYCHOLOGICAL FACTORS WITH BODY  
WEIGHT STATUS AMONG UNDERGRADUATE***

**MUHAMMAD DANISH HAFIY BIN HAZIDI**

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WITH BODY WEIGHT STATUS AMONG UNDERGRADUATE**

**BY  
MUHAMMAD DANISH HAFIY BIN HAZIDI**

A project submitted as a partial fulfillment of the requirement for the degree  
of the Bachelor of Science (Dietetic) from the faculty of Medicine and Health  
Sciences, University Putra Malaysia.

This project entitled “The associations between socio-demographic, psychological factors, dietary intake and physical activity with bodyweight status among pre-university students in Pusat Asasi Sains Pertainian (UPM)” was prepared by Muhammad Danish Hafiy Bin Hazidi and submitted to the Faculty of Medicine and Health Sciences as a partial fulfilment of the requirements for degree of Bachelor of Science (Dietetics) from Faculty of Medicine and Health Science, University Putra Malaysia.



Received and examined by:

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(Dr. Nor Baizura Md Yusop)

Date : \_\_\_\_\_

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## CHAPTER 1

### 1.0 Introduction

#### 1.1 Background

Obesity is becoming increasingly prevalence worldwide. It is classified as a chronic disease that brings many complications in various presenting comorbidities. According to WHO (2014), some of the comorbidities that significantly associated overweight and obesity are cardiovascular diseases, cancer, diabetes and other chronic diseases. By (James, 2004), prevalence of overweight and obesity every in country varies, with the higher prevalence rates for the Middle East, Central and Eastern Europe and North America. In addition, over the past decade the prevalence of obesity has more than doubled in Western and Westernizing nations.

In Asian countries, dramatic changes in lifestyle and nutrition have led to increment of obesity prevalence among population adults and pre-school children (Tee, 2002). In Malaysia, (Zaki, Robaayah, Chan, Vadivale, & Lim, 2010) stated that abdominal obesity is highly prevalent with association towards cardiovascular risk factors. From (Mohammad Nor et al., 2008), the percentage of overweight and obesity among 33 050 adults were 29.1% and 14.0% respectively. This study also stated woman had a significant higher prevalence of abdominal obesity than men. This shows Malaysia has a higher prevalence of obesity relative to other South East Asian countries (Mohammad Nor et al., 2008).

Prevalence of overweight and obesity are high among university students. According to (Lian, Bonn, Han, Choo, & Piau, 2016), 22% of pre-university students in Malaysia are overweight and obese with unhealthy waist circumferences. These students were also at risk of hypertension, particularly in females due to higher

unhealthy waist circumference measurement compared to their counterparts. Adolescents ranging from age 18 – 19 years old as pre-university students are an important part in the study of obesity and its magnitude of disease complications.

Dietary intake is one of the main factors that contributes to body weight status. Dietary practices such as non-vegetarian diet and consumption of high fat food were associated with overweight and obesity (Banjade, Naik, & Narasannavar, 2014). In addition, lack of physical activity (indoor and outdoor) were also contributed to overweight and obesity. This could be due to pre-university students belonged to a socio-economic class with high purchasing power, better living standard and changes in diets and lifestyles.

Besides diet and physical activity, one of the important angles in the study of obesity is psychological well-being. There are many studies that link obesity and psychological well-being such as depression, anxiety and stress level of individuals (de Wit et al., 2010). Depression can contribute to obesity, or vice versa. On top of that, there is a likelihood of both to be the causes of chronic diseases as well. According to (Johnston, Johnson, McLeod, & Johnston, 2004), a higher BMI has increased risk of depression. Aside from depression, anxiety and stress are also prevalent among pre-university students. The study also shows people with depression or anxiety diagnosis are more likely to be obese, smoke, physically inactive and binge drinking. (Sinha & Jastreboff, 2013) proved that stress is linked to obesity, as stress neurobiology significantly overlaps with appetite and energy regulation.

## 1.2 Problem Statement

Obesity is a multifactorial disease as it that affects the metabolic conditions in the body. It is regarded as a global health issue with concerns raising from countries worldwide (Pell et al., 2016). This is proven with the increasing link between obesity and other chronic diseases. Radzi et al. (2019) stated obesity can be the precursor to other metabolic diseases such as cardiovascular disease, metabolic syndrome and type 2 diabetes. As obesity cases are increasing in various range of population, non-communicable disease also gradually builds up among obese population. According to James (2004), Obesity is the development of adipose tissue in excess and to a degree that affects both physical and psychosocial well-being. The consumption of excess energy in dietary intake prolong, continue to accumulate energy intake and stores into the body as excess fat, eventually resulting in overweight and obesity. This trend is increasing worldwide as it is largely increasing in both developing and developed country.

Moreover, individuals will face difficulty in development of their life, with added burden on its risk of concurring chronic diseases. Rodin, Schank, & Striegel-Moore (1989) describe obesity as a complex relationship between genetic, physiological, and behavioural variables that affects the development and persistence of an obese condition. Obesity is classified according to the Body Mass Index (BMI). BMI is the universal tool to assess the severity of body weight in relation to height. This is to classify overweight and obesity and its link to estimate in the risk of diseases compare to normal weight (Sherina, Rampal, & Kaneson, 2004).

### **1.3 Research questions**

1. What are the associations between socio-demographic, dietary intake, physical activity and psychological factors with body weight status among pre-university students?

### **1.4 Significance of study**

Psychological distress and risk of obesity are found to be heavily correlated with one another. Transitioning from an adolescent mindset to an adulthood way of thinking can be a critical period for pre-university students. High amount of demands and expectation may expend the level of discomfort for pre-university students that are detrimental to their health mentally and physically. Both mental health and physical health can be affected significantly.

This study is important as it can highlight the changes that are developing in terms of body weight status of the pre-university students in UPM. Specifically, in Malaysia, there is a lack of information regarding the well-being of pre-university students. Most focus is toward undergraduate student or postgraduate student. There is a need for more information showing the trends of health status on pre-university with ongoing changes lifestyle changes due to social, environmental and physical advancements. Besides that, this study can act as the baseline for future research on body status of pre-university students. Dietitian or nutritionist, general health practitioner, nurses and other certified researcher may benefit from this as a material for other relevant research as well. Through this study, a future intervention may be established to manage on the body weight of pre-university students in an effective approach. This will help in learning the association of factors that are contributing to

changes in body weight status of pre-university students and its risk of obesity disorder.

