UNIVERSITI PUTRA MALAYSIA

PREVALENCE OF OBESITY AND ITS RELATED FACTORS AMONG MALAY GOVERNMENT EMPLOYEES IN KANGAR, MALAYSIA

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By

ZAHRATUL NUR BINTI KALMI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Master of Science

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Master of Science

PREVALENCE OF OBESITY AND ITS RELATED FACTORS AMONG MALAY GOVERNMENT EMPLOYEES IN KANGAR, MALAYSIA

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ZAHRATUL NUR BINTI KALMI

April 2012

Chair: Hazizi Bin Abu Saad, PhD

Faculty: Faculty of Medicine and Health Sciences

This is a cross-sectional study involving 272 randomly selected respondents (151 males and 121 females) from government agencies in Kangar, Perlis. Main objective of this study was to determine factors related to body weight status among government employees in Kangar Perlis. The data were collected by using self-administered questionnaires which have been translated to Bahasa Malaysia. Anthropometric measurements including weight, body fat percentage (BF%), height, waist circumference (WC) and blood pressure were assessed using Tanita body composition analyzer (Tanita TBF-306, Body Composition Analyzer, Japan), Body Meter (SECA 206, Body Meter, Germany), non-stretchable tape measure and digital blood pressure monitor (Omron HEM-780, Digital Blood Pressure Monitor, Japan). A 8-12 hour fasting venous blood sample was taken for analysis of plasma glucose, lipid profile and 2 hours oral glucose tolerance test (OGTT). All respondents were required to wear an accelerometer (Lifecorder e-Step, Suzuken Company Limited, Japan) for 3 days for physical activity level (PAL) assessment.

There were more respondents with overweight body mass index (BMI) status (37.5%) than normal BMI (34.9%) and among overweight respondents, there were more male (42.4%) than female respondents (31.4%). For PAL, most of the respondents were categorized under moderate level of PA (47.7% of male and 66.9% of female) by using IPAQ, and only 22.1% and 21.7% were categorized in low and high level PA. For accelerometer-determined of PAL, most of the respondents were classified as sedentary (55.1%) and only 8.0% were classified under vigorous PAL. On the other hand, when steps per day were used as PAL measure, most of the respondents (62.1%) were classified as inactive and there were only 15.4% and 7.7% of the respondents were categorized into sedentary and active level. For fasting plasma glucose level, there were more male respondents categorized as having impaired fasting plasma glucose and required provisional diagnosis compared to female respondents (18.0% and 10.7%). There were 14.8% having impaired 2Hr plasma glucose and needed provisional diagnosis. In term of total cholesterol, triglyceride and LDLC level, although most of the respondents were categorized as having normal level, more male respondents were categorized in high level (23.8%, 29.5% and 39.3%) compared to female respondents (12.6%, 5.8% and 18.4%). For HDLC level, there were only 2.2% of the respondents with high level HDLC which was good for health. Most of the respondents (81.6%) were normal in term of eating behavior and there were only 18.4% of the respondents who were at risk of having eating disorder, with female respondents (23.1%) had higher percentage of having eating disorder compared to male respondents (14.6%).

For multiple linear regressions, there were three models developed in the study to predict BMI (Model 1), WC (Model 2) and BF% (Model 3). It showed that in addition to the accelerometer- determined PAL, diastolic blood pressure, stages of change in body weight management, age and triglyceride were also significant predictors of BMI of the respondents, while age, sex, diastolic blood pressure, stages of change in body weight management and triglyceride were the other significant predictors of WC of the respondents. On the other hand, BF% was significantly predicted by accelerometer-determined PAL, diastolic blood pressure, stages of change in body weight management, IPAQ and systolic blood pressure.

