PERCEPTIONS OF TULSA PUBLIC SCHOOL TEACHERS ABOUT NUTRITION EDUCATION

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NOMENCLATURE

kcal	kilocalorie
BW	body weight
gm	gram
mg	milligram
kg	kilogram
RE	retinol equivalent
µg	microgram
SFA	Saturated Fatty Acid
PUFA	Polyunsaturated Fatty Acid
MUFA	Monounsaturated Fatty Acid
USDA	United States Department of Agriculture
USDHHS	United States Department of Health and Human Services
AHA	American Heart Association
ACS	American Cancer Society
NCI	National Cancer Institute
NFCS	Nationwide Food Consumption Survey
CSFII	Continuing Survey of Food Intakes by Individuals
NHANES	National Health and Nutrition Examination Survey

YRBSS	Youth Risk Behavior Surveillance System
CDC	Center for Disease Control
WIC	Women, Infants, and Children
NET	Nutrition Education and Training
THTM	Teenage Health Teaching Module
HEI	Healthy Eating Index
ANOVA	Analysis of Variance

CHAPTER I

INTRODUCTION

Adults have become increasingly concerned about nutrition to prevent chronic diseases such as diabetes, coronary heart disease, cancer, and stroke. Approximately 35% of the adult American population (ages 20 and older), 14% of children, and 12% of adolescents are overweight and the numbers continue to rise (Getty & Evers, 1997). The National Health and Nutrition Examination Survey (NHANES) studies have brought a vast amount of knowledge pertaining to the American population and its health status. The NHANES II study found that only 9% of Americans surveyed consume at least 5 servings of fruits and vegetables on a daily basis, and only 3% of the study participants consumed the appropriate amounts in all of the foods groups (Blossom, Patterson, Black, Rosenberger, Pee, Kahle, 1990). Another study, the Youth Risk Behavior Surveillance System (YRBSS), determined that students at the secondary school level consumed less that the recommended servings of fruits and vegetables. Approximately 10% of females and 15% of males actually ate at least five servings of these food groups (CDC, 1992; Neill & Allensworth, 1994).

To encourage more healthful eating behaviors among Americans, government intervention, such as *Healthy People 2000* (USDHHS, 1991), *Dietary Guidelines* (USDHHS, 1995), and *Food Guide Pyramid* (USDA & DHHS, 1996), and non-

government intervention, such as dietary guidelines developed by the American Heart Association (1995) and American Cancer Society (1996), have been initiated.

Nelson (1992) reported information on the government's role in nutrition education. In 1991, one in six Americans participated in at least one food assistance program sponsored by the U.S. government including: Food Stamp Program, National School Lunch and Breakfast Programs, Child and Adult Care Food Program, the Food Distribution Programs, and the Special Supplemental Food Program for Women, Infants, and Children (WIC). The objectives for each of the programs are to provide safe, nutritious foods to participants, and nutrition education for participants to make appropriate food choices to aid in maintaining a healthy lifestyle. Changes to these programs over the past years have included reducing fat, sugar and salt content in commodities and school breakfasts and lunches, as well as providing nutrition information to arm participants with the information necessary for making educated decisions in purchasing, preparing and consuming a healthful diet.

Behaviors and attitudes about food/nutrition are greatly influenced by our families, friends, and even our culture. Although parents feel that children learn the majority of these behaviors at home, they are beginning to realize the impact of children's exposure to new foods and attitudes at school. With this exposure, children are developing additional food likes and dislikes not ordinarily seen in the home (Wright & Radcliffe, 1992). Habits are learned at an early age, therefore teaching healthful eating behaviors and attitudes to children is important for long-term health benefits. This is especially important since adults find changing long-term behaviors more difficult than children do.

Children spend the majority of their day in school, an average of nine to ten hours each day (Wright & Radcliffe, 1992). The time children spend at school has only increased with extended day care and after-school activities.

With children spending many hours at school, schools can be an excellent source of nutrition information, provide exposure to new foods, and encourage changes in eating behaviors (USDHHS, 1996). Schools can reach the majority of the children in their community. Schools employ skilled personnel who have the ability to provide the information necessary to change eating behaviors, the environment to practice these skills, and the education needed to resist social pressures associated with inappropriate eating behaviors. Evaluations of previous research suggest that school-based nutrition education can improve the eating behaviors of children and adolescents (USDHHS, 1996).

In 1991, only nine states required nutrition education to be taught as a subject in the school and an additional twenty-one states required nutrition to be included as a topic in certain subjects such as health and home economics (Shannon, Mullis, Bernardo, Ervin, Poehler, 1992). However, many school systems are discontinuing these subjects as a mandatory part of their scholastic options thereby minimizing students' exposure to nutrition education. It is because of this limited exposure to nutrition education that teachers at the elementary and middle school levels should integrate nutrition into their classroom activities.

Elementary teachers teach a variety of subjects within their classrooms. Many have the option of choosing topics within specific subjects (i.e. food/culture in social studies, nutrient/calorie needs of the body in science, etc.). Selection may be based on teacher

preference, time allowance, expense of curriculum or materials, interest of students, and/or support of administration. Therefore, teachers' perceptions of nutrition education in the classroom are very important.

The American Cancer Institute (1993) developed the National Action Plan for Comprehensive School Health Education. This program was developed to provide a guide for organizations to develop their own Comprehensive School Health Education program. This model included all possible factors that could influence a child's eating behavior: 1) school environment, including all administration; 2) school health education, involving teachers and librarians; 3) school health services - nurses, registered dietitians, and physicians; 4) physical education teachers/instructors; 5) school counseling - counselors, social workers, and psychologists; 6) school worksite health promotion - staff and faculty members; 7) integrated school and community programs - parents, peers, community members, and local businesses; and 8) school food service programs - food service directors, dietitians, cooks and other food service staff. Within each of these components, activities were developed to aid the changes in eating behaviors including policies, training/inservices, instruction, media use, role modeling/social support, direct intervention, and environmental/facility changes. The authors suggest that focusing on these activities in all component areas will provide consistent messages to children on appropriate eating behaviors.

With the development of the School Breakfast and Lunch programs, many children eat one to two meals at school. These meals must provide adequate nutrition to meet the needs of the students for two-thirds of the food/nutrients consumed per day if both programs are utilized. Changes are being made in school meals to decrease the amount of

fat to thirty percent of calories to meet the *Dietary Guidelines* while maintaining adequate nutrient levels to meet the needs of school-age children (Nelson, 1992). With these changes, teachers, along with food service personnel, can use meal services to demonstrate and promote healthful eating behaviors.

Teachers are considered to be role models for students, therefore, they can influence students' eating behaviors by teaching the importance of nutrition and providing opportunities for students to choose healthful eating behaviors. However, teachers may often feel that lack of time limits the topics taught in their classrooms and may choose to exclude nutrition in their lessons. Teachers may also have limited or no nutrition materials/resources and activities available and choose not to include nutrition education in their lessons or minimize the amount of information they provide (Woodson, Benedict, Hill, 1995).

Achterberg & Clark (1992) conducted a study to identify theory- or model-driven research studies published in the *Journal of Nutrition Education* within the past ten years. Results indicated that over half of the studies were focused on the student, or learner. Almost one-fourth of the studies focused on the curriculum and/or testing, 12% focused on governance issues, and only 8.6% examined teacher characteristics or behaviors. The study reported here adds to our knowledge of teacher behaviors and perceptions of nutrition education.

Tulsa Team Nutrition Study

In 1995, The United States Department of Agriculture (USDA) provided a grant to Tulsa Public Schools in Tulsa, Oklahoma to participate in a nutrition research study called Team Nutrition. This pilot program was designed to improve children's health and

education by integrating nutrition education in their normal classroom activities. The study subjects were kindergarten, second, and fourth graders at eight schools in the school system. Four schools were chosen as the control group and four for the experimental group. Pre- and post- tests were given to all teachers and students. An extensive plate waste study was also conducted before and after the semester at the fourth grade level only.

Each experimental class received "Teacher Resource Kits" developed by *Scholastic, Inc.* and USDA (1995). Eight to ten lessons were taught in each classroom. The main focus of the lessons was on fruits, vegetables, and whole grains.

Student activities were also conducted at the experimental schools with the fourth graders. These activities included: Bread in the Bag, Cultural Menu Planning (with these meals served at school), Halloween Carnival Booth, Growing Herbs, Chef Presentations, and Snack Presentations. Parents were invited to attend these activities. The parents also received nutrition education through a monthly nutrition newsletter and a grocery store presentation on healthy eating. Results of the Team Nutrition study are pending.

Teachers' Perceptions

This study is an extension of the Team Nutrition research project because it focuses on those schools that volunteered but were not selected to participate in the actual USDA study. The teachers at these schools received questionnaires pertaining to their perceptions of nutrition education.

The objectives of this study were 1) to compare elementary and middle school teachers' perceptions of integrating nutrition education into classroom curriculum, 2) to compare teachers' eating behaviors to attitudes and use of nutrition education, and 3) to

determine if teachers who perceive greater benefits than obstacles would have healthier eating behaviors and provide more nutrition education than those teachers who perceive fewer benefits and greater obstacles. The design or approach to this study was to generate a semi-structured interview and a descriptive survey with a mailed questionnaire.

CHAPTER II

REVIEW OF LITERATURE

Several studies have identified learning behaviors, and changes in knowledge and attitudes after exposure to nutrition education. Most studies focus on the students and parents, but few focus on the teachers.

Nutrition Education for Children

Many studies have attempted intervention to aid children and adults in increasing their consumption of fruit and vegetables based on the recommendations from *Healthy People 2000* and *Dietary Guidelines.* One such attempt is the "5-A-Day" Initiative conducted by The National Cancer Institute (NCI) (Havas, Heimendinger, Damron, Nicklas, Cowan, Beresford, Sorensen, Buller, Bishop, Baranowski, & Reynolds. 1995). As part of the campaign to increase fruit and vegetable consumption, NCI provided grant money for nine research studies in nine different states to increase nutrition awareness, environmental support toward increasing consumption, and actual increased consumption of a variety of fruits and vegetables. Studies were conducted at schools and other community settings. The following are the school-based programs that were funded by the NCI grants:

1) *Louisiana: "Gimme 5: A Fresh Nutrition Concept for Students"*

This cohort study targeted ninth grade students in 19 high schools in New Orleans. The study followed these students through their senior year. Six pairs of schools were chosen for the actual study. The study began in the fall of 1993 and ended in the spring of 1997. The four components considered in this study were workshops and complementary activities, school meal and snack modification ("Fresh Choices"), school media and marketing campaign, and parent involvement ("Raisin Teens"). Workshops were conducted by coaches, health teachers and counselors. A total of six workshops were completed over the four year study. Activities that coincided with the lesson topics were reinforcement for the students learning. The activities were such things as French students learning the words of fruits and vegetables. "Fresh Choices" was a method of increasing the consumption of fruits and vegetables by increasing the availability in the school cafeterias and snack centers. Media and marketing campaigns used to increase awareness about fruits and vegetables included brochures, videotapes, posters, public service announcements, games, rap songs, and drama skits. Parents were encouraged to participate in the education of their children through the activities of "Raisin Teens." Parents were encouraged to increase the availability, variety, and taste of fruits and vegetables at home. Several methods were available: refrigerator tip sheets, cookbooks with monthly inserts, and cooking demonstrations by local chefs.

Focus groups of students within this study identified numerous obstacles limiting the consumption of fruits and vegetables in the school food service program. These obstacles were lack of availability, variety, and inconsistency in taste. Students indicated that they would like a school program which improved their diet and also included parent

involvement. A program was then introduced to the school using media and activities. After two months, 93% of students knew of the program and 96% were able to identify the message being presented through the program (Nicklas, Johnson, Farris, Rice, Lyon, & Shi. 1997).

2) *Minnesota: "5 A Day Power Plus Program"*

This study was conducted in 34 elementary schools in the St. Paul, Minnesota area. Each school was assigned as an experimental group or control group. The subjects were fourth graders and the study continued through the students' fifth grade year. Four activities were involved in the intervention: a) changes in the food service environment, b) classroom lessons, c) family involvement, and d) support from industry and the media. Through the changes in the food service environment, students were encouraged to increase their selection of fruits and vegetables. Environmental changes included training employees in proper preparation and presentation of foods; providing promotional information about fruits and vegetables as reminders at the registers; and offering incentives, such as card punches for "lottery tickets" after students selected ten servings of fruits and. Taste testing and nutrition lessons were used in classrooms to discuss fruits and vegetables. Foods were prepared by the students or were selected from the weekly breakfast or lunch menu. Homework assignments were used to involve family members. Activities included labeling fruits and vegetables in home as "Snack Power." Students were also able to educate family members by preparing "snack packs" at school to take home as appropriate snack models.

3) *Georgia: "Gimme 5 Fruits and Vegetables for Fun and Health"*

This project focused on families with children in the fourth and fifth grade. Previous research in this area indicated that students had increased consumption of fruits and vegetables only at school, therefore, this project included family intervention. Eight schools were assigned as the control group, while another eight schools were assigned as the experimental group. The goal for the school curriculum was to increase availability, preference, and consumption of fruits and vegetables at home as well as school and to improve children's ability to prepare fruit and vegetable dishes using "FaSST (fast, safe, simple, tasty) recipes." Newsletters were sent home to educate parents and encourage participation. Videotapes were also used to demonstrate appropriate eating behaviors. Taste testing booths with educational materials were available for parents at the grocery stores for additional encouragement of appropriate eating behaviors. Evaluations on consumption, availability, and preferences of fruits and vegetables at home were conducted at specific stages of the educational process.