## **1.5 Objective**

### **1.5.1 General Objective**

To determine the association between socio-demographic, dietary intake, physical activity and psychological factors with bodyweight status among foundation and undergraduate students in Universiti Putra Malaysia

### **1.5.2 Specific Objectives**

1. To determine the socio-demographic, dietary intake, physical activity and psychological factors among pre-university students.
2. To assess psychological factors among pre-university students.
3. To determine the association between socio-demographic, dietary intake, physical activity and psychological factors, among pre-university students

## **1.6 Alternative Hypothesis**

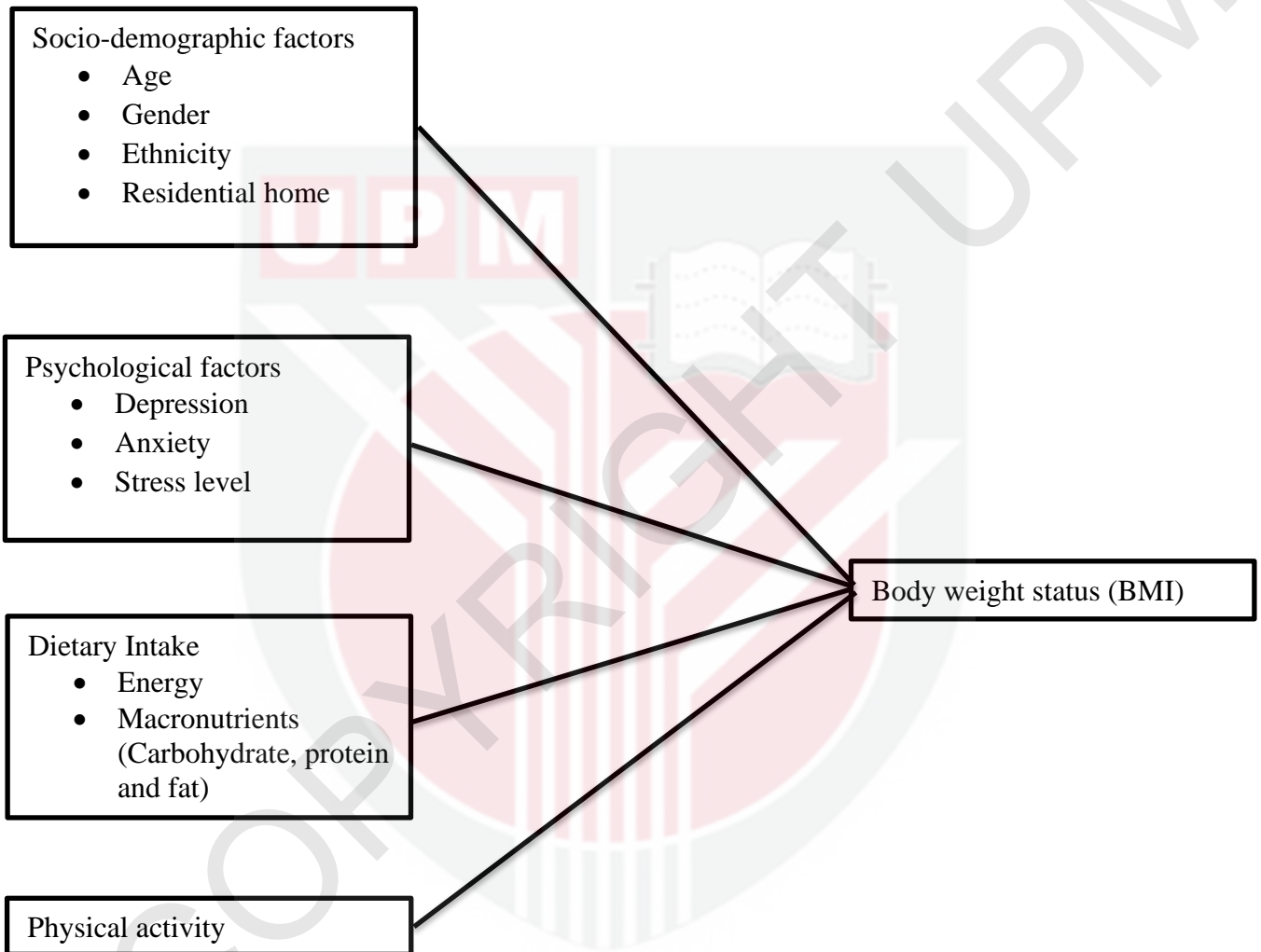
There is significant association between socio-demographic, dietary intake, physical activity and psychological factors with bodyweight status among pre-university students in Center of Foundation Studies for Agricultural Sciences (UPM), Serdang.

## 1.7 Conceptual Framework

The conceptual framework displays the association between socio-demographic, dietary intake, physical activity and psychological factors among pre-university students in Center of Foundation Studies for Agricultural Sciences (UPM), Serdang. In the framework, independent variable is represented by socio-demographic, dietary intake, physical activity and psychological factors. On the other hand, body weight status (BMI) is the dependent variable. Figure 1.0 showed the conceptual framework of the study.



Figure 1.1: The conceptual framework factors associated with body weight status among pre-university students from Center of Foundation Studies for Agricultural Sciences (UPM), Serdang.



## CHAPTER 2

### 2.1 Body Weight Status among pre-university students

Body weight is an important characteristic in evaluating health status of an individual. It is associated with socio-demographic, dietary intake, physical activity and psychological factor. High body weight status which is obesity is a critical body weight status which can cause many metabolic abnormalities. According to WHO (2014), obesity is defined as a disorder in which excess body fat accumulated in the body, with a serious physical, psychological, health, behavioural, social and economic consequences. Adolescents also susceptible to obesity. As these pre-university students face transition period from school-based setting to university setting, changes in lifestyle occurs and affect their body weight status. Edmonds et al. (2008) reported increase of weight, BMI and waist circumference among pre-university students. There was no increase of dietary intake but vigorous physical activity raised. Sedentary behaviors such as television use decrease but increase in computer used.

