



UNIVERSITI PUTRA MALAYSIA

***ASSOCIATION OF PHYSICAL ACTIVITY IN GREEN SPACE, DIETARY
PATTERN AND CHILD OBESITY***

DOGARA VICTOR ANDREW

FRSB 2018 6



**ASSOCIATION OF PHYSICAL ACTIVITY IN GREEN SPACE, DIETARY
PATTERN AND CHILD OBESITY**

By

DOGARA VICTOR ANDREW

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

November 2017

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DEDICATIONS

First and foremost, I dedicate this research to God almighty for his infinite grace, kindness and mercies throughout my years of study.



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

ASSOCIATION OF PHYSICAL ACTIVITY IN GREEN SPACE, DIETARY PATTERN AND CHILD OBESITY

By

DOGARA VICTOR ANDREW

November 2017

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Faculty : Design and Architecture

Over the past three decades, obesity rates affecting children in Malaysia have been rising rapidly thereby presenting a major public health concern. However green spaces have been seen as an effective environmental component that improves the quality of life. Hence, physical activity in green space and healthy dietary patterns may reduce the risk of obesity. In this guise, this study aims to empirically evaluate the diet and physical activity pattern of the children between the ages 6-12, determine their obesity levels after the first phase and the second phase and investigate the association of diet and physical activity on the body mass index (BMI) of the respondents after the first and second phase respectively.

The research utilize a quantitative experimental study design, and the instruments used for the research is the questionnaire which collects demographic information of the respondents. A researcher's checklist was used to record measurement of height and weight and calculates the BMI of the respondent. Also, a daily physical activity checklist which records the respondents frequency of visits to green space, time spent in green space, and the type of physical activity performed in green space and lastly a diet pattern checklist which records the type of food, fruits, snacks, drinks, the place eaten and the portion sizes of those for every meal of the respondents. Scores were imputed in to SPSS version 21 to evaluate physical activity in green space and diet pattern using descriptive statistics, the level of BMI of the respondents were analyze using paired sample t-test and linear regression model was used to analyze the association of diet and physical activity on the respondents BMI.

A total of 12 respondents participated in the first, second and third phase of the experiment for 180 days respectively. However 3 respondents later withdraw from

participating in the experiment. Nonetheless, the findings show that there was significant decrease in the level of BMI before and after the study. However, vigorous physical activity was found to be associated with bmi at the first, second and third phase while moderate physical activity and time spent on green space was found to be associated with the respondent's bmi at the second and third phase of the study respectively. In addition, the result shows that fruits were associated with the respondent's bmi at breakfast, lunch, and dinner at all phases of the study while drinks were found to be associated with bmi at all meals and at all phases of the study with food and snacks associated with the respondents bmi only at dinner and breakfast for second and third phase respectively. To reduce the rising prevalence of obesity, parent should ensure that their children participate in frequent moderate to vigorous physical activity and should also encourage the intake of more fruits and water along their meals.



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

**PERKAITAN ANTARA AKTIVITI FIZIKAL DI KAWASAN HIJAU,
CORAK DIET DAN OBESITI KANAK-KANAK**

Oleh

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Lebih daripada tiga dekad, kadar obesiti dikalangan kanak-kanak di Malaysia telah meningkat dengan mendadak yang turut menyumbang kepada masalah kesihatan ke atas mereka. Namun begitu, kawasan hijau dilihat sebagai satu komponen alam sekitar yang efektif dalam meningkatkan kualiti kehidupan. Maka, kekerapan aktiviti fizikal di kawasan hijau dengan cara pemakanan dan diet yang sihat mungkin dapat menurunkan kadar risiko mendapat obesiti. Dengan pernyataan ini, kajian ini berharap dapat menilai secara empirikal kaedah diet pemakanan dan kadar aktiviti fizikal dikalangan kanak-kanak berumur antara 6 hingga 12 tahun, mengenalpasti kadar obesiti mereka pada peringkat satu dan dua dan mengkaji kesan diet dan aktiviti fizikal tersebut ke atas indeks jisim badan (BMI) responden.

