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PREVALENCE OF AND FACTORS ASSOCIATED WITH OBESITY AMONG SECONDARY SCHOOL STUDENTS IN PETALING DISTRICT, SELANGOR

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By

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Chairman: Prof. Lekhraj Rampal, PhD

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Obesity is one of the public health problems that affects all ages in both developing and developed countries with an increasing prevalence globally. Obesity in adolescents can continue up to adulthood and increases the chance of developing non-communicable diseases.

An analytic cross-sectional study was done among secondary school students in Petaling district to determine prevalence and factors associated with obesity. Sampling with probability proportionate to size was used and 5 schools were selected. Self-administered pretested questionnaires in Bahasa Malaysia were used to capture the socio-demographic characteristics, physical activity, dietary pattern, smoking status and psychological factors (self-esteem & body image). Weight was measured to the nearest 0.1kg using a digital bathroom scale (TANITA model HD-319); height was measured by using SECA body meter model 206 to the nearest 0.1cm.

The response rate was 90.7%. The prevalence of obesity among the respondents was 13.7% (95% CI= 12.3, 15.1). Males had a significantly higher prevalence of obesity 15.9% (95% CI= 14.4, 17.4) compared to females with 12.3% (95% CI= 10.94, 13.66). Malay respondents had the highest prevalence of 16.2% (95% CI = 14.68, 17.72), followed by Chinese with 11.5% (95% CI= 10.2, 12.8) and then Indians with prevalence of 10.5% (95% CI= 9.23, 11.77).

Those with low physical activity had significantly higher prevalence of obesity than those with high physical activity (χ^2 = 237, df = 1, p <0.001). Those with low self-esteem had significantly higher prevalence of obesity than those with normal self-esteem (χ^2 = 143, df =1, p <0.001). Prevalence of obesity was also significantly higher among those with body parts dissatisfaction (χ^2 = 10, df = 1, p <0.001) and body size dissatisfaction (χ^2 = 90, df = 1, p <0.001). However, there was no statistical association between obesity and the dietary patterns (dietary pattern 1 χ^2 = 5.919, df= 3, p = 0.116; dietary pattern 2 χ^2 = 7.728, 3, p = 0.052; dietary pattern 3 χ^2 = 5.923, df= 3, p = 0.115).

Logistic regression was used to determine the predictors of obesity and the significant predictors of obesity were gender (Male's odd ratio (OR) =2.389, 95% CI= 1.7, 3.3, p < 0.001), age (13 to <14 years OR =2.05, 95% CI = 1.1, 3.7, p =0.019; 14 to <15 years OR =2.95, 95% CI = 1.1, 3.6, p = 0.034), low physical activity (OR = 82.8, 95% CI = 45.5, 151.0, p < 0.001), low self-esteem (OR = 7.77, 95% CI = 5.15, 11.71, p < 0.001), body parts dissatisfaction (OR = 1.479, 95% CI = 1.2, 1.9, p = 0.002) and body size dissatisfaction (OR = 4.705, 95% CI = 2.6, 8.5, p < 0.001).

In conclusion, this study has identified that the prevalence of obesity is high among adolescents and found to be associated with modifiable risk factors which are low physical activity, low self-esteem and body image dissatisfaction. The findings from this study can be used by policy makers to plan preventive measures to tackle the increasing prevalence of obesity.

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

PREVALENS DAN FAKTOR-FAKTOR YANG BERKAITAN DENGAN OBESITI DIKALANGAN PELAJAR SEKOLAH MENENGAH DI DAERAH PETALING SELANGOR

Oleh

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Obesiti adalah salah satu masalah kesihatan awam yang memberi kesan kepada semua peringkat umur dinegara sedang membangun dan juga negara membangun dengan peningkatan prevalen di peringkat global. Obesiti di kalangan remaja boleh berterusan sehingga ke usia dewasa dan ini boleh meningkatkan risiko untuk mendapat penyakit tidak berjangkit.

Satu kajian keratan rentas analisis telah dilakukan di kalangan pelajar sekolah menengah di daerah Petaling untuk menentukan prevalen dan faktor-faktor yang dikaitkan dengan obesiti. Persampelan dengan kebarangkalian berkadar dengan saiz telah digunakan dan 5 buah sekolah telah dipilih. Soal selidik dalam Bahasa Malaysia digunakan untuk mendapat ciri-ciri sosio-demografi, aktiviti fizikal, corak pemakanan, status merokok dan faktor-faktor psikologi (keyakinan diri dan imej badan). Berat diukur kepada 0.1kg terdekat menggunakan skala penimbang

digital (model TANITA HD-319); ketinggian diukur dengan menggunakan meter badan SECA model 206 meter ke 0.1cm terdekat.

Kadar respon adalah 90.7%. Prevalen obesiti di kalangan responden adalah 13.7% (95% SK = 12.3, 15.1). Lelaki mempunyai Prevalen yang lebih tinggi daripada obesiti 15.9% (95% SK = 14.4, 17.4) berbanding dengan wanita dengan 12.3% (95% SK = 10.94, 13.66). Responden Melayu mempunyai Prevalen tertinggi sebanyak 16.2% (95% SK = 14.68, 17.72), diikuti oleh China dengan 11.5% (95% SK = 10.2, 12.8) dan kemudian India dengan Prevalen 10.5% (95% SK = 9.23, 11.77).

Mereka dengan aktiviti fizikal yang rendah mempunyai Prevalen yang lebih tinggi daripada obesiti daripada mereka dengan aktiviti fizikal yang tinggi (χ^2 = 237, df = 1, p <0.001) Mereka yang mempunyai harga diri yang rendah mempunyai prevalen yang lebih tinggi terhadap obesiti daripada mereka dengan harga diri yang normal (χ^2 = 143, df = 1, p < 0.001). Prevalen obesiti juga lebih tinggi di kalangan mereka yang mempunyai bahagian badan yang dirasakan tidak memuaskan (χ^2 = 10, df = 1, p < 0.001) dan rasa tidak puas hati dengan saiz badan (χ^2 = 90, df = 1, p < 0.001). Walau bagaimanapun, tidak ada perkaitan statistik antara obesiti dan corak pemakanan (corak pemakanan 1 χ^2 = 5.919, df = 3, p = 0.116; corak pemakanan 2 χ^2 = 7.728, df = 3, p = 0.052; corak pemakanan 3 χ^2 = 5.923, df = 3, p = 0.115).

Regresi logistik telah digunakan untuk menentukan ramalan obesiti dan ramalan signifikan obesiti ialah jantina (Lelaki OR = 2.389, 95% SK = 1.7, 3.3, p < 0.001), umur (13 hingga <14 tahun OR = 2.05, 95% SK = 1.1, 3.7, p = 0.019; 14 hingga

<15 tahun OR = 2.95, 95% SK = 1.1, 3.6, p = 0.034), aktiviti fizikal yang rendah (OR = 82.8, 95% SK = 45.5, 151.0, p < 0.001), rendah diri (OR = 7.77, 95% SK = 5.15, 11.71, p < 0.001), bahagian-bahagian badan yang dirasakan tidak puas hati (OR = 1.479, 95% SK = 1.2, 1.9, p = 0.002) dan rasa tidak puas hati saiz badan (OR = 4.705, 95% SK = 2.6, 8.5, p < 0.001).

