FOOD CONSUMPTION PATTERN AND INTENTION TO PRACTICE HEALTHY SLEEP AMONG MALAY OBESE WOMEN IN MELAKA, MALAYSIA

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Chairman : Associate Professor Muhammad Shahrim Ab Karim, PhD
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Obesity management should be extended beyond the conventional manner that solely emphasizes on diet and exercise. Nevertheless, the increasing prevalence of obesity despite the current strategies needs to improvise and consider healthy sleep as one of the strategy as sleep has been an emerging issue in obesity yet it has been absent in Malaysia. The objective of the present study is to examine the current food consumption pattern and the intention to practice healthy sleep among obese Malay women in the state of Melaka. This study adopted the Theory of Planned Behavior to investigate the effect of Healthy Sleep Awareness on the intention to practice healthy sleep in an attempt to lose weight. The one-time program was conducted among 368 obese Malay women aged between 18 and 55 years old in the state of Melaka, in which they were asked to complete a survey form. This step appeared to be integral in measuring the current food pattern and healthy sleep as well as to measure whether the knowledge gained from the program is capable of influencing their intentions to practice healthy sleep in achieving weight loss. The analysis was conducted using the Partial Least Square Structural Equation Model (PLS-SEM) for both the measurement and structural models. Overall results on the current food consumption pattern and healthy sleep showed that majority of the respondents has similarity in consuming confectionary food with the highest percentage on snacking (84%) while at the same time practicing late time in bed (99%) most of the nights. There was no significant relationship between Attitude and Subjective Norms on the intention to practice healthy sleep, unlike Perceived Behavior Control that was found to be moderately significant. Nevertheless, Healthy Sleep Awareness was found to pose significant direct influence on all the predictors in the study and capable of moderating the relationship between the predictors in regards to the intention to practice healthy sleep. Age was found to positively influenced Attitude and Perceived Behavior Control on the intention to practice healthy sleep except for Subjective Norms. Nevertheless, the

results of the study managed to present the important implications regarding the possible planning and implementation of Healthy Sleep Awareness in a structured manner alongside the lifestyle practices in managing obesity apart from only focusing on diet and exercising. Therefore, it is suggested for future research to conduct a study that measures explicitly behavioral changes concerning practice healthy sleep that is considered as a new weight loss factor as well as exploring the impacts of healthy sleep in managing obesity.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

CORAK PENGAMBILAN MAKANAN DAN NIAT UNTUK MENGAMALKAN TIDUR YANG SIHAT DI KALANGAN WANITA MELAYU OBES DI MELAKA, MALAYSIA

Oleh

ABSAH BINTI MAMAT

Mei 2019

Pengerusi : Profesor Madya Muhammad Sharim Ab. Karim, PhD
Fakulti : Sains dan Teknologi Makanan

Pengurusan obesiti perlu dilanjutkan diluar cara konvensional yang semata-mata memberi penekanan kepada diet dan senaman. Walaubagaimanapun, peningkatan kelaziman obesiti dibawah perlaksanaan strategi kawalan semasa memerlukan penambahbaikan dengan mengambilkira amalan tidur yang sihat sebagai salah satu strategi memandangkan ianya adalah isu baru berkaitan obesiti yang masih belum diketengahkan di Malaysia. Tujuan kajian ini adalah untuk mengakji corak pengambilan makanan dan amalan tidur semasa di kalangan wanita obes di negeri Melaka. Kajian ini mengguna pakai 'Theory of Planned Behavior' untuk mengkaji kesan daripada kesedaran untuk amalan tidur yang sihat dalam usaha untuk menurunkan berat badan. Program kesedaran ini disertai seramai 368 wanita Melayu obes yang berumur antara 18 hingga 55 tahun di Negeri Melaka, di mana mereka diminta untuk mengisi borang kaji selidik. Lebih penting lagi, pendekatan ini penting dalam mengukur sama ada pengetahuan yang diperolehi dari kesedaran ini mampu mempengaruhi niat mereka untuk mengamalkan tidur yang sihat dalam mencapai penurunan berat badan. Analisis statistik telah dijalankan secara khusus bagi kedua-dua ukuran dan struktur model menggunakan 'Partial Least Square Structural Equation Model' (PLS-SEM). Keputusan analisis terhadap corak pemakanan dan amalan tidur semasa melaporkan bahawa majoriti responden mempunyai kesamaan dalam kecenderungan mengambil makanan tinggi kalori dengan pengambilan tertinggi terhadap snek (84%), pada masa yang sama mengamalkan tidur lewat malam (99%) pada kebanyakan malam. Sebagai tambahan, tiada hubungan signifikan antara sikap dan norma-norma subjektif terhadap niat untuk amalan tidur yang sihat melainkan tingkah laku kawalan yang didapati signifikan pada kadar sederhana. Namun begitu, kesedaran amalan tidur yang sihat telah dikenalpasti menimbulkan kesan pengaruh secara langsung pada kesemua kognitif dalam kajian masa kini dan sebagai pengantara, ianya mampu mengendalikan hubungan antara kognitif berkenaan niat untuk mengamalkan tidur yang sihat. Di samping itu, keputusan itu juga

mendedahkan bahawa umur secara positif dipengaruhi oleh sikap dan tingkah laku kawalan namun tidak terhadap norma-norma subjek. Bagaimanapun, keutamaan kajian ini adalah terhad dari pendekatan pengukuran, memandangkan ianya hanya memberi fokus kepada niat untuk melaksanakan amalan tidur yang sihat berbandingkan pengukuran terhadap perubahan sebenar selepas mengamalkannya. Walaubagaimanapun, keputusan kajian ini mampu mengenengahkan implikasi penting terhadap kemungkinan dalam merancang dan melaksanakan kesedaran amalan tidur yang sihat secara berstruktur disamping amalan lain dalam menangani obesiti daripada hanya tertumpu kepada diet dan aktiviti fizikal. Justeru itu, adalah dicadangkan agar kajian akan datang dapat melasanakan satu kajian yang menjurus kepada pengukuran terhadap perubahan tingkah laku yang berkaitan dengan amalan tidur yang sihat sebagai satu faktor terhadap penurunan berat badan termasuk mengkaji kesan atau impak tingkah laku tidur yang sihat dalam menangani masalah obesiti.

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Completing a dissertation take a lot of energy and determination; it also takes a lot of help. The process does not truly express the heart and soul which goes into such a piece of work. It also does not showcase that in order to get to each of these points there were many people who contributed - faculty, family, friends, and many others along the way. Coming into academic from the industry background has not been easy. But I have been working and studying part-time since my flying time with Malaysia Airlines. I am happy to have the courage to continue up to this stage despite all the challenges and really thank those who have been there for me, in one way or another, throughout this process.

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Again, thank you to everyone who helped me achieve this goal. I was looking forward to the next "chapter" in my life and excited to share it with all of my family, friends, and others who have made such a difference in my life thus far. ALHAMDULILLAH.

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This is to confirm that:

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LIST OF ABBREVIATIONS

AFS	Adrenal Fatique Syndrome
ATT	Attitude
AVE	Average Variance Extracted
BAT	Brown Adipose Tissue/Fat
BMI	Body Mass Index
CA	Cronbach Alpha
CDC	Centre for Disease Control
CPG	Clinical Practice Guidelines
CR	Composite Reliability (CR)
CVD	Cardiovascular diseases
F^2	Effect Size
GDP	Growth Domestic Population-Competition
HBM	Health Belief Model
HSA	Healthy Sleep Awareness
HTMT	Heterotrait-Monotrai Ratio
IPH	Institute of Public Health
IPHS	Intention to Practice Healthy Sleep Behavior
LV	Latent Variable
MANS	Malaysian Adult Nutrition Survey
NCD's	Non-Communicable diseases
NHMS	National Health and Morbidity Survey
PBC	Perceived Behavior Control
PLS-SEM	Partial Least Squares Structural Modelling
PMT	Protection Motivation Theory

Q^2	Predictive Relevance
R^2	Coefficients of Determination
SCN	Suprachiasmatic
SCT	Social Cognitive Theory
SDS	Sleep Disorder Society
SNM	Subjective Norms
SSM	Snowball Sampling Method
T3	Triiodothyronine
T4	Thyroxine
TIB	Time in Bed
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TRH	Thytrophin-Releasing Hormone
TSH	Thyroid Stimulating Hormone
VIF	Variance Inflation Factor
WAT	White Adipose Tissue /Fat

CHAPTER 1

INTRODUCTION

This chapter will provide briefly about the introduction of obesity prevalence all over the world, particularly among women in Malaysia. The problem statements points out the need for the present study to be conducted and directed to the problem statement. The rest of the chapter recognized the relevant research questions as well as the related objectives of the study in line with the next chapters. The operational definitions presented are to give a better understanding of the usage of terms in this study.

