

KNOWLEDGE AND ACCEPTANCE OF FRUITS AND
VEGETABLES BY PRESCHOOL CHILDREN

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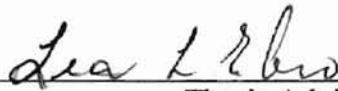
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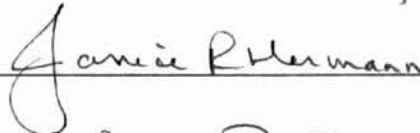
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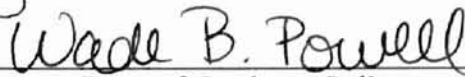
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CHAPTER I

INTRODUCTION

A major dietary problem in the U.S. is the lack of adequate fruit and vegetable consumption by the public and this problem may start with the children. Only one percent of the children between 2 and 19 years old met all the Food Guide Pyramid recommendations for grains, vegetables, fruits, meats, and dairy foods. Sixteen percent of children did not meet any of the recommendations, according to a study conducted by the National Cancer Institute (Munoz et al 1997). Incorporating sound dietary habits in children's lifestyles will hopefully avoid the necessary behavior changes in the adult diet.

Approximately 4 million young children in the U.S. eat at least one meal per day in child care facilities (Splett & Story 1991). This creates a window of opportunity for caregivers to influence a child's diet. According to the NHANES II survey, U.S. children's diets are relatively high in total fat (35% to 36%) and saturated fat (13%) (Branen & Fletcher 1994). The "threat of obesity is greater than ever for U.S. children and adolescents. All indications are that the current generation of children will grow in the most obese generation of adults in U.S. history. Despite the recognition of the severe health and psychosocial damage done by childhood obesity, it remains low in the public agenda of important issues facing policy makers. Perhaps this is because the most serious

health effects of obesity in today's children will not be seen for several decades" (Hill and Trowbridge, 1998, pg. 570). Action must be taken now to stop the epidemic of childhood obesity.

Major concern about childhood obesity is that obese children tend to become obese adults, facing increased risk for diabetes, cardiovascular disease (CVD) and many other chronic diseases. Pediatricians are already seeing hypertension, dyslipidemia and non-insulin dependent diabetes mellitus (NIDDM) in most obese children and adolescents. We must learn how eating and physical activity patterns develop throughout childhood and how these track into adulthood before we can develop effective obesity prevention strategies. In reaction to these findings, the American Academy of Pediatrics released dietary guidelines recommending that children older than 2 years of age consume no more than 30% of their energy from fat (Branen & Fletcher 1994). Likewise, to fully comprehend how recent dietary fat intake recommendations can be accomplished, children's food preferences and consumption pattern should be considered in addition to the overall consumption of the diets children are offered (Branen & Fletcher 1994).

The American Dietetic Association's (ADA) child nutrition objectives for the decade emphasize the importance for children and adolescence to establish a foundation for a healthful adult diet including exercise. In turn, this lifestyle could reduce the onset of obesity and decrease the development of chronic diseases (i.e., heart disease, hypertension, some cancers and osteoporosis) in later life (Birch & Fletcher 1995).

This healthy lifestyle can be achieved by using programs such as the "5-A-Day for Better Health", a National Cancer Institute (NCI) program. Nation-wide studies involving children of various ages are creating new nutrition education programs focusing

on the “5-A-Day” message. An excellent example of such a program is the “5-A-Day, Let’s Eat and Play”, developed by Judy Cooper, MS, Rd/LD and Penny Levy, MS, RD/LD, which will be tested in this research study.

Purpose and Objectives

The purpose of this study was to determine the effects of “5-A-Day Let’s Eat and Play” nutrition education program on the dietary habits of selected preschool children in Stillwater, OK.

Specific objectives were:

1. To increase the preschool children’s awareness regarding the abundant varieties of fruits and vegetables.
2. To increase the consumption of fruits and vegetables by preschool children after nutrition education and parental involvement.
3. To identify factors involved in children’s acceptance of fruits and vegetables through pre- and post-test evaluations.
4. To compare results of the Florida Health Department Study with the researcher’s study at Oklahoma State University.

Hypotheses

The following hypotheses guided the development of this research. They were:

H1_o: There will be no significant difference in the knowledge and acceptance scores between pre and post tests of fruits and vegetables after the completion of "5-A-Day Let's Eat and Play" Nutrition Education among children in both settings.

H2_o: There will be no significant difference in knowledge and acceptance scores between pre and post tests after the completion of the '5-A-Day let's Eat and Play' Nutrition Education among children within each school.

H3_o: There will be no significant difference in knowledge and acceptance scores between pre and post tests after the completion of the "5-A-Day Let's Eat and Play" Nutrition Education between children in a university daycare setting versus children in a private daycare setting.

Assumptions

The researcher assumed that students have been exposed to a number of fruits and vegetables available in homes, supermarkets or fruit farms. It was also assumed that children would tell the truth in the pre and posttests. Since the researcher worked at the Child Development Laboratory (CDL) before and during the research study, those children at the CDL may have been more familiar with fruits and vegetables than those at the private day care.

Limitations

The study is limited by only focusing on 4 to 5 year old children attending day classes in two day care facilities: OSU Child Care Development Laboratory (CDL) and private day care. Another limitation in this study is the convenience sample size of approximately 20 children at the CDL and 20 at the private day care.

Definitions

Knowledge gained: An increased vocabulary, exposure and education about fruits and vegetables, such as where each fruit and vegetable comes from i.e. the ground or a tree; which fruit or vegetable needs preparation before eating, and the variance in the traits of each fruit and vegetable.

Acceptance: Approval and consumption of the fruits and vegetables used in the study. Acceptance is measured by observation by the researcher and pre and posttests.

Quality Daycare: The National Association for the Education of Young Children (NAEYC) Accreditation Criteria require that high-quality early childhood programs contain the following principles. They should be developmentally appropriate, that is the learning materials and teaching styles are responsive to the age and individual differences of children and respectful of children's families and cultural backgrounds. These early childhood programs should be staffed with teachers and administrators who receive special preparation, sufficient compensation, and support to reflect on and improve their teaching practices. They should provide small group sizes and limit the number of

children to adults so educators get to know children's individual learning needs. These programs should establish close ties between families and the program and provide opportunities for meaningful parental involvement; and ensure that all of the children's needs are met by helping families gain access to needed health and social services (NAEYC 1996).

According to the Department of Health and Human Services, there are two types of Child Care Centers: One Star Center and Two Star Centers. Quality Criteria for the Centers is as follows:

One Star Center: Operates under a state license (permit, license, provisional license). The private day care used in the study is an example of a One Star Center.

Two Star Centers: 1. Compliance with licensing requirements. 2. Director's Qualifications. 3. Master teacher responsibility and qualifications. 4. Staff training. 5. Staff Compensation. 6. Learning Environment. 7. Parent Involvement. 8. Program Evaluation. The OSU Child Development Lab is an example of a Two Star Center.

U.S. Dietary Guidelines for Americans: These guidelines were developed by the USDA and USDHHS and provide dietary guidance and promote a healthy active lifestyle

Healthy People 2000: Administered by the Public Health Service, the nations goals for the year 2000 targeted at improving the health of the U.S. people over this decade.

NHANES: National Health and Nutrition Examination Survey (I, II, III, and HHNANES), source of periodic information on the dietary, nutrition and health status of the US population.

Food Guide Pyramid for children: Federal Nutrition Guidelines for children published by the American Dietetic Association based on the USDA Food Guide Pyramid. It is a graphical representation of what to eat each day based on five major food groups, allowing individuals over the age of two to choose a healthful diet that fits a particular lifestyle. (Appendix A)

Food acceptance patterns: Encompasses food preferences, food selection and consumption (Birch 1996).

Chapter II

REVIEW OF LITERATURE

Introduction

This chapter will be devoted to a review of the literature pertaining to children's food habits and preferences, their acceptance of new foods, childhood development and nutrition, daily fruit and vegetable recommendations, dietary guidance for healthy children and the 5-A-Day for Better Health Program. This study was undertaken to determine the knowledge and acceptance of fruit and vegetables of preschool children in a university day care setting versus a private day care setting.

Need for Healthy Diet in Children

Since two third's of the leading causes of deaths in US are related to eating habits (diabetes, heart disease, some cancers and hypertension), more research with children is needed to find preventative measures to reduce the instances of these diseases. Focusing more research on children will determine that if children practice healthier diet habits now, then these habits will follow them into adulthood. Developing a good attitude

towards healthier eating will reduce instances of obesity, which can be a risk factor for diabetes and heart disease. There is “explicit concern about young people’s diets and sedentary lifestyles” (Dixey, 1998, pg. 29).

“Children are becoming more sedentary and consuming diets thought to promote obesity (diets high in fat and low in fruits and vegetables). Birch and Fisher provided extensive evidence to suggest that children’s food preferences are shaped by early experience with food and eating and that family environment and prevention practices may effect dieting practices of children permanently.”(Hill & Trowbridge, 1998, pg. 274). According to Hill and Trowbridge, we need to improve techniques to treat and prevent obesity. Based on substantial evidence children and adolescents may be more receptive than adults to efforts directed toward obesity treatment and prevention. Treatment and prevention programs should be developed outside clinical setting in the school and community. Hill and Trowbridge place the development and evaluations of such programs at a high research priority (1998).

Nation-wide studies such as the National Health and Nutrition Examination Survey (NHANES) have confirmed the wide spread sedentary lifestyle of most U.S. children. The study illustrates a need for professionals associated with children to promote a healthier lifestyle. “Based on the outcome data of the NHANES III study it is recommended that nutritionists, health educators and pediatricians should continue to emphasize the importance of increased intake of grains, fruits and vegetables in diets of US children”(Subar et. al, 1998, pg.920).

Based on the outcome data of the NHANES II (1976-80) study, 45 percent of the population studied had no servings of fruit or juice and 22 percent had no servings of a vegetable on the 24 hour recall day. Further data revealed only 27 percent consumed the three or more servings of vegetables; 29 percent had the two or more servings of fruit and 9 percent had both. The U.S. Department of Agriculture and U.S. Department of Health and Human Services recommend the number of servings. Consumption of the fruits and vegetables was found to be lower in Blacks than Whites according to the NHANES II study. Patterson et al. (1990) also noted that although this study revealed the lack of variety in the choices of vegetables and overall low consumption of fruits and vegetables 10 years ago, recent surveys have shown similar results. Patterson et al. mark the discrepancy between the Dietary Guidelines and the U.S. diet to suggest a need for extensive public education (1990).

The researcher's study takes on the challenge to change the health profile of Americas as requested in Healthy People 2000. These objectives "aim to increase the span of life and reduce the disparities in health status experienced by different groups of Americans through the prevention of disease and disability" (Mason & McGinnis, 1990, pg. 441).

The researcher's study focuses on 5-A-Day For Better Health Program as an answer to disease prevention and health promotion as requested by Healthy People 2000. This study is congruent with the Health Promotion Objective concerning nutrition, which is to improve nutrition. "The objectives target changes in food consumption to mirror dietary recommendations. Supporting objectives target improved access to nutritious choices in schools, restaurants, and other food services, as well as increased availability

of low-fat food products and better labeling of nutritional content” (Mason & McGinnis, 1990, pg. 444).

It is necessary to do further research and expose more Americans to health promotion activities since the weight objectives are moving away from the targets set by Healthy People 2000. An example of this is “diabetes- related deaths for black Americans has increased from 65 to 71 age-adjusted per 100,000, instead of moving toward the target of 58” (Berg, 1994, pg. 7).

According to Kantor, children need to have a healthy diet due to the diet related chronic diseases- including chronic heart disease, cancer, stroke, and diabetes which account for nearly two-thirds of all deaths in the US each year. This costs society an estimated \$250 billion annually in medical care and lost productivity. To decrease the risk for these diseases, individuals must adapt to healthier diets, abundant in grains, vegetables and fruits, low in total fat, and cholesterol, combined with a physically active lifestyle. Kantor emphasizes that most Americans are not meeting recommended servings for most of the Food Guide Pyramid’s five major food groups, especially fiber-rich fruits and vegetables, while consuming excess calories from fats, oils and sweets (1996).

It is essential for children to consume a variety of fruits and vegetables five times a day. Kantor comments that the high consumption of a small number of vegetables and low consumption of deep yellow and dark green and dark-green leafy vegetables suggest that some people need to increase the quantity and change the composition of the vegetables that they consume (1996).

As recorded by Kantor, Americans eat one and a half servings of fruit a day and 3.2 servings of vegetables per day. More variety will help consumers increase their total

fruit intake and consumption of fiber, vitamins and minerals, and other nutrients found in abundance in this group. Kantor found that only six foods accounted for half of all fruit servings. The missing element is variety in the consumption of fruits and vegetables. (Kantor 1996).

