

Factor Affecting the Prevalence of Non-ideal Body Mass Index (BMI) among Female University Student

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Abstract—Objective. Non-ideal Body Mass Index (BMI) has increased around the world where they have been described as an epidemic, causing great concern among the health professional and researchers. This study aims to identify factors that affecting the prevalence of non-ideal body mass index (BMI) among female students. A total of 336 female students in Universiti Sultan Zainal Abidin (UniSZA) have been involved in this research. The researcher was using a descriptive analysis to identify the factors that affecting to non-ideal BMI. **Results.** There are four major factors to be considered in the study of which are environmental factors, genetic factors, dietary factors, and physical lifestyle. About 68.82 percent of physical lifestyle was the most contributed factor compared to other factors. The majority of respondents had never performed any physical activity which was heavy in a week of 79.46 percent while for engaging in moderate physical activity 74.11 percent of the respondents only performed this activity once in a week. In addition, sitting too long also contributed to non-ideal BMI problems where 59.22 percent of respondents seated for more than seven hours a day. For spending a lot of time on the computer, the 62.50 percent of respondents spent a lot of time on the computer for e-mail, video games, video, and social media (eg. facebook, twitter, Instagram, wechat etc.) in a relatively long period of 4-6 hours a day. **Conclusion.** All of these factors contributed affecting the prevalence of non-ideal BMI problem. Therefore, treatment and prevention should be done immediately so that the problem can be reduced from time to time.

Keywords— Prevalence, Non-ideal BMI, Female Student, UniSZA

I. INTRODUCTION

Among the public health issues that are considered serious and important in Malaysia as well as in most countries are related to BMI as reported by [1]. The growth in the number of adults who were overweight or within non-ideal BMI was at an alarming rate. The prevalence of non-ideal BMI rate has been doubled in more than 70 countries since 1980. About 603.7 million of adults in the world were categorized as non-ideal BMI by 2015. Overweight and non-ideal BMI grew health problems in Malaysia as well as in worldwide due to such lifestyle changes as decreased physical activity (PA), increased inactive behavior and unhealthy eating habits [2]. In 2016, more than 1.9 billion of adults aged 18 years and older were overweight. In addition, more than 650 million adults were identified as obese persons. Most overweight people were highly risked to death compared to the individuals with lower weight. A study in South Africa showed that non-ideal BMI have become a major health issue among teenagers [3].

The rate of non-ideal BMI have increased around the world where it has been described as an epidemic, causing great concern among the health professionals, health authorities and researchers [4,6]. Prevention and treatment of this problem had been a huge challenge, and yet no country has managed to reduce the growing trend internationally [5]. Non-ideal BMI is an escapable risk factor for countless chronic diseases including type 2 diabetes, cardiovascular diseases, various forms of cancer and depression [6,7]. Non-ideal BMI are interrelated with diabetes, high blood pressure, high levels of cholesterol, asthma, arthritis and deprived health status [6,8]. The major cause of non-ideal BMI is identified to be the inequity between the energy consumption from food and energy expenditure in activity while the secondary or indirect roots include social, cultural and economic status quos surrounding eating and lifestyle activity [9,10]. Both established and rising countries were experiencing a growth in the incidence and prevalence of type 2 diabetes and different BMI-associated diseases due to an evolving, obesogenic lifestyle and environment [4,7]. Overweight and non-ideal BMI happened due to genetic factors, age, race, deficiency of physical activity, too much of eating or energy consumption, medications, pregnancy, sleep deprivation, emotional and/or psychological factors such as depression. In addition increase, pressure and stress towards individuals all have been exposed to be significant risk factors [2]. Lack of awareness and incorrect information about the benefits of getting healthier and proper diet were the contributing factors aimed to non-ideal BMI. The high-quality diet and physical activity practices have been set up to have a significant influence on the nutritional status of the Malaysia population at large. The routine of avoiding breakfast between females was reported to generate a tendency for overeating during lunch or dinner [7,11]. Adolescents who live with non-ideal BMI hated or disliked the word "BMI". They would rather be called "fat" or "overweight" [12] and had difficulty in perceiving and labeling non-ideal BMI [13]. A systematic review defined adolescent non-ideal BMI as an "abandoned issue" and noted that the lack of clinical control and professional view makes this a priority research area given the high prevalence of adolescent non-ideal BMI and its significant longer-term health impacts [14]. Because of that, this topic is a foremost challenge to medical practitioner's deck for the reason that they have to get prepared and be responsible for the best treatment and at the same time, awareness of a balanced diet must be upgraded among the people all over the world.

