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# Development and Evaluation of Let's Eat Smart: a Pilot School-Based Nutrition Intervention for Elementry School Children in Kuwait

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# DEVELOPMENT AND EVALUATION OF LET'S EAT SMART: A PILOT SCHOOL-BASED NUTRITION INTERVENTION FOR ELEMENTRY SCHOOL CHILDREN IN KUWAIT

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ABSTRACT

Due to nutrition transition, the prevalence of childhood obesity is increasing significantly worldwide especially in affluent developing countries such as Kuwait. Obesity is associated with adverse chronic health conditions and financial burdens which provides an incentive for prevention. The objective of the study was to examine the effectiveness of a multi-component school-based nutrition intervention designed to improve healthy eating knowledge, attitudes, self efficacy and dietary behaviors among fourth and fifth graders in Kuwait. The Let's Eat Smart program was based on the social cognitive theory and used short interactive lessons, DVD sessions, posters, food models and parental letters to promote a healthy lifestyle message among fourth and fifth graders. Let's Eat Smart was delivered to 110 students in the English Playgroup and Primary School. Surveys and 3-day food-records were collected on pre- and post-intervention. Surveys assessed nutrition knowledge, attitudes, dietary behaviors and self efficacy while diet records were analyzed to examined intake of food groups. Additionally, program evolutions were collected on post-intervention. A paired t-test was used to analyze the change from pre- to post-intervention. Eighty four students completed all requirements of the program and were included in the quantitative analysis, while 95 students were included in the qualitative analysis of the program evaluation. After the intervention, students reported high levels of knowledge ($p < .0001$), positive attitude toward a healthy lifestyle ($p < .04$) and higher levels of self efficacy toward healthy eating ($p < .01$). There was no significant change in dietary practices assessed in the survey except for fast food consumption where there was a significant decrease in consumption after the intervention ($p < .001$). Diet-records analysis showed a significant increase

in fruits intake ($p < .02$) and vegetables intake ($p < .001$) after the intervention. The overall students' evaluation of the program was positive as 90.5% were satisfied and would like to have more nutrition lessons. Due to its apparent impact on children, Let's Eat Smart is an effective school-based intervention approach to address prevention of childhood obesity in Kuwaiti schools.

# DEDICATION

This thesis is dedicated to my beloved husband Youssif al-Hassan and my precious daughters Nada and Fatima. Without their motivation and tolerance, this project would never have been completed. Your love carried me through.

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CHAPTER I

## Introduction

The literature indicates that lifelong eating habits are shaped by early childhood and the social environment in which the child is fed (Nicklas & Johnson, 2004). Since dietary preferences start during childhood years, establishing healthy habits early will decrease the chance of becoming overweight or obese in adulthood (Davis et al., 2007; Veugelers & Fitzgerald, 2005a). Childhood obesity is a worldwide problem and a major public health concern. There is a great need for prevention strategies to tackle the problem of childhood obesity as it has reached epidemic proportions in many countries. A report by the World Health Organization on population-based prevention strategies for childhood obesity estimated that 43 million children under the age of five will become overweight by the end of 2010, with 35 million of them in developing countries (World Health Organization [WHO], 2010).

In the Middle East, the prevalence of childhood obesity has become exceptionally high especially among the affluent populations in the Arab Gulf Region (Al-Sendi, Shetty, & Musaiger, 2003; El-Hazmi & Warsy, 2002). Childhood obesity is a serious contributor to chronic disease and will grow to be a serious healthcare burden particularly in countries with a larger percentage of children in the population. Kuwait, one of the Arabian Gulf countries, has 25.8% of its population under the age of 15 (Central Intelligence Agency [CIA], 2011).

With the prevalence of childhood obesity increasing worldwide, a considerable amount of research has investigated the effectiveness of school-based nutrition intervention programs. Schools are consistently recognized as a logical place for health promotion and education (Center of Disease Control & Prevention [CDC], 1996; Stallings, Yaktine, & Institute of Medicine, 2007). The American Dietetic Association acknowledges the responsibility of dietetic professionals to develop empirical methods to begin prevention of chronic disease early in life (Nicklas & Johnson, 2004).

Helping children in Kuwait to understand why their small bodies need nutritious food can be challenging. It cannot be assumed they would understand why making healthy food choices matters. In order for the young population to conceptualize the message of making healthy food choices to eventually develop healthy eating habits, it is important to use an effective multi-component intervention that specifically addresses the needs of Kuwaiti children. According to Bergman (2010) an effective nutrition education program must: focus on specific behaviors, grasp the interest of the audience and motivate them, permit enough time to attain positive outcomes, develop and deliver a structured sequential curriculum and address the child's environment, not only at school but also at home. Ideally, a multi-component school-based intervention program, for elementary school students, that is theory-based can be very resourceful. Developing a theory-based school intervention that incorporates nutrition education, physical and social environments development, and a parental involvement would be the most appropriate path in teaching children how to maintain healthy habits throughout their lives (McArthur, 1998; Hyner, 2005; Ritchie, Crawford, Hoelscher & Sothern, 2006).

In 2005, The Center for Nutrition Policy and Promotion, an organization of the U.S. Department of Agriculture, released the MyPyramid Food Guidance System for children

focusing on promoting a healthy lifestyle and advancing and promoting healthy dietary guidelines (United State Department of Agriculture [USDA], 2011). MyPyramid is a food guide pyramid that is widely recognized as a tool for nutrition education in United States. Other countries have adopted similar guidelines to educate the public. Under the supervision of the Ministry of Health in Kuwait, the Nutrition Education Department has developed and utilized nutrition education materials for children that are mainly based on the MyPyramid (Kuwait National Programme for the Prevention of Obesity, 2010). Even with the use of these education materials during sporadic lectures and talks in Kuwaiti schools, there has been no scientific study completed on the effectiveness of teaching concepts from MyPyramid in elementary schools. Thus, the purpose of this study was to develop and evaluate a multi-component school-based nutrition intervention program (i.e., Let's Eat Smart) based on the Social Cognitive Theory (SCT). The intervention principally consists of interactive lessons that primarily utilize MyPyramid resources. The program intend to: increase nutrition knowledge, improve attitude and self efficacy toward healthy eating and enhance dietary behaviors among Kuwaiti elementary school children.

**Research Question**

Would a school-based nutrition education program for fourth and fifth graders in Kuwait, be effective in increasing healthy eating knowledge and promoting healthy dietary behaviors?

**Hypothesis**

A multi-component school-based nutrition intervention would improve healthy eating knowledge, attitudes, self efficacy and dietary behaviors of fourth and fifth graders in Kuwait.

**Specific Aims**

A. The different intervention components (curriculum, class activities, home sent letters, posters and DVD session) will be evaluated for practicality and effectiveness.

B. Students in this intervention will:

    1. Increase their nutritional knowledge in four topic areas: Energy Balance, My Pyramid, portion size and healthy snacking.
    2. Report more positive attitude toward healthy eating lifestyle.
    3. Increase their self efficacy toward healthy eating.
    4. Enhance their dietary practices.
    5. Enhance their dietary intake of food groups represented in MyPyramid.

CHAPTER II

# Review of Literature

## Definition of Childhood Obesity

Because childhood is a critical period when the human body is in a dynamic growth state, it is difficult to determine clear cut-offs for defining obesity and overweight in children. Even though there is no specific international definition for childhood obesity, throughout this paper the term "childhood obesity" is used to explain a condition of having excess body weight associated with immediate or later in life chronic diseases. In the United States, the terms "at risk of overweight" and "overweight" are preferred when referring to children with excess body weight and medical risks (Centers for Disease Control and Prevention [CDC], 2009).

In children overweight and obesity can be assessed using measurements that reflect body weight or body composition. Body Mass Index percentiles (BMI percentiles) are a commonly used measure for determining overweight and obesity in children. BMI is a measure of a child's weight and height (i.e., weight in kilograms divided by the square of height in meters). The BMI percentiles are age and gender specific due to the fact that body compositions changes with growth and growth rates differ between boys and girls (CDC, 2009). BMI is a measure of excess body weight rather than excess body adiposity, but it is considered a moderately sensitive and specific indicator of excess adiposity in children (Freedman & Sherry, 2009). This is because usually children above certain weight-for-height cutoffs are characterized as having both: excess body adiposity and excess body weight (Kuczmarski & Flegal, 2000).

The Centers for Disease Control (CDC) has defined overweight as at or above the 95th percentile of BMI for age and defines being at risk for overweight as between 85th to 95th percentile of BMI for age (Kuczmarski et al., 2002). Researchers in European countries have classified childhood overweight as being at or above 85th percentile and childhood obesity as being at or above 95th percentile of BMI for age (Flodmark, Lissau, Moreno, Pietrobelli, & Widhalm, 2004). International Obesity Taskforce (IOTF) gave overweight and obesity in childhood an international definition by relating growth charts and cut-off points to the WHO's adult BMI criteria (Cole, Bellizzi, Flegal, & Dietz, 2000). The new definition was based on pooled international data from several countries. According to Cole et al. (2000) BMI cut-off points for overweight and obesity in children aged 2-18 years are gender specific and defined to pass through body mass index of 25 and 30 kg/m2 at age 18. The rationale behind the IOTF cut-off points' development is to perform a valid international comparison of data in regard to obesity prevalence worldwide rather than to be used in a clinical setting.

Measurement of body weight is not reflective of body composition. Excess weight in some children who have bigger stature or have an athletic body might be explained by having excess lean body mass rather than excess body fat (McArdle, Katch & Katch, 2010). Measurement of body fatness and composition is more reflective and predictive of chronic diseases associated with obesity. In a study by Williams et al. (1992) that examined the skin fold thickness for 3320 children aged 5-18 years, children were classified as fat if their body fat percents were at least 25% for girls and 30% for boys. Unlike the well defined BMI percentile cut-off points, which measures excess body weight, there is no agreement in the literature on cut-off points for excess body fatness when examining overweight or obesity in children.

**Prevalence of Childhood Obesity Worldwide**

Many industrialized countries such as the United States recognize childhood obesity as a national problem. According to the National Center for Health Statistics (2009) the prevalence of obesity among children 6-11 years old in United States increased from 6.5% in 1980 to 17% in 2007. In the literature, there has been considerable evidence, mostly from industrialized countries, that childhood obesity has become a major public health problem that needs to be addressed through preventative interventions (Ebbeling, Pawlak & Ludwig, 2002).

Although, the increase in childhood obesity has become a worldwide phenomenon including both industrialized nations and developing nations, the greater increase has been in economically developed and urbanized populations (de Onis & Blossner, 2000; Wang & Lobstein, 2006). Lobstein, Baur, & Uauy (2004) evaluated obesity in children for the International Obesity Taskforce and estimated the prevalence of overweight and obesity among school-age children worldwide to be approximately 10%. Specifically, for different regions of the world, the highest prevalence of childhood obesity was in the Americas (32%), Europe (20%) and the Middle East (17%) respectively. This calls for the need of effectual international, regional and local interventions to deal with the childhood obesity problem.

Kuwait is considered one of the Arab Gulf developing countries in the Middle East region. According to the CIA (2011b), the Middle East region is defined by 19 countries and the State of Kuwait is one of them. The location of Kuwait on the world map in regard to the Middle East region is presented in Figure 10 in Appendix A. In a systemic review of the literature from 1950-2007 on childhood obesity in developing countries, Kelishadi (2007), established that the highest prevalence of childhood obesity was found in Eastern Europe and the Middle East (Kelishadi, 2007). The obesity levels in preschool children in some countries of the Middle East

(i.e., especially the affluent countries in the Arab Gulf area of the Middle East) are as high as the numbers found in United States (Martorell, Khan, Hughes, & Grummer-Strawn, 2000).

The Arabian Gulf countries; Kuwait, Kingdom of Saudi Arabia (KSA), Bahrain, Qatar, United Arab Emirates (UAE) and Oman, all characteristically face the problem of childhood obesity due to the lifestyle change upon oil discovery in the area in the last decades (Figure 11 in Appendix A). The problem of obesity in the Arab Gulf Region of the Middle East became a major public health concern starting two decades ago (Al-Awadi, Rahman, & Thomas, 1990; Musaiger, 1978).

Studies in UAE showed high proportions of obesity among children (Malik & Bakir, 2007; Zaal, Musaiger & Souza, 2009). A sample of 4381 Emirati adolescents aged 5-17 showed that, 21.5% of them were overweight and 13.7% of these were obese (Malik & Bakir, 2007). Another recent cross sectional study carried out among 661 adolescents in UAE found that, the proportion of overweight in boys was 18.5% and obesity was 22.2%, and the proportion of overweight in girls 13.1% and obesity was 20.5% (Zaal et al., 2009). Among the adolescent population in Qatar, a recent study found that the prevalence of overweight and obesity based on the IOTF cut-off points was respectively, 28.6% and 7.9% in boys and 18.9% and 4.7% in girls (Benar, 2006). Also, a study based on IOTF criteria in Bahrain found that the overall prevalence of obesity was 15% in boys and 18% in girls (Al-Sendi, Shetty, & Musaiger, 2003). In a comparative study among children, in KSA, the investigators found that the overall prevalence of childhood overweight was 10.7% in boys and 12.7% in girls, and the prevalence of obesity was 6% in boys and 6.7% in girls (El-Hazmi & Warsy, 2002).

**Childhood obesity in Kuwait.** The prevalence of obesity in Kuwait is among the highest in the Arab Gulf region (Moussa et al., 1999). In reference to ITOF cut-off points, childhood obesity prevalence in Kuwait is higher than in the United States (International Association for the Study of Obesity [IASO], 2011). In the United States, 35% of boys and 35.9% of girls are considered overweight or obese (Lobstein & Jackson-Leach, 2007). In comparison, in Kuwait 45.6% of boys and 44.9% of girls are obese or overweight (Al-Isa, 2004). The study by Al-Isa (2004) was performed among adolescents aged 10–14 years (n= 14659) in Kuwait and revealed a very high prevalence of overweight (31.8% of girls and 30.0% of boys) and obesity (13.1% of girls and 14.7% of boys). When compared with the US National Center for Health Statistics reference population, the body mass index of Kuwaiti adolescents exceeded that of American adolescents in each percentile category at or above the 50th percentile (Al-Isa, 2004).

In another cross-sectional study by Al-Isa & Moussa (2000) assessing the nutritional status of 6-10 years old Kuwaiti school-age children compared with a NCHS//CDC American reference population, the authors found Kuwaiti children to be heavier and shorter than the referenced American children. Moreover, 15.7% males and 13.8% females in the study were obese, and there was a greater significant change in fatness than in tallness among the Kuwaiti children over a decade (i.e., from 1985 to 1995).

Al-Shammari et al. (2006) in a cohort study examined changes in physical characteristics and obesity risk in 6-13 years old school-age Kuwaiti children (n=1536) over the last several decades to investigate the impact of environmental risk factors associated with the nutritional transition. In this matched cohort, they found that a present-day sample of children in 2004 were taller and heavier than their counterparts were in 1984 (20 years ago), with a significant upward shift in BMI in both boys and girls. Similarly, there was a significant excess of energy intake

above estimated total daily energy expenditure for both boys and girls. Thus, indicating that for such a genetically homogeneous population, hereditary predisposition alone cannot explain these observations. The findings of Al-Shammari et al. (2006) supported earlier evidence that environmental risk factors including lifestyle changes, lack of physical activity and unhealthy food choices related to rising household income are contributory to the childhood obesity problem.

**Contributors of Childhood Obesity**

Chronic diseases associated with obesity are an emerging public health concern in the Middle East due to the rapid rise in its risk factors. Dietary and lifestyle patterns among the young population living in the Middle East has changed and led to the emergence of diet-related chronic diseases. This is due to urbanization, economic development and transition from a traditional diet to a more fast food-based westernized diet (Galal, 2003; Musaiger, 2004). At the present time, younger generations in the Middle East are less likely to consume healthy food compared to older generations. Also, the younger population in the Middle East has the highest energy intake and obesity rates when compared to other developing countries (Galal, 2003).

More children are at a particularly high risk of obesity in developing countries especially those prosperous due to transition in nutrition and physical activity lifestyle. According to Popkin (2003) this can be explained by the nutrition transition phenomenon which happens in three stages: the receding famine stage, then the degenerative disease stage and last the behavioral change stage. The famine stage (i.e., characterized by low-variety diet, labor intensive lifestyle, high mortality and high prevalence of communicable diseases) begins to recede with economic growth. Some of the other causes of this transition are urbanization, increase leisure time and food processing. After that the society go through the degenerative disease stage were a

shift toward a sedentary lifestyle and an increase in food intake occur and lead to obesity and, therefore, an increase in chronic degenerative diseases. As a result of this degenerative disease stage, the society will be compelled to take measures to overcome the problem, and this leads to the behavioral change stage. In this stage, a shift toward a healthy diet and an active lifestyle occur and in return it would reverse the negative trend of obesity and extend healthy aging (Popkin, 2003).

Even though economic prosperity in some developing countries improved food security and decreased communicable diseases, the nutrition transition was associated with adverse health effects including childhood obesity. More food items that are high in fat and sweets content are readily available in developing countries at the present time. Overconsumption of these energy-dense food items among children is due to the increased perceived tastiness of these items and their abundance in the food supply (Drewnowski & Popkin, 1997). The population of the Arab countries in the Gulf region adopted a more sedentary lifestyle and their diet changed noticeably over the last two decades with a more noticeable increase consumption of fat, meat, sugar, rice and wheat flour than before (Musaiger, 1993). Kuwait is considered one of the developing prosperous countries. This calls for health educators in the country to consider preventative efforts in order to combat the childhood obesity trend and shift the society toward the behavioral change stage.

**Contributors of childhood obesity in Kuwait.** The rise of childhood obesity is fundamentally dependent on the shift toward an energy-dense diet that is high in fat and sugars but low in nutrients, and a drift toward a sedentary lifestyle (World Health Organization [WHO], 2010). During the last two decades, several important transformations have occurred in the epidemiological profile of the Kuwaiti population. Life expectancy has increased from 70.3 years

in 1980 to 77.9 years in 2010 (United Nations Department of Economic and Social Affairs, 2009, p.73). This epidemiological transition accompanied a shift from infectious to chronic diseases. An increased intake of processed foods rich in fats, sugars, and salt and low in dietary fiber and a decrease in physical activity, all known risk factors for obesity, have also increased considerably (Alawadi & Amine, 1989; Musaiger, 1993).

Most Kuwaitis lead sedentary lifestyle due to the considerable changes occurred in lifestyle, such as nutritional practice and physical activity, since the first shipment of oil in 1946 and the surge in oil prices of the 1970's, especially in the intervening years between the 1980's and the 1990's (Al-Isa, 1995). Kuwait has been transformed into a super-affluent society with rapid modernization (Kamel & Martinez, 1984). Obesity is known to be more prevalent in affluent societies undergoing modernization which can be recognized as a possible cause for adopting the developed world problems associated with obesity in such societies (Garrow, 1975; Bindon & Baker 1985). Al-Isa (1997) explained the increase in obesity prevalence among Kuwaitis was possibly due to modernization, affluence, increased food consumption and the associated changes to sedentary lifestyles.

There are several factors that specifically reflect lifestyle patterns among Kuwaitis that can be linked to childhood obesity. For instance, frequent gatherings with extended families and friends are a regular affair. During these times, individuals are consuming more fat, meat, sugar, rice, and wheat flour than usual (Musaiger, 1993). In addition, Kuwait's climate is like that of a dry desert (i.e., intensely hot summers and short cool winters) which may discourage children from indulging in regular exercise. Kuwait's rapid growth and socioeconomic developments have a negative impact on healthy behavioral practices among the Kuwaiti population (Al-Isa, 2003). Prior to the discovery of oil, there were natural checks and balances such as hard manual

labor like sailing, fishing and pearl-diving that protected against disease associated with metabolic syndrome. At present, the rising income levels in Kuwait have led to a more sedentary lifestyle, over-reliance on motor vehicles and fast foods and poor food choices among school-age children. If these present trends are allowed to continue, the impact on the health service would be enormous. These significant shifts in an otherwise homogenous population within the last two decades seem to confirm an impact of the demographic and epidemiological transition on nutritional risk (Al-Isa, 2003).

Beside the surplus of calorie-dense food being contributory to childhood obesity in Kuwait, there is an improper public perception of what is an appropriate diet. People would usually associate food rich in fat, sugar and salt as being good and tasty food (Al-Moussa, 1996). There might be a link between fast food consumption and childhood obesity trend in both developed and developing countries especially when considering the composition of fast food as being a risk factor chronic disease such as cardiovascular diseases and diabetes. Fast foods characteristically are energy dense, high in sugar content, high in saturated and trans-fat and larger in portion sizes. Moreover, they are low in fiber, antioxidants, minerals and vitamins (Slavin, Martini, Jacobs, & Marquart, 1999; Hu, van Dam, & Liu, 2001).

**Consequences of Childhood Obesity**

According to Lee (2009) Morbidities linked to childhood obesity do not only pose a direct impact on the health of obese children during childhood, but also elevate their chance of suffering from these chronic diseases during their adulthood life (i.e., being obese during childhood is linked with a higher likelihood of obesity, premature death and disability in adulthood). In Kuwait, coronary heart disease is recognized as the most common cause of death among adults, with an approximate 50% increase in mortality rate because of heart disease from

1972 to 1981 (Kurtz, 1984; Radovanovic, 1994). In another study among 3003 adult Kuwaitis 20 years of age and older, the prevalence of non-insulin dependent diabetes was 14.8% (Abdella, Al-Arouj, Al Nakhi, Al Assoussi, & Moussa, 1998).

In addition to increased future risks of chronic diseases such as coronary heart disease and diabetes, overweight children may experience breathing difficulties, high risk of fractures, elevated blood pressure, insulin resistance, early markers of cardiovascular disease and psychological effects (WHO, 2005). Chronic diseases, mainly cardiovascular diseases, diabetes, cancers and chronic respiratory diseases, are a growing global burden. A report in 2005 by the World Health Organization estimated 35 million deaths worldwide (60% of all deaths globally) to be due to chronic diseases and projected an increase by a further 17% over the next 10 years. Moreover, the report indicates that increasingly younger people are developing these chronic diseases in urban environments mainly due to unhealthy diet and physical inactivity (WHO, 2005).

Overall, considering the health-related quality of life, overweight children and adolescents scored lower on the emotional, physical and social aspects when compared to children at normal weight (Williams, Wake, Hesketh, Maher, & Waters, 2005). Obese children were more prone to bullying and were categorized as the least-desired friend (Griffiths, Wolke, Page, & Horwood, 2006). Children and adolescents classified as overweight or obese experienced lower psychological quality of life, emotional agony, body image disappointment and lower self-esteem (Huang, Norman, Zabinski, Calfas & Patrick, 2007; Wallander et al., 2009).

## Gap in the Literature

Most of research about childhood obesity conducted in Kuwait reported the prevalence of the problem and was descriptive in nature. The problem of childhood obesity, its prevalence, its possible causes and the risk factors associated with it were all fairly documented in the literature for the Arab Gulf Region. Equally, there is almost no literature testing the feasibility and the effectiveness of health interventions addressing the childhood obesity problem. What is more, considering the scope of the childhood obesity problem in Kuwait, most health educators stressed the urgent and desperate need for effective nutrition health promotion interventions and disease prevention programs especially for youth and children. According to Zaal et al. (2009) intervention programs focused on promoting lifestyle modifications, increasing physical activity and adapting better food habits need to be implemented as soon as possible. Al-Isa (2004) referred to the necessity of intervention programs that focus on educating and motivating adolescents in this region to modify their eating behaviors and increase their level of physical activity. In addition, Al-Shammari et al. (2006) referred to the population in the Arab Gulf area as being in a nutritional transition stage and at an increased risk of noncommunicable diseases unless appropriate interventions are implemented to reverse the trend of obesity.

Cost is another issue to consider. The higher prevalence and expenses associated with the obesity epidemic have made preventive efforts a public health precedence. Countries in the Gulf area need to invest in prevention programs targeting childhood obesity in a step toward reducing the cost of chronic morbidities associated with adulthood obesity. Finkelstein, French, Variyam, & Haines (2004) argued that it is relatively easy to justify on economic grounds the interventions targeting children due to the additional protections that this age group requires. The WHO (2008) recommended promoting healthy diet among children through: establishing food-based dietary

guidelines, enabling children to make educated decisions about their food choices by providing accurate and balanced information, implementing school-based programs in correspondence with WHO's health-promoting schools initiative and investing in preventative behavioral research to prevent noncommunicable diseases. Therefore, school-based interventions in Kuwait that focus on educating students on how to develop healthy dietary habits and be more physically active seems to be a viable promising step toward preventing chronic diseases associated with childhood obesity.

## Prevention

The influence of environmental, psychological and social factor on childhood obesity is critical. Ebbeling et al. (2002) pointed out that funding research that only focuses on the treatment of childhood obesity will not solve the problem as childhood obesity is not caused by an inherent biological defect. Rather, there should be a focus on primary prevention research that would address the lifestyle and environmental factors because they play a major role in combating childhood obesity (Kelishadi, 2007).