### 2.2. Socio-demographic

Adolescents are a critical age group that develops at a fast-pace rate to reach maturity into adulthood. According to WHO (2018), adolescence are at a period of life with specific needs and rights. They are in a process of rapid development of biological maturity which promote psychosocial maturity. They are defined to be the age between 10 and 19 years of age. There are approximately 1.2 billion adolescents worldwide (10 – 19 years old). In the modern era, generation z is the age group (1995 – 2010) that grows along with the internet, where they are often referred as digital natives. To date, they are the most ethnically diverse (Seemiller & Grace, 2015). With the growing numbers of population worldwide, millennials and generation z are

largely the students in universities. These ranges from pre-university, undergraduate and postgraduate students. In pre-university students, they are the adolescents ranging from an age of 18 to 19 years old. Pre-university students have high expectation and high efficacy for success in university (Yong, 2010). Furthermore, lifestyle of pre-university students change as increase in purchasing, physical inactivity, dietary intake and cultural transition, which later increase prevalence of obesity (Banjade et al., 2014).

There are many socio-demographic factors that associated with body weight status among pre-university students. Age, gender, ethnicity and residential home affects the body weight status of pre-university students. Pell et al, (2016), conducted a study among 16 – 20 years old showed that Indian had the highest prevalence of obesity, followed by Chinese. Indian youth were also linked to high number of eating out around 6 to 9 times a week. Instead of race, age, marital status and employment status are statistically significant BMI predictors. In addition, (Ismail et al., 2002) reported Malays youth to have 20.7% overweight and another 5.8% obese. Besides that, (Lim et al., 2000) showed BMI distribution to be proportionate to age, and the differences between BMI are Indian the highest, afterwards accompanied by Malay, Chinese and other indigenous group.

### **2.3 Dietary Intake**

One of the important components of nutritional status is dietary intake. As Malaysia is a developing country, dietary intake of energy, fats and sugars increase substantially (Ismail et al., 2002). A study among university students (Zalilah, Khor, Mirnalini, Norimah, & Ang, 2006), found that overweight female had higher energy consumption compared to their counterparts are underweight and normal weight.

Whereas, there is no significant difference of energy among underweight, normal and overweight male students. It was also stated that overweight female and male had a statistically low energy intake and high for both energy expenditure and physical activity.

## **2.4 Physical Activity**

Physical inactivity has been shown to associate with obesity. In Malaysia, there is a continuous trend that is increasing in physical activity since the last two decades. According to Lian et al., (2016), over 60% adults have a physically inactive lifestyle. It was found that physical activity was correlated with socio-demographic factors such as ethnicity, age, gender, occupation and educational level. In younger population, they are more physically active in vigorous and moderate exercises. In terms of gender, the males are more active in comparison to females. Adding to that, ethnic Chinese and Indian are reported to have lower physical activity. Cultural norms and lifestyle in different development of ethnic may differ in the total amount of physical activity.

## **2.5 Psychosocial**

Psychology is a branch that specializes in the mental well-being of an individual. Nowadays, adolescents and young adults face many psychological mental issues including anxiety, depression, drug addiction, and eating disorders (Buyukiscan, 2018). In psychology, it ranges to a variety of condition that affects the mind of an individual. Mental health is a term to describe an individual's health in the perspective of the mind. According to Jahoda, (1958), mental health is a matter of personal and individual. It involves a deeper sense of mechanism in the body or more

accurately, the human mind's condition. Interaction in a social environment or culture affects toward a characteristic shown in an individual rather than the community.

On the other hand, anxiety is also a marginalized mental illness that are increasing in the general population. Anxiety disorder is categorized as a physiological and psychological state, in relation to cognitive, somatic, emotional and behavioural components (Abdel Wahed & Hassan, 2017). It is presented into a form of excessive and prolong worry or fear. Anxiety was more likely associated with unhealthy behaviors such as smoke, binge drinking, physical inactivity and the resultant to be obese (Tara et al., 2008).

Stress is a process of the external environment demand that surpass the capacity of the psychological adaptive capacity of an organism, that offset a change in psychological and biological which may result in a person incurring a disease (Cohen, S., Kessler, R., & Gordon, L., 1995). University requires student to be efficient and efficacy in enduring through the many challenges in the study. It is a critical transitioning period where they are moving from adolescents to adulthood (Abdel Wahed & Hassan, 2017). With anxiety and stress combined, it creates a sensation of discomfort usually associated with uneasiness, fear or worry (Abdel Wahed & Hassan, 2017).

## CHAPTER 3

### 3.1 Study Designs

This was a cross-sectional study aimed to determine associations between socio-demographic factors, dietary intake, physical activity and psychological factors with body weight status among pre-university students in Center of Foundation Studies for Agricultural Sciences (UPM), Serdang.

### 3.2 Study Location

The conducted at Center of Foundation Studies for Agricultural Sciences (UPM), Serdang. It was first established in 2005. A foundation program for students whom achieved excellent results in *Sijil Pelajaran Malaysia* (SPM).

### 3.3 Sample Size Determination

Sample size of the respondent was calculated using formula from (Cole et al, 1997). It is suitable to determine the total respondent for this cross-sectional study.

Figure 3.1: shows the formula for total amount of respondent.

$$n = \frac{(Z_{1-\alpha/2} - Z_{1-\beta})^2}{r^2 / (1 - r^2)} + 5$$

(Cole et al, 1997)

Where

n = The calculated sample size

$Z_{1-\alpha/2}$  = z score for level of significance  $\alpha$  in two-sided test

= 1.94

$Z_{1-\beta}$  = z score for power of the test

= 0.84

r = Correlation coefficient

Table 3.1: Calculation of sample size

Correlation Studies	Correlation, r	Sample size, n	Design effect adjustments (DEFF)
Correlation between BMI and age among university students (Mokhtari, Jamaluddin, & Saad, 2015)	r = 0.19	$n = \frac{(1.94 + 0.84)^2}{0.281^2 / (1 - 0.281^2)} + 5$ n = 95	
Association between energy intake and BMI (Mokhtari, Jamaluddin, & Saad, 2015)	r = 0.281	$n = \frac{(1.94 + 0.84)^2}{0.281^2 / (1 - 0.281^2)} + 5$ n =	
Stress and	r =	$n = \frac{(1.94 + 0.84)^2}{0.281^2 / (1 - 0.281^2)} + 5$ n =	
Correlation between stress and body weight among university students. (Gupta, Ray, & Saha, 2009)	r = 0.362	$n = \frac{(1.94 + 0.84)^2}{0.362^2 / (1 - 0.362^2)} + 5$ n = 73	

### **3.4 Respondent**

The study will be involved pre-university students from Center of Foundation Studies for Agricultural Sciences, Univerisity Putra Malaysia, Serdang. The students will be recruited based on inclusion and exclusion criteria. The inclusion criteria are (1) foundation and first year students (2) an adolescent of age 19 – 21 years old.