Therefore, this study identified the factors that lead to non-ideal BMI among female students in UniSZA as well as the environment, genetic, food consumption, and physical lifestyle.

II. METHODOLOGY

2.1 Materials and Methods

This was an analysis descriptive study conducted in the UniSZA. A quantitative research was conducted to gain knowledge and a deeper understanding of the problems of this study. This study used the platform of a questionnaire to obtain information from the respondents were obtained by using the platform of the distributed questionnaire. The survey focused on information on the environment, genetic, food consumption and physical lifestyle to identify factors that contributed to non-ideal BMI .

2.2 Participants and Sampling

Female students in UniSZA from age 18 to 27 years old were involved in this study. A questionnaire that consisted of factors which led to non-ideal BMI was provided by the researcher. The identity and the information of the respondents are kept as private.

2.3 Procedures and Study Variables

Data collection was carried out for a month starting from July 8, 2018, and ending on August 10, 2018. This study was conducted by distributing questionnaire which involved four key areas. The respondent's environment, genetic, food consumption, and the respondent's involvement in physical activity were the areas covered in the study.

2.4 Instrumentation

Four major factors that contributed to non-ideal BMI namely environment factors, genetic, food, and lifestyle were emphasized by the researcher in this study.

In the environmental factor, a questionnaire related to the origin of the respondents like in urban or rural areas was provided from the researcher whereas for genetic-related questions which emphasized more on the weight of the mother and father based on these categories such as underweight, normal, overweight, and weight loss is excessive.

The instrumentation related to food were (a) the frequency of breakfast consuming over the last 30 days: using four scales , 1-9 times / month, 10-19 times / month, 20-29 times / month and every morning; (b) the reason for not consuming breakfast over the last 30 days: using three or more partitions that often consuming breakfast, do not have time, cannot eat early in the morning, bound with expenses, no money and try to lose weight; (c) fruit intake: with a frequency of less than once, once daily, twice daily, more than five times a day and not eating fruits; (d) consumption of vegetables over the last 30 days, the frequency of taking carbonated drinks over the last 30 days were also used a frequency scale such as fruits.; (e) the frequency of eating at fast food restaurants was used the

same scale as fruits as well; frequency of drinking milk or eating dairy products: using more than five frequency scales of none, once a week, twice a week, three times a week up to seven times a week while (f) the frequency of eating high fat foods such as nasi lemak, roti canai, cendol, ripe fat or durian.

Instrumentation related to the respondent's involvement in physical activity is (a) frequency of heavy physical activity: classified by eight frequencies starting with none up to seven times a week; (b) reasons not to be involved in heavy physical activity: optional reason like do not have much time, not interested, did not have ability and did not bring any benefit; (c) time allocated: using three and more time allocated that is none, less than 30 minutes a day up to more than seven hours a day; (d) moderate physical activity: none, once a week up to seven times a week; (e) excuse for not getting involved with the selected reasons such as no time, not interested, not capable and did not bring up any benefit; (f) time allocated: never, less than 30 minutes a day up to more than seven hours a day; (g) the frequency of walking at least 10 minutes at a time: using option none, once a week up to seven times a week; (h) reason for not walking: because of no time, not interested, not capable and did not bring up any benefit; (i) allocated time for walking, (j) the time allocated to sit, (k) the frequency of using the computer, (l) frequency of watching television: using the same time frequency scale of more than three frequencies that is none, less than 30 minutes, less than one hour a day, 2-3 hours a day, 4-6 hours a day and more than seven hours a day.