Unlike prevention program targeting alcohol and tobacco use, obesity prevention programs are more challenging and exceptional, because eating is essential to life and a message in obesity prevention programs would be about balancing food consumption rather than prohibition or cessation or limitation as in the case of tobacco or alcohol prevention programs (Dorfman, Wilbur, Lingas, Woodruff, & Wallack, 2005).

**Promoting healthy lifestyle and healthy eating.** The endorsement of healthy eating is considered essential approach of health promotion especially for strategic legislative programs that are considered with public health (Niva, 2007). Promoting healthy eating, as a favorable behavioral outcome among children, better serves and strongly relates to the purposes of obesity

prevention. Rather than endorsing restriction of bad dietary habits, it is more useful to learn about positive influences that could be introduced into a young person's life, because habitually it is difficult to remove a detrimental influence (Backman, Haddad, Lee, Johnston, & Hodgkin, 2002). There is no consistent definition of healthy eating in the literature, but generally it refers to a well balanced diet that is rich in fiber, fruit and vegetables, low in fat and sugar, constitute of appropriate average total energy intake and reflect consistent healthy eating habits (Tsorbatzoudis, 2005; Hewitt & Stephens, 2007). In a review by Davis et al. (2007) examining evidence provided by behavioral interventions linked to childhood obesity, the authors demonstrated that the literature show sturdy evidence in favor of: family meals, smaller portion sizes, limiting dining out especially at fast food restaurants, eating breakfast regularly, consumption of a calcium rich diet, eating a diet high in fiber, eating fruit and vegetable according to MyPyramid recommendations, limited consumption of sweetened beverages and being physically active for at least 60 minutes each day.

According to Melanson (2008) a healthy diet for children must consist of vegetables, fruits, whole grains, low-fat dairy, beans and lean sources of meat. Foods and beverages that are calorie-dense and low in nutrient should be consumed in moderation and only as a part of the child's discretionary calorie allowance. MyPyramid is a color coded food guide for Americans designed to provide general recommendations of food group consumption. The MyPyramid recommended-intake of food groups can be further personalized to be age and gender specific (Marcoe, Juan, Yamini, Carlson, & Britten, 2006). For school-age children the pyramid: is called MyPyramid for Kids, illustrates color coded food groups with an emphasis on regular physical activity and provides resourceful educational classroom materials that can be used by schools and health educators (French, Howell, Haven, & Britten, 20006). Further, French et al. (2006)

pointed out that the main focus of MyPyramid for Kids was to emphasize the points of: meeting daily calorie and food group requirements, having at least three meals and two snacks, restricting diet that is high in fat and sugars and exercising for 60 minutes daily. The challenge now is to develop innovative ways for disseminating the new MyPyramid to the general public, specifically among children.

Proper consumption of foods from each food group in the MyPyramid is essential for optimal health. Promoting healthy dietary habits, such as increasing fruit and vegetables intake and reducing fast foods consumption have vital effects on public health especially children (Rasmussen et al., 2006; Kelishadi, 2007). Fruits and vegetables help to prevent chronic disease (Ness & Powles, 1997; Reddy & Katan, 2004). Also, The American Academy of Pediatrics supports the promotion of healthy dietary practices that encourage moderation instead of overconsumption and accentuate healthful choices rather than restrictive eating patterns (Krebs et al., 2003).

In a study by Melnik, Rhoades, Wales, Cowell, & Wolfe (1998) dietary habits were evaluated among second ($n$ = 693) and fifth ($n$ = 704) grade students in New York, using house hold questionnaires and 24-hour recalls. Diets records were evaluated in relation to the Food Guide Pyramid and 5 A Day and illustrated an under-consumption of vegetables, fruits and grains, while milk and meat consumption met the recommendations (Melnik et al., 1998). The authors found that: school lunch participation, meal skipping, meal preparation by the child, and socio-demographic characteristics all influenced food habits. These findings indicate the need to tailor nutrition education intervention to specifically address the dietary practices of the targeted population.

**Intervention at an early age.** As lifestyles and behaviors are established early in life, it is important to focus early on adoption of health-conscious behaviors by young people. Special attention and early intervention may be considered for children and adolescents in school as overweight problems developed at this stage may be present during adulthood with adverse health outcomes. A 40-year weight history and adult morbidity and mortality cohort study of overweight children by Di Pietro, Mossberg & Stunkard (1994) found a marked increase in the BMI between post-puberty and age of 25 in subjects who consequently died, developed cardiovascular disease, and particularly who were diagnosed as diabetic concluding that that obesity during adolescence may persist in adulthood with adverse major health risks. Studying obesity during childhood is significant since the detection of children who may become obese during adulthood can aid in early intervention and avoidance of the adverse health effects related adult obesity (Moussa et al., 1999). A study carried out to measure adherence and barriers to lifestyle recommendations among adult patients with high cardiovascular risk factors found that the majority of individuals in the sample were overweight, did not engage in recommended levels of physical activity, and did not follow dietary recommendations (Serour et al., 2007). This further emphasizes the need to intervene early in life since healthy lifestyle adherence in adult populations is not present.

***Early dietary habits.*** Dietary practices are shaped during early childhood. For that reason, tailored nutritional messages that are culturally appropriate and age specific are essential to achieve positive outcomes when considering behavioral development (Doak, Visscher Renders & Seidel, 2006). Establishing healthy eating habits early in life is a major key to childhood obesity prevention. Lytle et al. (1997) explains that knowledge about a healthy eating lifestyle is not sufficient for a child to adopt healthy dietary practices. This is because the

interaction between the child and his social, cultural and physical environment also play a major role in shaping the child eating habits early in life. For health educators to assist children in making informed food choices, they must focus on conveying behavioral nutritional messages and empower children with dietary skills in addition to providing nutrition knowledge (Lytle, 1997). Giving children the opportunity to experience healthy eating in childhood is important. Many habits learned early are carried on to adulthood. According to Cooke (2007) children who are exposed to a large array of healthy foods can easily adopt and follow healthy diets during childhood which prove that children's intake and preference of food are highly influenced by their dietary experience.

***School-age children.*** Targeting school-age children in a classroom environment to convey nutrition knowledge and skills, provide students with tools to make healthy decisions. Students in fourth and fifth grade are at an appropriate age; to comprehend nutrition information and to make informed decisions about their food and beverage choices (Willeford, Splett, & Reicks 2000; Caballero et al. 2003; Robertson & Zalles, 2005). At this age (i.e., usually 8 to 11 years old) students become more autonomous in their food choices but are still young where their lifestyle attitudes and behaviors can be shaped and influenced. A study comparing fourth, fifth and sixth graders found that younger students had greater nutrition knowledge gain and more of them were making healthier food choices. This advocate that the younger the students are, the greater is their readiness to learn and the more likely they are to change behavior as a result of what they learned (Willeford, Splett, & Reicks, 2000).

**Consideration of parental influence.** It is crucial for parents to comprehend the importance of a healthy lifestyle for their children because parents largely influence their children food choices (Hesketh, Waters, Green, Salmon, & Williams, 2005). Parents are

considered the gatekeepers when it comes to providing food for the household and play an important role in developing their children eating habits. Therefore, educating families and increasing their awareness about the influence they have in the development of their children's lifelong food and physical activity habits are effective strategies for promoting a healthy lifestyle (Bergman, 2010; Epstein, Myers, Raynor, & Saelens, 1998; Epstein, Paluch, Gordy, & Dorn, 2000; Krebs, Jacobson, & American Academy of Pediatrics [AAP], 2003). In an effort to control childhood obesity, the American Academy of Pediatrics provides noteworthy recommendations and practical steps for health educators in regard to promoting healthy eating habits and physical activity and discouraging sedentary activities among children. Specifically, they recommend health educators help those who influence children such as parents, teacher and coaches to discuss health habits, proper diet and provide opportunities for regular physical activity. Also encourages parents and schools to: provide healthy food patterns and choices for children, become role models for healthy eating and empower children with autonomy to set appropriate limits on their food intake (Krebs et al., 2003).

Children do not have a total choice over what they eat, but their parents make decisions and cook the food for them. During childhood the family house is an environment where children learn and develop food preferences and eating habits (Perez-Rodrigo & Aranceta, 2001). It is useful to study associated factors with childhood obesity in different populations, since environmental factors play an important role in the development of obesity, and these factors vary from one population to another. Moussa et al. (1999) recommend early preventive measures in children with emphasis on families in which one or both parents are overweight because they found that parental obesity is a risk factor for obesity among children.

Since parental influence appears to determine children's food intake, it is beneficial to include parents when designing a school-based intervention. Sharma (2006) found that all interventions that documented parental involvement successfully influenced obesity indices. Sallis et al. (2003) also focused on parental education by communicating information through school newsletters, posters, and a brochure at open houses and PTA meetings. To communicate healthy eating effectively, nutrition education programs must include: nutritionists, physical activity instructors, parents and teachers in the school setting, who all can be influential to pass healthy behavioral practices to children (Al-Isa, 2000; Zaal et al., 2009).

**School-Based Intervention**

As discussed earlier, the high income developing countries of the Gulf region and countries in the developed world share the same problem and concerns of obesity and nutritional risks associated with it. Risk factors profile and related lifestyle patterns reveal levels generally similar to those in industrialized communities. High fat and cholesterol, lack of physical activity, obesity and hypertension are main factors responsible for the high incidence of diabetes and coronary heart diseases in these countries (Musaiger, 2002).Althouh the literature documents numerous school-based nutritional interventions for developed countries, there are non developed for the Gulf Region. Replicating interventions that have been proven to be successful in a new setting (e.g., Gulf Region Countries) with a similar demographic (i.e., such as age, gender, BMI & physical setting), would be beneficial, provided special cultural and environmental needs of the group were considered.

Evaluation measures used in intervention studies with school-aged children summarized by Contento, Randell & Basch (2002) are general nutrition education, attitudes, behavioral and dietary intakes, behaviorally focused nutrition education, skills, psychosocial variables, food

preferences, physiologic measures and environmental changes. These measures from the literature can be used to implement an effective nutrition school-based intervention in the Gulf region.

Schools provide convenience and practicality to conduct an effective health promotion intervention within a controlled environment and reach a large number of youth. During most of the year children spend six to eight hours in school which positions schools as a logical site for prevention. Schools provide an established setting for health education and prevention programs (Hayman et al., 2004). Schools provide children with: at least one regular meal, physical activity in a productive setting and a chance to learn from health educators about health and nutrition (Davis, Davis, Northington, Moll, & Kolar, 2002).

**Social Cognitive Theory.** Theory provides a systemic way for understanding and studying problems, developing appropriate interventions and evaluating their successes. Theory-based nutrition interventions are more likely to be successful than those developed without the advantages of a theoretical standpoint. This is because theory plays a key role in explaining the dynamics of health behaviors, including the process of changing them and the influence of the many factors that affect health behaviors including psychological determinant of behavior and environmental determinant of behavior (National Cancer Institute, 2005).

Behavior theories, like the Social Cognitive Theory (SCT) offers a comprehensive and structural, theoretical framework for nutrition interventions. It offers a better understanding of the factors that affect changes in human behavior and the mechanism through which learning occurs (McAlister, Perry & Parcel, 2008). For school-age children, programs based on the SCT appeared to be the most effective (Lytle & Achterberg, 1995). When working with a young audience the framework of SCT is particularly beneficial because it acknowledges the impact of

the environment on the child's ability to learn new behaviors. The prevention of poor health habits is less problematic than trying to change these habits once they have become a well-established part of a lifestyle (Baranowski et al., 2000).

According to Bandura's (1986) Social Cognitive Theory, any human behavior such as practicing healthy dietary habits is shaped by a dynamic interaction of personal, behavioral, and environmental influences. Bandura explained this triadic dynamic interaction as being reciprocal in nature. The concept of reciprocal determinism in the SCT emphasize that environmental factors influence individuals and mutually individuals influence their environment and control their own behaviors (McAlister et al., 2008).

Other concepts used by the SCT that can interact and lead to behavior change are outcome expectation, self-efficacy, collective efficacy, observational learning, incentive motivation, facilitation, self regulation and moral disengagement (McAlister et al., 2008). Further, McAlister et al. (2008) explained that the outcome expectations and self-efficacy concepts in the SCT can be categorized as psychological determinant of behavior. While incentive motivation and facilitation concepts are categorized as environmental determinant of behavior. Researchers can use all or some of these theory concepts to design an intervention. Therefore, the main thing when designing nutrition intervention based on SCT is to address personal, environmental and behavioral factors reciprocally (Figure 1).

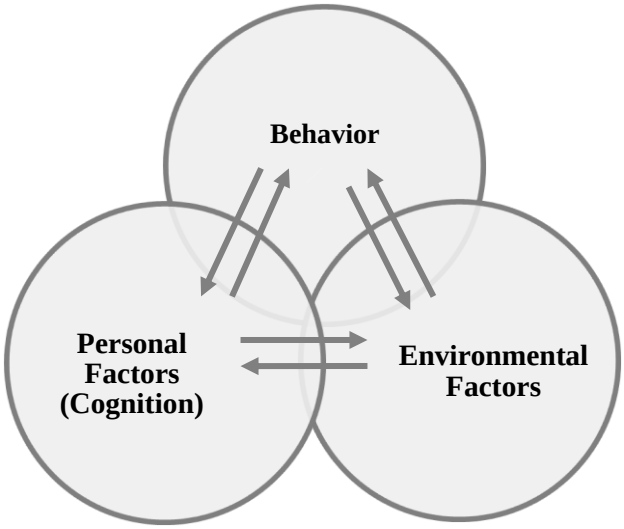


*Figure 1:* Reciprocal determinism concept in Social Cognitive Theory.

Social cognitive models tend to promote behavior change by applying more motivational than volitional processes. Motivational processes occur when a person moves from hoping to change his behavior to willing to do so. While, volitional processes happens when there is planning and the actual behavior is practiced and maintained (Garcia & Mann, 2003). According to SCT, participants in a study must have a behavioral goal. Then, outcome expectations provide the motivation for changing behavior, knowledge ensures the participants know what behavior to perform, self-efficacy provides the confidence for overcoming obstacles, facilitation and motivation provide a premium environment and observational learning offers a chance to model and apply the behavior (Bandura, 1986).

***Outcome expectations and self-efficacy.*** Outcome expectation is defined as person's beliefs about the likely consequences of a given behavior (McAlister et al., 2008). The more positive the outcome is perceived to be, the more likely it is that a child will engage in the behavior of making healthy food choices. Self-efficacy is the belief about personal ability and confidence in performing a given behavior that would lead to favorable outcomes (McAlister et al., 2008). Those with higher self-efficacy are more likely to practice healthy dietary habits and

are better at tackling obstacles (McAlister et al., 2008). Therefore, providing students with the proper nutrition education and tools that would help them practice healthy eating is important because this will give them the confidence to perform the healthy behaviors that they are taught and adopt a healthy lifestyle.

For a child (person) to adopt healthy dietary habits (behavior) in order to become healthy and improve school performance (outcomes), he must believe that a healthy lifestyle will benefit his health and help him perform better at school (outcome expectations) and believe that he is confidently capable of developing healthy dietary habits (self-efficacy). As explained by Bandura (1977) even though outcome expectation and self-efficacy are both being accounted as psychological determinants of behavior, it is important to distinguish between them (Figure 2).

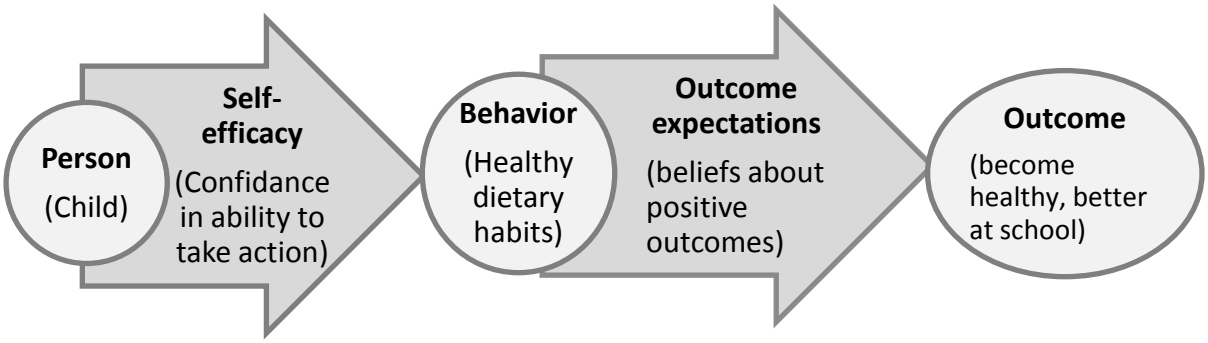


*Figure 2.* The difference between self efficacy and outcome expectations.

***Observational learning and attitude.*** Observational learning construct in the SCT can be a very effective tool when designing a nutrition intervention for children. Observational learning occurs by learning to perform new behaviors through emulating peer models in one's direct environment or through models observed in the media (McAlister et al., 2008). An example of peer modeling is, if a child sees another child being praised by his teacher for eating fruit, he is more likely to eat fruit because doing so may earn praise. Equally influential in observational learning are media models and the use of in-class modeling of healthy dietary behaviors by

health educators. By observing media models children can extract general rules from the observed situation and apply these rules to similar contexts (Bandura, 1986). These rules influence children's behaviors as well their attitude being expressed in a given context (Eyal & Rubin, 2003).

***Incentive motivation & facilitation.*** Modifying the environment can directly affect children's behaviors and vice versa. In order for observational learning to be effective and change a behavior, a supportive environment for the new behavior must be adopted. Both incentive motivation and facilitation are accounted as environmental determinants of behavior. Incentive motivation refers to the use of reward to modify the targeted behavior, whereas facilitation is the use of tools and resources and environmental modifications that would facilitate the targeted behavior (McAlister et al., 2008). Motivation seeks to influence behavior through external control. It is important to find incentives that are attractive and suitable for children. Appropriate positive rewarding system applied by the health educator for school-age children can also play an essential role in promoting a positive learning environment.

**Schools in the Arabian Gulf.** It is critical to evaluate current schools in the Gulf region to facilitate planning of an appropriate intervention that would be effective and produce meaningful results. The following sections will assess schools in the Gulf region and explore reasons for the need for health promotion programs, possible challenges and obstacles that need to be addressed and possible venues that researchers can employ when designing a nutrition school-based intervention.

Education systems in the Gulf region need standardization and regulation of the type of food served in school to promote healthy eating habits and provide nutritious healthy option for school-age children. Higher weight status resulting from eating breakfast at school was observed

by Zaal et al. (2009). This could be explained due to the consumption of caloric-dense foods at schools. Recently, a study by Musaiger & Gregory (2000) found that school cafeterias in Bahrain commonly served foods that are high in caloric content such as thymes bread and sausage sandwiches. Bahraini boys preferred beef burgers, liver and egg sandwiches, while Bahraini girls favored soft drinks, cheese, canned drinks and beans as a morning snack (Musaiger & Gregory, 2000). Snacking all day long on energy-dense foods can be detrimental to health because snacking between meals provides almost 25% of the daily energy intake in some adolescent populations. An effective approach would be to snack on nutrient-dense food as a healthier option (Zaal et al., 2009). Recognizing the situations in which adolescents snack and skip meals may help health educators to develop strategies that would promote healthy dietary habits among adolescents.

In a recent cross sectional study in UAE about the relationship between the dietary habits and behavioral factors to the increased risk of obesity among adolescents, the investigators found that caloric-dense food was significantly associated with obesity in girls. Also, the risk of obesity was high in boys who ate caloric-dense food (Zaal et al., 2009). Missing breakfast was significantly related to female adolescents' weight in the Gulf region as those who skip breakfast tend to consume greater quantities of food at lunch and thereby gain weight (Zaal et al., 2009; Musaiger, 1991). There is a need for nutrition interventions that assess the development of eating habits of local diets that contain adequate, but not excessive calories.

People have become more sedentary in the past decade. Health professionals need to promote a healthy lifestyle and regular physical activity among children. Changes in lifestyle are warranted through changes in the school environment rather than changes in individuals alone. Emphasizing the importance of physical activity sessions in the school to be in weather-

controlled centers, since the weather is hot most of the year in the Gulf region, is an essential step to encourage children's and teacher's participation (Al-Isa, 2000).

**Practicality of school-based interventions.** Early intervention with children that include increasing physical activity, reducing screen time and adhering to healthy eating habits, both at home and in school is an effective approach (Campell, Waters, O'Meara & Summerball, 2001). A comprehensive review meta-analysis of RCTs and clinical controlled trials (published between 1995 and 2007) evaluated the effectiveness of school-based programs in the prevention and management of childhood obesity presented persuasive evidence that at least on the short-term, school-based interventions were effective in reducing the prevalence of childhood obesity. The Longer-running programs had more successful rates than shorter programs. (Gonzalez-Suarez, Worley, Grimmer-Somers & Dones, 2009). Additionally, an article by Sharma (2006) reviewing international school-based interventions for preventing obesity in children published between 1999 and 2005 (i.e., excluding the United States) found most interventions were focused on individual-level behavior change approaches. Also, most of the interventions had experimental designs with at least 1-year follow-up. The recommendations provided by Sharma (2006) are a voluble resource that researchers can use and apply when designing an intervention in an international setting.

Schools provide important opportunities for public health initiatives to tackle the problem of childhood overweight and obesity. Interactive school-based nutrition education program generally produce positive effects concerning students' knowledge and attitudes toward nutrition (Robertson & Zalles, 2005). Schools that promote healthy standards of living by incorporating: health and nutrition education in their curriculum, healthy foods in lunchrooms, physical education classes, trained team, parental involvement and the banning of soft drink sales; had a

better influence on children's diet and reduced overweight by 59% and obesity by 72%. (Veugelers & Fitzgerald, 2005a). Another study by Veugelers & Fitzgerald (2005b) found an association between obesity levels and regularity of physical education classes as having a physical education class two or more times a week at school decreased the risk of overweight and obesity among fifth grade students.

Barlow & Dietz (1998) recommended using family-based and school-based approaches when it comes to childhood obesity prevention because children are somewhat intellectually and psychologically undeveloped and vulnerable to peer-pressure. Exploring the role of schools in obesity prevention Story, Kaphingst, & French (2006) suggested that school-based intervention take three main assortments, namely interventions that, promote healthy dietary practices and discourage unhealthy ones in lunchrooms and from vending machines, emphasize the importance of healthy eating and physical activity by providing health education curricula that support a healthy lifestyle and offer students opportunities to be active in physical education classes and recess time.

To achieve considerable effect when planning nutrition interventions, educators should modify both the physical and social environments directly. (French & Stable, 2003; Powers, Struempler, Guarino, & Parmer, 2005; Doak et al., 2006). According to Bergman (2010) in order for school-based intervention to be successful it must integrates changes to the school environment and curriculum and uses social marketing to promote healthy dietary practices. Further, the author emphasized that the intention of nutrition educators to impact behavior change must be through promoting skill-building that would aid students in adopting a healthy dietary practice (Bergman, 2010). Officials in Kuwait can make use of successful intervention strategies provided by neighboring Arab Gulf countries with similar demographics and culture.

As a part of its “Health Promoting Schools” initiative, Oman promoted nutrition and physical activity education by developing life-skills and physical education curricula, both with strong health messages, which were designed to be integrated into the existing school curriculum. An evaluation of this intuitive indicated that both students and school staff in health promoting schools have better dietary practices and better knowledge of healthy lifestyle and firmer beliefs regarding healthy lifestyle than those in control schools (WHO, 2010).

**Related studies from the developed world.** Children are a remarkable population to study and more promising when it comes to learning healthy dietary practices particularly in a controlled, structured and easily accessible environment such as a school. School-based interventions that involve multi-component measures in their design are usually more effective in dealing with a multifaceted problem such as childhood obesity. Articles reviewed in this paper shows clear evidence of the effectiveness of such multi-component school-based programs.

Designing interventions that emphasize nutritional issues for schools in the Gulf region would be productive if evaluated against other interventions with successful outcomes. The Gimme 5 intervention following 9th graders found a significantly more fruit and vegetable consumption among intervention students than among controls at 1 and 2 year follow-up (Nicklas et al., 1998). Intervention by Nicklas et al. (1998) included several components, such as a media marketing campaign, workshops, and school meal modifications increasing availability, variety, and taste of fruits and vegetables. All such factors possibly would produce similar positive results in the Gulf area.

A diabetes risk-factor prevention program by Trevino et al. (1997) addressed students' social systems (parents, school classroom, school cafeteria, and after-school care). Activities included a nutrition seminar for parents, education for cafeteria staff, and curriculum changes.

The after-school component reinforced classroom learning and promoted physical activity. The intervention resulted in a decrease in dietary fat servings and the number of servings of fruits and vegetables consumed increased. The Heart Smart Program by Hunter et al. (1990) attempted to increase students' self-efficacy for adopting healthy lifestyles for CVH. The program addressed 6 areas: curriculum, school lunch (menu modification), staff development, physical activity, school environment, and parental support. The intervention families showed greater improvements in physical activity and dietary practices compared with the controls (Hunter et al., 1990). Also, Harris et al. (1997) founders of Kansas LEAN school program included modifying school lunches to reduce the percentage of calories from fat, providing nutrition education, and increasing students' physical activity through increased opportunities, intensity, and incentives.