Exclusion criteria are characteristics (1) postgraduate students. (2) Student with chronic diseases or physical disability. Physical disability connects with high chronic stress due to circumstances of life and experience of people with disabilities (Turner & McLean, 1989).

### **3.5 Sampling method**

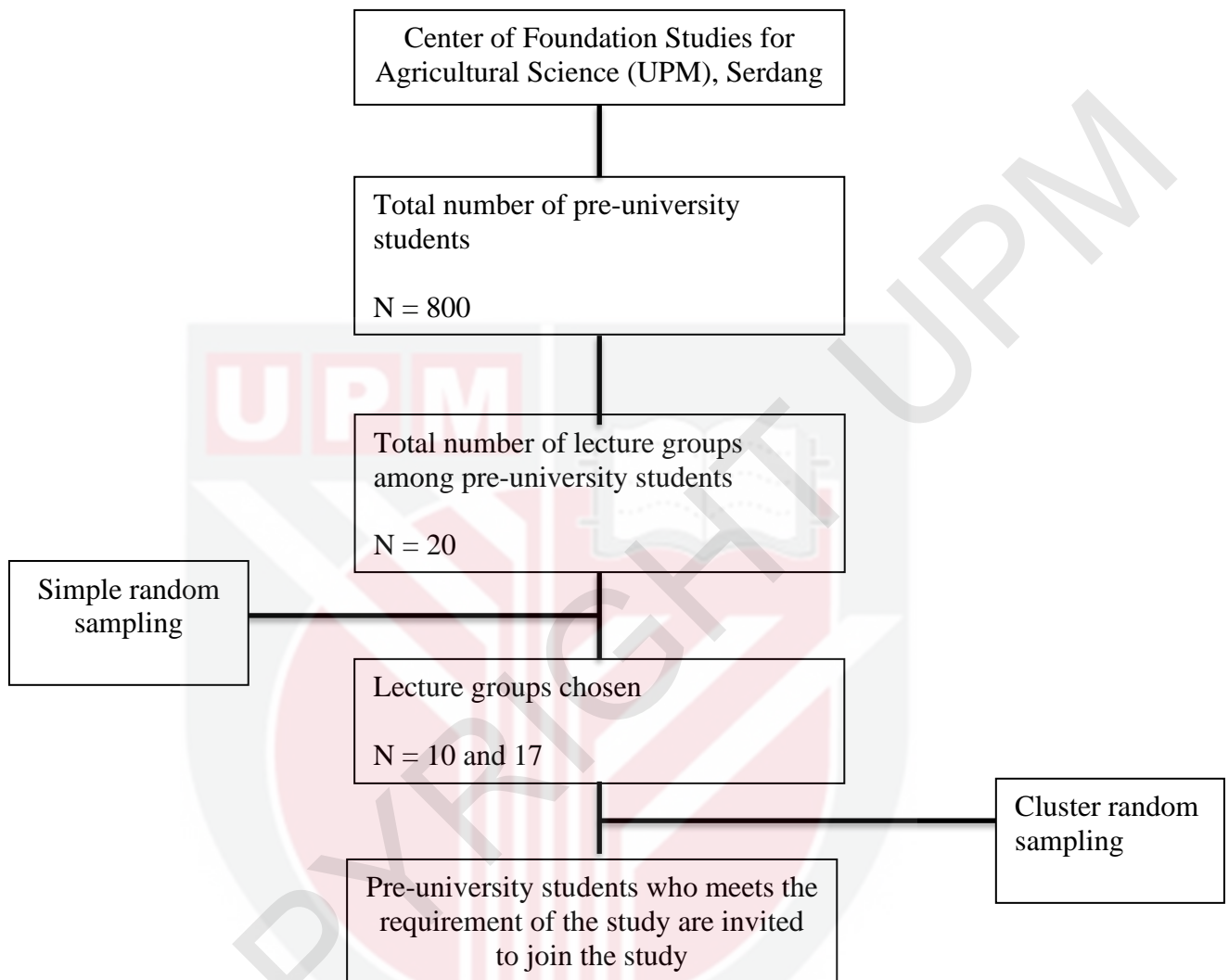
The Center of Foundation Studies for Agricultural Science (UPM), Serdang have approximately 800 of pre-university students under supervision of among 20 lectures. According to sample size calculation, a total of 56 are required in this study. In average, there are relatively 45 pre-university students per lecture. Randomly, two groups of students will be selected.

Firstly, the number of pre-university student branched through 20 lecture groups is chosen using the simple random sampling. This allows the choosing to be random as every pre-university student in lecture groups has equal and fair chances to be included. This is done by using computer programs such as Microsoft Excel. It has a function called 'rand' which randomly choose the lecture groups. The list of lecture groups is inserted into the Microsoft Excel spreadsheet, processed thoroughly with

formula  $'=INT(20*RAND())+1'$  and some lecture groups are selected. The selected lecture groups are 10 and 17. Next, using cluster random sampling which depicts that pre-university students are present in all of the lecture groups. Hence, lecture groups 10 and 17 are suitably selected to have pre-university students to represent as the whole pre-university student population.



Figure 3.5.1: Sampling method used in this study



## **3.6 Study Measures**

### **3.6.1 Socio-demographic**

Socio-demographic data will be assessed using questionnaire by self-administered. The questionnaire will be distributed to the pre-university students of Center of Foundation Studies for Agricultural Science (UPM), Serdang. The questionnaire include age, gender, ethnicity, level of education

### **3.6.2 Dietary Intake**

Dietary intake will be assessed through 24-hour dietary recall. It is a method to recall the previous day food and drinks consume by an individual. The researcher will asked questions regarding their food intake from the previous day with as accurate as possible with regards to the type of food, amount of food and drinks. A set of household measurement tools (glass, soup bowl, plate, cup, teaspoon and tablespoon) and food models as well as pictures from the Atlas of Food Exchanges and Portion Sizes (food album) (Suzanna et al., 2002) will be used to guide respondents in estimating portion sizes. Next, the food and drinks recorded will be analyzed by using Nutritionist Pro Tm Nutrition Analysis Software (2005). The main data to be extrapolated is the total energy intake and macronutrients. Kcal and macronutrients and compare with RNI. The data will then be further analyze using IBM SPSS Statistics Version 22.