1.1 Background of the Study

In today's world, obesity is known as a major threat to public health all over the world (Finucane et al., 2011). The World Health Organisation (WHO) defines obesity as abnormal or excessive fat accumulation that may affect health. In particular, obesity among adults is represented by body mass index (BMI) which is greater than or equal to 30.0, while the BMI for overweight adults is shown by the index that is greater or equal than 25.0. According to the facts sheet published by WHO (2018), the rate of worldwide obesity had a triple growth between the year of 1975 and 2016.

Moreover, about 1.9 billion adults aged 18 years and above were found to be overweight in 2016, while over 650 million adults that represented 13% of the world population were discovered to be in obese condition. Adult obesity continues to upsurge everywhere at an accelerated pace representing a major risk factor for non-communicable diseases including cardiovascular diseases, diabetes and some forms of cancer. On a similar note, further analysis showed that 11% of men and 15% of women out of the above-mentioned statistics were diagnosed with obesity in 2016 (WHO, 2018).

Obesity is a life-threatening disease that tends to kill more individuals compared to those who are underweight, and it has increased despite the current policies and strategies that were developed for the purpose of preventing growth. Concerning this matter, a total of 340 million adolescent and children aged ranged from 5 to 19 years old, as well as 41 million children under the age of 5 years old in the world's population, were found to be overweight or obese in 2016. Meanwhile, it should be noted that the number of overweight children under 5 years old in Africa has increased by almost 50% since 2000. On a more important note, nearly half of the children under 5 years old who were found to be overweight or obese in 2016 lived in Asia (WHO, 2018).

The prevalence of obesity was considered a problem of high-income countries worldwide, yet it is now nearly tripled between 1975 and 2016 with continuing rising in low and middle-income countries (Abarca-Gómez et al., 2017). Most of the world's

population that resides in developing countries tend to be overweight; therefore, this has been considered as a threatening risk that may lead to a higher amount of obese population in the future. In comparison to Asia by 7% and Africa by 11%, the issue was seen to be more severe in Europe, North America, and Oceania though it differs across regions, where approximately 28 % of adults were found obese. Almost one-quarter of the population in the Caribbean and Latin America were currently considered as obese. The prevalence of adult obesity in Africa and Asia was historically much lower nevertheless it has recently rapidly spread among larger parts of the population in these regions. In regards to the severe problem on obese and overweight individuals in high-income countries, it is also crucial to note that this number has been in the upsurge trend in low and middle-income countries where the population of these individuals has also been in the upsurge trend. Therefore, most low and middle income countries are currently facing an increasing burden from overweight and obesity that associate to the increase of particular non-communicable disease such as diabetes, despite the high levels of undernutrition, communicable diseases, and prevalence of infectious.

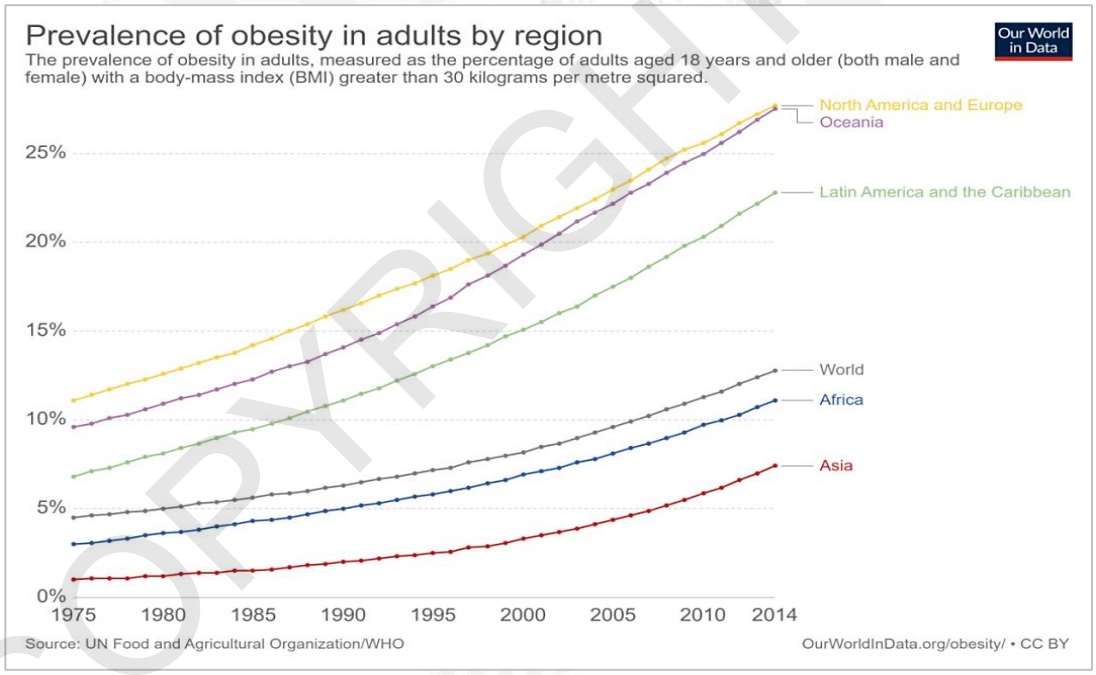

Figure 1.1 : Prevalence of obesity in adults by region (18+ years old) (FAO 2017) (Source : WHO Global Health Observatory Data Repository, 2017)

As can be seen in Figure 1.1, the prevalence of obesity in adults by region showed the highest prevalence in North America and Europe at 27.7% followed by Oceania at 27.5% and Latin America and the Caribbean at 22.8%. In which all three regions have shown higher prevalence above the world prevalence of 12.8% while Africa at 11.10% and Asia at 7.4%. The prevalence of obesity in 2016 among female was seen to be higher than the male at 5 points. Compared to the female at 37%, the highest prevalence among males were seen in the United States nevertheless the prevalence

among females were seen highest from the United Arab Emirates at 41%, followed by Lebanon at 37%.

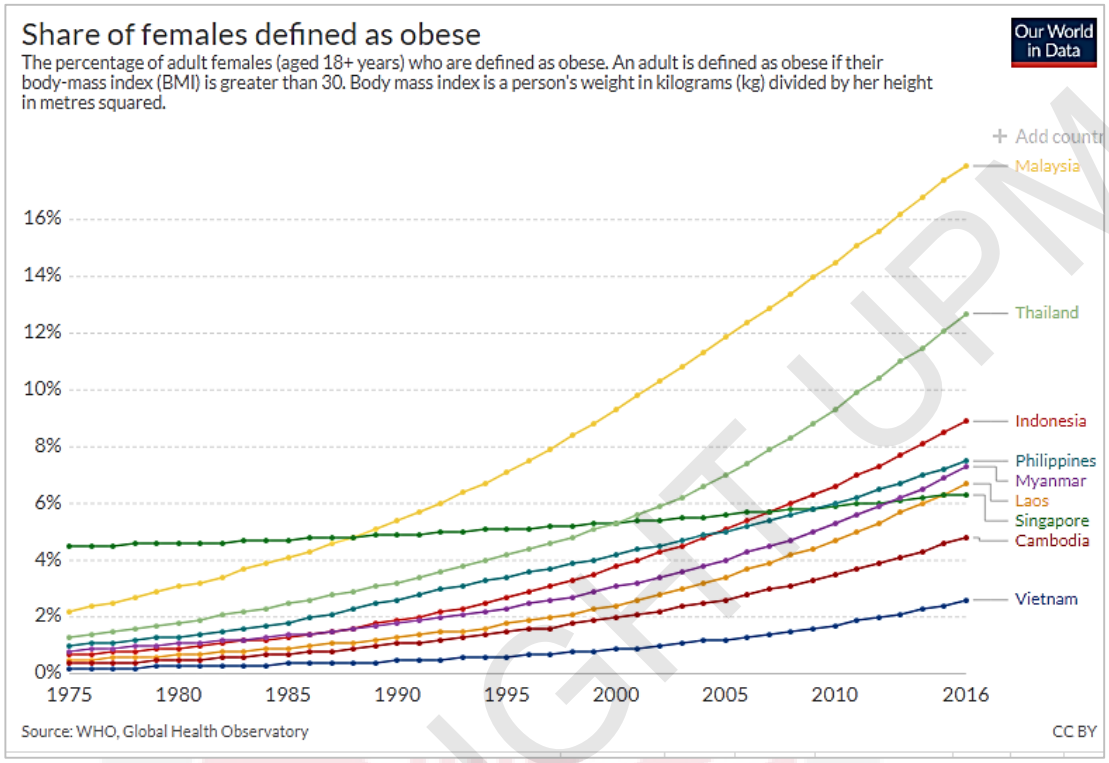

Figure 1.2 : Prevalence of obesity in adults (18+ years old) (FAO 2017)
(Source : WHO Global Health Observatory Data Repository, 2017)

The prevalence among female in South-east Asia countries as shown in Figure 1.2 was seen highest in Malaysia at 17.4%, followed in Thailand at 12.10 % and Indonesia at 8.5% while Vietnam is seen to be the lowest in obesity prevalence at 2.4% among female. Concerning this matter, Mohamud et al. (2011) identified several factors that caused obesity to grow as a leading concern in public health in Malaysia even among the rural communities which include improved socioeconomic status, continuous urbanization, unhealthy dietary habits and adoption of a more sedentary lifestyle. Consequently, obesity has replaced the current traditional public health problems such as malnutrition and infectious diseases. The findings highlighted that both gender and age remain uneven in regards to the prevalence of overweight and obesity. Meanwhile, the findings on ethnic groups related to local populations and other populations are inconsistent with previous studies.