A study by Powers et al. (2005) examined a six week nutrition program that was based on SCT. The researchers studied the effect of the program on nutrition knowledge and dietary practices among elementary school children in second and third grade. The study was a pre-/post- evaluation control group design with a sample of convenience selected from Alabama public schools (N= 1100). The curriculum for classes was based on materials from the Dairy Council, Wellness Inc., and the American Heart Association. The questionnaire included 24 dietary behavior questions and 16 nutrition knowledge questions. The concepts covered in classes that were assessed in the nutrition questionnaire were: dairy intake, fruit and vegetable intake, Food Guide Pyramid knowledge, nutrient-food association knowledge, and nutrient-job association knowledge. The researchers utilized the concept of reciprocal determinism were they taught skills to select healthy food, employed educator to serve as role models in lunchrooms, reinforced the concepts learned by hands-on activities and nutrition messages on bulletin boards.

In contrast to the control group, the treatment group showed a significant increase ($p < .001$) in nutrition knowledge (i.e., including comprehension of Food Guide Pyramid, nutrient-food association and nutrient job association). The study also showed a significant improvement ($p < .001$) in dairy, fruits and vegetables intake in treatment group. Powers et al. (2005) concluded that teaching positive nutrition messages have the potential of improving dietary knowledge and behaviors among children.

In another study among forth to sixth grade students (N= 1172) from rural areas in United States, Willeford et al. (2000) examined a six week nutrition curriculum that incorporated videotapes, experimental procedures and other nutrition learning activities. Nutrition and scientific methods were taught to students through an animal care and feeding project. Teachers volunteered to conduct the lessons and administrated the pre- and post-assessments to evaluate scientific method knowledge, nutrition knowledge and nutrition attitudes. Curriculum materials that were given to teachers included: class room activates manual, videotape, a Food Guide Pyramid poster and food nutrient comparison cards. Teachers were given the choice to implement the lesson based on their interest and feasibility of use in classrooms. All grade levels showed an increase in nutrition knowledge ($p < .0001$) and an improvement in attitude ($p < .0001$). In a comparison between groups, the researchers found that fourth graders had higher gain in nutrition knowledge than fifth and sixth graders which indicate a better readiness to learn among younger groups. Seventy five percent of all participant repotted they were making different food choices on a self-reported behavioral change evaluation. Fourth graders were more willing to make different healthy food choices than fifth and sixth graders with 86% of them reporting that they were making different food choices (Willeford et al., 2000).

In an after-school setting intended for third to fifth graders (N= 157, 61% retention rate), Kelder et al. (2005) designed the CATCH Kids Club after-school program based on the original CATCH program (Coordinated Approach to Child Health elementary school program). The study was based on SCT with a pre-/post-assessment controlled design and was conducted in 16 after-school programs in Texas. According to Kelder et al. (2005) it is difficult to incorporate a program during the busy school-day and an after-school program seemed a viable accessible option. The study focused on helping students to make healthy food choices, increase moderate to vigorous exercise at school and prevent chronic diseases. All program materials were designed to be flexible to implement with clear concise instruction manual. The program included 15 lessons (i.e., 15-30 minutes each) over five 3-week units, nutrition activities and education, snack and physical activity components. The study highlighted the use of modeling, monitoring, goal setting, contracting, building skills, practice and reinforcement in the nutrition education component. The snack component was intended to introduce students to healthy foods through cooking lessons and sensory taste evaluations and the emphasis of fruits and vegetables, whole grains and low-fat dairy intake. The physical activity component consisted of a variety of enjoyable physical activities, plenty of opportunities to practice skills in physical activity and participation of student in exercise for at least 30 minutes daily. Surveys and focus groups were used to assess the intervention effectiveness. As a result of the after-school program, the intervention group showed a significant increase in nutrition knowledge and a marginal increase in fruit and vegetable intake ($p < .10$). Children in the intervention group increased their moderate to vigorous physical activity ($p < .001$) from at post-intervention. Also, students in intervention group and decreased the amount of sitting ($p < .125$) or standing ($p < .072$) when compared to control groups (Kelder et al., 2005). Students' responses were better in the snack

and physical activity component compared to the education component. The researchers concluded that the program was effective, but the training of teachers was challenging and needed to be done routinely.

An interactive school-based nutrition education program identified as Nutrition Pathfinders for third to fifth graders was developed by the Dairy Council of California (Robertson & Zalles, 2005). The aim of the study was reinforcing the Food Guide Pyramid to help students recognize healthy food and physical activity behaviors and eventually practice them to minimize the risk of overweight and obesity. The program was based on SCT and included a CD-ROM, a teacher guide, student workbook and a website to provide students, teachers and parents with tools and support. Student in the intervention group had a 3-day camp experience, where their food choices, physical activity and interactions with other camp students were addressed by the investigators. The study evaluated teacher and students satisfaction with the program, implementation and changes in students' knowledge, attitudes, food intake behavior. The study had a pre-/post-assessment design with a matched comparison group. Student in the intervention group ($n$= 445) were trained to increase play activity, be familiar with Food Guide Pyramid recommendations and choose healthy food deliberately. Seventy six students were in the comparison group. Those who completed the program ($n$= 521) in both groups showed a significant increase in nutrition knowledge ($p < .05$). Eighty seven percent of students in intervention group reported their intention to consume appropriate amounts of food compared to only 75% of those students who were in the control group (Robertson & Zalles, 2005). The researchers concluded that students at third and fifth grade are receptive and still at an early age were their behaviors and attitudes can be influenced. Robertson & Zalles (2005)

highlighted the usefulness of using hands-on learning tools during class period and the interaction and support provide by the program website.

Jan, Bellman, Barone, Jessen, & Arnold (2009) developed and evaluated an obesity prevention program based on the SCT, among 89,736 second to fifth grade elementary school students at 175New Jersey schools. The results obtained from this study were intended to be used for improving the Shape It Up program in the future. The study used a pre-/post- evaluation design for a single sample. Missing and uncompleted surveys were excluded from data analysis. A sample of convenience ($n$ = 6,421) completed surveys at pre- and post-intervention to assess knowledge, attitude toward healthy eating and exercise and the overall impact of the program. Jan et al. (2009) specified that the main aim of the Shape It Up program was to promote healthy eating and exercise through 60 minutes interactive workshops delivered in schools auditoriums and cafeterias. The workshops depended on vivid demonstrations to get children's attention. Some of the main topics covered in the workshops included: healthy portion sizes, Food Pyramid, benefits of eating fruits and vegetables, detrimental effects of soda consumption and benefits of milk and water consumption. Posters in the school environment, a website especially developed for the program and sent home booklets explaining program objectives, were all intended to reinforce the nutrition message learned at school. Jan et al. (2009) found a significant increase in knowledge ($p < .001$) and a more positive attitude ($p < .001$) at post-intervention. Moreover, 91.7% rated the program as being satisfactory with 54.9% of students choosing the highest point on the satisfaction scale. Although the impact of the program is promising, the researchers stressed the need of a comparison group to determine if the results obtained can really be explained by the intervention (Jan et al., 2009).

Another study based on SCT and an ecological model investigated a school-based diabetes intervention program among 122 Native North American students in third, fourth and fifth grades (Saksvig, et al., 2005). The study design was a pre-/post-test design for a single sample. During the program teacher delivered 16 weekly lessons (i.e., each was 45 minutes in length) using a curriculum that focused on healthy eating and physical activity; knowledge, skills development and diabetes education. The family component of the intervention included sent home letters, information booth during parent-teacher meetings and weekly community radio shows. Modifications to the environment included a school-policy of banning high-fat and high-sweet snack in school, while pear modeling was used to reinforce positive learned habits such as children's video cooking club. The study found that because of the exposure to the intervention there was a significant increase in dietary knowledge, intention, preferences and self efficacy. Saksving et al. (2005) pointed out the effectiveness of using culturally adopted and relevant materials in interventions that would address health concern related to certain cultures.

The reviewed above school-based interventions focused on; physical education, enhancing nutrition knowledge, improving students' nutritional intake, assessing social and behavioral factor, emphasizing parental support and promoting environmental supports. All these procedures can be effectively implemented and replicated for schools in the Gulf region with more specific tailoring.

**Validity of food records.** Food records are written documentation of actual intake of the food and beverages consumed during a specific time period, usually three, five, or seven days (Thompson & Byers, 1994). The use of food records in school aged children is considered a valid standard instrument since collecting information at the time of consumption reduces error due to memory loss. A review that examined the reliability and validity of dietary assessment

methods among school children aged 5-18 concluded that the use of food recalls and diet record to measure dietary intake has higher validity than the use of food frequency questionnaires in this age group (McPherson, Hoelscher, Alexander, Scanlon, & Serdula, 2000). Further, McPherson et al. (2000) pointed out the advantages of using diet records as they do not rely on memory, they have a defined record time, intake can be quantified, they can be group administrated and procedure can be automated.

Thompson & Byers (1994) specified that the validity of food records for measuring usual food intake improves with more days of recording, which signifies the need for multiple records to generate a representative sample of usual intake. Moreover, a study designed to investigate three methods of collecting dietary information (i.e., 24-hour recall, 3-day food record, and 5-day food frequency) found that nine to ten years old children who used a 3-day record reported their observed intakes more accurately than did children who used a 24-hour recall or a 5-day food frequency (Crawford, Obarzanek, Morrison, & Sabry, 1994).

According to McPherson et al. (2000) a single food record measures actual intake and is not a suitable tool to predict individual-level health outcomes, rather it is more appropriate for estimating group means. A study that evaluated dietary assessment instruments in adolescents highlighted the need for a short, easily administered, inexpensive, precise instrument that can be used in a broad range of adolescent subpopulations (Rockett, Berkey, & Colditz, 2003). Gillman, Hood, Moore, & Singer (1994) specified that adequate preparation and teaching and the use of appropriate incentives immediately after the recording period motivated fifth grade students to complete multiple days of food records.

CHAPTER III

# Methods

## Study Design

This study was a pilot testing of the Let's Eat Smart program, a school-based nutrition education program with a pre-/post- evaluation design. Twelve interactive lessons were designed to promote healthy dietary habits among fourth and fifth grade elementary school children in Kuwait. The program lessons focused on: increasing nutrition knowledge, improving attitude toward a healthy lifestyle, enhancing self-efficacy for dietary change, and improving dietary behaviors. The pre-intervention data collection phase included nutrition surveys and 3-day food records. In addition, data collected during the post-intervention phase included program evaluation checklists collected during a post-program group evaluation session. The study was approved by the Institutional Review Board of the University of Mississippi and by the Kuwait Ministry of Education (Appendix B).

## Recruitment and Participants

A sample of convenience was selected from several private English teaching schools in Kuwait Capital and recruited for this study. The first school that replied was selected for the intervention. A private school system was chosen because it teaches in English and the materials used for this intervention are for English speaking audiences. Also, private schools include both genders compared to the separate gender public education system in Kuwait. Including both genders better serves the purpose of the study as it is not gender specific.

The English Playgroup and Primary School was the first school to respond. School authorities granted permission for the Let's Eat Smart program to be conducted at their school site (Appendix C). All fourth and fifth graders with English literacy and no known food allergies were qualified for the study. The total number of fourth and fifth grade students in the school was 113 students. The school had three fourth grade classes with 23 students in each and two fifth grade classes with 22 students in each. G Power analysis indicated that a total of 71 subjects was needed in order to obtain a power of 0.80 with an effect size of 0.30 at an α-level of 0.05 utilizing a t-test for two dependant samples (Faul, Erdfelder, Lang & Buchner, 2007).

Prior to the intervention, all fourth and fifth grade students in the school were given a parental consent form to take home (Appendix D). Forms signed by their legal guardian were collected later the same week. Oral assents to participate in the program were also collected from students (Appendix E). During the preliminary data collection week, students filled out the pre-survey during the regular class period (45 minutes). Those surveys were coded with student numbers and administered by the class teacher. Students were allowed enough time to complete the survey and upon completion they were asked to flip through the survey again and record any missing answers. In the same week, students filled out 3-day food records. The intervention lasted for 12 weeks. During the post data collection week students filled out post surveys, 3-day food records and attended a group evaluation session to complete program evaluations. Figure 3 shows the study design and the course of recruitment process.

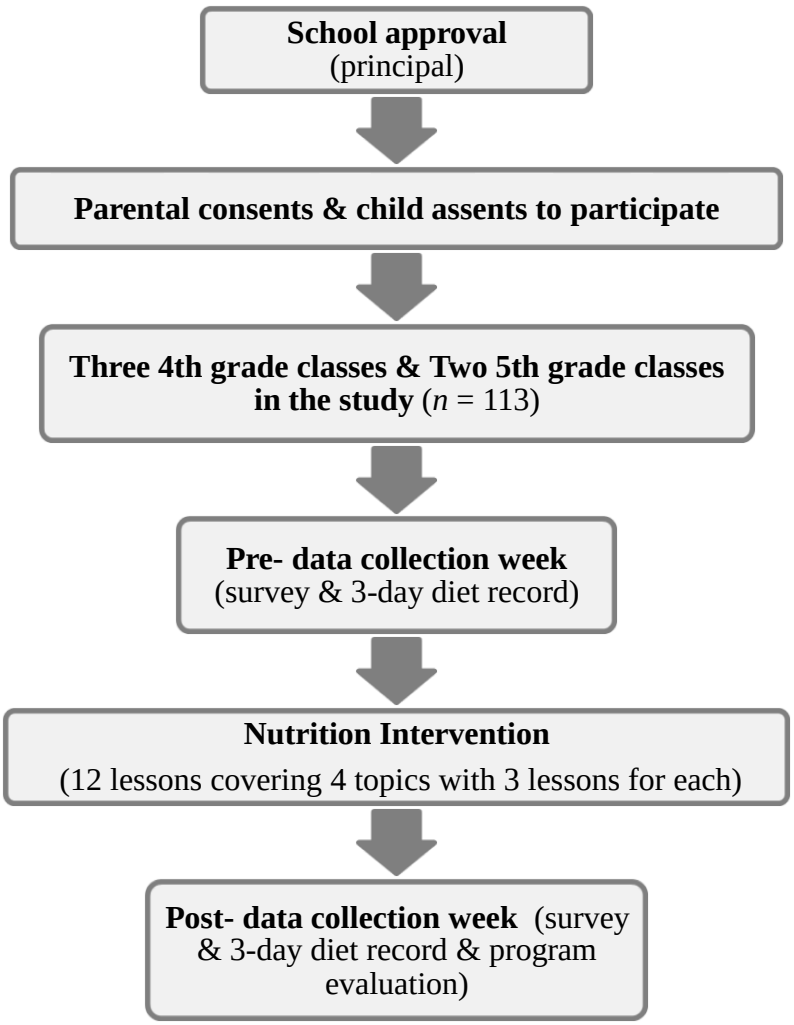


*Figure 3.* Study design and recruitment process.

One hundred ten students from the English Playgroup and Primary School participated in the study. All the 110 students attended at least 9 out of the 12 Let's Eat Smart Classes. Of those included in the study only 84 students completed all components of the quantitative data collection by completing both pre/post surveys and both pre/post 3-day food records. Twenty six students were excluded from the quantitative data analysis because of missing data. Therefore the sample size for the quantitative data analysis was N= 84 students.

Fifteen extra students who completed the post program evaluation checklists but had other missing data (i.e., the number of students' program evaluation checklists that were

completed is N = 95). These extra 15 students were included in the qualitative analysis to get the feedback of those who failed to complete all requirements. Finger 4 explains the process for selecting the final sample size for analysis.

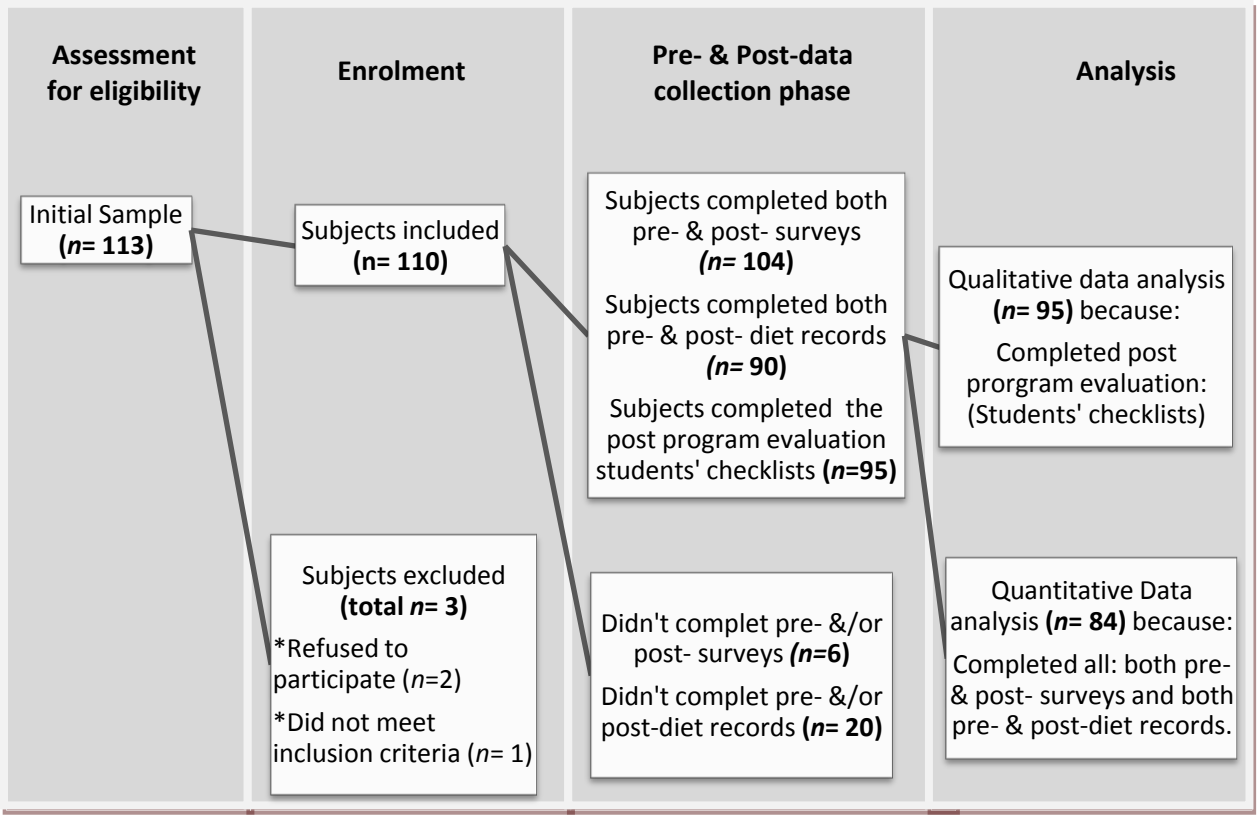


*Figure 4.* Flow of changes in sample size through each stage of the study.

**Theoretical Framework Applied to Let's Eat Smart**

Social Cognitive Theory provided the conceptual framework for the educational and behavioral components in this school-based nutrition intervention. The essential reason for choosing SCT is because the program aims to promote and motivate school children in Kuwait to change their dietary behaviors toward healthier eating habits. The concept of reciprocal determinism was applied to the Let's Eat Smart program focusing on the three factors of SCT (Figure 5).

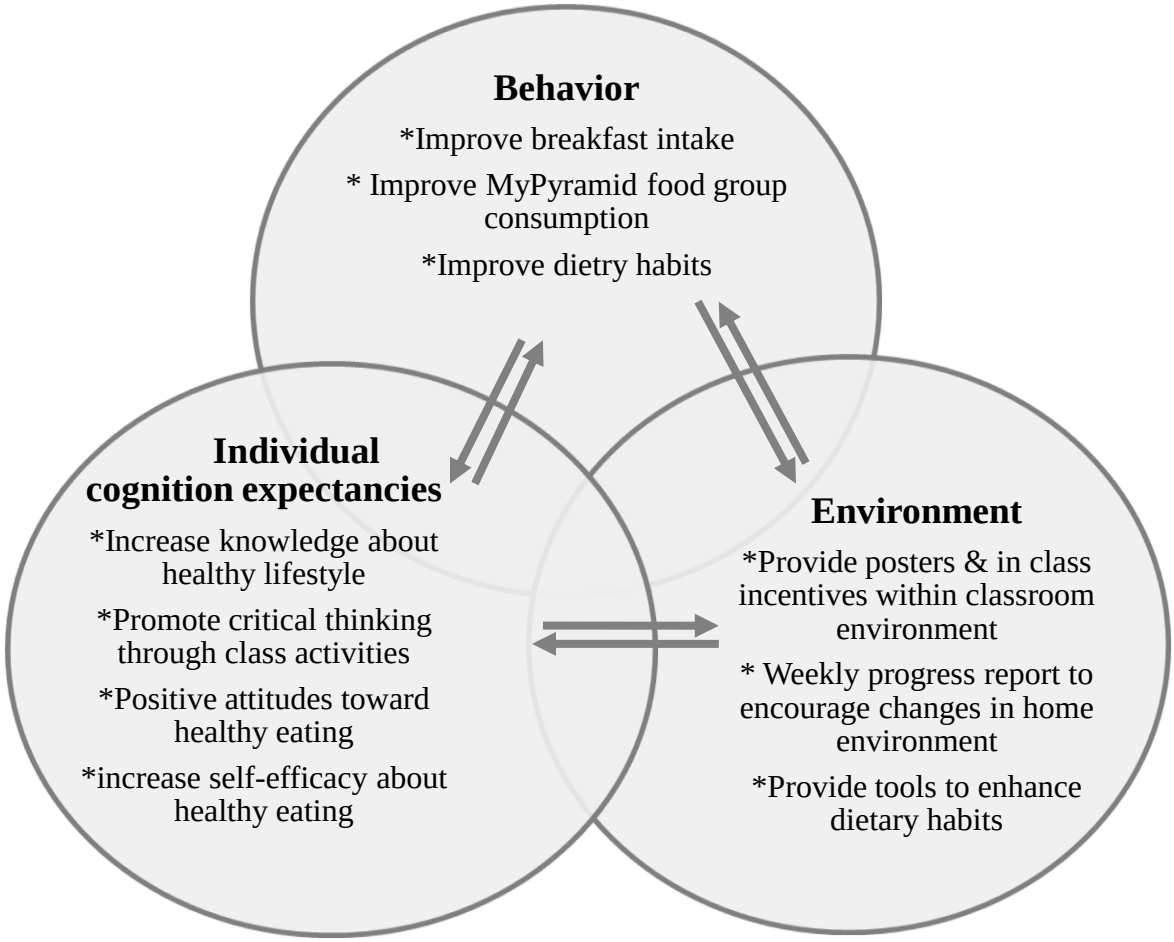


*Figure 5.* Reciprocal determinism concept of SCT applied to Let's Eat Smart Program Design.

The Social Cognitive Theory's constructs that were used in this study are outcome expectation and self-efficacy (psychological determinants of behavior); incentive motivation and facilitation (environmental determinant of behavior) and observational learning. The constructs were defined accordingly to fit within the purpose of this nutrition education program.

This intervention was tailored to increase outcome expectation of feeling more empowered to make healthier choices and become healthier by adopting healthy dietary habits. To increase children's self-efficacy toward healthy dietary behaviors and eventually developing healthy dietary habits, the interactive nature of the lessons in this program were designed to make use of both observational learning and participatory learning (i.e., practicing the behavior

during classes and at home). Children learn positive behaviors and were anticipated to develop positive attitudes from observing televised pictures of characters engaging in positive dietary behaviors.

Motivation in this program was encouraged by: supporting self-reward through amplifying the concept of making healthy choices as being the right thing to do and a reasonable goal to achieve (i.e., emphasize what is right and what is wrong when it come to nutrition choices). Another motivation strategy used in this program was to associate the message of healthy eating with pleasure by practicing in class activities and sharing good times with classmates (i.e., attending nutrition class is an opportunity to take a break from the routine of other demanding classes and learn simple fun concepts). Incentives during classes such as stickers, fruit stamps, crayons and bookmarks were provided for active participation to children. Facilitation was used in this program to empower children with skills such as healthy snacking practices and tools. It also focused on providing a supportive environment by using educational posters, parent letters and hands-on activities that support the nutrition messages conveyed during the program. A detailed illustration of how the SCT constructs were addressed in this study is displayed in Table 12 in Appendix F.

**Curriculum Lessons**

Let's Eat Smart intervention consisted of 12 interactive lessons. All lessons were conducted by the primary investigator during the time of the National Awareness Class. The classroom teacher's role was to assist in class management and data collection. The investigator taught three fourth grader classes on Wednesdays and two fifth grade classes on Thursdays every week during the intervention. These lessons were designed to be delivered within a class period

and would take 15 to 20 minutes. The lessons covered four major topics: energy balance, MyPyramid, portion size and healthy eating as illustrated in Table 1.