4) *Alabama: "High-5-Alabama"*

This project focused on fourth grade students and their families in Birmingham and surrounding area. Twenty-four schools were selected for the study - 12 control and 12 experimental with approximately 5 fourth grade classes per school. Three areas were identified as the intervention points: classroom curriculum, parent intervention, and environmental intervention. The classroom curriculum was composed of 15 lessons to be completed during the study period. Teachers were assisted by nutritionists in presenting the sessions. Parent intervention included special events, newsletters, tip sheets, and educational sessions. A food fair presented to the parents by the students is one example

of the special events. Another such example is a taste testing presentation also done by the students for the parents. Homework assignments are also part of the parent intervention process. Activities were completed by student and parents to demonstrate appropriate eating and reinforce the lessons being presented in school. Food service workers were part of the environmental intervention. An increase in fruit and vegetable availability was one goal for this section. Food service workers used labels to identify specific fruits and vegetables, as well as taste testings, and demonstrations/displays to reinforce the information presented in the classroom.

Results from the Georgia, Alabama, and Minnesota studies were reported by Kirby, Baranowski, Reynolds, Taylor, & Binkley. (1995). Focus group discussions were held with students to evaluate the differences in fruit and vegetable consumption based on environmental, personal and behavioral differences across different socioeconomic levels. Results indicated that children from families in the middle to high income level had a greater availability and variety of fruits and vegetables in the home. Whereas, children in the lower levels of income had fewer opportunities to consume fruits and vegetables and typically were responsible for meal preparation in their homes. The majority of fruits and vegetables available to the lower income level children were canned and/or frozen. Fresh fruits and vegetables were considered expensive. Children indicated they felt vegetables were "grown-up" foods which parents made them eat, but did not feel that way about fruits. However, all income level participants felt that "fruits and vegetables will make you healthier."

Surveys have been conducted to determine students' interest and needs in nutrition topics and preferred learning styles. The top nutrition topics reported by Murphy, Youatt,

Hoerr, Sawyer, & Andrews. (1994) in a study of 18 fifth, eighth, and eleventh grade classes in schools in the Michigan area were weight control, techniques for diet improvement, and nutrition and disease. Information about the Food Guide Pyramid was preferred more by elementary students. Middle schools students had very little interest in any topics. High school students were more interested in weight and diet control/improvements. Dietary fiber was of least interest to all age groups.

Murphy et al. (1994) determined nutrition education needs by students' responses to questions pertaining to the Dietary Guidelines. The number of correct answers depended upon the amount of exposure to previous nutrition education related to the Dietary Guidelines as well as the amount of teacher training received before the units were taught. Few students knew the correct number of servings of each food group. Knowledge about healthy weight maintenance and weight loss methods increased with age, while students of all age levels knew about health risks associated with low weights. Knowledge about fat, fruits and vegetables, sugars, and salt was high, but students indicated poor knowledge in food sources of fat. Students were not interested in fiber or reducing sugar and salt in the diet. Student attitudes toward school lunch were also evaluated. Responses indicated that students did not agree that "school lunches are good for you." However, responses indicated that students typically purchased their lunches from the cafeteria. Convenience seemed to be the major influence in purchases rather than taste or nutritional values.

Devine, Olson, & Frongillo. (1992) conducted a study of junior high students in New York State schools who had received instruction from the *Nutrition for Life* curriculum. Seventh and eighth grade students were given a post-test after receiving

nutrition education. Some students had been exposed to the *Nutrition for Life* curriculum and some had not. A comparison of nutrition knowledge, attitudes, and self-reported behaviors was conducted between the two groups: users of the curriculum and non-users of the curriculum. However, upon completion of the study, three groups had developed: users of the curriculum (NFL), non-users who taught nutrition (TEACH), and non-users who received no nutrition education (NO TEACH). Results indicated that the average number of hours of nutrition taught was 10 hours. The range of hours taught was 2 to 50 hours during the school year. Home and career skills classes were the main subjects where nutrition was taught. The NFL students from home and career skills classes had significantly higher attitude and behavior scores than home and career skills students in the TEACH group. However, no differences in attitude or behavior scores were found between the home and career skills NFL group and the NO TEACH group. Unfortunately, no difference in knowledge scores were found among the groups. Health NFL students had significantly higher scores in knowledge and attitude than the NO TEACH Health group, but no differences were found in behavior scores. Both the NFL and TEACH Health groups had similar scores in knowledge and attitude scores. The amount of time spent on nutrition instruction also had a significant positive impact on attitude and behavior scores with the low-income students, but not necessarily with the higher-income students.

Connell, Turner, & Mason. (1985) reports on results from the School Health Education Evaluation (SHEE) which involved more than 30,000 students (grades 4-7) from 20 states. In this paper, overall knowledge, attitude, practice and program-specific knowledge are identified in order to examine school health education. Increases were

identified in overall knowledge and program-specific knowledge based on results from pre- and post-tests administered to participating students in the control and experimental groups. Students who were involved in health classes had a higher score increase than students who had no health program available. Effectiveness of the program was dependent upon the degree of implementation in each classroom and priorities identified by teachers and program developers. Implementation was affected by the amount of training participating teachers received. The most effective programs were those where teachers provided full implementation of educational resources.

Contento, Balch, Bronner, Lytle, Maloney, Olson, & Swadene. (1995) concluded that nutrition education for children was more effective when it focused on behavioral changes. Interventions were more effective when methods were related to behavioral changes and addressed the need to provide adequate time and resources for teaching. Family involvement only enhanced the effectiveness of the programs. Self-evaluation and assessment provided older students with the feedback necessary for positive behavioral changes and increases in knowledge. For a program to be completely effective, environmental resources, in the school systems and in the community, must be utilized.

Teachers' Nutrition Education Teaching Methods

Woodson et al. (1995) reported on a study conducted to evaluate the education needs of teachers in public schools in northwestern Nevada and how to best provide for those needs. A total of 295 teachers from elementary, middle school and high school were surveyed. Middle school and high school teachers' responses were combined as one group and labeled "Secondary Teachers." Three objectives for this study were identified: to determine how nutrition was taught in their school, how they preferred it be taught, and

what were the nutrition education efforts in their classroom. Results indicated that approximately half of the elementary teachers included nutrition in health, one-third in science and/or physical education. Preferences of elementary teachers were supportive of nutrition being taught in health (66%), science (40%) and physical education (41%). Seventy-five percent of secondary teachers indicated that nutrition was taught in home economics or life skills classes, half in health, and/or one-third in physical education. Preferences of secondary teachers indicated support for nutrition education in home economics (79%), health (66%), and physical education (40%). The majority of all teachers indicated that nutrition education was important. Eighty percent responded that nutrition education should begin at an early age (K-2).

Woodson and coworkers' (1995) second objective was to assess the availability, utilization, and satisfaction with existing nutrition resources/support. Secondary teachers indicated that home economics teachers were the most helpful resource and elementary teachers responded that the Dairy Council was their most useful resource. However, many teachers (68% elementary and 38% secondary) indicated that they had not searched for support/resources. Many felt resources were limited in availability.

Woodson et al. (1995) also explored teachers' preferences regarding continuing education. In-services, newsletters, and self-study programs were the continuing education methods identified as most preferred by teachers. Seventy-three percent of the respondents showed interest in attending in-services, 70% showed interest in receiving newsletters, and 67% showed interest in participating in self-study programs. Personal interest was also evaluated using an eight-item rating scale. No relationship was found between interest in healthful eating and nutrition education efforts.

Gates, McDonald, & Dalton. (1994) conducted a survey using a questionnaire to determine the status of nutrition education in the Missouri school systems. A questionnaire was developed that requested information on grade level and subject taught, education preparation in nutrition, number of hours of nutrition taught, subjects where nutrition and specific concepts taught. Information on methods and concepts preferred were also obtained through the questionnaire. Respondents were divided into two groups: teachers who taught five or more hours of nutrition (n=494) or less than five hours of nutrition (n=299). Teachers who taught five hours or more were more likely to teach secondary school (biological science, health, home economics, and/or physical education) and to have one or more hours of nutrition education as part of continuing education. Elementary teachers incorporated nutrition into more than one subject (i.e. health, science, language arts, and social studies), but taught fewer hours of nutrition than secondary teachers. However, all teachers felt nutrition education had a positive effect on thinking, feeling, or eating behaviors of their students. Most reported an increase in student interest in and/or knowledge of nutrition. Teachers also felt that nutrition education encouraged students to eat better snacks and meals. Secondary teachers also indicated that students were more aware of food composition and were less likely to follow fad diets.

In a follow-up study, Reicks (1996) reported a personal communication (1996) on a questionnaire distributed to 194 elementary teachers in Minnesota. The survey was comprised of four parts; background information about the teachers, such as the number of students in class and previous nutrition education received; nutrition concepts taught;

teachers' experiences with student assignments requiring parental assistance; and teachers' perceptions on the effectiveness of parental assisted nutrition assignments.

Sixty-four elementary teachers (34 teachers of grades K-2; 30 teachers of grades 3-5) returned the questionnaires. Ninety-five percent of the teachers indicated they had studied some nutrition, but only 19% reported having taken one or more college nutrition courses. Teachers reported teaching 1-10 hours per school year with the upper elementary, grades 3-5, teaching more than the lower elementary, grades K-2. All teachers reported teaching nutrition either as a separate subject or integrated in other subjects with the health curriculum as the most prominent subject in which nutrition was integrated. The top concepts taught were "making good snacking choices," "food groups and serving sizes," "eating more fruits, vegetables, and grains," and "eating less sugar, fat, and salt." The majority of teachers regularly assigned homework which required parental assistance. Eighty-three percent indicated that parent involvement in nutrition assignments "enhanced what the student learns about nutrition" and 78% indicated that it "enhanced family relationships and interaction." Homework activities reported as most useful were "hands on experimental kits," "healthy recipes to make with their child at home," "checklists to post on the refrigerator," and "games and activities about nutrition and healthy eating habits." Teachers indicated that "lack of time" was the major factor for parental non-participation. Rewards or incentives were ranked as the best strategies to encourage increased parent involvement.

Norton, Galciglia, & Wagner. (1997) conducted a study to evaluate nutrition education in Ohio elementary schools based on teachers' perceptions and to determine areas most appropriate for intervention to improve education effectiveness. A

questionnaire was developed and distributed among a random sample of elementary teachers throughout Ohio (n=1000). The questionnaire obtained information on demographic data, teachers' opinions on their role in nutrition education and the effectiveness on students, and teacher training. Data was also collected on the number of hours of nutrition taught, concepts taught and formats used, and collaboration and/or interaction of teachers and food service personnel. Many factors were assessed to determine the probability of nutrition being taught in the classroom. These factors that influenced increased teaching of nutrition included were: whether teachers had taught the subject before, had access to nutrition teaching materials, had attended a workshop/ in-service on nutrition, and were regular classroom teachers, not specialized subject teachers.

Approximately half of the teachers returned the questionnaire (n=534). The average number of years taught was 16 ± 8 (mean ± SD) years. The range was 1 to 39 years. Almost all of the teachers reported that elementary teachers should provide nutrition education in their classrooms to increase students' knowledge. One-fourth felt that students should acquire skills in shopping and preparing healthy meals and/or snacks and few teachers reported that reduction of chronic disease risks should be a major goal of nutrition education. The majority of teachers believed that nutrition education was effective in increasing knowledge and interest in nutrition, and selecting nutritious snacks. Only one-fourth of the participants had attended an in-service/workshop on nutrition within the past 5 years. Teachers reported teaching 1 to 20 hours of nutrition during the school year, and 67% indicated they taught nutrition only during one-quarter of the school year. Most lessons on nutrition were integrated into other subjects, health and

science being the most popular subjects of integration. Topics most often included in the lessons were healthy snacks, food groups, eating a variety of foods, nutritious breakfasts, and food and fitness. Hands-on activities, including tasting parties and snack preparation, were among the most effective. Obstacles identified by the teachers included lack of funds, limited supervision for activities, lack of recipes, and unsupportive administrations for in-class food preparation. When questioned about interest in nutrition, teachers reported a moderate interest, but indicated they "don't know" about parents', school administrators', or food service personnel's interests. Results indicated that teachers were generally interested in working with school food service personnel, but that teachers did not feel that lunches were appropriate for demonstrating good nutrition. The problems indicated by teachers were fat and calorie content and excessive processed food items served.