### **3.6.3 Physical Activity**

Physical activity will be measured by using International Physical Activity Questionnaire (IPAQ). It is a physical activity questionnaire suitable with young and middle-aged adults (15 – 64 years old). It can be administered by self-report or via

telephone. The assessment measures intensity of physical activity as part of their daily life. This can be estimated to total physical activity in terms of MET-min/week. The classification of physical activity level is based on low, moderate or vigorous (Table 3.6.3.1). Then, it is calculated to METS- min/week value. Table 3.6.3.2 showed category of physical activity levels based on (METS- min/week).

Table 3.6.3.1: Calculation of physical activity (METS – min/week)

<b>Description</b>	<b>Calculation (METS- min/week)</b>
<b>Walking</b>	$3.3 \times \text{Walking (min)} \times \text{Walking days}$
<b>Moderate</b>	$4.0 \times \text{Moderate Intensity Activity (min)} \times$ Moderate days
<b>Vigorous</b>	$8.0 \times \text{Vigorous Intensity Activity Minutes} \times$ Vigorous days
<b>Total Physical Activity</b>	Total of (Walking + Moderate + Vigorous METS– min/week)

(Forde, 2005)

Table 3.6.3.2: Category of physical activity levels based on (METS- min/week)

Category	Criteria
<b>Low</b>	<ul style="list-style-type: none"> <li>• Not meeting any criteria specified in moderate or high physical activity level.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• 3 or more days of vigorous intensity activity and/or walking of at least 30 minutes per day.</li> <li>• 5 or more days of moderate intensity activity and/or walking of at least 30 minutes per day.</li> <li>• 5 days or more of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET minutes per week.</li> </ul>
<b>High</b>	<ul style="list-style-type: none"> <li>• Vigorous intensity activity on a minimum of 3 days achieving a cumulative total physical activity of at least 1500 MET minutes a per week.</li> <li>• 7 days or more of any combination of walking, moderate intensity or vigorous intensity activities achieving a cumulative total physical activity of at least 3000 MET minutes a week.</li> </ul>

(Forde, 2005)

### 3.6.4 Psychological factor

To measure psychological factor, an assessment tool named 'Depression, Anxiety and Stress Scale (DASS 21) will be used. It is a self-report questionnaire designed to measure the severity of common symptoms in depression, anxiety and stress in the past week. These negative emotional states will be divided into three-part subscale based on severity in the questionnaire. The short version of DASS 21 has 21 items with seven subscales while DASS 42 has 14 subscales with 2 – 5 of comparable content. DASS 21 takes less time to administer and is more suitable for research purposes such as screening.

Table 3.6.4.1: Subscale of emotional state in DASS 21

Emotional state	Presented in items
<b>Depression</b>	3, 5, 10, 13, 16, 17, 21
<b>Anxiety</b>	2, 4, 7, 9, 15, 19, 20
<b>Stress</b>	1, 6, 8, 11, 12, 14, 18

(Severe, 1995)

DASS 21 measures the common symptom that is clinically significant in emotional states such as depression, anxiety and stress. Depression measures dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. Stress is characterized by nervous tension, difficulty relaxing and irritability (Lovibond, S.H. and Lovibond, P.F. (1995). All of the items are inter-correlated rather than independent. DASS 21 operates within similar causes of

negative emotional state due to genetic, environment and other factors that influence psychologically.

The cut-off point is not defined, as each symptom experienced by individuals are subjective, therefore a severity the measure by 4-point severity/frequency scales to rate the extent of their experiences of a psychological symptom in the past week. The pre-university student was asked to fill in the DASS 21 questionnaire. Then, the results will be accumulated into the scoring template. After the scoring of the scale, the severity is categorized according to the severity for each emotional state. The score is multiplied by 2. The score will be categorized based on Table 3.6.4.2.

Table 3.6.4.2: Scoring template for the DASS 21

	<b>Depression</b>	<b>Anxiety</b>	<b>Stress</b>
<b>Normal</b>	0 – 4	0 – 3	0 – 7
<b>Mild</b>	5 - 6	4 – 5	8 – 9
<b>Moderate</b>	7 - 10	6 – 7	10 – 12
<b>Severe</b>	11 - 13	8 – 9	13 – 16
<b>Extremely severe</b>	14+	10+	17+

(Gomez, 2016)

Table 3.6.4.3: Severity category for DASS 21

<b>Severity</b>	<b>Depression</b>	<b>Anxiety</b>	<b>Stress</b>
<b>Normal</b>	0 – 9	0 – 7	0 – 14
<b>Mild</b>	10 - 13	8 – 9	15 – 18
<b>Moderate</b>	14 - 20	10 – 14	19 – 25

<b>Severe</b>	21 - 27	15 – 19	26 – 33
<b>Extremely severe</b>	28+	20+	34+

(Gomez, 2016)

### 3.6.5 Body Weight Status

A digital column weighing scale SECA 701 (SECA Vogel and Halke GmbH & Co., Germany) was used to measure height and weight. Height and weight were recorded to the nearest 0.1 cm and 0.1 kg, respectively. Participants were required to wear normal light indoor clothing and stand erect with feet together and eyes at the parallax state. WHO AnthroPlus software (WHO, 2018) was used to calculate BMI-for-age z-score, while (WHO, 2019) growth reference was used to determine the BMI-for-age z-score of participants (de Onis, Garza, Onyango, & Borghi, 2007).

Body mass index (BMI) is a metric for measuring your body weight relative to height. It is part of an assessment in nutritional status to assess the risks of comorbidity such as obesity.