Table 1

*Lesson Plan of the Let's Eat Smart Intervention*

| Topic | Weekly lessons | Lesson plan |
|---|---|---|
| **Energy balance** | Lesson 1 | Energy in equals Energy out. |
| | Lesson 2 | What is a Calorie? DVD session. |
| | Lesson 3 | Discussion and recap |
| **MyPyramid** | Lesson 4 | Understand My Pyramid |
| | Lesson 5 | Food Smart: My Pyramid DVD session. |
| | Lesson 6 | Discussion and recap |
| **Portion size** | Lesson 7 | Food Models & Portion estimation |
| | Lesson 8 | Portion Distortion DVD session |
| | Lesson 9 | Discussion and recap |
| **Healthy eating** | Lesson 10 | Nutrient Math & Science |
| | Lesson 11 | Healthy Snack Day |
| | Lesson 12 | Discussion and recap |

The main theme of this intervention was to convey a positive healthy eating message to promote healthy dietary behaviors among children. For each topic there were three lessons. The first lesson focused on introducing the concept to be learned in an interactive class, the second lesson was a DVD session and the third lesson was a discussion class that would emphasize the points learned earlier and address students concerns about the topic learned. In the interactive lesson children practiced educational activities that emphasized skill development, critical observation, learning by modeling and practicing. The DVD session was to support the concepts learned earlier, promote role modeling and promote positive attitudes toward a healthy lifestyle. The discussion session triggered dialogue about the concepts learned earlier and got children's feedback about what they learned. A summary of lessons used in this intervention is represented in Table 13 in Appendix G.

Energy balance lessons introduced the students to the concepts involved in energy metabolism and weight management. Students were able to articulate why food intake needs to be balanced with physical activity. Lesson 1 was based on the Energy Balance lesson plan from Program Energy school intervention lessons sponsored by Colorado State University (Program Energy, 2010). Lesson 2 was a DVD session. Students watched "What is a Calorie?" DVD, that explains calories in food and how energy that comes in food is balance by being physically active (School Media Associates, 2005). Lesson 3 used an open dialogue system that stimulated questions and addressed students concerns about the topic learned.

The MyPyramid lessons introduced students to MyPyramid as a reliable tool that could guide them toward healthy eating. Lesson 4 introduced the different food groups in MyPyramid and the appropriate serving size of each group for children in fourth and fifth grade. The students identified and matched different foods to their appropriate food group using a Food Pyramid model. In lesson 5 a DVD called "Food Smart: My Pyramid for Kids" was used to recap the purpose of MyPyramid and to represent peer modeling of students of similar age (Discovery School, 2006). Lesson 6 reviewed the main purpose of MyPyramid as a guide for children who want to be healthy and presented a discussion about the counterproductive and competitive media messages about junk food.

Lessons covering the portion size topic were represented to develop a better understanding of appropriate portion sizes. In lesson 7 food models were used to provide visual reinforcement about appropriate portion sizes of different food groups and were compared to some current larger serving sizes. Also in this lesson students were introduced to the plate method, food scales, and the use of comparable materials to estimate food portion sizes. This allowed students to perform critical analysis by creating a full day's menu of three meals using a

math activity sheet obtained from MyPyramid. Lesson 8 was a video session that focuses on reinforcing the concept of appropriate portion size and how the consumption of bigger portions nowadays is associated with bigger health problems. The "Portion Distortion DVD" was intended to explain the consequences of the change in food portions over decades and teach students how to measure portions using easy to understand analogies (Human Relations Media, 2004). Lesson 9 encouraged the dialogue about whether students can relate the concepts learned about portion distortion to examples of their own experiences and observations at school, home, grocery stores and restaurants.

The last topic covered in this curriculum was healthy eating. Lesson 10 dealt with protein, carbohydrate, fat and fiber content in food. Students had the opportunity to see and compare sugar, fat and fiber content of different foods using label reading and examining tubes of fat, sugar and fiber. For example students identified and compared sugar content of three brands of cereals by reading the label for sugar content and by comparing three test tubes filled with sugar that each represents a different cereal brand. An emphasis on nutrient dense versus caloric dense food allowed students to compare different foods based on label reading and develop a better sense of what is a healthy food choice. Lesson 11 focused on healthy snacking and the importance of breakfast. Students practiced preparing their own healthy snacks by preparing vegetarian sandwiches and decorative cantaloupe balls using fruit scoops. This activity was intended to let students practice healthy eating in a sharing and encouraging environment with their peers. Lesson 12 reviewed the concept of healthy snacking and the importance of breakfast. Finally, students were allowed to share their lunch boxes' contents as a demonstration of everyday food choices made by students and their parents. Materials used for each lesson are provided in Appendix H.

**Supportive Educational Materials & Incentives**

Parents are the gatekeeper when it comes to food choices offered to their children and they certainly play a key role in shaping the dietary habits of their children. A total of four parental letters covering the four major topics in the curriculum were sent home explaining briefly what their child learned in school. The purpose of these letters was to inform parents about the activities their child performed at school and to encourage discussion about the topics learned.

Posters about MyPyramid servings, Portion Distortion and healthy snacking were distributed and posted in the hallways and classrooms to create an environment conducive to healthy eating. In-class incentives such as bookmarks with a nutritionally sound message about healthy snacking or illustrations of the food pyramid were given to students for active participation. Other class incentives used were stickers, stamps with fruit and vegetable symbols and crayons.

The children were encouraged to consume five servings of fruit and vegetable every day. Fruit and vegetable wrist bands were distributed at the end of lesson 10. Each student was given a total of five colorful bands (i.e., three vegetable bands and two fruit bands). This method served as both a reminder and a way to count fruit and vegetable serving per day. For each serving consumed, a child could remove one fruit band from his left hand to his right hand and so on until he consumed all of his servings. This was a great tool to encourage students to implement what they learned at school in home.

To encourage students to complete all program requirements they received a ticket to the Scientific Center in Kuwait upon their completion of all program activities, pre-/post-surveys, pre-/post-diet records and program evaluation.

## Instrumentation

Measures for both quantity and quality were used in this study to build a comprehensive picture about the effectiveness of using a school-based nutrition intervention in Kuwait. Using both quantitative and qualitative measures ensured a greater understanding of the group studied and provided a more purposeful evaluation of the program. Program evaluation checklists collected during a post program evaluation session represent the qualitative data collected in this study. The quantitative measures used in this study were a nutrition survey and a 3-day food record analysis.

**Survey**. Reflecting the pre-/post-design of the study, students completed a self-administered survey prior to the intervention and at the end of the intervention. Demographic data on gender, age, grade level and nationality were collected through self-report on the pre-survey.

The survey used in this study consisted of two major sections: nutrition knowledge and psychological determinants of nutrition behaviors. The nutrition knowledge part of the survey was specifically developed to test the concepts covered in lessons. There were four questions for each topic: questions 1-4 for energy balance, 5-8 for MyPyramid, 9-12 for portion size and 13-16 for healthy snacking. These knowledge questions were intended to directly measure what the students learned from the curriculum. The questions were reviewed by a panel of experts in the fields of nutrition and elementary education.

The psychological determinants of nutrition behaviors part of the survey covered questions about attitudes toward a healthy lifestyle, dietary practices and self-efficacy. This part of the survey was adopted from the CATCH Kids Club pilot study designed for third, fourth and fifth grade students (Kelder et al., 2005). The survey used in CATCH Kids Club pilot study was

designed to measure behavioral and psychosocial variables. Survey items in the CATCH Kids Club study were modified from two questionnaires: the Health Behavior Questionnaire and the School-Based Nutrition Monitoring Student Questionnaire, both with an acceptable internal consistency of greater than 0.6 (Edmundson et al., 1996; Hoelscher, Day, Kelder, & Ward, 2003). The three attitude questions used in this study are intended to measure students' attitudes toward a healthy lifestyle both before and after participating in the Let's Eat Smart program. The dietary practices section contained five questions that measured fast food consumption, breakfast skipping, caloric-dense food snacking, fruit intake and vegetable intake. There were five self-efficacy questions that measured the students' confidence in making a healthy dietary choice (see Appendix I for the complete survey questions).

**Food records.** Each student was requested to complete a 3-day food record representing two school days and one weekend day at the beginning and at the end of the intervention, to investigate the students' dietary intake as a collective group.

The food record instrument in this study was divided into possible meals and snacking periods during the day. Illustrations for each time period were used to raise interest in recording by making it simple and appealing. Precision is also important therefore, students were asked a yes/no question about whether they ate at each meal or snacking period and if they did, they were asked to write what did they ate. The reason for using this diet record was to not only examine food intake but also to determine food intake patterns especially for breakfast (Appendix J).

The primary investigator instructed students on the how to keep a 3-day food record. The instructions were age-appropriate and emphasized recording all food and drink consumed during 3 consecutive days, 2 weekdays and 1 weekend day. Students were asked to record detailed information about their dietary intakes, such as brand names, ingredients of mixed dishes, food

preparation methods, estimates of amount consumed and food origin (e.g. home, school or restaurant). Written examples and simple guidelines about keeping a 3-day food record were given to students, and they were allowed to ask their guardians to assist them in recording their food intake. Students were asked to complete their food records together with their parents to increase the accuracy of their dietary report. The food and beverages could be recorded in either English or Arabic to account for cultural and local dishes that cannot be described in English. To get students to complete food records in a timely manner, each student received a packet of crayons upon completion of each diet record.

**Program evaluation.** The purpose of the evaluation was to determine whether the Let's Eat Smart curriculum was comprehensible, appealing, memorable, culturally sensitive and personally relevant to the students.

Following the intervention, a total of five, group qualitative evaluation sessions were conducted (i.e., one 45 minutes session per each). Topics presented during the evaluation sessions included students' opinions on the strengths and weaknesses of the program. Throughout the group session, open-ended questions were asked to examine students' acceptability of the lessons, including an evaluation of the lectures and in-class activities. Each student was able to report his/her opinion on a checklist in order to get structured and well thought-out feedback (Appendix K). The students' checklist was adopted from another study and modified to fit the nature and purpose of this program (DuBroc, 2007).

The theme questions that were used in the session are shown in Table 2. During the group evaluation session a discussion about each question on the checklist was encouraged. The primary investigator asked the question, then promoted a short controlled discussion and then allowed some time for students to report their ideas about that specific question. This process

continued until all questions on the checklist were answered. The checklist prompted students to comment on concepts learned during the program and aided in organizing the data collection throughout the group evaluation session. Also the checklists provided a way to communicate opinions freely and anonymously especially for those students who would not share their opinion publicly. In addition to the checklist the primary investigator notated students' verbal feedback for further analysis.

Table 2

*Themes Tested During Group Evaluation Sessions*

| Theme tested | Sample Questions |
|---|---|
| Comprehension & awareness | "What is the main idea that we are covering in this program or the purpose of the program?"<br>"What would you say is the main thing you learned from this program?" |
| Practicality & usability | "Name some things you liked/disliked about the lessons."<br>"Did you like the activities and did the DVD session aid in learning? |
| Overall Impact | "Are you interested in seeing more of this program?" |
| Relevance & Interest | "Did you share what you learned with your parents?"<br>"What else you would like to know about not covered in lessons?" |

**Data Analysis**

For quantitative analysis, only complete data sets collected from students were analyzed (i.e., students who had some or all missing diet records or surveys were not included) because the primary aim was to examine the changes from pre- to post-intervention. Qualitative data analysis included even those who did not complete some diet records or surveys because the aim was to investigate all feedbacks. The qualitative analysis included feedback from students' checklists and the primary investigator notes from the group evaluation sessions.

**Quantitative data analysis.** The pre- and post-surveys were graded manually. Data collected from the surveys and food records were coded for analysis. The data was analyzed using Statistical Program for Social Sciences (SPSS) version 19.0 for Windows. Significance for all analyses was set at $p < .05$.

***Survey.*** The questions in the survey were divided into four major sections; nutrition knowledge questions (16 items), attitude questions (3 items), dietary practices questions (5 items) and self efficacy questions (5 items). Each nutrition knowledge item had four answer options. Each correct response was allocated 1 point and each incorrect or no response was allocated 0 points. Each attitude item was on a 3 point-scale. The dietary practices items were assessed individually on a 4 point-scale. The self-efficacy five items had three answer options. The maximum scores for nutrition knowledge, attitude, dietary practices and self-efficacy items were 16, 6, 3 and 10 respectively, with higher scores indicating higher knowledge, positive attitude, better dietary practices and higher self-efficacy. The minimum score for all was zero. Examples of questions and response scales that covered each section of the survey are illustrated in Table 3.

Frequency analysis was used to provide descriptive characteristics of the sample, including age, grade, gender, and nationality. Individual survey items, as well as scale scores, were compared at pre- and post-survey. For each scale, a Cronbach's alpha was performed to determine the reliability. Scales in this survey include nutrition knowledge scale, attitude scale and self-efficacy scale. Dietary practices items were analyzed independently. Tabulation of frequency counts, percentages and paired t-tests were completed to determine if there were any

changes in students' nutrition knowledge, attitude, dietary behaviors and self-efficacy before and after the intervention.

Table 3

*Survey Sections' Response Scales and Sample Questions*

| Survey section | No. of Items | Sample Item | Response Scale |
|---|---|---|---|
| **Nutrition Knowledge Questions** | 16 | What do we call the unit of energy that comes from the food we eat and what we drink? | **A** |
| **Attitude Questions** | 3 | How important is eating healthy to you? | **B** |
| **Dietary Practices Questions** | | | |
| Fast Food Consumption | 1 | Think about last week. How frequently did you eat food from a fast food restaurant? | **C** |
| Breakfast Skipping | 1 | Think about last week. How frequently did you skip eating breakfast? | **C** |
| Caloric-dense Food Snacking | 1 | Yesterday did you eat snacks like candy, chocolate, chips, cookies, cake or ice-cream? | **D** |
| Fruit Intake | 1 | Yesterday, did you eat fruit? | **E** |
| Vegetable Intake | 1 | Yesterday, did you eat any vegetables? | **E** |
| **Self Efficacy Questions** | 5 | How sure are you that you can eat fresh fruit instead of a candy bar? | **F** |

*Note.* The possible response scales include the following: **A**: 0 = Incorrect, 1 = Correct; **B**: 0 = Not important, 1 = Somewhat important, 2= Very important; **C**: 3 = Never, 2 = Sometimes, 1 = Frequently, 0 = Daily; **D**: 3 = None, 2 = One-time, 1 = Two-times, 0 = Three-times or more; **E**: 0 = None, 1 = One-time, 2 = Two-times, 3 = Three-times or more; **F**: 0= Not sure, 1= Little sure, 2= Very sure.

***Food records***. The purpose of collecting 3-day food records was to analyze students' intake of breakfast and food groups from MyPyramid. Food records were coded and analyzed to examine MyPyramid food groups' intake using the most up-to-date version of "Nutritionist Pro" diet software, version 6.4 (Nutritionist Pro, 2010). This software is culturally relevant as its data base include over 20,000 foods and ingredients including brand-name foods, fast foods, and

ethnic foods of Arabian, Indian and Mediterranean origin. The Kuwaiti diet is mostly influenced by these cuisines in addition to the popular westernized diet. The Nutritionist Pro software is validated in the literature. Several studies have used this software to analyze food intake in youth populations of different ethnicity and nationalities (Davis et al., 2005; Kontogianni et al., 2008; Borradaile et al., 2009). The 3-day food record was analyzed to include two weekdays and one weekend day. For each student, intake of MyPyramid food groups for the three days was averaged to allow for a more accurate quantification and representation of usual intake. Food groups that were evaluated include grains (in ounces), meat and beans (in ounces), milk (in cups), fruit (in cups) and vegetable (in cups). Paired t-tests were used to compare intake of My Pyramid food groups from pre to post intervention. In addition, frequencies were used to compare breakfast intake before and after the intervention.

**Qualitative data analysis.** Qualitative data collected from students' checklists and the primary investigator notes during group evaluation sessions assessed: student acceptability of the lessons, main ideas students grasped form the lessons, lesson materials and activities, lesson difficulty and comprehension of the lessons. Student's comments provided on the checklists and form the investigator notes were collected, combined, analyzed and summarized in a tabular format. Mainly, the checklists were reviewed for common themes and messages. These comments provided by students were coded into categories to derive a list of positive and negative comments about the curriculum. The purpose of analyzing student's feedback was to generate a concrete list of recommendations for curriculum revision.

CHAPTER IV

# Results

## Subject Characteristics

Eighty four students were included in the quantitative data analysis. The sample consisted of 51.2% (*n* = 43) boys and 48.8% (*n* = 41) girls. Students' ages ranged from 8-11 years old. The mean age of the sample was 10 with a standard deviation of ±1. Most participants were Kuwaitis, 66.7% (*n* = 56). More students were in fourth grade than in fifth grade, 63.1% (*n* = 53) and 39.6 (*n* = 31) respectively. The demographic characteristics of the participants are reported in Table 4.

Table 4

*Participants' Demographic Characteristics (N= 84)*

| Characteristics | *n* | *%* |
|---|---|---|
| Gender | | |
| Boy | 43 | 51.2 |
| Girl | 41 | 48.8 |
| Age at the time of survey (years) | | |
| 8 | 4 | 4.8 |
| 9 | 44 | 52.4 |
| 10 | 23 | 23 |
| 11 | 13 | 13 |
| Grade | | |
| $4^{th}$ | 53 | 63.1 |
| $5^{th}$ | 31 | 36.9 |
| Nationality | | |
| Kuwaiti | 56 | 66.7 |
| Non-Kuwaiti | 28 | 33.3 |
| Jordanian | 7 | 8.3 |
| Lebanese | 7 | 8.3 |
| Egyptian | 4 | 4.7 |
| American | 2 | 2.4 |
| Syrian | 2 | 2.4 |
| Others | 6 | 7.1 |

**Quantitative Data (Survey)**

Students were asked 16 questions about nutrition knowledge, three questions about attitude, five questions about dietary practices and five questions about self efficacy. All nutrition knowledge questions collectively were analyzed as a scale by comparing pre-/post-survey means. Means were also compared from pre- to post-tests for attitude scale and self efficacy scale. Each question in the dietary practices section was analyzed individually by comparing means from pre- to post-surveys. In addition, changes in percentages were reported for each question from pre- & post-tests for an in depth analysis.

**Reliability analysis.** For this survey internal reliability analyses (Cronbach's α) were performed for nutrition knowledge scale, attitude toward healthy lifestyle scale and self-efficacy scale. Internal reliability analysis for each scale is presented in Table 5 and was considered to be acceptable if Cronbach's α was greater than 0.6 (Sim & Wright, 2000, p. 257).

Both pre-test and post-test nutrition knowledge scale had a reliability coefficient of 0.45 and 0.42 respectively which is below the 0.6 threshold. Therefore, percentages for each nutrition knowledge item were calculated to provide an in depth analysis of the change in nutrition knowledge parameter form pre-test to post-test period. The attitude toward healthy lifestyle scale and self efficacy scale had reliability coefficients almost slightly below and can be rounded to 0.6. This could be attributed to the small number of items (3-5 items) included in each scale.

Table 5

*Internal Reliability (Cronbach's α) for: Nutrition Knowledge scale, Attitude toward Healthy Lifestyle scale and Self Efficacy Scale*

| Scale | No. of items | Sample item | Response Scale[a] | Cronbach's α | |
|---|---|---|---|---|---|
| | | | | *Pre* | *Post* |
| Nutrition Knowledge | 16 | What do we call the unit of energy that comes from the food we eat and what we drink? | A | *.45* | *.42* |
| Attitude toward healthy lifestyle | 3 | How important is physical activity to you? | B | .63 | .59 |
| Self-efficacy | 5 | How sure are you that you can eat fresh fruit instead of a candy bar? | C | .57 | .56 |

*Note.* Cronbach's α = index of internal reliability, Pre= Pretest, Post= Posttest.
[a]The possible response scales include the following: **A**: 0= Incorrect, 1=Correct; **B**: 0= Not important, 1= Somewhat important, 2= Very important; **C**: 0= Not sure, 1= Little sure, 2= Very sure.

**Nutrition knowledge.** There were 16 nutrition knowledge items with 0 being the minimum possible score and 16 being the maximum possible score. A paired-samples t-test was conducted to evaluate the impact of the intervention on student's nutrition knowledge scores. There was a statistically significant increase in nutrition knowledge scores from pretest ($M$ = 4.95, $SD$ = 2.33) to posttest ($M$ = 9.43, $SD$ = 2.39), $t(83) = -12.81$, $p < .0001$, ES = 0.8.

The nutrition knowledge section of the survey covered the major four topics conveyed in the intervention lessons with a total of four questions relating to each topic. Percentages of correct answers for nutrition knowledge were calculated and students improved from pretest to posttest for every question except question three, the calorie definition, which had 32.1% correct answers at pretest compared to 31% correct at posttest. Figure 6 shows a comparison between percent correct responses at pretest and at posttest for each nutrition knowledge question.

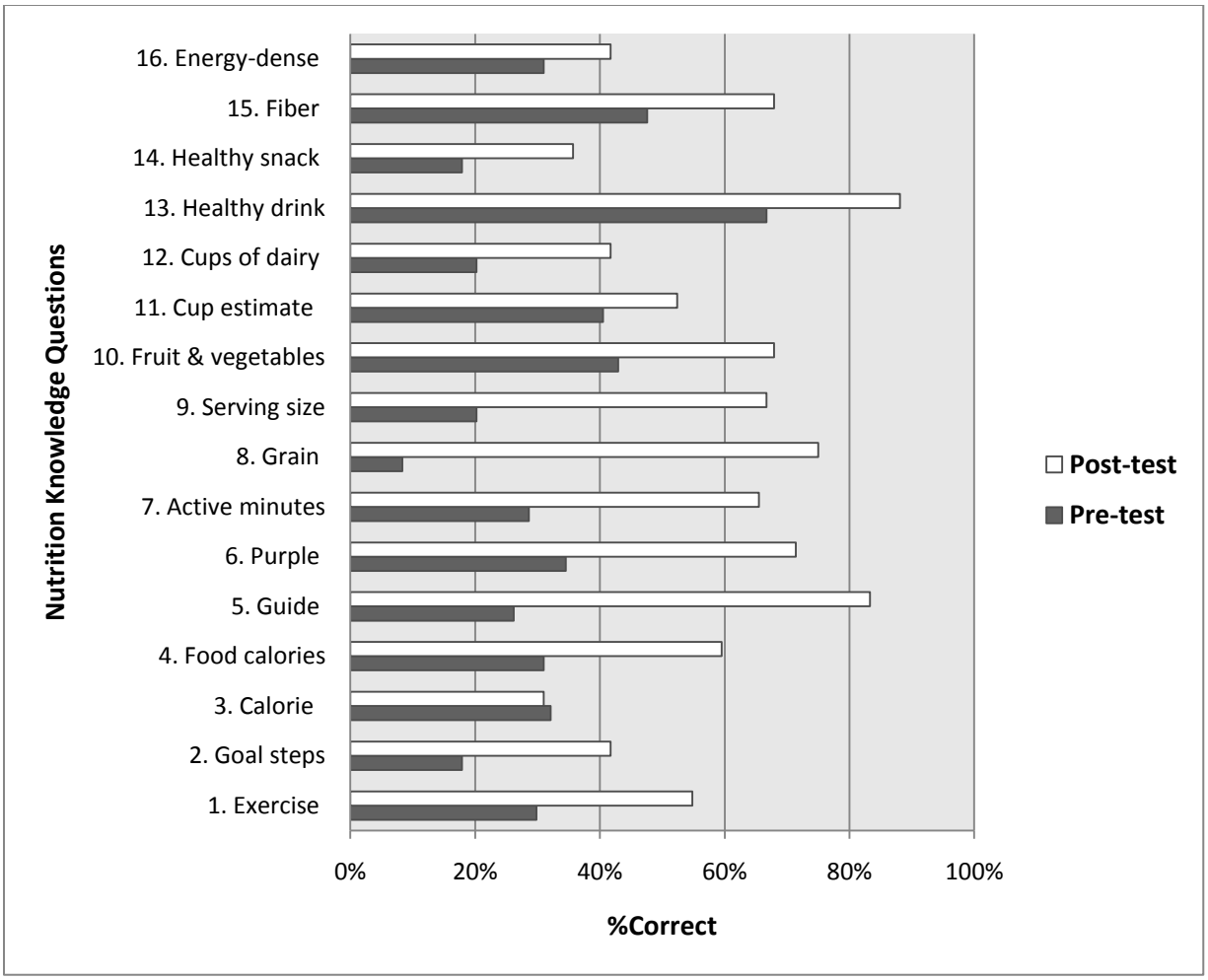


*Figure 6.* Comparison of percentages of correct responses for each nutrition knowledge question between pretest & posttest.

Table 6 includes the percent change for each nutrition knowledge question. The most positive magnitude of change was observed in questions 5-9 that asked about the MyPyramid topic. Also question nine about serving size, had a large 45.6 percent change. The lowest percent changes were found in question 11 about cup estimate (11.9% change), question 16 about energy-dense food definition (10.7% change) and question 14 about healthy snacking (17.8% change). The only question with negative percent change is the question about calorie definition (-1.1% change).