Kesimpulannya, kajian ini telah mengenal pasti bahawa obesiti mempunyai prevalen yang tinggi di kalangan remaja dan didapati berkait dengan faktor-faktor risiko yang boleh diubah dimana aktiviti fizikal yang rendah, keyakinan diri dan imej badan yang rendah rasa tidak puas hati. Hasil kajian ini boleh digunakan oleh penggubal dasar bagi merancang langkah-langkah pencegahan untuk menangani peningkatan prevalen obesiti.

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Approval sheet

I certify that a Thesis Examination Committee has met on 27th of Ausust, 2013 to conduct the final examination of Jamila Abubakar Garba on her thesis entitled "Prevalence and factors associated with obesity among secondary school students in Petaling district, Selangor" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science degree.

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DECLARATION

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

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JAMILA ABUBAKAR GARBA

Date: 27th August, 2013

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LIST OF ABBREVIATIONS

%	Percentage
ANOVA	Analysis of variances
BASS	Body Area Satisfaction Scale
BMI	Body Mass Index
CDC	Centers for Disease Control
CI	Confidence Interval
CPG	Clinical Practice Guidelines
CVD	Cardiovascular Disease
Df	Degree of freedom
DPAS	Diet, Physical activity & Health
FAO	Food and Agriculture Organization
IOTF	International Obesity Task Force
Kcal	Kilocalories
Kg/m^2	Kilogram per meter square
MGRS	Multicentre Growth Reference Study
mmHg	Millimetres of mercury
MOH	Ministry of Health
N	Number
NA	Not available
NCD	Non-Communicable Disease
NCHSS	National Centre for Health Statistics
NHMS	National Health and Morbidity Survey
NSP-NCD	National Strategic Plan for Non-Communicable Diseases

OR	Odds Ratio
P	α level of significance
PAQ-A	Physical Activity Questionnaire for Adolescents
PAQ-C	Physical Activity Questionnaire for Children
RM	Ringgit Malaysia
SD	Standard deviation
SPSS	Statistical package for the Social Sciences
UK	United Kingdom
UN	United Nations
USA	United States of America
U.S.D.H.H.S	United States Department of Health and Human Services
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background

The World Health Organization reported that there is an increase in the prevalence of overweight and obesity globally; about 1.5 billion adults were overweight and 500 million were obese (WHO, 2011a). Almost 43 million children below the age of five were overweight in 2010 and projected to reach 60 million by 2020 (de Onis et al., 2010; WHO, 2011a). The global prevalence of obesity in childhood was 4.2% in 1990 which increased to 6.7% in 2010 and is projected to reach 9.1% by 2020 (de Onis, et al., 2010).

The average prevalence of childhood obesity for developing countries in 2010 was 6.1% and predicted to reach 8.6% by 2020 while for developed countries it was 11.7% in 2010 and predicted to reach 14.1% by 2020 (de Onis et al., 2010). Several low and middle-income countries are now encountering both health problems of communicable diseases and infectious diseases; while they continue to have the problems of infectious disease and under-nutrition, they are encountering an increase in non-communicable disease risk factors like overweight and obesity (WHO, 2011a). It is common to have under-nutrition and obesity co-existing together in the same household, same community and the same country (WHO, 2011a).

In Asia, the prevalence of obesity in 2010 was 4.9% and predicted to be 6.8% by 2020 (de Onis et al., 2010). In South East Asian region, there were 300,000 deaths due to overweight and obesity (WHO, 2011a). In Malaysia, the Third National Health and Morbidity Survey (NHMS III) in 2006 showed a prevalence of obesity to be 14% in adults 18 years and above while it was 5.4% in children (MOH, 2008).

There are several causes of childhood and adolescent obesity and more causes are still being investigated (CPG, 2003). The aetiological factors are genetic factors, unhealthy diet, physical inactivity, endocrine disorders and in some cases a combination of above (WHO, 2003a). Many factors may affect eating habits and as a result may also affect obesity; these factors include depression, stress, anxiety, ethnicity, education, social support and income (Andersen 2003; Biro & Wien, 2010; Rohrer 2004).

Obesity in adolescents can continue up to adulthood and increases the chance of developing non-communicable diseases both in childhood and adulthood (Andersen, 2003). Some of the factors that could lead to persistence of childhood obesity at adulthood include degree of obesity and genetic factors (WHO, 2003a). Obesity is a significant risk factor for a number of morbidities and increases mortality at an early age (Pi-Sunyer, 2009). Obesity and overweight caused about 5% of global mortality (WHO, 2009). The complications that can result from obesity include cardiovascular disease, diabetes, some cancers, sleep apnea, early onset asthma and psychological disorders (Andersen, 2003; Pi-Sunyer, 2009; WHO, 2003a).

The main contributing factors for the increase in prevalence of obesity are physical inactivity and unhealthy diet (WHO, 2003a) and despite the various strategies on diet and physical activity, there is still an increasing prevalence of obesity (M.O.H, 2010a); hence, there is need to identify other factors such as the psychological and social factors in addition to unhealthy diet and physical inactivity that may be associated with obesity.

1.2 Problem Statement

Obesity and overweight are serious health problem globally both in children and adults (WHO, 2003a). In Malaysia, there is an increasing trend in the prevalence of obesity among adults 18 years and above; it was 4.4% in 1996 (MOH, 1997), increased to 12.3% in 2004 (Rampal et al., 2007a) and 14.2% in 2006 (MOH, 2008). In adolescents, the prevalence of risk of overweight and overweight was 11.4% and 8.2% respectively in 2005 among secondary school students in Klang district (Rampal et al., 2007b) and another study among adolescents in Putrajaya in 2010 showed prevalence of 12.5% and 11.7% respectively (Rampal et al., 2011).

Adolescent obesity can strongly lead to adult obesity and predispose to early mortality and increased chance of developing non-communicable diseases at an early age (Goodman & Whitaker, 2002; WHO, 2008a; WHO, 2011a). They are also prone to discrimination, poor self-esteem, body image dissatisfaction and other psychological disorders which may likely persist into adulthood (Andersen, 2003). The consequences of obesity have serious impact on the healthcare cost due to the

expensive cost in treatment and rehabilitation (M.O.H, 2010a); hence, there is need for preventive measures which are cheaper.

1.3 Significance of the Study

The study will determine the prevalence and factors associated with obesity. It will also identify how socio-demographic characteristics, lifestyle factors and psychological factors predict development of obesity. The information can be use by policy makers to plan preventive measures by focusing on the significant predictors of obesity among adolescents.

