REDUCING THE CHILDHOOD OBESITY RATES AMONG LOW-INCOME CHILDREN IN A VAN NUYS NEIGHBORHOOD

A graduate project submitted in partial fulfillment of the requirements
For the degree of Master of Science in
Family and Consumer Sciences

By

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May 2012
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DEDICATION

This graduate project is dedicated to:

My husband, Alexis Gutierrez, for his unconditional love and support. I could not have completed this graduate project without his help;

My beautiful children, Alexander and Adriana Gutierrez, whose smiles and love gave me the strength to continue pursuing my career;

My parents, Maria Elena and Ovel, for their devotion, love, and dedication;

My committee chair, Dr. Terri Lisagor, who believed in my abilities and encouraged me throughout this project and who has truly inspired me to be a better professional and a better person. Without your continued support and counsel I could not have completed this rigorous process.
ACKNOWLEDGMENT

I would like to thank the committee members who contributed to this graduate project.

To my chair, Dr. Terri Lisagor, who supported and guided me through this entire project with valuable suggestions and great contributions.

To Dr. Joyce Gilbert, whose valuable comments helped to enrich this graduate project.

To Dr. Claudia Fajardo-Lira, whose feedback and advice was important to this project.
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ABSTRACT

REDUCING THE CHILDHOOD OBESITY RATES AMONG LOW-INCOME CHILDREN IN A VAN NUYS NEIGHBORHOOD

By

Leidys Lorenzo

Master of Science in

Family and Consumer Sciences

Childhood obesity represents a major health problem in United States. Nutrition education curriculum delivered at school sites is one of the interventions suggested by researchers to change children’s eating behavior. The nutrition education curriculum presented in this project is a behavior-based intervention program designed to improve participants’ eating behavior, specifically increasing consumption of fruits and vegetables, thus, decreasing intake of more calorie-dense foods. This project includes the formative development of a nutrition education curriculum to be implemented in 1st and 2nd grade classrooms in an elementary school in the Van Nuys area of the San Fernando Valley. The project also includes a nutrition education lesson for a Parent Participation class at the elementary school. The curriculum was designed to be delivered in a series of four nutrition education classes, focusing on eating fruits and vegetables. Qualitative observations were made as the lessons were delivered to the children; thus, lectures could be improved and modified accordingly. Dietary intake and blood glucose and cholesterol levels were assessed for the Parent Participation class. Further research is suggested to analyze the collected data and to evaluate effectiveness of the curriculum.
CHAPTER I

INTRODUCTION

Childhood obesity is one of the most critical health problems in our society due to its staggering numbers, its association with several chronic conditions, and its economical, social, and psychological undesirable effects. The economical impact of obesity is enormous and unless policy makers, school authorities, community leaders, and health care professionals, including experts in nutrition and dietetics, unite their efforts to change the course of the obesity epidemic the health care cost will continue to increase.

The contributing factors are countless and research supports that children’s individual behavior is not only affected by their personal characteristics but also by the environment in which they live (Kipke et al., 2007). Therefore, interventions to reduce childhood obesity should take into consideration children’s interactions with their environment. School-based interventions have been identified as powerful solutions for prevention and reduction of childhood obesity. A majority of children spend a considerable amount of time in school, so it is easier to reach a great number of children at the school setting. Curriculum development that focuses on nutrition education to change children’s eating behavior, especially increasing dietary intake of fruits and vegetables, has been suggested by researchers as an approach that may improve children’s dietary intake, thus reducing the prevalence of childhood obesity (Davis, Ventura, Cook, Gyllenhammer, & Gato, 2011). Nutrition education curriculum offering nutrition lectures to parents is also essential for changing children’s behavior. Special attention should be directed to minority groups such as low-income Hispanic children, because they appear to be at a higher risk for overweight and obesity.
Statement of the Problem

Over the last thirty years, childhood obesity began to grow at alarming rates, such that we are facing a national health crisis. Even though the number of overweight and obese children is currently leveling off, it is estimated that in Los Angeles County, 20% of all the 5th, 7th, and 9th grade children are considered to be obese (Los Angeles County Department of Public Health [LACDPH], 2008). Childhood obesity is highly prevalent in the low-income Hispanic population. For instance, in one lower-income Van Nuys neighborhood, 29% of the children are identified as obese, representing one of the highest childhood obesity rates in Los Angeles County (LACDPH, 2008).

Children who are obese are facing serious health consequences. Diseases such as type II diabetes, hyperlipidemia, and hypertension, that, until recently were only seen in adults, are now common in children and adolescents (Boyle & Holben, 2010). Many more health conditions, including asthma, orthopedic problems, and sleep disorders, are linked to childhood obesity as well. With an early onset of these diseases, the quality of life of children, adolescents, and young adults is largely affected. As a result, economic consequences start to escalate, putting a burden not only on the individual, but also on families, communities, and the society in general. Childhood obesity also affects children emotionally since these children are more likely to experience depression and low-self esteem when compared to normal weight children. Furthermore, approximately 70%-to-80% of obese children are at higher risk of being obese during adulthood years, thus increasing their probability of having weight-related chronic conditions in the future (LACDPH, 2008).
Across the nation and locally in Los Angeles County, childhood obesity and its modifiable contributing factors remain a challenge for health authorities and policy makers. Even though childhood obesity is a problem for all children, there is a disparity in its prevalence. It is more widespread among Hispanic children from low-socioeconomic status, which is consistent with the characteristics found in the Van Nuys population.

**Purpose**

The purpose of this project was to develop a nutrition education curriculum to be implemented in 1st and 2nd grade classrooms, first at Cohasset Elementary School, with additional plans to expand the curriculum to two more elementary schools in Van Nuys (Gault Street and Anatola Avenue Elementary Schools). In addition to designing the Nutrition education curricula for the children, curriculum was developed for the Parent Participation classes at the school. Included in this project is one nutrition session for the Parent Participation class. Because parents influence their children’s dietary behavior and food preferences, it is important to enhance parents’ nutrition knowledge so they can be role models for their children. This curriculum was designed to address the childhood obesity problem confronting the largely Latino, lower income community of Van Nuys, California. The main goal was to improve first and second graders’ eating behavior, specifically increasing consumption of fruits and vegetables, thereby, decreasing intake of calorie dense foods. By achieving this goal, this curriculum may serve as a way to help reduce childhood obesity rate in Van Nuys, California, and thus reduce the risk of developing nutrition-related chronic diseases in adulthood.
Definitions

- Type II Diabetes Mellitus (T2DM): A type of diabetes usually occurring in persons older than 30 years of age, previously known as noninsulin dependent diabetes mellitus (NIDDM) or maturity onset diabetes; now also frequently diagnosed in youth and young adults (Mahan & Escott-Stump, 2008).

- Glucose intolerance: A condition characterized by blood glucose concentrations that are higher than normal, but not high enough to be diagnosed as diabetes. This condition is a risk factor for diabetes and cardiovascular disease (Mahan & Escott-Stump, 2008).

- Metabolic Syndrome: A condition associated with glucose intolerance, insulin resistance, hyperlipidemia, and hypertension; strongly linked to abdominal obesity, which increases the risk of cardiovascular disease (Mahan & Escott-Stump, 2008).

- Hypertension: Persistently high arterial blood pressure; defined as systolic blood pressure above 140 mm Hg or diastolic blood pressure above 90 mm Hg (Mahan & Escott-Stump, 2008).

- Hyperlipidemia: A lipid disorder characterized by high levels of cholesterol, triglycerides, and lipoproteins in the blood (Mahan & Escott-Stump, 2008).

- Stroke: Occlusion or hemorrhage of a cerebral artery resulting in impaired function, tissue damage, or death (Mahan & Escott-Stump, 2008).

- Coronary artery disease (CAD): A disease characterized by impaired blood flow in the coronary arteries, which can result in angina, myocardial infarction, and sudden death (Mahan & Escott-Stump, 2008).
- Non-alcohol fatty liver disease: Clinical pathologic condition characterized by abnormal lipid deposition in hepatocytes in the absence of excess alcohol intake (Halbower, Sanduram, Polotsky, & Smith, 2008).
- Obstructive Sleep Apnea: A condition characterized by a lack of airflow during attempted breathing. It can cause intermittent hypoxemia and it can exacerbate cardiovascular risk factors associated with obesity (Halbower et al., 2008).
- Asthma: A condition of hypersensitive airways from allergic and non-allergic causes generated by immunologic responses (Mahan & Escott-Stump, 2008).
- Osteoarthritis: A non-systemic joint disease characterized by degeneration of the joint cartilage, resulting in pain, stiffness, swelling, and joint damage and loss of function; most common form of arthritis in childhood (Mahan & Escott-Stump, 2008).
- Child: A person between 4 and 12 years old (Mahan & Escott-Stump, 2008).
- Adolescent: A person going through the adolescence period which occurs between the ages of 12 and 18 or 12 and 21 years old (Mahan & Escott-Stump, 2008).
- Teen: A person between 13 and 19 years old (Mahan & Escott-Stump, 2008).
- Obese children: BMI above the 95th percentile for a child’s age and sex group (Anderson & Butcher, 2006).
- Overweight children: BMI above the 85th percentile for a child’s age and sex group (Anderson & Butcher, 2006).
- Social Capital: Index that measures parent’s perceived level of neighborhood social capital or social support and combines four variables capturing social cohesion, trust, and reciprocity. The four variables relate to the following items.
  - Neighbors help each other out in the neighborhood
  - Neighbors watch out for each other’s children in the neighborhood
  - Neighbors can count on people in the neighborhood
  - When children get hurt or scared while playing outside, there are adults in the neighborhood who can help these children (Singh, Kogan, Van Dyck, & Siahpush, 2008).


- Food Insecurity: Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire foods in a socially acceptable way (Rosas et al., 2009).

- National School Lunch Program (NSBP): Is a federally assisted meal program operating in public and nonprofit private schools and residential child care institutions. It provides nutritionally balanced, low-cost or free lunches to children each school day (United States Department of Agriculture [USDA], 2012).

- School Breakfast Program (SBP): Provides cash assistance to States to operate nonprofit breakfast programs in schools and residential childcare institutions (USDA, 2012).
Assumptions

This curriculum was developed based upon the following assumptions:

- Participants will be first and second grade students at Cohasset Elementary Schools, with later implementation in two other elementary schools at Van Nuys, California.
- The Parent Participation class is for all parents who have children or grandchildren attending Cohasset Elementary School and who are willing to participate in the nutrition sessions.
- First and second grade participants will be able to understand English and basic and simple nutrition concepts as presented in the nutrition education sessions.
- Parents will be able to read and understand Spanish and/or English as presented in the nutrition lecture.
- The nutrition intervention program will promote changes in participant’s eating behaviors.
- Participants will attend at least ¾ of the nutrition education sessions.
- Participants will fill out the two Food Frequency Questionnaires truthfully.
- Parents will fast for 12 hours before the laboratory screenings.
- No errors were made during data entry and data analysis.

Limitations

This curriculum has the following limitations:

- The curriculum was designed for first and second graders attending Cohasset, Gault, and Anatola Elementary Schools in Van Nuys, California and their parents, and therefore is not generalizable.
The curriculum was only created to assess and improve consumption of fruits and vegetables.

The Food Frequency Questionnaire used to evaluate the nutrition intervention program was designed exclusively to fit participants’ unique characteristics.

The Food Frequency Questionnaire was not previously tested or validated by other studies.

The sample size used to evaluate effectiveness of the nutrition intervention program was limited to 20 to 25 parent participants.

Discrepancies between participants’ food intake and what they recorded in the Food Frequency Questionnaire may affect the accuracy of data analysis.
CHAPTER II
REVIEW OF LITERATURE

The purpose of this chapter is to provide a review of the existing research about childhood obesity to gain a better insight of this problem. This research will contribute to current information about effective interventions for reducing childhood obesity and its devastating health consequences. The literature review will facilitate the development and implementation of this curriculum and will include childhood obesity prevalence, contributing factors, effects, its relation with the Human Ecological Theory, and possible solutions and interventions to the childhood obesity epidemic.

Prevalence of Childhood Obesity

Over the years, the prevalence of childhood obesity in the United States has experienced a dramatic change. In the early 70’s only 5% of children between 2 and 19 years old were obese. Then in the mid 70’s and early 80’s, the obesity rate started to increase to some extent. In the 90’s, childhood obesity rates reached unexpected proportions with approximately 15% of children and teens categorized as obese. During the last decade, childhood obesity rates showed a slowed increase, but still the numbers continued to remain high. Currently, it is estimated that 12.5 million children and teens, representing 17% of this population, are affected by the nationwide obesity epidemic (Center for Disease Control and Prevention [CDC], 2011).