Child Development and Nutrition

To identify children's ability to comprehend the nutrition education material, its concepts and the children's reactions to the material used for this research study, it is important to identify which stage of development the children are in. This study focuses on children in the Preoperational stage (2-6 yr.). According to Piaget, an expert in the field of child development, children at this age possess " 'symbolic reasoning' which means children engage in increasingly complex forms of symbolic reasoning as they develop from childhood to adolescence. In the preoperational stage, preschoolers reason with preoperations (or preconcepts). During this stage children can organize mental images of events and objects both present and absent into primitive concepts that they can use to solve simple problems. Preoperational stage is a time when stable concepts are formed, mental reasoning emerges, egocentrism is stronger in the beginning and then weakens, and magical beliefs are constructed" (Santrock & Yussen, 1998, pg. 172).

A limitation at this stage is a tendency to focus on isolated parts of an event rather than seeing the whole picture (called centration). "Another limitation of preoperational thought is its irreversibility. Preschool children can think their way into a problem but are unable to reverse their thought process" (Krantz, 1994, pg. 32-33)

“In the preoperational stage the child begins to represent the world with words, images, and drawings; symbolic thought goes beyond simple connections of sensory information and physical action. Preoperational stage is a time when stable concepts are formed, mental reasoning emerges, egocentrism is stronger in the beginning and then weakens, and magical beliefs are constructed” (Santrock & Yussen, 1998, pg. 167).

According to Rolfs and DeBruyne extensive research with children indicates that if allowed to govern their own development, they often do better than when pushed. For example, when they are urged to try new foods, even by way of rewards, they are less likely to try those foods again than children who are left to decide for themselves (1990).

Researchers attempting to explain children’s food preferences are met with contradictions. Though children describe liking colorful foods, and vegetables are often rejected, their favorites are the brown peanut butter and white potatoes, apple wedges, and breads. Rolfs & DeBruyne suggest that raw vegetables are better accepted than cooked ones, so it is recommended to offer vegetables that are raw or slightly undercooked and crunchy, bright in color, served separately, and easy to eat. Also a child’s mouth is much more sensitive than an adult’s, so vegetables should be served warm, not hot. Children prefer foods familiar to them. When introducing new foods the number of exposures to the food is essential to the acceptance of them (1990).

Children’s Food Habits

Encompassing the development of children is their exposure to food- how they are exposed and what they are exposed to. Birch, a leader in the research of children and

food behaviors, emphasizes that the “infant’s successful transition from reliance on a single food to consuming a varied diet is essential to adequate growth and health” (1991, pg. 265). As children enter school age, eating involves interaction of social, cultural and environmental factors with physiological cues. Early learning experiences with food and eating play a central role in the development of food-acceptance patterns. Young children are introduced to the diet of their culture and acquire food preferences and aversions. They learn rules of eating, such as when to eat, and even how much to eat. “Learning and especially associative conditioning to the social contexts and the physiological consequences of eating, makes major contributions to the formation of food-acceptance patterns during early childhood” (Birch, 1991, pg. 265).

Factors involved in how children are exposed to food and what food items they are exposed to include their neophobia to new foods, comfort to familiar foods, caregivers influence (parents, child care and school) and socioeconomic status. The past two decades, however, have reflected a drastic change in the eating patterns across the life span of Americans. Focusing on the young children, data reveals that snacking between meals accounts for a greater proportion of children’s nutrient consumption. Taste was reported by 80% of children as the most influential factor in their snack choice. These choices were often noted as salty/crunchy foods and ice cream. The second change seen in eating patterns concerns location-more eating occasions occur away from home now than a generation ago. Research found that of surveyed families with children, 90% had eaten away from home during previous week and 50% had eaten away from home the previous day. Nearly half of family food expenditures were for food and drinks consumed outside the home with 1/3 of total food dollars spent on fast food. Even when

families do sit down together for a meal at home, they are often eating “carry-out” or other convenience food prepared elsewhere. Parents and caregivers are not the only ones to have an influence on children’s food habits. Peers and advertising messages can have a significant impact on children food consumption. Unfortunately, over half of food advertising on children’s television is for foods high in fat, oil, and sugar. With new technology and easy access to convenience foods including microwavable entrees, more children are starting to make their own decisions about food choices at an earlier age (Schwenk 1997).

Schwenk comments that children’s behaviors or attitudes toward food are not always influenced by their knowledge of the relationship between diet and health. Studies report that children consume only about half the daily recommended number of fruit and vegetable servings. The food guide pyramid recommends 3 to 5 servings from the vegetable group and 2 to 4 servings from the fruit group. According to CSFII (Continuing Survey of Food Intakes by Individuals) 19 to 24 % of children ages 1 to 5 consumed no vegetables on the day of the survey. Even though the children reported a higher preference for fruits in the survey, between 32 and 56% of 3-19 year-olds consumed no fruit on the day of the survey (Schwenk 1997).

Schwenk fears many children lack a sense of urgency about healthful eating and do not put into action what they know about nutrition. Many nutritionists are concerned about children’s snacking behavior and the nutrient composition of those snacks. Low-fat and low-salt snacks should be encouraged, along with eating more fruits and vegetables for snacks. Children’s eating habits are mainly influenced by their family; by institutions and programs, by the media, and by their peers. Schwenk recommends that healthy

eating among our youth may be best achieved by promoting consistent nutrition messages from all sources that affect their eating behavior (1997).

In a study conducted by Birch, Zimmermann and Hind, children's preferences for a set of snack foods were first assessed and then a neutral food, neither highly preferred nor non-preferred, was selected for each child. This snack food was then presented to the child in one of four situations: (1) as a reward; (2) non-contingently, paired with adult attention; (3) in a nonsocial context; (4) at snack time (1980). "Results indicated that presenting foods as rewards or presenting them non-contingently paired with adult attention produced significant increases in preference, and the effects persisted for at least 6 weeks following termination of the presentations. Results suggested that the manner in which foods are presented is extremely important in the formation of young child's food preferences" (Birch, Zimmermann & Hind, 1980, pg. 856).

The results of the Birch, Zimmermann and Hind study demonstrated that the means in which foods are presented influences the formation of food preferences and provide further evidence for the effects of learning and experience on the formation of food preferences. The effects on preference were not temporary and were still apparent in the post-assessment preference data obtained 6 weeks after the conclusion of the reward and non-contingent presentations. These presentations greatly impacted their preference, and the results suggest that children's preferences for sweet foods are being enhanced (Birch, Zimmermann & Hind 1980).

Humans have the ability to adapt and consume whatever edible substances happen to be available in their environment. "This adaptability implies that learning and experience must play central roles in shaping our food acceptance patterns" (Birch, 1996,

pg, 234). Most of a child's learning involves the formation of relationships among foods, the circumstances and consequences of eating. Recent findings indicate that some commonly used child-feeding practices can have unintended and untoward effects on children's food acceptance patterns. In addition, the development of relationships among foods and the post-ingestion signals of hunger, satiety, and nausea can also shape children's food acceptance patterns. According to Birch this knowledge of ways in which children's early learning and experience shape food acceptance can provide foundation for developing approaches to child feeding that can foster healthy food acceptance patterns. Such knowledge could also reduce caregivers' anxieties about child feeding (Birch 1996).

With experience and research, Birch found that when adults do not intervene, young children eat what they like and leave the rest. In making their food choices, children are not knowledgeable about energy content and nutrient value of foods, and express their food likes and dislikes (Birch 1996).

During the first years of life, children prefer sweet tastes and reject sour and bitter ones. "Children's food acceptance patterns result from their experience with complex multidimensional food stimuli, and even the responses to basic tastes change with experience" (Birch, 1996, pg. 235).

In some of Birch's initial research on children's food preferences, she investigated the question of "whether some dimensions of foods are particularly important to children in determining their likes and dislikes" (Birch, 1996, pg. 235). The initial research revealed that sweetness was a main ingredient in the children's preferences for foods. A second dimension, familiarity, was also very important in determining children's food

preferences. “This was a critical finding because a food’s familiarity is not a characteristic of the food, but results from the child’s experiences with that particular food. In general, Birch had found that other things being equal, children tend to prefer foods that are familiar to those that are unfamiliar” (Birch, 1996, pg. 236).

Children form relationships between food and social circumstances by eating and by associative learning. Social circumstances of feeding that are sensed by the child as positive enhance their preferences, and negative circumstances reduce the child’s preferences. “Because children form these associations between foods and feeding circumstances, child-feeding practices contribute to the formation of food acceptance patterns, often in unintended ways that can be inconsistent with good nutrition. Foods tend to be repeatedly presented in the same social circumstances. For instance, foods presented in positive social circumstances tend to be palatable foods, high in fat, sugar, and salt. While parents are present to impose them, coercive feeding practices may increase children’s intake of nutritious foods, and decrease intake of highly palatable foods high in sugar, fat and salt. They can also have negative, long term effects on children’s food acceptance patterns by enhancing preferences for foods high in fat, sugar and salt and building a dislike for nutritious foods” (Birch, 1996, pg. 236-237).

“Parents’ own eating and dietary history, and their child feeding practices provide important components of the environmental context of children’s eating, and profoundly shape children’s food acceptance patterns, including their children’s and their ability to regulate energy intake. Individual differences in these food acceptance patterns, in turn, have been linked to individual differences in children’s obesity. Information regarding the important components of the feeding context, and ways in which children’s

experience in the feeding context shapes their food acceptance patterns suggests possible areas for preventive intervention which could be targeted to prevent the development of food acceptance patterns associated with childhood obesity” (Birch, 1996, pg. 240).

A study conducted by Anliker et al. involved questionnaires developed to assess nutrition-related knowledge and attitudes of preschool children and the types of messages that their parents gave to them about nutrition. The children were between 3½ to 3¾ years of age. The children displayed significant levels of nutrition knowledge in the areas of food groups, food transformations, food origins, and energy balance. They revealed limited ability to judge relative food values: more children selected foods of higher, rather than lower, nutrient density in a role-play situation, as being the foods which would help a doll ‘grow big and strong’” (1990). According to Anliker et al., “the quantity and specificity of nutrition-related messages given by parents and about foods were significantly and positively correlated to the children’s nutrition knowledge scores” (1990, pg. 24). This study documents a significant level of nutrition awareness among young children, and highlights the importance of early parent-child communication patterns in the development of this nutrition awareness. This study illustrated that preschool children begin to learn about nutrition through these parental messages. Anliker et al. emphasized that parents and caretakers of young children should “recognize the potential importance of these early interaction patterns” (1990, pg. 24).

In focusing on the relationship between the developmental and nutritional needs of the preschooler, Sigman and Grant note “caregivers who recognize the emotional maturity of the preschooler will be better equipped to expand preschoolers’ eating experiences” (1992, pg. 14). Caregivers should be guided to view the preschooler’s

eating habits as separate from the erratic patterns noted during the toddler years. “This distinction is critical in achieving the nutritional and developmental goals of the preschool years-learning about, and living in, the world” (Sigman-Grant, 1992, pg. 14).

Preference and/or Acceptance of New Foods- Neophobia

Children must learn to accept some of the new foods offered to them if they are to successfully make the transition from milk diet of infancy to a modified adult diet. Birch and McPhee note that this poses a dilemma: although humans need variety, new foods are not readily accepted. The human’s dilemma is in the formation of food acceptance patterns of the young child, for whom all foods are new and initially unfamiliar. The reluctance to consume new foods has been termed “neophobia.” Research data concerning factors that affect the neophobic response has provided a better understanding as to how this initial rejection can be changed via experience. Birch’s findings indicate that many of the foods children initially reject will ultimately be accepted if the child has ample opportunity to sample the food under favorable conditions (Birch 1996).

Children’s acceptance of new foods has been extensively researched and Birch has found through a series of studies that children are neophobic by age two. Repeated exposure to novel foods (Birch & Marlin, 1982) reduced the neophobia in 2-5 yr. olds and enhanced preference to the exposed foods. Other studies concerning this neophobia in children have determined the social environment children are in have a significant impact on their acceptance of foods (Birch, Zimmerman, & Hind, 1980).

Neophobia can also occur when consumption of a new food is followed by negative gastrointestinal consequences such as nausea or emesis, a conditioned aversion may result, and the food will be rejected. Viewed from this perspective, “children’s initial rejection of new foods can be seen to serve an adaptive function. Rather than reflecting a lack of cooperation or negativism, the child’s rejection of new foods can be viewed as a normal, even an adaptive response” (Birch, 1996, pg. 236).

The effects of repeated exposure can be particularly important in establishing food acceptance patterns in young children, who are just being introduced to the dietary patterns of their culture. There is evidence that children’s food acceptance patterns are altered by associative conditioning to the social contexts in which eating occurs (Birch & McPhee 1989).