1.4 Objectives of the study

1.4.1 General objective

To determine the prevalence and factors associated with obesity among secondary school students in Petaling district, Selangor

1.4.2 Specific objectives

i. to determine the socio-demographic characteristics, physical activity, dietary pattern, smoking status, self-esteem, body parts satisfaction and body size perception,

ii. to determine the prevalence of obesity,

iii. to determine the association between socio-demographic characteristics and obesity,

iv. to determine the association between physical activity, dietary pattern and smoking; with obesity,

v. to determine the association between psychological factors (self-esteem, body parts satisfaction and body size perception) and obesity,

vi. to determine predictors of obesity,

1.5 Research hypothesis

i. There is an association between socio-demographic characteristics and obesity.

ii. There is an association between physical activity, dietary pattern and smoking with obesity.

iii. There is an association between psychological factors and obesity.

iv. Socio-demographic characteristics, physical activity, dietary pattern, smoking and psychological factors are significant predictors of obesity.

1.6 Conceptual framework

Socio-demographic characteristics such as age, gender, ethnicity, socioeconomic status and educational status have been shown to influence the lifestyle of an individual and predispose to development of obesity (Ismail et al., 2002; Moy et al., 2004; Ghazali et al., 2006; Rampal et al., 2007b). Lifestyle factors such as smoking habits, unhealthy dietary pattern and low physical activity may enhance the development of obesity (WHO, 2003a; Biro & Wien, 2010). It has been

documented that overweight occur as a result of imbalance between energy intake and energy expenditure and the calorie intake from foods is an important determinant of energy balance (WHO, 2003a; Woodward-Lopez et al., 2006). Physical activity is a significant determinant of energy output and thus essential to balance in energy and control of weight (WHO, 2011b). Heavy smokers may be predisposed to risky behaviours like low physical activity and poor dietary habits which can lead to obesity (Chiolero et al., 2008).

Psychological disorders have been shown to be associated with obesity either as risk factors or as consequences of obesity (Mustillo et al., 2003; Hamzaid, 2011). Some psychological disorders such as body image dissatisfaction, low self-esteem and depression can lead to eating disorders like binge eating which can cause obesity (Nieman & LeBlanc, 2012). On the other hand, stigma and discrimination related to obesity can affect self-esteem, body image and other psychological characteristics (Andersen, 2003; Pi Sunyer, 2009).

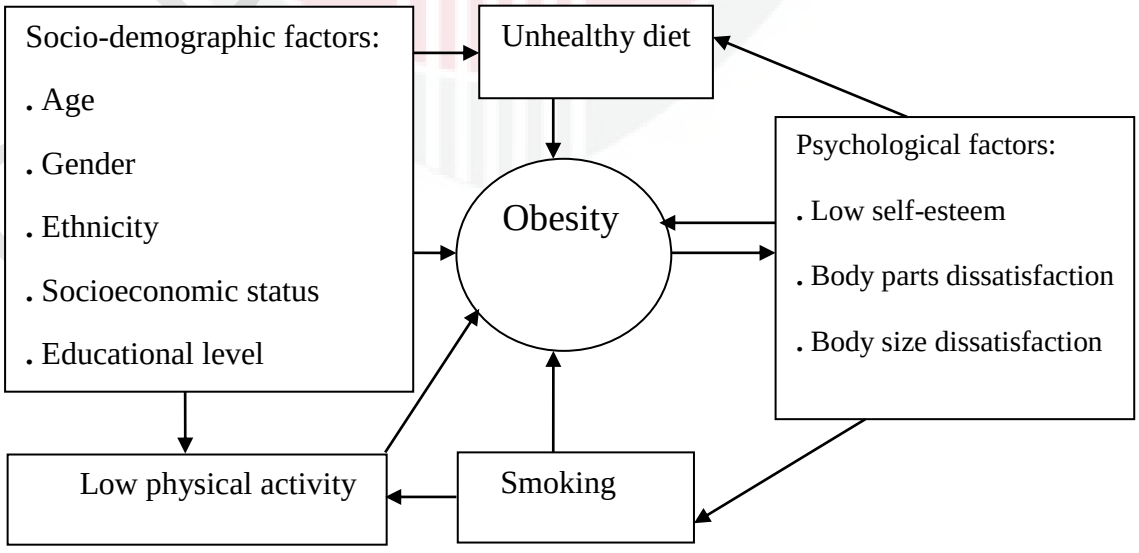

Figure 1.1 Risk factors associated with obesity

REFERENCES

Adami, F., Frainer, D.E.S., Almeida, F.S., de Abreu, L.C., Valenti, V.E., Demarzo, M.M.P., Monteiro, C.B.M and de Oliveira, F.R. (2012). Construct validity of a figure rating scale for adolescents, *Nutrition Journal*; 11:24.

Aday, L-A. & Cornelius, L.J. (2006). *Designing and Conducting Health Surveys: A Comprehensive Guide* (3rd Ed). San Francisco, CA: John Wiley & Sons.

Ali, M.M., Fang, H. & Rizzo, J.A. (2010).Body weight, self perception and mental health outcomes among adolescents. *Journal of Mental Health Policy and Economics,* 13 (2): 53-63.

Andersen, R.E (ed). (2003). *Obesity: Etiology, Assessment, Treatment and Prevention*. Champaign, IL: Human Kinetics, Inc.

Anderson, S.E., Cohen, P., Naumova, E.N., Jacques, P.F. & Must, A. (2007). Adolescent obesity and risk for subsequent major depressive disorder and anxiety disorder: Prospective evidence. *Psychosomatic Medicine*, 69(8):740-747.

Badland, H.M., Schofield, G.M., Witten, K., Schluter, P., Mavoa, S., Kearns, R.A.,...Mcphee, J. (2009). Understanding the relationships between activity and neighbourhoods (URBAN) study. Research design and methodology. *BioMed Central Public Health*, 9: 224.

Bamia, C., Trichopoulou, A., Lenas, D., Trichopoulos D. (2004). Tobacco smoking in relation to body fat mass and distribution in a general population sample. *International Journal of Obesity Related Metabolic Disorders,* 28:1091– 6.

Barlow, S. E. (2007). Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report. *Pediatrics*, 120; S164.

Berkey, C.S., Rockett, H.R.H., Field, A.E., Gillman, M.W., Frazier, A.L., Camargo, C.A & Colditz, G.A. (2000). Activity, dietary intake and weight changes in a longitudinal study of preadolescents and adolescent girls. *Pediatrics;* 105:E56.

Biro, F.M. & Wien, M. (2010). Childhood obesity and adult morbidities. *American Journal of Clinical Nutrition*, 91 (Suppl): 1499S-1505S.