A very similar situation is found in Los Angeles County where childhood obesity rates among 5th, 7th, and 9th graders rapidly increased from 18.9% (1999) to 23.3% (2005). After these years, the prevalence of obese children and teens appears to stabilize; however, 22.9% of children remain obese and 18.4% of children are considered overweight (LACDPH, 2008).
Relevant disparities in childhood obesity rates exist regarding children’s gender, age, ethnicity, socio-economic status, and educational background. Obesity rates are higher among boys than girls by a rate of 1 in 4 boys and 1 in 5 girls; younger children have a higher percent of obesity rate. As an example, 26.4% of 5th graders in Los Angeles County are obese, while obesity in 9th graders is only 19.2%. Likewise, obesity is not evenly distributed by ethnic groups. For example, Pacific Islanders have a higher prevalence of obesity (34.9%), followed by Hispanics (27.4%), when compared to other ethnic groups (LACDPH, 2008).

Singh, Kogan, Van Dyck, and Siahpush (2008) studied the common and independent connections between the prevalence of obesity and ethnicity, socioeconomic status, and some behavioral factors in U.S. children 10-to-17 years of age (n=46,707). The large sample size used in this study permitted researchers to analyze a wide range of participants with very different behavioral and socio-demographic characteristics for a better analysis of childhood obesity prevalence in the United States. The researchers found that 15% of the participants were obese, with boys having a higher prevalence of obesity than girls (Singh et al.). When looking at ethnicity, these same researchers noted that American Indian/Alaska Native children were the ethnic group with a higher prevalence of obesity. Following this group were non-Hispanic black children representing the second cluster with the highest prevalence. Hispanic and Native Hawaiians/Pacific Islanders had the same percentage of obesity rate (19%), followed by Asians (16%) and non-Hispanic whites with the lowest percentage of obese children (12%). While making comparisons among different ethnic groups, Hispanics and black children were more likely to be obese than Non-Hispanic white children. When the
researchers kept socioeconomic and demographic variables constant, they determined that Hispanics and black children continued to have an increased risk of being obese than Non-Hispanic white children (Singh et al.). Contrary to this, when regulating some behavioral factors such as physical activity and hours spent watching television, the ethnicity and socioeconomic disparities were lessened to some extent (Singh et al.).

Singh et al. (2008) noted that children coming from non-English speaking families, non-metropolitan areas, single-parent families, and low socio-economic status had a higher prevalence of obesity. Also, the prevalence increased as the social capital of the neighborhood and parents’ educational level decreased. A higher risk for obesity was observed in children with parents having less years of formal education (less than 12 years). On the other hand, children with parents who had graduated from college were less likely to be obese. By controlling behavioral characteristics, researchers were able to demonstrate that parents’ educational level and poverty status were contributors to the prevalence of childhood obesity because children with these characteristics had more probabilities of being obese.

Similar findings have been reported by other researchers. Stapleton (2012) examined childhood obesity prevalence data (1999 to 2010) from the National Health and Nutrition Examination Survey (NHANES) and found profound ethnic and gender disparities as well. The researcher established that boys, especially non-Hispanic whites, had a higher prevalence of obesity than non-Hispanic white girls. Data from the 2009 to 2010 NHANES revealed that non-Hispanic black and Hispanic children are the two ethnic groups with higher obesity rates in the country.
Data from 2005 to 2008 collected by NHANES showed that the prevalence of obesity in children decreased as income and educational level of household head increased. However, this relationship was not the same in all ethnic groups (CDC, 2010).

Even though childhood obesity rates are unacceptably high and obesity continues to be a major problem in our society, the prevalence has been leveling off since 2007, with no reported increase in 2010 (Stapleton, 2012). Since the findings about racial/ethnic and socioeconomic status disparities are consistent throughout the literature, more interventions should be directed towards these groups to eradicate the existent inequalities and to reduce childhood obesity rates (Singh et al., 2008).

Childhood Obesity Effects

Physical Effects of Childhood Obesity

As childhood obesity rates started to increase, its negative effects started to mount. Numerous conditions are linked to childhood obesity, such as fatty liver disease, high blood pressure, type II diabetes, glucose intolerance, and lipid disorders, to name a few (Lieb, Snow, & DeBoer, 2009). If the obesity rates continue to go up, “the generation represented by children born since 2000 is estimated to have a 35% chance of developing diabetes and represents the first generation in United States since the Civil War to have a life expectancy shorter than that of their parents” (Lieb et al., 2009, p. 349).

Prior to the obesity epidemic, type II diabetes was a disease of adulthood, but currently its incidence among children and adolescents has increased. A case series study conducted in Cincinnati revealed that the number of adolescents newly diagnosed with type II diabetes increased substantially between 1982 and 1994. The majority of children
with non-insulin dependent diabetes (NIDDM) are overweight or obese. Sinha and colleagues (as cited in Lieb et al., 2009) conducted a study of obese children and adolescents (n=167) and they found that nearly 21% to 25% of participants had impaired glucose tolerance, which is generally the predecessor of type II diabetes. Researchers established that 4% of obese children had undiagnosed diabetes and they noted that having early onset of diabetes increases the risk for premature diabetes complications such as renal, cerebrovascular, and heart conditions. In addition to this, obese children and adolescents with type II diabetes frequently have hypertension and hyperlipidemia which are known risk factors for cardiovascular conditions (Lieb et al., 2009).

Long-term prospective studies demonstrated a link between obesity and coronary artery disease, high blood pressure, stroke, colon cancer, osteoarthritis, gallbladder disease, and postmenopausal breast cancer (Olstad & McCargar, 2009). Although there is no evidence that these conditions are prevalent in children, researchers agree that the development of these chronic conditions may start during childhood as part of a long process (Olstad & McCargar, 2009). Contrary to this, metabolic syndrome is commonly seen in obese children. Also, childhood obesity is linked to obesity problems during adulthood, with obese children having a higher predisposition for being obese adults. Furthermore, obese infants are more likely to be obese during preschool years and obese children less than 6 years of age have a higher risk of being obese later in childhood (Olstad & McCargar).

According to Halbower, Sundaram, Polotsky, and Smith (2008), obese children with insulin resistance are at higher risk for non-alcoholic fatty liver disease. Childhood obesity is also related to obstructive sleep apnea (OSA). Obese children have a greater
probability of being diagnosed with sleep apnea than normal weight children. Additionally, OSA is connected to hyperactivity, poor school performance, and memory and learning problems. The hypoxia related to sleep apnea can exacerbate the development of cardiovascular complications. The coexistence of obesity and sleep apnea are more harmful with a detrimental effect in the long-term mortality and morbidity of obese individuals (Halbower et al.).

The literature consistently reports an association between overweight/obese children and asthma during childhood (Bergström & Melén, 2011). The underlying mechanism for this association is still unknown; however, researchers have proposed two theories to explain the relationship among both conditions. First, it is hypothesized that asthma and obesity share a small percentage (10%) of their genetic components, but this may be true for females only, with a small number of cases documented in the literature (Bergström & Melén, 2011). This genetic connection between both conditions may not be relevant for children, due to the fact that obesity in early stages of life does not have a long-term effect in asthma during childhood. Analysis of data from the Dutch birth cohort PIAMA reported that preschoolers with high BMI had a higher risk for asthma symptoms at 8 years of age. However, preschool obese children who were normal weight at age 6 or 7 years did not have an increased risk for asthma. Furthermore, children at 6 or 7 years of age with high BMI had an increased risk for asthma, regardless of any changes in BMI during early ages (Bergström, & Melén, 2011). Secondly, researchers proposed a connection between common inflammatory pathways that are activated in obesity and asthma with an increase in circulating pro-inflammatory proteins such as cytokines and C-reactive protein. But the link between these two conditions is complex and requires
more research, although obesity may negatively affect the mechanical functions of the lungs resulting in asthma symptoms (Bergström, & Melén, 2011).

Nonphysical Effects of Childhood Obesity

Nonphysical effects from childhood obesity are more evident and immediate in obese children and teens. A study following obese children from kindergarten to third grade noted that participants had decreased performance in math and reading, children were sad, anxious, and felt lonely. Also, children experienced difficulty with social relationships. Researchers suggested that these psychological factors could exacerbate the physical effects of childhood obesity leading to a rapid development of diabetes mellitus and cardiovascular diseases in children (Olstad, & McCargar, 2009).

Furthermore, childhood obesity is strongly associated with bullying, which is one of the main health concerns for parents of obese children. These concerns are based on published studies linking bullying with anxiety, loneliness, and depression (“Obesity Increases Odds of Being Bullied,” 2010). Obese children are more likely to be bullied than normal weight children regardless their socioeconomic status, ethnicity, gender, and school achievement.

Warschburger (2005) reported that obese children have fewer friends and obese girls have stated that they are treated differently and that they feel discriminated against due to their weight status. Obese girls frequently feel rejected by classmates and brothers and sisters with normal weight. In a study conducted in 158 overweight children and adolescents investigating the effects of obesity in regards with their feelings of being teased by others and how they were coping with it, researchers found that overweight children were more frequently teased due to their weight status compared to their
performance (Warschburger, 2005). As a result, children and adolescents, especially boys, were experiencing aggressive behavior; girls more commonly experienced sadness and anxiety, resulting in social relationship evasion. At the same time, obese children were reporting low self-esteem and depression. The emotional stress resulting from these adverse effects can lead children to use food as a coping mechanism, which may further add to their weight problems. In addition, childhood obesity can create functional restrictions, since obese children have reported their dislike for sports activities due to the fact that they experience breathing and joint problems (Warschburger, 2005).

There exists a correlation between physical and non-physical consequences of childhood obesity. Both are creating a negative influence in children’s quality of life, which may ultimately also impact society.

**Childhood Obesity Contributing Factors**

**Childhood Obesity and the Human Ecology Theory**

The childhood obesity epidemic is complex because there is not a single factor contributing to this problem. On the contrary, the underlying causes of childhood obesity are multiple and the simultaneous interactions among these factors contribute to the epidemic. At its most basic level, obesity is the result of an imbalance between calorie consumption and calorie expenditure (i.e. the increase of energy intake and the decrease of energy expenditure). In order to understand that children’s weight is not only affected by how and what they eat, but also how the environment around them changes and how that influences a child’s weight status and food consumption, it is essential to study and understand the Human Ecology Theory (HET) proposed by Bronfenbrenner in 1979.
Bronfenbrenner’s theory identifies five environmental systems that are closely related with the individual/child. These systems are interrelated and, according to the theory, this relationship shapes the individual’s behavior and development. At the same time, the individual/child can influence the structures included in each system. The theory emphasizes that the environment plays a major role in individual/child’s development.

The five environmental systems are described as follows, and depicted in Figure 1:

Figure 1 – Bronfenbrenner’s Human Ecological Model
The Microsystem: Represents the immediate environment around the individual/child and it includes the structures that have the closest relationship with the individual/child such as family, peers, and neighborhood, doctor’s office, childcare, and school. This system has the greatest impact in the individual/child development.

The Mesosystem: Represents the correlations between the microsystem’s structures, for example, the connection between child’s parents and the school.

The Exosystem: Represents the large social, political, economic, religious system where the child does not play a direct role. The development of the child may be affected by the interaction between the structures of the microsystem and the exosystem.
• The Macrosystem: Represents the outermost layer of the child’s environment and its structures include the culture in which the child lives, including values, customs, and laws.

• The Chronosystem: Represents the events and transitions that take place through the time.

After analyzing the Human Ecology Theory (HET), Birch and Davison (2001), two researchers from the State University of Albany and Pennsylvania, developed the Ecological Model of Childhood Overweight (EMCO) as depicted in Figure 2. This innovative theory explains how the multiple environment structures surrounding children could affect their individual weight status. This model is essential to understanding the joint effects of family, individual, and society characteristics as causal factors of childhood obesity (DeMattia & Denney, 2008).

The closest system to the child’s weight status is the genetic environment and the individual characteristics and risk factors of the child, including gender and age, familial susceptibility to gain weight, sedentary behavior, and physical activity level. It is important to consider that the energy requirements and growth rates of children are variable. In addition, children with overweight parents will be more likely to experience a rapid increase in weight even with a minor increase in dietary intake (DeMattia & Denney, 2008). This explains the role of genes in obesity, as evidence suggests that 25% to 40% of the BMI is attributed to hereditary factors (Anderson & Butcher, 2006).