In research designed to investigate ways to reduce this neophobia, Birch and other researchers offered samples of new foods to young children repeatedly, and they were encouraged to take a small taste of the food. The changes in food acceptance that resulted from repeatedly tasting the foods were compared to changes obtained when children did not taste but only looked at and smelled the food. Repeated opportunities to taste the food enhanced acceptance; looking and smelling did not lead to greater acceptance. The changes in the children’s food acceptance that result from tasting occur relatively slowly, and may require 8 to 10 exposures before clear changes in acceptance are achieved (Birch 1996). Baxter concurs with Birch, McPhee, Zimmermann and Hind that preschool children’s food preferences and acceptance patterns are largely influenced by repeated exposure to food, and by the social context in which it is offered. (1998)

Another aid in conquering neophobia is timing. Duyff, et al. suggests offering new foods when children are not tired, excited, or already full from lunch or snacks. In a child care facility, a good time for tasting and learning about new foods is snack time or before lunch- when children are hungry. "Trying a new food when hungry leaves a pleasant sensation, which translates to the next experience with that food" (Duyff, et al., 1995, pg. 35).

The responsibility of this exposure to new food items lies with parents and caregivers. Baxter comments that children learn about what to eat and why to eat, and they receive reinforcements and incentives for eating from their families and the environment. Most of this learning occurs during children's routine meal-time experiences, in the absence of formal teaching (Baxter 1998).

This environment in which foods are eaten is critical because research indicates that preschooler's food preferences for both sweet and non-sweet snack foods significantly increase when foods are presented as rewards, or noncontingently paired with positive adult interaction. "This suggests that positive social contexts could be used to increase preferences for foods not initially liked" (Baxter, 1998, pg. 64).

"Research with preschool children indicates that the instrumental ("if") use of foods reduces preferences for foods eaten to obtain other rewards. The associative learning that contributes to food-acceptance patterns is inconsistent with good nutrition because foods which children are coerced into eating usually include nutritious foods such as vegetables ("If you eat your vegetables, then you can have some dessert"). Foods presented as rewards, however, tend to be palatable foods high in sugar, such as candy" (Baxter, 1998, pg. 64).

“Such research provides a foundation for intervention strategies. Adults need information on the importance of learning and experience in the development of children’s food preferences. Adults need to repeatedly expose children to nutritious foods, provide them opportunities to learn to like rather than dislike nutritious foods. Adults need to learn about development of food habits that support growth, development, and positive attitudes toward healthful food” (Baxter, 1998, pg. 65).

Since preschool children’s food preferences are influenced by repeated exposure to food and the social context in which food is offered, similar instances may be occurring in elementary schools. School staff probably does not realize that they may be teaching children to prefer candy to vegetables. Perhaps elementary school staff use candy because they perceive it to be economical and desirable to children. Other economical options for rewards, however, are also desirable: stickers may be used with young children, and some sort of token economy with older ones. Elementary staff must be educated on behaviors they could use to teach children to prefer nutritious foods (Baxter 1998).

Many times children don’t have repeated opportunities to eat new foods because caregivers mistakenly interpret the child’s initial rejection of a new food as reflecting a fixed and persistent dislike for the food. Due to this interpretation, the food is not offered again. As a result, the child does not learn to accept new foods and may be labeled as “finicky” or as a “picky eater.” In turn, caregiver may become frustrated and anxious about feeding the child, possibly resorting to coercive feeding techniques. Birch notes that these techniques can have negative effects on food acceptance, including food selection and the child’s ability to regulate energy intake (1996).

Caregivers should be encouraged to be persistent and to continue to offer new foods that are initially rejected by children. Birch recommends the following guidelines to introduce new foods with effective results. “A schedule should include a couple of opportunities per week to sample the food. The child should not be coerced, but should have the chance to taste the food in a relaxed setting. Parents should set a clear expectation that children try new foods. This policy works most successfully if imposed when children are first introduced to new foods, during late infancy, before the toddler period. By the time children reach the “terrible twos,” eating can easily become a focal point for parent-child power struggles. Having a well-established routine for tasting new foods can minimize negative interactions that can develop around feeding” (Birch, 1996, pg. 236).

Other individuals are often present at meals and snacks, where their eating behaviors and reactions to foods can serve as models for young children. Children learn the basic rules of cuisine very early, such as knowing that desserts come at the end of a meal regardless of our satiety. “This sequencing of courses fosters the use of sweet foods as effective rewards for finishing the previous course (‘finish your vegetables and you can have dessert’)” (Birch, 1996, pg. 236).

Sigman-Grant comments on an article from Satter: “caregivers appear to be more concerned with the amount of food consumed rather than the type of food feed or even the feeding environment. Satter recommends allowing children to determine how much, and even whether, they eat. She also stresses that caregivers are responsible for selecting and buying food, setting timing of meals and snacks, making meals, presenting foods in appropriate forms, maintaining standards of behavior at the table and making mealtimes

pleasant (Sigman-Grant 1992). Based on monumental studies such as Davis (1928) which ascertained that young children choose a variety of foods in enough quantities to promote growth and health when they are presented with food choices. The study by Klesges et al. (1991) suggests that if given choices between non-nutritious and nutritious foods, preschoolers are not inclined to choose nutritious foods on their own. Birch and Deysher (1985) demonstrated the ability of young children to show caloric compensation in response to changes in caloric density and food cues. This study showed that when children, ages 3 to 5, were given a high-calorie pudding before being offered other snack foods, they responded by consuming less of the snack than when given a low-calorie pudding. Another study conducted by Birch et al. (1991) measured food intake of 15 preschool children on 6 different days. In this study, children were presented with two different menus at planned feeding times. Menus contained nutritious and familiar foods. Children were free to consume whatever they wished at a particular meal or snack. In most instances, high energy consumption at one meal were followed by low energy consumption at subsequent meals and vice versa. The critical issue is for the caregiver to provide adequate amounts of healthful food choices and then step aside allowing the children to self select without coercion or interference (Sigman-Grant 1992).

Health experts and nutrition educators agree, it is the adult caregiver who presents more feeding challenges than the preschoolers for whom they care. Adults receive a variety of messages regarding their role in feeding situation. They are told they should foster a nurturing environment, make certain their child gets adequate amounts of nutritious food for proper growth and development. Often adults receive conflicting information. Bombarded with expectations, parents and caregivers can become confused

and unsure. “Limited nutrition knowledge and food preparation skills may negatively affect caregivers’ abilities to feed preschoolers appropriately” (Sigman-Grant, 1992, pg. 16).

Sigman-Grant stresses that it is the responsibility of health professionals and nutrition educators to help caregivers recognize the biological, physical and social environments associated with feeding preschoolers and to assist caregivers in developing personal feeding and food selection strategies with-out unwarranted feelings of guilt. Caregivers should be encouraged to follow the traditional adage of balance, variety and moderation. Adults and children can eat moderate amounts of all foods. Acceptance of new foods, new textures and new tastes takes time and patience. Caregivers should be encouraged to maintain their responsibility to provide preschoolers with adequate amounts of a variety of nutritious foods and to allow the children the freedom to select the amounts needed from these foods (Sigman-Grant 1992).

Dietary Guidance for Healthy Children

The Dietary Guidelines for Americans recommend increasing vegetables and fruit consumption and moderating sugar consumption, yet, most American adults and children consume too few. Intensive school board interventions in elementary schools to increase vegetable and fruit consumption resulted in small increases, mostly fruits. Baxter questions the role of behavior and learning in liking and eating vegetables and sugar – specifically candy (Baxter 1998).

The American Dietetics Association (ADA) states that nutrition is key to optimal growth and development for children. The ADA recommends that the first priority of a dietary guidance for children should be to “emphasize the attainment of adequate growth and development. A second priority is to focus on the role of diet and disease prevention, which is critical to creating a healthier America” (ADA, 1995, pg. 370).

The ADA in 1999 has taken a position on the Dietary guidance for healthy children aged 2 to 11 years. “It is the position of the American Dietetics Association (ADA) that children aged 2 to 11 years should achieve healthful eating habits and participate in regular physical activity to promote optimal physical and cognitive development, attain a healthful weight, and reduce the risk of chronic disease” (ADA, 1999, pg. 93).

Through extensive research conducted with U.S. children, the ADA reports findings of certain dietary trends and specific current food and nutrient intake of these children. These studies report that although children are consuming more fruit and fruit juices and less total fat, they are also consuming more carbonated beverages, protein and carbohydrates. These latter three mentioned may be responsible for the increased rate of obesity among children between 2 and 11 years of age. The ADA comments that although the diets of children are healthier today, “approximately 70% of US children still exceed the current dietary recommendations for total and saturated fats” (ADA, 1999, pg. 94). “Although vegetables, soups, fruit and fruit juices contribute close to 40% of the total dietary fiber of 10-year-olds, their intake has remained the same for over 20 years- 11.2 g (3 to 5 year olds) and 14.0 g (6 to 11 year olds)” (ADA, 1999, pg. 94).

Clearly children are not consuming the recommended amounts of fruits and vegetables. ADA reports other studies have found that “Ninety-one percent of children aged 6 to 11 years are not consuming the recommended minimum of 5 servings of fruits and vegetables a day. They are averaging 2.5 servings daily. Similarly, in a study of 4-year-old Latino children, the mean number of servings of fruits and vegetables consumed per day was 2.8” (ADA, 1999, pg. 94).

The American Dietetics Association (ADA) comments that US children are not adhering to the recommendations of the Food Guide Pyramid. Data reflects that the percentage of children who do not meet these recommendations range from 64%-70% for fruits, vegetables, grains, meats, and dairy. “The number of servings from the vegetable and meat groups increased in 2 to 19 year olds, whereas those from the fruit group decreased. These data emphasized the need for a total diet approach that encourages the consumption of fruits, vegetables and grains with an emphasis on lower-fat options” (ADA 1999).

The dietary recommendations first developed in the late 80's for children older than two years old include the following guidelines: reduce fat and saturated fat, increase intake of dietary fiber, increase fruit and vegetable consumption to 5 or more per day and increase consumption of calcium rich foods. The American Academy of Pediatrics Committee on Nutrition recommends our children two and older gradually adopt a diet less than 10% saturated fat from total calories; total fat over three or more days should be between 30-20% of total calories, and cholesterol should not exceed 300 mg per day (ADA 1999).

It is recommended for children to increase their fiber intake to an equal amount or greater than their age plus 5 g per day and to attain intakes of 25 to 35 g per day after 20 years of age. In order to meet children's calcium needs it is recommended that children two years and older consume 3 servings of milk or dairy products per day (ADA 1999).

The ADA stresses that the environment and personal factors have important influences on dietary behavior. Taste preferences, cultural norms, and food availability influence dietary behavior when it comes to making food choices. Parents have a major impact on their children's eating patterns. Children's preferences for high-fat foods, total fat intakes, and time spent in sedentary activities have been positively associated with parental obesity (ADA 1999). Though children determine their food preferences by what they like and do not like, they can be swayed to try new foods by repeated exposure to them. Numerous studies have confirmed that children will develop a clear increase in preferences for a food after 8-10 exposures. Parents and caregivers can then provide opportunities for children to learn to like a variety of nutritious foods by simply exposing them to these foods (ADA 1999).

Sigman-Grant comments that while children are meeting/exceeding two thirds the Recommended Dietary Allowances for micronutrient and energy, the concern is the caloric distribution and type of fat ingested. In the struggle to decrease children's fat intake to 30% percent, 'lost' calories must be made up. A significant increase in fruit and vegetable consumption along with grains, therefore, is essential for children to consume enough calories and nutrients for proper growth and development (1992).

Extensive research has proven our consumption of adequate intake of fruit and vegetable to be essential to a healthy diet. Fruit and vegetables are packed with essential nutrients- vitamins and minerals proven to thwart off certain cancers and decrease the rate of cardiovascular disease. While some nutrients may be taken in pill form, research has found that the digesting of the whole fruit or vegetable is more effective than taking the pill form containing certain nutrients.

Extrapolating the recommendations from the Food Guide Pyramid, the National Cancer Institute (NCI) has started a nation-wide campaign labeled 5-A-Day for Better Health Program, which promotes the daily consumption of 5 fruits and vegetables. Their research has found only one percent of children between 2 and 19 years old met all FGP recommendations for grains, vegetables, fruits, meats, and dairy foods. The 5-A-Day is part of a larger campaign supported by the NCI to promote healthy eating.

Almost 70% of all cancer are diet related. On a scientific level, results from 206 human epidemiologic studies and 22 animal studies found the effect of increased fruit and vegetable consumption consistently protects against cancers of the stomach, esophagus, lung, oral cavity and pharynx, endometrium, pancreas, and colon. Vegetables and fruit that frequently appear to be protective against cancer are raw vegetables, allium vegetables, carrots, green vegetables, cruciferous vegetables, and tomatoes. There are specific substances and mechanisms in vegetables and fruit that help protect against cancer, which include beta-carotene, folic acid, vitamin C and E, selenium and numerous others. The authors comment that the scientific evidence concerning a purpose for vegetable and fruit consumption in the diet is generally consistent and supportive of current dietary recommendations (Steinmetz & Potter 1996).