Table 1: INSTRUMENTATION

Factors	Details
Environment	Urban
	Rural
Genetic	Father's weight
	Mother' weight
Food	Breakfast
	Fruit intake
	Vegetables
	Taking carbonated drinks
	Eating at fast food restaurants
	Drinking milk or eating dairy products
Physical lifestyle	Eating high-fat foods
	Heavy physical activity
	Moderate physical activity
	Walking at least 10 minutes
	Using the computer
	Watching television

2.5 Statistical Analysis

Descriptive analysis to describe data by numbers was used by the researcher. Data was collected, processed and prepared in

accordance with the schedule including the frequency and percentage. The analysis of this research data was begun with data encoding, data entry in SPSS software, data cleaning, checking of missing values and descriptive analysis to analyze, study and identify factors that contributed to non-ideal BMI based on the highest percentage.

III. RESULTS

3.1 Result and Discussion

The average respondent to respond in a day was a total of 5-10 people. In total, 336 respondents were involved in answering the questionnaires. Results were analyzed using descriptive analysis and there were four factors that contribute to non-ideal BMI .

3.2 Environment

The majority of respondents living in rural areas, which accounted for 55.95 percent against 44.05 percent of the rest living in urban areas are as shown in Table 2. Prevalence of non-ideal BMI continued significantly higher among rural compared to urban [15]. These results are in contrast to studies conducted by [16], whereby out of 1063 randomly selected women, 40.54% of urban and 22.75% of rural females were obese. Rural areas communities have suffered from non-ideal BMI and weight loss whereby the rate is higher than the people who live in the city as a whole, but many rural communities did not have the resources to deal with this critical health issue. Rural healthcare facilities are less likely to have nutritionists, dieticians, or weight management experts available. Facilities and infrastructure did not exist in rural areas which are functioned as encouraging physical activity. Access to healthy and affordable food is also limited to many rural communities where respondents living in rural areas are more susceptible to BMI problems.

Table 2: Environment Factor

Environment		
Origin	f	Percentage (%)
Urban	148	44.05
Rural	188	55.95

3.3 Genetic

Non-ideal BMI among girls in UniSZA are as shown as in the tables below and not caused by genetic factors. This is because the weight of their parents for the majority is normal. Researchers have found that non-ideal BMI gene has caused BMI problems. However, without the genetic predisposition, it could cause non-ideal BMI [10].

Table 3: Weight of Father

Weight of Father	f	Percentage (%)
Underweight	17	5.06
Normal	228	67.86

Overweight	79	23.51
Obese	12	3.57
Total	336	100

Table 4: Weight of Mother

Weight of Mother	f	Percentage (%)
Underweight	10	2.98
Normal	226	67.26
Overweight	96	28.57
Obese	4	1.19
Total	336	100

3.4 Food

3.4.1 Lack of fruit intake

Table 5 showed that the majority of respondents consumed the fruit less than once a day, as much as 49.70 percent. It showed that almost half of the respondents consumed less fruit and led to nutritional deficiencies such as vitamins, minerals, amino acids, fatty acids, and phytonutrients, which were the substances contained in it. While 23.81 percent consumed fruits in a day and some of them consumed twice daily. Thus, 53 respondents equivalent to 15.77 percent. The result was contrary to the research showed that non-ideal BMI was caused by the consumption of fruit [17]. However, those with poor eating habits were three times more likely to be with non-ideal BMI compared to those in other groups. Likewise, those who did not consume or had unsatisfactory consumption of fruits were at least three times more likely to be with non-ideal BMI compared to those who consumed fruits [18]. Thus, the fruit is a nutritious food that helps the growth and health of the body.