Table 6

*Percent Change in Correct Responses for Nutrition Knowledge Items*

| Variable | % Correct at pretest[a] | % Correct at posttest[b] | % change |
|---|---|---|---|
| Energy Balance | | | |
| 1. Exercise | 29.8 | 54.8 | 25.0 |
| 2. Goal steps | 17.9 | 41.7 | 23.8 |
| 3. Calorie | 32.1 | 31.0 | -1.1 |
| 4. Food calories | 31.0 | 59.5 | 28.5 |
| MyPyramid | | | |
| 5. Guide | 26.2 | 83.3 | 57.1 |
| 6. Purple | 34.5 | 71.4 | 36.9 |
| 7. Active minutes | 28.6 | 65.5 | 36.9 |
| 8. Grain | 8.3 | 75.0 | 66.7 |
| Portion Size | | | |
| 9. Serving size | 20.2 | 66.7 | 46.5 |
| 10. Fruit & vegetables | 42.9 | 67.9 | 25.0 |
| 11. Cup estimate | 40.5 | 52.4 | 11.9 |
| 12. Cups of dairy | 20.2 | 41.7 | 21.5 |
| Healthy Snacking | | | |
| 13. Healthy drink | 66.7 | 88.1 | 21.4 |
| 14. Healthy snack | 17.9 | 35.7 | 17.8 |
| 15. Fiber | 47.6 | 67.9 | 20.3 |
| 16. Energy-dense | 31.0 | 41.7 | 10.7 |

*Note.* The four topics covered in the intervention are: energy balance (questions 1-4), MyPyramid (questions 5-8), portion size (questions 9-12) & healthy snacking (questions 13-16). [a] percent of students who answered correctly at pretest. [b] Percents of students who answered correctly at posttest.

In order to further understand the change in students' responses on the knowledge questions from pretest to posttest, Table 7 point out that for each individual knowledge question frequencies were used to identify: the percentage of students who answered pre/post questions both correctly, the percentage of students who answered pre/post questions both incorrectly, the percentage of students who answered incorrectly at pre and correctly and post, and the percentage of students who answered correctly at pre and incorrectly at post.

Table 7

*Analysis of Nutrition Knowledge Items as: Pre & Post Correct responses, Pre & Post Incorrect Responses, Improved Responses and Diminished Responses*

| Item | Pre & Post Correct *n(%)* | Pre & Post Incorrect *n(%)* | Improved *n(%)* | Decreased *n(%)* |
|---|---|---|---|---|
| Energy Balance | | | | |
| 1. Exercise | 13(15.5) | 26(31.0) | 33(39.3) | 12(14.3) |
| 2. Goal steps | 7(8.3) | 41(48.8) | 27(32.1) | 9(10.7) |
| 3. Calorie | 10(11.9) | 42(50.0) | 17(20.2) | 15(17.9) |
| 4. Food calories | 16(19.0) | 24(28.6) | 34(40.5) | 10(11.9) |
| MyPyramid | | | | |
| 5. Guide | 17(20.2) | 9(10.7) | 53(63.1) | 5(6.0) |
| 6. Purple | 22(26.2) | 17(20.2) | 38(45.2) | 7(8.3) |
| 7. Active minutes | 17(20.2) | 22(26.2) | 38(45.2) | 7(8.3) |
| 8. Grain | 6(7.1) | 20(23.8) | 57(67.9) | 1(1.2) |
| Portion Size | | | | |
| 9. Serving size | 11(13.1) | 22(26.2) | 45(53.6) | 6(7.1) |
| 10. Fruit & Veg. | 24(28.6) | 15(17.9) | 33(39.3) | 12(14.3) |
| 11. Cup estimate | 22(26.2) | 28(33.3) | 22(26.2) | 12(14.3) |
| 12. Cups of dairy | 5(6.0) | 37(44.0) | 30(35.7) | 12(14.3) |
| Healthy snacking | | | | |
| 13. Healthy drink | 51(60.7) | 5(6.0) | 22(26.2) | 6(7.1) |
| 14. Healthy snack | 14(16.7) | 53(63.1) | 16(19.0) | 1(1.2) |
| 15. Fiber | 29(34.5) | 16(19.0) | 28(33.3) | 11(13.1) |
| 16. Energy-dense | 14(16.7) | 38(45.2) | 20(23.8) | 12(14.3) |

*Note.* The four topics covered in the intervention are: energy balance (questions 1-4), MyPyramid (questions 5-8), portion size (questions 9-12) & healthy snacking (questions 13-16). Pre & Post Correct = those who answered pre/post questions both correctly; Pre & Post Incorrect = those who answered pre/post questions both incorrectly; Improved = those who answered incorrectly at pre and correctly and post; Decreased = those who answered correctly at pre and incorrectly at post.

By examining question 13 in Figure 7, it is clear that students had a good knowledge of what is a healthy drink as 60.7% answered correctly on both pre and post surveys compared to 26.2% of those who improved from pre to post survey. In contrary, for question 14 student were unable to recognize what a healthy snack option would be as 63.1% answered incorrectly at both pre and post surveys compared to 19% of those who improved. The impact of the intervention on nutrition knowledge is most noticeable in question five to nine. Answers to question five

shows that, because of the intervention students are more familiar with that MyPyramid as a guide for what they should eat as 63.1% improved their answers from pre to post. Also, in question eight 67.9% improved from pre to post and became more aware after the intervention that the food group that they should eat most from is the grain group.

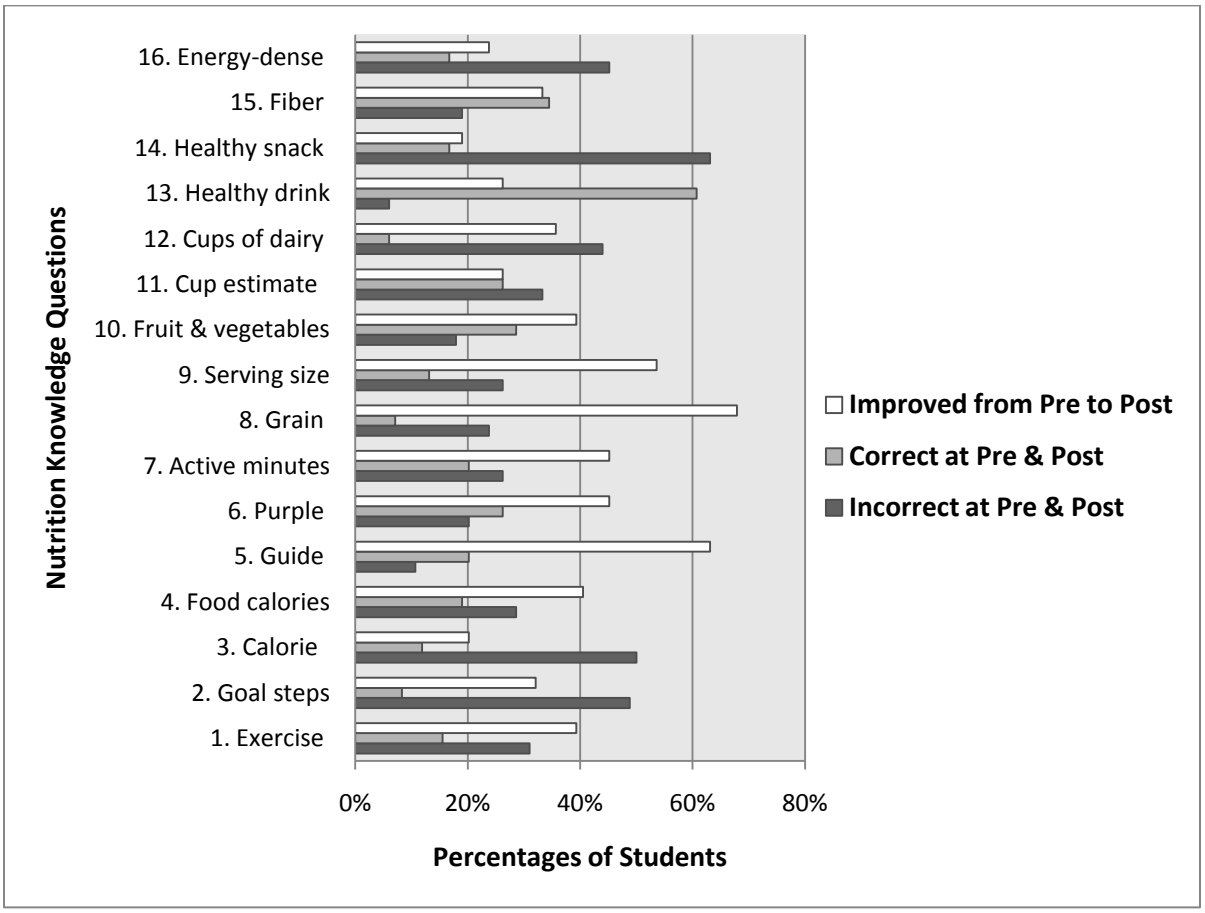


*Figure 7.* Evaluation of: improved test scores, correct test scores at pre & post and incorrect test scores at pre & post for each nutrition knowledge questions.

**Attitude.** Students were asked three questions regarding attitude toward a healthy lifestyle. For the attitude scale zero represent the minimum and six represent the maximum possible points on the scale. Students' improvement in attitude toward a healthy lifestyle improved significantly from pretest ($M$ =5.00, $SD$ =1.15) to posttest ($M$=5.33, $SD$ =1.07), $t(83)$ = -2.037, $p < .043$, ES = 0.2.

To further examine responses for each question on the attitude scales counts and percentages are reported for each question's responses. Students were asked three attitude questions about healthy eating, physical activity and health education at school. The majority of students ranked eating healthy, being physically active and health education at school as either very important or somewhat important to them in both pretest and posttest. For all three questions, the percentages of those who answered not important were consistently low from pretest to posttest and were not considerably different. Tabular and graphical presentations of attitude questions are depicted in Table 8 and Figure 8.

Table 8

*Participant's Responses on Attitude Questions*

| | Pre | | Post | |
|---|---|---|---|---|
| Attitude | *n* | *%* | *n* | *%* |
| Healthy Eating | | | | |
| Not important | 3 | 3.6 | 3 | 3.6 |
| Somewhat important | 23 | 27.4 | 14 | 16.7 |
| Very important | 58 | 69.0 | 67 | 79.8 |
| Physical Activity | | | | |
| Not important | 2 | 2.4 | 1 | 1.2 |
| Somewhat important | 30 | 35.7 | 19 | 22.6 |
| Very important | 52 | 61.9 | 64 | 76.2 |
| School Health Education | | | | |
| Not important | 3 | 3.6 | 3 | 3.6 |
| Somewhat important | 15 | 17.9 | 9 | 10.7 |
| Very important | 66 | 78.6 | 72 | 85.7 |

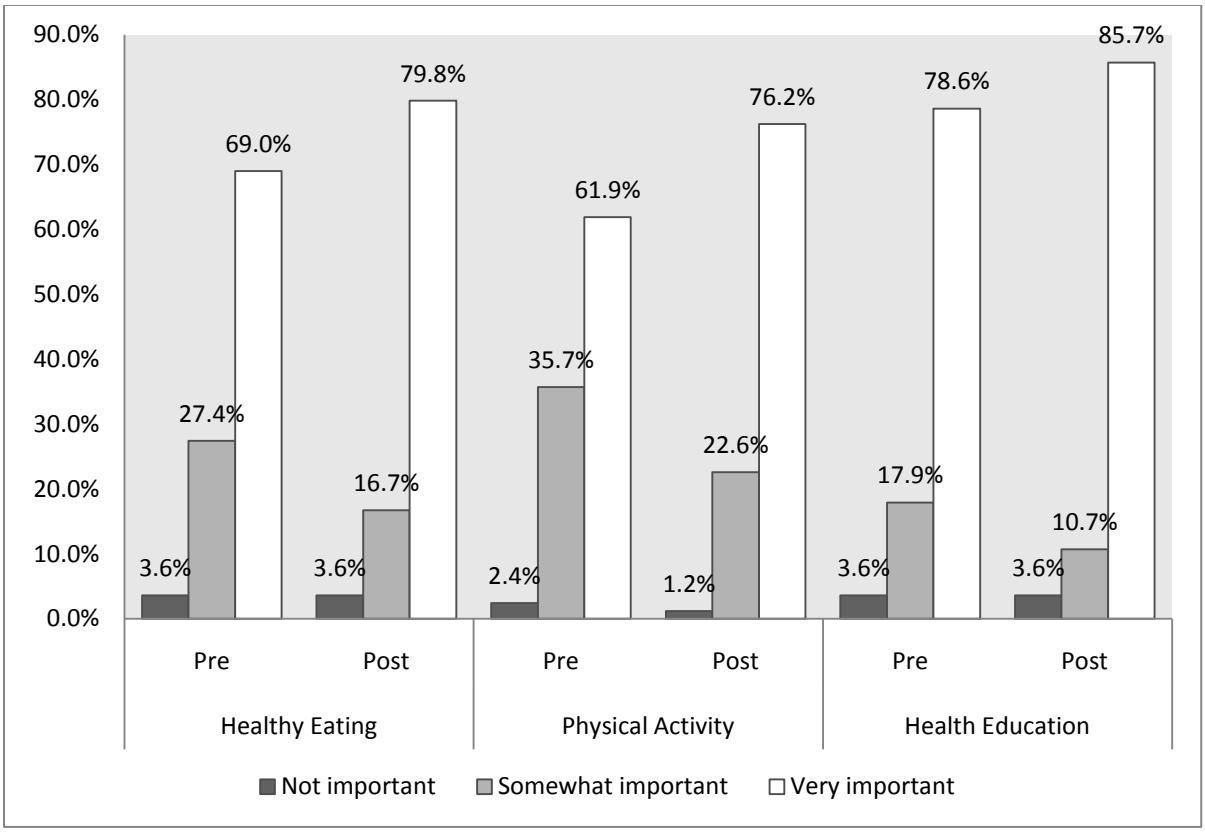


*Figure 8.* Comparison of attitude questions responses from pretest to posttest.

**Dietary practices.** There were no significant differences from pretest to posttest in the four dietary practices that were assessed in the survey: breakfast skipping, caloric-dense food snacking, fruit intake and vegetable intake ($p$ = .655, $p$ = .928, $p$ = .320, $p$ = .360) respectively. Only fast food consumption behavior was significantly improved from pretest ($M$ = 2.04, $SD$ = 0.65) to posttest ($M$ = 2.29, $SD$ = 0.51), $t(83) = -3.49$, $p < .001$, ES = 0.4 (Table 9).

Points allocated for each response on the answer's scale are noted in Table 9 with a possible minimum of zero and a maximum of three for each question. Analyzing means provides a general picture of change from pretest and posttest but cannot explain how students responded on each question. To further examine students' responses on each dietary practice question; percentages for each response were calculated and are presented in Table 14 in Appendix L.

Table 9

*Means of Dietary practice Questions at Pretest and Posttest*

| | Pre(N=84) | | Post(N=84) | | | | |
|---|---|---|---|---|---|---|---|
| Dietary Practice Question | *M* | *SD* | *M* | *SD* | *df* | *t* | *p* |
| Fast Food Consumption | 2.04 | 0.65 | 2.29 | 0.51 | 83 | -3.49 | .001* |
| Skipping Breakfast | 1.98 | 1.01 | 2.04 | 0.96 | 83 | -0.45 | .655 |
| Caloric-dense Food Snacking | 1.98 | 1.01 | 1.99 | 0.90 | 83 | -0.09 | .928 |
| Fruit Intake | 1.52 | 1.23 | 1.65 | 1.22 | 83 | -1.00 | .320 |
| Vegetable Intake | 1.19 | 1.09 | 1.31 | 1.16 | 83 | -0.92 | .360 |

*Note.* Fast Food Consumption & Skipping Breakfast answer scale: 3 = Never, 2 = Sometimes, 1 = Frequently, 0 = Daily; Caloric-dense Food Snacking answer scale: 3 = None, 2 = One-time, 1 = Two-times, 0 = Three-times or more; Fruit Intake & Vegetable Intake answer scale: 0 = None, 1 = One-time, 2 = Two-times, 3 = Three-times or more.
* $p < 0.05$.

**Self efficacy.** The scale of self efficacy is represented by five questions with zero being the possible minimum score and 10 being the maximum. Students were asked how sure they that they can consume: skim instead of regular milk, fruit instead of candy, baked potato instead of French fries, fruit juice instead of soft drink and brown instead of white bread. Possible answer responses for each question were: not sure, little sure and very sure. The improvement in self efficacy from pre-test ($M = 6.49$, $SD = 2.46$) to post-test ($M = 7.14$, $SD = 2.17$) was statistically significant, $t(83) = -2.52$, $p < .014$, ES = 0.3.

**Quantitative Data (Food Record)**

**MyPyramid food group servings.** Table 10 gives the mean number of servings of each food group at pretest and posttest. Significant differences in means were found only in the number of vegetable and fruit servings. Vegetables servings increase significantly from pretest ($M = .967$, $SD = .645$) to posttest ($M = 1.27$, $SD = .841$), $t(83) = -3.34$, $p < .001$, ES = 0.34. Fruit servings also increased from pretest ($M = 1.41$, $SD = 1.04$) to posttest ($M = 1.68$, $SD = .981$), $t(83) = -2.34$, $p < .022$, ES = 0.25.

Table 10

*Comparison of Food Groups Intake from Pretest to Posttest*

| Food Groups Intake | Pre | | | | Post | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *Min* | *Max* | *M* | *SD* | *Min* | *Max* | *df* | *t* | *p* |
| Grains[a] | 6.93 | 1.89 | 1 | 17 | 6.81 | 1.82 | .5 | 14.5 | 83 | .473 | .637 |
| Vegetables[b] | .967 | .645 | 0 | 6.3 | 1.27 | .841 | 0 | 8 | 83 | -3.34 | .001* |
| Fruits[b] | 1.41 | 1.04 | 0 | 7 | 1.68 | .981 | 0 | 5.5 | 83 | -2.34 | .022* |
| Milk[b] | 2.23 | .992 | 0 | 7.8 | 2.21 | 1.01 | 0 | 6.8 | 83 | .18 | .858 |
| Meat&Bean[a] | 6.36 | 2.68 | 0 | 16 | 6.29 | 2.50 | 0 | 18 | 83 | .235 | .815 |

*Note.* Numbers of servings recommended by MyPyramid for each food group are: Grain = 6 ounces, vegetable = 2.5 cups/day, fruits = 1.5 cups/day, Meat & Bean= 5 ounces/day, Milk = 3 cups/day. The mean servings of each food group was compared from pre to post-intervention period and also compared to the recommended serving in MyPyramid.
[a]Serving in ounces. [b]Serving in cups.
*$p < 0.05$

A comparison of the pretest/posttest food group intakes to MyPyramid recommendations is presented in Figure 9. When compared to the MyPyramid recommendation for grain intake (6 ounces/day), students consumed more servings of grains on average at both pre- and post-test (6.93 and 6.81 ounces/day respectively). Numbers of meat & bean servings were also higher at pretest (6.36 ounces/day) and at posttest (6.29 ounces/day) than MyPyramid recommendations (5 ounces). The amount of milk at both pretest and post test were equal (2.2 cups), but still lower than what is recommended by MyPyramid (3 cups). Although, there was a significant improvement in vegetable intake (.967 to .841 cups/day), it is still below the MyPyramid recommendation. The significant increase in fruit intake from pretest (1.41cups/day) to posttest (1.68 cups/day) is slightly above what is recommended by MyPyramid (1.5 cups/day).

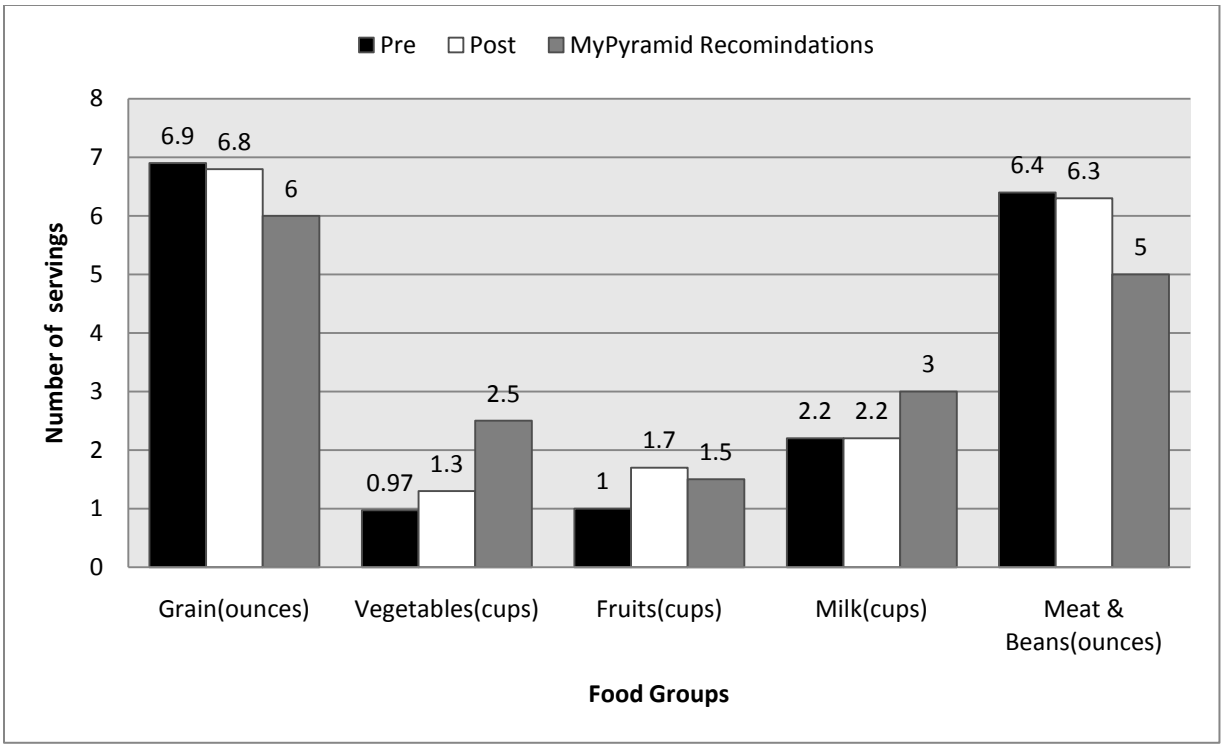


*Figure 9.* Comparison of food groups servings in pretest and posttest to MyPyramid Recommendations.

**Breakfast intake.** The food record instrument developed for this intervention examined food intake and food intake patterns. There was a specific focus on breakfast intake because of its known health benefits. Overall, the numbers of those who had breakfast were more than those who didn't across the three days of food record period (Table 11).

Table 11

*Breakfast Intake as Reported in the 3-Day Food Records*

| | Pre | | Post | |
|---|---|---|---|---|
| Breakfast intake | *n* | *%* | *n* | *%* |
| Day 1 | | | | |
| Skipped breakfast | 25 | 29.8 | 18 | 21.4 |
| Had breakfast | 59 | 70.2 | 66 | 78.6 |
| Day 2 | | | | |
| Skipped breakfast | 26 | 31.0 | 26 | 31.0 |
| Had breakfast | 58 | 69.0 | 58 | 69.0 |
| Day 3 (weekend) | | | | |
| Skipped breakfast | 19 | 22.6 | 18 | 21.4 |
| Had breakfast | 65 | 77.4 | 66 | 78.6 |

There was a decrease in the percent of those who skipped breakfast from pre-intervention (29.8%) to post-intervention (21.4%) during day 1. During day 2 and day 3 the percentages of those who skipped breakfast were not significantly different from pretest to posttest and remained lower than those who had breakfast (Figure 10).