The Five A Day for Better Health Program

The National Cancer Institute began a nationwide campaign in 1991 to achieve the Healthy People 2000 Objective to increase fruit and vegetable consumption. The program is 5-A-Day For Better Health and this campaign also entails nine nation-wide NCI funded research studies initiated in 1993. These community-based projects include the Special Supplement Food Program for Women, Infants and Children (WIC Programs), churches, work-sites and schools. One of these studies based in Maryland at a WIC site used focus group discussions and central location intercept interviews to answer questions concerning food shopping, preparation and eating habits; preconceptions about fruit and vegetables and barriers to fruit and vegetable consumption. Results indicated that these women in WIC did not cook often, though they were responsible for the shopping and food preparation. The participants reported positive preconceptions for fruits and vegetables but noted barriers to increasing their intake of these food items. The data revealed ways in which nutrition intervention could address the specific barriers identified by the women (Treiman et al. 1996).

Outcome data from another NCI 5-A-Day study involved intervention of fresh nutrition concepts to high school students. The interventions comprised of a media campaign, classroom workshops, school meal modification, and parental support. Usual daily servings of fruit/vegetables increased 14% in the intervention group compared to the control group the first three years. Data revealed after a follow-up with the students that the intake of fruits and vegetables increased within the control group, resulting in no significant difference between groups. Within the intervention groups, however, the

knowledge scores and awareness indicators were significantly higher than those of the control group.

This 'Gimme-5' study "provided a first model to show that dietary habits of high school students can be influenced by positive media messages relative to that age group, increased exposure to a variety of tasty products, and minimal classroom activity"(Nicklas, 1998, pg. 248).

A third National Cancer Institute study promoting 5-A-Day for Better Health labeled 5-A-Day Power Plus focused on changing the fruit and vegetable consumption of fourth and fifth graders. These students in St Paul, Minnesota schools were subjected to a multicomponent intervention. This approach included parent telephone surveys, school food service changes and classroom participation among other components. Results revealed that the intervention increased fruit and vegetable consumption during lunchtime. The female students increased their vegetable intake. The children's daily fruit consumption and proportion of daily calories from fruit and vegetable intake also increased (Perry 1998 et al.).

The Five-A-Day, Let's Eat and Play program used for this thesis was field tested at two different pre-school sites in Palm Beach County Florida before being used in Oklahoma. Individual pre and post evaluations with 65 students showed that upon completion of the program their recognition of fruits and vegetables rose an average of 50%. The participants were more likely to name a fruit or vegetable as a food that was good for you. These students easily grasped the concepts of *five servings a day* and *fruits and vegetables are good for you because they make you strong and healthy*. Parents reported that nearly 90% of children ate more fruits and 62% ate more vegetables after

attending the program. The critical learning experience occurred when the child was able to hold, smell, prepare, and taste the fruit or vegetable. Judy Cooper and Penny Levy, the creators of the program, commented on the observation of the children's senses awakening when a fresh pineapple was sliced open illustrating that learning can take place in a simple yet effective manner.

CHAPTER III

METHOD

The curriculum designed for this research, “5-A-Day Let’s Eat and Play” was developed specifically for preschool aged children. The Oklahoma State University’s Child Development Laboratory (CDL) of Family Relations and Child Development was readily accessible and willing to participate in the study with parental permission. Also the public day care facility of Stillwater, OK agreed to participate in the research under the same parental conditions.

The curriculum used in this study was labeled “Five-A-Day, Let’s Eat and Play” and was obtained from the Florida Department of Health. Judy Cooper, MS,RD/LD and Penny Levy, MPH, CDE, RD/LD created these nutrition education materials. The program was still in the development stages when the OSU study was conducted. Judy Cooper conducted a pilot test in Florida to further enhance the project and to discover which aspects of the program need to be modified. The OSU study when completed should provide pertinent data for reliability to further advance the program. The nutrition education program used in this research study included three parts: the 10 lesson plans, the parent handouts and the pre and post test questionnaire. The researcher adapted the 10 lesson plans accordingly. (Appendix B) The parents received handouts which

coincided with the lessons. (Appendix C) A pre and post test questionnaire was used with the children to evaluate the effectiveness of the curriculum. (Appendix D) The questionnaire was given before the lessons started and after all the lessons were completed. The correct answers are provided in Table 1. Each question was worth one point. Question 5, however, had three parts: 5 (know), 5 (eat), 5 (like) and each part was worth 12 points. In question 1 and 2 the researcher only counted a “fruit”, “vegetable” or name of a fruit or vegetable as the correct answer in this study.

TABLE 1
 QUESTIONS AND CORRECT ANSWERS TO PRE AND POST TEST
 QUESTIONNAIRE

Questions	Correct Answers
1. What is good to eat and makes you healthy and strong?	“Fruit”, “Vegetable” or name of a fruit or vegetable
2. What is your favorite snack?	“Fruit”, “Vegetable” or name of a fruit or vegetable
3. What is your favorite vegetable?	Name of a vegetable
4. What is your favorite fruit?	Name of a fruit
5 (know). What is this (photograph of fruit or vegetable shown)?	Proper name of each fruit and vegetable shown to the child
5 (eat). Have you eaten this (photograph of fruit or vegetable identified in 5 (know))?	“Yes”
5 (like). Do you like this (photograph of fruit or vegetable identified in 5 (know))?	“Yes”
6. How many fruits and vegetables should you eat every day?	“5”
7. Why should everyone eat lots of fruits and vegetables?	“To make you healthy and strong” or “Because they make you healthy and strong”

Research Design

The pre-experimental design was chosen for this research. The experiment was a modified two groups, pretest-post-test design

$$\begin{array}{c} O_1 \quad X \quad O_2 \\ O_1 \quad X \quad O_2 \end{array}$$

which includes an acceptance evaluation (Campbell & Stanley 1963).

Sample and Population

The sample in this study was composed of four-year-old preschool children in two different day care facilities in Stillwater, Oklahoma during the spring semester 1998. A convenience sample was used because of the accessibility of the day care facilities and to the researcher. Each facility had approximately 20, 3½ to 4½ year old children who were eligible to participate in the study with parental permission.

At the time of the study, the day care centers were not teaching “5-A-Day Let’s Eat and Play” Nutrition Education. Therefore, upon agreement with the centers, the researcher chose March 16, 1998-April 18, 1998, as the span of time in which to collect the data as the day care operators did not specify otherwise. The fact that most of these children have been exposed to fruits and vegetables has been taken into consideration for this study.

Data Collection

Development of Instrument

The research instruments used to collect the data were developed and pilot-tested by Judy Cooper, MS RD/LD and Penny Levy MS RD/LD and the Health Department of Florida. Some modifications were made as the lessons were reviewed and re-enacted by the researcher.

At the time of the study, the researcher worked at the Child Development Laboratory of Family Relations and Child Development, College of Human Environmental Sciences, OSU, where she managed the operations of the kitchen and preparation of meals and snacks. This position served as the researcher's graduate assistantship.

Procedure

Upon approval from the OSU Institutional Review Board, permission from the two day care facilities and consent from the children's parents, the researcher proceeded to collect the data. Only the researcher taught the lessons. These lessons were conducted on Tuesday and Thursday mornings approximately at the children's morning snack time. The lessons were taught similarly to how Judy Cooper taught them. To ensure the nutrition education went as planned, the researcher practiced the lesson plans with the Child Development Laboratory kindergarten at OSU but did not collect data at that time.

This preliminary step prevented potential problems the researcher would have had when presenting the nutrition education to the subjects involved in the study.

Data Analysis

Standard Statistical procedures (t-test and Analysis of Variance) were used to analyze the pre and post scores of the children in a university setting and private day care setting (Shavelson 1996). Statistical analysis will also determine if there was an increase in acceptance of fruits and vegetables between children age 3½ and 4½ in both settings.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine the effects of “5-A-Day Let’s Eat and Play” nutrition education program on dietary habits of preschool children in Stillwater, OK. Data were obtained using the research instrument described in Chapter III, “Methods and Procedures”. Although there were 49 participants, 13 children did not complete the post test questionnaire. Data from 36 children were statistically analyzed. Thirty-six children completed both the pre and post test questionnaire, thus, 72 questionnaires were statistically analyzed using Least Square Means which only calculates those participants who completed the pre and post test questionnaire.

Characteristics of Participants

Age and Gender

Of the 49 predominately Caucasian children who were included in the study, 16% (n= 8) were 3.5 years old, 57% (n= 28) were 4 years old, and 27% (n= 13) were 5 years old as shown in Figure 1 on page 40. Forty-three percent were female and 57% were male as in Figure 2 on page 40.

Figure 1. Gender composition of children in study.

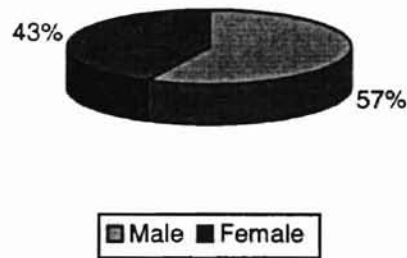
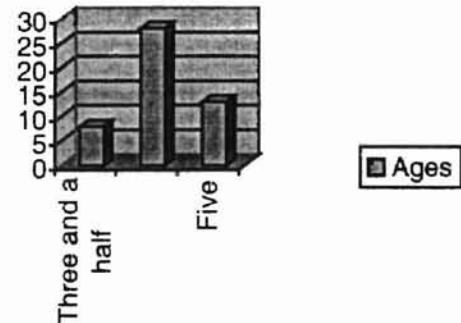


Figure 2. Age of children in study.



Responses to Questionnaire

To determine the children's knowledge and acceptance of fruit and vegetables, they were asked a series of simple questions before the education program started, then the same questionnaire was used after the program was completed. The first three questions asked included what foods are good to eat and make you healthy and strong, what is their favorite snack, what is their favorite vegetable and fruit. Using photographs of fruits and vegetables, other questions targeted identification of certain fruits and vegetables, like and dislike of these fruits and vegetables and consumption of these fruit and vegetables. The last two questions asked included how many servings of fruits and vegetables should they eat and why they should eat fruits and vegetables.

Statistical Analysis

Testing of Hypothesis One

Ho1: There will be no significant difference in the knowledge and acceptance scores of fruits and vegetables after the “5-A-Day Let’s Eat and Play” Nutrition Education is completed among children in both settings. Table 2 on page 41 illustrates the effects of education on knowledge scores pre to post of the total group. The greatest significance was in question 3, question 5 (know), question 6 and question 7 ($p \leq 0.001$). More children were able to correctly name a favorite vegetable and these children could properly name more of the 12 fruits and vegetables shown to them after they finished the lessons. Also a greater number of the participants knew how many servings of fruits and vegetables to eat every day and why everyone needs to eat fruits and vegetables. Significant differences were found pre to post in question 2 and question 4 ($p \leq 0.05$). More children correctly named a fruit or vegetable as their favorite snack and correctly named a favorite fruit after they completed the lessons. There was significant difference pre to post in question 5 (eat) and 5 (like) ($p \leq 0.05$). More children responded ‘yes’ to eating and liking the fruit or vegetable they previously tried to identify in question 5(know). Based on these results, the researcher rejected Ho1.

TABLE 2
EFFECTS OF EDUCATION ON KNOWLEDGE
AND ACCEPTANCE SCORES¹ PRE TO POST OF TOTAL GROUP

Questions in pre/post test	LSMEANS ± SE
Question 1 pre	0.592 ± 0.066
Question 1 post	0.778 ± 0.078
Question 2 pre	0.163 ± 0.062
Question 2 post	0.472 ± 0.072 *
Question 3 pre	0.327 ± 0.067
Question 3 post	0.722 ± 0.078 **
Question 4 pre	0.510 ± 0.065
Question 4 post	0.833 ± 0.076 *
Question 5 (know) pre	5.735 ± 0.238
Question 5 (know) post	10.583 ± 0.278 **
Question 5 (eat) pre	7.673 ± 0.378
Question 5 (eat) post	9.389 ± 0.440 *
Question 5 (like) pre	7.102 ± 0.368
Question 5 (like) post	8.750 ± 0.430 *
Question 6 pre	0.184 ± 0.048
Question 6 post	0.944 ± 0.056 **
Question 7 pre	0.551 ± 0.059
Question 7 post	0.944 ± 0.068 **

¹LSM ± SE

* Significant difference in scores pre to post of all subjects who completed pre and post tests ($p \leq 0.05$).

** Significant difference in scores pre to post of all subjects who completed pre and post tests ($p \leq 0.001$).

Testing of Hypothesis Two

Ho2: There will be no significant difference in the knowledge and acceptance scores between pre and post tests after the completion of the “5-A-Day Let’s Eat and Play” Nutrition Education among children within each school. Table 3 on page 43 illustrates the effects of education on knowledge and acceptance scores pre to post within each school. The researcher found the greatest significant differences with question 5 (know) and question 6 ($p \leq 0.001$) with both schools. After the lessons were completed,

more children at the university daycare and at the private daycare correctly identified the pictures of fruits and vegetables shown to them. Also more participants in both settings knew the correct number of fruits and vegetables to eat every day and why everyone should eat fruits and vegetables. The children at the private day care demonstrated a greater significant increase ($p \leq 0.001$) pre to post in question 7. More of these children knew why they should eat lots of fruits and vegetables. Also in question 2, the children at the private day care showed a significant increase ($p \leq 0.05$) in their ability to name a fruit or vegetable as their favorite snack. Both schools showed a significant difference pre to post in question 3 ($p \leq 0.05$). More children in both day care settings were able to correctly name a favorite vegetable after they finished the lessons. The Child Development Laboratory (CDL) showed a significant increase ($p \leq 0.05$) pre to post in question 4 which means more of these participants correctly named a favorite fruit. There was a significant difference pre to post in question 5 (eat) and question 5 (like) ($p \leq 0.05$) with the Child Development Laboratory (CDL). More CDL children ate and liked more fruit and vegetables they previously tried to identify in question 5 (know). There was a significant increase in scores pre to post in Question 7 with the CDL ($p \leq 0.05$). More of the children at the Child Development Laboratory knew why they should eat lots of fruits and vegetables. Based on these results, the researcher rejected H_0 .