Teachers' Perceptions About Specific Curriculum

Hammond, Barr, & McCarger. (1994) conducted a study focusing on teachers' perceptions of an early childhood nutrition education program. The program, known as *Foodstyles: K* was developed for kindergarten curriculum. Teachers wishing to use the program were required to attend an in-service workshop to receive training to teach this curriculum. A survey was mailed to each teacher who attended the in-service workshop. Approximately half (49%) of the questionnaires were returned: 24% never used the program; 29% were not currently using the program, but had used it in past years, and 47% were currently using the program. Respondents not currently using the program or who never used it, did so mainly because they did not teach kindergarten. The second response was related to limited time factors. Other reasons included established lesson

plans, preferences of teaching nutrition incidentally and organization time requirements. Teachers who reported currently teaching the curriculum indicated that they taught nutrition in some classroom activities, all classroom activities, as its own unit, or a combination of methods. The average number of times they taught nutrition was one to two times each month. The majority of teachers taught the curriculum all ten months with the next largest response teaching the curriculum in only one month. The activities used by the majority of the participating teachers were Cooking activity, the *"Look What I Tried"* journals, and the *"I Tried It!* stickers, but only 36% used the *"I Tried It" Class Club* activity. Of the four activities, *Cooking* was ranked as the most useful. Students were ranked as "very interested" in activities and parents were "somewhat supportive."

Olson, Devine, & Frongillo. (1993) described a study that was conducted in New York State public schools, focusing on teachers at the secondary level. Approximately 1300 teachers of health, home economics, and physical education were surveyed from schools throughout the state to evaluate the *Nutrition for Life* curriculum. A questionnaire was developed to determine if teachers had received the curriculum materials, used the materials, and the number of hours the curriculum was taught. Upon completion of this study, researchers found that half of the junior high teachers and 1/3 of the senior high teachers had received the curriculum materials. Three-fourths of the teachers who received the materials used them. Teachers with more low-income families tended to utilize the materials more than teachers from higher income schools. Teachers who used the curriculum to teach more hours of nutrition were usually health teachers. Teachers who used the curriculum to teach fewer hours of nutrition were usually home economics

teachers. Teachers who attended a training in-service were more likely to use the curriculum.

A study involving The Teenage Health Teaching Modules (THTM) (Allensworth, 1994) evaluated teacher training and student responses. Results indicated that teachers with a background in health were more confident in the materials than those teachers without prior education. However, participation in training did not increase the number of hours spent teaching nutrition in the classroom.

Ross, Luepker, Nelson, Saavedra, & Hubbard. (1991) also discussed this study, the Teenage Health Teaching Modules, designed to require no teacher training. The study consisted of 85 schools and approximately 75% of the teachers were assigned to receive pre-curriculum implementation training. The purpose of the study was to identify if trained teachers perceived more preparedness than untrained teachers and if trained teachers would attain greater knowledge, attitudes, practices and behaviors in their students. Ross et al. (1991) felt that trained teachers would be more effective and have greater success with the THTM curriculum implementation than non-trained teachers.

Results indicated that trained teachers felt more prepared to teach the curriculum than non-trained teachers. Trained teachers also had more success implementing the THTM curriculum than untrained teachers. However, no significant difference in proficiency was found between the two groups.

Brown & Park (1986) conducted a survey of 24 elementary school in eastern New York to evaluate nutrition education needs. Upon completion of the survey results indicated that 29% of teachers did not teach nutrition and those teachers who did teach nutrition averaged about 1.7 weeks of nutrition education per school year.

After the survey results were analyzed, a nutrition education program was developed. This program was piloted at an elementary school with one teacher from each grade level participating The program was called Project HAND (Health and Nutrition Development) and it was an in-service training program which consisted of a workshop followed by a two-day planning session and two-hour follow-up workshops held after school each month. Participants in the program were teachers, foodservice personnel, school nurse, principal, parents' representative, and school health coordinator. The beginning workshop presented nutrition information, teaching materials and resource lists. The planning session included activities such as outlining program goals, planning activities to meet those goals, and ordering needed materials. The objectives for the monthly workshops were to disseminate information, develop lesson plans, provide feedback to participants about experiences, and coordinate additional activities for all grades. Teachers were allowed freedom with teaching methods, and therefore, some teachers taught lessons as single units while others chose to incorporate the information throughout the school year. The program was evaluated by pre- and post-tests given to students to evaluate the change in knowledge and pre- and post-surveys given to teachers to evaluate changes in use of resources, time spent teaching nutrition, materials used and parent participation.

Results from the student tests indicated that knowledge of nutrition increased significantly after the program, except for the sixth grade class. Teachers' surveys reported that availability and use of resources increased, and the amount of time spent on nutrition education more than doubled. Parent participation increased dramatically, approximately 46% increase.

Shannon, Marbach, Graves, & Sims. (1981) conducted two studies that included 125 kindergarten though sixth grade teachers who used the *Nutrition in a Changing World* curriculum. Each teacher received teacher training study guides, in-services, or 45-hour training course and completed a pre- and post-study assessment to evaluate nutrition knowledge, attitudes, and commitment to teach nutrition. Results indicated that teachers' knowledge of nutrition increased with the level of training, but training did not increase the level of commitment to teaching. Positive correlations were found between teacher knowledge scores and attitude toward teaching nutrition, and student knowledge scores and teacher training levels. Attitudes toward nutrition education were positively changed after use of the curriculum and the majority favored nutrition education in the school curriculum.

Teachers' Perceptions on Nutrition Education Workshops/In-services

Similar studies involved training by Nutrition and Education Training (NET) programs. Farthing, Graves, Turchi, & Smith. (1989) conducted a study to assess teachers' perceptions of curriculum materials and training program effectiveness. A questionnaire was distributed among teachers in eight schools participating in the North Carolina NET program and eight schools who did not participate in the program. Results indicated that teachers who were involved in NET schools were more likely to participate in these workshops than teachers who were in non-NET schools. Positive attitudes toward teaching nutrition and school food services were identified. Teachers from the NET participating schools felt less pressure toward time limitations for teaching nutrition.

Roberts-Gray, Sparkman, Simmons, Buller, & Engquist. (1989) conducted five studies to evaluate changes in knowledge, attitudes, and behaviors in personnel in

licensed day care facilities through the Texas Nutrition and Education Training (NET) Program. The studies focused on three questions. The first question was, "Can single, brief, (4-8 hours) workshops be relied on to improve child nutrition related knowledge and attitudes of child care personnel?" To determine the answer to this question, a pre- and post-test on knowledge related to child nutrition was given to 80 participants in a workshop. Results indicated that knowledge scores were higher in the post-test than the pre-test and attitudes were also higher, although attitudes toward nutrition were positive before the workshop.

The second question was, "When nutrition education materials are made available, do teachers use them?" Two studies were conducted to determine the answer to this question. Teaching materials on nutrition were made available to the participants of the workshop through a lending library of the Texas NET Program. A feedback form was developed to identify the use of this lending library. Unfortunately, the participants of the workshop did not utilize this resource. Only four of the participants from the workshop made use of the library. The second study focused on aiding teachers and food service personnel to apply the information received at the workshop. Nutrition teaching materials and food service management materials were distributed to the cooperating facilities. Questionnaires were distributed to inquire about the use of these materials along with an attitude scale toward the use of the materials. Results indicated that the materials were used at least once and most were used "many times."

The third question was, "Are children's opportunities to learn nutrition education, and practice appropriate eating habits in the facility, improved when workshops and nutrition materials and are provided to teachers and food service personnel?" Two studies

were also conducted to determine if the training and materials influenced improvement in the nutrition education and also menu planning for the children in the facilities. A questionnaire was distributed among workshop participants and randomly selected non-participant child care facilities to determine the number of hours of nutrition taught in their facility. Results indicated that attending the workshop did not increase the number of hours of nutrition presented in the participants' facility. The number of hours spent on nutrition education was similar between the workshop participants and the non-participants. The second study evaluated the menus for a ten day period from each of the workshop participant facilities. The menus were then analyzed for nutrient content and sensory appeal using a utility model. Results indicated that the menus did not improve after attendance of the workshop. Menus were virtually the same. Evaluation of the menus indicated that protein, vitamin A and C were adequate, but calorie and iron content were low or inadequate. Meals presented at the facilities were scored high in variety of color, but low in variety of fruits.

Similar results were found with another teacher training study using 50 classes in 22 schools with 1394 fifth and sixth grade students (Tinsley, Houtkooper, Engle, & Gibbs., 1985). Four separate groups were identified for this study: teachers who received no nutrition education training (control group), teachers who received a one-hour session/orientation, teachers who received a three-hour nutrition-fitness training session with monthly consultations during the study, and teachers who received a 15 hour training session on nutrition-fitness. Results indicated that all teachers used the curriculum similarly, but the group that received the extra consultations implemented more of the activities than the other groups.

Rye, Hunt, Nicely, & Shannon. (1982) conducted a study involving teachers of grades K-6. A 45-hour nutrition education course was developed to provide training to the teacher. Twenty teachers completed the course with a post-study questionnaire to determine the responses of teachers to the objectives, content and usefulness of the course. Teachers indicated they felt the course was very effective for the improvement of their diet and understanding and presenting nutritional needs throughout the lifecycle. Some of the favored topics presented were obesity, conservation of nutrients in food, and vegetarianism. Many teachers indicated that "hands-on" activities and lesson plans were favored methods of learning. The course was revised and then distributed to 112 teachers, preschool and above. A post-course questionnaire was provided and a follow-up questionnaire was distributed six months later. Both questionnaires tested the objectives of the nutrition workshop. Teachers felt the course was beneficial with use of teaching techniques and text as most favored. Teachers reported suggestions for course improvements, such as increase the number of nutrition education teaching techniques, decrease self-instructional material, and/or have more group discussions. Outcomes from attending the in-service desired by teachers were an increase in basic nutrition knowledge and improved nutrition teaching methods for classroom instruction. From the follow-up questionnaire, teachers reported "teaching of general nutrition," preparing "nutritious snacks," and provided "lessons on dental health." Time limitations were the major obstacle encountered when teaching nutrition in the classroom.

Stark & Johnson (1981) conducted a 3-hour workshop for home economic teachers after surveying 600 teachers in Oregon about nutrition topic choices. The objectives for the workshop were to provide nutrition information, to demonstrate teaching techniques,

and to familiarize teachers with teaching materials. Sixteen workshops were attended by 180 home economic teachers and 76 nonteachers. One hundred thirty eight teachers completed the pre- and post-workshop questionnaires followed by a one month follow-up questionnaire. Post-workshop and follow-up questionnaire scores indicated an increase in knowledge compared to the pre-workshop questionnaire. Approximately half of the teachers reported using the materials obtained form the workshop and almost all the remaining teachers intended to use them in the future.

Neafsey, Jensen, & Burklund. (1985) reports on a study which evaluated a nutrition education course on the post-baccalaureate level. The study included 140 elementary and 30 home economics teachers. Nutrition knowledge was evaluated to assess effectiveness of the course and the amount of nutrition education taught was assessed on year after completion of the college course. The course objectives included increasing teacher nutrition knowledge and the relationship between nutrition and growth and development, increasing teachers' abilities to evaluate advertised nutrition information and education materials, and increasing teachers' abilities to adapt, develop, and use different teaching methods.

A pre- and post-test was given to participants of the nutrition course. Results of these tests identified a significant increase in nutrition knowledge and home economic teachers scored higher on both pre- and post-tests than the elementary teachers. The majority of participants indicated a positive attitude toward the course and the activities included. Recommendations on changing the course were decreasing technical information and the amount of work and increasing teaching methods. Follow-up questionnaires were distributed six and 12 months after the nutrition course. A total of

115 teachers returned the questionnaire. The majority of teachers reported teaching nutrition in their classrooms and sharing the information with other teachers who did not attend the nutrition education class. Results indicate that teachers with previous experience in teaching nutrition may have contributed to the amount of implementation of nutrition education after completing the nutrition course.

Parents' Perceptions on Nutrition Education

Reicks, Macpherson, & Haggans. in a personal communication (1996) reported on a study which involved three focus group interviews. Participants from these focus groups were low-income parents of school-aged children. These interviews were conducted in preparation for the development of nutrition homework that requires parental involvement. Discussions among the focus group participants included children's homework schedule and attitudes toward homework, parents' ability, willingness and commitment to assisting with student's homework, and ideas for homework with which parents would like to help their children.

Twenty participants were included in the focus groups. Topics discussed in the focus groups were students' homework, students' attitudes toward their homework, incentives for completion of homework, the amount of homework, and parents assistance with homework. The most important subjects identified by parents were math, reading, and spelling, but when questioned about nutrition they felt it was an important subject. Parents identified specific nutrition topics they felt were beneficial: diets for athletes, good sources of calcium for those who don't drink milk, how to pick out healthy foods instead of fast foods, how to avoid fat, getting kids to eat nutritious foods at a young age, choosing fruits and vegetables, overweight issues, cutting out candy, what a serving size

is, the importance of drinking milk, and helping kids eat healthier foods after school. When discussing specific nutrition topics, a lack of knowledge by parents was identified by the focus group leaders indicating a need for parental education as well as student education in nutrition.

Koblinksy, Guthrie, & Lynch. (1992) conducted a study to evaluate a parent education program involving the parents of Head Start preschool students in New York City and Maryland. Participants (mothers) in the study were divided into two groups: treatment and control groups. The treatment group received 13 weekly nutrition newsletters and attended four workshops on child nutrition, food shopping, and meal planning and preparation. Each participant completed a pre- and post-study interview to evaluate the preschoolers' food consumption and food-related behaviors. Results indicated that after the presentation of newsletters and workshops, children in the Maryland treatment group had indeed increased their consumption in varieties of foods and a more nutritious diet. However, no differences in diet or eating behaviors were found in the New York groups. Both states' treatment groups indicated a positive change in families' meal planning and preparation and food shopping practices compared to the control groups. Results indicated that a positive effect on parents' and children's food-related behaviors can occur in families not consuming the appropriate number of servings of foods with adequate nutrition education and participation.

