



HOUSEHOLD FOOD INSECURITY AND
NUTRITIONAL STATUS OF SCHOOLCHILDREN IN
KUANTAN PAHANG

BY

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ABSTRACT

The emerging problem of childhood obesity and food insecurity in Malaysia is now becoming a major public health concern. There is a clear need to understand the prevalence of childhood obesity and its relationship with food security status; however, the understanding of this phenomenon is still lacking due to scarcity of local data. To address this gap, this study was undertaken to explore the prevalence of obesity among schoolchildren and to investigate its relationship with socio-demographic and economic characteristics. This study adopted a different approach in the methodology whereby, the entire database was linked to Geographical Information System (GIS) to create maps. In this cross sectional study, weight and height was measured in the sample of schoolchildren aged 7 and 13 years. Questionnaire was used to collect socio-economic and demographic information. The household food security phone call survey was done in 128 selected households. The validated Radimer/ Cornell Food insecurity questionnaire was utilized to assess food insecurity. This study revealed that the prevalence of obese, overweight, underweight, stunting, and wasting were 14.9%, 11.2%, 9.4%, 8.6% and 7.2% respectively. This study found that, schoolchildren living in large household size were two times higher to be overweight/obese (OR=1.785, b=0.58, p=0.04). The findings from mapping schoolchildren nutritional status revealed that, there were clusters pattern of overweight/obesity found in Kuala Kuantan (urban area). Likewise, the distribution of stunting was seen to be overlapping with the distribution of overweight/obesity children. About 23% of the households were food secure, while 77% experienced food insecurity. Out of food insecure category, 52% were household food insecure, 9% women were individual food insecure and 16% fell into the child hunger category. This study also revealed that, the proportions of overweight/obese children among food insecure households were higher compared to food secure groups. However, this study failed to prove the direct association between food insecurity and obesity. The results warrant the need for further investigation to identify the possible complex interaction of food insecurity and childhood obesity. Health intervention programmes should include food security into consideration based on its adverse implications towards public health.

خلاصة البحث

سعى هذا البحث إلى تحديد مدى توافر التقنيات الرقمية في المدارس الابتدائية العامة و استخدامها في تدريس مادة العلوم من وجهة نظر معلمي العلوم في مدينة حائل، المملكة العربية السعودية. ركز هذا البحث أيضا على قابلية تطبيق نموذج قبول التكنولوجيا. ووضعت عينة تطبيقية عشوائية من 330 من معلمي ومعلمات العلوم (145 ذكور و 185 إناث). تم تطوير أداتين لجمع البيانات؛ كان أول أداة قائمة مرجعية ذاتية متقدمة لمعرفة البيانات المتعلقة بتوافر التقنيات والتسهيلات الرقمية في المدارس الابتدائية في مدينة حائل، المملكة العربية السعودية، و كانت الاداة الثانية عباره عن استبيان اقتبس من ثلاث دراسات. لوحظ في النتائج أن هناك نقص حاد في توافر مرافق التكنولوجيا الرقمية في جميع المدارس الابتدائية للبنين والبنات التي شملتها الدراسة. استخدام المعلمين للتقنيات الرقمية في التعليم والتعلم يتأثر بعدة عوامل، وهي الدعم الإداري وقلق الكمبيوتر والتمتع. تفاوتت توفر وسائل التقنيات الرقمية داخل نطاق المدارس الابتدائية في مدينة حائل. ضمن وسائل التقنيات الرقمية الاثني عشرة المتناولة في هذا البحث لم تتوافر سوى أربعة منها في جميع المدارس. ويؤكد هذا البحث على أن الدعم الإداري والاستمتاع التي يشهدها المعلمون والمعلمات لديهما علاقة طردية مع متغير مدى الفائدة المرجوة فيما يخص استخدام التقنيات الرقمية. بالإضافة إلى ذلك فإنه يؤكد على أن الرهبة او القلق من الحواسيب لدى معلمي ومعلمات مادة العلوم لها علاقة عكسية مع متغيرمدى سهولة الاستخدام فيما يخص استخدام التقنيات الرقمية. وقد وجد البحث بأن النية في الاستخدام تؤثر على الاستخدام الفعلي للتقنيات الرقمية داخل المدارس الابتدائية. وجد أيضا أن مدى سهولة الاستخدام المدركة والاستمتاع يؤثران على نية معلمي ومعلمات مادة العلوم في استخدام التقنيات الرقمية في المدارس الابتدائية. بالرغم من ذلك فإنه يبدو بأن مدى الفائدة المرجوة لا يؤثر على نية معلمي ومعلمات مادة العلوم في الانتفاع من التقنيات الرقمية في المدارس الابتدائية. أظهرت هذه النتائج أن هيكله نظرية قبول التكنولوجيا TAM تؤثر تأثير مباشر على السياقات المتعلقة بكل من الدعم الاداري والقلق تجاه الكمبيوتر والتمتع والفائدة المدركة من الاستخدام وسهولة الاستخدام المدركة ونية الاستخدام والاستخدام الفعلي للتكنولوجيا الرقمية. كذلك النتائج تدل على نجاح التمديد المقترح للنموذج في تحقيق أهداف هذه الدراسة.