The explained variance in each regression models was significant. All the three models showed that PAL made the strongest significant contribution in predicting the dependent variable in each model. Diastolic blood pressure and stages of change in body weight management also shows significant contribution in all the three models. On the other hand, age and triglycerides were significant contributors for BMI and WC, but not for BF%. In addition, sex made significant contribution for WC alone, while PAL determined by IPAQ and systolic blood pressure only made significant contribution to BF%. This study suggested that accelerometer-determined PAL made the strongest unique contribution in explaining body weight status, followed by diastolic blood pressure and stages of change in body weight management.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Master Sains

PREVALEN KEGEMUKAN DAN FAKTOR YANG BERKAITAN DI KALANGAN KAKITANGAN KERAJAAN MELAYU DI KANGAR, MALAYSIA

Oleh

ZAHRATUL NUR BINTI KALMI

April 2012

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Satu kajian keratan rentas yang melibatkan 272 responden (151 lelaki dan 121 perempuan) dari agensi-agensi kerajaan di Kangar, Perlis telah dijalankan, di mana responden telah dipilih secara rawak. Objektif utama kajian ini adalah untuk menentukan faktor-faktor yang berkaitan dengan status berat badan di kalangan kakitangan kerajaan Melayu di Kangar Perlis. Data dikumpulkan dengan menggunakan borang soal selidik yang telah diterjemahkan kepada Bahasa Malaysia, juga melalui ukuran antropometri termasuk berat badan, peratusan lemak badan, tinggi, lilitan pinggang dan tekanan darah yang menggunakan penganalisis komposisi badan TANITA (TANITA TBF -306, penganalisis komposisi badan, Jepun), pengukur ketinggian (SECA 206, Jerman), pita ukuran dan mesin pemantau tekanan darah digital (Omron HEM-780, Jepun) . Sampel darah vena puasa (8-12 jam) telah diambil untuk analisis glukosa plasma, profil lipid dan ujian toleransi glukosa oral 2 jam (OGTT). Semua responden juga dikehendaki memakai accelerometer (Lifecorder e-Step Suzuken Company Limited, Jepun,) selama 3 hari untuk menentukan tahap aktiviti fizikal (PAL).

Terdapat lebih ramai responden yang dikelaskan sebagai berlebihan berat badan (37.5%) berbanding 34.9% mempunyai IJT normal. Di kalangan responden yang mempunyai IJT berlebihan, terdapat lebih ramai lelaki (42.4%) daripada responden perempuan (31.4%). Untuk tahap aktiviti fizikal, kebanyakan responden adalah dalam kategori aktiviti fizikal sederhana (47.7% lelaki dan 66.9% perempuan) berdasarkan soalselidik IPAQ, dan hanya 22.1% dan 21.7% dikategorikan sebagai aktiviti fizikal rendah dan tinggi. Untuk PAL yang ditentukan oleh accelerometer, kebanyakan responden diklasifikasikan sebagai sedentari (55.1%) dan hanya 8.0% dikelaskan dalam PAL tinggi. Sebaliknya, kebanyakan responden (62.1%) diklasifikasikan sebagai tidak aktif apabila jumlah langkah per hari digunakan dan hanya 15.4% dan 7.7% responden dikategorikan dalam tahap sedentari dan aktif. Untuk tahap glukosa plasma puasa, terdapat lebih ramai responden lelaki dikategorikan pada glukosa plasma puasa yang tinggi berbanding responden perempuan (18.0% dan 10.7%). Terdapat 14.8% mempunyai glukosa plasma 2 jam tinggi dan perlu mendapatkan diagnosis lanjutan. Untuk jumlah kolesterol, trigliserida, dan LDLC, walaupun kebanyakan responden dikategorikan sebagai mempunyai tahap normal, lebih ramai responden lelaki dikategorikan di tahap yang tinggi (23.8%, 29.5% dan 39.3%) berbanding responden perempuan (12.6%, 5.8 % dan 18.4%). Untuk HDLC, terdapat hanya 2.2% daripada responden mempunyai tahap yang HDLC tinggi yang mana baik untuk kesihatan. Untuk tingkah laku pemakanan, kebanyakan responden (81.6%) dikategorikan sebagai normal, dan hanya 18.4% responden yang berisiko mempunyai gangguan pemakanan, namun, responden wanita (23.1%) mempunyai peratusan yang lebih tinggi

dalam mempunyai gangguan pemakanan berbanding dengan responden lelaki (14.6%).