Bolen, J.C., Rhodes, L., Powell-Griner, E.E., Bland, S.D., Holtzmann, D. (2000). State-Specific Prevalence of Selected Human Behaviours, by Race and Ethnicity- Behavioral Risk Factor Surveillance System, 1997. CDC *Surveillance Summaries*, 49 (SS02): 1-60.

Brown, T.A., Cash, T.F and Mikulka, P.J. (1990). Attitudinal body image assessment factor analysis of the body-self-relation questionnaire. *Journal of Personality Assessment*; 55: 135-144.

Bully, P. & Elosua, P. (2011). Changes in body dissatisfaction relative to gender and age: The modulating character of BMI. *The Spanish Journal of Psychology*; 14(1): 313-322.

Burt Solorzano, C.M & McCartney, C.R. (2010). Obesity and pubertal transition in boys and girls. *Reproduction*; 140 (3): 399-410.

Byrne SM. (2002). Psychological aspects of weight maintenance and relapse in obesity. *Journal of Psychosomatic Research*. 53:1029-1036.

Carpenter, K.M., Hasin, D.S., Allison, D.B. & Faith, M.S. (2000). Relationships between Obesity and DSM-IV Major Depressive Disorder, Suicide Ideation, and Suicide Attempts: Results from a General Population Study. *American Journal of Public Health*, 90:251-257.

CDC, Center for Disease Control. (2011). Obesity and overweight. Retrieved from http://www.cdc.gov/obesity/childhood/basics.html.

Childress, A.C., Brewerton, T.D., Hodges, E.L & Jarrel, M.P. (1993). The Kids' Eating Disorders Survey (KEDS): A Study of Middle School Students. *Journal of American Academy of Child and Adolescent Psychiatry*; 32:843-850.

Chin, Y.S., Taib, M.N.M., Zalilah, M.S & Khor, G.L. (2008). Development of multidimensional body image scale for Malaysian female adolescents. *Nutrition Research and Practice*, 2(2): 85-92.

Chiolero, A., Faeh, D., Paccaud, F. & Cornuz, J. (2008). Consequences of smoking for body weight, body fat distribution and insulin resistance. *American Journal of Clinical Nutrition*, 87: 801-9.

Cho, J.H., Han, S.M,. Kim, J.H. & Lee, H.M. (2012). Body image distortion in 5th and 6th grade students may lead to stress, depression and undesirable dieting behaviours. *Nutrition Research and Practice*; 6(2): 175-181.

Chung, W.K. & Leibel, R. (2008). Consideration Regarding the Genetics of Obesity. *Obesity (Silver Spring)*, 16 (Suppl 3): SS 33-39.

CPG, Clinical Practice Guidelines on Management of Obesity. (2003). Academy of Medicine Malaysia. Retrieved from http://www.acadmed.org.my/viewfile.cfm?filied=183.

Cole, T.J., Belizz, M.C., Flegal, K.M & Dietz, W.H. (2000).Establishing standard definition for child overweight and obesity worldwide: International survey. *British Medical Journal*; 320:1240-1246.

Craig, L.C.A., McNeill, G. Macdiarmid, J.I., Masson, L.F. & Holmes, B. (2010). Dietary patterns of school-age children in Scotland: association with socio-economic indicators, physical activity and obesity. *British Journal of Nutrition*, 103: 319-334.

Crawford, D & Ball, K. (2002). Behavioural determinants of the obesity epidemic. *Asia Pacific Journal of Clinical Nutrition.* 11(Suppl):S718-S721.

Dan, S.P., Mohd Nasir, M.T., Zalilah, M.S. (2011). Determination of Factors Associated with Physical Activity Level among Adolescents in Kuantan, Malaysia. *Malaysian Journal of Nutrition*; 17 (2): 175-187.

Darmon, N. & Drewnowski, A. (2008). Does social class predict diet quality? *American Journal of Clinical Nutrition,* 87:1107–17.

Davis, M.M., Gance-Cleveland, B., Hassink, S., Johnson, R., Paradis, G., Resnicow, K. (2007). Recommendations for prevention of childhood obesity *Pediatrics*; 120:S229–53.

Davison, K.K. & Birch, L.L. (2001). Child and Parent characteristics as predictors of in girls body mass index. *International Journal of Obesity;* 25: 1834-1842.

de Onis, M., Onyango, A.W., Borghi, E., Siyam, A., Nishida, C. & Siekmann, J. (2007). Development of a WHO Growth Reference for School-Aged Children and Adolescents. *Bulletin of the World Health Organization*; 85(9): 649-732.

de Onis, M., Blossner, M., Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool Children. *American Journal of Clinical Nutrition,* 92:1257-64.

Dietz, W.H. (1996). The role of lifestyle in health: The epidemiology and consequences of inactivity. *Proceedings of the Nutrition Society,* 55, 829-840.

Dietz, W. H. (1998). Health consequences of obesity in youth: Childhood predictors of adult disease. *Pediatrics*, 101:518—525.

Dinsdale, H., Ridler, C. & Ells, L. J. (2011). *A Simple Guide to Classifying Body Mass Index in Children.* Oxford: National Obesity Observatory.

Durkin. S., Paxton, S.J., & Sorbello, M. (2007). Mediators of the impact of exposure to idealized female images on adolescent girl's body satisfaction: An integrative model. *Journal of Applied Social Psychology.* 37: 1092-1117.

Erermis, S., Cetin, N., Tamar, M., Bukusoglu, N., Akdeniz, F. & Goksen, D. (2004). Is obesity a risk factor for psychopathology among adolescents? *Pediatrics International*; 46(3):296-301.

Farah Wahida, Z., Mohd Nasir, M.T. & Hazizi, A.S. (2011). Physical activity, eating behaviour and body image perception among young adolescents in Kuantan, Pahang, Malaysia. *Malaysian Journal of Nutrition*; 17(3):325-36.

Flodmark, C. (2005). The happy obese child. *International Journal of Obesity*, 29:S31 – 33.

Frost, J & Mckelvie, S. (2004). Self-esteem and body satisfaction in males and females elementary school, high school and university students. *Sex Roles*, 51 (1-2): 45-54.

Ghazali, S.M., Kamaluddin, M.A., Said, I.M., Isa, M.R., Ghazali, I.M.M. & Idris, N. (2006). Obesity among school children in Kuala Selangor: A cross sectional study. *Tropical Biomedicine*, 23 (2): 148-154.

Giammattei, J., Blix, G., Marshak, H.H., Wollitzer, A.O & Pettitt, D.J. (2003). Television watching and soft drink consumption: Associations with obesity in 11 to 13 year old schoolchildren. *Archives Pediatrics and Adolescent Medicine* 157 (9): 882-886.

Gills, L.J., Kennedy, L.C., Gill, A.M. & Baror, O. (2002). Relationship between juvenile obesity, dietary energy intake and physical activity. *International Journal of Obesity;* 26: 458-463.