Kajian ini menggunakan kaedah eksperimen secara kuantitatif dan instrumen yang digunakan ialah soal selidik yang mana demografi responden dikumpul. Satu senarai semak digunapakai dalam merekodkan ukuran tinggi dan berat kanak-kanak tersebut dan indeks jisim badan mereka dikira. Selain daripada itu, aktiviti fizikal harian mereka juga direkodkan dalam senarai semak tersebut dengan mencatatkan kadar kekerapan mereka melawat ke kawasan hijau, jangka masa mereka meluangkan masa di kawasan hijau tersebut dan jenis aktiviti fizikal yang mereka laksanakan di sana. Akhirnya, kadar diet permakanan mereka juga direkodkan dengan mengambilkira jenis makanan, minuman, snek, tempat makan dan saiz makanan setiap makanan. Perisian SPSS versi 21 digunakan untuk menilai secara deskriptif statistik kekerapan lawatan ke kawasan hijau dan kadar diet permakanan, manakala kadar indeks jisim badan (BMI) dianalisa menggunakan kaedah *paired sample t-test*. Kaedah model regresi linear pula digunakan untuk menganalisa pengaruh diet pemakanan dan aktiviti fizikal ke atas indeks jisim badan (BMI) responden.

Seramai 12 responden terlibat dalam ketiga-tiga peringkat kajian yang meliputi eksperimen selama 180 hari berturut-turut. Namun begitu, tiga orang responden telah menarik diri dari menyertai eksperimen ini. Hasil kajian menunjukkan terdapat penurunan yang signifikan pada kadar indeks jisim badan (BMI) responden sebelum dan selepas kajian dilaksanakan serta selepas responden terlibat dalam aktiviti fizikal yang sederhana dan bertenaga. Kadar permakanan buah dan minuman juga memberi kesan ke atas indeks jisim badan (BMI) responden. Justeru, dapat disimpulkan bahawa ibu bapa perlu memastikan anak-anak mereka kerap terlibat dalam aktiviti fizikal dan perlu memastikan anak-anak mereka mengambil buah-buahan dan minuman secukupnya bagi memastikan mereka kurang terdedah kepada risiko obesiti.



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I certify that a Thesis Examination Committee has met on 24 November 2017 to conduct the final examination of Dogara Victor Andrew on his thesis entitled "Association of Physical Activity in Green Space, Dietary Pattern and Child Obesity" 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.

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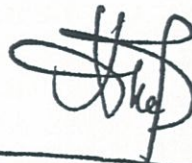
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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance.
BMI	Body Mass Index.
CDC	Center for Disease Prevention and Control.
CABE	Commission for Architecture and Built Environment.
FFQ	Food Frequency Questionnaire.
ILAM	Institute of Leisure and Amenity Management.
KFC	Kentucky Fried Chicken.
NCDs	Non Communicable Disease.
NHANES	National Health and Nutrition Examination Survey.
SSHS	School-based Student Health Survey.
SPSS	Statistical Package for Social Sciences.
UNH	United Nation Habitat.
UNICEF	United Nations International Children's Emergency Fund.
UKM	University Kebangsaan Malaysia.
WHO	World Health Organization.

CHAPTER 1

INTRODUCTION

1.1 Background to the study

The global urban population in 1960 accounted for 34 percent of the total global population, rising to 54 percent in 2014, and keeps on growing. It is projected to increase by approximately 1.84 percent per year between 2015 and 2020, 1.63 percent per year between 2020 and 2025, and 1.44 percent per year between 2025 and 2030 (World Health Organization, 2014). Also, it is estimated that by 2030 a greater part of the population will be leaving in urban areas globally (World Health Organization, 2014). Malaysia is currently developing into an urbanized nation as well, with an expected urban population of 78% by 2030.