Table 5: Consumption of fruits over the last 30 days

Variables	f	Percentage (%)
I did not eat fruits for the last 30 days	16	4.76
Less than once a day	167	49.7
Once a day	80	23.81
Two times a day	53	15.77
More than 5 times a day	20	5.95
Total	336	100

3.4.2 Consumption of vegetables over the last 30 days

In terms of consumption of vegetables, Table 6 recorded 38.10 percent, the highest number with daily frequency per day. About 25.62 percent contributed to vegetable consumption twice a day while respondents who took vegetables with less than once daily consumption of 22.62 percent. The intake of fruits and vegetables causes a significant decrease in the percentage of non-ideal BMI and overweight [10, 19]. Malaysian Dietary Guidelines 2010 recommend taking at least three servings of vegetables and

two servings of fruit a day. This is due to the consumption of vegetables in the diet can reduce the risk of various diseases such as cancer, stroke, cardiovascular disease, and other chronic diseases and will lead to overweight if it is not taken in accordance with the appropriate provisions.

Table 6: Consumption of vegetables

Variables	<i>f</i>	Percentage(%)
I did not eat fruits for the last 30 days	13	3.87
Less than once a day	76	22.62
Once a day	128	38.10
Two times a day	86	25.62
More than 5 times a day	33	9.82
Total	336	100

3.4.3 Frequency of drinking milk or dairy products consumption, like yogurt and cheese

Table 7 shows the results of milk consumption and dairy products by UniSZA students. The findings were quite worrying as half of the respondents (50.00 percent) chose to consume milk and dairy products less than once a day. Other results showed that 20.24 percent answered of the frequency once a day and there were not similar to those who did not consume milk and yogurt directly over the last 30 days which was 19.35 percent. This study indicated lower results whereby only 17.90 percent, which was made up of 29 women who consumed milk and dairy products [20, 21]. However, milk and yogurt are diets that can be used together to maintain the beauty and health of themselves and prevent dangerous diseases.

Table 7: Frequency of drinking milk or dairy products consumption

Variables	<i>f</i>	Percentage (%)
I did not eat fruits for the last 30 days	65	19.35
Less than once a day	168	50.00
Once a day	68	20.24
Two times a day	28	8.33
More than 5 times a day	7	2.08
Total	336	100

3.5 Physical Lifestyle

3.5.1 Frequency of heavy physical activity such as aerobics, running, jogging, biking, or playing netball.

The questionnaire also emphasized on the frequency of physical activity within a week. The habit of practicing physical activity that is inactive from time to time will lead to chronic problems such as non-ideal BMI. This could give a bad effect on the well-being of the individual and pose a public health burden on [18]. The high percentage of 33.93 percent of respondents who only performed this heavy

physical activity once a week while almost 33 percent did not do any physical activity such as jogging, aerobic and others. There were also respondents who performed physical activity twice weekly with 12.80 percent and this would be sufficient on maintaining their health throughout their daily physical activity. Based on the National Health and Morbidity Survey (NHMS) 2015 conducted by the Ministry of Health found that about 33.5% of Malaysians did not practice physical activities and it also created problems for the health.

Table 8: Frequency of heavy physical activity

Variables	<i>f</i>	Percentage (%)
None	267	79.46
Once a week	29	8.63
Two times a week	1	0.30
Three times a week	7	2.08
Four times a week	13	3.87
Five times a week	6	1.79
Six times a week	13	3.87
Total	336	100

3.5.2 How often did you do moderate physical activities like swimming, lifting light items, gardening, ping-pong/badminton, or kayaking? (not inclusive of walking).

Table 9 shows the low frequency in doing moderate physical activities such as swimming, lifting lightweight goods, gardening, playing table tennis/badminton, or kayaking were also the factors that led to non-ideal BMI. About 30.95 percent of students performed the activity once a day while 28.87 percent of them did not perform this modest activity. This issue raised concerns of various parties. According to the latest report by [22], it showed that students in primary school did much physical activity compared to students in University. There was over 40.00 percent of these people engaged in physical activity actively within one to three days a week. Habits of unhealthy lifestyles, particularly sedentary lifestyle in our community, was a major contributing factor to an emerging public health problem [23].