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2 (\text{m}^2)}$$

The respondents Body Mass Index (BMI) will be calculated as weight (kilogram) divided by height square (meter<sup>2</sup>). The cut-off point for BMI is classified into several category in Table 3.6.5.1

Table 3.6.5.1: Body Mass Index Classification

Body Mass Index	Classification
<18.50	Underweight
18.50 - 24.99	Normal
≥25.00	Overweight
30.00 – 34.99	Obese Class I
35.00 - 39.99	Obese Class II
≥40.00	Obese Class III

(WHO, 2020)

### 3.7 Data Collection

After receiving ethical approval, data collection for this study will begin expectedly on March - April 2020. The pre-university students will be given information sheet informed that contains details about the study and, if interested, they need to sign consent form. Then, they will receive a set of questionnaires that's comprised of socio-demographic background, physical activity and psychosocial questionnaire. A face-to-face interview will be conducted for 24-hr diet recall. Besides that, height and weight will be measured to calculated BMI.

### 3.8 Data Analysis

For the data analysis, IBM SPSS Statistics software Version 22 will be used. This allows data entry and analysis. Statistical significance will set at  $p < 0.05$ . Univariate analysis will be used to present results in a percentage and frequency for categorical variables. Means and standard deviations for continuous variables.

Pearson correlation moment will be used to analyze the correlation in continuous variable. Chi-squared test is used to test the associations in categorical variables.



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## CHAPTER 4

### 4.0 Socio-demographic factors

Table 4.0.1: Socio-demographic factors

Sociodemographic characteristics	Mean $\pm$ SD	Range	Frequency (%)
<b>Age (years)</b>	$57.2 \pm 12.2$	36 – 80	
31 – 40			7 (13.0)
41 – 50			12 (22.2)
51 – 60			12 (22.2)
>60			23 (42.6)
<b>Gender</b>			
Male			32 (59.3)
Female			22 (40.7)
<b>Ethnicity</b>			
Malay			42 (77.8)
Chinese			7 (13.0)
Indian			5 (9.3)
<b>Marital status</b>			
Single			5 (9.3)
Married			41 (75.9)
Divorced			2 (3.7)
Widow or widower			6 (11.1)
<b>Occupational status</b>			
Working			12 (22.2)
Unemployed			42 (77.8)
<b>Educational level</b>			
No formal education			1 (1.9)
Primary education			4 (7.4)
Secondary education			33 (61.1)
Tertiary education			16 (29.6)
<b>Household income (RM)</b>			
< RM1,000 per month			5 (9.3)
RM1,000 – RM3,999 per month			23 (42.6)
> RM4,000 per month			19 (35.2)
			7 (13.0)

RM4,000 – RM7,999 per month		
≥ RM8,000 per month		
<b>Duration of dialysis (months)</b>	50.5 ± 45.6	3 – 168
<5 years		39 (72.7)
5 – <10 years		10 (18.5)
≥10 years		5 (9.3)

Table 4.0.1: Socio-demographic factors

Variable	Male	Female	All (Mean ± S.D) n(%)
Gender	8(19.5)	33(80.5)	41(100)
Age	21.95 ± 2.34	21.99 ± 3.94	
19 years old	6(14.6)	23(56.1)	29(70.7)
20 years old	2(4.9)	9(22.0)	11(26.8)
21 years old	0	1(2.4)	1(2.4)
Ethnicity	21.95 ± 2.33	21.99 ± 3.94	
Malay	5(12.2)	27(65.9)	32(78.0)
Chinese	1(2.4)	4(9.8)	5(12.2)
Indian	2(4.9)	2(4.9)	4(4.9)
Level of education	21.95 ± 2.33	21.99 ± 3.94	
Pre-university	6(14.6)	24(59.0)	30(73.2)
First-year	2(4.9)	9(22.0)	11(22.0)

Table 4.0.1 shows the distribution of socio-demographic factors. It is comprised of gender, age, ethnicity and level of education. Based on the results presented, it was accounted for low numbers of male students (19.5%) and high

number of female students (80.5%). Furthermore, most of the male and female students are in the age of 19 years old by (14.6%) and (56.1%) respectively. In terms of ethnicity, most are Malay (78%), followed by Chinese (12.2%) and Indian (4.9%). Next, both male and female are higher in pre-university students (73.2%) than first-year students (22%).

#### 4.1 Dietary intake

Table 4.1.1: Dietary Intake

Dietary Intake	Male (Mean ± S.D)	Female (Mean ± S.D)	Total (Mean ± S.D)
Energy(kcl)	1911 ± 890	1466 ± 481	1553 ± 596
≥			
Carbohydrate(g)	210 ± 85	180 ± 66	186 ± 70
Protein(g)	105 ± 69	67 ± 26	75 ± 40
Fat(g)	70 ± 42	52 ± 23	56 ± 28

#### 4.1.3: Recommended Nutrient Intakes (RNI) by age 19 – 29 years old

Dietary Intake	Male		Female	
	RNI	RNI (%)	RNI	RNI (%)
Energy (kcl)	2240		1840	
Carbohydrate (g/day)	280 - 336	50 – 60	230 - 276	50 – 60
Protein (g/day)	62	10 – 15	53	10 – 15
Fat (g/day)	62 - 75	15 - 30	51 - 61	15 - 30

## 4.2 Physical activity

Table 4.2.1: Physical activity

Data Variable	Male (mean & SD) n(%)	Female	Total
Level of physical activity			
- Low	0	14(34.1)	14(34.1)
- Moderate	4(9.8)	14(34.1)	18(44.0)
- High	4(9.8)	5(12.2)	9((22.0)

Table **Error! No text of specified style in document.**2.2: Physical activity score in both groups at baseline

Characteristic	All (n=40) (mean $\pm$ S.D)	Intervention (n=20) (mean $\pm$ S.D)	Control (n=20) (mean $\pm$ S.D)
<b>Physical activity score</b>	1.99 $\pm$ 0.68	1.93 $\pm$ 0.54	2.04 $\pm$ 0.80
<b>Physical activity level (%)</b>			
<b>Low</b>	29 (72.5)	15 (75.0)	14 (70.0)
<b>Moderate</b>	11 (27.5)	5 (25.0)	6 (30.0)

The results presented by Table 4.2.1 are the level of physical activity for both genders. For males, they are equal in moderate and high level of physical activity which is (9.8%). Next, females have moderate number of students for low and moderate level by (34.1%) but low number of students in high level of physical activity.