TABLE 3
EFFECTS OF EDUCATION ON KNOWLEDGE ACCEPTANCE SCORES¹ PRE TO POST WITHIN EACH SCHOOL

Questions in pre/post test	School 1: CDL ¹	School 2: Private Day Care ¹
Question 1 pre	0.567 ± 0.086	0.632 ± 0.109
Question 1 post	0.782 ± 0.098	0.769 ± 0.131
Question 2 pre	0.200 ± 0.082	0.105 ± 0.094
Question 2 post	0.435 ± 0.094	0.538 ± 0.113 *
Question 3 pre	0.400 ± 0.085	0.211 ± 0.105
Question 3 post	0.783 ± 0.097 *	0.615 ± 0.126 *
Question 4 pre	0.633 ± 0.072	0.316 ± 0.112
Question 4 post	0.957 ± 0.082 *	0.615 ± 0.136
Question 5 (know) pre	6.100 ± 0.325	5.158 ± 0.318
Question 5 (know) post	10.652 ± 0.372 **	10.462 ± 0.385 **
Question 5 (eat) pre	7.400 ± 0.428	8.105 ± 0.716
Question 5 (eat) post	9.435 ± 0.489 *	9.308 ± 0.866
Question 5 (like) pre	6.733 ± 0.423	7.684 ± 0.685
Question 5 (like) post	8.826 ± 0.483 *	8.615 ± 0.282
Question 6 pre	0.167 ± 0.058	0.211 ± 0.085
Question 6 post	0.957 ± 0.066 **	0.923 ± 0.102 **
Question 7 pre	0.667 ± 0.075	0.368 ± 0.088
Question 7 post	0.913 ± 0.085 *	1.000 ± 0.106 **

¹ LSM ± SE

*Significant difference in scores pre to post within each school ($p \leq 0.05$).

**Significant difference in scores pre to post within each school ($p \leq 0.001$).

Testing of Hypothesis Three

Ho3: There will be no significant difference among the knowledge acceptance scores pre and post tests after the completion of “5-A-Day Let’s Eat and Play” Nutrition Education between children in a university daycare setting and a private daycare setting. Table 4 on page 44 illustrates the effects of education on change in knowledge scores pre to post between schools. There was a significant difference pre to post between schools in question 5 (know) and question 7 ($p \leq 0.05$). Children in the private day care

compared to the children at the Child Development Laboratory demonstrated a higher level of improvement in identifying pictures of fruits and vegetables and knowing why they should eat lots of fruits and vegetables. Based on these results, the researcher rejected Ho3.

TABLE 4
EFFECTS OF EDUCATION ON THE CHANGE IN
KNOWLEDGE AND ACCEPTANCE SCORES¹
PRE TO POST BETWEEN SCHOOLS

Schools	LSMEANS \pm SE ¹
Q1: School 1	0.174 \pm 0.087
School 2	0.077 \pm 0.116
Q2: School 1	0.174 \pm 0.080
School 2	0.385 \pm 0.107
Q3: School 1	0.348 \pm 0.087
School 2	0.385 \pm 0.116
Q4: School 1	0.217 \pm 0.087
School 2	0.231 \pm 0.116
Q5 (know): School1	4.261 \pm 0.233
School 2	5.385 \pm 0.310 *
Q5 (eat): School 1	1.652 \pm 0.377
School 2	1.615 \pm 0.501
Q5 (like): School 1	1.739 \pm 0.396
School 2	1.231 \pm 0.527
Q6: School 1	0.783 \pm 0.064
School 2	0.692 \pm 0.086
Q7: School 1	0.174 \pm 0.073
School 2	0.538 \pm 0.097 *

¹LSM \pm SE

* Change in scores pre to post were significantly different between schools ($p \leq 0.05$).

**Change in scores pre to post were significantly different between schools ($p \leq 0.001$).

School 1 = CDL

School 2 = Private Day Care

Discussion

The significant differences in knowledge scores and increased preferences of fruit and vegetables in this study support findings and comments of several authors identified in Chapter 2. Birch discovered in her studies that to change a child's food acceptance, 8 to 10 exposures may be required before clear changes in acceptance are achieved (1996). This study used 10 lesson plans focused on tasting a limited number of fruit and vegetables and learning the names of several fruits and vegetables. Data from this study show clear evidence of changes in knowledge and preference after 10 exposures.

This study supports Kantor's comments on America's need to increase their consumption and variety of fruits and vegetables (1996). This study used a variety of fruits and vegetables ranging in color, texture, taste and nutrition. The results of this study demonstrate that children will consume a variety of fruits and vegetables if given the opportunity to do so.

The researcher chose to do the lessons during the children's morning snack because research shows that the timing for introducing new foods is crucial if the child is expected to eat that food item again. This supports the comments of Duyff, et al. (1995) concerning new foods and timing. The positive results from this study, however, may have been due to the children being hungry at the time the lesson was given, therefore, eating the fruits and vegetables to satisfy their hunger.

Similar outcomes were apparent when comparing the data of this study to the preliminary data of Judy Cooper's pilot study in 1996, "Five A Day, Let's Eat and Play" program.

Both studies revealed that children's food preferences could be positively influenced after a series of lessons involving various activities. Through parental involvement, Judy Cooper's study in 1996 indicates that children show a greater interest in fruits and vegetables and food preparation. The parents who participated in Cooper's study claimed that after the lessons were completed their children ate more fruits and vegetables, including some they had never tried before.

CHAPTER V

SUMMARY, RECOMMENDATIONS, AND IMPLICATIONS

Summary

This study determined the effects of the “5-A-Day Let’s Eat and Play”, a 10 lesson plan nutrition education program on dietary habits of preschool children. Two dietitians from Florida Health Department developed this program and the researcher adapted the lessons. The sample population was selected from preschool children at the Child Development Laboratory at Oklahoma State University (n=20) and from a private day care (n=20) in Stillwater, OK. The study was conducted at both sites by the researcher who administered all the lessons and completed the questionnaires for the pre and post tests. Data from 36 participants were analyzed using frequencies, percentages, ANOVA and Least Square Means to answer the three hypotheses postulated in the study. P value accepted was $p \leq 0.05$.

The majority of the children (57%) were 4 years old. Forty three percent of the children were female and 57% were male. The researcher found a significant difference in knowledge and acceptance scores (pre to post) amongst all participants after the 10

lessons were completed. The greatest differences in the pre to post scores among all the children were two questions concerning the identification of fruits and vegetables and the knowledge of how many servings of fruits and vegetables should be eaten per day. The knowledge and acceptance scores (pre to post) within each school indicated that children in a university day care and those in a public day care gained significant knowledge of proper nutrition and enhanced preferences for fruits and vegetables. The children at the university day care, however, scored significantly higher than those in the private day care on the question of knowing their favorite fruit. The private day care children scored significantly higher than those in the university day care on two questions concerning the identification of fruits and vegetables and the rationale for eating fruits and vegetables. The results from this study suggest that children can be taught proper nutrition at an early age. Children will accept and consume new fruits and vegetables at significantly higher rates after 8 to 10 exposures.

Recommendations

The research instrument used in this study included 10 lesson plans, nutrition wheel, puppet, pre and post test questionnaire, and parent handouts. Overall, the 10 lessons were fun for the children and held their attention. The lessons allowed the children to practice cutting with scissors and plastic knives, drawing, coloring, singing and working together as a team, while creating faces and figures using real food. The researcher kept personal observation logs of each lesson taught and found the children's favorite activities from the lessons were the singing and sampling of the fruits and vegetables. To increase the validity of the research instrument, however, the participants

should have been chosen randomly and a pre and post test should have been given to a control group.

The puppet, Freddie Five-A-Day, was a tool used to help the children learn about nutrition. The puppet became more of a distraction than an aide in teaching and at other times the children were completely disinterested in the puppet. The children's varied reaction to the puppet may have been the researcher's lack of puppeteering skills. The nutrition wheel was an excellent, versatile tool using pictures of real fruit and vegetables. The nutrition wheel was used quite often, allowing the children to spin the arrow and guess the correct fruit or vegetable.

Some of the fruit used in the lessons were expensive. The high cost of some of the fruit may have been due to the time of the year and the availability of the fruit. Other fruits, which were in season, could have been used to reduce cost.

The pre and post test questionnaire was an excellent tool to test the children's knowledge of fruit and vegetables and the children's change in food preferences. There was unfortunately not enough parental involvement. A few of the children's mothers told the researcher that their children enjoyed singing the "I eat broccoli" song and asked for more fruits and vegetables such as kiwi and carrots.

Based on the results of this study, additional research needs to be conducted to determine if the participants of this study retain their knowledge and acceptance of the fruits and vegetables used in the lessons. Studies of other population groups should be conducted to determine if the knowledge and acceptance of fruits and vegetables will vary in other daycare settings, and locations. Ethnicity and gender could also be used as independent variables if a larger sample is used. Other 5-A-Day programs need to be

developed and tested, then utilized at home and at school. More studies involving older children, kindergarten through fourth grade need to be conducted. This study could be compared state-wide to other nutrition education studies with preschool children to determine if Oklahoma's young children are knowledgeable about healthy eating and consume a healthy diet based on the food guide pyramid and dietary guidelines.

Implications

The results of this study indicated that children were not aware of the importance of eating fruits and vegetables nor were they exposed to these foods often enough to enjoy them. Nutrition educators need to create and use more innovative nutrition education programs geared towards different age groups such as children in kindergarten through fourth grade. The nutrition education material should provide the caregivers and parents with accurate nutrition information about the importance of eating fruits and vegetables at least five times a day. A list of the variety of fruits and vegetables, when they are in season and how to properly eat, store and handle them should be included in the nutrition education material. Nutrition educators should provide parents and caregivers with fun and innovative ways to teach the children this information. Preschoolers are eager to learn and can be persuaded to try new foods and snacks after being exposed to these foods several times. Teaching children during their formative years will provide excellent foundation for a lifetime of healthy eating habits.

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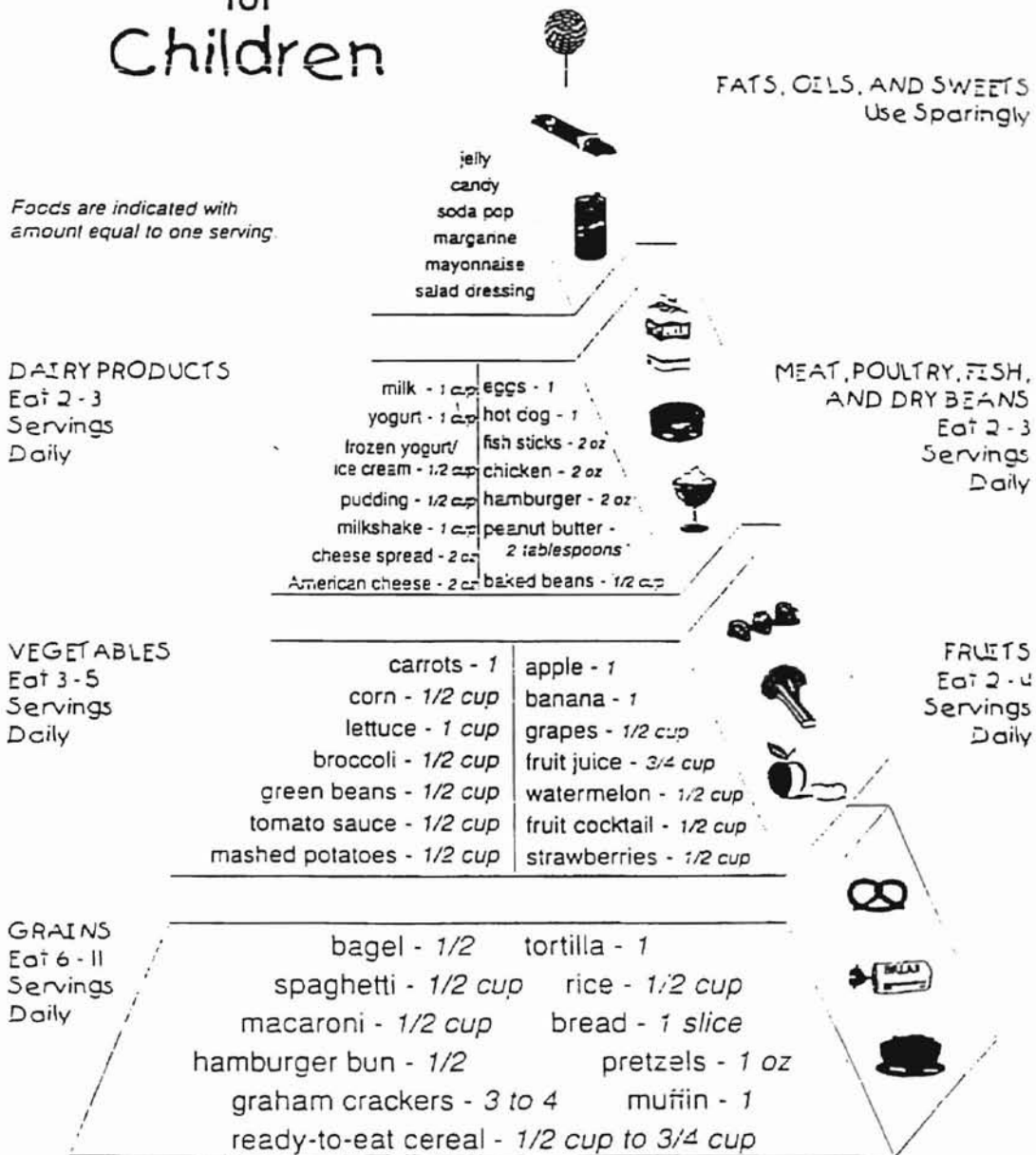
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APPENDIX A

FOOD GUIDE PYRAMID FOR CHILDREN

FOOD GUIDE PYRAMID for Children



Foods are indicated with amount equal to one serving.