Untuk analisis regrasi linear berganda, terdapat tiga model bagi meramalkan IJT (Model 1), ukur lilit pinggang (Model 2) dan peratusan lemak badan (Model 3). Ia menunjukkan bahawa selain PAL yang ditentukan oleh accelerometer, tekanan darah diastolik, peringkat perubahan dalam pengurusan berat badan, umur dan trigliserida juga merupakan prediktor yang signifikan untuk IJT responden, manakala umur, jantina, tekanan darah diastolik, peringkat perubahan dalam pengurusan berat badan dan trigliserida merupakan prediktor yang signifikan untuk ukur lilit pinggang responden. Untuk peratusan lemak badan responen pula, prediktor yang signifikan ialah PAL yang ditentukan oleh accelerometer, tekanan darah diastolik, peringkat perubahan dalam pengurusan berat badan, PAL yang diukur oleh IPAQ dan tekanan darah sistolik.

Varians dalam setiap model regresi adalah signifikan. Ketiga-tiga model menunjukkan bahawa PAL adalah signifikan bagi meramalkan pembolehubah bersandar dalam setiap model. Tekanan darah diastolik dan peringkat perubahan dalam pengurusan berat badan juga adalah signifikan dalam kesemua model. Umur dan trigliserida hanya signifikan bagi IJT dan ukur lilit pingang, tetapi tidak signifikan untuk peratusan lemak badan. Di samping itu, jantina hanya signifikan untuk ukur lilit pinggang, manakala PAL yang diukur oleh IPAQ dan tekanan darah sistolik hanya signifikan untuk peratusan lemak badan. Kajian ini menunjukkan bahawa PAL yang diukur melalui accelerometer adalah signifikan bagi menjelaskan status berat badan, diikuti oleh tekanan darah diastolik dan peringkat perubahan dalam pengurusan berat badan.

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I certify that an Examination Committee has met on **23 April 2012** to conduct the final examination of **Zahratul Nur Binti Kalmi** on her thesis entitled **"Prevalence of Obesity and its Related Factors among Malay Government Employees in Kangar, Malaysia"** in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the student be awarded the Master of Science (Community Nutrition).

Members of the Examination Committee were as follows:

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of **Master of Science.** The members of the Supervisory Committee were as follows:

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Date:

DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledge. I also declare that it has not been previously and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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ZAHRATUL NUR BINTI KALMI

Date:

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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
WHO	World Health Organization
NHMS	National Health and Morbidity Survey
PA	Physical Activity
PAL	Physical Activity Level
DSM-IV	Diagnostic and Statistical Manual of Mental Disorder, 4th Edition
BMI	Body Mass Index
TTM	Trans Theoretical Model
FDA	Food and Drug Administration
ACSM	American College of Sports Medicine
AHA	American Heart Association
CDC	Centers for Disease Control and Prevention
OR	Odds Ratio
DLW	Doubly Labeled Water
IPAQ	International Physical Activity Questionnaire
NZPAQ	New Zealand Physical Activity Questionnaire
RNI	Recommended Nutrient Intakes
GI	Glycemic Index
HDLC	High Density Lipoprotein Cholesterol
LDLC	Low Density Lipoprotein Cholesterol
WHR	Waist Hip Ratio
BF%	Body Fat Percentage
BF	Body Fat
SE	Self Efficacy
WC	Waist Circumference
TG	Triglyceride
EAT	Eating attitude Test
EDNOS	Eating Disorder Not Otherwise Specified
SPM	Sijil Pelajaran Malaysia
STPM	Sijil Tinggi Pelajaran Malaysia
ESES	Exercise Self Efficacy Scale
MANS	Malaysian Adults Nutrition Survey
MyNCDS-1	First Malaysia Non-communicable Disease Surveillance

CHAPTER I

INTRODUCTION

1.1 Background

Body weight problem specifically obesity has been on an increasing prevalence throughout the world and has become a global problem as reported by the World Health Organization (2007). It has thus alarmed many governments of developed and developing countries with overweight and obesity having reached epidemic proportions in their respective countries.