Summary

Contento, Manning, & Shannon. (1992) conducted a literature review of major school-based nutrition education research studies completed in the 1980s. Results from this search indicated that most studies consisted of only 10-15 hours of instruction over a

3-15 week period. Studies were found to be effective in increasing teacher and student nutrition knowledge and food choice skills. Attitude changes were not consistent, but were overall positive. Teachers who received more training taught more hours of nutrition education. If parents were involved in the study, the classroom assignments and lessons were enhanced.

Studies which identified training effects on teachers' knowledge had significant increases. In-service preparation had a positive effect on the amount of nutrition curriculum use, supplemental material use, and also provided for positive changes in teaching methods. For the majority of these studies time limitations were the major obstacles encountered by teachers when teaching nutrition. Student outcomes in most studies were positive in relation to increases in knowledge . Overall, studies indicated that the length of time spent on nutrition education was not as critical as continuous training.

For effective changes in behaviors and attitudes, teachers and students require continued training and reinforcement as these changes are gradually made. Teachers need time to use the information during the training and then be allowed to discuss with colleagues the benefits and obstacles encountered when teaching. For effective learning, teachers need "hands-on" activities to adequately understand and assimilate the information provided at in-services. Feedback is necessary for teachers to adequately incorporate nutrition into their classrooms and have confidence that the information is accurate.

Nutrition education that is effective must be continuous over a long period of time. Changes occur slowly and teachers and students need time to adjust and learn new

methods of teaching and learning. Nutrition education must be continually updated and maintained in order to provide accurate information and maintain interest and motivation (Contento, Balch, Bronner, Lytle, Maloney, Olson, & Swadene., 1995).

CHAPTER III

METHODS

This chapter discusses the procedures used to conduct teacher interviews, design and administer the questionnaire, and analyze the data. The design or approach to this study was to generate a semi-structured interview and a descriptive survey with a mailed questionnaire.

Study Population

Teachers in the elementary and middle schools in the Tulsa Public School system were petitioned by letter for interest in the use of the Team Nutrition curriculum and student activities by the Team Nutrition study director, Lisa Griffin, RD/LD. Twenty-nine schools responded positively to the petition. All elementary schools who were interested received copies of the Team Nutrition curriculum before this study; however, the middle schools did not receive materials since curriculum for that age groups was not yet developed.

This study involved the schools that volunteered but were not selected to participate in the USDA study. Teachers in 19 elementary schools and 10 middle schools were surveyed.

Teacher Interviews

Each school's principal appointed a contact teacher to receive study information to be distributed to the remaining teachers. A letter of petition for interview volunteers was sent in November 1996 to each contact teacher and circulated among the faculty. The letter to the principals is in Appendix A and the letter for each contact teacher is in Appendix B. The objective of the interview was to obtain faculty's reasons for choices of nutrition education topics, motivations for topic selections, and obstacles and benefits encountered when including those topics in their curriculum. A form for volunteering was to be completed and returned by those wishing to participate. The appeal letter for interview volunteers is in Appendix C and the consent letter to participate is in Appendix D. Response to the petition was minimal.

Seven semi-structured interviews were conducted in person or by phone in January and February 1997. When a repetition in responses to the interview questions began, additional interviews were felt to be unnecessary (Krueger, 1988). The interview questions are outlined in Appendix E. Each interview took approximately 20 to 30 minutes depending upon the amount of time spent on nutrition topics in the classroom and the interest of the volunteer.

Questionnaire

The responses to the interview questions, along with questions from the survey developed by Gates et al. (1993) and Woodson et al. (1995) were used to develop a three part questionnaire. A copy of the questionnaire is in Appendix F. The first part of the questionnaire obtained background information about the participant including the number of years taught, subjects taught, grade level(s), and educational preparation

related to nutrition. The second section, titled *Food and Nutrition Curriculum*, was developed to determine the number of hours of foods/nutrition taught in the classroom, the topics chosen, perceived effects of education on student behaviors, and perceived obstacles and benefits. The third section obtained the teachers' needs for additional nutrition education materials. Questions requested information on concepts/topics and formats that would be most useful.

A Food Intake Form was attached to the questionnaire. A copy of this form is in Appendix G. The form requested age, gender, height, weight, pregnancy/lactation status for females, and amount and type of food consumed on a typical school day. Results from this form were evaluated for nutrient intake using the Food Processor IV computer program. Personal information was input into the program along with each item listed on the Food Intake form. The information was then evaluated for nutrient content and adequacy for that specific person based on gender, age, height, and weight.

The Nutrient Intake Feedback request form was completed by those teachers wishing an analysis of dietary intake based on their Food Intake form. The Feedback Request form is in Appendix H. This was the only form that requested a name for feedback. Names were not received from those participants who did not complete the request form.

Each subject received a packet containing a) a cover letter printed one-sided on 8.5" x 11" paper with instructions on completing the questionnaire *(Appendix I)*, b) the questionnaire printed two-sided on 11" x 17" paper, c) the Food Intake form printed two-sided on 8.5" x 11" paper with instructions for completion, and d) the Feedback Request form which was printed on one-sided 8.5" x 11" paper. All pages were placed in 9" x 12"

envelopes which were numbered and mailed through the school mail to participating schools prior to spring break for the elementary schools and after spring break for the middle schools. The school office manager was given distribution instructions. Packets were to be completed and returned within a two weeks of receipt by teachers.

The study was approved by Oklahoma State University Institutional Review Board for Human Subjects prior to distribution. The approval form is in Appendix J. Further approval was received by the Tulsa Public School Assistant Superintendent for Curriculum and Instruction and other administration directors. This approval request form and approval form are in Appendix K and L.

Data Analyses

Objective one was to compare elementary and middle school teachers' perceptions on integrating nutrition education into classroom curriculum. Elementary teacher responses were compared to middle school teacher responses in questions 5, 8, 11, and 14 of the Teachers' Perceptions Questionnaire using Chi-square analysis. Questions 5 and 8 pertained to the appropriate age level at which children should begin receiving nutrition education and whether this information should be taught as a separate unit or integrated into other subjects. Question 11 pertained to the perceptions of barriers; question 14 pertained to the teachers' perceptions of benefits. The number of benefits and obstacles identified by elementary and middle school teachers were summed for each teacher.

Objective two was to compare eating behaviors to attitudes and use of nutrition education. Teachers' food intakes were evaluated using the "Healthy Eating Index" (HEI) (USDA, 1990). The Healthy Eating Index evaluates the adequacy of an individual's

dietary behaviors by scoring ten components: five food groups and five dietary guidelines, each component receiving a maximum score of 10. The score for the five food groups is dependent upon the minimum number of servings recommended for each food group using serving sizes based on Food Guide Pyramid. Subjects consuming the appropriate number of servings in a food group achieved a score of 10, whereas, subjects consuming no servings in that food group received a score of 0. Each subject received a score of 10 if a dietary guideline was met (i.e. Component 6 - subject whose total fat intake was not greater than 30% of calories received a 10 and subject who consumed greater than or equal to 45% of calories received a 0. (Kennedy et al., 1995). Teachers' HEI scores were correlated with the approximate number of hours the teacher has taught or will teach nutrition during the school year (question 6), and the number of nutrition concepts included in the teacher's classes (question 9).

Attitudes toward nutrition were obtained from responses to questions 16 and 18-20. Responses to the students' interest in nutrition (question 16) and to teachers' perceptions of personal changes in eating behaviors (questions 18-20) were compared to HEI scores and the number of benefits and barriers using Analysis of Variance (ANOVA).

Objective three was to determine if teachers who perceive greater benefits than obstacles have healthier eating behaviors and provide more nutrition education than those teachers who perceive fewer benefits and greater obstacles. Teachers who perceived more benefits than barriers were compared to teachers who perceived more barriers than benefits. T-test was used to compare these groups by the number of hours of nutrition education taught in the classroom and HEI scores. Interval data are expressed as mean

Standard Deviation (SD). A significant level of at least .05 was used to determine statistical significance in all calculations.

CHAPTER IV

RESULTS

Of the 912 questionnaires distributed to the teachers in 19 elementary and 10 middle schools, 94 were returned (46 elementary packets and 48 middle school packets) indicating a return rate of 10.3%. However, only 65 teachers submitted the Food Intake Form for evaluation (37 elementary teachers and 28 middle school teachers) indicating a response rate of 7.1%. Of the 65 teachers who submitted the Food Intake Form, nine were males.

Background Information

The average number of years taught was 12.2 ± 9.4 years. The grade level most commonly taught at the elementary level was fourth grade and at the middle school level was eighth grade *(See Table I).* The most reported subjects taught were science, social studies, and language arts *(See Table II).* Teachers reported their educational preparation in nutrition as completing at least one college level course in nutrition, attending workshops or inservice training sessions on nutrition and/or participating in independent study of nutrition *(See Table III).* Almost one-fourth of the teachers reported having no preparation in nutrition.

Food and Nutrition Curriculum

The average number of hours of nutrition taught was 6.8 ± 14.1 with a maximum number of hours being 72. Forty-four teachers reported they did not teach nutrition. The subjects in which nutrition was taught most often were science and health *(See Table IV).*

Almost half of the teachers responded that they taught nutrition integrated into other subjects (44.7%). The top three nutrition concepts taught were "food groups," "nutrition needs of the child," and "nutrition, health, fitness." The concept least taught was "nutrient supplementation" *(See Table V).* The average number of concepts teachers reported discussing was 2.8 ± 3.1.

The most reported obstacle to teaching nutrition encountered by elementary and middle school was "limited time and resources" followed by "lack of training" *(See Table VI).* The average number of barriers identified was 1.2 ± 1.1. Many teachers reported that they felt there were few barriers that were easily overcome or difficult to overcome *(See Table VII).* Suggestions to overcome the barriers identified were "emphasize benefits to increase interest among students and faculty" and "provide training" *(See Table VIII).*

The top three benefits to students identified were "interest and knowledge in food or nutrition increased," "eat more nutritious snacks," and "try more foods" *(See Table IX).* The average number of benefits identified was 1.8 ± 1.9. Many teachers responded that there were many benefits to teaching nutrition and they plan to continue teaching the subject *(See Table X).* Students were considered to have "little interest" in nutrition topics *(See Table XI).*

The three concepts that teachers identified the need for teaching materials were "food groups," "nutrient needs of the child," and "nutrition, health, fitness" *(See Table XII).* The average number of concepts identified was 2.8 ± 3.1. The three most requested formats of nutrition education materials were films or videotapes, posters or charts, and games or puzzles *(See Table XIII).*

The first objective was to compare elementary and middle school teachers' perceptions on integrating nutrition education into classroom curriculum. There was a significant difference between elementary and middle school teachers in their opinion of the appropriate grade level to begin nutrition education ($p < .05$, $X^2 = 8.4$) *(See Table XIX).* Thirty-one elementary teachers (67.4%) and 19 middle school teachers (40.4%) indicated that preschool is the appropriate age when children should begin receiving nutrition education. Fifteen elementary teachers (32.6%) and 25 middle school teachers (53.4%) responded that "elementary" is the appropriate grade level when nutrition education should be included in the curriculum. No elementary and three middle school teachers (6.4%) indicated that middle school is the grade level to begin nutrition education.

Elementary teachers reported more benefits to teaching nutrition than middle school teachers. ($p < .001$, $t = -5.0$) *(See Table XX).* Elementary teachers also reported more barriers than middle school teachers ($p < .05$, $t = -2.3$).

Elementary and middle school teachers had significantly different approaches to teaching nutrition ($p < .05$, $X^2 = 7.4$) *(See Table XXI).* Fewer elementary teachers than middle school teachers believed nutrition should be integrated into other subjects. More

elementary teachers responded that nutrition should be "both" integrated into other subjects and also taught as a separate subject than middle school teachers.

Objective three was to determine if teachers who perceive greater benefits than obstacles had healthier eating behaviors and provided more nutrition education than those teachers who perceived fewer benefits and greater obstacles. Teachers who perceived more barriers to teaching nutrition than benefits did not report teaching a greater number of hours than teachers who perceived more benefits to teaching nutrition than barriers. No significant difference was found between teachers who perceived greater benefits than barriers and teachers who perceived fewer benefits than barriers to HEI scores.