The next system influencing children’s weight status is the family environment, which includes the parenting styles and family characteristics. Specific structures in the system encompass parents’ food preferences, dietary intake, weight status, activity
patterns, nutritional knowledge, preference for activity, child feeding practices, type of foods available at home, hours of TV viewing, and parents monitoring child TV viewing (DeMattia & Denney, 2008). The interaction of these factors may affect children’s weight status as family environment has a great impact in children behavior.

The outermost system represents the community, demographic, and society characteristics including ethnicity, socioeconomic status, school lunch program, school physical education programs, accessibility of recreational facilities and convenience stores and restaurants, crime rates and neighborhood safety, leisure time, family leisure time activities, and work hours. These factors are also associated causes of the childhood obesity epidemic (DeMattia & Denney, 2008).

After analyzing both theories, we can understand that the environment systems have changed during the past 30 years in areas such as neighborhood safety, accessibility to fast food restaurants and convenience stores, accessibility to recreational facilities, children’s and parents’ dietary and physical activity patterns, school’s nutrition education and physical activity programs, families’ working hours and leisure time, and increase in food advertisements, etc. These changes have had a tremendous impact on individuals, resulting in an increase of obese and overweight children.

**Dietary Patterns and Childhood Obesity**

High consumption of energy-dense foods with low dietary intake of fruits and vegetables has been associated with childhood obesity. In a research study that analyzed data from NHANES 2001-2002 and 2003-2004 in children 2-8 years of age (n=2442), investigating whether there is an association between energy-dense food intake and childhood obesity, researchers found that there is a positive correlation between energy-
dense dietary intake and children’s body weight (Vernarelli, Mitchell, Hartman, & Rolls, 2011). In addition, the researchers established that lean children had lower intake of energy-dense foods, and children with low consumption of energy-dense foods had more servings of fruits and vegetables and less intake of fat and added sugar than children with high intake of calorie dense foods. When researchers excluded fruit juices and white potato, there were more remarkable disparities among the groups because the group with low dietary intake of energy-dense foods was consuming 2 cups of fruits, and the group with high dietary intake of energy-dense foods had only 0.2 cups of fruit intake. Furthermore, children with low intake of energy-dense foods had higher BMI, showing and inverse relationship (Vernarelli et al.).

According to Vernarelli, Mitchell, Hartman, & Rolls (2011), other epidemiological studies have not reported a correlation between high intakes of calorie dense foods and obesity in children; however, these studies were conducted in the 90’s and the children’s dietary patterns have changed since then. Also, the previous researchers were using parent-reported weight and height while NHANES measures these parameters to calculate BMI which increases the accuracy of their results.

Excessive consumption of sweetened beverages, including fruit juices and sodas, has been associated with childhood obesity as well. Epidemiological studies have found that 5-year-old children with high intakes of sweetened beverages have higher BMI, waist circumference, and higher percentage of body fat (Kavey, 2010). In analyzing data from NHANES 2003-2004, in children 2-to-18 years of age, researchers found that soda was one of the top five sources of energy and that carbonated beverages were the main source of added sugars in children’s diet. Another epidemiological study in low-income
African American children (3-to-5 years old) found that after 2 years of age, the prevalence of overweight and obesity increased significantly as the consumption of sweetened beverages were also increasing. The researcher concluded that intake of energy-dense drinks can predict progression of overweight and obesity in children. These findings suggest that excessive consumption of energy-dense foods such as sweetened beverages is one of the contributing factors to the childhood obesity epidemic (Kavey).

Moreover, the increase of soft drink consumption has been attributed to children being more exposed to food advertising. As the numbers of obese children started to increase, there was also an increase in money spent for food advertising, especially for soft drinks. The results of the studies are mixed. A direct causal relationship between childhood obesity and advertising has not been pointed out because advertisements can either increase food consumption or change consumption of the brand being advertised more often. Some researchers noted that advertising can influence children’s food preferences by the age of two (Anderson & Butcher, 2006).

Food insecurity is another factor associated with childhood obesity, because children living in households with low food security are more likely to have unhealthy dietary patterns that may lead to weight gain. In a cross-sectional study investigating the relationship of food insecurity and dietary intake in 5-year old children of Mexican descent (n=301) living in California, it was found that children with food insecurity had higher intakes of energy, fat, and saturated fat, as they were consuming more sweets and fried snacks. Researchers agree that energy-dense foods are more affordable than nutrient dense foods such as fruits, vegetables, lean meat, and whole grains. Children consuming diets with high contents of fat and sugars are at higher risk for childhood overweight. In
addition, previous studies have found that food insecurity is linked to increased weight in children. The assumption used to explain this association is that households with food insecurity have to rely on energy-dense foods, which are less expensive than nutrient dense foods (Rosas et al., 2009).

It is well recognized by research that environmental and socio-economic factors play an important role in children and adolescents’ dietary patterns. Beydoun, Powell, Chen & Wang (2011) assessed dietary patterns in relation to fast food and fruits and vegetables prices in 2-18 year old children and adolescents (n=8,438). The researchers found that children 2-9 years of age had higher consumption of fruits, vegetables, calcium, and fiber when the fast food prices were high; children in this age group had higher intake of fiber when the prices of fruits and vegetables were lower. In addition, high fruits and vegetables prices were associated with higher BMI in children. The authors concluded that prices of fruits and vegetables had a negative influence in BMI, especially for low-income families. They proposed that increasing prices for fast foods may improve quality of diet of children and adolescents.

The dietary behavior of children and adolescents can be affected by the neighborhood where they live; hence, a communities’ environment may play an important part in the childhood obesity epidemic. Children living in poor neighborhoods have more access to convenience and small grocery stores, when compared to children living in suburb areas with high accessibility to supermarkets with wide variety of nutrient-dense foods and better prices. Convenience and grocery stores more commonly provide calorie-dense foods with less availability of healthy foods such as fresh fruits and vegetables (F/V), which are also expensive. One study found that children living in
neighborhoods with high prices for fruits and vegetables were more likely to weigh more than children living in areas where fruits and vegetables was cheaper (Kipke et al., 2007).

Cross-sectional studies have found that children eating more meals at fast food restaurants usually consume more energy-dense foods with low nutrient content. A long-term study conducted in girls (8-12 years old) found that those eating at fast food restaurants two or more times per week had gained more weight at a three-year follow up than those eating less at fast food restaurants (Anderson & Butcher, 2006). It is estimated that 30% of children between 4-to-19 years old consume fast food at least once per day (DeMattia & Denney, 2008). Not only has eating meals away from home at fast food places increased, but so has the supersizing of these meals, including pizza, sweetened beverages, and French fries, among other empty-calorie foods. Eating fast food at higher frequency with the addition of big portion sizes had contributed to an increase of fat, saturated fat, and total calories intake with a decrease in fruits, vegetables, and milk intake. Therefore, researchers believed that this trend is associated with childhood obesity (Kipke et al., 2006).

**Family Environment and Childhood Obesity**

During the last thirty years, the work force has shown an increase in the number of families having both parents employed. As a result, pre-packaged meals consumption and food consumed away from home has increased and homemade meals have decreased. Nowadays, parents look for convenience because their time to cook at home is very limited. The increased demand for prepared meals may have contributed to a change in the food market as well. One study investigating the relationship between maternal employment and the children’s diet quality found that as the intensity of the mothers’
work increased (total working hours), children have more probability of being obese. This is due to the fact that mothers who work long hours have less time to spend preparing meals at home; therefore, the quality of their children’s diets is lower.

Researchers concluded that is the job intensity that could influence overweight and obesity in children (Anderson & Butcher, 2006).

Furthermore, mothers working fewer hours can supervise their children while performing active playing; hence, children may be more physically active. Walking or riding bikes to school is discouraged when both parents have full time jobs, as it is more convenient for parents to take their children to school in their cars on their way to work. In addition, children with working parents may spend more time watching television since they may be unsupervised during the afternoon hours. Consequently, children adopt sedentary behaviors that may be a contributor to childhood obesity (Anderson & Butcher, 2006).

The home environment has a fundamental role in children’s eating and physical activity behavior. Parents’ eating behavior, sedentary habits, and level of physical activity can influence children’s weight, which contributes to childhood overweight and obesity. Parents influence children’s dietary behavior by the type of food they serve and consume at home, by the places they go to eat, and by the food they purchase. Parents who eat more servings of fruits and vegetables are more likely to have children consuming more fruits and vegetables as well. On the other hand, with parents who show a preference for fast food consumption their children will commonly do the same. Parents can potentially pass their food preferences and habits to their children, forming unhealthy eating
behavior during childhood that can become a lifelong pattern (Grier, Messinger, Huang, Kumanyika, & Stettler, 2007).

**Physical Activity and Sedentary Behavior**

Trends in physical activity of the U.S. population, including children and adolescents, have changed drastically since the 70’s, where a higher percentage of trips for 5 -15 year old children were via bicycles or by foot. Data from a nationally representative survey collected in 2002 confirmed that, more recently, most children go to school either by bus or have their parents drive them to school. Only a small percentage walk to school and about 5% ride their bikes. Parents reported that schools were too far from home, unsafe routes to walk to school, criminality in the neighborhoods, and risk of children being abducted. In contrast, more than 70% of parents used to walk to school thirty years ago when they were children. Schools being far from home, use of bus transportation, and unsafe routes to walk to school are some of the reasons in the decline of physical activity in children (Anderson & Butcher, 2006).

Despite the fact that the benefits of being physically active are numerous, physical activity in our population has declined over the years. This is another factor influenced by the environment in our communities. An observational study conducted in 409 communities in U.S. found that communities with high poverty levels had fewer locations designed for physical activities, while communities with higher socioeconomic status had more available settings (e.g. park, bicycles routes, and fields for sports) for physical activities. In the East Los Angeles area, researchers assessed availability and functionality of recreational parks through observations. They found that there were six parks with adequate space for practicing sports and for doing recreational activities.
However, those parks could only be accessed by transportation and the space for activities such as walking, cycling, and jogging was limited. They also found the parks to be safe, but other studies have associated childhood obesity with unsafe parks and recreation areas, especially in poor neighborhoods (Kipke et al., 2007).

The decline in physical activity and the increase in sedentary behaviors (e.g. increase in hours watching television or playing video games) are associated with childhood obesity. Many studies have found a causal relationship between TV watching and overweight and obesity in children (Anderson & Butcher, 2006). However, studies in pre-school children are showing mixed results. Researchers have either found a correlation or not relationship at all between childhood obesity and TV-watching. The association between both variables may be due to the combination of factors, such as an increase in snacking during viewing time, the increased exposure to unhealthy food’s advertisements, and less time for physical activity (Olstad & McCargar, 2009).
Additionally, long-term studies have established an inverse correlation between physical activity and BMI in children.

**School Environment and Childhood Obesity**

School food environment and physical education requirements have changed as well in the past thirty years, coinciding with the increase in childhood obesity epidemic. Consumption of soft drinks increased at school cafeterias and vending machines. Accessibility to vending machines in middle and high schools increased considerably as well, because it was lucrative for schools. In 2000, a great number of these schools and even elementary schools began allowing soft drink companies to advertise their products on school grounds. Students also have access to energy-dense foods such as cookies,
pastries, crackers, and salty snacks through the vending machines and at the school cafeteria (Anderson & Butcher, 2006). These environmental changes at school settings may have contributed to the rise in obese and overweight children.

**Interventions to reduce childhood obesity epidemic**

It is doubtful that a single intervention method or institution can eliminate the childhood obesity epidemic by itself. Rather, researchers have recommended creating strong partnerships among communities, schools, industries, and government institutions to reduce childhood obesity and to prevent further expansion of the epidemic (DeMattia & Denney, 2008). Some of the interventions recommended to help reduce childhood obesity include interventions involving enacting legislation, including school-based, modifying neighborhood environments (community-based), and including school-based interventions.

**School-based legislation interventions to reduce childhood obesity**

Today, 95% of schools in U.S. participate in the National School Lunch (NSLP) and Breakfast Program (SBP) (Fox, 2010). These are two federally-funded programs designed to improve school food environments that set regulations for participant schools regarding foods and beverages served during school hours. The regulations are directed to control the amount of total calories from fat and saturated fat per meal and the total amount of sodium served per meal. Data obtained from School Nutrition Dietary Assessment (SNDA) II and III showed that the amount of fat and saturated fat provided by these programs was reduced when compared with the data from SNDA I; however further improvement was still needed. In 2010, the Institute of Medicine (IOM) made further revisions to the SNDA program: Breakfast must provide one-fourth of the Dietary
Recommended Allowance (DRA) for vitamin C, vitamin A, iron, calories and calcium, while lunch must provide one-third of the DRA for those nutrients; more servings from whole grains, fruits, and vegetables are also requirements of the programs. The IOM also suggested that the U.S. Department of Agriculture (USDA) should supervise school meals’ nutritional quality more frequently to improve compliance with NSLP and SBP standards and to provide technical support when needed. Children from low-income families, which are at higher risk for obesity and overweight, are eligible to receive free or reduced priced lunch and breakfast at participating schools in the NSLP and SBP (Fox, 2010).