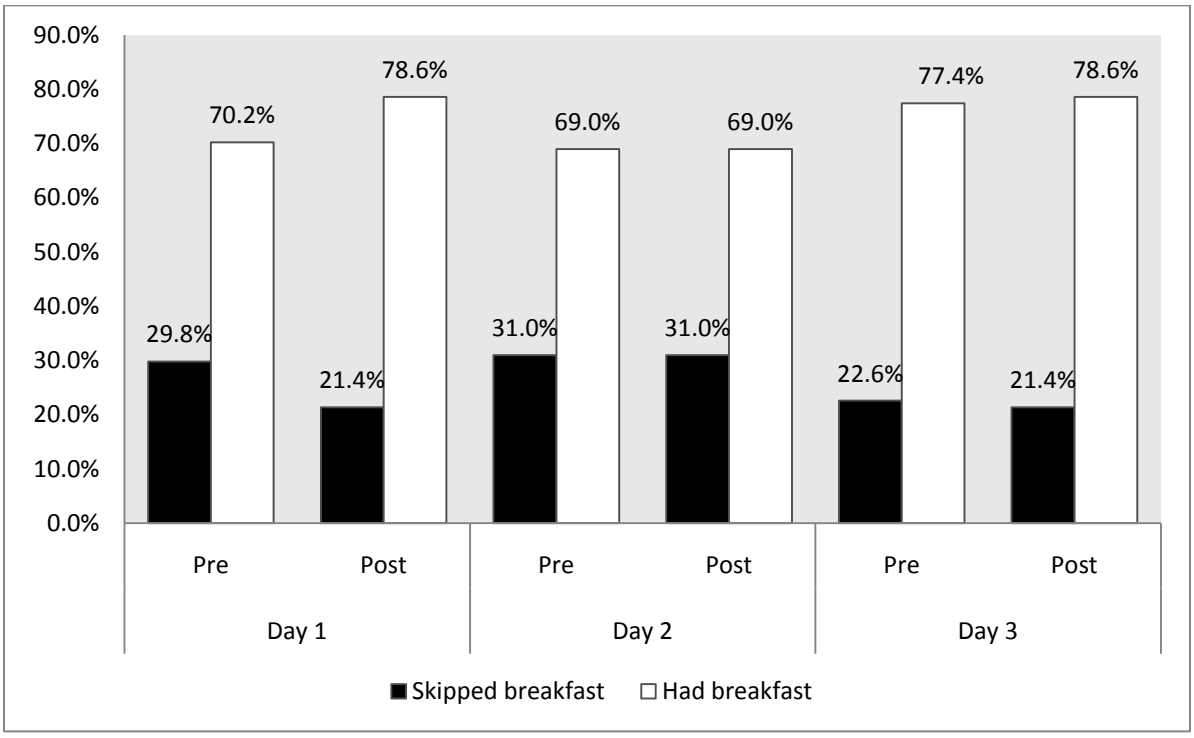


*Figure 10.* Breakfast intake according to the 3-day food records.

**Qualitative Data (Program Evaluation)**

Ninety five students participated in the group evaluation session. Overall, the students mostly provided comments that are in favor of the Let's Eat Smart program. Examples of comments that were thoughtful and significant are presented in a tabular format in Appendix M.

**Comprehension and awareness.** When asked about awareness, students clearly recognized the purpose of the program as having a balanced diet and choosing their food in a way that would mostly benefit their health. In regard to students' comprehension of the lessons, those who reported they comprehended the lessons (96.8%, $n$ = 92,), were more than those who

stated they did not understand (3.2%, *n* = 3). Several topics notated in checklists as the main things the students learned were: choosing foods that benefit their bodies is important, the energy concept of balancing diet with exercise, following MyPyramid as a trust worthy resource, the type of food and portion size they eat matters and could benefit or harm their bodies, and fruit and vegetables are good for health. Some of the topics that students did not understand were calories, food labels, food nutrients, and reasons why bad eating habits lead to obesity and chronic diseases. Some of the students' comments are listed in Table 15 in Appendix M.

**Practicality and usability.** When asked about if they liked the lessons and activities or not, 95.8% liked the lessons (*n* = 91) and 4.2% did not (*n* = 4). Some of the things students liked are: MyPyramid activity, preparing healthy snacks, incentives, outside activities, fruit and vegetables bands and food models. Students mentioned that they didn't like: the idea of eating more fruits and vegetables, the need to limit fast food consumption, the exercise activity and the lack of resources such as few tables and not having enough space in class. Students' opinions were divided on the usefulness of the DVD session in helping them learn about previous lessons. Eighty five students (89.5%) thought that the DVD session helped them to learn compared to 10 who thought that it did not help (10.5%). Those who thought the DVD was interesting liked the use of illustration on the DVD, learning about other role models, and the MyPyramid camp activity. Those who did not like the DVD thought that it would help to: do more in-class activities, watch something culturally relevant to Kuwait, do more experiments with food, and do more cooking classes. Some also noted that the characters in the DVD talked too fast, and some said that they didn't understand some words (Table 16 in Appendix M).

**Relevance and interest.** During the program evaluation session more students reported that they shared what they learned in the Let's Eat Smart program with their parents than those who did not share with their parents, 82.1% (*n*= 78) and 17.9% (*n*=17) respectively. The ones who shared what they learned with their parents talked with them about things like: importance of healthy eating, benefits of fruits and vegetables, MyPyramid as a guide, and food labels. On the other hand, students who didn't share what they learned mentioned several reason of why they didn't such as: didn't have time because of homework, forgetting to do so, didn't feel like talking, their parents would not care about such matters, and they don't have to share because they already have healthy food at their home. Only 15.8% of students showed desire to learn things that were not covered in these lessons (*n* = 15). Some of the things they would like to know about were: exercise and its benefits, pedometers, food measures, fast food, oil intake effects on health, chocolate, and how to avoid food pesticides (Table 17 in Appendix M).

**Overall Impact.** On the checklists 90.5% of the students declared that they would participate in more Let's Eat Smart lessons (*n* = 86) compared to 9.5% who would not like to do so (*n* = 9). Additional comments are listed in tabular format at the end of Appendix M in Table 18.

CHAPTER V

## Discussion

The purpose of this study was to investigate the effectiveness of the Let's Eat Smart Program and its curriculum for elementary school students in Kuwait with a pre-/post- evaluation design. The specific objectives for students receiving the program included: increasing nutrition knowledge, improving attitude toward a healthy lifestyle, enhancing self-efficacy for dietary change and improving dietary practices.

At the preliminary phase, the high return rate of parental consent forms for this study may have been due to the short length of the lessons, and the recommendations of the school principal to conduct the lessons within the National Awareness class period. Parents were not anxious about their children having to spend extra time attending extra class hours and were enthusiastic to let their children be a part of an international study.

Out of the 110 students in this study, only 84 students completed all the program requirements. Even though incentives offered to the students did help participation rates by encouraging them to have their surveys and diet records completed and returned on time, some students had difficulty comprehending what they needed to do. Incentives included stickers, fruit stamps, bookmarks, and crayons. Upon program completion students received a ticket to The Scientific Center at Kuwait. Students who did not complete the requirements (n = 26) explained that they didn't have time, they didn't know how, or their parents didn't help because this was optional. The short time window for each lesson, 15-20 minutes, may not have been enough for

some students to learn how to fill a diet record. Additionally, parents may not have received the written instructions on how to help their children report a diet record or discarded the diet record. Failure of young subjects to complete requirements is not unusual especially if there is low parental support. Low parental participation has been shown to result in low final sample sizes (Perry et al., 1998; Levine et al., 2002).

Most lost data in this study was due to uncompleted diet records rather than uncompleted surveys (i.e., Only 90 students completed both pre- and post- diet records compared to 104 students who completed both pre- and post- surveys). This is because of a perceived higher burden of completing a diet record (i.e., students had to take it home and record their diet for three consecutive days) than completing a survey. Lack of survey completions were due to absences. The numbers of students who completed both surveys were relatively high (n = 104) because 40 minutes were given during the class period for students to complete the survey, and questions were read out loud. Also, the nutrition lessons were delivered within the first segment of the National Awareness classes; and that class was perceived as being important and required mandatory attendance, which made students attend the whole class period including the time specified for the nutrition lessons.

As mentioned previously, quantitative data was only analyzed those who completed all program requirements because the main purpose was to report progress (i.e., compare pre- and post-data). The sample size estimated for this study was 71 subjects and those who completed all data were 84 out of 110 students (retention rate = 76.4%). Eighty four is a sufficient number when compared to the estimated sample size, but still there is a limitation that not including the missing results in analysis could lower the validity of the results being significant. Program evaluation however collected quantitative data and was analyzed for all participants (n = 95 with

86.3% retention rate) even if they were missing other requirements. This was done to gather collective feedback including that of those who were less motivated to complete all program requirements.

One of the main objectives of this study was to assess improvements in nutrition knowledge after the intervention. Nutrition knowledge was assessed by 16 questions and Cronbach's α, an internal reliability measure, for the nutrition knowledge scale was lower than the 0.6 cutoff point at both pretest and at posttest. Despite that, the nutrition knowledge was analyzed as a scale for all 16 questions because according to Lowenthal (2001) it is feasible to include items having internal reliability lower than the 0.6 cutoff point if they were theoretically justified, valid, and practically reasonable. Adding more questions to assess nutrition knowledge scale would improve reliability, but also it would be a burden to students. Also, too many questions require longer time and may cause loss of interest in response.

The nutrition knowledge questions were validated as being related to the topics covered in lessons and were intended to test the degree to which the students comprehended each topic in the program. Validity may be more vital than reliability because if an evaluation is not measuring what it supposes to, its use is unreasonable even if it measures consistently and is described as reliable. Percentages for each question in the nutrition knowledge section were analyzed separately to obtain a better understanding of the data rather than only looking at the change in nutrition knowledge overall.

Due to limited resources, a sample of convenience was investigated for the pilot testing of the Let's Eat Smart program and a better design would incorporate a control group. Conducting extensive validity and reliability testing for the instruments before administration in the study is a must, especially, because the instruments were being used for the first time in a

school in Kuwait. Validity and reliability testing is important to develop an effective assessment or evaluation tool when being used with children of different cultural and income backgrounds. (Siti Sabariah et al., 2006).

Overall improvement in nutrition knowledge was achieved ($p < .0001$) as students were able to comprehend the nutritional messages conveyed to them. Despite that, nutrition knowledge alone is not sufficient to modify health behaviors and should be not assessed solely to reflect intervention success. When comparing the percent of correct answers at pretest to the percent of correct answers at post test, students mostly improved in questions relating to the MyPyramid topic. Similarly, the treatment group in a study by Robertson et al. (2005) improved Food Guide Pyramid knowledge by 54% compared to a 41% improvement of control participants.

What is more important is the investigation of true improvement in knowledge scores. Therefore, another analysis was conducted to differentiate those who answered correctly at both pre- and post- tests from those who improved (i.e., answered incorrectly at pretest but correctly at posttest). The analysis provided a better insight about students' knowledge. For example, students had a good knowledge of what is a healthy drink as 60.7% answered correctly on both surveys compared to only 26.2% who improved. The largest number of students answered the goal steps, calorie definition and healthy snacking questions incorrectly at both surveys, 48.8%, 50% and 63.1%, respectively. The question about what is a healthy snack option may be difficult and complex to comprehend as students were unable to identify what is a healthy snack option, (63.1% answered incorrectly at both surveys compared to 19% who improved). Better wording of the questions and greater emphasis on these concepts during lessons would improve responses. Also, distraction, misapprehension, lack of interest, lack of knowledge or guessing the

answers could all have contributed to decreased response rates or answering incorrectly on both tests by some students. Increase in nutrition knowledge in other studies correlates with the findings of this study. In an evaluation of a 6-week curriculum in fourth through sixth graders Willeford et al. (2000) found that all students had significant increases from pre- to post-intervention. Other studies that randomized students into treatment and control groups and found a significant increase in nutrition knowledge in treatment groups compared to control groups (Powers et al. 2005; Robertson et al. 2005).

Another objective of this study was to improve attitudes toward a healthy lifestyle. Three items were assessed on the attitude scale with a significant improvement in attitude toward a healthy lifestyle from pretest to posttest ($p < .043$). When comparing percentages of each response for each item, most of the students rated being physically active, eating healthy and health education at school as either somewhat important or very important. Reported attitudes were highly positive at pretest and remained so at posttest. Having a positive attitude toward a healthy behavior correlates with adopting that behavior (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). This is reflective of students' perception about health being a priority which is promising for nutrition educators as they can assume student positive receptiveness to nutrition instruction. Those who answered not important for all attitude questions were consistently low in both the pretest and the posttest. Similarly, Willeford et al. (2000), Robertson & Zalles (2005) and Jan et al. (2009) reported a significant increase from pre to post regarding nutrition attitudes.

There was no significant change in dietary practices, except for fast food consumption which decreased significantly ($p < .001$) after the intervention. Typically, for short term interventions, changes in dietary practices are not warranted because dietary habits take time to

occur and longer intervention periods and follow-ups are needed to track change considering different demographics (Gortmaker et al., 1999). Another possible explanation of the no change in dietary practices is that, previously established dietary practices among parents largely influence their children intake and are more challenging to change (Taylor, Gallagher, & McCullough, 2004). This signifies the need and the importance of parental involvement in future interventions.

In the United States, previous research has shown that households with children were significantly associated with higher rates of eating at fast food restaurants, where children consumed more total energy and had inferior diet quality (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Jeffery, Baxter, McGuire, & Linde, 2006). High intake of fast food has been associated with obesity among children in the Arab Gulf region; globalization and free trade have brought these fast food chains to developing nations, and their influence as a popular trend among children is no longer limited to the developed world (Musaiger, 2004). Regardless of the short period of this intervention, fast food consumption decreased. This is promising for health educators as the results demonstrate that communicating the right message about eating can be influential and has the potential to develop a new trend of healthy eating in the Kuwaiti schools.

Reported self-efficacy increased after the intervention ($p < .01$). In addition to nutrition knowledge, having the opportunity to practice and model healthy eating such as preparing food, doing food experiments, solving problems in class activates, may all have resulted in improved self-efficacy. Similarly, Saksvig et al. (2005) found an improvement in dietary self efficacy among girls ($p < .05$), boys ($p < .05$) and students who were obese at baseline ($p < .01$).

Change in the consumption numbers of each food group servings were examined, and the significant changes detected were an increase in fruit ($p < .02$) and vegetable ($p < .001$) consumption. These findings are noteworthy, as this change is probably because of the skills that student practiced using fruit and vegetable wrist bands to count daily servings. These wrist bands served as a reminder of fruit and vegetable servings and created a trendy culture among the students that eating healthy can be fun. Powers et al. (2005) found an increase not only in fruit and vegetable consumption but also in that of dairy. As well, Kelder et al. (2005) found a marginally significant increase in fruit and vegetable intake at post-intervention.

As described previously in Figure 9, there was a higher intake of the grain group and meat and bean group at both the baseline and after the intervention compared to the recommended servings of MyPyramid. Milk consumption (2.2 cups) at both pretest and posttest, was lower than the recommendations. Even with the significant increase, the number of vegetable servings was still below what is recommended by MyPyramid, while the increase in the number of fruit serving gave an intake that was slightly higher than recommended amounts. Melnik et al. (1998) reported that students in the second and fifth grades consumed lower than the recommended servings for fruits, vegetable and grains; while they met the milk and meat recommendations. This implies that each population has its own characteristics and could manifest different patterns of consumptions.

Taking in to consideration the unique characteristics of the Kuwaiti diet, health habits and environmental factors; health educators should investigate and determine what the appropriate numbers of servings for the food groups for Kuwaiti children are and establish dietary guidelines accordingly. There was no significant change in breakfast intake. Overall, breakfast intake was fairly high across the three days of the food record period at both baseline and post-intervention.

Likewise, Jan et al. (2009) reported that 81.6% of second to fifth grade students in their study ate breakfast daily. Apparently, breakfast is an important meal for this sample as most would eat breakfast at school if it was not eaten at home.

The atmosphere of the classrooms was influential on students and their ability to focus on the topics learned during the lessons. Noise level, the teacher's classroom management skills, movement of students, and students' comprehension levels all contributed to the outcomes in this pilot study. However, analysis of the students' evaluation checklists revealed key points. Students were clearly able to recognize the purpose of the program, and a high number of students reported that they understood the lessons (96.8%). The students also showed an interest to learn even more about the topics covered. The comments indicated that although some of the concepts learned were entirely new at the beginning of the intervention, for that, they recognized the importance of topics such as calorie and food labels and wanted more information about them. Most students (95.8%) liked the interactive nature of the lessons such as the MyPyramid, healthy snacks, and pedometer activities. They also liked the fruit and vegetables bands and food models. Others didn't like the message of eating less of unhealthy food and more of healthy food. Taking this in to consideration, a message that would focus on promoting healthy eating behaviors rather than limiting unhealthy ones is recommended. Also, better classroom facilitation and management is would help to create a better experience for children.

Most students thought the DVD sessions were interesting and helped them to learn (89.5%). Students liked the DVD sessions because they made information taught in class more applicable to them. The other 10.5% of students preferred to do more interactive activities or thought the DVDs should be more culturally relevant to Kuwait. The results show that the DVD session is a great tool to reinforce information presented during lessons, but it should be

culturally relevant. Seventy eight students shared what they learned with their families compared to 17 students who did not share. Some of the reasons for those who didn't share what they learned were; "I didn't have time because of homework", "I forgot" and "My parents would not care". Unquestionably, future interventions need to be designed to have greater parental involvement to help build a supportive environment of healthy eating at home.

Fifteen students showed a desire to learn new things about nutrition. Some of the things they were interested to learn were: exercise and its benefits, pedometers, fat intake effects on health and food pesticides. The topics suggested by students could be taken into consideration when designing future interventions.

Overall, 90.5% of the students would participate in more Let's Eat Smart lessons and reported positive additional comments. Concerns expressed with class conditions, anticipations for more lessons and general gratitude. Generally, the students were satisfied with class activities and showed interest in nutrition. These nutrition classes were popular because of their interactive nature were children got to do experiments, watch movies, examine food models, play and move around during class.

**Recommendations and significance**

Compared to other nations, the prevalence of childhood obesity in Kuwait is very high. Therefore, serious action and prevention strategies are needed. Even though, the findings of this pilot study cannot be generalized to the rest of schools in Kuwait, these findings are important because they represented a novel approach to intervention for Kuwait. According to Doak et al. (2006) reporting interventions with small sample size, lacking study design and no significant change in outcomes is important because the evaluation and publication of these interventions can be useful in improving and informing future interventions.

Incorporating nutrition education into the schools' health education curriculum could positively influence children's perception about a healthy lifestyle. There is a need for school-based interventions that utilize interactive lessons to achieve favorable outcomes and promote a healthy lifestyle among school-aged children in Kuwait. Based on the results of this study, nutrition educators in Kuwait may find it helpful to develop programs based on the reciprocal determinism concept of Social Cognitive Theory that address environmental, personal and behavioral factors.

Another point to consider is that school-based interventions cannot solely solve the problem of childhood obesity. Let's Eat Smart was well received and filled a gap within the school curriculum. An extended intervention and evaluation is needed to improve and assess long-term program efficiency. Story et al. (2006) indicated that even though school-based interventions, in general, exhibit high participation rates and usually affect targeted health behaviors positively, their effect on body weight and fatness were less prominent. To achieve long-term success, considerable collective cooperation between public policy makers, health promotion educators and health practitioners is necessary for addressing a multifaceted problem such as childhood obesity.

Also, longer, more intensive interventions may be needed to attain considerable change in targeted outcome behaviors. Including measures such as BMI or percent body fat and measures of caloric intake change would be helpful to detect change in longer- period-interventions. Future interventions should consider larger sample sizes, randomization, adding a control group, greater parental involvement, the use of both qualitative and quantitative measures and follow-up assessments to detect change over time.

## Conclusion

Schools are an ideal place to reach children and provide nutrition and health education. The Let's Eat Smart program was developed to offer comprehensive and interactive nutrition education tailored to elementary school children in Kuwait. Positive, significant changes in nutrition knowledge, attitude toward a healthy lifestyle, self efficacy toward healthy eating and some dietary behaviors (i.e., increased consumption of fruit and vegetables and decreased consumption of fast food) emerged among the majority of fourth and fifth grade students after receiving the Let's Eat Smart lessons. Students had high satisfaction levels with the program. Although more elaboration and an addition of a control group is crucial to examine the program's full impact, The results show potential and indicate the feasibility and effectiveness of applying school-based interventions in Kuwait.

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LIST OF APPENDICES

Appendix A

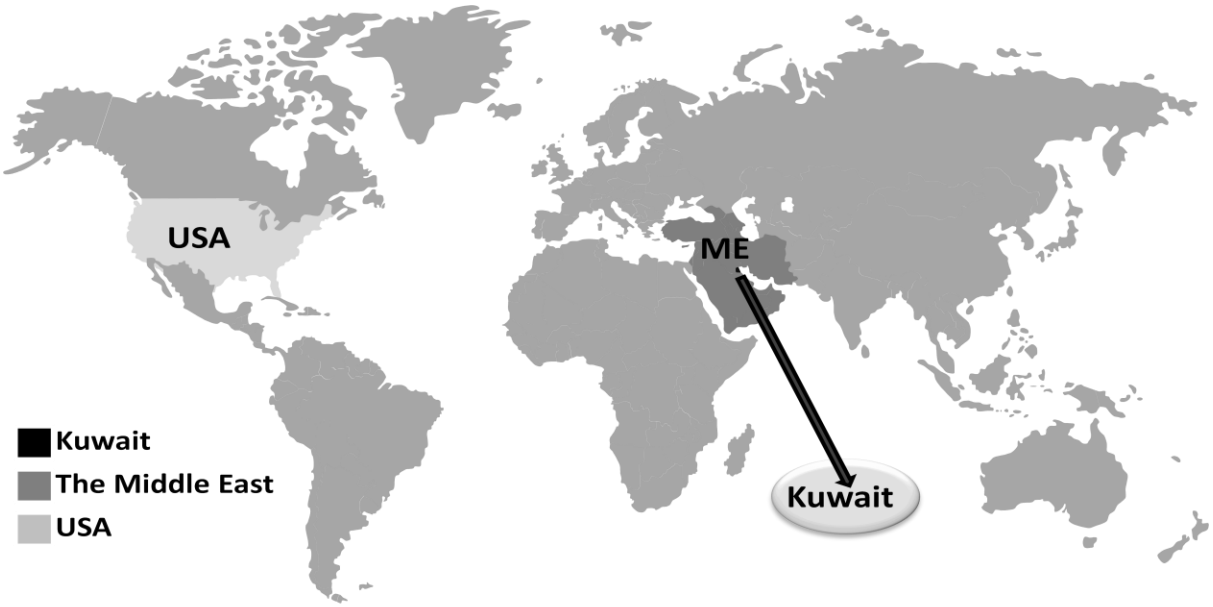



*Figure 11.* Location of Kuwait on the world map.


*Figure 12.* Location of Kuwait and the Arab Gulf countries in the Middle East region.

Appendix B

The University of Mississippi
Oxford • Jackson • Tupelo • Southaven

Office of Research and
Sponsored Programs
100 Barr Hall
Post Office Box 907
University, MS 38677
(662) 915-7482
Fax: (662) 915-7577

February 3, 2011

Ms. Sondos A. Kalendar
250 Salem Drive Ext.
Oxford, MS 38655

Dr. Kathy B. Knight
Nutrition and Hospitality Management
University, MS 38677

Dear Ms. Kalendar and Dr. Knight:

This is to inform you that your application to conduct research with human participants, ***Development and Evaluation of Let's Eat Smart: A Pilot School-Based Nutrition Intervention for Elementary School Children in Kuwait*** **(Protocol 11-147)**, has been approved as Exempt under 45 CFR 46.101(b)(1).

Please remember that all of The University of Mississippi's human participant research activities, regardless of whether the research is subject to federal regulations, must be guided by the ethical principles in *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*.

It is especially important for you to keep these points in mind:

- You must protect the rights and welfare of human research participants.
- Any changes to your approved protocol must be reviewed and approved before initiating those changes.
- You must report promptly to the IRB any injuries or other unanticipated problems involving risks to participants or others.

If you have any questions, please feel free to call me at (662) 915-7482.

Sincerely,

Diane W. Lindley

Diane W. Lindley
Coordinator, Institutional Review Board

Appendix C

Investing in your child's future

مدرسة المجموعة الانجليزية
للتعليم المبكر والابتدائي

Salwa :
Tel.: 5611864 - 5652457 - Fax: 5639531
Salmiya :
Tel.: 5668145 - Fax : 5636321
www.theenglishplaygroup.org

Date: 3rd November 2010

**To whom it may concern,**

Based on the recommendation of the General Administration of Special Education, at The Ministry of Education in Kuwait and after reviewing the proposed programme, **"Let's Eat Smart"**, presented by Ms. Sondos Kalendar, a graduate student at the University of Mississippi, I have granted permission for the programme to be conducted at The English Playgroup and Primary School.

The purpose of the study is to determine if a nutritional education programme in the school environment can increase the nutritional knowledge and influence the healthy behaviour choices of students. The primary activity will be nutrition interactive lessons designed to teach the students about nutrition and healthy lifestyle behaviors. Only students in the fourth and fifth year with no food allergy are eligible to participate.

I understand that the interactive lessons of the **Let's Eat Smart** program will occur for *eight weeks during normal classroom instruction. This is a weekly event, with lessons lasting from 15 to 20 minutes*. I expect that this project will end no n later than 30/1/2011. Ms. Kalendar will *contact* and *recruit* our students and will *collect data* at our school.

I understand that Ms. Kalendar will receive parental/guardian consent for all participants, and have confirmed that she has the cooperation of the classroom teachers. Any data collected by Ms. Kalendar will be kept confidential. Ms. Kalendar has also agreed to provide to us a copy of the aggregate results from her study.

I have met with the principal researcher and we have discussed the programme proposal. I hereby give her my permission to conduct the **"Let's Eat Smart"** nutrition programme at The English Playgroup and Primary School as proposed.