Goldfeild, G.S., Raynor, H. A., Epstein, L.H. (2002). Treatment of paediatric obesity. In *Handbook of obesity treatment*, eds. Stunkard A.J. and Wadden T. Newyork: Guildford press. 532-555.

Goodman, E., Whitaker, R.C. (2002). A Prospective Study of the Role of Depression in the Development and Persistence of Adolescent Obesity. *Pediatrics;* 110(3):497-504.

Gruber, K.J., Haldeman, L.A. (2009). Using the family to combat childhood and adult obesity. *Preventing Chronic Disease*; 6:A106.

Hamzaid, H., Taib, R.A., Azizi, N.H., Maamor, N., Reilly, J.J. & Wafa, S.W. (2011). Quality of life of obese children in Malaysia. *International Journal of Pediatric Obesity*; 6 (5-6), 450-4.

Hesketh, K., Wake, M., Waters, E. (2004). Body mass index and parent reported self-esteem in elementary school children: Evidence for a causal relationship. *International Journal of Obesity and Related Metabolic Disorder*, 28(10):1233 – 7.

Hosmer, D.W., Lemeshow, S. (2000). *Applied Logistic Regression*. 2nd Edition. San Francisco, CA: John Wiley & Sons.

Hu, F.B. (2002). Dietary pattern analysis: a new direction in nutritional epidemiology. *Current Opinion in Lipidology*, 13: 3-9.

Hu, F.B. (2008). Physical Activity, Sedentary Behaviors, and Obesity. In: Hu FB, ed. *Obesity Epidemiology*. New York: Oxford University Press.

Ibrahim, A.M., Ali, A.M. & Sivarajan, F.E. (2010). Predictors of obesity in school-aged Jordanian adolescents. *International Journal of Nursing Practice*; 16: 397-405.

Incledon, E., Wake, M. & Hay M. (2011). Psychological predictors of adiposity: Systematic review of longitudinal studies. *International Journal of Pediatric Obesity*, 6:e1- e11.

Ismail, M.N. (2002). The nutrition and health transition in Malaysia. *Public Health Nutrition*, 5: 191-195.

Ismail, M.N., Vickneswary, E.N. (2000). Prevalence of obesity in Malaysia: data from three ethnic populations. In: Inoue & Zimmet (Eds). *The Asia – Pacific Perspective: Redefining Obesity and its Treatment*. WHO (WRRO)/IASO/10TF: Health Communication Australia.

Ismail, M.N., Chee, S.S., Nawawi, H., Yusoff, K., Lim, T.O. & James, W.P. (2002). Obesity in Malaysia. *Obesity Reviews*, 3:203-208.

Ivarsson, T., Svalander, P., Litler, O. & Nevonen, L. (2006). Weight concerns, body image, depression and anxiety in Swedish adolescents. *Eating Behaviours*; 7(2).

Jacobson, M.F. (2001). Liquid candy: How soft drinks are harming Americans health. Retrieved from http://www.cspinet.org.sodapop/liquidcandy.htm.

John, U., Hanke, M., Rumpf ,H.J., Thyrian, J.R. (2005). Smoking status, cigarettes per day, and their relationship to overweight and obesity among former and current smokers in a national adult general population sample. *International Journal of Obesity Related Metabolic Disorders*, 29:1289 –94.

Keery, H., Van den Berg, P & Thompson, J.K. (2004). An evaluation of the tripartite influence model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image* 1:237-251.

Kerver, J.M., Yang, E.J., Bianchi, L., Song, W.O. (2003). Dietary patterns associated with risk factors for cardiovascular disease in healthy US adults. *American Journal of Clinical Nutrition*, 78:1103–10.

Khor, G.L., Zalilah, M.S., Phan, Y.Y., Ang, M., Maznah, B. & Norimah, A.K. (2009). Perceptions of body image among Malaysian male and female adolescents. *Singapore Medical Journal*; 50 (3): 303.

Kinnear, P.R. & Gray, C.D. (2010). *PASW Statistics Made Simple*. New York: Psychology press.

Knauss, C., Paxton, S.J. & Alsaker, F.D. (2007). Relationships amongst body dissatisfaction, internalization of the media body ideal and perceived pressure from media in adolescent girls and boys. *Body Image*; 4:353-60.

Koletzko, B., Girardet, J.P., Klish, W. & Tabacco, O. (2002). Obesity in children and adolescents worldwide: Current views and future directions-working group report of the first world congress of pediatric gastroenterology, hepatology and nutrition. *Journal of Pediatric Gastroenterology and Nutrition,* 35: 05-12.

Kowalski, K. C., Crocker, P. R. E., & Faulkner, R. A. (1997). Validation of the Physical Activity Questionnaire for Older Children. *Pediatric Exercise Science, 9,* 174-186.

Kowalski, K. C., Crocker, P. R. E., & Kowalski, N. P. (1997). Convergent validity of the Physical Activity Questionnaire for Adolescents. *Pediatric Exercise Science, 9,* 342-352.

Kuczmarski, R.J., Ogden, C.L., Guo, S.S, et al. (2000). CDC growth charts for the United States: Methods and development. National Center for Health Statistics. *Vital Health Statistics,* 11(246). 2002.

Larson, N.I., Story, M.T., Nelson, M.C. (2009). Neighbourhood Environments: Disparities in access to healthy foods in the U.S. *American Journal of Preventive Medicine,* 36 (1): 74-81.

Ledikwe, J H, Ello-Martin, J. A, Rolls, B.J. (2005). Portion Sizes and the Obesity Epidemic *Journal of Nutrition,* 135(4) 905-909.

Lee, Y., Mitchell, D. C., Smiciklas-Wright, H. & Birch, L. L. (2001). Diet quality, nutrient intake, weight status and feeding environments of girls meeting or exceeding recommendations for total dietary fat of the American academy of Pediatrics. *Pediatrics*; 107.

Lemeshow, S., Hosmer, D.W., Klar, J. & Lwanga, S.K. (1990). *Adequacy of Sample Size in Health Studies.* Chichester: John Wiley & Sons.

Lin, B.H. & Morrison, R.M. (2002). Higher fruit consumption linked with lower Body Mass Index. *Food Review*; 25:28-32.

Lob-Corzilius, T. (2007). Overweight and obesity in childhood- A special challenge for public health. *International Journal of Hygiene and Environmental Health*, 210 (2007) 585-589.

Lowes, J., & Tiggemann, M. (2003). Body dissatisfaction, dieting awareness and the impact of parental influence in young children. *British Journal of Health Psychology,* 8: 135-147.

Ludwig, D.S., Peterson, K.E. & Gortmaker, S.L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity. *Lancet*; 357:505-8.

Magarey, A.M., Daniels, L.A., Boulton, T.J.C. & Cockington, R.A. (2001). Does fat intake predict adiposity in healthy children and adolescents 215 years? A longitudinal analysis. *European Journal of Clinical Nutrition*, 55: 471-481.