Similarly, WHO (1998) also classified the substantial increase of obesity prevalence from 12.2% based on the Malaysian Adult Nutrition Survey (MANS) conducted in 2003 to 14.5% in the National Health and Morbidity Survey, 2006 (Khor et al. 2008) Moreover, in 2011 the NHMS reported continuous incremental to 15.4% while the current MANS (Institute for Public Health (IPH) 2014) reported at 18.5%. Meanwhile, it was also found that the abdominal obesity prevalence in NHMS, 2014 is 20.0%

(IPH, 2014), which is higher than 16.8% of NHMS, 2006 (Khor et al., 2008), 18.6% of NHMS (2011). However, it should be noted that in MANS (2003) the waist circumference have not been measured. It is certain that both general and abdominal obesity are the main contributors that lead to numerous of chronic health diseases which include hypertension, coronary heart disease, type 2 diabetes mellitus as well as several categories of cancers. Apart from that, the high accumulation of fat depository was found to cause an increased risk of premature mortality, which consequently affected the quality of life.

Overweight and obesity issues are in an alarming condition and are being considered as global major health issues, that also include Malaysia where the prevalence has been increasing every year. Furthermore, the National Health and Morbidity Survey (NHMS) (Khor et al., 2008) revealed that 5.6 million adult aged 18 years old and above were overweight while 3.3 million were obese in the year 2015. The trend of obesity and overweight can also be seen from 1996 to 2015 as presented in Figure 1.3 which shows that the pattern of the overweight population exceeds the obese population.

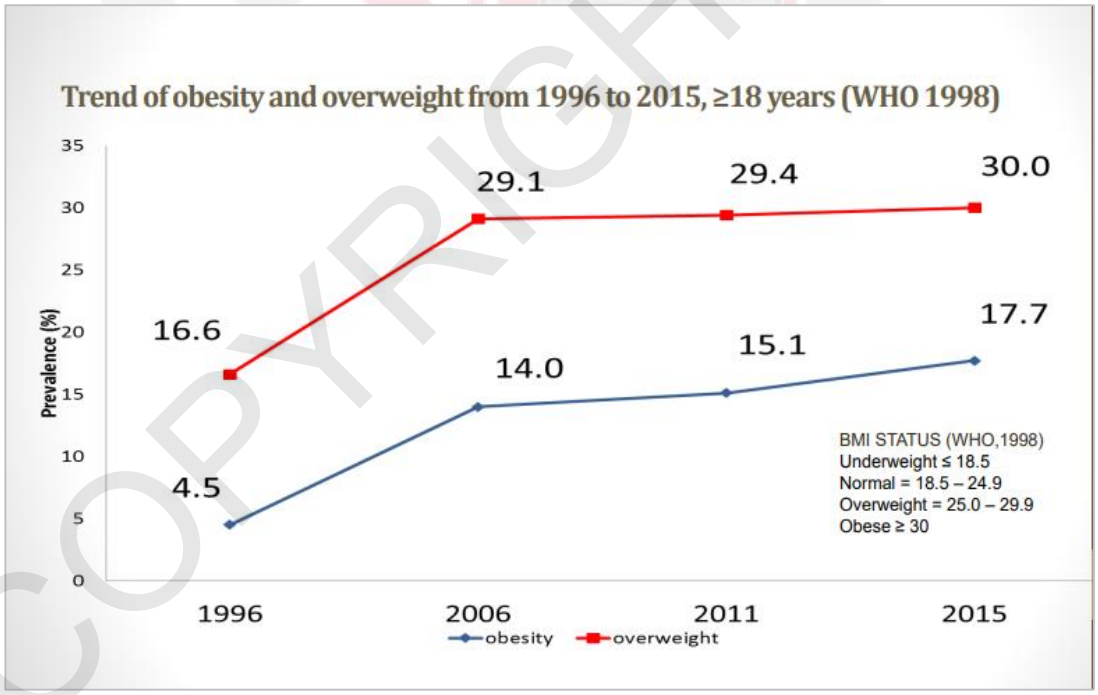

Figure 1.3 : The trend of Obesity and Overweight from 1996 to 2015 ≥ 18 Years
(Source : Muhammad et al., 2017)

Figure 1.4 presents the prevalence of obesity that is shown (circled) to be significantly higher in women at 22.9% compared to men recorded at 14.5%. Meanwhile, the prevalence of abdominal obesity in women is recorded to be high at 31.8% (circled), compared to 28.1% for men in 2011, as presented in Figure 1.5. Additionally, it is critical to highlight the alarmingly growing number from the overweight base percentage towards the expected increase in obesity prevalence in the future. Figure 1.6 shows the national overweight prevalence at 10% higher than the obesity

prevalence with men higher than women. As compared with the national total percentage in obesity prevalence of 14.5%, the prevalence of overweight is at 33.3% (circled) which is 18.8% higher. These numbers strongly indicate that obesity in women continues to increase despite the current weight loss effort. Concerning this matter, there have been numerous strategies which tend to emphasize more on diets and community physical activities such as aerobics and Zumba. Therefore, more future research should be conducted to understand the behavior of obese women towards the current lifestyle strategies by looking into the current emerging issues on sleep behavior that have only attracted very little attention from the scholarly community in Malaysia.

To date, several reports have highlighted several states that were given the critical status of having a high prevalence of obesity in Malaysia. Moreover, the IPH (2014) reported the increase by 0.6% for overweight, 2.6% for obesity, and 2.0% for abdominal obesity compared to the previous findings provided by NHMS in 2011. Presently, it is very crucial to note that Malaysia is higher than the world's prevalence of obesity of 13.0% as recorded in 2014 (WHO, 2014).

The national total prevalence of obesity in Malaysia established by Malaysian Adult Nutrition Survey (MANS) (IPH, 2014), reported an increase of 6.3% since 2003 which was higher in women with the national prevalence at 8.2% since 2014, while the national overweight prevalence among women is 31.4% which is higher than the prevalence of obesity at 22.9%. In addition, these facts also highlight the alarming number of the overweight base, which may lead to higher numbers of obesity prevalence in the future, especially if the current intervention remains the same without assessing the lifestyle issues that have been occurring for many years.

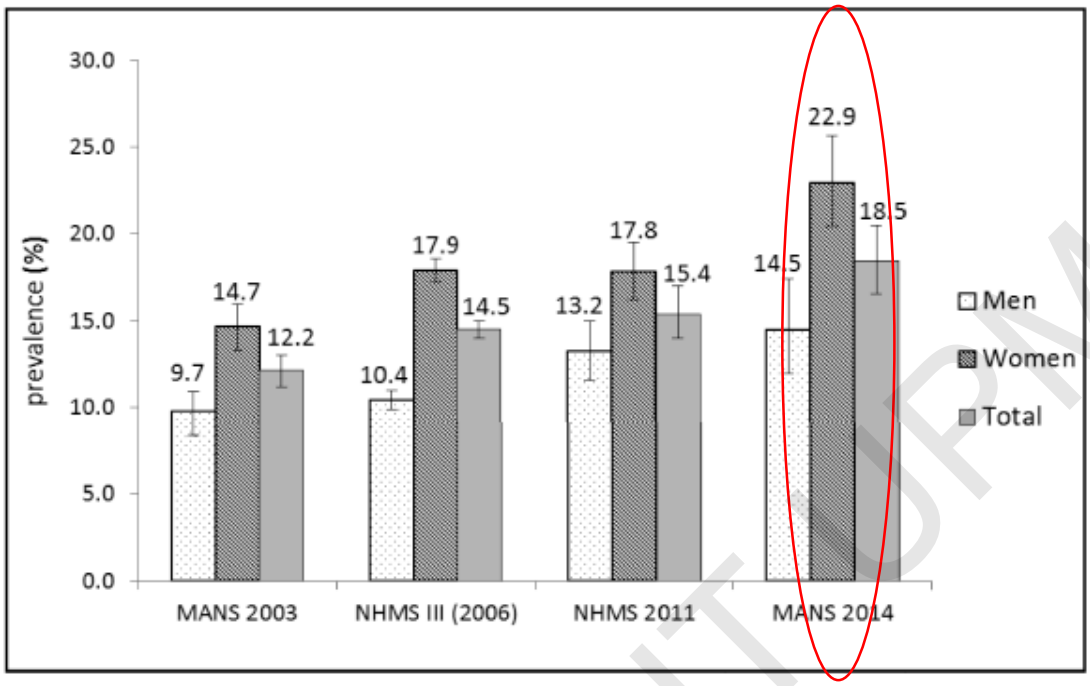

Figure 1.4 : Prevalence of Obesity among Malaysian Adults Aged 18-59 Years by Sex. Obesity (BMI: ≥ 30 kg/m)
(Source : IPH, 2014)