#### 4.4 Psychological factors

Table 4.4.1: Psychological factors

Data Variable	Male	Female	Total
<b>Depression</b>			
-Normal	5(12.2)	23(56.0)	28(68.3)
- Mild	1(2.4)	4(9.8)	5(12.2)
- Moderate	1(2.4)	4(9.8)	5(12.2)
- Severe	1(2.4)	0	1(2.4)
- Extremely severe	0	2(4.9)	2(4.9)
<b>Anxiety</b>			
- Normal	4(9.8)	10(24.4)	14(34.1)
- Mild	0	6(14.6)	6(14.6)
- Moderate	3(7.3)	14(34.1)	17(41.5)
- Severe	0	3(7.3)	3(7.3)
- Extremely severe	1(2.4)	0	1(2.4)
<b>Stress</b>			
- Normal	7(17.0)	29(70.7)	36(87.7)
- Mild	0	2(4.9)	2(4.9)
- Moderate	1(2.4)	1(2.4)	2(4.9)
- Severe	0	1(2.4)	1(2.4)
- Extremely severe	0	0	0

Table 4.4.1 display the psychological factors which includes for depression, anxiety and stress. Based on the results, most of the students have a normal depression factor (68.3%). Higher severity has low number of students for both male and female. Next, there is a moderate number of students in moderate severity for anxiety which is 17 (41.5%). Lastly, high number of students have normal severity of stress by (87.7%). Overall, females were seen to be more anxious than males.

#### 4.5 Body weight status

Table 4.5.1: Body weight status

	Male	Female	Total
Body weight status		(Mean $\pm$ S.D) n(%)	
Weight (kg)	65.21 $\pm$ 8.53	56.57 $\pm$ 12.61	58.25 $\pm$ 12.33
Height (cm)	171.75 $\pm$ 3.24	159.62 $\pm$ 7.58	161.99 $\pm$ 8.46
BMI (kg/m <sup>2</sup> )	21.96 $\pm$ 2.33	21.99 $\pm$ 3.95	21.99 $\pm$ 3.67
<b>BMI classification</b>			
< 18.5	0	8(19.5)	8(19.5)
Underweight			
18.5 – 24.9	7(17.1)	19(46.3)	26(63.4)
Normal weight			
25 – 29.9	1(2.4)	4(9.8)	5(12.2)
Overweight			
$\geq$ 30	0	2(4.9)	2(4.9)
Obese			

Body weight status results are presented in Table 4.5.1 with mean  $\pm$  S.D, n(%) and BMI classification. Firstly, overweight and obesity are low by (12.2%) and (4.9%) respectively. High number of students for both genders are in the normal category by males (17.1%) and females (46.3%). However, a moderate number of females are underweight (19.5%). In general, females were higher in underweight than males.

#### 4.6 Body Mass Index category based on socio-demographic factors

Table 4.6.1: Body mass index (BMI) and socio-demographic factors

Socio-demographic	Body weight status n(%)				Total
	Underweight	Normal	Overweight	Obese	
<b>Gender</b>					
- Male	0	7(17.1)	1(2.4)	0	8(19.5)
- Female	8(19.5)	19(46.3)	4(9.8)	2(4.9)	33(80.5)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)
<b>Age</b>					
- 19 years old	7(17.1)	15(36.6)	5(12.2)	2(4.9)	29(70.7)
- 20 years old	1(2.4)	10(24.4)	0	0	11(26.8)
- 21 years old	0	1(2.4)	0	0	1(2.4)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)
<b>Ethnicity</b>					
- Malay	6(14.6)	19(46.3)	5(12.2)	2(4.9)	32(78.0)
- Chinese	1(2.4)	4(9.8)	0	0	5(12.2)
- Indian	1(2.4)	3(7.3)	0	0	4(9.8)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)
<b>Level of education</b>					
- Pre-university	7(17.1)	16(39.0)	5(12.2)	2(4.9)	30(73.2)
- First-year	1(2.4)	10(24.4)	0	0	11(26.8)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)

Table 4.6.1 display the body mass index (BMI) and socio-demographic factors of the students. Majority of the male are normal weight (17.1%). The female

students were distributed but most are normal weight (46.3%). A moderate number of female students are underweight (19.5%). In general, most have normal weight (63.4%). Next, most of the students are 19 years old (70.7%), followed by a moderate number of underweight (17.1%) and normal weight (36.6%). Low number of overweight (12.2%) and obese (4.9) can be seen from 19 years old. The distribution for 20 years old and 21 years old are also among normal weight (24.4%) and (2.4%) respectively. Moreover, Malay have the highest number of student (78%) and are distributed with low overweight (12.2%) and obese (4.9%) number of students. Chinese and Indian were also by (12.2%) and (9.8%) respectively. Furthermore, pre-university have moderate students of underweight (17.1%) and normal weight (39%). Low number of students that are overweight and obese (12.2%) and (4.9%). However, there is no first-year students that are overweight or obese.

Table 4.6.2: Associations between body mass index (BMI) and socio-demographic factor

Socio-demographic	BMI category (underweight, normal, owt/obese)					
	Male (BMI)		Female (BMI)		Total (BMI)	
	X <sup>2</sup>	p-value	r	p-value	r	p-value
Gender					0.285	0.343
Ethnicity	0.293	0.710	0.182	0.903	0.172	0.877
Level of education	0.218	0.537	0.398	0.155	0.356	0.158

Chi-Square, Sig at 0.05

Table 4.6.2 shows the associations between BMI and socio-demographic factors. Chi-square of independence analysis is used to analyze the socio-demographic factors (gender, age, ethnicity and level of education). Based on the result, gender, ethnicity and level of education have a positive correlation and a non-significant relationship with BMI by gender ( $r = 0.285$ ,  $p = 0.343$ ), ethnicity ( $r = 0.172$ ,  $p = 0.877$ ), and level of education ( $r = 0.356$ ,  $p = 0.158$ ).

Table 4.6.3: Correlation between age and BMI

Socio-demographic	Body weight status					
	Male (BMI)		Female (BMI)		Total (BMI)	
	r	p-value	r	p-value	r	p-value
Age	-0.22	0.60	-0.07	0.69	-0.87	0.588

Pearson correlation, sig. at 0.05

Based on Table 4.6.3, a test called Pearson Correlation test is used to analyze between body mass index (BMI) and age. The results showed negative correlation of r value and non-significant p-value for both gender, male ( $r = -0.22$ ,  $p \leq 0.60$ ) and female ( $r = -0.07$ ,  $p = 0.69$ ). Overall, body mass index was non-significant with age.