In 2004, Congress passed the Child Nutrition and Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Reauthorization Act establishing that schools participating in the NSLP and SBP should implement a wellness policy in 2006-2007. The main purpose of the school wellness policy was to help reduce and prevent childhood obesity and to improve students’ nutritional, physical education, and academic achievement. Local school wellness policies were required to have goals for nutrition education, physical activity, and other school-related activities that promote students wellness, and nutrition regulations for available foods during school. Then, in 2010, another act passed by Congress (The Healthy Hunger-Free Kids Act of 2010) expanded the requirements for the school wellness policy so the schools have to revise their existing policy and make changes according to the new requisites, which include goals for nutrition promotion. Also, schools have to assess compliance with the wellness policy on a regular basis and inform the public about the progress made toward goal achievement (USDA, 2011). The wellness policy allows school authorities to exert
control over what food is available in vending machines and in cafeterias, as well as to foods used during school fundraising and other classroom-related activities.

Legislation at state levels has also worked toward the improvement of physical activity and nutrition in schools. In 2006, about thirty-one states enacted such legislation, and about eleven states in the country implemented them (DeMattia & Denney, 2008).

These enacted legislations are helping schools to make positive changes in their food environment, which may help to reduce and prevent childhood obesity. However, more research is needed to investigate the effectiveness of these measures in regards to foods that are selling a la carte in schools’ cafeteria, especially at middle and high schools. A limitation to the federal and state policies is that the standards vary across the different school districts, so it would be better to create national nutritional and physical activity standards to make these policies stronger. On the other hand, enacting local legislation will allow each school to bring together representatives from different areas of the community to help developing their local policies based on their particular environment (Fox, 2010).

**Community-based interventions**

Community-based interventions to reduce childhood obesity are numerous. Some of the solutions proposed in the literature include provision of safety routes to schools, safe parks and recreational areas, creating healthier communities that support physical activity, developing collaborations with schools that allow community members to use school resources and facilities after school hours, creating schools in healthier environments, increasing access to healthy foods in grocery and convenience stores,
increasing promotion of healthy foods and beverages in vending machines, government institutions, and public events.

In 2005, the Safe Routes to School (SR2S) Program was created at the national level to provide financial support to communities to create projects designed to increase safer walking and biking to schools. For instance, in Milwaukee, this program helped to build six brand new schools and expand and renovate a total of thirty-four schools. With more schools available, children would return to their neighborhood school, increasing the likelihood that children would walk to school and or parents would walk their children to schools as well. This positive change may increase physical activity and therefore reduce probability of weight gain in children (DeMattia & Denney, 2008).

Increasing community accessibility to fruits and vegetables is an important solution to promote more consumption of produce among children and to discourage intake of energy-dense foods. Local governments have created programs to help increase availability of fruits and vegetables. For example, in Pennsylvania one program was created to stimulate construction of new food markets in low-income neighborhoods. The program provides more than two billion dollars in loans and grants to those investing in these underserved areas. In 2005, legislation was passed in Nevada to provide temporary tax incentives to those who were willing to expand or locate grocery stores in the southern part of the state (DeMattia & Denney, 2008). Additionally, other interventions created to reduce the obesity epidemic include the creation of zoning codes and incentives to promote better access to fresh locally-grown produce through Farmers’ Markets (LACPH, 2007).
Restaurants and fast food places have made slight changes in their menus to offer more healthy meals options to the public. For example, Subway is one of the leading fast food chains with more healthy options in the menu to promote healthy eating in our communities. But, there are many restaurants that are resistant to these changes (DeMattia & Denney, 2008). One approach to overcoming these challenges might be that cities could recognize publically those restaurants committed to promoting healthy eating among their customers. Also, is important to keep consumers informed about the nutritional values of the meals provided at these restaurants (LACPH, 2007).

The current Obama administration has launched a series of interventions aimed at reducing childhood obesity from 20% to 5% by 2030. These interventions are part of a nationwide campaign focus on foods distributed in schools, marketing unhealthy foods to children, promoting walking and biking, menu labeling, more access to healthy foods in poor rural and urban areas, and more. But the implementation of these interventions is still to come (“United States Focus Shift Market to Food Marketing in Battle to Reduce Childhood obesity,” 2010).

**School-based interventions**

Schools are an ideal setting to implement interventions to reduce childhood obesity by promoting healthy eating and physical activity. Many randomized studies have found that curriculum-based programs are successful in modifying sedentary behavior, unhealthy eating habits, and BMI in children from preschool to middle school ages (DeMattia & Denney, 2008).

A recent randomized controlled trial found that school-based curriculum interventions with nutrition lectures and gardening sessions were successful in increasing
dietary intake of fruits and vegetables by half a cup per day, in fourth and fifth graders. Participants not only improved their intake of produce but also showed preference for fruits and vegetables. Another randomized study found that providing nutrition education and gardening classes in school setting to students in fourth grade improve preference and willingness to consume more vegetables when compared to control groups and to interventions providing nutrition lectures only (Davis, Ventura, Cook, Gyllenhammer, & Gatto, 2011).

Afterschool programs have been shown to be important in reducing obesity and in improving dietary patterns in children. “LA Sprouts” is a curriculum-based program developed for fourth and fifth grade Hispanics students. This program provides gardening, nutrition, and cooking sessions for twelve weeks. Nutrition lectures were aimed at increasing the intake of fruits and vegetables (Davis et al., 2011). Participants’ parents were also receiving nutrition and gardening sessions at the elementary school, which is an important intervention because parents can influence children’s eating habits. Parental nutrition knowledge and their modeling healthful eating practices to the children are fundamental to their children life-long habits to promote normal weight status. Students who did not enroll in the program served as a control group. Dietary intake of fruits and vegetables was analyzed by a food frequency questionnaire before and after the intervention. Also, Body Mass Index (BMI) and blood pressure were assessed. Researchers found a significant difference in the dietary intake between the intervention and the control group. The intervention group had a greater increase in fiber intake, while the control group had a 12% decrease in fiber intake. Overweight participants in the intervention group had a 1% decrease in BMI and overweight subjects in the control
group had a 1% increase in BMI. Systolic blood pressure was significantly reduced in the intervention group (Davis et al.).

Researchers concluded that a combination of nutrition, gardening and cooking classes culturally adapted to Hispanic children improve intake of fruits and vegetables and reduce the rate of weight gain in children. These findings are consistent with other randomized studies that have found that nutrition and gardening sessions increase the willingness of children to eat vegetables in children of 6-to-7 years of age (Davis et al., 2011).

**Behavior-based interventions**

Behavior-based interventions are essential for reducing and preventing childhood obesity. Behavior and food preferences are shaped at early stages of life; therefore it is important to consider interventions that focus on changing children’s dietary behavior to develop life-long healthy lifestyles.

Because fruit and vegetable consumption among children is below the recommended levels and is the low intake is associated with an increase of calorie-dense foods that lead to overweight and obesity in children, interventions designed to increase fruits and vegetables dietary intake have been proposed as an effective solution to the obesity epidemic.

Thomson and Ravia (2011) conducted a systematic review to analyze behavior-based interventions that promote higher consumption of fruits and vegetables in adults. They established that out of 22 randomized controlled trials investigated, 17 demonstrated significant increases in dietary intake of fruits and vegetables. This improvement was more prominent in studies using subjects with health conditions and in
small group settings (Thomson & Ravia, 2011). The researchers concluded that behavior-based interventions that include goal setting and small groups are more effective. In children, there was an improvement in consumption of fruits and vegetables as well, but the dietary change was less than in adults. Seven studies conducted in children were reviewed and four confirmed an increase in serving of fruits and vegetables per day, but only three studies demonstrated a significant change (Thomson & Ravia, 2011). One study in children suggested that children’s intake (pre-school age) of fruits and vegetables is influenced when parents change their intake. One limitation to these studies was that participants were reporting their intake by themselves. Researchers concluded that behavior-based interventions produced a modest increase in fruits and vegetables intake and still this change was not meeting the participants’ recommendations for fruits and vegetables dietary intake (Thomson & Ravia, 2011).

The literature reviewed in this chapter confirmed that childhood obesity is a problem of great concern in our society. The environment around children has a great influence in this epidemic; therefore, interventions for reducing childhood obesity should be directed to influence not only the children, but their families, schools, and communities in general. Nutrition education curriculum delivered at school sites and designed to change children’s eating behavior is one of the interventions suggested by researchers.

The curriculum presented in this project is a behavior-based intervention program designed to increase the consumption of fruits and vegetables in children participating in the program. The program is implemented in the school setting but also has a component designed for parents, as we recognize the enormous influence parents’ dietary behavior
has on their children eating habits. Increasing parents’ nutritional knowledge and teaching them how to be role models to their children is essential to this program to achieve our goals and reduce childhood obesity, especially in the Latino population where obesity is more prevalent.
CHAPTER III
METHODOLOGY

Childhood obesity rates have reached epidemic proportions in the U.S. and around the world. This nutrition education curriculum is aimed to improve first and second graders’ eating behavior by increasing their consumption of fruits and vegetables and decreasing their intake of calorie dense foods. Another goal is to increase parents’ awareness of the health benefits of increased consumption of nutritious foods, while decreasing consumption of calorie dense foods. The ultimate goal of the implementation of the curriculum is to help reduce childhood obesity rate in Van Nuys, California.

Curriculum Development

This project includes the formative development of a nutrition education curriculum to be implemented in 1\textsuperscript{st} grade classrooms in an elementary school in the Van Nuys area of the San Fernando Valley, as well as a nutrition education lesson for a Parent Participation class at the elementary school. The first step in the development of the curriculum was the selection of the health content of each nutrition education lecture (Appendix K). The next step was the creation of the behavior change objectives and the learning objectives. These objectives were valuable for the assessment of the lectures. A Curriculum Matrix is a powerful and easy-to-use tool that assists instructors in improving participants’ performance and helps them acquire the knowledge they need to change their eating behavior. As a final step, the Curriculum Matrix was designed (Appendix E, F, G, H, and I) taking into consideration the objectives of the lectures and the results of the qualitative observations made while delivering the initial lesson plans (Appendix A, B, C, and D). The Curriculum Matrix was created in an organized document that is easy to follow by any educator.
**Curriculum Delivery**

The curriculum was delivered in a series of four nutrition education classes with duration of 20 minutes per class, focusing on eating fruits and vegetables. Additionally, the curriculum included one nutrition education lecture for the Parent Participation class. The nutrition lectures included the following teaching tools: MyPlate and the food groups, serving sizes for fruits and vegetables, recognizing the difference between healthy and unhealthy foods, and recognizing the benefits of adequate dietary intake of fruits and vegetables. Classes were designed to be taught at Cohasset Elementary during regular school hours in a regular classroom. Different teaching methods were used to deliver the lectures including: hand-on activities and various types of visual aids such as short videos, food models, MyPlate, and food cards.

Qualitative observations were made as the lessons were delivered to the children; thus, lectures could be improved and adjusted accordingly. Qualitative observations included observing participants’ behavior during class time. Participant’s questions and answers and their reaction to the material presented were essential for developing the final modified lectures. As a result, a series of modified nutrition education lectures were created in the Curriculum Matrix (Appendix E, F, G, H, and I). The modified lessons were created to deliver simple and easy to understand nutrition concepts that are appropriate for first and second graders, and for adults with low literacy level. In addition, each class included an anticipatory set to gather students’ attention and to facilitate the introduction of the lecture. The modified lectures were more organized and very explicit so any instructor can deliver the lecture. The lectures in this curriculum covered the health education content standards for California public schools (Appendix
K). These lectures could be implemented next semester in two additional elementary schools (Gault Street and Anatola Avenue Elementary Schools).

**Data Collection**

As part of the evaluation of the effectiveness of the Parent Participation class, a Food Frequency Questionnaire (Appendix W) assessing children’s and parent’s dietary intakes was administered to parents pre- and post-presentation of the lectures to measure changes in eating behaviors. The Food Frequency Questionnaire was exclusively created for this project to fit participants’ characteristics. It was designed to collect participants’ dietary intake from all food groups but especially for consumption of fruits and vegetables. In addition, it will be used to evaluate participants’ dietary intake of unhealthy calorie dense foods. Parents in the participation class filled out the Food Frequency Questionnaire at the first lesson, and again at the last lesson, which is the post-test to evaluate whether participants have any changes in their eating behavior after receiving the nutrition education component of this project. This evaluation will be suggested for future studies. Qualitative observations made during application of the Food Frequency Questionnaire, resulted in the development of a modified questionnaire (Appendix X) that is shorter and easier to implement for the two additional elementary schools where this curriculum will be delivered.