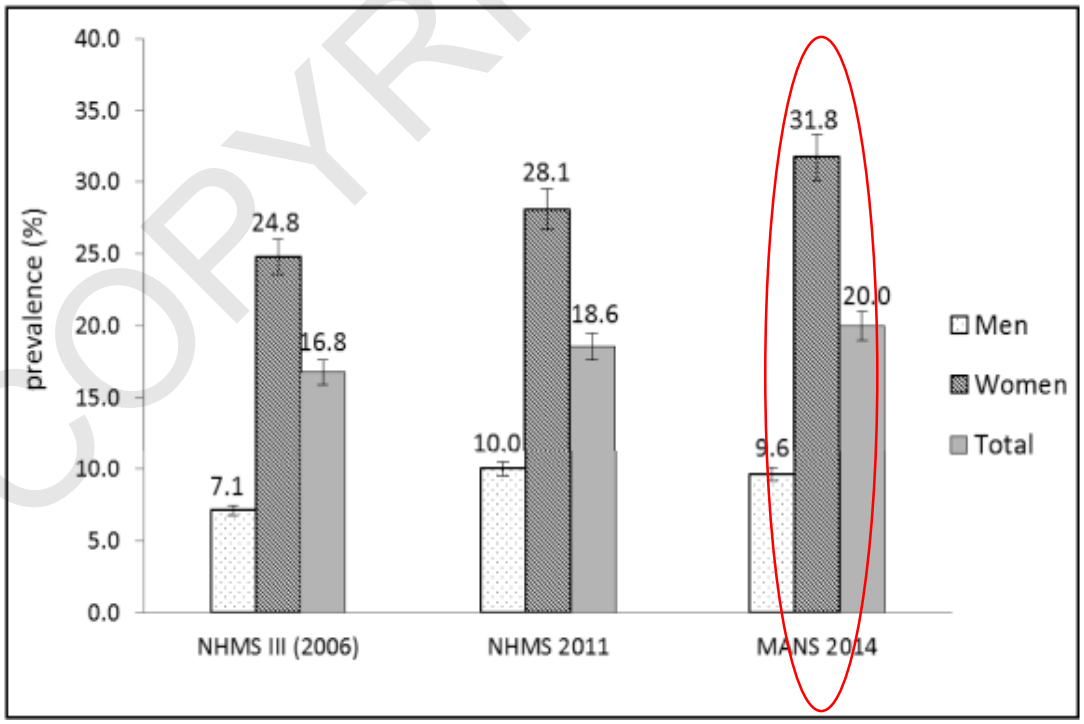

Figure 1.5 : Prevalence of Abdominal Obesity among Malaysian Adults Aged 18-59 Years by Sex (WC WHO 1998: Men 102cm/ Women 88cm)
(Source : IPH, 2014)

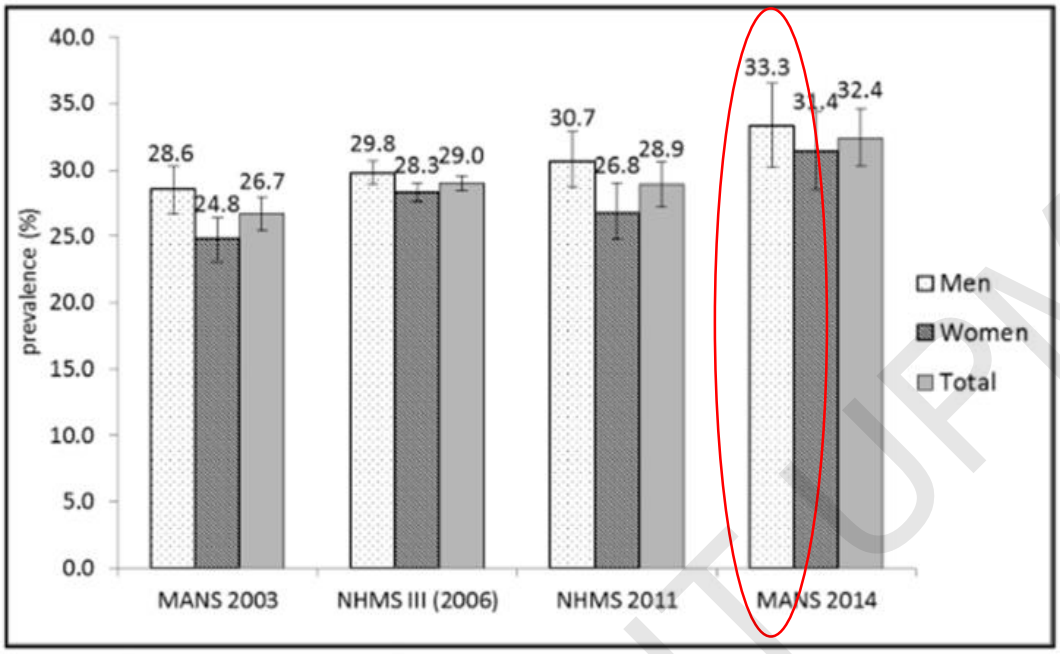

Figure 1.6 : Prevalence of Overweight among Malaysian Adults Aged 18-59 Years by Sex. Obesity (BMI: ≥ 30 kg/m)
(Source : IPH, 2014)

Several adverse health consequences are connected with overweight and obesity, which are linked to an increased risk of multiple NCDs (such as diabetes, stroke coronary heart disease, and cancers) and hypertension. Obstructive sleep apnea and osteoarthritis are among other conditions associated with overweight and obesity (World Health Organization, 2018b). Mohamud et al. (2011) in his study on Malaysian population also emphasized that compared to the Malays and Indians the Chinese have continuously been found to be the least obese due to the differences in physical activity and dietary pattern. Meanwhile, it was found that those with numerous cardiovascular risk factors such as diabetes, hypertension, and dyslipidemia are more possible to be overweight and obese. Therefore, this study is constant with numerous previous studies which demonstrated a strong positive relationship between BMI and the increased rate of diabetes, hypertension, and dyslipidemia.

On a more important note, the healthcare cost is very much burdened by obesity despite the increased prevalence of cardiovascular diseases (CVD) and Type 2 diabetes and some type of cancers due to decreasing quality of life. According to Mohamud et al. (2011), the prevalence of obesity tends to be higher in developing countries with CVD as the leading cause of death. Besides, more than 62% of the populations from these countries are predicted to be diagnosed with diabetes by the year 2030. Adult females were found to be higher in obesity prevalence considering the increase to 17.4% in 2006 from 7.6% in 1996 (Mohamud et al., 2011).

The reports on the prevalence trends based on geographical variations published by the IPH (2014) in Table 1.1 revealed that Negeri Sembilan, Perlis, Melaka, and WP Putrajaya had been the same states that were reported to have a high prevalence of obesity for a few cycles of the survey. Similarly, according to the World Health Organisation (WHO, 1998) classification, the national prevalence of obesity by the IPH (2014) was at 17.7%, which subsequently positioned Melaka as one of the highest state at 21.9% that has high prevalence of obesity following Perlis at 22.6%, Negeri Sembilan 23.5% and WP Putrajaya being the highest at 25.8% as shown in Table 1.1.

On another note, IPH (2014) also stated that the statistics obtained from the previous survey also positioned Melaka as one of the highest states with diabetic and hypertension diseases. Meanwhile, it should be noted that other Non-Communicable Diseases (NCDs) have been showing improvements despite the high number of undiagnosed diabetes and hypercholesterolemia. Nevertheless, the report also highlighted that there was an improvement in the current diabetic prevalence in the state despite being positioned as the highest in diabetic nationally.