According to Gairola and Noresah (2010), many green areas are affected by population increase in the cities and rapid urbanization has continued to isolated people from their natural environment (Wilson, 1984; Miler, 2005). Just as urbanization increases, the need for space for recreation, socialization and relaxation is also increasing subjecting the environment to a lot of developmental pressure. The natural environment is the ultimate foundation of life (Cecily Maller et al 2006). Many researchers have claimed that humans are reliant on nature not only for material needs (foods, water, shelter etc) however, more significantly for psychological, emotional and spiritual needs (Wilson, 2001; Frumkin, 2001; Friedmann and Thomas, 1995; Katcher and Beck, 1987; Wilson, 1984). Contact with the natural environment, especially urban green space may play a significant role in reducing obesity among urban population.

The increasing westernization, urbanization and mechanization occurring in Malaysia and most countries around the world is associated with changes in the diet pattern and leading to lifestyle of physical inactivity whereby most work that requires physical efforts are being replaced by machines (World Health Organization, 2014). This shift is associated with increase in childhood and adult obesity both in developed and developing countries around the world as argued by Swinburn et al (2004); constituting the core public health challenge globally. Worldwide the epidemic of overweight and obesity affecting children in many developed and developing countries are worsening globally. Between 1980, to 2003 the prevalence of overweight and obesity in children and adolescence increase by nearly 50 percent. In 2013, more than 22 percent of girls and nearly 24 percent of boys living in developed countries were found to be overweight or obese (World Health Organization, 2014). Rates are also on the rise amongst children and adolescence in the developing world, where nearly 13 percent of boys and more than 13 percent of girls are overweight and obese. Particularly high rates of child and adolescence obesity were seen in Middle Eastern and North Africa countries, notably

among girls (Institute for Health Matrix and Evaluation, 2016; World Health Organization, 2014).

In 2014, an estimated 41 million (6 percent of the world's population) children under 5 years of age were affected by overweight or obesity (World Health Organization, 2014). 70 million young children will be overweight or obese by 2025 if the current trends continue and the rate of increase is 30 percent higher in low and middle income countries than that of developed countries (World Health Organization 2016). In Africa the numbers of children who are overweight or obese has nearly doubled since 1990, increasing from 5.4 million to 10.3 million. In 2014, of children less than 5 years of age who were overweight, 48 percent lived in Asia and 25 percent in Africa (World Health Organization, 2015). Critically childhood obesity is an obvious predictor of adult obesity if not treated, and have well known health and economic consequences both for the individual and the society as a whole (Ihwin SE, 2014; Nader PR, O'Brien, Houts R, Bradley R, Belsky.J, Crosnoe R, 2006).

A study conducted by Poh et al (2013) claimed that, in the year 2010–2011 in six regions of Malaysia reported 14.4% overweight and 20.1% obesity among urban children aged 7 to 12 years old and the rate is still increasing. In Malaysia, the accessibility of food vendors has influenced the diet pattern of people and also facilitates the people to eat in a circle. Therefore, it is of no surprise that obesity rates in Malaysia is said to be the highest in South East Asia (Malaysian Digest, 23/01/2017). The basis of interventions to treat or prevent this disease is weight loss through lifestyle change, including diets and frequent physical activity within green spaces along with behavioural practice to maintain these changes.

Green spaces surrounding children is claimed to performed an important role on their physical growth and development (Acar, 2014), however raising concern over the spreading out and internal reformation of urban areas in many countries can separate urban dwellers from making contact with green spaces (Wilson, 1984; Miller, 2005; Fuller, 2007). Previous research has suggested that the presence of urban green space as a component of the natural environment in urban areas may to a large extent relieve social problems and provide pleasing environment to urban populace (Kellert and Wilson, 1993; Ulrich, 1991). Urban green spaces are now widely recognized and regarded as major contributors both to the quality of the environment, and human health and wellbeing (Ulrich, 1984; Grahn, 1989; Kaplan and Kaplan, 1988).