For the parent group only, Northridge Hospital’s Cardiology Department conducted glucose and cholesterol screenings, once at the beginning of the nutrition sessions, once at the end of the project. Parents were asked to fast for 12 hours before these tests for accurate results. These laboratory tests will be used in a future research to
assess whether participants improve their blood glucose and cholesterol levels after receiving the nutrition education classes.

**Participants**

The study population included first grade children (n=100) at Cohasset Elementary School in Van Nuys. Subjects were 6 years of age, either male or female, healthy; weight status varies from normal weight to overweight or obese. All were from low-income families. Additionally, some of their parents (n=30) were part of this project (adults > 18 years of age). All adults, male and female, are low-income and healthy individuals.
CHAPTER IV

RESULTS

Results from the qualitative observations

Qualitative observations were conducted during the implementation of the initial nutrition education lectures in first and second grade classrooms, at Cohasset Elementary School, and in the Parent Participation class. After completing the qualitative observations, the initial nutrition lectures were improved and adjusted leading to the modified and final nutrition education lectures forming part of the Curriculum Matrix (Appendix E, F, G, H, and I).

The finalized curriculum contains four nutrition education lesson plans designed for 1st and 2nd graders, and one nutrition education lecture for the Parent Participation class. The lectures are interactive and appropriate for age and educational level of participants. These lectures contain all the required components of a lesson plan including: behavior change objectives, addressed standards, learning objectives, teaching resources, anticipatory set, learning activities, student assessment, and summary closure. These modified lectures will contribute to a successful curriculum implementation next semester in the two additional elementary schools in Van Nuys area. More importantly, the lectures were modified to achieve the main goal of this project which is to change participants’ eating behavior.
CHAPTER V

DISCUSSION

The purpose of this project was to develop a nutrition education curriculum to be implemented in 1st and 2nd grade classrooms, first at Cohasset Elementary School, with additional plans to expand the curriculum to two more elementary schools in Van Nuys. The curriculum was also developed for the Parent Participation class at the school. The main goal was to improve first and second graders’ eating behavior, specifically increasing consumption of fruits and vegetables; thereby, decreasing intake of calorie dense foods. Another goal was to increase parents’ awareness of the health benefits of increased consumption of nutritious foods, while decreasing consumption of calorie dense foods. After completing qualitative observations while the initial nutrition lectures were delivered to the children and to the Parent Participation class, the improved and modified nutrition education lesson plans were developed for future implementation during next semester at two additional elementary schools.

Recommendation for Further Research

Evaluating the effectiveness of this curriculum is essential to assess whether or not the implementation of the nutrition education sessions achieved its purpose of changing participants’ eating behavior. It is clear that healthy eating habits with adequate dietary intake of fruits and vegetables and minimum consumption of unhealthy calorie dense foods may reduce the risks of nutrition-related chronic conditions such as type II diabetes and hyperlipidemia. Therefore, further research is recommended to measure whether or not parents in the Parent Participation class had any changes in their blood glucose and cholesterol levels, as this could serve as a indicator of possible improvements.
in dietary habits. Additionally, participants’ dietary intake that was collected using a
Food Frequency Questionnaire should be evaluated by further research to assess if there
were any changes in participants eating behavior. Measuring these parameters in a further
research will contribute to the assessment and evaluation of this curriculum.

**Limitations**

The main limitation of this project is that the effectiveness of the nutrition
education curriculum was not evaluated. Participants’ dietary intake and blood glucose
and cholesterol levels were collected but the data was not analyzed during this project.
However, this project will be assessed in the future. Another limitation is that the
curriculum was only designed for assessing and increasing consumption of fruits and
vegetables but there are other important food groups that are essential for healthy diets as
well. Some other limitations of this project include the following: the nutrition education
classes were developed for first and second graders and their parents, a small sample size
was used to evaluate effectiveness of the curriculum in the future; therefore, results
cannot be generalized to the entire population. The Food Frequency Questionnaire used
to collect participants’ dietary intake was designed to fit participants’ characteristics and
it has not been validated by other studies.

Despite these limitations, this nutrition education curriculum will add to the
existing behavior-based interventions, implemented at school settings, which are
designed for increasing children’s consumption of fruits and vegetables. Behavior-based
interventions were suggested in the literature as important tools for improving
consumption of fruits and vegetables in children (Thomson & Ravia, 2011). As a result,
this curriculum may help reducing the childhood obesity rate in Van Nuys, California.
Implications

This project will provide benefits to participants – first grade children and those parents attending the Parent Participation classes, in that the participants will be receiving nutrition education classes to promote better eating habits. Children and parents will learn to the benefits and value of consuming fruits and vegetables. They will be encouraged to include five servings of fruits and vegetables on a daily basis. Participants will recognize the importance of eating nutrient dense foods versus calorie dense foods. The aim of this project is to increase consumption of fruits and vegetables to promote healthy eating among low-income families, with the ultimate goal of helping to reduce the rate of childhood obesity in this community. If this type of nutrition education is found to be beneficial in helping to fight obesity, the curricula could be used in other communities, thus benefitting society as well. If children and parents can improve their eating habits, this may reduce or prevent onset of obesity and their associated chronic diseases, thus helping to reduce medical costs.

Conclusions

The childhood obesity epidemic is affecting individuals, families, communities, and the entire society. Multiple factors are contributing to this problematic and children’s unhealthy dietary patterns are one of these factors, especially inadequate consumption of fruits and vegetables and excessive intake of calorie dense foods. The purpose of this nutrition education curriculum was to change participants’ eating behavior and increase parents’ awareness of the health benefits of a healthy diet. The ultimate goal was to help reduce childhood obesity rates in the low-income Hispanic children in Van Nuys,
California, and thus, reduce the risk of developing nutrition-related chronic diseases in adulthood.
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APPENDIX A

Initial Lesson Plan Session 1: MyPlate

Lesson Plan: Session 1: MyPlate
Learning Objectives: 1. Students will be able to identify the different food groups on the MyPlate.
2. Students will be able to identify food items per each food group.

Behavior Change Objective: 1. Students will increase their intake of fruits and vegetables by adding fruits and vegetables to half of their plates at least lunch and dinner four times per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
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| Introduction: 2 minutes | • Introduce instructor.  
                          • Introduce the topics of the each nutrition lecture.  
                          • Introduce the topic of the first lecture: My Plate | Paper printouts of MyPlate.  
                          Paper and laminated pieces of different foods.  
                          Magnetic board with MyPlate.  
                          MyPlate |
| Learning Activities: 16 minutes | • Explain the different parts/food groups on the MyPlate.  
                          • Explain what each color represents.  
                          • Explain how much of each food group should be on MyPlate.  
                          • List the food items that belong to each group.  
                          • Students will use the MyPlate coloring sheet to identify each food group. They will color it while instructor is explaining MyPlate.  
                          • The instructor will then distribute food images to every child.  
                          • The instructor will pick one child at a time to come up to the board and name what food image they got (child will then hold up image so the rest of the children can see).  
                          • Child will then tell us where this image goes on the food plate and stick it to the appropriate section.  
                          • Ask children (one at a time) to place a food item on the MyPlate (magnetic board). |
<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary Closure:</strong> 1 minute</td>
<td>• The instructor will summarize important topics of the lecture:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Half of MyPlate should be fruits and vegetables.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Eat a variety of fruits and vegetables every day.</td>
<td></td>
</tr>
<tr>
<td><strong>Student Assessment:</strong> 1 minute</td>
<td>• Ask students to tell something new about MyPlate that they learned in today’s lecture. At least ¾ of the class should be able to answer.</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

Initial Lesson Plan Session 2 MyPlate: Fruits

Lesson Plan: Session 2: MyPlate: Fruits
Learning Objectives:
1. Students will be able to identify foods in the fruit group.
2. Students will be able to recognize the recommended daily amount of fruits for children (6 to 8 years old).

Behavior Change Objective: 1. Students will increase their intake of fruits by adding at least 2 portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipatory Set: 1 minute</td>
<td>- The instructor will show a short video that can be found following this link: <a href="http://www.youtube.com/watch?v=-lzqKop-ESc&amp;feature=related">http://www.youtube.com/watch?v=-lzqKop-ESc&amp;feature=related</a></td>
<td></td>
</tr>
</tbody>
</table>
| Learning Activities: 18 minutes | - Pass out fruit coloring handouts.  
- Review the MyPlate.  
- Explain what foods go into each group.  
- Explain how many servings of fruits they should have each day.  
- Ask if the children had a fruit for breakfast.  
- Have the children name different foods that go into the fruit group.  
- Have children find and color in the fruits listed on the handout.  
- Name the fruits they find with the entire class. | - Color-in handouts  
- MyPlate  
- Fruit pictures |
| Summary Closure: 1 minute | - Instructor and children will provide a short summary of the lecture.  
- Let the children know that they are teachers and they should teach their parents, family and friends about healthy eating. | |
| Student Assessment: 1 minute | - The students will tell what they learned in today’s lecture. The instructor will ask at least ¾ of the class. | |
APPENDIX C

Initial Lesson Plan Session 3 MyPlate: Vegetables

Lesson Plan: Session 3: MyPlate: Vegetables
Learning Objectives:
1. Students will be able to identify food in the vegetable group.
2. Students will be able to describe the different colors of vegetables.
3. Students will be able to recognize the recommended daily amount of vegetables for children (6 to 8 years old).

Behavior Change Objective: 1. Students will increase their intake of vegetables to having at least 3 portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipatory Set</td>
<td>• The instructor will show a short video at the beginning of the lecture. The link for the video is the following: <a href="http://www.youtube.com/watch?v=loANI3tIPUg">http://www.youtube.com/watch?v=loANI3tIPUg</a></td>
<td>• Colorful vegetable photos</td>
</tr>
<tr>
<td>Set: 1 minute</td>
<td></td>
<td>• MyPlate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Large pot or salad bowl for imaginary soup</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Paper cups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fresh vegetable soup for snacking</td>
</tr>
</tbody>
</table>
| Learning Activities: 18 minutes | • Pass out photos of vegetables.  
• Review the MyPlate.  
• Explain what foods go into each group.  
• Explain how many servings of vegetables they should have each day.  
• Ask if the children had a vegetable today or the day before and if they will have a vegetable later today.  
• Each child will receive a picture of a vegetable.  
• Ask the children to come up in the same order as they are sitting and share their picture with the entire class.  
• Have the class say the name of the vegetable together before the child places their vegetable into the bowl of imaginary soup.  
• Repeat this procedure until all students share their pictures.  
• Once all pictures are in the bowl, the instructor and students will sing a song.  
• Students will receive a small cup of fresh vegetable soup.  |
| Closure: 1 minute   | relevant topics of the lecture  
|                    | • Let the children know that they are teachers as well and is important for them to share with their families that having 3-5 servings of vegetables is good for their heart and health. |
| Student Assessment: 1 minute | • Instructor will ask the students to tell one thing they learned during the lecture. At least $\frac{3}{4}$ of the students should answer. |
APPENDIX D

Initial Lesson Plan Parent Participation Class: MyPlate

Lesson Plan:

Parent Participation Class: MyPlate

Learning Objectives:

1. Parents will be able to describe the different food groups of MyPlate.
2. Parents will be able to recognize that half of MyPlate is for fruits and vegetables.
3. Parents will be able to identify the daily recommended amount of fruits and vegetables for children between 6 to 8 years old and for adults.
4. Parents will be able to identify serving sizes for fruits and vegetables.
5. Parents will be able to explain the importance of adequate intake of fruits and vegetables for a healthy heart.