Although the advantages of maintaining healthy body weight status are well-publicized, the prevalence of overweight and obesity are still high and even increasing. Data showed that one billion adults over the world are overweight and at least 300 million are clinically obese (Butler and Mellor, 2006). In Malaysia, approximately one in two adults aged 25 to 64 years was either overweight or obese (Ministry of Health Malaysia, 2009). Malaysia had 6 million adults who were either overweight or obese, where the highest prevalence is among Indians, followed by Malays and Chinese. The prevalence of overweight and obesity increased from 16.7% and 4.4% in 1996, to 26.7% and 12.3%, respectively, in 2003 (Ministry of Health Malaysia, 2007). The prevalence of overweight and obesity still increasing in 2006 as the result from the National Health and Morbidity Survey (NHMS) III showed that 29.10 % and 14.01% of the adult population in Malaysia were overweight and obese respectively (Ministry of Health Malaysia, 2006). On the other hand,

underweight that is due to protein-energy malnutrition is still highly prevalent among Malaysian population, but the prevalence of underweight among Malaysian adults was 8.5% in 2006 (Ministry of Health Malaysia, 2006).

Body weight and body fatness status are assessed by body mass index (BMI), waist circumference (WC) and also body fat percentage (BF%). BMI is a weight to height index that provides a measure of body weight corrected for height (Deurenberg and Yap, 1999). It also describes relative weight for height, calculated as weight (kg)/ height squared (m^2) and has been shown to be a good indicator of general fatness, muscularity and frame size (Vazquez *et al.,* 2007). According to National Heart, Lung and Blood Institute, (2010), BMI is significantly correlated with total body fat content and it is used to assess overweight and obesity and also to monitor changes in body weight (National Heart Lung and Blood Institute, 2010). In addition, BMI has been used in many epidemiologic studies and by public health organizations to define the degrees of overweight and obesity. However, BMI does not directly assess body fat distribution and is not as good as circumference, such as WC measures for the measurement of the most metabolically active intra-abdominal fat. Measurement of BMI could be influenced by lean muscle mass, particularly in athletes. Besides that, the gradual decrease in lean muscle mass due to aging also affects the validity and interpretability of BMI as a marker of adiposity among older populations (Flint *et al.,* 2010).

Instead of measuring general obesity like BMI, WC has been used as measures of central obesity, where visceral adipose tissue is stored (Vazquez *et al.,* 2007).

In addition, central obesity is known to generate diabetogenic substances and should therefore be more informative than general obesity (Vazquez *et al.,* 2007). Furthermore, WC is easy to measure, is feasible to assess in a clinical setting and contains relatively little measurement error (Flint *et al.,* 2010). Studies that have analyzed the association of anthropometric measures and abdominal visceral fat have found waist circumference to be a better measure of central obesity because it is a better predictor of abdominal visceral fat, and it can be easily measured and interpreted. However, waist circumference cannot distinguish abdominal subcutaneous fat, total abdominal fat, and total body fat, and it is strongly correlated with BMI (Vazquez *et al.,* 2007).

In obesity or adiposity, body composition is characterized by a high to very high BF%. Body fat can be determined in vivo in various ways, using accurate laboratory techniques or using simple estimation techniques that can also be applied in field conditions (Deurenberg and Yap, 1999). For field study purposes, there are a number of other methods available, for example skin fold thickness measurements, bio-electrical impedance or the use of a weight-height index or circumferences to predict BF%. Classically, impedance is measured from foot to hand, but nowadays there are impedance analyzers that measure impedance from foot to foot or hand to hand, or measure both total body impedance and the impedance of the extremities (Deurenberg and Yap, 1999).

Body weight problem particularly obesity is multi-factorial and it involves genetic (Barsh *et al.,* 2000), as well as behavioral and environment components. The behavioral components include physical activity (PA) and food habits,

which are influenced by the social, cultural, and environmental context (Ekelund *et al.,* 2001). The rise in the prevalence of excess body fat (BF) in young people is proposed to be mainly due to environmental changes such as easy access to large size portions of energy dense foods and a reduced physical activity level (PAL) (Ekelund *et al.,* 2005).

Many researchers agree that changes in the environment are responsible for the rapid change in obesity rates (Jeffery and Utter, 2003). Environment in the neighborhood and at working place have been associated with obesity and obesity related behaviors, particularly PA. Living in neighborhoods that promote active transportation (Heath *et al.,* 2006), easy access to recreation facilities (Humpel *et al.,* 2002) and promote active lifestyle have been positively associated with PA and with lower risk of obesity (Giles-Corti *et al.,* 2003; Saelens *et al.,* 2003).