Table 1.1 : Prevalence of Obesity among Adult above 18years Base on World Health Organization (WHO) 1998 (BMI: ≥ 30 kg/m)

States	Prevalence (%)
Malaysia	17.7
State	
Johor	18.1
Kedah	20.5
Kelantan	16.2
Melaka	**21.9**
Negeri Sembilan	23.5
Pahang	19.4
Penang	13.8
Perak	17.5
Perlis	22.3
Selangor	18.7
Terengganu	18.6
Sabah & WP Labuan	13.4
Sarawak	18.4
WP Kuala Lumpur	14.9
WP Putrajaya	25.8

(Source : IPH, 2014)

A speech on health activity program by Melaka's formers Chief Minister highlighted that Melaka lifespan is 1.4 years shorter than individuals residing in other states in Malaysia. More specifically, the lifespan of Melaka women was found to be 1.1 years shorter compared to other women living in other parts of Malaysia. Regarding this matter, it is alarming to discover that 50% of deaths in Melaka are related to obesity and overweight which lead to other critical diseases (Rustam, 2011). Moreover, it is

concerning to discover that Malay women are the most affected with critical diseases due to being overweight and obese.

Table 1.2 : Adequate intake of plain water (≥6 glasses) by geographical variations

States	Prevalence (%)
Malaysia	72.9
State	
Johor	73.1
Kedah	71.1
Kelantan	64.2
Melaka	**73.8**
Negeri Sembilan	79.6
Pahang	77.9
Penang	75.9
Perak	79.4
Perlis	75.3
Selangor	70.2
Terengganu	56.9
Sabah & WP Labuan	81.7
Sarawak	67.7
WP Kuala Lumpur	71.1
WP Putrajaya	74.6

(Source : NHMS, 2015)

Though it is not clear on what factors could be the cause of why a small state had been repeatedly reported as one of the highest in the prevalence of obesity the study found that the state was found to have complied on other weight loss factors in terms of water, fruit and vegetable consumptions. Table 1.2 and Table 1.3 of the National Health and Morbidity Survey (NHMS 2015) showed that the prevalence on water, fruit, and vegetable consumption or the states is one of the highest compared to other states. While the NHMS 2015 reports on dietary practice were focusing on the consumption of water, fruit, and vegetables which can be observed by each states, Malaysian Adults Nutrition Survey (MANS 2015) reports on food consumption statistics is available in total population and not by state.

Nevertheless, the comparison of food consumption based on Top 10 highest prevalence food items in Table 1.4 showed that the prevalence among Malay women were higher compared to other ethnic especially on high carbohydrate foods which are also high energy-dense food including white rice (99.38%), flavoured rice (83.57%), bread (83.18%), chicken (94.51%), local 'kuih' (87.6), cream crackers (68.51%) and sugar (84.85%). According to Lim (2016), Malay women recorded a significantly higher energy intake than other ethnic groups. As a whole, the above statistics have led towards the reason for selecting the Malay women in Melaka in this study,

considering its position as one of the highest states in obesity prevalence. In addition, the statistic on the food consumption pattern also supports the selections of Malay women due to their high consumption of high energy-dense food which was seen to be one of the major contributors towards weight gain if the energy consumed is not being used through physical activities. Additionally, the state was also reported to be the lowest prevalence in physical activity. Therefore, the study serves to measure if food consumption pattern and sleep behavior could be among the contributor.

Table 1.3 : Adequate Intake of Fruits and Vegetables (≥ 3 servings) by Geographical Variations

States	Prevalence (%)
Malaysia	11.2
Johor	8.2
Kedah	0.6
Kelantan	1.5
Melaka	**16.1**
Negeri Sembilan	4.4
Pahang	8.7
Penang	10.1
Perak	2.3
Perlis	3.0
Selangor	2.9
Terengganu	2.4
Sabah & WP Labuan	9.1
Sarawak	12.8
WP Kuala Lumpur	2.9
WP Putrajaya	4.4

(Source : NHMS 2015)

Table 1.4.Top 10 Food Consumption Statistic comparison by Ethnic among Female Populations in Urban Peninsular

No	Food Item	Prevalence (%)					
		Total	Malay	Chinese	Indian	Others	Other Bumiputra
1	White Rice	98.2	99.38	95.60	95.07	98.91	99.73
2	Flavoured Rice	76.9	83.57	54.66	62.40	66.95	63.94
3	Rice vermicelli/ Rice noodle/ Loh Shi Fun	83.1	80.40	84.87	78.68	62.48	62.11
4	Bread	80.6	83.18	68.77	80.31	69.20	75.51
5	Chicken	93.7	94.51	94.02	91.99	96.50	95.23
6	Marine Fish	95.1	95.83	88.08	93.98	90.37	92.94
7	Chicken Egg	94.7	95.32	97.13	92.58	93.35	93.89
8	Local Kuih	82.6	87.6	58.19	82.83	70.24	83.53
9	Cream Crackers	72.2	68.51	52.45	74.29	58.69	69.55
10	Sugar	75.9	84.85	50.35	85.25	65.51	69.92

(Source: MANS, 2014)

On another note, it has been known that obesity is best considered not just as a state of excess of body fat or body mass index above an arbitrary cut-off, but as the disease process, of excess body fat accumulation that has interacting (epi-) genetic and environmental causes and multiple pathological consequences (Intercollegiate & Network, 2010). A study also found that although obesity tracks in families and has relatively high heritability, thorough searches for genetic factors have been unfruitful, yet environmental drivers may be increased by epigenetic changes. The study also found that 20-30% of entire populations have become obese in only 50 years the dominant cause of the current obesity epidemic lies in environmental factors (J. Elder, 2012)

The current global scenario has demonstrated an increase in physical inactivity as well as the consumption of energy-dense foods that are high in fat. Recent evidence also suggests that sedentary lifestyle, increased consumption of energy, and reduced intake of high-fiber foods are among the main driving forces that promote the increase in the prevalence of obesity (Qi & Cho, 2008) In addition, it is also crucial to understand the environmental and societal changes are often the cause that influenced the changes in dietary and physical activity patterns which are associated with the development as well as the absence of supportive policies in most sectors. These include health, environment, transport, distribution, food processing, marketing, and education.

Many believed that physical exercise is essential or sufficient for weight loss nevertheless, physical exercise although has a small benefit on weight loss when combined with an energy-restricted food plan (Foster-Schubert et al., 2012), few studies found that neither aerobic nor resistance exercise in typical amounts are effective as a sole strategy (Thorogood et al., 2011; Willis et al., 2012) Recognising

additional weight loss factor that lies in the environment factor involving towards lifestyle behavior change, may lead towards more strategic plan in managing obesity.

Short sleep duration and poor sleep quality are considered as a newly discovered risk that promotes obesity development based on the emerging evidence from epidemiological and laboratory studies (Beccuti & Pannain, 2011). Concerning this matter, it is important that there are various accumulating pieces of evidence on how short sleep duration has been proven as a factor that leads to obesity as well as how it is associated to both obesity and weight gain (Chaput & Tremblay, 2012a).

The suggestion of positioning sleep behavior as weight loss factor in the study is to identify if sleep could be one of the behaviors that contribute to the obese population, considering that sleep problems were also found to be associated to high dense energy intake. The link between sleep and obesity has been acknowledged by a growing body of literature.

Chaput, (2011) highlighted the fact that a great deal of effort has been focused on interventions to address most of the health-related behaviors which causing critical health disease including obesity, interventions aimed at sleep behaviors often have been notably absent. Evidence that short sleep duration is a determinant of obesity is accumulating and has shown that short sleep duration is associated with obesity and weight gain (Chaput & Tremblay, 2012). The increase in food consumption, poor quality diet, and overweight are found to be associated with the lack of sleep duration, poor sleep quality, and a late bedtime. Prior to these, it was also found that the increase in daily meals consumption, number of meals intake daily, snacking, and influence of high energy-dense foods are all associated with lack of sleep (Chaput, 2014).

Accordingly, a compiled statistic has reported that based on a number of studies looking at the association between sleep deficiency and obesity, lack of sleep was seen to have an impact mainly on the increase in the number of patients with sleep apnea. Sleep apnea was also seen to be a serious issue causing 18 million Americans with sleep apnea, which is even thought to be connected to obesity (The Good Body, 2018). Statistics also show that sleep deficiency attributed up to 13% of the total percentage of obesity in children. While the attribution of short sleep to obesity among adult is up to 5%. It was also found that obese women were three times more possible to have been diagnosed with a sleep disorder than women who were not overweight or obese (11.4% versus 3.8%, respectively). Besides, in a recent survey in all 50 states among of 444,306 Americans led by the Centers for Disease Control and Prevention (CDC) found that 35% of the participants sleep less 7 hours per night. The recommended sleep durations by the CDC for adults aged 18 to 60 were at least hours per night. (Liu et al., 2016) Sleep deprivation according to recent statistics has also caused to economic loses to some countries including the US at $411 billion annually which is equivalent to whole world loses to cyber-crime each year (Hafner, Stepanek, Taylor, Troxel, & Stolk, 2017)

In addition, Chaput (2011) highlighted the fact that numerous efforts have been taken to address most of the health-related behaviors that lead to critical health disease including obesity; however, the intervention targeted on sleep behavior has been absent most of the time. Though some researchers have highlighted the relationship between sleep and obesity, much of the intervention strategies in managing obesity in Malaysia have focused on physical activity and diet without looking on the current emerging issue on obesity-sleep related. The study also agreed that the obesity epidemic is in line with the trend of reduced sleep duration. Nevertheless, the survey of obesity-sleep related in Malaysia is still lacking, and currently, there is no sufficient statistical data or survey on sleep behavior. Public awareness and activities were also seen to remain to promote the same strategies and these calls to position healthy sleep behavior due to its emerging global epidemic. As such, it is important to introduce healthy sleep behavior as multi-component strategies in combating obesity by studying their behaviors towards acceptance of new behavior changes in order to lose weight.