Behavior Change Objective:

1. Parents will increase intake of fruits and vegetables (for parents and their children) by eating at least three to five portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| Introduction: 4 minutes | • Introduce instructor  
• Introduce the nutrition education program for children and parents.  
• The instructor will provide a sign in sheet for parents to sign in.  
• Explain rules of the program. | Strawberries  
Pomegranate Juice  
Paper plates  
Paper cups  
Food models  
Food photos  
Muscle & Fat models  
Test tubes of fat  
Healthy foods for each food group  
Unhealthy foods for each food group |
| Learning Activities: 38 minutes | • Ask parents a series of questions: Do you love your child? Do you care for their health?  
• Pass out handouts: 10 healthy tips and MyPlate handouts  
• Go over the different food groups on the MyPlate  
• Present visual serving size for each food group.  
• State how many servings for each food group  
• Go over 10 tips to a great plate (Balance, Variety, Moderation, & Exercise).  
• Explain importance of parents as role models for children. |

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- Have parents place real food examples in the appropriate food group in the paper plates.
- Allow parents to choose between unhealthy and healthy versions of each food group (fruit roll ups vs. fresh fruit, grilled fish vs. Hot dogs, brown rice vs. white rice, whole milk vs. 1%, etc).
- Divide parents into groups, having them come up with 10 healthy tips they could do at home with their children.
- Reward parents with strawberries and pomegranate juice – and they can eat their cups of real food! (whole grain crackers, string cheese, canned beans and peanuts, the strawberries, and carrots.)

<table>
<thead>
<tr>
<th>Summary Closure: 2 minutes</th>
<th>• Instructor will provide a summary of relevant topics.</th>
</tr>
</thead>
</table>
| Student Assessment: 1 minute | • Ask parents what is one thing they have learned today.  
• Ask parents what is one thing they can start doing this week. |
APPENDIX E

Curriculum Matrix: Modified Lesson Plan Session 1

**Lesson Plan:** Session 1: What is on MyPlate?

**Learning Objectives:**
1. Students will be able to identify the five food groups of MyPlate.
2. Students will be able to recognize food items in each food group.
3. Students will be able to identify that fruits and vegetables are half of MyPlate.
4. Students will be able to recognize foods in the fruit and vegetable food group.

**Behavior Change Objective:**
1. Students will increase their intake of fruits and vegetables by adding fruits and vegetables to half of their plates at least for lunch and dinner four times per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| Anticipatory Set: 2      | • Instructor will show a short video  
• Instructor will ask students a question from the video. (Appendix L)                                                                                                                                                                                                                                                                   | • Projector  
• Laptop                          |
| minutes                  |                                                                                                                                                                                                                                                                                                                                                                                            |                                |
| Learning Activities: 16  | • Introduce instructor.  
• Introduce the topics of the each nutrition lecture.  
• Introduce the topic of the first lecture: What is on MyPlate?  
• Instructor will pass out MyPlate coloring sheet and 5 cut out food pictures per student.  
• Instructor will show MyPlate to explain the food groups for a healthy plate.  
• Show the food photo cards one by one. The students will name the foods and they will attach the cut out food pictures to MyPlate coloring sheet.  
• Instructor will call two students to the front of the classroom to show and explain their plates to the whole class.  
• Students will take home the MyPlate coloring sheet and use it as a guide                                                                                                                                                                                                  | • MyPlate  
• Food photo cards  
• MyPlate coloring sheet (Appendix R)  
• Food pictures (Appendix Q)  
• Glue  
• Plates  
• Napkins  
• Carrots  
• Strawberries  
• Whole grain crackers |
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>for meal times.</td>
<td></td>
</tr>
<tr>
<td>• Pass out snacks for each student and reinforce the food groups they belong to. (Appendix L)</td>
<td></td>
</tr>
<tr>
<td><strong>Summary Closure: 1 minute</strong></td>
<td><strong>Instructor will provide a summary of important topics. (Appendix L)</strong></td>
</tr>
<tr>
<td><strong>Student Assessment: 1 minute</strong></td>
<td><strong>Ask students to tell something new about MyPlate that they have learned in today’s lecture. At least ¾ of the class should answer.</strong></td>
</tr>
</tbody>
</table>
## APPENDIX F

### Curriculum Matrix: Modified Lesson Plan Session 2

**Lesson Plan:**  
Session 2: MyPlate: Fruits

**Learning Objectives:**  
1. Students will be able to identify foods in the fruit group.  
2. Students will be able to recognize the recommended daily amount of fruits for children (6 to 8 years old).  
3. Students will be able to identify the health benefits of adequate fruit intake.

**Behavior Change Objective:**  
1. Students will increase their intake of fruits by adding at least 2 portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipatory Set: 2</td>
<td>• Instructor will show a short video</td>
<td>• Projector</td>
</tr>
<tr>
<td>minutes</td>
<td>• Instructor will ask students questions related to the video. (Appendix M)</td>
<td>• Laptop</td>
</tr>
<tr>
<td>Learning Activities:  16</td>
<td>• Introduce topic of the lecture</td>
<td>• Fruit coloring sheet (Appendix S)</td>
</tr>
<tr>
<td>minutes</td>
<td>• Show MyPlate to students and point out to the fruit group for students to identify the food group.</td>
<td>• Fruit cards</td>
</tr>
<tr>
<td></td>
<td>• Students will list some fruits and they will tell instructor whether or not they eat fruits the day before the lecture or today’s breakfast.</td>
<td>• MyPlate</td>
</tr>
<tr>
<td></td>
<td>• Explain different colors of fruits and health benefits of eating fruits.</td>
<td>• Dry fruits: raisins and pineapple (snack)</td>
</tr>
<tr>
<td></td>
<td>• Explain the different forms of fruits: fresh, frozen, dry, and fruit juices. Show it to students with food models, packages, and real fruits.</td>
<td>• Fresh Fruit: grapes (snack)</td>
</tr>
<tr>
<td></td>
<td>• Ask students to identify which is healthier between fruit juice and fresh fruit.</td>
<td>• 100% fruit juice (one)</td>
</tr>
<tr>
<td></td>
<td>• Explain difference between fruit juice and fresh fruit.</td>
<td>• Empty package of frozen fruit (one)</td>
</tr>
<tr>
<td></td>
<td>• Explain recommended amount of fruit juice (show the food model).</td>
<td>• Plates</td>
</tr>
<tr>
<td></td>
<td>• Pass out fruit coloring sheet for each student.</td>
<td>• Napkins</td>
</tr>
<tr>
<td></td>
<td>• Instructor will show fruit cards one by one and students will identify and color the fruits.</td>
<td>• Food model (juice cup)</td>
</tr>
<tr>
<td></td>
<td>• Explain recommended daily amount</td>
<td></td>
</tr>
</tbody>
</table>
for fruits.
- Students can take their fruit coloring sheet home to show it to their parents.
- Provide snacks for each student. (Appendix M).

<table>
<thead>
<tr>
<th>Summary Closure: 1 minute</th>
<th>• Summarize important topics of the lecture (Appendix M).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Assessment: 1 minute</td>
<td>• Students will tell what they learned in today’s lecture. The instructor will ask at least ¾ of the class.</td>
</tr>
</tbody>
</table>
### APPENDIX G

#### Curriculum Matrix: Modified Lesson Plan Session 3

**Lesson Plan:** Session 3: MyPlate: Vegetables

**Learning Objectives:**
1. Students will be able to identify foods in the vegetable group.
2. Students will be able to describe the different colors of vegetables.
3. Students will be able to identify health benefits of adequate vegetables intake.
4. Students will be able to recognize the recommended daily amount of vegetables for children (6 to 8 years old).

**Behavior Change Objective:**
1. Students will increase their intake of vegetables by adding at least 3 portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| **Anticipatory Set: 1 minute** | • Instructor will show a short video (Appendix N) | • Projector  
• Laptop |
| **Learning Activities: 17 minutes** | • Introduce topic of the lecture.  
• Show MyPlate and point out to the vegetable group.  
• Instructor will ask students to identify the food group and to list some vegetables they ate the day before or at today’s breakfast.  
• Instructor will ask students how many servings of vegetables they are eating daily.  
• Explain recommended daily amount for vegetables.  
• Pass out vegetable cards to make an imaginary vegetable soup.  
• Instructor will call students one by one to put the card in the bowl. This will be done by calling the vegetables by their color.  
• When a student is called, she/he will show the picture to the entire class so they can identify the vegetable.  
• Once all vegetable pictures are in the imaginary soup, the instructor will explain the health benefits of eating | • Vegetables cards  
• My Plate  
• Large pot or salad bowl  
• Small paper cups  
• Fresh vegetable soup  
• Napkins  
• Projector  
• Laptop  
• Vegetable soup song (Appendix T) |
<table>
<thead>
<tr>
<th><strong>Summary Closure: 1 minute</strong></th>
<th>• Provide a summary of relevant points of the lecture (Appendix N).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Assessment: 1 minute</strong></td>
<td>• Instructor will ask the students to tell one thing they learned during the lecture. At least ¾ of the students should answer.</td>
</tr>
</tbody>
</table>
APPENDIX H

Curriculum Matrix: Modified Lesson Plan Session 4

Lesson Plan: Session 4: Eating Real and Health
Learning Objectives: 1. Students will be able to identify whole and healthy foods.
2. Students will be able to identify processed foods as unhealthy food choices.
3. Students will be able to list the benefits of eating whole foods such as fruits and vegetables.

Behavior Change Objective: 1. The students will reduce consumption of processed foods (hot dogs, chips, soda, French fries, hamburgers, sweets) by only eating these food items once or twice per week; thus, they will increase their intake of fruits and vegetables by adding 5 portions at least four days per week.

METHODS | LESSON CONTENT | MATERIALS
--- | --- | ---
Anticipatory Set: 2 minutes | • The instructor will show students two snack bags filled with different food items.
• Instructor will ask students to identify the healthy snack and to give an explanation. (Appendix O). | • Two snack bags filled with food models

Learning Activities: 13 minutes | • Instructor will explain the meaning of eating real and healthy.
• Explain differences between whole foods and processed foods while showing some of the food cards. This will include the health benefits of eating whole foods over processed foods.
• Explain the meaning of the green and red bar in the change little and change a lot food cards.
• Assign randomly the food cards to each student.
• Students will identify the healthy foods vs. unhealthy foods (processed foods) as the instructor is calling them.
• Students with change little and change a lot food cards will form pairs based on the food cards they will eat. | • Eat Real Food Cards or whole food cards (Appendix U)
• Change a little and change a lot food cards (Appendix V)
• Food models
• 1 can of soda (empty)
• Fresh baby carrots
<table>
<thead>
<tr>
<th>Summary Closure: 1 minute</th>
<th>• Provide a summary of relevant points (Appendix O).</th>
</tr>
</thead>
</table>
| Student Assessment: 4 minutes | • Students will participate in a group activity to demonstrate understanding of the concepts reviewed during lecture time.  
                                • Students will form 5 groups to create a healthy snack using food models  
                                • Instructor will check the results. (Appendix O). |
|                           | • Five empty paper snack bags.  
                           • Food models |
APPENDIX I

Curriculum Matrix: Modified Lesson Plan Parent Participation Class

Lesson Plan: Parent Participation Class: MyPlate

Learning Objectives:

1. Parents will be able to identify the different food groups of MyPlate.
2. Parents will be able to recognize that half of MyPlate is for fruits and vegetables.
3. Parents will be able to identify daily recommended amount of fruits and vegetables for children between 6 to 8 years old and for adults.
4. Parents will be able to understand serving sizes for fruits and vegetables.
5. Parents will be able to explain the importance of adequate intake of fruits and vegetables for a healthy heart.

Behavior Change Objective:

1. Parents will increase intake of fruits and vegetables (parents and their children) by adding at least three to five portions per day, at least four days per week.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>LESSON CONTENT</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipatory Set: 2</td>
<td>• Instructor will show parents the heart muscle model and the plastic tubes to explain normal functioning of the heart and the consequences of a blocked vein or artery.</td>
<td></td>
</tr>
<tr>
<td>minutes</td>
<td>• Instructors will ask questions to parents related with the explanation. (Appendix P).</td>
<td>• Plastic tubes representing a blocked artery and a normal artery</td>
</tr>
<tr>
<td></td>
<td>• My Plate</td>
<td>• Heart muscle model</td>
</tr>
<tr>
<td>Learning Activities:</td>
<td>• Introduce instructor</td>
<td></td>
</tr>
<tr>
<td>40 minutes</td>
<td>• Provide sign in sheet for parents</td>
<td>• Food models</td>
</tr>
<tr>
<td></td>
<td>• Introduce topic of the lecture</td>
<td>• A cup</td>
</tr>
<tr>
<td></td>
<td>• Explain food groups in the MyPlate while showing MyPlate to parents.</td>
<td>• Plastic plates</td>
</tr>
<tr>
<td></td>
<td>• Point out to each food group and ask parents to name foods for each food group.</td>
<td>• Napkins</td>
</tr>
<tr>
<td></td>
<td>• Explain recommended foods for grains, protein, and milk group.</td>
<td>• Forks and spoons</td>
</tr>
<tr>
<td></td>
<td>• Explain importance of eating a colorful variety of fruits and vegetables.</td>
<td>• Canned beans</td>
</tr>
<tr>
<td></td>
<td>• Ask parents what are some health</td>
<td>• Canned salsa</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Broccoli or carrots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Strawberries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Whole grain crackers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• String cheese</td>
</tr>
</tbody>
</table>
benefits of adequate consumption of fruits and vegetables.
- Explain health benefits of adequate intake of fruits and vegetables.
- Explain recommended daily amounts of fruits and vegetables.
- Explain what 1 serving of fruits and vegetables is.
- Ask parents if they are eating the recommended daily amount of fruits and vegetables.
- Explain different forms of fruits and vegetables (fresh, frozen, canned, juice)
- Explain which forms of fruits and vegetables are healthier.
- Form groups of two parents (at least 10 groups) and provide them with the two handouts (two handouts per group).
- Parents will have the opportunity to discuss one topic of each handout in the group and then share their ideas with the whole class.
- Instructor will provide a plate for each parents and she/he will fill out each plate with a food item per each food group.
- Once all plates are served, parents will identify the foods in the plate by telling to which group each food belongs to. (Appendix P).