Furthermore, there is also a need to counteract the changing nature of work and to support promotion of PA at the worksite (Pronk and Kottke, 2009), since the increasing sedentary nature of many jobs and work tasks is nowadays become the normal characteristic of the contemporary workplace. Cross- sectional studies have demonstrated higher health care costs and absenteeism rates among the less fit workers. In addition, there is a clear potential for economic benefits to employers who improve employee fitness levels (Aldana and Pronk, 2001). Food environments were also likely to affect risk of obesity in population (Hill and Peters, 1998; Egger and Swinburn, 1997), but there were few studies which

examined the role of both food and PA environments in relation to overweight and obesity status.

However, people from the lower socio economic groups as well as the elderly aged over 60 years old are more prone to be underweight. Besides that, according to Fassino *et al.,* (2004), poor interoceptive awareness characterized by uncertainty in the recognition of emotional states and difficulties to discriminate sensations related to hunger and satiety is also often a core psychopathological element which plays an important role in the onset and maintenance of other weight problems, such as anorexia nervosa, bulimia, overweight and obesity (Fassino *et al.,* 2004).

Healthy weight management behaviors are needed for the prevention and treatment of overweightness and obesity. It is also important for those who are dieting or using unhealthy weight control behaviors to lose, gain or maintain their body weight (Shepherd *et al.,* 2006). Extreme body weight management behaviors, such as vomiting or using laxative are not effective in long term weight management and may lead to a number of undesirable consequences, including weight gain over time, inadequate intakes of nutrients such as calcium or iron and the onset of disordered eating and eating disorders (Shepherd *et al.,* 2006). In a longitudinal study, those who dieted were at twice the risk compared to those who were not dieting in engaging in extreme body weight management behaviors and reporting an eating disorder five years later. Thus, knowledge, skills and support are important for healthful body weight management behaviors; and, care needs to be taken in the development of information, so that

it will not lead to behaviors that may be counterproductive and even harmful (Shepherd *et al.,* 2006).

Research suggests that adults who are successful in body weight management are those who could self-monitor their food intake, PA and body weight. Furthermore, studies with adults suggest that regular body weight monitoring may be an important component of effective weight loss and long term weight control (Alm *et al.,* 2008). As the prevalence of obesity increases from time to time due to the imbalance between energy input and output, body weight management is very useful to provide people with the skills and knowledge on how to manage their body weight healthily.

1.2 Problem Statement

The interest of having healthy and ideal body weight status is improving over time. However, in Malaysia, overweight and obesity rate has rapidly increased over the decade, although many studies (Christakis and Fowler, 2007; Al Snih *et al.,* 2007 and Stewart, Cutler and Rosen, 2009) have revealed their harmful implications on health. This phenomenon showed that basic understanding alone is not adequate to ensure the decrease in body weight problem specifically overweightness and obesity. Hence, it is important to develop not only scientific understanding and awareness, but also practices on improving body weight to ensure maintenance of healthy body weight status.

Although the health consequences of body weight status are well documented, contributing factors to it still are dynamic and not fully understood. Since there

are many measurements in assessing body weight status, such as BMI, WC and BF%, the contributing factors may vary and different for various measurement. Thus, there is a need to study the factors that affect body weight status by using various complementary measurements. This study involved Malay employees only since the majority of the employees in government sector in Kangar, Perlis were Malay. Government sector was chosen as employees in this sector were having high percentage of unhealthy body weight and lifestyle. In addition, Kangar, Perlis was chosen as nutritional data from this state are still limited.

This study focuses on various factors such as socio demographic factors (sex, age, income, occupation and education level), medical history, PAL, eating behavior and stages of change and self efficacy in body weight management behaviour that are responsible to make a current body weight status. A better understanding on its causal is crucial so that effective strategies could be developed in order to ensure lifelong healthy body weight status among community. Hence the focus of this study is guided by the following research questions.

Research Questions:

1) What is the prevalence of obesity?

2) What factors contribute to obesity?