**Sincerely,** Margarita Edwards

Ms Margarita Edwards

Principal

The English Primary School

The English Playgroup & Primary School - The Early Learning Specialists

Appendix D

PARENT/GUARDIAN PERMISSION **to participate in**: **Let's Eat Smart Nutrition Education Program**

**Dear Parents please take a moment to read this letter.**
Your child is invited to participate in a research study called **Let's Eat Smart Nutrition Education Programme** being conducted by Ms. Sondos Kalendar, Master Candidate at The University of Mississippi, USA. This will be delivered as an educational programme within school, and your child has been selected because he/she is a fourth or a fifth year student at English Play Group Primary School. This topic also ties into the English National PSCHE curriculum (Personal, Social, Citizenship & Health Education). The purpose of this programme is to determine whether a nutritional education curriculum in the school environment can increase the nutritional knowledge and influence the healthy behaviour choices of fourth and fifth year students. Data will be confidentially collected as to contribute to research on this topic; student's data will be anonymous.

**Programme Delivery**
The **Let's Eat Smart Programme**, which will be tested as a part of the school curriculum, consists of twelve interactive lessons designed to teach the students about nutrition and lifestyle behaviours that could have a positive impact on their overall health. One day each week during the twelve-week programme, 15-20 minutes will be devoted to nutrition education including four major topics of; energy balance, My Pyramid, portion size and healthy snacking. The interactive lessons are delivered during the school day and are designed to motivate students to make healthy lifestyle choices and increase their awareness of healthy eating. A knowledge and behavioural survey will be administered to your child at the beginning and at the end of the study. In addition he/she will be asked to record his/her food intake for three days at the beginning and at the end of the programme. Approval for delivery of the programme was obtained from The Kuwait Ministry of Education and English Play Group School management. There is no extra school work associated with this nutrition programme as the nature of lessons is intended to increase nutrition awareness. There are no known risks associated with this research project. However, if your child is known to have sensitivity to any food or food ingredient he/she should not participate in this study.

Potential benefits for students will be learning about healthy eating habits and making healthy food choices. The students involved have the potential to develop lifestyle behaviors that may positively impact their health. There will be in-class incentives like; Bookmarks, stickers, fruit bands to further convey the message of healthy lifestyle. Also upon your child completion of the intervention he/she will receive a ticket to the Scientific Center. Your decision whether or not to allow your child to participate will not affect you or your child grade, treatment, or any other benefits to which they are otherwise entitled. If you decide to allow your child to participate, you are free to withdraw your permission and to discontinue the use of your child's data for the purpose of this research study at any time. If you have any questions now or at any time during the study you can contact Ms. Sondos Kalendar by e-mail: **eatsmartq8@hotmail.com**

**To indicate you grant permission for your child to participate in this programme, please sign below the white copy and return it back to school.**

| _____ | _____ | _____ |
|---|---|---|
| Parent/Guardian Name | Signature | Date |
| _____ | _____ | |
| Relation to Child | Name of Child | |

Appendix E

# Child/Minor Assent-Oral Script

***Let's Eat Smart***

Dear *(participant):*

Hi, my name is *Sondos Kalendar*. I am a student at the University of Mississippi and I am doing a project to help me learn more about how to help children learn about activities and foods that are good for their health. I would like to ask you for your help so I can do the *Let's Eat Smart* project.

Let me tell you about what you would be doing. You will fill out some surveys on how much you know about eating healthy and record what you eat for three days at the beginning and at the end of the project. You will also attend 15 minutes nutrition classes each week. No one will see your answers except members of our staff, and we won't use your name in any reports we write.

If you say "yes" you can still stop at any time by telling me "I want to stop." You won't get in any trouble for stopping. If you have questions please ask me now.

Sincerely,
Sondos Kalendar

I agree to help with this research project. ❑ YES ❑ NO

Name: _____ Date: _____

Appendix F

Table 12

*Application of Theory Constructs in Let's Eat Smart Program*

| Construct | Definition within study | Activities |
|---|---|---|
| **Outcome expectations** | If students were to adopt healthy dietary habits:<br>• They are anticipated to feel healthier.<br>• They are expected to feel the ease of making a healthy food choice.<br>• They are expected to feel more positive toward adopting healthy lifestyle that would bring health benefits | Lessons provide students with knowledge about likely outcomes of adopting healthy dietary habits such as having more energy, excelling in school, become smarter by choosing foods that benefits their bodies & preventing diseases.<br>Lessons on healthy eating emphasized the concepts of nutrient dense food vs. energy dense food & gave students the chance to explore why dietary practices are important for optimal health. |
| **Self-Efficacy** | • Confidence in ability to make healthy food choices such as eating more fruit and vegetables, whole grains and low fat dairy.<br>• Confidence in adopting a healthy lifestyle | Students were expected to belief they are empowered with tools that aid them to make healthy choices. Tools used to build self confidence were: fruit and vegetable bands used to remind them of their 5 a day intake, meal planning activities, simple label reading & preparing their own healthy snack. |
| **Observational Learning** | Learning to develop and being able to practice:<br>• Making healthy food choices.<br>• Eating breakfast consistently.<br>• Choosing proper food portions.<br>• Positive attitude toward a healthy lifestyle. | Students practiced and modeled through class activities such as preparing healthy snack. The health educator served as a role model by dining with students in lunchroom. Students had the chance to emulate Media role models & learned to develop positive attitudes toward healthy eating by watching nutrition education DVD sessions. |
| **Incentive motivation** | The use of reword to modify healthy dietary habits. | Incentive to motivate students to adopt a healthy lifestyle used were: bookmarks to remind them of Mypyramid groups intake, stickers and fruit stamps passed for participation and paying attention during class & those who bring healthy snack in lunch break were verbally encouraged. |

| | | |
|---|---|---|
| **Facilitation** | Providing tools, resources & environmental changes to make it easy for children to learn the nutrition concepts and to practice develop healthy dietary habits. | Tools that promote adopting healthy dietary habits used in this study included: practical nutrition guidelines sent home letters, school posters promoting healthy dietary lifestyle, simple label reading practice, using everyday materials to estimate portion size, the use of plate method & the use of fruit & vegetable bands system to track fruit and vegetable intake during the day. |

Appendix G

Table 13

*Lessons for Let's Eat Smart Program*

| Topic | Lesson | Lesson description |
|---|---|---|
| **Energy Balance** | **1.** Energy in= Energy out. | **Lecturing:** Students introduced to energy balance concept, pedometers, calories, nutrient-dense, energy-dense and exercise. **Interactive lesson:** student demonstrate a double amount of exercise after consuming 2 Hershey kisses chocolate vs. 2 slice of apples **Group activity:** bar graph work sheets and comparison between groups and discussion. |
| | **2.** What is a Calorie? DVD. | **Review and introduction**. **DVD:** A 20 minutes video for 4 and 5$^{th}$ graders about energy balance to reinforce the concept learned previous week |
| | **3.** Discussion & Recap | **Q&A**: a guided discussion about the energy balance concept and the video from last week. |
| **MyPyramid** | **4.** MyPyramid | **Lecturing:** introduce MyPyramid five colored groups and recommended exercise with examples of food models to show what a serving size for each food look like. **Interactive lesson:** student demonstrates healthy choices by participating in a Food Pyramid pocket chart & card Game. **Group activity:** children will fill an activity sheet about MyPyramid groups and each group will compose a healthy breakfast, lunch and dinner using food models. |
| | **5.** Food Smart: MyPyramid DVD. | **Introduction & review** of MyPyramid portion size for each group. **DVD:** A 20 minutes video suitable for 4$^{th}$ & 5$^{th}$ graders about what is MyPyramid and how it can help in food choices to reinforce previous week lesson. |
| | **6.** Discussion & Recap | **Q&A:** a guided discussion about MyPyramid and the video from last week. |
| **Portion Size** | **7.** Food Models & Portion estimation | **Review** of serving size of food groups and introduction of portion distortion. **Interactive lesson**: using visual posters and food models to make children make their own comparison about portion change. Introducing the children to some handy object around home that they can use to estimate their food servings. **Group activity:** students groups will create a full day menu of three meals using a Math activity sheet obtained from MyPyramid. |
| | **8.**Portion Distortion DVD. | **Review** of portion distortion. **DVD:** a 20 minutes video about food portion sizes change over the years. |

| | | |
|---|---|---|
| | **9.** Discussion & Recap | **Q&A:** a guided discussion about the appropriate serving sizes and the video from last week. |
| **Healthy Eating** | **10.** Nutrient Math & Science | **Introduction** about what is nutrient dense vs. energy dense food, vitamins, minerals, fiber, sugar, fat, protein and their role in health. **Interactive lesson:** showing simple food labeling information, visualizing sugar, fat and fiber content of some common food and using measuring tools such as food scales and beakers to measure fluid volumes and compare finding with food labels on food boxes. **Group activity:** compare and draw a bar chart about sugar, fat and fiber content of different common foods. |
| | **11.** Healthy snack Day | **Introduction:** emphasizing the importance of healthy breakfast and healthy snack choices with focus on fruits and vegetables. **Interactive lessons:** snack day is about A fun cooking activity. Group 1 will make smiley low fat cheese sandwich with olives, tomato, yellow pepper and group 2 will make cantaloupe balls for desert. **Group activity:** student will try new fruits and vegetables and record their opinions on a food palate. |
| | **12.** Discussion & Recap | **Q&A:** a guided discussion about the appropriate snacking habits. |

Appendix H

Topic 1

# Energy Balance

## Balancing energy in is (food) and energy out is (exercise)


**Calorie:** is a unit that represents the energy stored in food. 


**Pedometer:** a device that measures footsteps. 
(The goal for physical activity is to take **10,000 steps** every day)

**Nutrient-dense food:** food that is rich in vitamins and minerals 
(Like whole grains, beans, fruits and vegetables)

**Calorie-dense food:** food that has lots of calories. 
(Like candy and fast food. These foods have lots of fat and fats have lots of calories)

| | | |
|---|---|---|
| 1cup of butter = **1600** calories  | 1 cup of rice = **200** calories  | 1 cup of strawberries = **45** calories  |

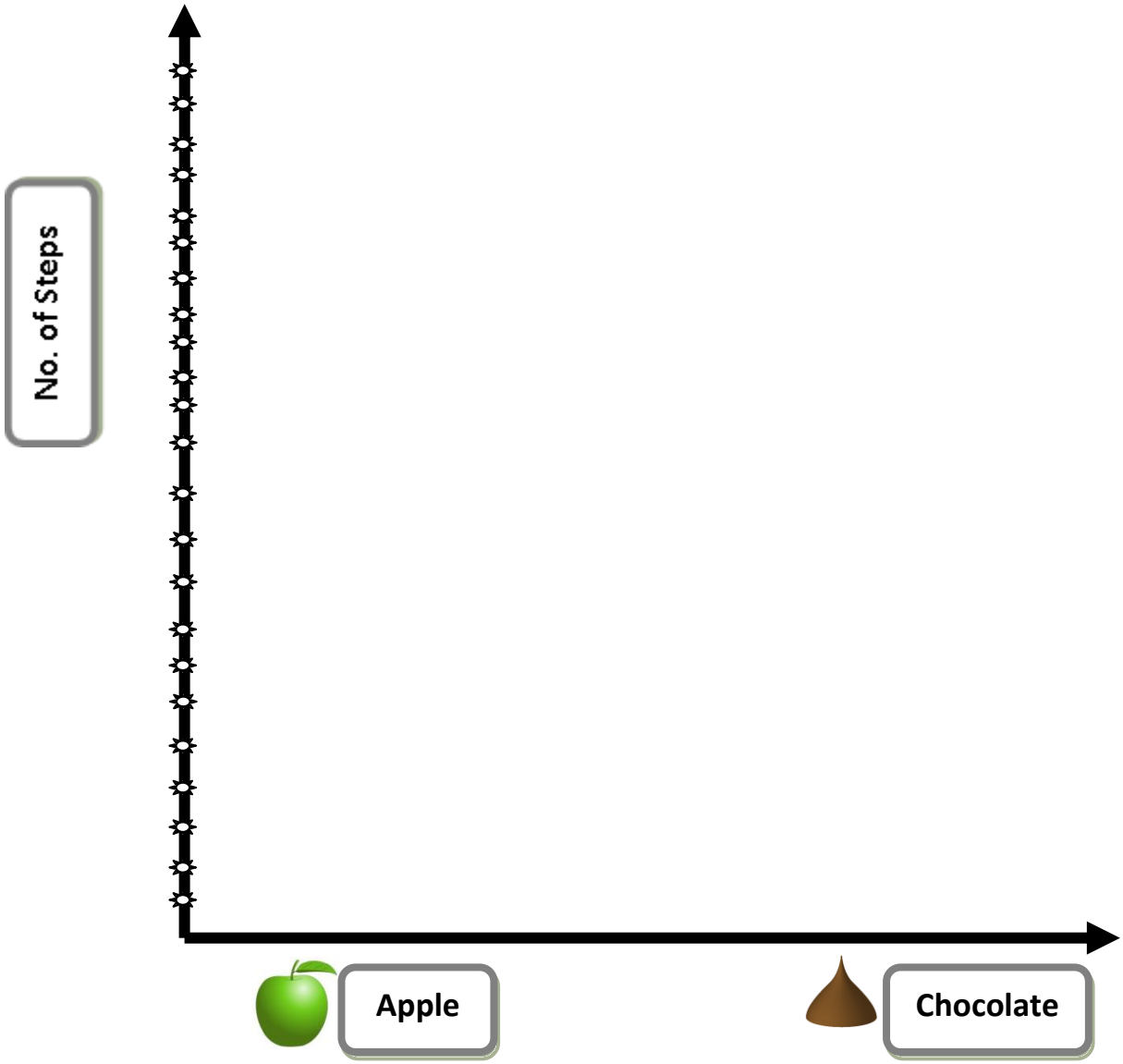
# Activity

Topic 1

**Write number of steps:**

| Food choice | Number of laps | Number of steps |
|---|---|---|
| **2 Apple slices** | 1 lap | |
| **2 Hershey's Kiss Chocolate** | 2 laps | |

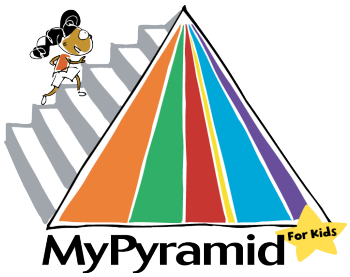
**Complete the bar graph below:**



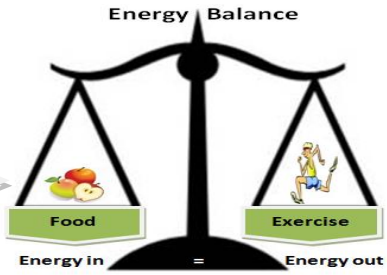
Topic 2

# MyPyramid

**MyPyramid:** is a guide that helps you balance energy in (food) with energy out (exercise).

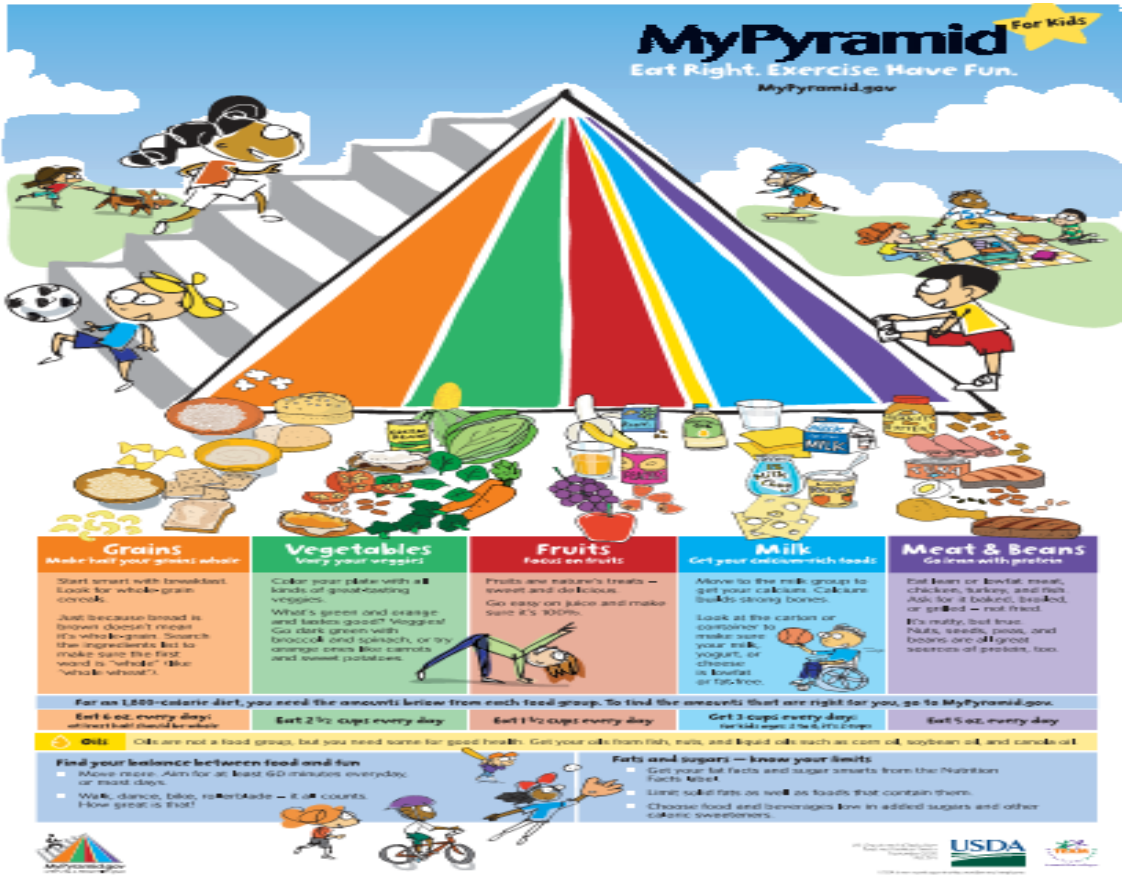



Guide you




**Eat the MyPyramid way:**

- MyPyramid shows you the **correct food servings** you should eat form each food group.



# Activity

Topic 2

**Match each food group with the box that tells us what the group gives our bodies.**

| Food Groups | Picture of Foods from Each Food Group | What the Food Group Gives to Our Bodies |
|---|---|---|
| Grains |  | Foods from this group can include all the plant parts. They provide many nutrients and fiber. Orange or dark green ones are rich in vitamin A. |
| Fruits |  | Foods from this group provide our bodies with fiber and energy from complex carbohydrates. We need carbohydrates to do all the things we do every day. |
| Vegetables |  | Foods from this group provide our bodies with the protein that our muscles need to grow and stay strong. |
| Milk |  | Foods from this group contain seeds. They provide many nutrients and fiber. Many are rich in vitamin C. |
| Meat and Beans |  | Foods from this group provide our bodies with the calcium that our teeth and bones need to grow and stay strong. |

Every day I need to have _____ cups of dairy.

Every day I need to have at least _____ servings of fruit and vegetables.

Every day I need to do _____ minutes of physical activity.

I need to eat most from _____ group and limit _____.

Topic 3

# Portion Distortion

A **portion** is the amount of food that you choose to eat. It can be big or small—you decide.

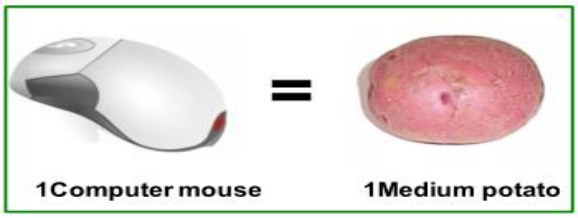
A **serving** is a measured amount of food or drink, such as one slice of bread or one cup (250ml) of milk .

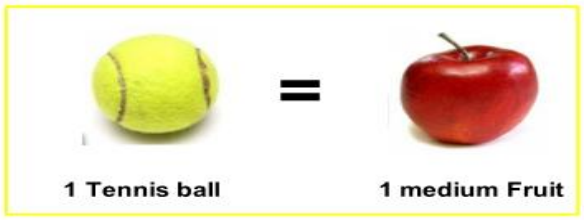
**Example:** You eat a sandwich with 2 slices of bread. The Food Guide Pyramid serving size for bread is 1 slice. Your portion is 2 slices, which equals 2 servings from the Pyramid Grains group.

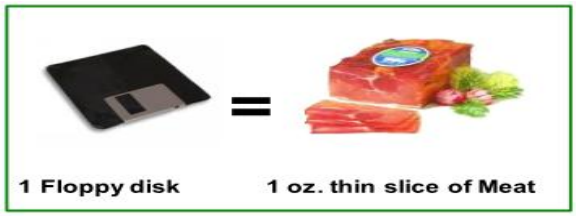
| 20 years ago | | Now | |
|---|---|---|---|
|  | 333 Calories |  | 590 Calories |
|  | 1 cup |  | 2 cups |
|  | 210 Calories |  | 610 Calories |
|  | 85 Calories |  | 250 Calories |
|  | 210 Calories |  | 500 Calories |
|  | 500 Calories |  | 850 Calories |
|  | 270 Calories |  | 630 Calories |

## Visual guide for portion size

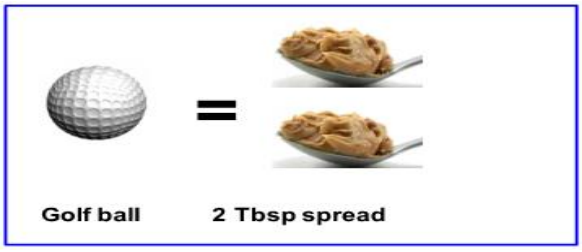


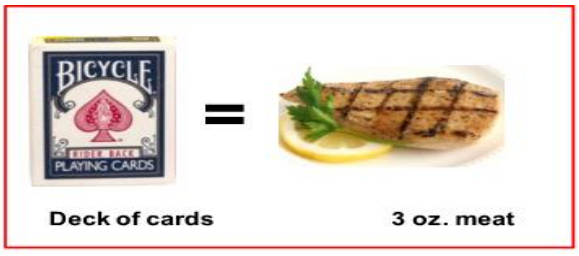







## Try this portion measuring tips:

- Measure your typical portion of foods you eat often using measuring cups or you can use the plate method.
- Limit portions of foods high in calories, such as cookies, cakes, other sweets, and fats.
- Try using a smaller plate for your meal.
- Put sensible portions on your plate and *don't* take "seconds".

## Activity

List two reasons why "bigger" is not always "better"?

_____

_____

# Food Math Activity

**Jason is 9 years old. He is physically active sometimes. Each day, he needs to eat:**

| Grains | Vegetables | Fruit | Milk | Meat and Beans |
|---|---|---|---|---|
| 6 ounces | 2½ cups | 1½ cups | 3 cups | 5 ounces |

Help Jason decide what to eat today. Plan breakfast, lunch, dinner, and a snack. Be sure he gets all the food he needs from each group. (Food items may be selected more than once.)

## Grains 6 ounces

___ 1 slice whole-wheat toast* **(1 OZ EQ.)**
___ 5 whole-wheat crackers* **(1 OZ EQ.)**
___ 1 slice white bread **(1 OZ EQ.)**
___ 1 slice whole-wheat bread* **(1 OZ EQ.)**
___ 1 cup whole-grain ready-to-eat breakfast cereal* **(1 OZ EQ.)**
___ ½ cup cooked brown rice* **(1 OZ EQ.)**
___ 1 cup cooked pasta **(2 OZ EQ.)**
___ 1 hamburger bun **(2 OZ EQ.)**
___ 3 cups lowfat popcorn* **(1 OZ EQ.)**

*Items marked with a * are whole-grain*

## Vegetables 2½ cups

___ 6 baby carrots* **(½ CUP EQ.)**
___ 1 large ear of corn **(1 CUP EQ.)**
___ 1 medium baked potato **(1 CUP EQ.)**
___ 1 cup cooked greens* **(1 CUP EQ.)**
___ 1 large baked sweet potato* **(1 CUP EQ.)**
___ 3 spears broccoli* **(1 CUP EQ.)**
___ ½ cup tomato juice **(½ CUP EQ.)**
___ 1 cup chopped lettuce **(½ CUP EQ.)**

*Items marked with a * are dark green or orange vegetables*

*Key: (1 OZ EQ.) means (equals 1 ounce equivalent)*

## Fruits 1½ cups

___ 1 small apple or ½ large apple **(1 CUP EQ.)**
___ 1 large orange **(1 CUP EQ.)**
___ 1 snack-sized container of peaches **(½ CUP EQ.)**
___ 1 large plum **(½ CUP EQ.)**
___ 1 small box raisins **(½ CUP EQ.)**
___ 1 cup 100% orange juice **(1 CUP EQ.)**
___ 1 medium wedge cantaloupe **(½ CUP EQ.)**
___ 1 small wedge watermelon **(1 CUP EQ.)**

## Milk 3 cups


___ ½ cup lowfat or fat-free cottage cheese **(¼ CUP EQ.)**
___ 1 cup fat-free milk **(1 CUP EQ.)**
___ 1 snack-sized lowfat or fat-free yogurt **(½ CUP EQ.)**
___ 1 half-pint container 1% or 2% milk **(1 CUP EQ.)**
___ 2 ounces of lowfat or fat-free American cheese **(1 CUP EQ.)**
___ 1½ ounces of lowfat or fat-free cheddar cheese **(1 CUP EQ.)**
___ 1½ cups light ice cream **(1 CUP EQ.)**

## Meat and Beans 5 ounces

___ 1 ounce of nuts **(2 OZ EQ.)**
___ 1 cup split pea soup **(2 OZ EQ.)**
___ 1 small chicken breast half **(3 OZ EQ.)**
___ 1 small lean hamburger **(3 OZ EQ.)**
___ 1 hard-boiled egg **(1 OZ EQ.)**
___ 1 tablespoon peanut butter **(1 OZ EQ.)**
___ ¼ cup of pinto beans **(1 OZ EQ.)**
___ 1 slice of turkey **(1 OZ EQ.)**

# Healthy Snacking

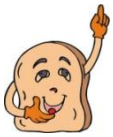
Topic 4

## Snacking tips for healthy kids


- Keep beverage choices healthful. Choose low-fat milk (1 cup serving), water, and moderate amounts of 100% fruit juice.