Source: The American Dietetic Association
Based on the USDA Food Guide Pyramid

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APPENDIX B
10 LESSON PLAN

LESSON 1

⇒ PLAN

Lesson 1 is a general introduction to fruits and vegetables. The children will be able to identify 5 fruits and 5 vegetables, know that 5 servings per day is appropriate and understand that fruits and vegetables should be eaten to maintain good health. These concepts are repeated in each lesson. **The Five A Day - Let's Eat and Play** program is introduced along with the puppet, Freddy Five-A-Day and/or the Nutrition Wheel.

Concepts: Fruits and vegetables are good for you.

We need to eat 5 servings of fruits and vegetables every day. Fruits and vegetables come in a wide variety of colors, shapes and flavors.

⇒ PREPARE

Freddy Five-A-Day puppet (select any available puppet)

5 real, familiar fruits

5 real, familiar vegetables

Tablecloth

"I Eat Broccoli" song (copies may be sent home)

Freddy Five-A-Day's Treasure Hunt storybook

Nutrition Wheel (included)

Parent Handout (included)

The children sit on the floor in a circle. Place the 10 fruits and vegetables on the tablecloth in the center of the circle.

⇒ PLAY

Samples of dialogue to initiate discussion:

Presenter introduces Freddy to the children: "Good morning children. This is Freddy Five-A-Day and he is here to help us talk about fruits and vegetables. Say good morning to Freddy."

(children respond)

Freddy begins speaking: "Good morning children. Look at all these delicious fruits and vegetables. They look yummy! Do you know what they are? Who can pick one and tell me what it is?"

(child responds)

Freddy: "That's right! Do you know what color that is?" (child responds)

Freddy: "Who can show me what they ate yesterday?" (child responds)

Freddy: "Show me something that you can eat in the morning with your cereal." (child responds)

Freddy: "Tell me the name of that vegetable with the pretty orange color." (child responds)

Freddy: "Which ones taste sweet?"

(child responds)

Freddy: "Which ones do you have to peel before you eat them?"

(child responds)

Freddy: "Now, let's look at all the fruits and vegetables and name each one."

(children respond)

Freddy: "Do you know why it is good to eat lots of fruits and vegetables?"

(child responds)

Freddy: "You need them so your body can stay healthy and so you don't get sick. Fruits and vegetables make you grow strong and healthy; they make you feel good.

I eat 5 fruits and vegetables every day (hold up hand of five fingers). I don't eat the entire vegetable, I just have some of it and share the rest with my family. Who can pick their 5 favorite fruits and vegetables from what you see?"

(child responds)

Freddy: "That's great! It is important to eat 5 different fruits and vegetables every day.

Who else would like to pick their five favorites?"

(child responds)

Select any of these activities:

Using the **Wheel** with pictures of cut-up fruits and vegetables attached, select two children to come up to **Wheel**. One child spins the wheel and the other child will retrieve or pick up the fruit or vegetable that matches the one selected by spinning the wheel. Continue and allow each child to participate.

Have children sing the "**I Eat Broccoli**" song using some of the 10 real fruits and vegetables on the tablecloth. As each item is mentioned the next child in the circle gets to hold up the appropriate food while that stanza is being sung.

The presenter may read the story, **Freddy Five-A-Day's Treasure Hunt**. This is a playful tale of a boy going on a treasure hunt for five servings of fruits and vegetables. Along the way he meets his friends and neighbors and they share their fruits and vegetables with him. This story can be used in dramatic play. Select students to play the characters in the story. Provide them with fresh fruits or vegetables that are mentioned in story.

At end of lesson, fruits may be cut in chunks and given to the children to eat.

Summary:

Freddy: "I had a lot of fun being here with you today. I love to talk about fruits and vegetables. Who remembers the names of these fruits and vegetables?"

(children respond)

Freddy: "How many should we eat each day?"

(children respond)

Freddy: "Why should we eat 5 different fruits and vegetables every day?"

(children respond)

Freddy: "Good-bye, and I can't wait to come back and see you! Don't forget to eat your 5 fruits and vegetables!"

Song – I EAT BROCCOLI
(To the tune: Frere Jacques or Are You Sleeping Brother John)

I eat broccoli, I eat broccoli.
Yes I do, yes I do.
Broccoli is good for you,
It makes you strong and healthy, too.
Brocc-o-li, is good for me.

I eat apples, I eat apples.
Yes I do, yes I do.
Apples are so good for you,
They make you strong and healthy, too.
Apples are, good for you.

I eat oranges, I eat oranges.
Yes I do, yes I do.
Oranges are good for you,
They make you strong and healthy, too.
Or-an-ges, are good for you.

(Any fruit or vegetable may be substituted in the song.)

by Judy Cooper

LESSON 2

⇒ PLAN

Lesson 2 is the first of four classes focusing on fruit. There is reinforcement of what was learned in the previous class, with our puppet, Freddy Five-A-Day, again assisting. Five new fruits are introduced in this lesson. An art project to make a fruit necklace is included.

Concepts:

- Eat 5 servings of fruits and vegetables every day.
- Fruits and vegetables make you strong and healthy.
- Fruits taste sweet.
- Fruits have a covering or peel that may need to be removed before eating.
- Fruits come in different colors and textures (hard, soft or mushy).

⇒ PREPARE

- Five REAL fruits (not shown in the previous class)
- Tablecloth
- Freddy Five-A-Day puppet
- Fruit necklaces to color (included), cut page into 6 rectangles
- Crayons
- Scissors
- The "I Eat Broccoli" song

The children sit on the floor in a circle. Place the 5 fruits on the tablecloth in the center of the circle.

⇒ PLAY

Presenter: "Good morning children, Freddy Five-A-Day is back with us today. Say good morning to Freddy."

(children respond)

Freddy begins speaking: "Good morning children, how are you today?" (children respond)

Freddy: "Last week we talked about fruits and vegetables. Do you remember some of the fruits and vegetables we looked at?"

(children respond)

Freddy: "Did you eat any of those fruits and vegetables since I last saw you? Which ones did you eat? Did you like them?"

(children respond)

Freddy: "How many fruits and vegetables are good to eat each day?" (children respond)

Freddy: "That's right! Five fruits and vegetables every day! Do you need to eat the whole fruit or vegetable at one time? No, only some of it, only a piece of it; we share the rest with our family or friends."

Freddy: "Why should you eat lots of fruits and vegetables?" (children respond)

Freddy: "Yes, you want to make your body strong and healthy. You don't want to get sick and have to stay in bed. Fruits and vegetables make our bodies strong. Look at my muscles. I'm strong because I eat lots of fruits and veggies. Let's see your muscles."

Freddy: "Today we have 5 new fruits, no vegetables today, only fruits. Help me count the five fruits (1, 2, 3, 4, 5). Does anyone know what the names of these fruits are?" (children respond)

Freddy: "These fruits _____, _____, _____, _____." (Name the fruits and show which they are.)

Freddy: "Which ones have you tasted before?" (children respond)

Freddy: "Do these fruits taste sweet? Do they have to be peeled? What colors are they?" (children respond)

Freddy: "Pass the fruits around the circle. Do they feel hard, soft, rough, mushy, etc.?" (children respond)

Activity: Fruit Necklace

The children sit at their desks and are given the materials (scissors, crayons) for the fruit necklace project. Review the names of fruits pictured. Each child chooses one fruit picture to color and cut out around the dotted lines. The teacher can punch a hole at the top of cutout shape.. A piece of yarn is threaded through the hole to make the necklace.

If possible, one or two of the fruits may be cut into chunks and given to the children to eat as a snack.

Summary:

Freddy: "I had a wonderful time with you today. Before I leave let's sing the "I Eat Broccoli" song using the fruits we saw today."
(children sing)

Freddy: "I'll see you next time. Until then I'll be eating lots of fruits and vegetables and I hope you will, too. Good-bye!"

LESSON 3

⇒ PLAN

This lesson continues to acquaint the children with fruit. The children participate in a simple food project to make a Fruity Clown Face. They then taste the results of their efforts. Freddy Five-A-Day does not appear in any of the food projects or cooking sessions.

Concepts:

- Eat five servings of fruits and vegetables each day
- Fruits and vegetables make you strong and healthy.
- Fruits are easy to prepare.
- It is fun to try new fruits to eat.

⇒ PREPARE

- Cutting board, knife for teacher
- For students, use disposable plate and plastic knives, if they are cutting up fruit
- Paper plate for each child
- Whole fruit of each of following fruits to be used in discussion:
- Fresh pineapple slices, one per child
- Grape half, two per child
- Kiwi, 1/2 slice per child
- Strawberry, 1/2 per child
- Orange, 2 halves of a slice per child
- Cantaloupe, one thin slice per child
- Raisins, about 5 per child

Pre-made clown face

Parent letter/diagram of clown face

The teacher may choose to have all the fruit pre-cut or this can be a part of the experience for the students.

⇒ PLAY

Presenter: "Hi, boys and girls. I'm glad to see you again. Have all of you been eating your fruits and veggies? Which ones have you been eating? Have you tried anything new?"

How did it taste?"

(children respond)

Presenter: "Look at what we have today. Who can tell me the names of these fruits?"

(children respond)

Presenter: "Why do we eat lots of fruit?"

(children respond)

Presenter: "That's right! Fruit tastes good and it makes you feel good."

Presenter: "Today we are going to make a fun fruity clown face. Who wants to help make it? Good, we can all help."

Activities: Fruity Clown Face

Pass out paper plates.

Show child a completed clown face made with fruit.

Give each child the fruit pieces to make face.

Once completed, child can eat design.

Sing "I Eat Broccoli" song using fruits in the clown face. Keep some pieces or whole fruit available to point to when singing the song. Then the next song, "I Eat 5 A Day" may be introduced and sung.

Presenter: "How did you like the fruity clown face?" (children respond)

Presenter: "Can you tell me the names of all the fruits we used to make the clown face?" (children respond)

Presenter: "Remember to eat some fruit every day. Fruit makes you grow strong and healthy and doesn't it taste good?!"

Presenter: "Well, boys and girls, it was really wonderful being with you, again, today. I will be back soon and we will do more fun things. Good-bye!"

LESSON 4

⇒ PLAN

Lesson 4 continues to focus on fruit. The presenter uses the puppet, Freddy Five A Day to discuss why eating fruits is good for us. The activity includes an art project to make a chef's hat, using the design included.

Concepts:

- Fruits make us strong and healthy.
- Fruits grow on trees, vines or bushes.
- Fruits taste good and smell sweet.
- There are many different types of fruits.

⇒ PREPARE

- Display of various fruits (include ones on chefs hat)
- Chefs Hats (handout included)
- Crayons
- Freddy Five-A-Day puppet
- Freddy's Chefs Hat

⇒ PLAY

Freddy: "Hello, boys and girls! I'm here again to talk with you. Guess what we are going to talk about today?"

Freddy: "Fruit! That's right, fruit! How many of you ate fruit since I saw you last?"

Freddy: "Which fruit did you eat? Do you see any of them on this table? Which ones do you see?"

(children respond)

Freddy: "How did it taste? Was it wet and cold? What color was it?" (children respond)

Freddy: "Do any of you have fruit trees, like mango trees, or grapefruit or orange trees, in your yard?"

(children respond)

Freddy: "Have you picked the fruit off the tree and eaten it? How was it? I bet it was yummy!"