APPROVAL PAGE

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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LIST OF ABBREVIATIONS

BMIAZ	BMI-for-age Z-score
EPU	Economic Planning Unit
e.g.	(example gratia); for example
<i>et al.</i>	(et alia); and others
Fig	Figure
FAO	Food and Agriculture
GIS	Geographic Information System
IQR	Inter Quartile Range
RMT	Rancangan Makanan Tambahan
SPSS	Statistical Package for Social Science
S.D.	Standard Deviation
USA	United States of America
U.N	United Nation
WHO	World Health Organization
WAZ	Weight-for-age Z-score
WHZ	Weight-for-height Z-score

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

One of the most fundamental human needs is food. Food supplies all the energy needed as well as the essential nutrients which are required by the body to achieve the optimum level of human development. The most critical stage in human development occurs during early years of life. Thus, when the food supply is insufficient, children are the most vulnerable group that will be affected.

The household access to food depends on many factors such as income and the ability to get food. Household food availability determines individual food intakes and the issue becomes crucial when children are concerned. People who are constantly living in inequality environment may be highly exposed to poverty and hunger. In fact, researchers had documented that children who were growing up in poverty too often were susceptible to have poor nutritional status, unhealthy development and poor school performances.

Identifying the ongoing unpleasant situation, in 1996 and 2000, the World Food Summit as well as the Millennium Summit, world leaders work together to reduce poverty and hunger by half by 2015. However the goal did not reach the target as only 20% of the total hunger and poverty was reduced. To realize this intention, ready access to a safe and affordable food supply has been acknowledged as a human right (Food and Agricultural Organization, 2015).

According to FAO (2002), “Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and

nutritious food that meets their dietary needs and food preferences for an active and healthy life", "while food insecurity is a situation that exists when people do not have adequate physical, social or economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2002). Not having consistent access to food sources that are nutritious and affordable is a denial of basic needs.

Not only in poor countries, this problem also occurs in developed and developing countries, including Malaysia. The alarming rate of food insecurity in Malaysia and its consequences as documented in the literature have been a great concern among public health practitioners. The present study contributes toward the pool of knowledge in terms of providing a better understanding on the extent of food insecurity and its consequences in Malaysian population.

1.1 BACKGROUND OF STUDY

The co-existence of dual form of malnutrition (under and over nutrition) in developed and developing countries including Malaysia has been reported (Haddad, 2001). The emerging problem of over-nutrition (overweight/obesity) and food insecurity in Malaysia is now becoming a major public health concern. There is a clear need to understand the prevalence of overweight/obesity and its relationship with food security status; however, the understanding of this phenomenon is still lacking due to scarcity of local data.

This study was conducted in Kuantan, Pahang. The research work had started since August 2014 and was completed in January 2015. The district of Kuantan had been identified as the largest district in Pahang with various socio economic and demographic backgrounds. Thus, this study was conducted to explore the prevalence

of malnutrition and to investigate its relationship with certain community-level characteristics. This project incorporated a different approach in the methodology, whereby, the entire database was linked to Geographical Information System (GIS) to create maps and community profiles.

The sampling frame involved schoolchildren aged 7 and 13 years old. The survey was conducted using a cross sectional study approach and data were collected through nutritional survey and phone call food security interview.

As the cause of overweight/obesity is complex, there is a need for nutritionist to explore different angles when searching for the evidence. For instance, food insecurity could be potential cause that can be directly or indirectly affect children's body weight status. Yet, since Malaysia has limited studies on food security, this led to a project to conduct an investigation on food security and nutritional status among schoolchildren in Kuantan, Pahang.