- Avoid soda, sweetened juice drinks, and sports drinks!

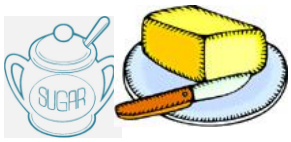
- Look for snacks that have at least 2 grams of fiber per serving listed on the nutrition label.



- Choose whole-grain snacks as much as possible. Look for the word "whole" as one of the first ingredients on the product label.

- Keep fresh fruits and veggies readily available.

- Choose low-fat dairy products, like low-fat cheeses, cottage cheese, yogurt, and milk.

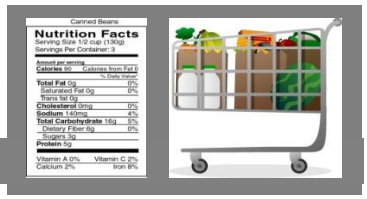



- Aim for snacks low in fat and sugar.

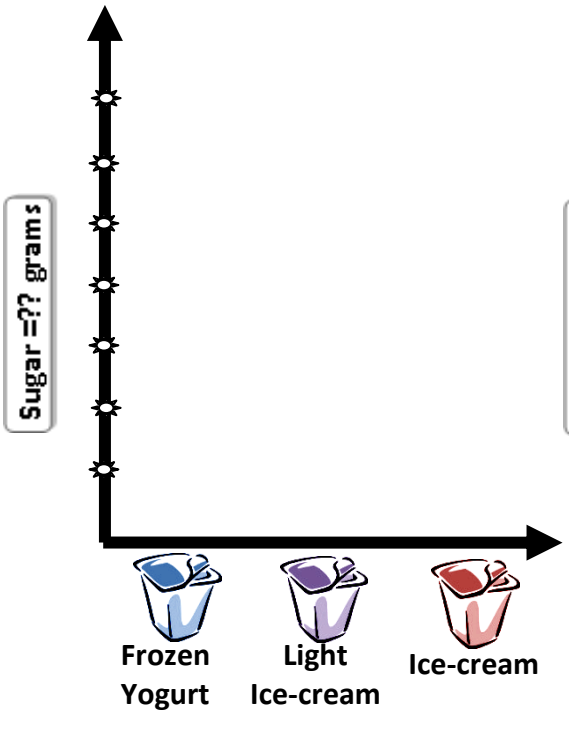
- Snacks that include at least two of the major food groups are best (carbohydrates, meats/beans/nuts, dairy, fruits and vegetables). For example, cottage cheese with cucumber slices.

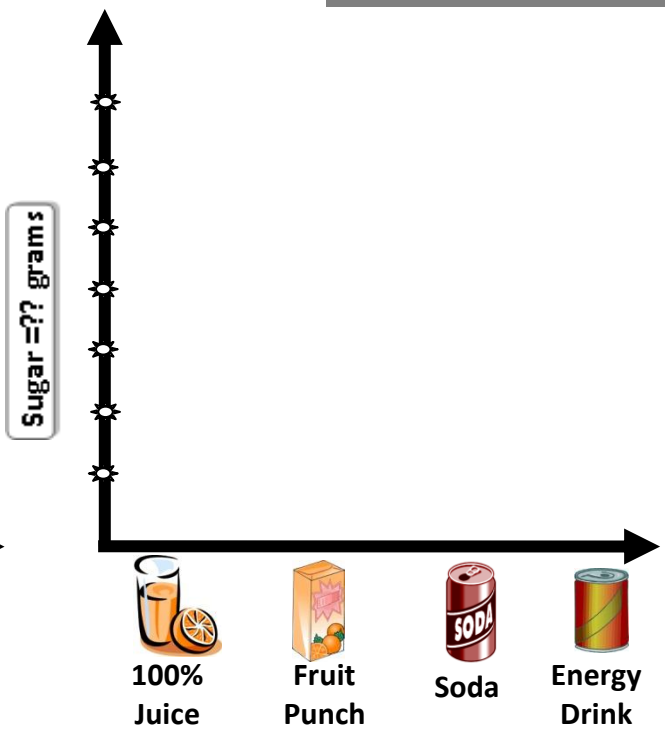
# Activity

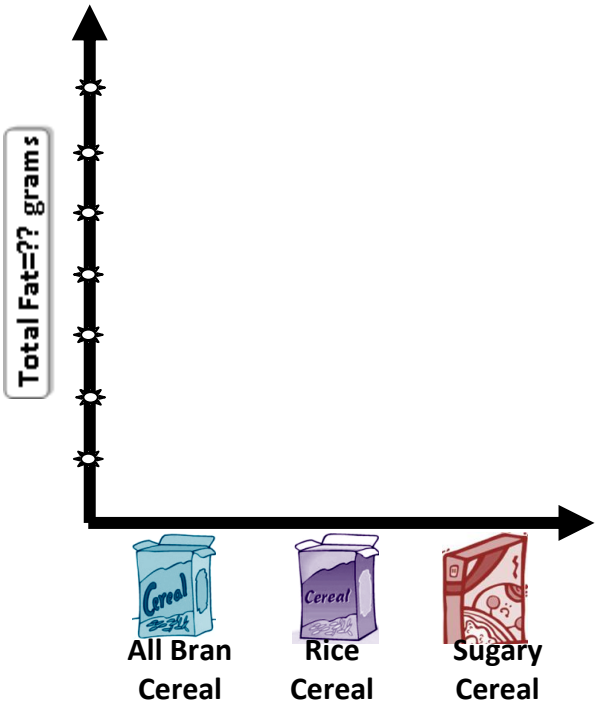
**In the grocery store LOOK at the Food Label**

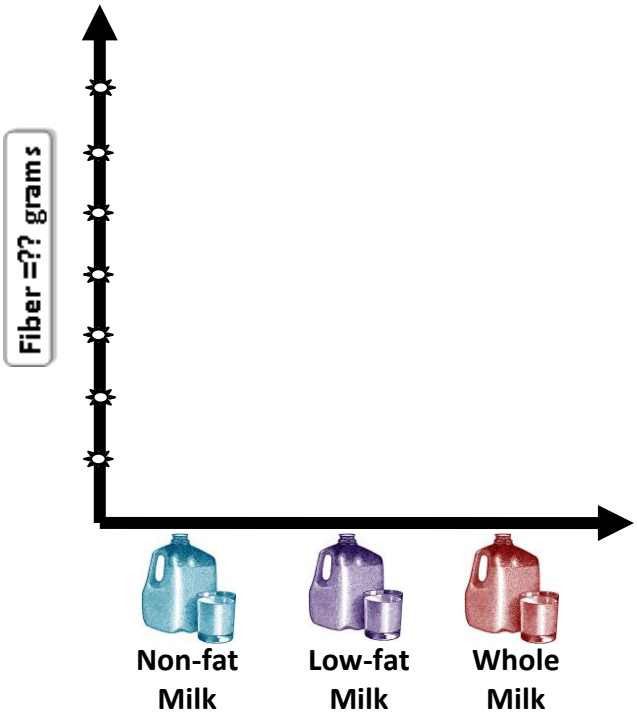



**Complete the bar graphs below:**

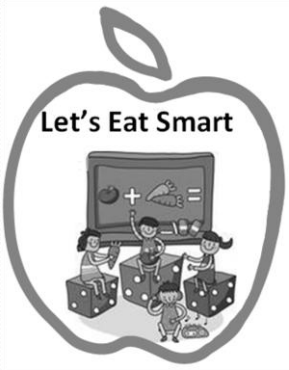


Appendix I




# Let's Eat Smart (Survey)

My student ID_____

Class _____

## Nutritional knowledge and healthy lifestyle behavior survey

### Please tell me some things about you

**I am a** ○ **Boy,** ○ **Girl**
**My Nationality** ○ **Kuwaiti ,** ○ **Others** _____
**I am in year** ○ **4** ○ **5**
**My age is** _____
**My birth date Month** ___ ___ **Day**___ ___ **Year**_____
**My Initials** _____ _____ _____

### For each question, please fill the circle next to the answer you think is correct

1. **Balancing energy in and energy out is important to maintain a healthy body weight. Energy out is also known as:**
   - ○ exercise
   - ○ calories
   - ○ Nutrients
   - ○ water

2. **The goal for physical activity is to take _____ steps every day.**
   - ○ 1000
   - ○ 100
   - ○ 5000
   - ○ 10,000

3. **A unit of energy that comes from the food we eat and what we drink is called:**
   - ○ Nutrient
   - ○ Vitamin
   - ○ Serving size
   - ○ Calorie

4. **Calories in 1 cup of butter _____calories in 1 cup of rice.**
   - ○ Equal
   - ○ Less than
   - ○ More than
   - ○ None of the above

**5. A guide that helps us to balance what we eat with regular physical activity called:**

- ○ Food pyramid
- ○ Food label
- ○ Diet
- ○ Menu

**6. A guide that helps us to evaluate what are the nutritional contents of food products called:**

- ○ Food pyramid
- ○ Food label
- ○ Diet
- ○ Menu

**7. My Pyramid recommends _____minutes of activity per day.**

- ○ 5-10
- ○ 15-20
- ○ 30-60
- ○ 90-120

**8. According to My Pyramid you should eat most from the _____ group.**

- ○ Grain
- ○ Milk
- ○ Vegetables
- ○ Fruits

**9. A correct food serving refers to _____**

- ○ How much a person normally eats
- ○ How much a person should eat following the guide of My Pyramid
- ○ How much it takes to feel full
- ○ How much a person should eat following the guide of food menu

**10. Total number of servings of fruits and vegetables you should eat every day are:**

- ○ At least 2
- ○ At least 5
- ○ At least 10
- ○ At least 8

**11. One cup of cooked rice is equal to:**

- ○ Tennis bal
- ○ Basketball
- ○ Football
- ○ Ping-Pong ball

**12. Every day you need _____ cups of dairy.**

- ○ 4
- ○ 3
- ○ 2
- ○ 5

**13. The healthiest choice from the following is to drink:**

- ○ 100% fruit juice
- ○ Fruit punch
- ○ Soft drink
- ○ Energy drink

**14. Which food is considered a healthy snack?**

- ○ Low fat yogurt
- ○ Lettuce and tomato salad
- ○ Baked potato
- ○ All of the above

**15. Which food had most fiber?**

- ○ A slice of watermelon
- ○ A spoon of low-fat mayonnaise
- ○ A small cupcake
- ○ A slice of meat

**16. Foods that contain high amounts of vitamins and minerals and relatively few calories are called:**

- ○ Energy-dense food
- ○ Calorie-dense food
- ○ Nutrient-dense food
- ○ Weight-dense food

**For each Question, please fill the circle next to the answer that describes you best**

## Attitude

**17. How important is eating healthy to you?**

○ Very important ○ Somewhat important ○ Not important

**18. How important is physical activity to you?**

○ Very important ○ Somewhat important ○ Not important

**19. How important is it for schools to help students learn about healthy diet and physical activity?**

○ Very important ○ Somewhat important ○ Not important

## Dietary practices

**20. Think about last week. How frequent did you eat food from a fast food restaurant?**

○ Never ○ Sometimes ○ Frequently ○ Daily

**21. Think about last week. How frequent did you skip eating breakfast?**

○ Never ○ Sometimes ○ Frequently ○ Daily

**22. Yesterday did you eat snacks like candy, chocolate, chips, cookies, cake or ice-cream?**

○ No, I didn't eat any of the foods listed above yesterday.

○ Yes, I ate 1 of these foods 1 time yesterday.

○ Yes, I ate 1 of these foods 2 times yesterday.

○ Yes, I ate 1 of these foods 3 or more times yesterday.

**23. Yesterday, did you eat fruit? Do not count fruit juice.**

○ No, I didn't eat any fruit yesterday.

○ Yes, I ate fruit 1 time yesterday.

○ Yes, I ate fruit 2 times yesterday.

○ Yes, I ate fruit 3 or more times yesterday.

**24. Yesterday, did you eat any vegetables?**
**Vegetables are salads; boiled, baked and mashed potatoes; and all cooked and uncooked vegetables. Do not count French fries or chips.**

○ No, I didn't eat any vegetables yesterday.

○ Yes, I ate vegetables 1 time yesterday.

○ Yes, I ate vegetables 2 times yesterday.

○ Yes, I ate vegetables 3 or more times yesterday.

## Self efficacy

**25. How sure are you that you can drink low fat or skim milk instead of regular white milk?**

○ Not sure ○ A little sure ○ Very sure

**26. How sure are you that you can eat fresh fruit instead of a candy bar?**

○ Not sure ○ A little sure ○ Very sure

**27. How sure are you that you can eat a baked potato instead of French fries?**

○ Not sure ○ A little sure ○ Very sure

**28. How sure are you that you can drink fruit juice instead of a soft drink?**

○ Not sure ○ A little sure ○ Very sure

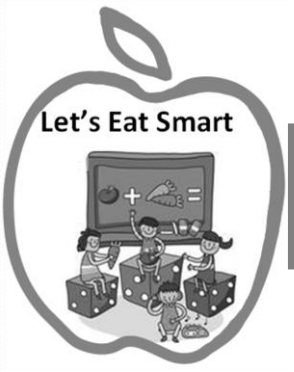
**29. How sure are you that you can eat brown bread instead of white bread?**

○ Not sure ○ A little sure ○ Very sure

**Thank you**

**The end of the Questionnaire**

Appendix J




# Let's Eat Smart (Food Record)

My student ID_____

Class _____

Dear parents,

- Please help your child to write down all what he actually eats and drinks for **three days.** (Day 1 in the first table, Day 2 in the second table and Day 3 in the third table.)

- Please note that you child should describe his intake with your help **thoroughly**.

- Your child should write **the type, size, brand name and amount of food he eats and drinks**. (**Example**: 2 medium oranges, ½ cup vegetable salad, 1 ½ cup whole milk, 1 cup white rice, 3 small pieces of fried fish, ½ cup lentil soup, 250ml fresh apple juice, 2 tablespoon honey, 3 pieces of white toast, 1 piece medium brown bread, 1 medium MacDonald's cheese burger, 1 large MacDonald's fries, 1 cup coca cola medium size, 1 beef kabob with tomato 2 slices on a white bread pita bread sandwich, 6 black olives large size, 4 slices of tomato.)

- Your child should complete this form and return it back by **next week at most.**

- **Reminder:** Only those who complete the questionnaire & the food record at the beginning and at the end of the study will be eligible for the scientific center ticket.

**Thank you for your cooperation**

**Please fill out the chart below with the food you will eat today** **Day 1**

| Meals | Did you have any? | If yes, What is the kind and size of food you ate and how much? |
|---|---|---|
| **Breakfast**  | ○ Yes<br>○ No | |
| **At school meal**  | ○ Yes<br>○ No | |
| **Lunch**  | ○ Yes<br>○ No | |
| **Afternoon snack**  | ○ Yes<br>○ No | |
| **Dinner**  | ○ Yes<br>○ No | |
| **Late snack**  | ○ Yes<br>○ No | |

**Please fill out the chart below with the food you will eat today** **Day 2**

| Meals | Did you have any? | If yes, What is the kind and size of food you ate and how much? |
|---|---|---|
| **Breakfast**  | ○ Yes<br>○ No | |
| **At school meal**  | ○ Yes<br>○ No | |
| **Lunch**  | ○ Yes<br>○ No | |
| **Afternoon snack**  | ○ Yes<br>○ No | |
| **Dinner**  | ○ Yes<br>○ No | |
| **Late snack**  | ○ Yes<br>○ No | |

**Please fill out the chart below with the food you will eat today _Day 3 Weekend**

| Meals | Did you have any? | If yes, What is the kind and size of food you ate and how much? |
|---|---|---|
| **Breakfast**  | ○ Yes<br>○ No | |
| **Early snack**  | ○ Yes<br>○ No | |
| **Lunch**  | ○ Yes<br>○ No | |
| **Afternoon snack**  | ○ Yes<br>○ No | |
| **Dinner**  | ○ Yes<br>○ No | |
| **Late snack**  | ○ Yes<br>○ No | |

Appendix K

**Group evaluation session-- Student's checklist**

**1. What do you think is the purpose of the program?**

_____

_____

**2. Did you understand all the lessons?** ○ **Yes,** ○ **No**

If no, what did you not understand?

_____

If yes, what would you say is the main thing you learned?

_____

**3. Did you like the lessons and the activities?** ○ **Yes,** ○ **No**

If no, what did you not like about it?

_____

If yes, what did you like about it?

_____

**4. Did the DVD help you learn about the previous lessons?** ○ **Yes,** ○ **No**

If no, what do you think would help you learn?

_____

If yes, what did you like about the DVD?

_____

**5. Is there anything you wanted to learn about that was not covered in the lessons?** ○ **Yes,** ○ **No**

If yes, what do you like to know?

_____

_____

**6. Did you talk about what you learned this week with you parents?** ○ **Yes,** ○ **No**

If no, why did you not share?

_____

If yes, what did you talk about?

_____

**7. Would you like to participate in more Let's Eat Smart lessons and activities?** ○ **Yes,** ○ **No**

**8. Please write any other comments about the lesson and the activities you did if you wish.**

_____

_____

Appendix L

Table 14

*Participant's Responses on Dietary Practices Questions*

| | Pre | | Post | |
|---|---|---|---|---|
| Behavioral Variable | *n* | *%* | *n* | *%* |
| Fast Food Consumption | | | | |
| Never/last week | 18 | 21.4 | 26 | 31.0 |
| Sometimes/last week | 52 | 61.9 | 56 | 66.7 |
| Frequently/last week | 13 | 15.5 | 2 | 2.4 |
| Daily/last week | 1 | 1.2 | 0 | 0.0 |
| Skipping Breakfast | | | | |
| Never/last week | 30 | 35.7 | 30 | 35.7 |
| Sometimes/last week | 33 | 39.3 | 37 | 44.1 |
| Frequently/last week | 10 | 11.9 | 7 | 8.3 |
| Daily/last week | 11 | 13.1 | 10 | 11.9 |
| Caloric-dense Food Snacking | | | | |
| 0 times/yesterday | 30 | 35.7 | 27 | 32.1 |
| 1time/yesterday | 33 | 39.3 | 35 | 41.7 |
| 2 times/yesterday | 10 | 11.9 | 16 | 19.0 |
| 3 or more times/yesterday | 11 | 13.1 | 6 | 7.1 |
| Fruit Intake | | | | |
| 0 times/yesterday | 25 | 29.8 | 22 | 26.2 |
| 1time/yesterday | 17 | 20.2 | 15 | 17.9 |
| 2 times/yesterday | 15 | 17.9 | 17 | 20.2 |
| 3 or more times/yesterday | 27 | 32.1 | 30 | 35.7 |
| Vegetable Intake | | | | |
| 0 times/yesterday | 29 | 34.5 | 27 | 32.1 |
| 1time/yesterday | 24 | 28.6 | 24 | 28.6 |
| 2 times/yesterday | 17 | 20.2 | 13 | 15.5 |
| 3 or more times/yesterday | 14 | 16.7 | 20 | 23.8 |

Appendix M

Table 15

*Students' Comments in Regard to Comprehension and Awareness*

| Theme tested | Example of Students comments |
|---|---|
| **Comprehension & awareness** | |
| 1. What do you think is the purpose of the program? | • Eating healthy to give the body energy and protect it from diseases<br>• How often you should eat healthy food<br>• What to not eat and what to eat<br>• To choose food wisely and choose food that benefits our bodies<br>• Balance diet and healthy food<br>• To know the importance of eating healthy food<br>• That we need to exercise and eat healthy |
| 2. Did you understand the lessons? | **If Yes, what is the main thing you leaned? (n = 92)**<br>• That we should eat more healthy food<br>• How to choose food at home smartly<br>• We must follow MyPyramid<br>• That what matters is what kind of food we eat and the quantity<br>• Fruit and vegetables are good for health<br>• We must balance diet with activity<br>**If No, what did you not understand? (n = 3)**<br>• Calories and how to read food label<br>• nutrients in food<br>• Why so much fast food and candy makes us sick, then why we like it. |

Table 16

*Students' Comments in Regard to Practicality and Usability*

| Theme tested | Example of Students comments |
|---|---|
| **Practicality & usability** | |
| 3. Did you like the lessons and the activities? | **If Yes, what did you like? (n = 91)**<br>• I like everything, it is fun and easy<br>• The idea of eating smart<br>• I like the presents<br>• The pyramid activity<br>• I like when we counted steps with pedometers and went outside to run<br>• That I know now what to eat and how much<br>• I like how the teacher bring food and show us how many calories in them.<br>• The fruit and vegetable bands helped a lot.<br>• I liked the lesson that tells us about fiber, fat and sugar in food<br>• I liked the cooking class it was awesome<br>**If No, what did you dislike? (n = 4)**<br>• I don't like that we have to eat more fruits and vegetables.<br>• I like fast food and mom says it is ok so these lessons are not important<br>• When we have to run and do exercise<br>• That sometimes we didn't have space or tables |
| 4. Did the DVD help you learn about the previous lessons? | **If Yes, what did you like about it? (n = 85)**<br>• I like how the DVD help me learn what I must eat<br>• I liked the cartoon it is funny and interesting<br>• Everything<br>• That it had real people talking about them selves<br>• It helped a lot in learning about calories<br>• The food pyramid camp<br>• That I learn about what other people do to live healthy<br>• That it made me remember what you talk about<br>**If No, what would help you learn? (n = 10)**<br>• Do more class activities<br>• I prefer the teacher tell us more about Kuwait<br>• It helps littlie. I like to do more experiments and cook food<br>• The kids in DVD talk too fast and I do not understand some of what they say. So better the teacher talk<br>• I do not remember it, I remember better when I do things<br>• I did not like the healthy food it shows<br>• I did not understand it |

Table 17

*Students' Comments in Regard to Relevance and Interest*

| Theme tested | Example of Students comments |
|---|---|
| **Relevance & Interest** | |
| 5. Did you share with your parents what you learned? | **If Yes, what did you share? (n = 78)**<br>• How it is important to eat healthy<br>• How we should eat fruits and vegetables and using bands to remind us<br>• I told mom to give me vegetables everyday<br>• How fruits are better than chocolate<br>• The pyramid help us to eat healthy<br>• How to look at food label in grocery<br>**If No, why you did not share? (n = 17)**<br>• I forgot<br>• I didn't have time, because of lots of homework<br>• I don't feel like to say a lot<br>• I did not share because I already have healthy food in my house<br>• Because they don't care |
| 6. Is there anything you wanted to learn that was not covered in the lessons? | **If Yes, what would you like to know? (n = 15)**<br>• About exercise<br>• What is in fast food<br>• Why too much oil is not good for us<br>• About chocolate<br>• More about pedometers<br>• How it feels when we eat junk food or healthy food<br>• I would like to know about food pesticides and how we can avoid it |

Table 18

*Students' Comments in Regard to the Overall Impact*

| Theme tested | Example of Students comments |
|---|---|
| **Overall Impact** | |
| 7. Would you participate in more Let's Eat Smart lessons? | **Number of yes responses (n = 86)**<br>**Number of no responses (n = 9)** |
| 8. Other comments you may have? | • Sometimes the class gets noisy<br>• The lesson is too short and I wish we have more time<br>• I did not like the DVD telling us about healthy food<br>• It was assume when we watched the DVD<br>• I like the lessons so much thank you<br>• I like that it is ok to eat chocolate sometimes<br>• I like that we have to use fruit and vegetables bands at home<br>• I love your classes they are fun<br>• I wish we did more activities outside<br>• You made me think that I have power to eat smart<br>• Thank you I enjoyed your classes |

# VITA

Sondos Kalendar was born in Raleigh, North Carolina on November 14, 1978 to her parents, Ahmad Kalendar and Hind Al-Mulla. She was raised in Kuwait and graduated from Qurtuba High School in 1996. She attended the Faculty of Medicine at Kuwait University from 2000 to 2002. After that, she traveled to the United States and attended the University of Colorado at Boulder in 2005. The following spring she attended Colorado State University where she graduated with a Bachelor of Science in Dietetics in 2007. In fall 2008, she began attending the Food and Nutrition Services program at the University of Mississippi and received a Master of Science in 2011.

She will be returning to Kuwait to fill a teaching position in the Collage of Nursing at the Public Authority of Applied Education and Training. She is married and has two daughters.