(children respond)

Freddy: "Why should we eat fruit?" (children respond)

Freddy: "That's right! Because fruit keeps us healthy and strong. And, because fruit tastes good! Does it also smell good? Well, let's smell the different fruits and see if they have a good smell."

Freddy: "Who wants to be the first to smell the banana? (Choose a child to smell the banana.) How does it smell?"

(child responds)

Freddy: "Who wants to be next to smell the pineapple?"

(child responds)

Repeat with more of the fruits.

Activity: Chef's Hat

Freddy: "Today we are going to make hats that chefs wear. Do you know what a chef is? A chef is a person that cooks food in a restaurant? And a chef wears a special hat so that his hair won't fall into the food he cooks and so that everyone can tell that he is the chef."

Freddy: "At the next lesson you will all cook something. So, today we will make chef's hats to wear the next time we cook together. Who would like to make a chef's hat?"

(children respond)

Freddy: "Good!"

Distribute front and back pieces to hat. Distribute crayons and scissors.

Freddy: "Before we begin, look at your hat. What fruits do you see on the hat? Do you see any fruits on the hat that you also see on the table? Which ones are they?" (children respond)

Freddy: "Color all the different fruits that you see on the hat and then we will attach the 2 ends so that you will be able to wear your hat."

Children do the project. Teacher assists students by fitting hat to head and stapling ends together. Add extra staple to attach top of front and back together.

Children, again, gather around Freddy.

Freddy (wearing one of the hats): "I love my chef's hat. Now I can cook in the kitchen like a real chef. Do all of you like your hats?"

(children respond)

Freddy: "Who can tell me the name of a fruit on the hat? And who can tell me the name of another fruit? And another?"

(children respond)

Freddy: "Let's take one last look at the fruit on the table. Let's name them, also."

(children respond)

Freddy: "Which fruits do you want to eat this week? Which ones are your favorites? Why are they your favorites? Do you like the pretty colors? Do you like the way they taste? Do you like the way they feel?"

(children respond)

Freddy: "Let's save our chef's hats for next time when you will all cook. Take them off now and give them to Mrs. _____ so she can put them in a safe place."

Mrs. _____ collects the hats.

Freddy: "Good-bye! Eat lots of fruit and have a good week!"

LESSON 5

⇒ PLAN

This is the last lesson that focuses only on fruit. The children will participate in a cooking experience to make fruit salad. The object of this lesson is for the children to become more comfortable in the handling and preparation of fruit. This class is most effective if done at snack time, when the children are hungry.

Concepts:

- Fruits are easy and fun to prepare.
- Fruits make us strong and healthy.
- Different fruits taste good.

⇒ PREPARE

Chef's hats from last class

Parent handout

10 fruits, washed, peeled and cut in large chunks; here are some suggested fruits:

apple	mango
banana	nectarine
blueberries	oranges
blackberries	papaya
cantaloupe	peaches
casaba melon	pears
grapes	pineapple
grapefruit	raspberries
honeydew melon	strawberries
kiwi	watermelon

- paper plates for each child
- plastic knife for each child
- ten small-medium size bowls
- ten serving spoons
- sharp knife for presenter
- plastic spoons for each child
- napkins

Fruit preparation that children are unable to do should be done before the lesson begins (i.e.: remove rind from melon, remove outer covering from pineapple, etc.).

⇒ PLAY

Presenter: "Hi, boys and girls. Today we are going to have lots of fun. We are going to be chefs. Do you remember what a chef does? That's right! A chef is a person that cooks. Today all of you are going to be chefs! First put on your chef's hat and wash your hands,

then we can begin.”

(children put on chef's hats and wash hands)

Presenter: "I know that you have seen most of these fruits and have tasted many of them. Do you remember their names? Tell me what they are?"

(children respond)

Presenter: "Great! You remembered all of the fruits we saw before. Here are a few new ones. Does anyone know the names of these?"

(children respond)

Presenter: "The new ones are called _____ and _____. Please say their names with me.

Presenter: "What do we eat to make us strong and healthy and so we don't get sick? That's right fruit is good for us and really tastes good, doesn't it?" (children respond)

Presenter: "Now we are going to make a fruit salad. Then we can taste the fruit salad and have a fruit salad party. Who wants to help with the fruit salad party? Good, everyone can help!"

Activity: Fruit Salad

Wash fruit, remove peel and cut in large chunks.

(This may be done ahead.)

Pass out paper plates and plastic knives.

Distribute large fruit chunks to child.

Put cut-up fruits in individual bowls on table; do not mix fruits

Presenter: "We're having a fruit salad party! Look at all the delicious fruit. I want each of you to tell me the name of the fruit you prepared."

(children respond)

Presenter: "Okay, now you take a plastic bowl and choose a spoonful of at least 5 fruits. How many is five? One, two, three, four, five! Yes, each of you take at least 5 fruits and put them in your bowl. You can take more than five if you want, but choose at least five. Put them in your bowl and go to your seat."

(Children eat fruit salad.)

Presenter: "Did you enjoy your fruit salad party? Great, so did I! You can take home your chef's hats and wear them at home when you help in the kitchen."

Freddy: "Don't forget to eat lots of fruit this week. Ask Mom or Dad if you can help make a fruit salad at home. The next time I see you we will talk about vegetables and we will do fun things. Good-bye!"

LESSON 6

⇒ PLAN

Lesson 6 is the first of four classes focusing on vegetables. Vegetables are introduced as a separate category using discussion, real vegetables, a game, and a song.

Concepts:

- Vegetables are good for you; they make you strong and healthy.
- Vegetables come in different colors, shapes and textures.
- Vegetables may be eaten raw or cooked.

⇒ PREPARE

- Freddy Five-A-Day puppet
- "I Eat Broccoli" song
- Nutrition Wheel with vegetable pictures
- Tablecloth

As many of these real vegetables as possible (they correspond to the pictures on the wheel):

Broccoli	Okra
Cabbage	Peas
Carrot	Spinach
Corn	Spaghetti Squash
Eggplant	Green pepper
Green beans	Tomato
Greens	Zucchini

The children sit on the floor in a semi-circle. Place all the vegetables on the tablecloth in the center. The Nutrition Wheel is placed in front of the group where all the children can see and have access to the wheel.

⇒ PLAY

Freddy Five-a-day: "Hi, boys and girls. I've missed you. It seems like I haven't seen you in a long time. Have you been eating lots of fruit while I was gone? Which ones?"

(children respond)

Freddy: "That's great! Do you remember how many fruits and vegetables you should eat every day?"

(children respond)

Freddy: "Yes! 5 is the magic number! Everyone should eat 5 different fruits and vegetables every day because.

(children respond) Yes! Fruits and vegetables make you strong and healthy. They keep you from getting sick. All of us want to be strong and healthy, right?"

(children respond)

Freddy: "Today we are going to talk about vegetables. Who can tell me the name of one of the vegetables we see here?"

(child responds)

Freddy: "That's right. Is that your favorite vegetable? Do you know what color it is?"

(child responds)

Freddy: "Yes. Let's pass the broccoli around so everyone can look at it and feel it."

Freddy: "Now who else wants to choose their favorite vegetable? Okay, what is it?"

(child responds)

Freddy: "Very good! Do you eat it the way it is now or do you have to cook this first?"

(child responds)

Freddy: "Right! Now let's pass this one around for everyone to touch. How does it feel?"

Is it hard, soft, cold, bushy, leafy?

(children respond)

Let all the children have turns touching and talking about the vegetables.

Activity: Nutrition Wheel

Freddy: "Is everyone ready to play a game?"

(children respond)

Freddy: "This is what we will do. Sammy, go up to the wheel and spin it. When the wheel stops which vegetable do you see at the top?"

Child answers: "Carrots"

Freddy: "Yes, now (child) find the real carrots in the circle and tell me one thing about carrots."

Sammy chooses the carrots and says nothing.

Freddy: "(Child), tell me about the color or how you eat carrots - in a salad or cooked?"

Child: "I eat carrots in a salad"

Freddy: "Good. Does anyone else want to tell me something about carrots?"

Child: "They are orange."

Freddy: "Yes, very good."

Another child: "They feel hard."

Freddy: "Great! Who wants to be next to spin the wheel?"

Let each student have a turn to spin the wheel and match the picture to the real vegetable and say something about the vegetable. Then let other children volunteer additional facts.

Sing "I Eat Broccoli" Song. Let a child choose one of the vegetables. She stands and holds it while it is used in the first verse. The next child chooses another vegetable to be used in the next verse, and so on.

Review questions, using Freddy: What color are vegetables? Why do we eat vegetables? How many fruits and vegetables should we eat every day? Do you eat some vegetables cooked? Which ones? Do you eat some vegetables raw? Which ones?

Freddy: "I had a wonderful time with you today. Remember to eat your veggies."

LESSON 7

⇒ PLAN

Lesson 7 continues to acquaint the children with vegetables. The children participate in a game called Toss the Salad to prepare them for the preparation of a fresh vegetable salad. Using at least 5 different vegetables, each child will assist by cuffing up some vegetables. If done at snack time the children will enjoy this more.

Concepts: Vegetables are easy to prepare and fun to eat.
Salads can be a mixture of different vegetables.

⇒ PREPARE

Chef's hats
Cutting board for presenter
34 vegetable peelers
Sharp knife for the presenter
Plastic knife for each child
1 plate and napkin per child
For 20 children, choose at least 5 vegetables, washed:
1 bag lettuce, pre-washed and cut
1 bag spinach, pre-washed
4 carrots
2 cucumbers, cut in half
2 green or red peppers, cut in half
2 tomatoes, cut in half
1 small head purple cabbage, cut in chunks.
1 avocado, peeled and cut in half
Salad dressing forks for each child

⇒ PLAY

Presenter: "Good morning, girls and boys! Remember all the fun we had with the Nutrition Wheel? We talked about all the vegetables. Can you tell me which vegetables we talked about?"

(Children respond)

Presenter may review the last session by asking:

Which of the vegetables did you eat this week?
Do you remember their colors?
Why should we eat lots of vegetables?
Do you eat vegetables cooked? Do you eat vegetables raw?
Did any of you help at home in the kitchen? What did you help prepare?

Activity: Toss the Salad Game

Presenter: "Who wants to play a game? Today we are going to play a game called Toss the Salad! Has anyone ever had a salad before? What was in it?" (Discuss what a salad is and what can go in it)

Presenter: "Now we will play our game, called Toss the Salad."

(reprinted from 500 Five Minute Games: Quick and Easy Activities for 3-6 Year Olds, copyright 1995, by Jackie Silberg, Price \$19.95/\$5.00 Shipping. Available from Gryphon House, Box 207, Beltsville, MD 20704-0207, 1-800-638-0928. <http://www.ghbooks.com>.)

Choose one child to be the chef.

Seat the others in a circle, and have the chef stand in the middle. Ask all the children in the circle to decide what kind of food they would like to be in a salad. Go around the circle and ask each child what food he is. Help children with suggestions, if needed. (Give them a picture or real vegetable to hold.) Then say "Chef, would you like some lettuce in your salad."

The chef answers, "Yes, I would like some lettuce in my salad." Whoever is the lettuce--and it can be more than one child--gets up, goes into the middle of the circle and stands next to the chef. Continue until every child is in the circle.

Then say "Toss the Salad!" All the children jump up and down. Say "Time to eat the salad." The children sit down again.

Activity: Vegetable Salad

Presenter: "We have 5 vegetables that we will cut up or peel and put in the salad. Let's name them."

(children respond)

Have children wash hands and return to their table.

Distribute paper plates and plastic knife to children.

Distribute chunks of vegetables to each child.

Have each child put his cut up vegetables into an extra large bowl.

Add salad dressing and toss.

Serve salad to children (they may use plate used for cutting vegetables.) Provide forks.

Review Five A Day concepts.

Presenter: "What a delicious, colorful salad you made! How many vegetables did we put in the salad? Who can name them? What colors are they?"

Presenter: "I'm glad you enjoyed your five-vegetable salad. The next time I see you we will play a game called, 'Guess the Vegetable'. Good-bye!"

LESSON 8

⇒ PLAN

This lesson reinforces the facts that have been presented about vegetables. Freddy Five-A-Day plays a game with the children, "Guess the Vegetable". The children then color a placemat that has pictures of vegetables. This placemat will be used in next week's food preparation class.

Concepts: Vegetables come in different colors, shapes, and textures. Vegetables may be eaten raw or cooked.

⇒ PREPARE

Freddy Five-A-Day puppet
Vegetable pictures or card deck
Placemats - one for each child
Crayons

Spread the vegetable pictures out on a table or floor and have the children sit around them in a circle. Alternately, the pictures may be put onto a flannel board and placed in front of the group.

⇒ PLAY

Freddy: "Hello, girls and boys. Guess what we are going to talk about today?"

(children respond)

Freddy: "That's right - vegetables! Who ate vegetables yesterday? What did you eat?"

(children respond)

Activity: Guess the Vegetable Game

Freddy: "Let's play a game. It's called "Guess the Vegetable". This is how we play: I will tell you about a vegetable without saying its name and you find the picture and tell me what it is. Okay? Who wants to go first?"