The treatment of obesity has attracted considerable attention and has been widely investigated in many studies. However, the issues of obesity are unable to be solved with the development of new procedures and drugs. A good understanding of the root cause of obesity and any barriers in managing the issues is important as successful weight management is complicated. Thus, positioning healthy sleep as weight loss factor in this study is to support the novel findings on how sleep might be an important factor in successful weight loss. There is accumulating evidence that promotes sleep as a proven weight loss solution. Though it may not be the solution for everyone who is struggling to lose weight, positioning sleep as one of weight loss factor may help to improvise on the current strategy in Malaysia. Therefore sleep should not be overlooked when prescribing a weight-reduction program in managing obesity.

There are many pieces of evidence on how sleep quality could be the influence of a successful weight loss intervention. A study among 245 women in a 6-month weight-loss program that sleep quality increased the likelihood of successful weight loss by 33%, for those who slept more than 7 hours per night (Thomson et al., 2012) Another study among participants who were randomly assigned to sleep either 5.5 hours or 8.5 hours every night for 14 days showed a cut on daily calorie intake by 680 calories and slept in a lab. While those who slept for 5.5 hours were found to lose 55 % less body fat, and 60 % more of their lean body mass compared to those who slept for longer hours, other studies by (Chaput & Tremblay, 2012b) have also yielded similar results of fat loss among 123 adults who were overweight or obese and undergoing moderate caloric restriction under 17 weeks supervision by a dietician. The study found that both total sleep time and sleep quality at baseline predicted loss of fat mass.

The development of obesity was also seen across age, particularly among women. The overall overweight and obesity by age categories in Malaysia from 1996 to 2015 as shown in Figure 1.7 showed that the prevalence increased double to a peak in middle age. According to Lim (2016), the peak age for obesity was those between 40-49 earlier in the NHMS 1996, and the peak moved to the age of 50-54 in NHMS 2011

that leads to moving to 55-59 in NHMS 2015. Hence, it shows that those who were born from 1952 to 1957 carried the peak of obesity with them as they aged indicating that the current obesity intervention needs to be improved considering the current emerging trends.

In the study perspective, the association of age and obesity among mid-age women were seen to increase with substantial weight gain and high incidence of overweight/obesity (Alljadani, Patterson, Sibbritt, & Collins, 2014) Aging is associated with an increase in abdominal obesity, a major contributor to insulin resistance and the metabolic syndrome (Jura & Kozak, 2016) while BMI has been found to be related with peri-menopausal symptoms. A study among women aged between 30 and 75 years comprising of 169 premenopausal and 147 postmenopausal women in Southern India found that menopausal transition brings about irregularities in total body composition characterized by an increased body fat mass and central adiposity. This creates a compatible atmosphere for irregular metabolism and worsens cardio-metabolic risk factors. Thus, menopausal status and associated obesity is the major predictor of metabolic abnormalities over age in menopausal women (Dasgupta et al., 2012)

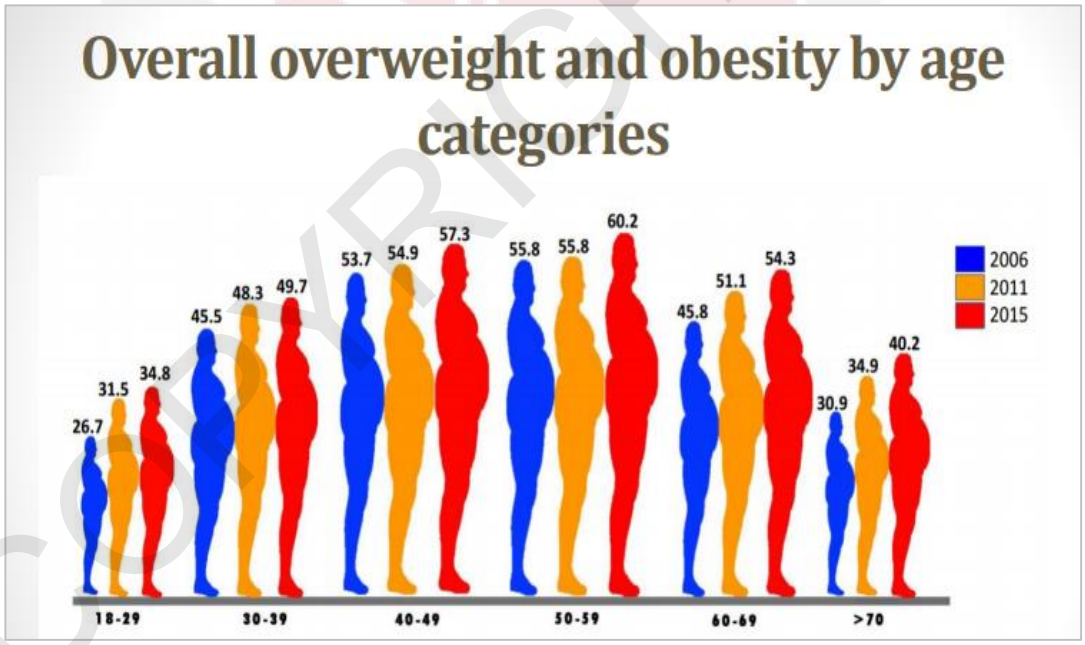

Figure 1.7 : Overall Overweight and Obesity by Age Categories in Malaysia from 1996 to 2015
(Sources : Muhammad et al., 2017)

In addition, few studies have provided in detail on sleep disturbances issues and the related risk which are common during female mid-life. A study in 11 Latin American countries conducted among 6079 women aged 40-59 found that 56.6% of women were identified from either insomnia, poor sleep quality, insomnia or both were 43.6% presented insomnia while 46.2% poor sleep quality. A study on the association of age

and obesity among women also showed that insomnia prevalence among women was seen to increase at the age of 40-44years by 39.7% and 45.2% with those aged 44-59 years. Insomnia as one of the leading sleep issues was also seen among those aged 40-44years in premenopausal stage to 46.3% in late postmenopausal ones. Thus, the study also found that insomnia and poor sleep quality were highly prevalent in the mid-aged female participants in which the influence of age and the menopause was only modest and rather associated to menopausal symptoms seems to occur since the pre-menopause stage. In these findings, it was also found that Awakening during the night" seems to happen at all menopausal phases. Age and menopause status seems to also worsen quality in sleep, impairment particularly affecting sleep efficiency and latency and the increased use of hypnotics. Vasomotor symptoms (VMS), depressive mood and anxiety were associated with sleep disturbances. (Blümel et al., 2012)

Since the association of age and obesity among women occurs mostly during mid-age which is associated with substantial weight gain and high incidence of overweight/obesity, Alljadani, Patterson, Sibbritt and Collins (2014) suggest that public health interventions are needed to help prevent weight gain at this life stage. In needs towards developing strategies in managing obesity and overweight which were seen to affect mostly among mid-age women, the study suggests to position healthy sleep in the form of knowledge program to educate on the importance of quality in sleep along with the progression of age. Therefore, in positioning Healthy Sleep Awareness, the measuring of intention to practice healthy sleep behavior in managing their weight and sleep issues needs to be a plan in a structured program. Measuring age in this study is to determine the influence of age on the TPB determinants towards intention to practice healthy sleep behavior for weight loss.

Apparently, based on the drawn up of Clinical Guideline for the Management of Obesity published by the Ministry of Health, the Academy of Medicine and several specialist medical societies under the chairmanship of Ikram SI in 2004 (Clinical Practice Guidelines on Management of Obesity, 2004) that includes defining the problem and strategies for weight loss, the outlined therapy only include dietary as well as physical therapy. Additionally is the discussion on the role of pharmacotherapy and surgery. In the context of the present study, it was identified that measuring intention towards practicing sleep behavior as part of weight loss strategy has not been outlined and need to be positioned in educating the community not only to those who are exposed to risk. The knowledge in managing obesity through healthy sleep behavior needs to be instilled as multi-component strategies.