Makinen, M., Puukko-Viertomies, L-R., Lindberg, N., Siimes, M.A. & Aalberg,V. (2012). Body dissatisfaction and body mass in girls and boys transitioning from early to mid-adolescence: Additional role of self-esteem and eating habits. *BioMed Central Psychiatry*; 12: 35.

Maxwell, M.A. & Cole, D.A. (2009). Weight change and appetite disturbance as symptoms of adolescent depression: Toward an integrative bio-psychosocial model. *Clinical Psychology Review*; 29 (3):260 – 73.

McCabe, M.P., & Ricciardelli, L. A. (2003). Body image and strategies to lose weight and increase muscle among boys and girls. *Health Psychology*. 22: 39-46.

McGloin, M. T., Jeffrey, R. W., French, S. A. & Hannan, P. J. (2001). The relationship between restraint and weight related behaviours among individuals in a community weight gain prevention trial. *International Journal of Obesity*, 25: 574-580.

McNaughton, S. A., Ball, K., Mishra, G. D.5 and Crawford, D. A. (2008). Dietary patterns of adolescents and risk of obesity and hypertension. *Journal of Nutrition,* 138: 364–370.

Mikkila, V., Rasanen, L., Raitakari, O.T., Pietinen, P. & Viikari, J. (2004). Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases: The Cardiovascular Risk in Young Finns Study. European *Journal of Clinical Nutrition*, 58:1038-1045.

Minehira, K et al. (2003). Effect of carbohydrate overfeeding on whole body and adipose tissue metabolism in humans. *Obesity Reviews*; 11(9): 1096-103.

Ministry of Health (MOH), Malaysia. (1997). Second National Health and Morbidity Survey, 1996. *NHMS II Report* 1997.

Ministry of Health (MOH), Malaysia. (2008). Third National Health and Morbidity Survey, 2006. *NHMS II Report* 2008.

Ministry of Health (MOH), Malaysia. (2010a). *National Strategic plan for Non-Communicable Disease (NSP-NCD).* Non-Communicable Disease section, Disease Control Division, Ministry of Health, Malaysia

Ministry of Health (MOH), Malaysia. (2010b). *Malaysian Dietary Guidelines.* National Coordinating Committee on Food and Nutrition, Ministry of Health Malaysia.

Mishra, G.D., Ball, K., Arbuckle, J., Crawford, D. (2002). Dietary patterns of Australian adults and their association with socioeconomic status: results

from the 1995 National Nutrition Survey. *European Journal of Clinical Nutrition*, 56:687–93.

Moy, F.M., Gan, C.Y. & Zaleha, M.K. (2004). Body mass status of schoolchildren and adolescents in Kuala Lumpur, Malaysia. *Asia Pacific Journal of Clinical Nutrition* 13(4): 324-329.

Mustillo, S., Worthman, C., Erkanli, A., Keeler, G., Angold, A. & Costello, E.J (2003). Obesity and Psychiatric Disorder: Developmental Trajectories. *Pediatrics;* 111(4):851-859.

Neumark-Sztainer, D., Paxton. S., Hannan, P.J., Hainees. J., & Story, M. (2006). Does body satisfaction matter: Five-year longitudinal associations between body satisfaction and health behaviours in adolescent females and males. *Journal of Adolescent Health;* 39: 244-251.

Newby, P.K., Weismayer, C., Akesson, A., Tucker, K.L. & Wolk, A. (2006). Long-term stability of food patterns identified by use of factor analysis among Swedish women. *Journal of Nutrition*; 136:626–33.

Nieman, P. & LeBlanc, C.M.A. (2012). Psychosocial aspects of child and adolescent obesity; *Pediatric Child Health*; 17 (3): 205-6.

Norimah, A.K. & Kather, H.M.M. (2003). Nutritional status and food habits of middle-aged adults in selected areas of Selangor. *Malaysian Journal of Nutrition*, 9 (2): 125-136.

Norimah, A.K., Safiah, M., Jamal, K., Siti Haslinda., Zuhaida, H., Rohida, S., … Azmi, M.Y. (2008). Food consumption pattern: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*. 14 (1): 25-39.

Ogden, J. (2003). *The Psychology of Eating: From Healthy to Disordered Behaviour*. Oxford: Blackwell.

Ogden, C.L., Carroll, M.D., Kit, B.K., Flegal, K.M. (2012). Prevalence of Obesity in the United States, 2009–2010. *National Center for Health Statistics Data Brief* No. 82.

Ohring, R., Graber, J.A., & Brooks-Gunn, J. (2002).Girls recurrent and concurrent body dissatisfaction: Correlates and consequences over 8 years. *International Journal of Eating Disorders.* 31:404-415.

Onyike, C.U., Crum, R.M., Lee, H.B., Lyketsos, C.G., Eaton, W. (2003). Is Obesity Associated with Major Depression? Results from the Third National Health and Nutrition Examination Survey. *American Journal of Epidemiology,* 158(12):1139-1147.

Ozmen, D., Ozmen, E., Ergin, D., Cetinkaya, A.C., Sen., Dundar, P.E., Taskin, E.O. (2007). The association of self-esteem and body satisfaction with obesity among Turkish adolescents. *Public Health*, 7 (80): 2458-7-80.

Parsons, T.J., Power, C., Logan, S., Summerbell, C.D. (1999). Childhood predictors of adult obesity. A systematic review. *International Journal of Obesity*, 23, suppl 8, S1-S107.

Paxton, S.J., Schutz, H.K., Wertheim, E. R, & Muir, S. L. (1999). Freindship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviours and binge eating in adolescents girls. *Journal of Abnormal Psychology*, 108: 255-266.

Paxton, S.J., Norris, M., Wertheim, E. H., Durkin, S.J., & Anderson, J. (2005). Body dissatisfaction, dieting and importance of thinness to attractiveness in adolescent girls. *Sex Roles.* 53: 663-675.

Paxton, S.J., Eisenberg, M.E., Neumark-Sztainer, D. (2006). Prospective predictors of body dissatisfaction in adolescent girls and boys: a five-year longitudinal study. *Developmental Psychology*, 42:888–899.

Pi-Sunyer, F.X. (1998). Clinical guidelines on the identification, Evaluation and treatment of overweight and obesity in adults. *The Evidence Report, National Institute of Health Publication;* 98-4083.

Pi-Sunyer, X. (2009).The Medical risks of obesity.*Postgraduate Medicine*; 121(6): 21-33.

Pon, L.W., Kandiah, M. & Mohd Nasir, T. (2004). Body Image Perception, Dietary Practices and Physical activity of Overweight and Normal Weight Malaysian Female Adolescents. *Malaysian Journal of Nutrition*; 10 (2): 131-147.

Population Distribution and Basic Demographic Characteristics. (2010). Department of Statistics, Malaysia.

Puhl, R.M. & Latner, J.D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin*, 133(4):557-80.