<table>
<thead>
<tr>
<th>Summary Closure: 2 minutes</th>
<th>• Summarize important topics of the lecture (Appendix P).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Student Assessment: 1 minute</th>
<th>• The instructor will ask parents to tell one thing that they learned during the lecture. The instructor will ask at least ¾ of participants.</th>
</tr>
</thead>
</table>
APPENDIX J

Outline of Selected Health Content for the Nutrition Lecture Series

Lecture 1. What is on MyPlate?
   A. Understanding the five food groups of MyPlate
   B. Identifying food items per each food group
   C. Half of MyPlate: Fruits and Vegetables

Lecture 2. MyPlate: Fruits
   A. Understanding fruit group of MyPlate
   B. Identifying foods in the fruit group
   C. Health benefits of fruits intake
   D. Fruit intake recommendations for children
   E. Understanding different forms of fruits

Lecture 3. MyPlate: Vegetables
   A. Understanding vegetable group of MyPlate
   B. Identifying foods in the vegetable group
   C. Health benefits of vegetable intake
   D. Vegetable intake recommendations for children

Lesson 4. Eat Real and Healthy
   A. Whole foods vs. Processed foods
   B. Health benefits of eating whole foods
   C. Identifying whole foods as healthy options
   D. Identifying processed foods as unhealthy options
Parent Participation Class: MyPlate

A. Understanding and using MyPlate

B. Identifying foods in the five food groups of MyPlate

C. Health benefits of fruits and vegetables

D. Fruits and vegetables intake recommendations for children and adults

E. Parents as role models for their children

F. Making fruits and vegetables fun for children
Health Education Content Standards

Growth and Development

Standard 1: Essential Concepts

1.3.G  Identify a variety of behaviors that promote healthy growth and development

Nutrition and Physical Activity

Standard 1: Essential Concepts

1.1.N  Classify various foods into appropriate food groups

1.2.N  Identify the number of serving of food from each food group that a child needs daily

1.3.N  Discuss the benefits of eating a nutritious breakfast every day

1.4.N  List the benefits of healthy eating (including beverages and snacks)

1.7.N  Identify a variety of healthy snacks

1.9.N  Explain how both physical activity and eating habits can affect a person’s health

Standard 4: Interpersonal Communication

4.1.N  Demonstrate how to ask family members for healthy food options

Standard 7: Practicing Health-Enhancing Behaviors

7.1.N  Examine the importance of eating a nutritious breakfast everyday

7.3.N  Select healthy beverages

7.4.N  Examine the criteria for choosing a nutritious snack
Standard 8: Health Promotion

8.1.N Practice making healthy eating choices with friends and family
APPENDIX L

Supplemental Information Session 1

Session 1: What is on MyPlate?

Opening Strategy (Anticipatory Set):

The instructor will start the lecture by showing a short video (2 minutes) called Funmi and Friends discuss MyPlate. Use the following link to find the video.

http://www.youtube.com/watch?v=4vgQlR_yU1s&feature=related

After the video, the instructor will ask students to name what food items were in MyPlate (video) and to classify the food items by food groups.

The students should be able to answer the following:

- Carrots – vegetable group
- Apple – Fruit group
- Peanut butter – protein group
- Sandwich: bread – grain group, meat – protein group, lettuce – vegetable group, cheese – milk group.

Learning Activities:

- The instructor will pass out the MyPlate coloring sheet and the cut out food pictures. Each student should have 5 food pictures (one from each food group).

  The instructor will explain that students will glue the food pictures in the corresponding food group section of MyPlate coloring sheet (as instructor is explaining each food group). Students should do this activity when the instructor tells them to do so.

- The instructor will show MyPlate to the students.
• The instructor will explain that a healthy plate should have the five food groups: grains, protein, fruits, vegetables, and milk and milk products. The instructor should point at each food group while mentioning them.

• The instructor will show the students the food photo cards one by one and the students will name the foods. The instructor will show the cards in the following order:
  - Grains (rice, cereal, pasta, bread, crackers, etc). Then, students will glue the cut grain picture to the coloring sheet.
  - Proteins (meat, chicken, fish, turkey, eggs, beans, nuts). Then, students will glue the cut protein picture to the coloring sheet.
  - Milk (milk, cheese, and yogurt). Then, students will glue the cut food picture belonging to the milk group.
  - Fruits (apple, pear, strawberry, grape, orange, watermelon, etc). Then, students will glue the cut fruit picture to the coloring sheet.
  - Vegetables (broccoli, cauliflower, carrot, lettuce, cabbage, spinach, peas, etc). Then, students will glue the cut vegetable picture to the coloring sheet.

• Once all food groups have been covered and students have attached the food pictures to their plates coloring sheet, the students will hold up their plates and show it to the class so everyone can see them. The instructor will call two students to come up at the front of the class and explain the food groups they glue to MyPlate. The instructor will tell students that they did an excellent job.

• Then, the instructor will tell students that they can take their plate home to show it to their parents. They can also teach their families and friends about MyPlate. The
instructor will encourage students to place it in the refrigerator so they can see it and follow it during the meals.

- The instructor will pass out snacks for each student: baby carrots, strawberries, whole grain crackers. As the instructor is passing out the snacks, she/he will reinforce the food groups that the snacks belong to and the food groups that are missing from the snack.

**Summary Closure:**

At the end of the session the instructor and children will review together a summary of important topics:

- A healthy plate should have the five food groups: grains, protein, fruits, vegetables, and milk and milk products.
- Half of your plate should have fruits and vegetables.
- Follow MyPlate at each meal.
APPENDIX M

Supplemental Information Session 2

Session 2: MyPlate: Fruits

Opening Strategy (Anticipatory Set):

The instructor will show a short video that can be found following this link:
http://www.youtube.com/watch?v=-IzqKop-ESc&feature=related

The video is about Cookie Monster singing a song about healthy foods (fruits and vegetables).

After the video the instructor will ask students the following questions:

- Who was singing the song? The students will answer Cookie Monster.
- What was the song about? The students will answer the song was about healthy eating; fruits and vegetables.
- Was Cookie Monster eating cookies or fruits and veggies? The students will answer fruits and vegetables.

Then, the instructor will tell students that Cookie Monster has become Fruity & Veggie Monster.

Learning Activities:

- The instructor will introduce the topic of the lecture. Today’s’ lecture is about MyPlate fruit group.
- The instructor will show MyPlate to the students. She/he will point at the fruit group and ask the students which food group she/he is pointing at.
• Then, the instructor will ask students to list some fruits that they like. After hearing 5 to 6 responses, the instructor will ask which fruits they ate yesterday as snack or today’s breakfast. The instructor will praise them for eating healthy.

• The instructor will tell students that fruits have different colors and it is important to eat a colorful variety of fruits on a daily basis. Each color represents different nutrients that are important for normal growth and development. Eating fruits help to maintain a healthy heart, strong muscles, healthy brain, and overall health.

• The fruit group includes: fresh fruits (instructor will show students the grapes), frozen fruits (instructor will show students the empty package of frozen fruit), dry fruits (instructor will show students the raisins and dry pineapples), fruit juice (instructor will show students 100% fruit juice).

• The instructor will hold up the fruit juice and the fresh fruit and she/he will ask students which one is healthier. Then, the instructor will explain that fresh fruits are a better option than fruit juice because juices have a lot of sugar. The instructor will show students the fruit juice cup (food model) and tell students that they should not drink more than ½ a cup per day.

• The instructor will pass out the fruit coloring sheet for each student. The instructor will explain that she/he will be showing them fruit cards (pineapple, banana, pear, apple, grape, orange, cherry). When they see a fruit that is on the coloring sheet, students will say the name of the fruit and they will color it. When students say pineapple, the instructor will ask who live in a pineapple under the sea. The students will say Sponge Bob. When the students say orange, the instructor will say oranges are purple and students will say NO oranges are
orange. The instructor will say I thought oranges were purple and students will laugh. The instructor will say silly me I thought they were purple.

- Once students have color all the fruits, the instructor will tell them that the recommended daily amount of fruits for children their age is two to three servings of fruits per day. The instructor will tell students to write down in the coloring sheet: Three fruits per day. The instructor will say “three fruits a day keeps the doctor away”. The students will take the coloring sheet home to show it to their parents.

- The instructor will give students snacks: grapes, raisins, and dry pineapple.

**Summary Closure:**

The instructor and children will summarize the following relevant points:

- Children should eat a colorful variety of fruits every day.

- Fruits are good for a healthy heart, normal growth and development, strong muscles, fighting infections, and healthy skin.

- Children should eat 2 to 3 servings of fruits per day.

- Snacking with fruits and eating fruits at every meal. Put fruits in your Plate.
Session 3: MyPlate: Vegetables

Opening Strategy (Anticipatory Set):

The instructor will show a short video at the beginning of the lecture. The link for the video is the following:

http://www.youtube.com/watch?v=loANI3tlPUg

The video is a song called Fruit Veggie Swap. After the video (1 minute), the instructor will start the lecture.

Learning Activities:

- The instructor will greet students and introduce the topic of the lecture. In this session students will learn about vegetables.

- The instructor will show My Plate to the students and she/he will be pointing at the vegetable group. The instructor will ask students which group is the one she/he is pointing at. Then, the instructor will ask students to list some vegetables that they ate the day before the lecture or at breakfast (about 5 to 6 responses). The instructor will reinforce student’s positive eating behavior by saying the following: you are making good choices by eating vegetables in your meals. Good job!!

- Then the instructor will ask students how many servings of vegetables they are eating daily. After hearing 5 to 6 responses, the instructor will explain that at their age they should eat three to five servings of vegetables per day. It is important to eat vegetables in each meal (breakfast, lunch, and dinner) and snacks.
• The instructor will pass out photos of vegetables, so each student will have a picture. Then, the instructor will explain that the pictures will be used to make an imaginary vegetable soup. The students will be putting the pictures in the soup bowl as the instructor is calling them, according to the color of the vegetables. Before the students place the vegetable photo in the bowl, students will hold up the picture so everybody in the classroom can see it. While holding the picture up, the students will name the vegetable and then put it in the bowl.

• First, the instructor will call students with green vegetables and one by one they will come to the instructor, hold up the picture for the classmates to see it and say the name of the vegetable, then they will put it in the bowl. When the spinach card appears, the instructor will ask which cartoon character likes to eat lots of spinach? Then students will answer Popeye and they will laugh. The instructor will ask them how Popeye benefit from eating spinach. The students will say Popeye had strong muscles. The instructor will pretend to stir the imaginary soup up every time the students place a card in it.

• Then, instructor will call students with orange vegetable photos and the same routine will be repeated. When the instructor sees the carrots, then she/he will ask: which animal likes to eat lots of carrots. The students will say bunnies. The instructor will ask: What carrots are good for? The students will say for good vision. Then, the instructor will call students with yellow vegetables and so on until all colors have been called.

• Once all pictures are in the bowl, the instructor will explain that vegetables exist in many different colors and it is important to eat a colorful variety of them
because different colors have different vitamins and nutrients and it is important to eat all the nutrients. The instructor will explain that vegetables are good for a healthy heart, for strong muscles, for adequate growing and development, for good vision, healthy skin, etc. The instructor will tell students that they can be teachers as well. After this lecture, their mission is to teach their families and friends that eating 3 to 5 vegetables per day is great for their health.

- Finally, the instructor will show the lyrics of a veggie soup song (in the projector, using the laptop) and the instructor will sing the song with the students.
- The instructor will give a small cup of vegetable soup to each student.