The introduction of healthy sleep awareness (HSA) that induces the element of knowledge-based in a one-time approach acts as a preliminary stage in measuring the intention of new behavioral change. More importantly, this may be a good indicator to evaluate the acceptance of new behavior change in combating obesity. Nevertheless, measuring the intention to practice healthy sleep behavior would be a good start to promote the new health behavior changes due to the emerging issues of obesity sleep-related that have not been widely discussed in Malaysia. This would not only be beneficial in terms of weight loss effort but it will also improve their total

health. The intention to practice healthy sleep behavior can be measured based on the willingness of the respondents to practice the behaviors for the purpose of losing weight after they are made aware of the benefit of healthy sleep to weight loss through the healthy sleep awareness (HSA). Therefore, it is important to introduce healthy sleep behavior as multi-component strategies in combating obesity by studying their behaviors towards the acceptance of new behavior change for weight loss.

Managing obesity should not just rely on medication and some surgery procedures especially due to the increase in weight loss treatment available in the market. Instead of the mainstay that could lead to sustainable weight, the reduction is through behavioral modification with the support of knowledge. Nevertheless, measuring the intention towards the new weight loss behavior may have some challenges as it is new to the populations. Intention to practice new behavior needs to be supported by clarity and consistency in providing new knowledge that can relate the logic of how healthy sleep could aid to weight loss. Moreover, the expectation of behavior changes may not be expected to occur in a short time frame considering that instilling new behavior needs to be treated in a more structured program.

Chang (2007), in a study among 271 native Sarawakians living in villages who were overweight or obese, found that only 60.5% out of 76.8% overweight/obese population were not even thinking of behavior change towards weight loss. However, 20.7% of the population was considering change within the next six months while remaining 18.9% were in either the intention to take action within 30 days, in the stage of overt modification of the behavior of fewer than six months duration or behavior change longer than six months. Similarly, in a study, Chang (2007) also found that a higher level of education was the only factor that correlated with a higher level of preparedness towards behavioral change. While Ang et al. (2013) in a survey among 377 university staff across the spectrum of weight distribution, done as a baseline for behavior intervention, found that 50.7% were in the preparation stage, 30.0% were either in the action or maintenance stage of change, 14.5% were in the contemplation stage and only 5.0% were in pre-contemplation. These studies indicate that behavior change towards action was mostly influenced through knowledge-based across education level which requires consistent awareness which can be plan in a more structured intervention program.

Additionally, the existence of awareness on the current sleep behavior of the nation is still lacking, and currently, there is no available data which can be used to diagnose the current sleep behavior. The only data on lifestyle behavior available in the NHMS and MANS statistic are only on tobacco use, alcohol consumptions, physical activities, and dietary/nutritional practices which imply the lack of empirical study on current sleep practices. Thus measuring the intention towards practicing healthy sleep would aid in providing preliminary data or guide on new lifestyles measurement in the health survey. The success of TPB application is in providing evidence to support that factors in TPB were all factors to predict the intention to act in a behavior (Armitage & Conner, 2001). Therefore, relating the constructs of the TPB to healthy sleep behavior that linked to obesity which is modifiable through the consistent knowledge-based

program was seen to be able to explore the level of acceptance and knowledge on the importance of sleep health.

1.2 Problem Statement

The prevalence of obesity tends to be higher in developing countries with CVD as the leading cause of death. Besides, more than 62% of the populations from these countries were predicted to be diagnosed with diabetes by the year 2030. (Mohamud et al., 2011)

According to IPH (2014), the national prevalence of obesity by the IPH (2014) was at 17.7%, which subsequently positioned Melaka as one of the highest states at 21.9%. On another note, IPH (2014) also stated that the statistics obtained from the previous survey also positioned Melaka as one of the highest states with diabetic and hypertension diseases. While the state was seen high in the prevalence of other weight loss factor such water consumption, fruit, and vegetable, facilitating to understand factors that caused weight gain among obese Malay women in Melaka beyond the current factors will likely benefit from improving the current strategies in managing obesity. These will also contribute as a preliminary awareness of the similarity of food consumption pattern and sleep behavior of the obese population.

In the perspective of the current study, women are given the priority and identified as a means through which important behavior changes related to the reduction of childhood and adolescent obesity could be addressed. Obesity carries a unique disease burden on women and is influenced by a variety of biological, hormonal, environmental, and cultural factors. Reproductive transitions, such as pregnancy and menopause, increase the risk for obesity (Azarbad & Gonder-Frederick, 2010) The association of age and obesity among mid-age women were seen to increase with substantial weight gain and high incidence of overweight/obesity (Alljadani, Patterson, Sibbritt, & Collins, 2014) In addition it should be understood that children's early experiences with food and eating that influence the development of their genes and environments are shaped by the parents. Furthermore, children's eating patterns are commonly developed in the early social interactions surrounding feeding (Savage, Fisher and Birch, 2007). Thus, educating obese women who may have similar influence on their current food consumption pattern and sleep behavior may cascade down to practice the knowledge gained towards a healthy lifestyle. In which were considered modifiable, prevalent and relevant among women due to their biological influence as they age.

Therefore, positioning healthy sleep that emphasized on sleep quality according to Chaput and Tremblay (2012) observation was associated with greater fat mass loss. The study also suggested that sleeping habits can influence the success of a weight-loss intervention and should be taken into consideration when one decides to start a diet. In particular, towards improving the current issues through healthy sleep behavior, the awareness of healthy sleep behavior to weight loss needs to be delivered

with the aim of measuring intention towards practice. Nevertheless, the increasing prevalence of obesity despite the current strategies needs to improvise and consider healthy sleep as one of the strategies as sleep has been an emerging issue in obesity yet it has been absent in Malaysia. On an important note, currently there is no available data which can be used to diagnose the current sleep behavior. The only data on lifestyle behavior available currently are only on tobacco use, alcohol consumptions, physical activities and dietary/nutritional practices which implies the lack of empirical study on current sleep practices. Hence, it is merely unreasonable why sleep survey has not been listed as part of the lifestyle survey in the national morbidity survey in Malaysia which has been held every four years.

1.3 Research Questions

The main purpose of the study is to answer the main question, "Do the obese women in the state of Melaka have the intention to practice healthy sleep behavior in order to lose weight after being informed on how healthy sleep could aid to their weight loss effort during the awareness? Accordingly, four specific research questions expected to be answered by the present study are described as follows:

a. What were the current food consumption pattern and sleep behavior of Malay obese women in Melaka?
b. What was the obese Malay women's prediction (attitude, subject norms, perceived behavioral control) towards the intention to practice healthy sleep behavior (IPHS) in order to lose weight?
c. Is there a direct influence of Healthy Sleep Awareness (HSA) on obese Malay women's prediction towards the intention to practice healthy sleep behavior for weight loss?
d. Is there a positive moderating effect of Healthy Sleep Awareness (HSA) on the TPB Constructs towards the intention to practice healthy sleep behavior (IPHS) for weight loss?
e. Is there a positive moderating effect of age (AGE) on the predictors in regard towards the intention to practice healthy sleep behavior for weight loss?

1.4 Research Objectives

The general objective of the present study is to examine the current food consumption pattern and the intention to practice healthy sleep behavior of Malay obese women in the state of Melaka. Therefore, the specific objectives of the study are;

a. To evaluate the current food consumption pattern and sleep behavior of Malay obese women in Melaka.
b. To measure the influence of the determinants of Theory of Planned Behavior (TPB) on the intention to practice healthy sleep behavior (IPHS) for weight loss.

c. To examine the direct effect of Healthy Sleep Awareness (HSA) on TPB determinants.
d. To determine the moderating effect of (i) Healthy Sleep Awareness (HSA) and (ii) age (AGE) between the TPB determinants in regard to the intention to practice healthy sleep behavior (IPHS) in order to lose weight.

1.5 Significance of the Study

a. Contribution to the food management field

Population-based food consumption survey among obese women in the study is crucial in establishing a preliminary database of the current food consumption pattern and sleep practices of the population While managing the change of behavior towards practicing healthy sleep behavior is new to the population and may take some time to increase high awareness on its association to obesity, the study would contribute in emphasizing on the important needs of nutrient-dense foods, limitation of portions of energy-dense foods, and reduce the overall energy density food as part of the development of a healthy and productive society. Such information is vital for the government in formulating public policies, risk management measures, and education strategies to ensure food safety. On the more important note is to instill an ethical and responsible food management culture as part of the development towards productive and healthy society that helps people make healthier food choices.

b. Contribution to the Current Strategies

The study on the association of sleep behavior and obesity is widely known as an emerging issue which has been discussed globally but is still understudied in Malaysia. The findings on the behavior associated with the obese population could be significant to improve the intervention strategies on obesity as well as the Non-Communicable Diseases (NCD) risk. The current research aims to provide new insight into positioning healthy sleep behavior as one of the weight-loss behaviors that are part of the multi-component strategies in managing obesity among women.

c. Contribution to Health Bodies

The original contribution of the present study will benefit the government agencies that will aid them to create or revise the strategies and policies based on the results obtained from this research. Next, practitioners and health experts may even decide to change the current obesity awareness by emphasizing education and knowledge through a strategic awareness plan. The study will benefit the current obese and overweight population by equipping them with new knowledge on the importance of sleep to improve their weight loss effort. Finally, the information collected is intended to expand the existing body of knowledge about obesity and strategized educational intervention program. In this case, the role of women in managing obesity is explored by understanding their prediction towards healthy sleep behavior based on the theory.