1.2 RESEARCH PROBLEM

This thesis focuses on nutritional status of schoolchildren in Kuantan, focusing more on overweight/obesity and its relationship with food security. Over the past decades, public health researchers were focusing on the issues of hunger, food insecurity and under nutrition thus research on food insecurity and its relationship with childhood obesity remains unexplored. Obesity has always been related to overeating. Nevertheless, not having enough food may also leads towards obesity (Adams et al., 2003; Townsend et al., 2001)

In Malaysia, over and under nutrition is reportedly coexisting due to rapid socio-economic development of the country. Schoolchildren may also be at high nutrition risk. However, their nutritional status is poorly documented. In relation to

that, Nutrition Society of Malaysia (NSM) had initiated the My Breakfast study among 8705 primary and secondary schoolchildren in 2013. The findings reported that 6.4% were thinness, and 7.2 % were stunting (NSM, 2015). Moreover, the third Nutritional Health and Morbidity survey III (NHMS, 2006) has documented that 12.9% of children were reported as underweight and it is better compared with other neighboring countries (Khor et al., 2009).

The global prevalence of underweight children has declined from 25% in 1990s to 14.3% in 2014 (UNICEF, 2015). Similarly, the global trend in stunting prevalence and numbers affected has been decreased between 1990 and 2014. Stunting prevalence declined from 39.6% to 23.8% and numbers declined from 255 million to 159 million (UNICEF, 2015).

In contrast, obesity among children is on the rise. While comparing the prevalence of obesity from National Health and Morbidity Survey (NHMS) 2006 to NHMS 2011 and NHMS 2015, the prevalence of childhood obesity escalates from 5.4%, 6.1% to 11.9% respectively. Additionally, according to South East Asia Nutrition Survey (Poh et al., 2013), the prevalence of overweight was 9.8% and obesity 11.8%, higher than thinness 5.4% and stunting 8.4%. Similarly, a survey carried out in 2008 among primary school children in Kuala Lumpur recorded that 17.9% were overweight and 16.4% were obese. The prevalence of obesity was also found to be significantly higher among boys (25%) than in girls (9.5%) (Khor et al., 2011).

Based on the studies mentioned above, underweight and stunting seems like a subsiding issue whereas overweight and obesity is still up trending and the upward trend of obesity is quite alarming.

While the studies mentioned above provided an insight into nutritional status in Malaysia, unfortunately the available data is still limited. To address this gap, the aim of this study is to identify the nutritional status of schoolchildren and to investigate its relationship with socio-economic and demographic characteristics.

This present study also emphasizes the capabilities and potential of Geographical Information System (GIS) in nutrition-health field. In developed country, GIS has been widely used as a tool for decision makers to structure national health policies and programs aimed to improving nutritional status among various populations. Additionally, the ability to visualize information on a map can facilitate stakeholders and policy makers for policy planning. The results are also useful for planning, implementing and monitoring intervention programs, as well as assessing clusters of cases to help identify possible etiological factors.

1.3 RESEARCH QUESTIONS

1. What is the prevalence of schoolchildren nutritional status in the district of Kuantan?
2. Do socio-economic and demographic contribute to childhood obesity and food insecurity?
3. What is the distribution of nutritional status among schoolchildren in relation to geographical area across the district of Kuantan?
4. Does household food insecurity contribute to childhood obesity?

1.4 JUSTIFICATIONS

The relevance of conducting this study is based on two main reasons. Firstly, research on food security is quite new in public health field in Malaysia. Therefore it is a great

challenge to find out for indicators and its consequences to nutritional outcome among schoolchildren. In fact, this study highlights an important issue which serves as progression towards forecast of malnutrition. The co-existence of under and over nutrition in one community is clearly evident. However, the existing data is still limited in terms of explaining the situation. Underweight is seems like a subsiding issue but overweight and obesity has captured attention in the public health area nowadays. In fact, it is believed that this study is the first in developing nutritional database of schoolchildren and adolescents in Kuantan, Pahang.

Secondly, the use of the Geographical Information System (GIS) and spatial analysis in Malaysia is still in infancy stage especially in the study to identify the relationship between food security and nutritional status. The ability and capability of GIS to integrate the spatial data with health related data makes it possible to virtually identify areas of need. Health intervention towards nutritional status can be facilitated by investigating and providing evidence in terms of the relationship between nutritional status, food insecurity and geographical characteristics.

1.5 OBJECTIVES

1.5.1 General objective

To study household food insecurity and nutritional status among schoolchildren in Kuantan district and visually map the findings using GIS.

1.5.2 Specific objectives

- 1.** To determine nutritional status of schoolchildren in Kuantan, Pahang.
- 2.** To assess socio-economic and demographic factors contributing to childhood obesity and food security status.
- 3.** To identify the distribution of nutritional status of schoolchildren using Geographical Information System (GIS).
- 4.** To identify household food security status and its relationship with childhood obesity.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter provides reviews regarding important topics addressed in this study. There are three sub-topics divided in the chapter. Firstly, food security will be reviewed in detail. Secondly, details on current schoolchildren's nutritional status will be reported. Lastly, the abilities and capabilities of GIS in health will be explained.