Urban green space provides opportunities for direct contact with the natural environment and many researchers note that urban green space is capable of infusing cities with vitality such as environmental, social and economic benefits (Givoni, 1991; Heldt and Neef, 2008; Tzoulas, 2007). More so urban green spaces are one aspect of the urban environment that is of great importance in the daily life of people who lives in urban areas. In children for example contact to greenness has been connected with decrease sedentary behaviours and weight loss (Bell, 2008; Cohen,

2006; Wolch, 2011) which are of great public health importance considering the emerging pandemic of obesity worldwide (Kimm and Oberzanek, 2002; Malecka Tendera and Mazur, 2006). Availability of these green spaces provides opportunities for outdoor physical activities, social contacts and relaxation, and might be an important environmental determinant of the health of urban residents (Magdalena Van Den Berg, et al., 2015).

Urban green space can be generally seen as any terrain mainly covered with vegetation or water that is located within an urban area (Mohd Johari Mohd Yusof 2012). This space can include parks, gardens, playing fields, children's play areas and also derelict and vacant land. Green space is often considered to be an important type of urban land use that can benefit urban dwellers through making their everyday life more pleasant, livable and healthy (Yusof 2012).

1.2 Statement of Research Problem

Globally, the rise in overweight and obesity rates over the last three decades has been substantial and widespread, affecting populations in many developed and developing countries and representing a major health epidemic around the world (World Health Organization, 2014 and Public Health England, 2014). There is also a growing concern that children are becoming inactive, this situation predicts serious health challenges as they grow due to an inactive childhood and adolescence. It is pertinent to note that childhood obesity is one of the twenty first century most serious global health challenges. Better access to and frequent visit of green space within urban areas (example parks, plazas, etc) may encourage physical activity and reduce the risk of obesity amongst children and impact many health and well being benefits.

In 2014, more than 2.9 billion adults 18 years and older were overweight, of these over 600 million were obese. In addition 38 percent of men and 40 percent of women of the world's population were overweight or obese (World Health Organization, 2014). In 2014, 42 million children under the age of 5 years were overweight or obese, representing nearly 30 percent of the world's populations are either obese or overweight, according to a new first of its kind analysis of trend data from 188 countries (Institute for Health Matrix and Evaluation, 2016).

The worldwide prevalence of obesity and overweight has more than double between 1980 and 2014 (World Health Organization, 2014), and no country has achieved success in reducing obesity rates and the epidemic is expected to rise steadily as incomes rise in low and middle income countries particular, unless urgent steps are taken to address this public health crisis (Institute for Health Matrix and Evaluation, 2013). Obesity and overweight are linked to more deaths worldwide than underweight and it is an issue affecting people of all ages and incomes everywhere.

Regionally, countries in the Middle East and North Africa, Central America, island nations in the Pacific and Caribbean have already reached exceptionally high rates of overweight and obesity 44 percent or higher. In 2013 the highest rate of obesity were seen in the Middle East and North Africa, where more than 58 percent of men and 65 percent of women age 20 or older were found to be either overweight or obese. More than two thirds of the countries in the region had overweight and obesity rates over 50 percent in adult men and women (Institute for Health Metrics and Evaluation, 2016).

Looking at individual countries, the highest proportion of the world's obese people 13 percent live in the United States, China and India together represent 15 percent of the world's obese population. Conversely, in developing countries, where almost two thirds of the world's obese people currently live, increases are likely to continue (Institute for Health Metrics and Evaluation, 2016). Particularly, Malaysia has been labeled as a country that has the highest obesity problem in South East Asia, and the 6th in Asia (The Star, 2012). Malaysia known as Asia's fattest country recorded an increase in its obesity rate according to the national health and morbidity survey of 2015, obese Malaysians make up 17.7 percent of the population while those who are categorized as overweight make up 30 percent. What is more worrying is that 38 percent of them were children (World Health Organization, 2009) and almost all countries in the world are plagued with this problem. The rising prevalence of overweight and obesity amongst adults and children in Malaysia is as a consequence of fast development. As a developing nation, Malaysia has experienced a shift from under nutrition to over nutrition within the periods of thirty years (World Health Organization, 2014). The period of industrialization in modern time has certainly transformed the life style of Malaysians. As a result, Lee et al (2015) suggested that a lot of people are growing up in an environment that promotes weight gain and obesity, physical inactivity and more time are spent on screen based or sedentary leisure activity. As a result, children are being exposed to ultra processed, energy dense, nutrient poor foods which are cheap and readily available for consumption.