1.3 Significance of the Study

The findings of this study will be beneficial in determining the association between body weight status, PA, eating behavior and weight management behaviour. Firstly, the present study provides an update of scientific knowledge on several research findings. Although there were many studies focusing on body weight status, there is a dearth of study that explores the relationship between body weight status and body weight management behavior. Furthermore, the present study also explores the relationship between self efficacy and stages of change in performing body weight management behavior per body weight status, where both elements are rarely being studied among employees in Malaysia. Since the availability of the data on body weight status especially BF% and body weight management behaviour among adults in Malaysia is still limited, this study will provide such data specifically among government employees. This study also provides data on PAL among adults assessed by two different instruments such as questionnaire and accelerometer, thus the results from this study provide the comparative data of the PA level assessed by the aforementioned instruments. Since there were limited data on accelerometer-assessed ambulatory activity in Malaysia, this study could provide data on pattern of PA among adults by using accelerometer as assessment tool. Thus, collectively these data can be used to determine the pattern of PA among Malaysian adults, especially among the government employees.

Secondly, the present study also provides baseline data of new ideas and useful information for intervention programmes as guide for health professionals and

staff leaders of organizations to conduct programs to improve the health of the employees. At the national level, the findings from this study may be used as an updated reference and preliminary guidance for data on body weight status of government employees, specifically in Kangar, Perlis. Furthermore, the findings from this study shall provide data on factors that influence body weight status, such as the socio demographic factors, eating behaviour, physical activity level and self efficacy and stages of change in body weight management behavior.

The results of this study can also provide a more holistic picture of the factors that contribute to body weight status and it may be used to plan interventions in order to enhance knowledge, awareness and health practices of the people. The increase of obesity and overweight problems shows that the appropriate body weight management skills and knowledge are important to be delivered to the population in order to manage their body weight healthily. On the other hand, researches on body weight management among adults in Malaysia are still limited. Although there are many studies conducted in other countries, specific local data are needed to implement healthy body weight management programmes for Malaysians. Since this study provides data on body weight management behavior among the study samples, it can be used for conducting future study or for intervention programmes. Last but not least, the findings from the present study could be used to assist the policy makers to formulate new policies to curb issues of obesity.

1.4 Objectives of the Study

1.4.1 General Objective

To determine factors related to body weight status among government employees in Kangar, Perlis.

1.4.2 Specific Objectives:

1) To determine the socio demographic characteristics (sex, age, income, occupation and education level), medical history, health- related factors (blood pressure, plasma glucose level and blood lipid profile), physical activity level, eating behavior, stages of change and self efficacy in body weight management behaviour, and body weight status among the respondents.
2) To determine the relationship between socio demographic factors and body weight status.
3) To determine the relationship between medical history and body weight status.
4) To determine the relationship between health-related factors (blood pressure, plasma glucose level and blood lipid profile) and body weight status.
5) To determine the relationship between physical activity level and body weight status.
6) To determine the relationship between eating behavior and body weight status.
7) To determine the relationship between stages of change and self efficacy in body weight management behaviour and body weight

status.

8) To determine the contribution of independent variables (socio demographic factors, medical history, physical activity level, eating behavior and stages of change and self efficacy in body weight management behaviour) toward body weight status among the respondents.

1.5 Conceptual Framework.

Figure 1 shows the conceptual framework of the study. It shows factors that contribute to the body weight status such as socio demographic factors which includes sex, occupation, income and educational level, medical history, health-related factors (blood pressure, plasma glucose level and blood lipid profile), PAL, eating behavior and stages of change and self efficacy in body weight management behaviour. Interactions between independent variables also exist. In short, socio demographic factors, medical history, PAL, eating behavior and stages of change and self efficacy in body weight management behaviour are hypothesized as contributing factors to body weight status among government employees. Body weight status is an important indicator in assessing health status in a population. Although the benefit of having healthy body weight status is already known, the prevalence of body weight problem such as overweight and obesity is still increasing among adults.