Rampal L, Azhar MZ, Senan P, et al. (2004). Questionnaire booklet, *Wellness and quality of life study: tackling lifestyle and health issues using new technologies and novel intervention methods in Malaysia*. Faculty of Medicine and Health Sciences. Universiti Putra Malaysia (UPM), Serdang-Malaysia.

Rampal, L., Rampal, S., Khor, G.L., Zain, A. M., Ooyub, S., Rahmat, R., Ghani, S.N. & Krishnan, J. (2007a).A national study on the prevalence of obesity among 16,127 Malaysians. *Asia Pacific Journal of Clinical Nutrition*, 16(3):561-566.

Rampal, L., Sidik, S. M., Rampal, S., Jie, D.W.I., Lee, C.P., Shya, L.J. & Shun, S. Y. (2007b). Prevalence of overweight among Secondary School Students in Klang District, Selangor. *Malaysian Journal of Nutrition*, 13(1): 1-8.

Rampal, L., Ng K.C., Izzati I. N., Izzati, Z.F., Nazrul, I.M., Faisal, I., Zainiyah, S.Y. (2011). Prevalence of Hypertension among Malay Adolescents in Putrajaya Secondary Schools, Malaysia, 2010. *Malaysian Journal of Medicine and Health Sciences*, 7(2):53-60.

Rehkopf, D.H., Laraia, B.A., Segal, M., Braithwaite, D. & Epel, E. (2011). The relative importance of predictors of Body Mass Index change, overweight and obesity in adolescent girls. *International Journal of Pediatric Obesity*; 6: e233-242.

Reilly, J.J., Methven, E., McDowell, Z.C., Hacking, B., Alexander, D. & Kelnar, C. J. (2003). Health consequences of obesity. *Archives of Disease in Childhood* 88 (9): 748-752.

Ritchie, L.D., Spector, P., Stevens, N.J., Scmidt, M.M., Schreiber, G.B., Striegel-Moore, R.H…Crawford, P.B. (2007). Dietary patterns in adolescence are related to adiposity in young adulthood in black and white females. *Journal of Nutrition*, 137: 399-406.

Rocandio, A.M., Ansotegui, L. & Arroyo, M. (2001). Comparism of dietary fibre intake among overweight and non-overweight school children. *International Journal of Obesity*, 25: 1651-1655.

Rodriguez-Artalejo, F., Giarcia, E.L., Gorgojo, L., Garces, C., Royo, M.A., MartinnMoreno, J.M., Benavente, M., Macias, A. & De Oya, M. (2003). On behalf of the investigators of the four provinces study. Consumption of bakery products, sweetened soft drinks and yoghurt among children 6-7 years: Association with nutrient intake and overall diet quality. *British Journal of Nutrition;* 89:419-29.

Rohrer, J.E., & Rohland, B.M. (2004). Psychosocial risk factors for obesity among women in a family planning clinic. *BioMed Central Family Practice*. 5:20.

Rolls, B. & Barnett, R. A. (2003). *The Volumetrics Weight-Control Plan: Feel Full on Fewer Calories.* HarperTorch New York, NY.

Rosenberg, M. (1965).*Society and the Adolescent Self-Image*. Princeton, NJ: Princeton University Press.

Sahlstein, E. & Allen, M. (2002). Sex differences in self-esteem: a meta-analytic assessment. In: *Interpersonal Communication Research: Advances Through Meta-Analysis.* Edited by Allen M, Preiss RW, Gayle BM, Burrell NA. Lawrence Erlbaum Associates: Mahwah; 59–72.

Scaglioni, S., Agostoni, C., De Notaris, R., Radelli, G., Radice, N., Valenti, M., Giovannini, M. & Riva, E. (2000). Early macronutrient intake and overweight at 5 years of age. *International Journal of Obesity*; 24: 777-81.

Schulz, M., Kroke, A., Liese, A. D., Hoffmann, K., Bergmann, M.M. & Boeing, H. (2002). Food groups as predictors of short term weight changes in men and women of the EPIC-Potsdam cohort. *Journal of Nutrition;* 232: 1335-40.

Schulz, M.B & Hoffmann, K. (2006). Methodological approaches to study dietary patterns in relation to risk of coronary heart disease and stroke. *British Journal of Nutrition*; 95:860–9.

Schwartz, M.B. & Puhl, R. (2003).Childhood obesity: a societal problem to solve. *Obesity Reviews*, 4:57-71.

Serene, T.E., Shamarina, S. & Mohd, N.M. (2011). Familial and socio-environmental predictors of obesity among primary school children in Selangor and Kuala Lumpur. *Malaysian Journal of Nutrition,* 17 (2): 151-62.

Sherina, S.M. & Ahmad, R. (2004). Childhood Obesity: Contributing Factors, Consequences and Intervention. *Malaysian Journal of Nutrition*, 10 (1): 13-22.

Silva, E.R., Bermudez, G.A., Villasmil, J.J., Munoz, M.M., Bracho, M.J. & Esis, C. (2012). Obesity indexes and high blood pressure in Hispanic adolescents. *ASH Annual Scientific Meeting, volume 14, May 2012, Abstract, Supplement. The Journal of Clinical Hypertension,* May 19-22, 2012.

Singh, G.K., Siahpush, M., Hiatt, R.A. & Timsina, L.R. (2010). Dramatic Increases in Obesity and Overweight Prevalence and Body Mass Index among Ethnic-Immigrant and Social Class Groups in the United States, 1976-2008. *Journal of Community Health,* 36(1):94-110

Smolak, L. & Thompson, J.K., (Editors) (2009). *Body Image, Eating Disorders, and Obesity in Youth: Assessment, Prevention, and Treatment.* Washington, DC: American Psychological Association.

Sorof, J.M., Lai, D., Turner, J., Poffenbarger, T. & Portman, R.J. (2004). Overweight, ethnicity, and the prevalence of hypertension in school-aged children. *Pediatrics*, 113; 475.

Spear, B.A., Barlow, S.E., Ervin C, et al. (2007). Recommendations for treatment of child and adolescent overweight and obesity. *Pediatrics*, 120: S254–88.

Stice E, Presnell K, Shaw H. (2005). Psychological and Behavioral Risk Factors for Obesity Onset in Adolescent Girls: A Prospective Study. *Journal of Consulting and Clinical Psychology;* 73 (2), 195–202.

Stevens, J.P. (2002). *Applied multivariate statistics for the social sciences* (4th edition). Hillsdale, NJ: Erlbaum.

Strauss R.S. (2000). Childhood Obesity and Self-Esteem. *Pediatrics*; 105; e15

Stubbs, R.J., Johnstone, A.M., Mazlan, N., Mbaiwa, S.E. & Ferris, S. (2001). Effect of altering the variety of sensorially distinct foods of the same macronutrient content on food intake and body weight in men. *European Journal of Clinical Nutrition;* 55:19-28.