(children respond)

Freddy: "I am thinking about a vegetable that is orange. It's long, crunchy, and hard. You can eat it cooked or cut up in a salad. Who can find the picture of this vegetable and tell me what it is?"

(child responds correctly)

Freddy: "That's wonderful! Good for you! Now I am looking for a vegetable that is green and has a bushy top. Usually we cook it before we eat it. Who can find the picture for me and tell me what it is?"

(child responds correctly)

Freddy: "Terrific! How about looking for a vegetable that is green and leafy? It is very light to hold. We use it in salads. I see the picture, do you?"

(child responds)

This is continued until all the pictures are chosen. Children return to their desks.

Activity: Placemats

Freddy: "Now, boys and girls, we are going to color vegetable placemats. What is a placemat?"

(children do not know)

Freddy: "A placemat is put on a table and then you put your plate with food on top of it."

Freddy: "But, first let's name the vegetables that we see in the picture."

Freddy: "These are special placemats. You are going to use these next time when you cook. Then you will prepare some food in class and eat it and this will be your placemat under you plate."

Freddy: "When you finish coloring these placemats please give them to

Mrs. _____ so she can put them aside until next time when you cook."

Children color their placemats. If possible, placemat can be laminated to prolong use.

Freddy: "Good-bye children and don't forget to eat lots of vegetables this week so you can stay strong and healthy!"

LESSON 9

⇒ PLAN

Lesson 9 continues to reinforce the positive aspects of preparing and eating vegetables. Children prepare a Veggie Man, using fresh precut vegetables and then enjoy their tasty creation.

Concepts: Vegetables are easy to prepare and fun to eat.

We need to eat 5 servings of fruits and vegetables every day.

⇒ PREPARE

Vegetable placemats from last lesson

Paper plate for each child

Vegetables for Veggie Man (see attachment for design)

Wash and precut the following:

1 head broccoli cut into small florets

2 zucchinis, cut in round slices

1 small can corn

1 small can sliced olives

2 red peppers cut in thin strips and then ~t in half

1 bunch celery, cut into 3 inch stalks

3-4 carrots, cut into thin 2 inch strips

French Salad Dressing Sample Veggie Man prepared

⇒ PLAY

Presenter: "Hi, boys and girls! Here are the placemats you made last week. Take the one you made and put it on your desk. What pictures are on the placemats?"

(children respond)

Presenter: "Very good. What are all these pictures called? Yes, vegetables. What colors are vegetables?"

(children respond)

Presenter: "That's right! Most vegetables are yellow, red, orange, and green." "Why is it good to eat lots of vegetables?"

(children respond)

Presenter: "Remember what Freddy says, 'Vegetables make you strong and healthy so you don't get sick.' He told you to eat how many fruits and vegetables everyday?"

(children respond)

Presenter: "Yes, 5 fruits and vegetables everyday to keep you strong and healthy!" "How many is five?"

(children respond)

Presenter: "One - two - three - four - five! That's wonderful! You remembered everything Freddy told you! Freddy will be very happy to hear that!"

Activity: Veggie Man

Presenter: "Today we are going to make a Veggie Man. This is what he will look like."

(Show prepared sample.)

Distribute plates.

Distribute vegetables to each child to arrange as shown.

Put salad dressing in bowl and allow child to spoon onto zucchini slice.

Children will like dipping the vegetables in salad dressing.

At the conclusion of the food tasting the children clean up and are told that they may take their placemats home to use at dinner.

Presenter: "Before I leave let's sing the "I Eat Broccoli" song but we'll sing about the vegetables used in Veggie Man instead."

LESSON 10

⇒ PLAN

Lesson 10 is the conclusion of **Five-A-Day, Let's Eat and Play**. It reviews many of the program's highlights. Freddy Five-A-Day is present. The instructor may choose to any of the activities listed.

⇒ PREPARE

Freddy Five-A-Day puppet
 Nutrition wheel
 Freddy Five-A-Day's Treasure Hunt storybook
 Songs

⇒ PLAY

Freddy: "Good morning, everyone. I am so happy to see you all. Did you know that today is our last lesson on fruits and vegetables? I have had so much fun talking to you about fruits and vegetables. What do you like about fruit and vegetables?"

Child responds: "I like them because they taste good, they come in pretty colors and they are good for me."

Freddy: "So how many fruits and vegetables do we need to eat every day? Right, 5. I ate my 5 servings yesterday (use pictures of foods, food models or real food). I had some juice at breakfast and an apple for a snack, some carrots at lunch, some bananas after school and then I had some salad at dinner. I feel great'.

Do you eat 5 fruits and vegetables every day?" Child responds.

Freddy: "Great. And why do we need to eat 5 servings of fruits and vegetables every day? Right. I hope you keep eating all kinds of fruits and vegetables and grow up strong and healthy."

Freddy: "Now we are going to play a counting game called Five Fruits and Vegetables."

Activities -- Choose one.

Game 1: Nutrition wheel: Child spins the wheel; i.e.: banana shows; child tells how he likes to eat the banana i.e.: "I like to eat the banana cut up in my cereal." i.e.: I like to eat the broccoli raw with dip." i.e.: " I like to eat carrots in my soup." i.e.: "I like to eat an apple as a snack."

Game 2: Nutrition wheel: Child spins wheel while all others close their eyes. When it stops child describes what she sees and others must guess what it is. Fruit or Vegetable? Color? Hard or soft? Wet, crunchy, etc.? Sweet or not sweet? Eat it cooked or raw or both? Class guesses what it is. The child to guess is the next one to spin the wheel.

Five Fruits and Vegetables

(adapted from **500 Five Minute Games**)

Choose five children to be fruits and vegetables. Give them a picture of the fruit or vegetable they represent.

Ask them to sit in floor in a row.

Choose 5 more children to take away fruits and vegetables. Give them each a penny.

Recite poem. Have children recite it with you line by line.

Five fruits and vegetables in a grocery store.

Colorful and tasty, good to the core.

Along came (child's name) with a penny to pay.

Who bought a fruit or vegetable and took it right away?

One of the "takers" pretends to pay a penny.

Then she says the name and takes the arm of one of the "fruits or vegetables" and goes to another part of the room.

Repeat with "four fruits and vegetables" and so on.

After game is completed, sing "I Eat Broccoli" song using fruits/vegetables in game.

Freddy: "This has been so much fun. I hope you all keep eating fruits and vegetables and grow up to be strong and healthy. Remember how easy it is to prepare fruits and vegetables; you made delicious salads, a fruity clown face and veggie man. You made a fruit necklace, a chef's hat and a placemat. I hope you share this with your family. Tell them what fruits and vegetables you like to eat and maybe they'll eat more too. Good-bye."

APPENDIX C
PARENT HANDOUTS

FIVE-A-DAY, LET'S EAT AND PLAY

Your child is participating in the nutrition education program, Five-A-Day, Let's Eat and Play. The children are learning the names of fruits and vegetables, that we should eat them to be strong and healthy and five servings a day are needed. They are very interested and are anxious to learn more. In the coming weeks they will learn about fruits: what they look like, how they feel and smell, and how to make yummy things to eat with them.

Please have your child help you pick out fruits at the grocery store and let them help at home by cutting up fruit (with plastic knife) for a fruit salad or for other dishes. Remember to wash all fruit under cool running water before eating. Here are some other ways to add fruit to your day.

Start off the morning with 100% pure juice (1/2 cup is the serving size for a child).

Top cereal, pancakes or waffles with slices of fresh or even canned fruit.

Place a bowl of fresh fruit where your child can see it and reach it for quick snacks. Apples, oranges, bananas, peaches, plums, and pears are good choices. Store cut-up melon, berries or other ripe fruit on a low shelf in the refrigerator.

Keep canned fruits packed in fruit juice in your cupboard for days when you run out of fresh fruit.

Try dried fruits, like raisins and apricots, as a quick pick-me-up. They are good for trips or days when you have long errands with the kids.

Set a good example for your children. If they see you eating lots of fruits, they will want to do the same.

FIVE-A-DAY, LET'S EAT AND PLAY

Today your child has participated in the 5-A-Day, Let's Eat and Play nutrition program. We made a funny Fruity Clown Face. The children used the picture below as an example of how to make their own. The fruit was precut and the children were given pieces of the various fruits to make their own fruity face. Let your child show you what he/she learned and make the fruity clown face together. Other fruits may work just as well as the ones listed on the example below. Be creative!!!!!! Thank you for your cooperation, Michelle Naples.

FIVE-A-DAY, LET'S EAT AND PLAY

Today your child participated in the Five-A-Day, Let's Eat and Play nutrition program.

We made a delicious fresh fruit salad. They helped wash, peel and cut up the fruit and mix the salad together.

You need:

2 cups fresh fruits such as melons, apples, oranges, bananas, berries or pineapple

¼ cup orange juice (optional)

Wash, peel and cut up fruits. Place in large bowl and add juice. Mix together. Eat and enjoy.

Dear Parents,

Your child has now completed the 10 lessons on fruits and vegetables. I have really enjoyed teaching all the children who participated. Please answer the questions below and return to this to your child's teacher by April 24. Thank you so much for your cooperation, Michelle Naples.

Five-A-Day, Let's Eat and Play

1. Has your child discussed this program with you?
2. If yes, what has he/she discussed or shared with you?
 - nutrition wheel with fruit and veg. pictures _____
 - puppets _____
 - veg. placemats _____
 - chef's hats _____
 - fruit necklaces _____
 - songs _____
 - real food experiences _____
 - "The Vegetable Man" _____
 - "Fruity Clown Face" _____
 - other _____
3. At the supermarket, does your child show more interest in fruit? _____
vegetables? _____
4. At home, does your child show more interest in helping you prepare fruits and vegetables? _____
5. Does your child seem to eat more fruit? _____
6. Does your child seem to eat more vegetables? _____
7. Are there any specific fruits or vegetables that your child now eats that he/she would not eat before?

APPENDIX D
PRE AND POST TEST QUESTIONNAIRE

PRE AND POST TEST QUESTIONNAIRE

Five-A-Day, Let's Eat and Play

Children are to be individually questioned:

1. "What is good to eat and makes you strong and healthy?"
2. "What is your favorite snack?"
3. "What is your favorite vegetable?"
4. "What is your favorite fruit?"
5. Show the child each of the following and ask:
 "What is this? Have you ever eaten this? Do you like it?"
 (left column; check if the response is correct or write in incorrect response)
 (right column; check if the child has eaten the item)

<u>NAME</u>	<u>EATEN?</u>	<u>LIKE</u>
APPLE		
ORANGE		
BROCCOLI		
CARROT		
PINEAPPLE		
GREEN PEPPER		
SPINACH		
STRAWBERRIES		
CANTALOUPE		
GRAPES		
GRAPEFRUIT		
ZUCCHINI		

6. "How many fruits and vegetables should you eat every day?"
7. "Why should everyone eat lots of fruits and vegetables?"

APPENDIX E
INSTITUTIONAL REVIEW BOARD APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

88

Date: February 27, 1998

IRB #: HE-98-052

Proposal Title: KNOWLEDGE AND ACCEPTANCE OF FRUITS AND VEGETABLES INTO THE
DIETS OF 4 YEAR OLD CHILDREN IN CHILD CARE

Principal Investigator(s): Lea L. Ebro, Michelle Naples

Reviewed and Processed as: Expedited/special population

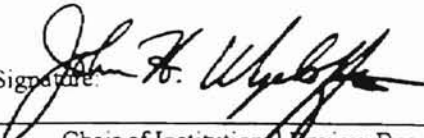
Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT
NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE
APPROVAL PERIOD.

APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR
PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE
SUBMITTED FOR BOARD APPROVAL.

ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:

Signature: 

Chair of Institutional Review Board

cc Michelle Naples

Date: March 4, 1998

VITA

Michelle Marie Naples

Candidate for the Degree of

Master of Science

Thesis: KNOWLEDGE AND ACCEPTANCE OF FRUITS AND VEGETABLES BY
PRESCHOOL CHILDREN

Major Field: Nutritional Sciences

Biographical:

Personal Data: Born in St. Louis, Missouri, On November 19, 1973, the daughter of Charles and Sally Naples.

Education: Graduated from St. John the Baptist Preparatory High School, St. Louis, Missouri in May 1992; received Bachelor of Science degree in Dietetics from Southeast Missouri State University, Cape Girardeau, Missouri in May 1996. Completed the requirements for the Master of Science degree with a major in Nutritional Sciences at Oklahoma State University in July 1999.

Experience: Worked for a family owned catering business 1991-1996; worked through college for residential dining services at Southeast Missouri State University 1992-1996; employed by Oklahoma State University, Willham Cafeteria as a caterer 1997-1998, Child Development Laboratory as a Graduate Assistant 1996-1998 and College of Human Environmental Sciences as an Extension Educator 1997-present; employed by Cushing Regional Hospital as Director over Nutritional Services Department 1998-present.

Professional Memberships: Kappa Omicron Nu Honor Society, American Dietetics Association, Oklahoma Dietetics Association.