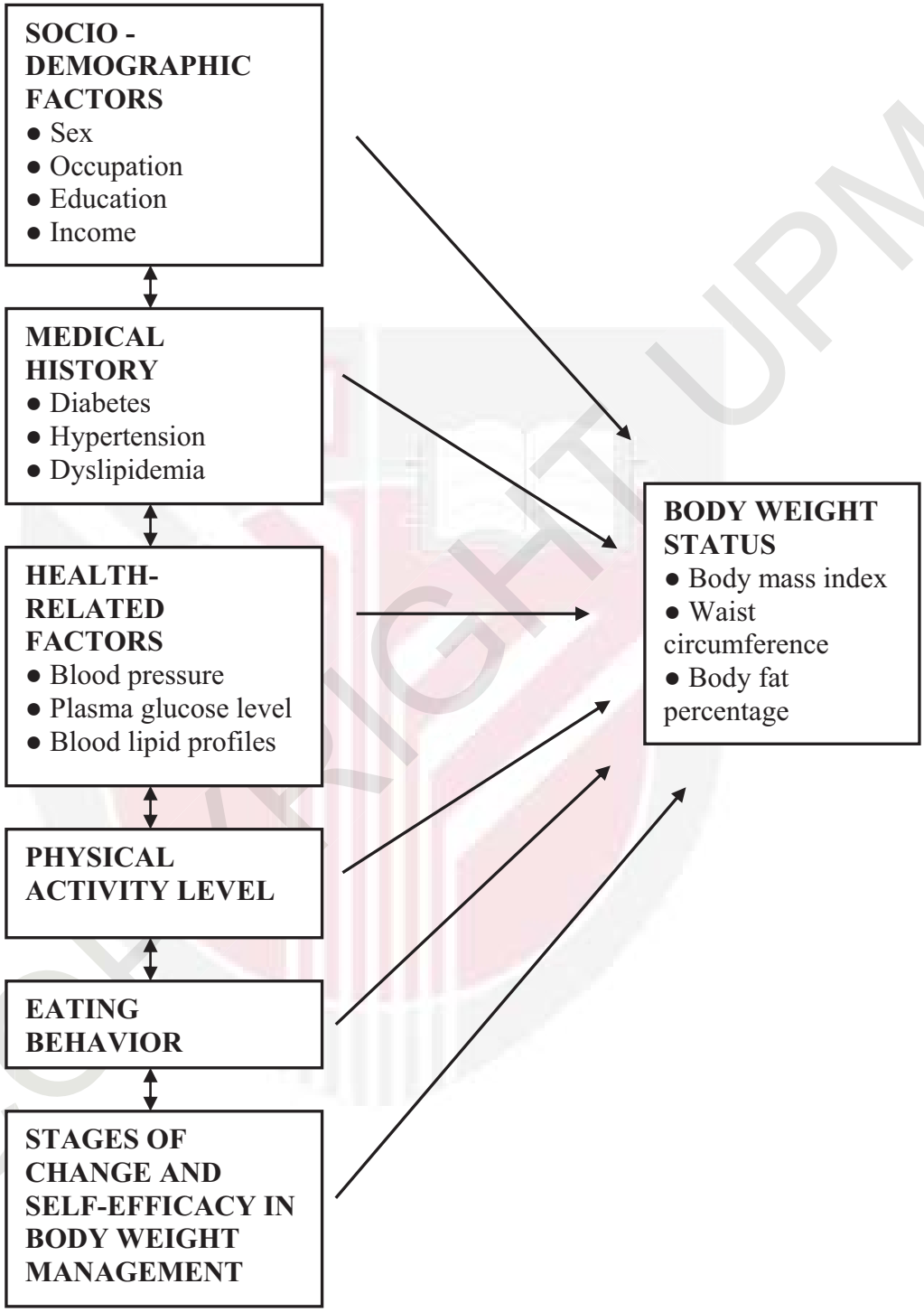

Figure 1: Conceptual framework of factors contributing to body weight status

Hence, determining factors related to body weight status among adults is very important since it is associated with health consequences. Since body weight problem particularly obesity is multi-factorial (Barsh *et al.,* 2000), there is a need to determine factors related to body weight status.

The main purpose of this study therefore is to determine factors related to body weight status among government employees in Kangar, Perlis. Previous studies showed that body weight status was associated with socio demographic factor such as sex, age, income, occupation and education level (Sanchez-Vaznaugh *et al.,* 2009). Besides that, medical history of patients diagnosed as having chronic diseases (Poirier *et al.,* 2006) and PAL (Koplan and Dietz, 1999; den Hoed and Westerterp, 2008) also showed association with body weight status. Eating behavior (Brewer, Kolotkin and Baird, 2003) and stages of change (Sarkin *et al.,* 2001) and self efficacy (Roach *et al.,* 2008; Butler and Mellor, 2006) in body weight management behavior also related to body weight status.

The framework of this study is therefore built on established Western studies which are relevant to local scenario, which shall eventually adds to increase the limited availability of such data in Malaysia.

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