Stunkard, A.J., Sorensen, T and Schalsinger, F. (1983). Use of the Danish adoption register for the study of obesity and thinness. *Genetics Neurology Psychology Disorders*; 60:115-120.

Suzana, S., Aini, M.Y., Shanita, S., Rafidah, G. & Roslina, A. (2009). *Atlas Makanan: Saiz Pertukaran and Porsi: Atlas of Food Exchanges and Portion Sizes.* 2nd edition. (Kedua, E., Ed). Malaysia. KL. MDC.

Sweeting, H., Wright, C., Minnis, H. (2005). Psychosocial correlates of adolescent obesity, 'slimming down' and 'becoming obese'. *Journal of Adolescent Health*, 37 (5): 409.

Tee, E.S., Mohd, I.N., Mohd, N.A and Khatijah, I. (1997). *Nutrient Composition of Malaysian Foods*. 4th edition. Institute for Medical Research, Malaysian Food Composition Database Programme, Kuala Lumpur, Malaysia.

Tee, E.S. (1999). Nutrition of Malaysians: where are we heading? *Malaysian Journal of Nutrition*, 5; 87-109.

Tee, E. S, Khor S.C, Ooi H.E, Young S.I, Zakiyah O, Zulkafli H. (2002). Regional study of nutritional status of urban primary schoolchildren in Kuala Lumpur, Malaysia. *Food and Nutrition Bulletin;* 23 (1), pp 41-47.

Thompson, A. M., Baxter-Jones, A. D. G., Mirwald, R. L. and Bailey, D. A. (2003). Comparison of Physical Activity in Male and Female Children: Does Maturation Matter? *Medicine and Science in Sports Exercise*, 35 (10), 1684–1690.

Thompson, J.K. & Smolak, L. (Editors) (2001). *Body Image, Eating Disorders, and Obesity in Youth: Assessment, Prevention, and Treatment*. Washington, DC: American Psychological Association.

Torrance, B., McGuire, K.A., Lewanczuk, R. & McGavok, J. (2007). Overweight, physical activity and high blood pressure in children: a review of literature. *Vascular Health and Risk Management*, 3 (1) 139-149.

Tremblay, M.S., Willms, J.D. (2003). Is the Canadian childhood obesity epidemic related to physical inactivity? *International Journal of Obesity Related Metabolic Disorders*, 27:1100–5.

Troiano, R.P., Briefel, R.R., Carrol, M.D. Biolostosky, K. (2000). Energy and fat intake of children and adolescents in the United States. Data from the National Health and Nutrition Examination Survey. *American Journal of Clinical Nutrition;* 72 (suppl): 13435-535.

U.S. Department of Health and Human Services. (2012). *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Vámosi, M., Heitmann, B. L. & Kyvik, K. O. (2010). The relation between an adverse psychological and social environment in childhood and the development of adult obesity: a systematic literature review. *Obesity Reviews,* 11: 177–184.

Wadden, T. A., Brownell, K. D., & Foster, G. D. (2002). Obesity: Responding to the global epidemic. *Journal of Consulting and Clinical Psychology, 70,* 510–525.

Wang, F., Wild, T.C., Kipp, W. (2009). The influence of childhood obesity on the development of self-esteem. *Health Reports*; 20 (2):21 – 7.

Ward, K.D., Klesges, R.C., Vander Weg, M.W. (2001). Cessation of smoking and body weight. In: Björntop P, ed. *International textbook of obesity*. Chichester, UK: Wiley & Sons Ltd.

Wardle, J. & Cooke, L. (2005). The impact of obesity on psychological well-being. *Best Practice and Research: Clinical Endocrinology and Metabolism*, 19 (3): 421 – 40.

Waters, E., Swinburn, B., Seidell, J., Uauy, R. (Eds.) (2010). *Preventing Childhood Obesity, Evidence Policy and Practice.* Chichester, UK: Wiley-Blackwell.

Welsh, P., Polisecki, E., Robertson, M. (2010). Unraveling the directional link between adiposity and inflammation: a bidirectional Mendelian randomization approach. *Journal of Clinical Endocrinology and Metabolism;* 95:93–9.

Wertheim, E.H, Paxton, S.J. & Blaney, S. (2009). Body image in girls; In: Smolak, L. & Thompson, J.K., (Editors). *Body Image, Eating Disorders, and Obesity in Youth: Assessment, Prevention, and Treatment.* Washington, DC: American Psychological Association.

Wikepedia: www/en.wikepedia.org/wiki/Petaling-Selangor. Retrieved on 29th August, 2013.

Woodward-Lopez, G., Ritchie, L. D., Gerstein, D. E. & Crowford, P. B. (2006). *Obesity, Dietary and Developmental Influences.* Boca Raton, FL, Taylor & Francis.

World Health Organization. (2000). *Global Strategy for the Prevention and Control of Noncommunicable Diseases*. Geneva, World Health Organization.

World Health Organization. (2003a). Diet, Nutrition and Prevention of Chronic Diseases. *WHO Technical Report Series,* 916.World Health Organization, Geneva, Switzerland.

World Health Organization. (2003b). *Global Strategy for Infant and Young Child Feeding*. Geneva, World Health Organization

World Health Organization. (2004). *Global Strategy on Diet, Physical Activity and Health*. Geneva, World Health Organization, 2004.

World Health Organization. (2007). Development of a WHO Growth Reference for School Aged Children and Adolescents. http://www.who.int/growthref/growth whobull/en.

World Health Organization. (2008a). *School Policy Framework: Implementation of the WHO Global Strategy on Diet, Physical Activity and Health.* World Health organization, Geneva, Switzerland.

World Health Organization. (2008b). 2008–2013 *Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases*. Geneva, World Health Organization, 2008.

World Health Organization. (2009). Global Health risks: *Mortality and Burden of disease Attributable to Selected Major Risks.* World Health organization, Geneva, Switzerland.

World Health Organization. (2010a). *Global Recommendations on Physical Activity for Health*. World Health Organization, Geneva, Switzerland.

World Health Organization. (2010b). Population Based Strategies for Childhood Obesity. *Report of WHO Forum and Technical Meeting.* World Health Organization, Geneva, Switzerland.

World Health Organization. (2011a). *Overweight and Obesity Factsheet*, Department of Sustainable Development and Healthy Environment, World Health Organization, Geneva, Switzerland.

World Health Organization. (2011b). *Global Status Report on Non-Communicable Diseases 2010*, World Health Organization, Geneva, Switzerland.

Yao, M. & Roberts, S. B. (2001). Dietary Energy Density and Weight Regulation. *Nutrition Review*, 59:247-55.

Zalilah, M.S., Khor, G.L., Mirnalini, K., Norimah, A.K. & Ang, M. (2006). Dietary intake, physical activity and energy expenditure of Malaysian adolescents. *Singapore Medical Journal*, 47 (6): 491.