Personal Perceptions

Personal evaluation for changes in food choices due to teaching nutrition included: "increased interest and knowledge in foods or nutrition," "encouraged me to eat better snacks," "encouraged me to eat better meals," and "made me more aware of food composition" *(See Table XIV).* Many teachers felt that teaching nutrition had little effect on their personal food *(See Table XV).* Most teachers rated their food choices as good compared to what is considered most healthy *(See Table XVI).*

Food Intake

A total of 65 Food Intake forms were returned. Results from the forms were analyzed to determine total calories, protein, carbohydrate, total fat, saturated fat, polyunsaturated fat, monounsaturated fat, cholesterol and fiber. Vitamins and mineral calculated were calcium, folate, iron, sodium, zinc, and vitamin A, C, and D *(See Table XVII).* Since the majority of respondents were female (99%), macronutrients were

typically at appropriate levels for females, but lower than recommended levels for males (FASEB, 1995). Total calorie, carbohydrate, total fat, saturated fat, polyunsaturated fat, monounsaturated fat and cholesterol intakes were at or slightly below recommended levels. Protein intake however was above recommended levels and fiber was considerably less than recommended levels. Vitamin and mineral intakes were equal or above recommended levels, except for calcium which was considerably less than recommended levels. Folate, iron, and zinc levels were greater than recommended and sodium was within the advised amount. Vitamin A and C were greater than necessary and vitamin D met the needed amounts for the age level of 25-50 years old.

The Food Intake form was also evaluated for total servings of each food group: bread/grains, vegetables, fruits, meats, and milk using the Food Guide Pyramid (USDA, 1990) to compare as the standard *(See Table XVIII).* The average HEI score was 76.6, with 100 being the highest score possible.

The second objective was to compare eating behaviors to attitudes, and hours and topics of nutrition education. No significant difference was found in HEI (Healthy Eating Index) scores among teachers with different perceptions on how teaching nutrition affected their personal food choices. No significant differences were found in the number of benefits or barriers identified by teachers with different perceptions on how teaching nutrition affected personal food choices.

A significant difference ($p < .05$, $t = 2.6$) in the number of benefits of teaching nutrition was found between teachers who rated their food choices as "good" compared to those teachers who rated themselves as making "poor" food choices *(See Table XXII).* No significant differences were found in HEI scores or the number of barriers among

teachers' with different ratings of personal food choices compared to what is considered most healthy.

A significant difference ($p < .01$, $F = 5.1$) was found in the number of benefits of teaching nutrition among teachers with different perceptions of their students' interest in nutrition education. Teachers who perceived their students' interest as being "little," "much," or "great" reported more benefits than teachers who saw no student interest. Teachers who perceived students' interest as being "no," "little," or "much" reported fewer benefits than teachers who reported "great" interest *(See Table XXIII).* No significant differences were found in teachers' HEI scores and the number of barriers among teachers with different ratings of their students' interest in nutrition concepts presented in class.

Significant positive correlations were found between the number of barriers and the number of benefits, the number of nutrition concepts taught, and the number of positive changes in teachers' food choices ($p < .05$). Significant positive correlations were found between the number of benefits and the number of hours of nutrition taught, the number of concepts taught, and the number of positive changes in teachers' food choices ($p < .05$). Significant correlations were also found between the number of hours of nutrition taught and teachers' HEI scores, the number of concepts taught, and the number of positive changes in teachers' food choices ($p < .05$) *(See Table XXIV).* The number of personal eating changes were significant positively correlated with the number of hours of nutrition taught and the teachers' HEI scores.

CHAPTER V

DISCUSSION

This study was conducted to compare elementary and middle school teachers' perceptions on integrating nutrition education into classroom curriculum, to compare teachers' eating behaviors to attitudes and use of nutrition education, and to determine if teachers who perceived greater benefits than obstacles would have healthier eating behaviors and provide more nutrition education than those teachers who perceived fewer benefits than obstacles. Data collected in this study examined: 1) teachers' background information including the number of years, the subject(s) and grade level(s) taught, and educational preparation in nutrition; 2) the number of hours of nutrition taught, subject(s) in which nutrition education is taught, perceived effects of education on student behaviors, and perceived obstacles and benefits encountered when teaching nutrition; 3) teachers' needs for additional nutrition education materials pertaining to concepts and formats best suited for their use; and 4) the average daily food intake, adequacy of diet compared to dietary guidelines identified by the National Nutrition Monitoring and Related Research Program (FASEB, 1995).

In this study, hours of nutrition taught ranged from 1 to 72 hours per school year with an average of 6.8. Devine et al. (1992) determined that participating middle school teachers in their study taught approximately 10 hours per semester, with a range of 2 to

50 hours; Norton et al. (1997) reported that elementary teachers taught a range of 1 to 20 hours per year; and Reicks et al. (1996) reported elementary teachers teaching nutrition from 1 to 10 hours each year. Brown and Park (1986) reported elementary teachers providing minimal time to teaching nutrition, approximately 1.7 weeks per year. Similarly, Hammond et al. (1994) revealed that the kindergarten teachers in their study taught nutrition one to two times per month. Although teachers received training in studies by Robert-Gray et al. (1989) and Shannon et al. (1981), they did not increase the number of hours devoted to teaching nutrition. However, Neafsey et al. (1985) reported that the majority of the teachers who received training utilized the materials by teaching nutrition in their classrooms.

Benefits to students were identified by the majority of studies discussed in this paper. The majority identified increased knowledge, attitude and behavior changes. Brown and Park (1986) and Gates et al. (1994) found that the students were encouraged to eat better snacks and meals, were more aware of food composition, and were less likely to follow fad diets. Norton et al. (1997) indicated that teachers felt reduction of chronic disease risk was also a perceived benefit from teaching nutrition.

Teachers in this study indicated that they taught many nutrition concepts from food groups to eating disorders. Reicks et al. (1996) revealed the major nutrition concepts covered by the elementary teachers in their study were good snacking choices; food groups and servings sizes; eating more fruits, vegetables, and grains; and eating less sugar, fat, and salt. Norton et al. (1997) and Rye et al. (1982) indicated similar concepts were taught by elementary teachers: healthy snacks, food groups, eating a variety of foods, nutritious breakfasts, and food and fitness. However, Murphy et al. (1994) focused

on students' preferred topics which included: weight control, techniques for diet improvement, nutrition and disease, and Food Guide Pyramid. They also indicated that students' least favorite topic was dietary fiber.

A significant difference was found between elementary and middle school teachers in their opinion of the appropriate grade level to begin nutrition education. Many elementary teachers believed that preschool was the appropriate grade level to initiate nutrition education in the classroom, but many middle school teachers felt elementary was the appropriate grade level to begin nutrition education. Elementary teachers have a better understanding of the knowledge level of young children and their learning capacity at the earlier ages, while middle school teachers are not always aware of the training received at the earlier age levels and therefore may not feel that students do not have the capacity to comprehend such topics as nutrition. Woodson et al. (1995) determined that the majority of teachers participating in their study believed that nutrition education should begin at the early elementary level (K-2). Norton et al. (1997) also found that teachers felt nutrition education should begin at the elementary.

Elementary and middle school teachers also reported different views on teaching nutrition education. Elementary teachers used both integrated and separate subject methods while middle school teachers preferred integrating nutrition into other subjects. Woodson et al. (1995) and Gates et al. (1994) found that elementary teachers in Nevada and Missouri taught nutrition both as a separate subject and integrated into subjects and secondary school teachers typically taught nutrition incorporated into various subjects. Norton et al. (1997) found that most elementary teachers integrated nutrition education into other subjects. Likewise, Reicks et al. (1996) found that elementary teachers either

integrated nutrition into other subjects or taught it as a separate unit. Health was the preferred subject in which to integrate nutrition. These findings may be the result from the way in which teachers at these levels teach their classes. Elementary teachers usually teach all subjects and try to integrate different topics within many subjects to reinforce the information, but can also teach specific lessons for those subjects when appropriate. Whereas, middle school teachers typically teach on one subject per class and therefore teach nutrition as an integrated part of that subject.

The majority of teachers in this study reported having completed at least one college level course in nutrition, attending workshops or training sessions on nutrition, or participating in self-taught studies. However, approximately 1/4 of teachers reported having no nutrition education preparation. Reicks et al. (1996) found that few teachers had taken at least one college nutrition course, but most indicated they had studied some nutrition. Similarly, Norton et al. (1997) found that teachers had some nutrition education, but only one-fourth of the participants indicated having attended an in-service on nutrition within the past 5 years. Gates et al. (1994) concluded that teachers need more training in nutrition to provide effectual and reliable nutrition information to students. Many studies have shown that teachers who are trained to teach nutrition are more likely to include nutrition education in their lessons (Woodson et al., 1995; Farthing et al., 1989).

Teachers with different perceptions on how teaching nutrition affected their personal food choices did not have significantly different HEI scores. As Roberts-Gray et al. (1989) stated, eating behaviors and attitudes are not changed solely based on increase in knowledge. However, repeated exposure to nutrition education can and often does

have a positive effect on attitudes and behaviors (Contento et al., 1992). Just as discussed in the introduction, adults find it difficult to change eating behaviors that are long-term practices. Even after learning how they should eat, adults find altering their lifestyles difficult to accomplish.

Although Woodson et al. (1995) did not identify a correlation between teachers efforts (i.e. use of nutrition education) in teaching nutrition and their personal eating behaviors, this study found a positive correlation between the number of hours of nutrition taught and teachers' HEI scores. Teachers whose diets were more healthy when compared to the Food Guide Pyramid and Dietary Guidelines taught more hours of nutrition in their classrooms.

The most commonly reported obstacle to teaching nutrition encountered by elementary and middle school was "limited time and resources" followed by "lack of training." Woodson et al. (1995) found that obstacles encountered most when teaching nutrition were lack of time and resources. However, research completed by Farthing et al. (1989) indicated that teachers completed the NET training did not feel the time limitations as strongly when teaching nutrition compared to those teachers who did not participate in the NET program. Hammond et al. (1994) indicated that teachers did not teach the *Foodstyles: K* curriculum because they did not teach kindergarten, however, teachers who did teach kindergarten but were not using the curriculum indicated that time limitations kept them from doing so. Norton et al. (1997) found additional obstacles encountered by teachers which were lack of funds, limited supervision for activities, lack of recipes, and unsupportive administration for in-class food preparation.

Food Intake - Macronutrients

As previously discussed, obesity in American is on the rise. The major contributor for obesity is excessive food intake and limited activity. The average energy intake (1402 kcal) reported by the participants of this study was slightly less than the average intake of approximately 1500 calories for women and considerably less than the average intake, 2000-2200 calories, for men in national studies (FASEB, 1995). However, many of the teachers reported intakes of only breakfast and lunch, no dinner, and therefore, mean intakes of nutrients may be higher than actually reported.

Recommended levels of total fat intake are less than 30% of total calories and saturated fat (SFA) less than 10% of total calories. Polyunsaturated fat (PUFA) is also recommended to be no more than 10% of calories and monounsaturated fat (MUFA) is to be no more than 15% of calories (FASEB, 1995). Cholesterol intake is recommended to be less than 300 mg per day. High intake of total fat, SFA, and cholesterol are associated with high serum cholesterol and low-density-lipoprotein (LDL) cholesterol which are health risk factors associated with coronary heart disease (FASEB, 1995). Results from this study showed that the teachers intake met current recommendations for total fat, SFA, PUFA, MUFA, and cholesterol. However, as previously mentioned these levels may not be accurate because of incomplete food records.

Carbohydrates are known as the "fuel" for the body. Recommendations for carbohydrate intake are at least 55% of calories from carbohydrates (FASEB, 1995). These carbohydrates should be *complex* carbohydrates rather than *simple* carbohydrates, or sugars. Excessive sugar, mainly sucrose, is associated with dental caries. The mean carbohydrate intake in this study was approximately 55%. Dietary fiber intake is

recommended at 20-30 mg per day. The average intake of fiber by participants in this study was below recommended levels. Higher intakes of fiber, soluble and insoluble, are known for increased health benefits such as decreasing serum cholesterol levels and risks of colon cancer.

The average diet for participants in this study for protein (67.9 gm) is above the recommended dietary allowance (RDA) which is 63 gm for men age 25-50 and 50 gm for women age 25-50 (FASEB, 1995). Since only nine men participated in the food intake portion of this study, protein levels are mostly reported by females and therefore are considered excessive. The American Heart Association dietary guidelines also recommend that 15% of calories should be protein (AHA, 1995). The mean intake for this study was approximately 19%.

Food Intake - Micronutrients

Vitamins and minerals are important for health and healing. This study focused on specific nutrients that are associated with health risks. Intakes for vitamin A were assessed as this nutrient is necessary for the prevention of blindness and improving night blindness. However, excessive amounts of vitamin A also have health risks, such as bone malformations and liver damage. The mean intake by participants met the RDA.

Vitamin C is considered one of the antioxidant vitamins. Antioxidants have been shown to decrease the risks for many health problems (e.g. heart disease, cancer, cataracts, and macular degeneration). The average intake of vitamin C by participants in this study exceeded the RDA.

Osteoporosis, or loss of bone mass, has become a health concern by many elderly Americans. The major nutrients associated with bone density are calcium and vitamin D.

Vitamin D is necessary for calcium absorption. The mean intake of vitamin D in this study met the RDA. Average calcium intake was below the RDA. Unfortunately, studies have shown that calcium intakes are typically low in the American diet (FASEB, 1995).

Iron deficiency is very common in the American public and is the leading cause for anemia. Low iron levels typically found in children age 1-2, and adolescent and adult females often result in anemia. However, excessive intakes of iron can cause iron overload which is dangerous for postmenopausal women and men. The reported intakes of participants were adequate in iron.

Low levels of folate are associated with increased risks of neural tube defects (i.e. spina bifida, encephalocele, and anencephaly). In this study, the mean folate intake met the RDA.