Also, the prevalence of overweight and obesity among children aged 6 to 12 years old in Malaysia has increased from 20.7% in year 2002 to 26.4% in year 2008 and more than 48.5% girls and 46.4% boys reported spending more than 3 hours a day in sedentary activities School-based Student Health Survey, 2013 (SSHS). Obesity is seen as a huge emerging problem and sedentary lifestyle which is lack of daily physical activity contributes to the obesity epidemic and (Wafa et al., 2013), claimed that the level of physical activity is exceptionally low in Malaysian children. There is the need to investigate whether the frequency of visits to green space, diet pattern reduces overweight and obesity among primary school children in Malaysia.

1.3 Research Question

1. What are the current obesity levels among children age 6-12 years in Malaysia?
2. What are the children daily diet and physical activity patterns in Malaysia?
3. Does the children diet and physical activity patterns influences obesity in Malaysia?

1.4 Research Aims and Objectives

The research aim and objectives of this study are:

Research Aim

This study aims to investigate the association between frequency of physical activity in green space, diet pattern and obesity among children 6-12 years old.

Research Objectives

1. To evaluate the children daily diet and physical activity pattern.
2. To determine obesity level among children aged 6-12 years.
3. To examine the association of the children diet and physical activity on obesity.

1.5 Hypothesis

This section considers the assumption that Physical activity in green space and diet pattern may impact on obesity. In harmony to this statement the following supposition forms a basis for investigation in this research.

1. There is no difference in the mean of children daily diet and physical activity for the two phases.
2. Physical activity in green space and diet may reduce obesity.

1.6 Limitation of Study

A major limitation in this study is the difficulty to get the approval and consent of parents to allow their children participate in the study, and also as a result of the researcher being a non Malaysian decent. Hence the study also relied on self report of parent for children in the daily children's diet and physical activity checklist. Nevertheless the researcher was always available to answer any questions or concerns from parent of the respondents.

However, another limitation is that the sample of the study may not be representative of all obese children in Malaysia because of the sample size, and the duration of the study which lasted for 6 months thereby also contributing to the difficulty of getting parents consent in allowing their children participate in the study. Recruitment of the study was done through purposive sampling, being an experimental study rather than random sampling; nevertheless, selecting a random sample of all obese children may have increased the study's potential of being more representative of the general population of obese children in Malaysia.

Furthermore, another limitation of this study is the difficulty of the parents to record the physical activity pattern i.e. time spent on green space and the type of activity engaged in by the children as well as the diets pattern i.e. the type of food eaten and the portion size of meals as well as the time meals were eaten. It was reported in this study that majority of the respondent drinks more of plain water and have their meals at home.

1.7 Thesis Structure

This thesis consists of five (5) chapters, and a possible publication plan was thought of when writing the thesis. The result of chapter three (3) and four (4) will provide and allow the extraction of thesis materials for the publication of academic literatures.

Chapter one (1) outlines the research focus, statement of problem, research questions, and sets of research objectives to answer the research questions mentioned earlier. It further explains the research scope and limitation thereby restricting the age range of respondents from 6-12 from which data could be obtained. Chapter two (2) is a rundown of the literature review, this explore previous research and literatures that have been conducted in different areas relating to this study. Hence, being a cross disciplinary project, this research covers a variety of different disciplines and subject areas.

Furthermore, chapter three (3) discusses the quantitative experimental method approach of the research. It examines the questionnaire and checklist and the reasons for employing the questionnaire and checklist, the structure and administration of both the questionnaire and checklist. Chapter four (4) contains data analysis and discussion of findings from the data obtained from the respondents. Chapter five (5) contains discussions of the summary of major finding, policy implication, recommendation and conclusion.



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