Table 9: The frequency of moderate physical activity

Variables	<i>f</i>	Percentage (%)
None	33	9.82
Once a week	249	74.11
Two times a week	26	7.74
Three times a week	9	2.68
Four times a week	11	3.27
Five times a week	3	0.89
Six times a week	3	0.89
Seven times a week	2	0.60
Total	336	100

3.5.3 The estimated time to sit

Table 10 shows people who took much time of sitting which could cause non-ideal BMI and overweight problems. About 26.49 percent of students in UniSZA seated for 4-6 hours a day and those who seated for more than 7 hours were at 20.24 percent. However, in contrast to studies which 54.3 percent of respondents were found to spend less than 4 hours a day to perform sedentary behavior such as sitting or lying down [7, 24]. If you consume high amounts of energy, particularly fat and sugars, but do not burn off the energy through exercise and physical activity, much of the surplus energy will be stored by the body as fat. In conclusion, sitting too long can cause non-ideal BMI problems because of the lack of movement that could release sweat and be healthy.

Table 10: Estimated time to sit

Time	<i>f</i>	Percentage (%)
Never	8	2.38
< 30 minutes a day	49	14.58
< 1 hour a day	44	13.1
2-3 hours a day	10	2.98
4-6 hours a day	26	7.74
> 7 hours a day	199	59.22
Total	336	100

3.5.4 Spending much time on computers for email, video games, youtube, and social media (such as facebook, twitter, Instagram, wechat etc)

Finally, the factors that caused non-ideal BMI and overweight were the use of a computer for e-mail, video games, youtube, and social media. A total of 36.61 percent of students spending much time on the computer with a frequency of 2-3 hours a day. The results were in line with the study that stated busy with work, watching television and more time spent in front of computers were into the cause of weight problem [7]. On average, Malaysians spent three hours a day on social media, hence placing the country among the 10 highest in the world for this activity.

Table 11: The frequency of time spent on the computer

Time	<i>f</i>	Percentage (%)
Never	7	2.08
< 30 minutes a day	18	5.36
< 1 hour a day	36	10.71
2-3 hours a day	4	1.19
4-6 hours a day	210	62.50
> 7 hours a day	61	18.15
Total	336	100

IV. CONCLUSION

The major factors have been identified in contributing to the non-ideal BMI problem in terms of the environment, nutrition, and lifestyle. They are shown in the findings.

The importance of the study

This study was important for research and practiced by health and professional experts and policymakers involved in prevention, education, intervention and BMI control in Malaysia. From this study as supported by previous studies which stated, this decision was due to unhealthy eating habits and risk behaviors among students in UniSZA. Therefore, these findings required more educator intervention and awareness programs such as preventive counseling and health check-ups in educational institutions and communities to expose students to lead a healthy lifestyle for sake of good health.

This study presented a population that did not prioritize physical activity as an important lifestyle involvement. Therefore, it is important to establish early prevention and action to keep students healthy not only on physical health but also social health behavior that could lead to a more dangerous non-ideal BMI in adulthood ultimately. The importance of physical activity should also be exposed to students as social activities and could become part of their co-curricular activities.

For healthcare professionals and doctors, it is important to conduct screening routine for chronic diseases such as non-ideal BMI, coronary heart disease and type 2 diabetes at hospitals and clinics. This will allow early detection of various symptoms associated with these diseases. It is also important to have follow-up plans for social workers to enable proper management of non-ideal BMI and related diseases as well as any of the symptoms that need to be diagnosed.

V. RECOMMENDATION

As discussed above, the evidence from research on non-ideal BMI prevention is done can be inconclusive, incomplete, and inconsistent. Systematic processes are needed to increase the use of existing evidence to enhance the prevention of non-ideal BMI and other health problems. Commitment to such a process is also required by both decision makers and those involved in producing evidence. They include policymakers and their advisors, public health practitioners and other sectors, the assessment program, public health researchers and research scientists, journal editors, and sponsors. Hence, certain parties make the following recommendations to help decision-makers and researchers in the use of current evidence to prevent non-ideal BMI and take a more effective approach to generate more useful evidence.

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