#### 4.7 Associations between Body Mass Index (BMI) and Dietary intake

Table 4.7.1: Associations between body mass index (BMI) and dietary intake

Dietary Intake	Male (BMI)		Female (BMI)		Total (BMI)	
	r	p	r	p	r	p
Energy Intake	-0.17	0.68	0.11	0.53	0.79	-0.62
Carbohydrate	-0.47	0.25	-0.16	0.00	-0.49	0.76
Protein	0.83	0.11	0.61	0.00	0.28	0.58
Fat	0.95	0.00	0.86	0.00	0.46	0.78

The data presented in Table 4.7.1 are associations between body mass index (BMI) and dietary intake. Pearson Correlation test is used to analyze the dietary intake variables and body mass index. According to the analysis, male's energy intake and carbohydrate showed a negative and non-significant relationship by ( $r = -0.17$ ,  $p = 0.68$ ) and ( $r = -0.47$ ,  $p = 0.25$ ). However, female's energy intake has a low positive correlation and non-significant relationship ( $r = 0.11$ ,  $p = 0.53$ ) while carbohydrate accounts for no relationship and non-significant by ( $r = 0.00$ ,  $p = -0.49$ ). In overall, energy intake has a strong positive correlation and is non-significant ( $r = 0.79$ ,  $p = -0.62$ ). Carbohydrate has a negative correlation and a non-significant association ( $r = -0.49$ ,  $p = 0.76$ ). Next, both genders have moderate to strong correlation and significant

association with protein and fat except for male by protein ( $p = 0.11$ ). In general, there is a positive correlation of protein and fat but non-significant association.

#### 4.8 Associations between Body Mass Index (BMI) and Physical activity

Table 4.8.1: Body mass index (BMI) and physical activity

Physical Activity	Body weight status n(%)				Total
	Underweight	Normal	Overweight	Obese	
High	2(4.9)	12(46.2)	0	0	14(34.1)
Moderate	5(12.2)	9(22.0)	4(9.8)	0	18(43.9)
Low	1(2.4)	5(12.2)	1(2.4)	2(4.9)	9(22.0)

A descriptive analysis between body mass index (BMI) and physical activity are presented in Table 4.8.1. From the high level of physical activity, the prevalence weight category was normal weight (46.2%) and low in underweight (4.9%). In moderate level of physical activity, there was a moderate number of students in underweight (12.2%), normal weight (22.0%) and overweight (9.8%). Moreover, obese are seen in low level of physical activity by (4.9%). Overall, higher physical activity has generally normal bodyweight.

Table 4.8.2: Associations between BMI and physical activity

	Male (BMI)		Female (BMI)		Total (BMI)	
	r	p	r	p	r	p
Physical Activity	0.378	0.285	0.539	0.004	0.401	0.041

Table 4.8.2 presented the associations between body mass index (BMI) and physical activity. Chi-squared test of independence is used to analyze the variables. Firstly, physical activity has a positive correlation for both genders by ( $r = 0.401$ ). However, only female has a significant association with ( $p = 0.004$ ).

#### 4.9 Associations between Body Mass Index (BMI) and Psychological factors

Table 4.9.1: Body mass index (BMI) and psychological factors

Psychological factors	Body weight status				Total
	Underweight	Normal	Overweight	Obese	
<b>Depression</b>					
- Normal	5(12.2)	19(46.3)	4(9.8)	0	28(68.3)
- Mild	0	3(7.3)	0	2(4.9)	5(12.2)
- Moderate	2(4.9)	3(7.3)	0	0	5(12.2)
- Severe	0	1(2.4)	0	0	1(2.4)
- Extremely severe	1(2.4)	0	1	0	2(4.9)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)
<b>Anxiety</b>					
- Normal	2(4.9)	11(26.8)	1(2.4)	0	14(34.1)
- Mild	3(7.3)	1(2.4)	2(4.9)	0	6(14.6)
- Moderate	2(4.9)	11(26.8)	1(2.4)	2(4.9)	17(41.5)
- Severe	0	2(4.9)	1(2.4)	0	3(7.3)
- Extremely severe	0	1(2.4)	0	0	1(2.4)
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)
<b>Stress</b>					
- Normal	7(17.1)	24(58.5)	3(7.3)	2(4.9)	36(87.8)
- Mild	0	1(2.4)	1(2.4)	0	2(4.9)
- Moderate	0	1(2.4)	1(2.4)	0	2(4.9)
- Severe	1(2.4)	0	0	0	1(2.4)
- Extremely severe	0	0	0	0	0
- Total	8(19.5)	26(63.4)	5(12.2)	2(4.9)	41(100)

The analysis presented in Table 4.9.1 are associations between body mass index and psychological factors. Firstly, majority of the number of students had normal body weight with normal depression factor (46.3%). Next, moderate severity of anxiety accounts for higher distribution in overall number of students by underweight

(4.9%), normal (26.8%), overweight (2.4%) and obese (4.9%). Moreover, stress does not show a clear connection with BMI as there is high number of students in normal stress severity (87.7%) even in overweight and obese category.

Table 4.9.2: Associations between body mass index (BMI) and psychological factors

<i>Physical Activity</i>	<i>Male (BMI)</i>		<i>Female (BMI)</i>		<i>Total (BMI)</i>	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Depression	0.293	0.877	0.471	0.009	0.433	0.028
Anxiety	0.488	0.386	0.355	0.186	0.334	0.317
Stress	0.143	0.686	0.378	0.117	0.291	0.316

<b>Variables</b>	<b>Fluid adherence</b>	
	<b>r-value</b>	<b>p-value</b>
<b>MSPSS scale</b>		
Total social support	-0.091	0.512
Significant other support	-0.274	0.045*
Family support	0.005	0.971
Friends support	0.035	0.801

Table 4.9.2 showed the associations between body mass index (BMI) and psychological factors. The test used to analyze the association was Chi-square of Independence. Based on the results, there was a positive correlation with BMI by depression ( $r = 0.433$ ), anxiety ( $r = 0.334$ ), and stress ( $r = 0.291$ ). However, all of the psychological factors showed non-significant relationship with BMI.



**CHAPTER 5**



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