Zinc is associated with taste acuity, appetite and growth. If zinc is deficient in the diet, decreased appetite, taste, and growth retardation may occur. The mean intake of zinc in this study exceeded the RDA.

The last nutrient to be assessed in the participants' diets was sodium. Excessive sodium in the diet is associated with hypertension. This is a major concern in the American population. The recommended level for sodium is no more than 2,400 mg of sodium per day. The average intake of sodium by the participants of this study met the recommendation, however, subjects were not asked to report added salt.

Limitations

Since this study included only subjects from schools in Tulsa, Oklahoma who volunteered to participate in the Team Nutrition study, results are not necessarily generalizable to the total population. The response rate to the questionnaire (10.3%) was

less than the anticipated 30% for mailed questionnaire surveys (Waltz et al., 1991). Reasons for the limited response may be that the questionnaire was mailed to all teachers including those who did not teach a subject that relates to nutrition (i.e. algebra, math, music, art, etc.), the teachers had only a limited time to complete the packet, and/or the teachers had a lack of interest in the topic/study. Woodson et al. (1995) reported similar limitations in their mail surveys: lack of opportunity for clarifying respondents questions and answers, and low response rates.

Some of the comparisons may have resulted in no significant difference due to the limited number of responses. Limiting the sample population to teachers who taught subjects related more closely to nutrition (e.g. health, science, social studies, etc.) might have increased the response rate. Also, providing an incentive to the participants to complete the packets, such as a drawing for teaching materials or gift certificates for supplies, may have encouraged a larger response.

Recommendations

Identification of nutrition education resources for teachers may help to decrease the number of obstacles perceived by teachers. This would provide teachers with the ability to obtain materials and additional assistance to aid them in increasing nutrition education. Development of a curricula for the middle school level would also be an excellent endeavor. A curricula is needed for this age level that is easy to use, understandable, and requires a minimal amount of training. Surveys could be taken to obtain middle school and high school teachers preferences on materials and teaching formats as well as students' topic preferences and interests.

Additional research is needed to determine the most feasible method of training teachers for long-term retention and usage of nutrition education materials. As Stark & Johnson (1981) indicated, teachers who receive training in a manner that is appropriate for their needs, will use that training to present nutrition education in their classrooms. A widespread survey of teachers in various states and who work with students with different socio-economic backgrounds should be conducted to evaluate their preferences and needs for nutrition education training.

With the increase of obesity and chronic diseases among the American population, proper nutrition and eating behaviors have become a very important focus for all ages. By teaching children the appropriate behaviors and attitudes, they will have the knowledge and ability to decrease the health risks associated with diseases.

As discussed in *Healthy People 2000* (DHHS, 1991), effective nutrition education programs must include multiple interventions and multiple participants including student/child, parent/family, teacher/personnel, and organizations/community. Programs must consider the relationship between each participant involved and plan for the appropriate level of interaction. The goal of all community-based programs is to involve as many aspects of community life as possible.

Nutrition education is needed to provide children with knowledge and skills necessary to make informed decisions to maintain a healthy lifestyle throughout their lives. Education also allows communities to adequately choose health resources, to implement community programs and services, and to enact legislation for those programs and services.

Nutrition education should be continuous throughout school, K-12 and taught by trained teachers. A variety of topics and concerns should be taught to provide the knowledge and skills needed to face various situations (e.g. teen pregnancy). Content and format of nutrition education should be determined by the needs of all participants involved: children, parents, teachers, leaders, health professionals, and health officials.

A teacher training survey would provide data on teachers' specific needs for nutrition education training. Continued development of education programs which include multiple interventions and participants as per the recommendations of the National Action Plan for Comprehensive School Health Education would also be beneficial in increasing the use of nutrition education curriculum in the classroom. With our multicultural society, research is needed to evaluate the most effective methods for teacher nutrition education to different cultures.

Implications

Implications from this study involve: administration education on the importance of nutrition education, mandating of nutrition education in the curriculum, and collaboration between teachers and food service personnel to reinforce nutrition education taught in the classroom. Continued parent involvement is needed to reinforce nutrition education because the more exposure to the topics and encouragement to use the methods taught the more nutrition information and practices children will retain. Teachers need to provide nutrition topics which are appropriate for age level and build on previous education to increase knowledge and understanding and adequate time should be provided for effective nutrition education.

By obtaining information from this study, school administration and nutrition educators have the necessary data to develop programs to decrease the number of obstacles and increase the number of benefits encountered by teachers. Activities can be developed to stimulate and excite students to desire to learn more about nutrition education. Multi-level teams can work together to provide nutrition education to children in hopes of decreasing obesity and also the risks associated with chronic disease
By focusing of child nutrition education, children have the ability to make appropriate food choices to aid in maintaining a healthy lifestyle.

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APPENDIX A

To: Elementary and Middle School Principals

From: Becky Schmidt, OSU Graduate Student
Through: Lisa Griffin, Team Nutrition Coordinator

Date: September 6, 1996

Re: Interest in participation with Team Nutrition Project and Research

I am an OSU graduate student beginning my thesis research with Tulsa Public Schools under the Team Nutrition Project. I have received approval from USDA and Tulsa Public Schools. Attached you will find the approval letter from the directors of Tulsa Public Schools.

My research project goal is to compare perceptions of elementary teachers to perceptions of middle school teachers and compare eating behaviors to attitudes and use of nutrition education.

My plan of research will include:

1) Interview selected volunteer faculty on
    * Reasons for choosing certain nutrition topics
    * Motivations for including nutrition in curriculum
    * Pressures/obstacles of including nutrition in curriculum;

(Each interview will take approximately 15-20 minutes)

2) Develop, distribute, and evaluate a questionnaire of participating teachers to obtain attitudes/perceptions on Nutrition Education along with a Food Frequency Questionnaire and evaluate for nutrient intake.

(Questionnaire packets will be completed at participant's leisure and returned by a given date.)

3) Compare attitude/perception responses of elementary teachers to responses of middle school teachers; and
4) Compare Food Frequency questionnaire results to attitudes and use of nutrition education.

Along with my research, I will help Lisa Griffin with the Team Nutrition project (i.e. community projects, parents' newsletters, classroom projects/activities, etc.).

In order to begin the interview section of my research, I am contacting each school for interest in participating in my research project. I wish to obtain the name of a contact teacher, and then petition for interview participants. Please contact me at 455-2411 or Lisa Griffin at 746-6207 if you wish to participate or have any questions regarding the Team Nutrition project or my research project.

Thank you for your time and interest.

APPENDIX B

Becky Schmidt
1100 W. Huntsville St.
Broken Arrow, OK 74011-6219
(918) 455-2411
e-mail: schmidr@okstate.edu

<first name> <last name>
<school name>
<street address>
Tulsa, OK <zip code>

November 22, 1996

Dear <first name> <last name>:

I am an OSU graduate student working on my research with Team Nutrition. I contacted your principal and she gave me your name as a contact teacher to be a representative for the teaching faculty. Thank you for agreeing to act in this capacity.

The first activity I want to inform you about is an interview about the perceptions of nutrition education in the classroom. If you or any of your colleagues are interested in participating in the interview, please complete a copy of the enclosed form and return it to the address listed on the page or call me to arrange an appointment. The interviews can be conducted in person or over the telephone which ever is more convenient for the participant; however, the interview will be audio taped for both methods of interview for later evaluation of responses.

The second activity involved will be a questionnaire given to all teachers at your school about the perceptions on nutrition education and a food frequency. This will be distributed after the interviews have been conducted and evaluated.

Please take a few moments to talk with the other teachers at your school about this project.

Again, thank you for your participation. I look forward to talking with you and the other teachers about their views on this matter.

Sincerely,

Becky Schmidt
enclosure

APPENDIX C

APPEAL LETTER FOR INTERVIEW VOLUNTEERS

Dear Tulsa Public School Faculty:

A nutrition research project is in progress. We would like to talk to you about nutrition education in your classroom.

The interview will be conducted at a time and place convenient for you and will take approximately 15 to 20 minutes. The purpose of the interview is to obtain reasons for choosing certain nutrition topics as well as motivations and obstacles encountered by teachers when including nutrition education in the curriculum.

If you are interested in participating, please fill out the section below and return it to:

Lisa Griffin
Tulsa Public Schools Service Building
3027 S. New Haven
Tulsa, OK 74147-0208

or contact Becky Schmidt at (918) 455-2411. Thank you for your interest.

Sincerely,

Becky Schmidt
Principal Investigator

Gail E. Gates, Ph.D., RD
Associate Professor, Nutritional Sciences, OSU, Stillwater

= =

Detach and return to the address above.

Yes, I am interested in participating in the nutrition research interview. The best day and time for me to be interviewed is:

Monday at ________ a.m./p.m.
Wednesday at ________ a.m./p.m.
Friday at ________ a.m./p.m.
Saturday at ________ a.m./p.m.

An alternate day and time is ____

_______________________________ _______________________________

TEACHER'S SIGNATURE DATE

APPENDIX D

CONSENT TO PARTICIPATE IN RESEARCH

I, _____, voluntarily agree to participate in the above titled research that is sponsored by the College of Human Environmental Sciences at Oklahoma State University. The research will be conducted at Tulsa Public elementary and middle schools.

I understand that:

(1) the purpose of the study is to compare perceptions of elementary teachers to perceptions of middle school teachers and compare eating behaviors to attitudes and use of nutrition education.

(2) I will participate in an individual interview about influences on my choices of nutrition topics and motivations and obstacles of including nutrition in the curriculum.
   (a) The interview will take about 15 to 20 minutes.
   (b) I will allow the researcher to audio tape my interview.
   (c) The tape of the interview may be transcribed.

(3) all data obtained about me as an individual will be considered privileged and held in confidence by the researchers.
   (a) Audio tapes of the interviews will be assessed by the project director or her authorized representatives. Tapes will be filed in the project director's office until completion of the study when they will be destroyed.
   (b) I will not be identified in any presentation of the results.

(4) this research is beneficial in that it provides information about teachers' perceptions of nutrition education in the curriculum at different grade levels, and the information gained from this study may provide insight into strategies to better present nutrition education to teachers;

(5) I may contact Becky Schmidt at (918) 455-2411 or Dr. Gail Gates at (405) 744-5040 should I wish further information. I may also contact Gay Clarkson in the office of University Research Services, 305 Whitehurst, Oklahoma State University, Stillwater, OK 74078 at (405) 744-5700.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Signed _____ Date _____ Time _____(a.m./p.m.)

I certify that I have personally explained all elements of this form to the subject before requesting the subject to sign it.

Signed _____ Printed name_____
(project director or her authorized representative) (project director or her authorized representative)

Copy 1 - Researcher *Copy 2 - Participant*

APPENDIX E

INTERVIEW SCRIPT

Introduction

I. Introduction of interviewer.

2. Purpose of the interview.

Questions

1. When planning your curriculum for this school year, what nutrition topics did you decide to present to your class?

2. What motivated you to choose these topics?

3. How many hours do you plan to teach nutrition?

4. What type of class do you teach?

5. What do you feel are the benefits of teaching nutrition as a separate unit vs. teaching nutrition integrated with other subjects?

6. What are some possible obstacles in teaching nutrition in your class? What are some of the obstacles you have heard from other teachers?