In the present study, positioning healthy sleep behavior as weight loss behavior is considered new to the population.

1.6 Operational Definitions

The followings are the definitions that are important in the scope and focus of the present study:

a. Obesity

Obesity is defined as abnormal or excessive fat accumulation that may affect health. WHO defines obesity as a body mass index (BMI) that is greater than or equal to 30.0. Therefore, the measurement of obesity in the present study will be based on the World Health Definition (WHO) at ≥ 30.0 on general obesity instead of abdominal obesity.

b. Body Mass Index (BMI)

Body mass index (BMI) is a simple index of weight to height ratio, which is normally used to categorize overweight and obesity in adults. For analysis, the BMI is measured based on the classification of the World Health Organization (1998). The World Health Organization (1998) classified body mass Index (BMI) into six categories as follows: underweight (<18.5 kg/m2), normal (18.5-24.99 kg/m2), overweight (25.0-29.99 kg/m2), obese I (30.34-34.99 kg/m2), obese II (35.39-39.99), and obese III (>40 kg/m2).

c. Adults

Adults in the present study refer to Malay women aged between 18 and 55 years old.

d. Healthy Sleep behavior or also known as sleep health.

Healthy sleep behavior or known as Sleep health is defined as the multi-dimensional sleeping pattern and wakefulness, altered to an individual, environmental and social demand which supports physical as well as mental well-being (Buysse, 2014). The characteristic of good healthy sleep is characterized by the feeling of satisfaction, sufficient duration, the right timing, high productivity, and constant alertness during wake hours.

Sleep behavior in the present study refers to the sleeping pattern that affects sleep quality which includes inadequate sleep, sleep loss, sleep deprivation and other related sleep issues including insomnia and apnea. It will measure the time in bed as early as 10:00 pm, sleep duration between 7 and 9 hours, and the dark environment to sleep. Meanwhile, sleeping in a dark environment is defined as sleeping in total darkness with no artificial lights in order to avoid the impact of blue lights suppressing the

melatonin hormones. More discussion will be elaborated in Chapter 2. Hence, the measurements of sleep in the present study will enable the quality of sleep based on the three factors to be examined.

e. Healthy Sleep Awareness (HSA)

Healthy Sleep Awareness is a health awareness knowledge-based attempt to encourage health awareness among the public by creating new health interventions that is accessible through media and within the community. The purpose of Healthy Sleep Awareness (HSA) in the present study is to measure the direct impact on the predictors including the effect of HSA as a moderator between the relationship of the predictors and the intention to practice. Apart from that, the purpose of the program is to promote healthy sleep behavior which emphasizes sleep quality based on three factors, namely sleep duration of 7 to 9 hours, early time in bed (TIB) by 10:00 pm, and sleep in a dark environment. Health awareness is frequently used by organizers in the form of education, along with the opportunity to participate further as a means of behavior maintenance or sustainability.

f. Physical activities

Physical activity, based on the definition by the World Health Organization (WHO) is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activities in this study were aimed at activities which are actively conducted in the states such as aerobics, brisk walk, and Zumba.

g. Age

In the current research, age will measured as a moderator variable on the relationship between predictors and the intention to practice healthy sleep behavior for weight loss.

h. Behavioral intentions

The behavioral intention is an indication of a person's willingness to practice an agreed behavior which is presumed as the immediate antecedent of behavior (Ajzen, 1991). Attitude towards the behavior, subjective norm and perception of behavioral control were established towards the development of behavioral intention. Moreover, these constructs and an individual's intention to practice were found to have a direct association towards the behavior. Behavioral Intentions about Sleep Behavior- In the present study, the construct of behavioral intention about practicing healthy sleep behavior has been defined as the likelihood that the obese women will sleep as early as 10:00 pm daily in a dark environment for at least 5 days per week for duration of 7 to 9 hours per day.

i. Attitudes (ATT)

The construct of ATT, as suggested by Ajzen (1991) is an individual overall assessment of behavior. It consists of constituents that are dependent on each other which are behavioral beliefs and outcome evaluations. Behavioral beliefs are the beliefs on the effects of the behavior, while outcome evaluations are described as the conforming opinion of positive or negative for each of the behaviors.

Attitudes towards Healthy Sleep Behavior - Attitudes about healthy sleep behavior is defined as the obese women beliefs about the consequences of sleeping as early as 10:00 pm daily at least 5 days per week in a dark environment for a duration of 7 to 9 hours per day.

j. Subjective norm (SNM)

Ajzen (1991) suggested that SNM is a construct that measures the social pressure accessed by that individual in evaluating his or her own decision in practicing the behavior. The components in SNM are about the interactions of normative beliefs as well as motivation to comply. Normative belief is the beliefs of individuals who are important or close to a person would want them to act or behave. In the meantime, an individual's willingness to follow to those beliefs is known as motivation to comply. Subjective Norms towards Healthy Sleep Behavior is defined as the beliefs possessed by obese women about how others would like them to behave, particularly in relation to sleep early by 10:00 pm at least 5 days a week, in a dark environment for a duration of 7-9 hours per day as well as the importance that is placed on that belief.

k. Perceived behavioral control (PBC)

Ajzen (1991) highlighted that the PBC is the degree of feeling of an individual on his or her capability to enact a behavior comprised of control beliefs as well as the influence of control beliefs. Control beliefs refer to how much control a person has over the behavior, while the level of confident felt about practicing the behavior will determine the influence on control beliefs. Perceived Behavioral Control towards Healthy Sleep Behavior is defined as the degree to which the obese women felt they are capable of sleeping as early by 10:00 pm daily for at least 5 days per week in a dark ambiance for 7-9 hours per day.

1.7 Scope of the Study

The present study aims to address the emerging issues by conducting further investigation on the intention towards healthy sleep behavior as one of the weight loss factors among obese women based on the notion that they are commonly affected by the issues of sleep and obesity. Prior to that, the current food consumption pattern and sleep behavior of the obese respondents that may relate to their obese BMI were also examined. The measurements of intention to practice healthy sleep behavior in

positioning healthy sleep as weight loss factor through an awareness program will be carried as a preliminary stage in promoting healthy sleep for weight loss. A one-time awareness program will be conducted among 400 obese Malay women in the state of Malacca in measuring intention and not towards behavior change. Identifying the association of food consumption pattern and sleep behavior of the obese respondents is important in positioning healthy sleep behavior as new weight loss factor as well in food safety risk assessment to determine if the public is exposed to any potential dietary risks such as those from high dense energy food and food additives, and also to understand the size of the risk and which population groups may be most at risk.

1.8 Organisation of the Thesis

This thesis shows the realistic on the needs of positioning sleep behavior as one of the weight-loss strategies in managing obesity among women. As such, the organization of this thesis is as follows. In Chapter 1, as the prevalence of obesity in Malaysia was seen to be increasing despite the current strategy, the emerging issues of sleep associated with obesity need to be in place as part of the strategy in managing obesity in Malaysia. Hence, the state of Melaka was selected as the location of the study as it has been consistently high in obesity prevalence. This is to measure the association between food consumption pattern and sleep behavior of the respondents. Chapter 2 discussed the consequences of obesity among women and how sleep was seen to be one of the contributors. The association between sleep towards high energy-dense food were also explained in study. The explanation on how sleep can be seen as weight loss factor was explained in this chapter that leads to the three measurements factor as healthy sleep. The last section in Chapter 2 is focusing on reviewing other related models that lead to the development of conceptual framework of the study.

Chapter 3 explained the research design, the sampling process and the conceptual framework that lead to the presentation of the hypothesis and development of the questionnaire. Data collection procedures and analysis were also explained in this chapter. In Chapter 4, the study extends to the analysis of the study from a point-to-point analysis using the PLS-SEM analysis that leads to the presentation of the results of the study. Both analyses for structural and measurement models were conducted and the discussions for each result were explained based on objective of the study. Chapter 5 summarized the major findings of the study and recommendations based on each finding. The limitations and significant contributions of the study were also discussed that leads to the conclusions of the study.

1.9 Summary

This chapter gave a brief introduction to the prevalence of overweight and obesity throughout the world, specifically among women in Malaysia and the state of Melaka being one of the highest in obesity prevalence. The statement of the problem indicated the need for this study and established the relevant research questions and objectives, as well as the significance of the study to public health, health promotion, and health education was established to prepare readers for the upcoming background information in Chapter 2. Operational definitions were written for a better understanding of the terminology used throughout the study.

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