2.1 FOOD SECURITY CONCEPTS AND DEFINITION

The food security issues were firstly discussed during the declaration of Human rights in 1948, which recognized the right to food is the root element to achieve adequate standard of living. The public concerns of food security expanded rapidly after World Food Summit in 1974.

The first definition of food security was concern about the availability of world's food supplies. Food security was defined in the 1974 World Food Summit as "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuation and prices" (UN, 1975). Food security became an important issue in 1983 and the definition of food security was expanded to take into account the accessibility of food for all people at all times. During that time, the United Nations Food and Agriculture Organization (FAO) defined food security as "ensuring that all people at all times have both physical and economic access to the basic food that they need" (FAO, 1983).

Later, in 1986 the World Bank focused on the temporal dynamics of food insecurity (i.e., transitory and chronic food insecurity). The transitory food insecurity occurs in time of crisis due to natural disasters or economic collapse. The chronic food insecurity exists continuously and it is associated with poverty and low incomes. Then, food security is further elaborated as an "access for all people at all times to enough food for an active and healthy life" (World Bank, 1986).

By the mid-1990s, food security was recognized as a significant concern from the individual to the global levels. The 1996 World Food Summit adopted more complex definition of food security which includes food accessibility and availability at the macro and micro levels as well as the quality of food intakes (Norhasmah et al., 2010). Food security, at the individual, household, national, regional and global is achieved when all people have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle at all times (Maxwell, 1996).

In 2002, FAO refined the definition of food security as a situation that exists when "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life at all times" (FAO, 2008). To date, this definition remain constant and still being used by the committee .This latest definition includes the social aspect which emphasize that food should be assessed in socially acceptable way such as purchase from market and not through the socially unacceptable ways such as stealing or obtained from welfare.

A part from that, the definition of food insecurity was developed by the Life Science Research Officer (LSRO). Food Insecurity exists whenever the availability of nutritionally adequate, safe foods or the ability to acquire personally acceptable food

in socially acceptable ways is limited or uncertain (LSRO, 1990). Therefore, food security and food insecurity are measured on the same spectrum where food insecurity happens in the absence of food security and vice versa.

The operational definitions of food insecurity vary between the international organizations. One of the most comprehensive definitions describes food insecurity as "the limited or uncertain availability of nutritionally adequate, safe foods or the inability to acquire personally acceptable foods in socially acceptable ways" (Bickel et al, 2000). This general definition noted that food insecure individual may have one or several of the following characteristics, namely; 1) insufficient quantity of food; 2) limited diversity of food groups; 3) poor safety of food; and 4) procurement of food in socially unacceptable ways such as stealing from market, begging from charity, exchanging sex for food, and other illicit activities (Bickel et al., 2000).

Based on a study by Radimer (1992), there are four components to the concept of food insecurity that can be applied in the household and individual dimension namely quantity, quality, psychological acceptability and social components. Both quantity and quality related directly to food. The nutritional aspects of food such as calories, carbohydrate, fat, protein, vitamins and minerals directly refers to the quality components. Quantity component refers to the depleted quantities of food such as running out of food supply in the household or inadequate food intake as individual. The psychological components include food anxiety as worrying about whether the food supply would last and having no other choice about food.

The social components of food insecurity refers to whether the household food was acquired in socially acceptable way such as purchased from market and not through the socially unacceptable ways such as stealing or obtained from the welfare. In short, at the household level, measures of food insecurity include households food

supplies, quality and safety of available foods, anxiety about food supplies, and sources of food (Anderson, 1990). In contrast, at the individual level, measures of food insecurity include adequacy of energy intake, adequacy of nutrient intake, feeling of deprivation and normal meal pattern. This study focused on measurement of food security at the household level.

There are several terms that are closely related to food insecurity such as hunger, under-nourishment (food insufficiency) and malnutrition which are briefly explained in Table 2.1. Although food insecurity is linked to hunger, it is important to differentiate between socioeconomic and biological aspects of the two terms (Campbell, 1991). Hunger is defined as the painful or uneasy sensation caused by lacked of food (Anderson, 1990) and therefore may become potential but not necessarily a consequence of food insecurity. In addition, hunger is associated with individuals but food security or insecurity could be characteristics of nations, communities, households or individuals (Campbell, 1991). Food insecurity has been defined in many ways and perspectives and it is allowed to do so without stretching its definition (Campbell, 1991).