7. What type of nutrition resources are available at your school?

8. What do you feel are the benefits of teaching nutrition in your classroom?

9. How do you feel the students in your classroom will benefit from nutrition education?

10. What educational preparation have you had in nutrition?

11. What impact do you feel nutrition education has had on you as an individual?

12. What has been left out of the discussion?

13. Do you have anything else to add?

APPENDIX F

QUESTIONNAIRE FORM

A. Background Information

1. How many years have you taught school? _____
2. List the grade level(s) you teach this year. _____
3. Circle the subject(s) you teach this year.
   a. Health
   b. Home Economics *(Life Skills, Foods, Human Environmental Sciences, etc.)*
   c. Language Arts *(English literature, etc.)*
   d. Physical Education
   e. Science
   f. Social Sciences
   g. Other, please list _____
4. What educational preparation have you had in nutrition?
   a. Completed at least one college level course of nutrition (year _____)
   b. Attended workshops or in-service training sessions on nutrition.
   c. Independent study, studied nutrition on my own.
   d. Other, please list _____
   e. No preparation

B. Food and Nutrition Curriculum

5. Circle the grade level you feel nutrition is most appropriate for the introduction into the curriculum?
   a. Preschool
   b. Elementary
   c. Middle School/Junior High
   d. High School
   e. Does not belong in the curriculum
6. *Estimate* the total number of HOURS you have taught or will teach foods or nutrition this school year.
   _____ hours
7. Circle the subject(s) in which you teach foods or nutrition.
   a. Health
   b. Home Economics *(Life Skills, Foods, Human Environmental Sciences, etc.)*
   c. Language Arts *(English literature, etc.)*
   d. Physical Education
   e. Science
   f. Social Sciences
   g. Other, please list _____

8. Do you teach nutrition as a separate unit or is it integrated with other subjects?
    a. Separate
    b. Integrated
    c. Both

9. Circle the concept(s) you include in your classes.
    a. Food Groups *(Food Guide Pyramid, etc.)*
    b. Determining adequate intake *(RDAs, Guidelines, etc.)*
    c. Influences on nutrition *(psychological, social, cultural, etc.)*
    d. Nutrient functions *(e.g. vitamin A helps with night vision)*
    e. Nutrients needs of the child
    f. Nutrient needs of the young adult
    g. Nutrient sources *(e.g. oranges are a good source of vitamin C)*
    h. Nutrition, health, and fitness
    i. Food selection based on sound nutrition information
    j. Food facts and fallacies
    k. Eating disorders
    l. Nutrition and sports
    m. Nutrient supplementation
    n. Reliability of sources of information *(media, health food stores, etc.)*
    o. Other, please list _____

10. Choose the barriers or obstacles you confronted when teaching foods or nutrition in the classroom *(select all that apply):*
    a. Limited time and resources
    b. Lack of training
    c. Curriculum too involved
    d. Lack of interest among faculty
    e. Lack of interest among students
    f. Other, please list _____

11. How do you feel about these barriers or obstacles?
    a. No barriers
    b. Few barriers, easily overcome
    c. Few barriers, difficult to overcome
    d. Many barriers, easily overcome
    e. Many barriers, difficult to overcome
    f. Too many barriers, gave up

12. What do you suggest as possible solutions to the above barriers? *(select all that apply)*
    a. Limit amount of time and money spent on nutrition
    b. Provide training in nutrition
    c. Simplify curriculum
    d. Emphasize benefits to gain interest of faculty and students
    e. Other, please list _____

13. Choose the benefits the students in your classroom encountered while teaching foods or nutrition in the classroom, students: *(select all that apply)*
    a. Interest & knowledge in food or nutrition increased.
    b. Eat more nutritious snacks.
    c. Eat more nutritious meals.
    d. Try more new foods.
    e. Discuss nutrition with their parents.
    f. Are more aware of food composition.
    g. Are less likely to follow fad diets.
    h. Other, please list _____

14. How do you feel about theses benefits?
    a. No benefits, quit teaching curriculum
    b. Little benefits, not worth time
    c. Some benefits, may or may not be worth time
    d. Little benefits, worth time to continue
    e. Many benefits, but not worthwhile
    f. Many benefits, will continue

C. Need for Additional Materials

15. Circle the concepts on which you would like more teaching materials.
    a. Food Groups (Food Guide Pyramid, etc.)
    b. Determining adequate intake (RDAs, Guidelines, etc.
    c. Influences on nutrition (psychological, social, cultural, etc.)
    d. Nutrient functions
    e. Nutrient needs of the child
    f. Nutrient needs of the young adult
    g. Nutrient sources
    h. Nutrition, health, and fitness
    i. Food selection based on sound nutrition information
    j. Food facts and fallacies
    k. Eating disorders
    l. Nutrition and sports
    m. Nutrient supplementation
    n. Reliability of sources of information (media, health food stores, etc.)
    o. Other, please list _____

16. How interested are your students in learning about the concepts listed?
    a. Not interested
    b. Little interest
    c. Much interest
    d. Great interest, students requested information

17. Circle the formats that you would find most useful for any additional nutrition materials provided.
    a. Curriculum guides
    b. Workbooks
    c. Quizzes/exams
    d. Films/videotapes
    e. Posters/charts
    f. Computer programs
    g. Bulletin board displays
    h. Games/puzzles
    i. Puppets/skits
    j. Food models
    k. Cookbooks/recipes for students
    l. Other, please list _____

D. Personal Perceptions

18. How did your foods or nutrition teaching change your food choices?
    a. Increased interest and knowledge in foods or nutrition
    b. Encouraged me to eat better snacks
    c. Encouraged me to eat better meals
    d. Encouraged me to try more new foods
    e. Encouraged me to discuss nutrition with my family
    f. Made me more aware of food composition
    g. Made me less likely to follow fad diets
    h. Other, please list _____

19. Overall, how has your foods or nutrition teaching effected your food choices?
    a. No effect
    b. Little effect
    c. Much effect
    d. Great effect

20. How would you rate your food choices compared to what is considered most healthy?
    a. Poor
    b. Fair
    c. Average
    d. Good
    e. Excellent

APPENDIX G

FOOD INTAKE FORM

Please complete the requested information below. Without all information, a complete evaluation is not possible. In the chart, list foods eaten in a typical school day. Make sure to indicate quantities or serving sizes and preparation methods. A sample is given to demonstrate the proper way to complete the list of foods consumed. Please include all meals and snacks, foods and beverages (including water).

Male [ ] Female [ ] Age: Ht: ft. in. Wt: lbs.

Female - Pregnant? [ ] yes [ ] no **Breastfeeding?** [ ] yes [ ] no

Do you take supplements? [ ] yes [ ] no

Do you exercise? [ ] never [ ] 1-2 times/month [ ] 1-2 times/week [ ] every day

Serving Abbreviations: T=tablespoon **t**=teaspoon **oz**=ounce **c**=cup **lb**=pound **sl**=slice

Food Item	Amount Eaten	Preparation Method
ex. Milk	*1/2 c*	*skim*
ex. Chicken	*3 oz*	*without skin, grilled*

APPENDIX H

FOOD INTAKE FEEDBACK REQUEST FORM

Dear Participant:

No names are to be provided with the questionnaire packet. Each packet is coded with a number. However, if you would like a nutrient evaluation of your Food Frequency Questionnaire you submit, please complete the form below and return it with the completed questionnaire packet.

Thank you for participating.

Yes, I would like to have the nutrient evaluation information on my Food Frequency Questionnaire.

Name _____

Packet Code Number _____

School Name _____

School Address _____

_____

School Phone Number _____

Copy 1 - Researcher *Copy 2 - Participant*

APPENDIX I

COVER LETTER FOR QUESTIONNAIRE PACKET

Dear Faculty:

A nutrition research project is in progress. Your input is of vital importance to this research. The goal of this research project is to compare perceptions of elementary teachers to perceptions of middle school teachers and to compare eating behaviors to attitudes and use of nutrition education.

On the following pages you will find a questionnaire asking about reasons for choosing certain nutrition topics as well as benefits and obstacles confronted by teachers by including nutrition in the curriculum. These questions were developed from responses received by volunteer teachers who participated in an individual interview. A food intake form is also part of this packet which needs to be completed. In it you will be asked about the foods and beverages you typically consume in a school day, including all meals and snacks.

As a result of this questionnaire packet, we hope to identify relationships among teachers' perceptions of nutrition education at different grade levels and eating behaviors to attitudes and use of nutrition education. Results also will provide insight into strategies to better present nutrition education to teachers.

By returning the questionnaire, you are indicating consent to participate in this portion of the project. All data obtained about you as an individual will be considered privileged and held in confidence by the researchers; you will not be identified in any presentation of the results. Please take a few moments to complete the questionnaire, taking careful consideration of your answers. After completing the forms, return them sealed in the envelope provided. Place them in the box in the main office of your school. A representative will pick up the completed packets daily.

Thank you for participating in this research project. Your contribution is greatly appreciated. If you have any questions about the questionnaire, intake form, or study, please call Becky Schmidt, RD/PLD at (918) 455-2411 or Gail Gates, Ph.D., RD at (405) 744-5040.

Sincerely,

Becky Schmidt, RD/PLD
Principal Investigator

Gail Gates, Ph.D., RD
Associate Professor
Nutritional Sciences, OSU, Stillwater

APPENDIX J

Oklahoma State University Institutional Review Board
Research Approval Letter

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 08-19-96 **IRB#: HE-97-007**

Proposal Title: PERCEPTIONS OF TEACHERS ABOUT NUTRITION EDUCATION IN TEAM NUTRITION PROJECT

Principal Investigator(s): Gail Gates, Becky Schmidt

Reviewed and Processed as: Expedited

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 ONE CALENDAR YEAR 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 Reasons for Deferral or Disapproval are as follows:

Signature: John F. Wyble

Chair of Institutional Review Board

Date: September 25, 1996

APPENDIX K

July 18, 1996

Dr. Bandeh
Tulsa Public Schools
3027 S. New Haven
Tulsa, OK 74147-0208

Dr. Bandeh:

I am an OSU graduate student hoping for an opportunity for thesis research with Tulsa Public Schools under the Team Nutrition project. USDA has given approval for me to work under their project as my plan of research will not interfere with the research already in progress. I am requesting approval from you and other staff members at Tulsa Public Schools.

My plan of research will include:

1) Interview selected volunteer faculty on -
    * Reasons for choosing certain nutrition topics
    * Motivations for including nutrition in curriculum.
    * Pressures/obstacles of including nutrition in curriculum;
2) Develop, distribute, and evaluate a questionnaire of participating teachers to obtain attitudes/perceptions on Nutrition Education along with a Food Frequency/Record and evaluate for adequacy;
3) Compare attitude/perception responses of elementary teachers to responses of middle school teachers; and
4) Compare Food Frequency/Record results to attitudes and use of nutrition education.

Along with my research, I hope to help Lisa Griffin with the Team Nutrition project as a whole (i.e. teacher training of curriculum, community projects, parents' newsletters, classroom projects/activities, etc.).

Enclosed you will find a copy of my resume to show my qualifications in doing this project and hope you will allow me to work with you and the schools to further nutrition education.

Thank you for your time and consideration.

Sincerely,

Becky Schmidt

APPENDIX L

Tulsa Public Schools Administrative Research Approval Letter

S-11/64-221-376

INDEPENDENT SCHOOL DISTRICT NO. 1
Tulsa County, Oklahoma
FOR INTER-OFFICE AND INTER-SCHOOL CORRESPONDENCE

To: Dr. La Verne Ford Wimberly

From: Lisa Griffin, Team Nutrition Coordinator LG
Through: Brett Ladd, Director Child Nutrition Services BL

Date: August 8, 1996

Re: Request for approval of OSU graduate student research

Becky Schmidt, an Oklahoma State University graduate student, would like to collaborate with the USDA Team Nutrition project and a select group of Tulsa Public Schools teachers to conduct thesis research. Her assistance with Team Nutrition as well as her research would be very beneficial to the project and nutrition education.

Please see the attached letter and the list of schools she would be contacting, if approved. Thank you for your consideration of this request.

Approved: _____
Dr. La Verne Ford Wimberly 9/19/96
Assistant Superintendent for Curriculum
and Instruction

BL/gp c:\winword\documents\grant\osu student 2.doc 9/19/96

S-11/64-221-376

INDEPENDENT SCHOOL DISTRICT NO. 1
Tulsa County, Oklahoma
FOR INTER-OFFICE AND INTER-SCHOOL CORRESPONDENCE

To: Dr. LaVerne Wimberly

From: Lisa Griffin, Team Nutrition Coordinator
Through: Brett Ladd, Director Child Nutrition Services

Date: August 8, 1996

Re: Request for approval of OSU graduate student research

Becky Schmidt, an Oklahoma State University graduate student, would like to collaborate with the USDA Team Nutrition project and a select group of Tulsa Public Schools teachers to conduct thesis research. Ms. Schmidt said the voluntary teacher interviews and questionnaire would require approximately forty-five minutes of the teacher's time. Her assistance with Team Nutrition as well as her research would be very beneficial to the project and nutrition education.

Please see the attached letter and the list of schools she would be contacting, if approved. Thank you for your consideration of this request.