**Summary Closure:**

The instructor and children will summarize important points of the lecture:

- Eat three to five servings of vegetables per day
- Eat a colorful variety of vegetables per day
- Half of My Plate is for fruits and vegetables. Follow My Plate at every meal
- Eat vegetables for snacks.
Session 4: Eat Real and Healthy

Opening Strategy (Anticipatory Set):

The instructor will show students two snack bags filled with different food items.

The snack bags will contain the following food models

- Snack # 1: 1 apple, cup of milk, carrots,
- Snack # 2: nachos, French fries, soda (real empty can of soda, if no food model)

Then, the instructor will ask students which one contains healthier items. In addition, the instructor will ask why they think the selected bag is healthier. The instructor will hear two to three responses. The instructor will explain that all food items in snack bag # 1 are whole foods (healthier options) and all food items in snack bag # 2 are processed foods (unhealthy options). Finally, the instructor will introduce the topic of lecture: Eating real and healthy.

Learning Activities:

- The instructor will explain that eating real and healthy means eating whole foods from plants and animals such as fruits, vegetables, low fat dairy products, lean protein, legumes, and whole grains. These foods contain lots of nutrients that are good for the heart and normal growth and development of children. While explaining, the instructor will show students the whole food cards.

- The instructor will explain that processed foods are unhealthy choices and should be avoided as much as possible. These foods should be consumed in moderation because they contain lots of sugar, fat, and salt. Processed foods lack nutrients
that are important for staying healthy and strong. While explaining, the instructor will show students some of the processed food cards (change little and change a lot). The change little cards are processed foods with less fat, sugar, and salt than the change a lot processed cards. The instructor will explain the meaning of the green bar (how healthy) and the red bar (how much processing) in the cards. The instructor will tell that the taller the green bar is, the healthier the food and the taller the red bar is, the unhealthier the food.

- Then instructor will randomly assign each card to students so they will be telling which card belongs to the whole foods (healthy options) and which one belongs to the processed foods (unhealthy options). First the instructor will call students that have whole food cards. The students will stand up one by one and show their card to the class. Finally, the instructor will call students with processed food cards and they will show it to the class. The instructor will ask students with processed food cards (change a little and change a lot) to come up to the front of the class (two students at a time). She/he will form pairs of students based on their processed food cards (one pair at a time). The pairs will be the following:
  - Canned corn and frosted corn breakfast cereal
  - Orange juice and orange soda
  - Fried chicken and chicken nuggets
  - White rice and rice cereal treat
  - Fruit flavored yogurt and American processed cheese
- The instructor will explain that the cards with the highest red bar are super processed foods and very unhealthy (corn breakfast cereal, orange soda, chicken
nuggets, rice cereal treat, and American processed cheese). The cards with lower red bar are processed foods as well but have less processing and therefore a little bit healthier than the other foods (canned corn, orange juice, fried chicken, white rice, and fruit flavored yogurt).

- Then the instructor will call out the students with the whole food cards and they will come out to the front of the class. The instructor will explain that these are healthy options and these foods contain lots of nutrients that are good for children’s healthy hearts (corn on the cob, fresh orange, baked chicken, brown rice, fat reduced milk, and other fruits and vegetables cards). The instructor will say these are the foods you should eat more.

- The instructor will emphasize that eating fruits and vegetables is better than eating processed foods such as hot dogs, French fries, sodas, chips, and candies.

- The instructor will make clear that processed foods must be consumed in moderation.

- Finally, the instructor will divide the students in five groups. Each group will receive food models (whole foods and processed foods) and one small paper bag.

- The instructor will explain the rules of the activity as follows:
  - Each group has to set up a healthy snack by putting two food models inside the paper bag.
  - After finishing the activity, the instructor will check the results.

- The instructor will distribute a healthy snack to students (three to four baby carrots per student).
Summary Closure:

At the end of the lecture, the instructor will facilitate a discussion with the students, providing a summary of relevant concepts such as:

- Fresh fruits and vegetables are always the best option for snacks and meals.
- Fruits and vegetables make you grow taller and stronger, they are good for your heart, you can run faster and you become smarter and happier.
- Choose more fruits and vegetables for snacks, breakfast, lunch, and dinner and eat processed foods in moderation.
**Parent Participation Class: MyPlate**

**Opening Strategy (Anticipatory Set):**

The instructor will introduce her/himself and then she/he will start with the opening strategy.

The instructor will show the two plastic tubes and the heart (model) to the class. The, the instructor will explain that one of the tubes is representing a normal artery/vein and the other one is representing a blocked artery/vein. While holding the heart with the normal artery/vein attached to it, the instructor will explain that the main function of the heart is to supply blood with adequate oxygen and nutrients to the rest of the body, so the organs can function properly. The instructor will hold up the heart and simulate that the block artery/vein is attached to the heart. The instructor will ask parents what they think will happen when the artery/vein is blocked and what foods they think will cause a blocked artery/vein. After few responses, the instructor will explain that consuming adequate amounts of fruits and vegetables won’t cause blocked arteries/veins. High consumption of foods rich in fat such as hot dogs, chips, French fries, hamburgers, donuts, cream cheese, etc cause blockage of arteries/vein resulting in heart attacks and strokes. The instructor will explain that the formation of plaques in the arteries start during childhood. Therefore, healthy eating habits should be prioritized early in life.

**Learning Activities:**

- The instructor will explain that the lecture is about My Plate and it will include the following topics; foods groups of My Plate, fruits and vegetables in half of
My Plate, benefits of fruits and vegetables for a healthy heart, serving sizes of fruits and vegetables, daily recommended amounts of fruits and vegetables, and tips for making healthy foods fun for kids.

- The instructor will hold up My Plate and she/he will explain the five different food groups that make up My Plate. Half of My Plate is for fruits and vegetables and the other half is for protein and grains. Milk and other dairy products is another food group of My Plate.

- By holding up My Plate, the instructor will point at the grain group and ask parents what are some foods that belong to the grain group. After 5 to 6 answers, the instructor will tell parents that at least half of grains should be whole grains. Then, instructor will ask participants to list some whole grain foods. Whole grains are: brown rice, oatmeal, bulgur, whole wheat bread, whole wheat pasta, etc.

- Holding up My Plate, the instructor will point at the protein group and ask parents what are some foods in the protein group. This group includes: meat, poultry, fish, nuts, beans and legumes, etc. Explain that is important to choose lean meat to prevent clogged arteries; thus reduce risk of heart attack and strokes.

- Another group in My Plate is milk and milk products. Instructor will ask parents what are some dairy products. Dairy products are: milk, yogurt, cheese. Instructor will emphasize that choosing low-fat and fat-free dairy products are recommended.

- The instructor will point out the fruit group and she/he will ask parents to name some fruits. Then, instructor will point out the vegetable group and she/he will ask parents to list some vegetables.
• After parents have mentioned some fruits and vegetables, the instructor will emphasize that it is important to eat a colorful variety of fruits and vegetables because each color represents different nutrients. She will continue explaining that is essential to consume a variety of nutrients on a daily basis. For example: oranges and strawberries are rich in vitamin C which is important for growth and repair of tissues and helps in wound healing, carrots and cantaloupes are rich in vitamin A which is essential for good vision, bananas, oranges, and prunes are rich in potassium which helps maintain normal blood pressure.

• Ask parents what are other benefits of eating fruits and vegetables. After 4 to 5 responses, the instructor will summarize some of the benefits by adding the following:

  - Fruits and vegetables are good sources of fiber. Fiber helps reduce blood cholesterol levels; thus, reducing risk of heart disease. Fiber helps reduce constipation and provide a feeling of fullness with fewer calories; thus, reduce weight gain.

  - Fruits and vegetables reduce the risk of heart attack, stroke, and type II diabetes and offer protection for certain types of cancers.

• Now, the instructor will explain the recommended daily amounts of fruits and vegetables for children between 6 to 8 years old and for adults:

  **Fruits**

  - Children: 1 to 1 ½ cup (2 to 3 servings)

  - Adults: 2 cups (4 servings) For females > 31 years old 1 ½ cup
Vegetables

- Children: 1 ½ cup
- Adults: 2 ½ cup females and 3 cups for males (19 to 50)
  2 cups female and 2 ½ cup males (51 and older)

- The instructor will explain what 1 serving of fruits and vegetables is: The instructor will show parents that a tennis ball is the size of a small fruit, the fist is 1 cup and she/he will show the serving sizes by using food models as well.
- 1 serving of fruits = 1 small fresh fruit, ½ cup of canned or fresh fruit or unsweetened fruit juice, and ¼ cup of dried fruit
- 1 serving of vegetables = 1 cup raw vegetables, ½ cup cooked vegetables or vegetable juice.

- Ask parents who is getting the recommended amount of fruits and vegetables on a daily basis (or their children). If someone in the class is having the right amount of fruits and vegetables, the instructor will ask the parent to share with the group how she/he is making that possible. The instructor will congratulate parents who are compliant with the recommendations and thank them for sharing it with the class.

- The instructor will tell parents that fruits can be: fresh, frozen, canned, juice. Fresh and frozen are the best choices because there is not processing. Fruit juices have sugar added so children should not drink more than 6 ounces of juice per day. It is recommended to choose 100% juice. Canned fruit is also processed with sugar added. It is better to consume fruits in their own juice and not in syrup.
• The instructor will explain that vegetables can be: fresh, frozen, and canned. Fresh and frozen are healthier options. Canned vegetables have added salt so it should be consumed in moderation. A good tip is to rinse canned vegetables before eating them.

• The instructor will form groups of two parents (at least 10 pairs). Each pair will receive the two handouts. Each group will be assigned a number from 1 to 10. Group one will discuss tip number 1 from both handouts; group two will discuss tip number two from both handouts and so on. The pairs will discuss one topic from both handouts, then after 5 to 7 minutes of group discussion they will share their thoughts with the entire class. The purpose of the group activity is for parents to provide ideas about being better role models for their children and making eating vegetables and fruits more fun for their children. After the activity, the instructor will give both handouts for parents to take home.

• The instructor will give parents snacks. She/he will fill out a plate for each parent with strawberries, broccoli or carrots, 3 to 4 whole wheat crackers, beans, salsa, and string cheese. Once all plates have been served, the instructor will tell parents to classify each food item in their plates. The instructor will tell that this is a healthy and balanced plate.

**Summary Closure:**

Summarize important topics of the lecture

• Follow My Plate in each meal. A complete meal includes: protein, grains, milk and dairy products, and half of My Plate for fruits and vegetables.

• Eat a colorful variety of fruits and vegetables every day
• Be role models for your children

• Make eating fruits and vegetables a fun activity for your children
APPENDIX Q

Food Pictures Session 1: What is on MyPlate
Food Pictures Fruit Group
Food Pictures Protein Group

Grain Group
APPENDIX R

MyPlate Coloring Sheet
Veggie Soup Song

Soup, soup
We made a soup
Delicious and nutritious
A veggie soup
We put some tomatoes,
Carrots and potatoes
We put some yummy spinach,
Broccoli, cauliflower
Zucchini and squash
Oh my goshhhhh. We need more flavor
Let’s put some onions, bell peppers
And sweet potatoes
So yummy, so colorful
Delicious and nutritious
A veggie soup
My HEART is so HAPPY
My MUSCLES are so STRONG
Eating veggies is good
For my CORAZON!!!
APPENDIX U

Whole Food Cards
Orange

How healthy

How much processing
APPENDIX V

Change a Little and Change a Lot Food Card

Canned Corn

Frosted Corn Breakfast Cereal
White Rice

How healthy

Rice Cereal Treat

How healthy

How much processing
APPENDIX W

Food Frequency Questionnaire

Questionario de Frencuencia de Alimentos # 1

Ponga un círculo en los alimentos que su hijo come. Marque con una X cuantas veces por semana su hijo come los alimentos que usted circuló.

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<thead>
<tr>
<th>Productos lácteos</th>
<th>1-2 veces/semana</th>
<th>3-4 veces/semana</th>
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<tr>
<td>Leche entera</td>
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<td>Leche baja en grasa</td>
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<td>Leche sin grasa</td>
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<td>Queso Regular</td>
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<td>Queso bajo en grasa</td>
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APPENDIX X

Modified Food Frequency Questionnaire

Questionario de Frequencia de Alimentos # 1

Ponga un **círculo** en los alimentos que su hijo come. Marque con una **X** cuantas veces por semana su hijo come los alimentos que usted circuló.

<table>
<thead>
<tr>
<th>Frutas</th>
<th>1-2 veces/semana</th>
<th>3-4 veces/semana</th>
<th>5-7 veces/semana</th>
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