Approved: _____
Mr. Jewru Bandeh
Executive Director Logistical Services

Approved: _____
Dr. Carol Caldwell
Executive Director Elementary Schools

Approved: _____
Elizabeth Lawrence
Executive Director Elementary Schools

Approved: _____
Dr. Robin Gooldy
Executive Director Elementary Schools

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S-11/64-221-376

INDEPENDENT SCHOOL DISTRICT NO. 1
Tulsa County, Oklahoma

FOR INTER-OFFICE AND INTER-SCHOOL CORRESPONDENCE

Approved: Bobbie Johnson

Bobbie Johnson
Executive Director Middle Schools

BL/gp c:\winword\documents\grant\osu student.doc 8/19/96

TABLE I

GRADE LEVELS TAUGHT BY TEACHERS

Grade Level Taught	n	% *
Preschool	2	2.1
Kindergarten	11	11.7
1st	16	9.4
2nd	18	19.1
3rd	19	20.2
4th	21	22.3
5th	20	21.3
6th	20	21.3
7th	28	29.8
8th	29	30.9

**Percentages add to more than 100% because many respondents taught more than one grade level*

TABLE II

SUBJECTS TAUGHT THIS SCHOOL YEAR

Subject	n	%*
Science	39	41.5
Social Studies	33	35.1
Language Arts	33	35.1
Physical Education	20	21.3
Health	17	18.1
Home Economics	8	8.5
Other	57	60.6
Math		
Visual Arts		
Special Education		
Computer Science		
Spanish		
Yearbook		
Keyboarding		
Counselor		
Speech		
Drama		
Music		
Art		
Gifted, talented		

**Percentages add to more than 100% because many respondents taught more than one subject.*

TABLE III

TEACHER NUTRITION EDUCATION PREPARATION

Education Method	n	%*
College course(s)	38	40.4
Independent study	34	36.2
Workshop/In-service	18	19.1
No preparation	23	24.4
Other Doctor Dietitian Research	6	6.4

**Percentages add to more than 100% because many respondents participated in more than one option.*

TABLE IV

SUBJECTS IN WHICH NUTRITION WAS TAUGHT

Subject	n	%*
Science	36	38.3
Health	22	23.4
Physical Education	14	14.9
Social Studies	11	11.7
Language Arts	10	10.6
Home Economics	11	11.7
Other Positive Action Math Special Education Kindergarten After school program Home Base Spanish Counseling	17	18.1

**Percentages add to more than 100% because many respondents taught more than one subject.*

TABLE V

NUTRITION CONCEPTS TAUGHT

Concept	n	%*
Food groups	43	45.7
Nutrients needs of the child	32	34.0
Nutrition, health, and fitness	32	34.0
Nutrient sources	28	29.8
Nutrient functions	23	24.5
Influences on nutrition	17	18.1
Food selection based on sound nutrition information	17	18.1
Nutrition and sports	15	16.0
Eating disorders	12	12.8
Determining adequate intake	10	10.6
Reliability of sources of information	10	10.6
Nutrient needs of the young adult	9	9.6
Food facts and fallacies	8	8.5
Nutrient supplementation	5	5.3
Other Food safety/handling Economic impact of prepared foods Food labels Purposes for additives	5	5.3

**Percentages add to more than 100% because many respondents taught more than one concept.*

TABLE VI

BARRIERS TO TEACHING NUTRITION CONFRONTED BY ELEMENTARY AND MIDDLE SCHOOL TEACHERS

Barriers	n	%*
Limited time and resources	57	60.6
Lack of training	18	19.1
Lack of interest among students	11	11.7
Curriculum too involved	10	10.6
Lack of interest among faculty	7	7.4
Other No books Money for foods to taste and cook Student comprehension Students don't read Lack of parental cooperation	5	5.3

**Percentages add to more than 100% because many respondents identified more than one barrier.*

TABLE VII

TEACHERS' PERCEPTIONS ABOUT BARRIERS TO TEACHING NUTRITION EDUCATION

Perceptions	n	%
Few barriers, easily overcome	28	29.8
Few barriers, difficult to overcome	18	19.1
Many barriers, difficult to overcome	7	7.4
Many barriers, easily overcome	5	5.3
No barriers	3	3.2
Too many barriers, gave up	2	2.1
No Response	31	33.0

TABLE VIII

TEACHERS' SUGGESTIONS TO OVERCOME BARRIERS TO TEACHING NUTRITION

Suggestion	n	%
Emphasize benefits to gain interest	24	25.5
Provide training	21	22.3
Simplify curriculum	17	18.1
Limit time and money spent	4	4.3
Other	11	11.7
Nutrition on state objective		
After school program		
Start at an early age		
Limited time most difficult		
Have morning snacks		
Accessible water in classrooms		
Need assistant to aid teacher		
Funding to purchase items		
Use "teachable moments"		
Better nutrition curriculum		
Provide more resources		

** Respondents could choose more than one suggestions.*

TABLE IX

BENEFITS OF TEACHING NUTRITION IDENTIFIED
BY ELEMENTARY AND MIDDLE SCHOOL TEACHERS

Barriers	n	%*
Interest and knowledge in food or nutrition increased	44	46.8
Eat more nutritious snacks	29	30.9
Try more new foods	28	29.8
Eat more nutritious meals	22	23.4
Are more aware of food composition	21	22.3
Discuss nutrition with their parents	14	14.9
Are less likely to follow fad diets	8	8.5
Other More likely to eat breakfast on test days Several stopped eating "rare" meats Food excites them Appreciate modern foods Drink more water	7	7.5

**Percentages add to more than 100% because many respondents identified more than one benefit.*

TABLE X

TEACHERS' PERCEPTIONS ABOUT BENEFITS
TO TEACHING NUTRITION

Perceptions	n	%
Many benefits, will continue	30	31.9
Some benefits, may or may not be worth time	15	16.0
Little benefits, worth time to continue	13	13.8
No benefits, quit teaching curriculum	2	2.1
Little benefits, not worth time	1	1.1
Many benefits, but not worthwhile	0	0
No Response	33	35.1

TABLE XI

STUDENTS' INTEREST IN NUTRITION

Interest	n	%
Little interest	37	39.4
Much interest	23	24.5
Not interested	4	4.3
Great interest, students requested information	1	1.1
No Response	29	30.9

TABLE XII

NUTRITION CONCEPTS NEEDING MORE TEACHING MATERIALS

Concepts	n	%*
Food groups	42	44.7
Nutrient needs of the child	42	44.7
Nutrition, health, and fitness	33	35.1
Influences on nutrition	32	34.0
Food selection based on sound nutrition information	23	24.5
Nutrient functions	22	23.4
Food facts and fallacies	21	22.3
Nutrient sources	20	21.3
Determining adequate intake	18	19.1
Nutrient needs of the young adult	18	19.1
Nutrition and sports	18	19.1
Eating disorder	17	18.1
Nutrient supplementation	10	10.6
Reliability of sources of information	10	10.6
Other Life skills and food	1	1.1

**Percentages add to more than 100% because many respondents identified more than one concept.*

TABLE XIII

PREFERRED FORMATS OF NUTRITION EDUCATION TEACHING MATERIALS

Formats	n	%*
Films/videotapes	47	50.0
Posters/charts	45	47.9
Games/puzzles	42	44.7
Cookbooks/recipes for students	41	43.6
Bulletin board displays	34	36.2
Curriculum guides	33	35.1
Computer programs	33	35.1
Workbooks	27	28.7
Food models	25	26.6
Puppets/skits	23	24.5
Quizzes/exams	10	10.6
Other	3	3.2

**Percentages add to more than 100% because many respondents identified more than one format.*

TABLE XIV

CHANGES OF TEACHERS' PERSONAL FOOD CHOICES AFTER TEACHING NUTRITION

Changes	n	%*
Increased interest and knowledge in foods or nutrition	34	36.2
Encouraged me to eat better snacks	31	33.0
Encouraged me to eat better meals	30	31.9
Made me more aware of food composition	27	28.7
Made me less likely to follow fad diets	13	13.9
Encouraged me to discuss nutrition with my family	10	10.6
Encouraged me to try more new foods	7	7.4
Other No change	5	5.4

**Percentages add to more than 100% because many respondents identified more than one change.*

TABLE XV

EFFECT OF TEACHING NUTRITION ON
PERSONAL FOOD CHOICES

Effect	n	%
Little effect	34	36.2
Much effect	18	19.1
No effect	11	11.7
Great effect	5	5.3
No Response	26	27.7

TABLE XVI

TEACHERS' PERCEPTIONS OF HOW WELL THEIR DIET COMPARES TO A HEALTHY DIET

Rating	n	%
Good	35	37.2
Average	25	26.5
Fair	9	9.6
Poor	6	6.4
Excellent	4	4.2
No Response	15	16.0

TABLE XVII

TEACHERS' MEAN NUTRIENT INTAKES (n=65)

Nutrient	Mean ± SD	Nutrient Intake* Guidelines (age 25-50)
Calories (kcal)	1402.1 ± 507.1	Men - 2900 kcal Women - 2200 kcal
Carbohydrates(gm)	194.76 ± 81.3 (55.6 %)	≥ 55% kcal
Protein (gm)	67.86 ± 26.8	Men - 63 gm Women - 50 gm
Total Fat (gm)	42.45 ± 24.7 (27%)	≤ 30% kcal
Saturated Fat (gm)	15.23 ± 10.6 (9.8%)	≤ 10% kcal
Polyunsaturated Fat (gm)	6.74 ± 5.1 (4.3%)	≤ 10% kcal
Monounsaturated Fat (gm)	13.89 ± 8.5 (8.9%)	≤ 15 kcal
Cholesterol (mg)	148.34 ± 94.1	< 300 mg
Fiber (mg)	14.91 ± 7.3	20-30 gm
Vitamin A (RE)	926.4 ± 724.8	Men - 1000 RE Women - 800 RE
Vitamin C (mg)	101.86 ± 71.5	60 mg
Vitamin D (ug)	4.85 ± 12.8	5 ug
Iron (mg)	18.66 ± 52.32	Men - 10 mg Women - 15 mg
Calcium (mg)	637.83 ± 354.4	800 mg
Folate (ug)	229.48 ± 137.3	Men - 200 ug Women - 180 ug
Zinc (mg)	30.97 ± 194.22	Men - 15 mg Women - 12 mg
Sodium (mg)	2231.1 ± 1158.6	≤ 2,400 mg

**Based on information taken from Third Report on Nutrition Monitoring in the United States.*

TABLE XVIII

AVERAGE NUMBER OF SERVINGS BY FOOD GROUP

Food Group	n	Mean Number of Servings (Mean ± SD)	Recommended Servings*
Bread/grain	65	4.9 ± 3.1	6-11
Vegetable	65	2.6 ± 1.8	3-5
Fruit	65	1.9 ± 1.7	2-4
Meat	65	1.8 ± 1.2	2-3
Milk	65	1.3 ± 1.0	2-3

**Recommended Servings according to the Food Guide Pyramid*

TABLE XIX

TEACHERS' PERCEPTIONS OF GRADE LEVEL
FOR NUTRITION EDUCATION TO BEGIN

Grade Level	Middle School Teachers		Elementary Teachers	
	n	%	n	%
Preschool	19	40.4	31	67.4
Elementary School	25	53.2	15	32.6
Middle Schools	3	6.4	0	-
No Response	1	2.1	0	-

TABLE XX

DIFFERENCES IN MEAN NUMBER OF BARRIERS AND BENEFITS IDENTIFIED BY ELEMENTARY AND MIDDLE SCHOOL TEACHERS

Grade Level	n	Barriers Mean ± SD	Benefits Mean ± SD
Middle School	48	0.9 ± 1.2	1.0 ± 1.8
Elementary School	46	1.4 ± 1.0	2.7 ± 1.6

TABLE XXI

TEACHERS' METHODS OF TEACHING NUTRITION EDUCATION: SEPARATE SUBJECT, INTEGRATED, OR BOTH

Teaching Method	Middle School Teachers		Elementary Teachers	
	n	%	n	%
Integrated with other subjects	15	75.0	27	61.4
Both separate and integrated	2	10.0	16	36.4
Separate	3	15.0	1	2.3

TABLE XXII

THE DIFFERENCE IN BENEFITS BY EFFECT OF TEACHING NUTRITION ON PERSONAL FOOD CHOICES

Food Choice Rating	Number of Benefits
Poor	0.5 ± 0.5 [a]
Fair	1.4 ± 1.0 [b]
Average	1.9 ± 1.7 [b]
Good	2.7 ± 1.9 [b]
Excellent	2.8 ± 3.4 [b]

[a,b] *Means ± SD in column with difference superscrips were significantly different ($p < .05$)*

TABLE XXIII

THE DIFFERENCE IN BENEFITS BY STUDENTS' INTEREST IN NUTRITION CONCEPTS

Students' Interest	Mean Number of Benefits
No	0.5 ± 0.6^{a}
Little	2.3 ± 1.8^{b}
Much	3.0 ± 1.6^{b}
Great	$7.0 \pm --^{c}$

$^{a-c}$ *Means ± SD in a column with different superscripts are significantly different ($p < .05$)*

TABLE XXIV

CORRELATIONS AMONG TEACHERS' PERCEPTIONS, USE OF NUTRITION EDUCATION, AND PERSONAL EATING BEHAVIORS

Teachers' Perceptions and Attitudes	Benefits	Nutrition hours taught	HEI score	Nutrition concepts taught	Personal eating changes
Number of barriers	.45***	.15	.22	.49***	.46***
Number of benefits		.22*	.16	.64***	.44***
Number of hours of nutrition taught			.25*	.37***	.35***
HEI score				.12	.27*
Number of nutrition concepts					.66***

* $p < .05$ *** $p < .001$

VITA

Rebecca Marie Schmidt

Candidate for the Degree of

Master of Science

Thesis: PERCEPTIONS OF TULSA PUBLIC SCHOOL TEACHERS ABOUT NUTRITION EDUCATION

Major Field: Nutritional Sciences

Biographical:

Personal Data: Born in Tulsa, Oklahoma, On March 14, 1966, the daughter of Tom and Shirley Rathbone.

Education: Graduated from Broken Arrow High School in May 1984; received Bachelor of Science degree in Vocational Home Economics from Northeastern State University, Tahlequah, Oklahoma in May 1988. Completed the requirements for the Master of Science degree with a major in Nutritional Sciences at Oklahoma State University in December, 1997.

Experience: Completed a teaching internship, 1988; employed as a substitute teacher for Broken Arrow Public Schools in Broken Arrow, Oklahoma, 1990-1993; employed as a graphic artist for ABC Printing in Coweta, Oklahoma, 1990-1993; employed as a graduate teaching assistant for Oklahoma State University, Undergraduate Programs and Services, 1994-1995,1996-1997; employed as a clinical dietitian at Hillcrest Medical Center, Tulsa, Oklahoma, 1996-1997; employed as a clinical dietitian at St. Francis Hospital, Tulsa, Oklahoma, 1997-present.

Professional Memberships:

American Dietetic Association, Oklahoma Dietetic Association, Tulsa District Dietetic Association, Society for Nutrition Education.