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# Compliance to Dietary Guidelines in Elementary School Food Service

Martha Anne Henry

*University of Tennessee, Knoxville*

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To the Graduate Council:

I am submitting herewith a thesis written by Martha Anne Henry entitled "Compliance to Dietary Guidelines in Elementary School Food Service." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Food Science and Technology.

Jeannie Sneed, Major Professor

We have read this thesis and recommend its acceptance:

Betty R. Carruth, Jean D. Skinner

Accepted for the Council:

Dixie L. Thompson

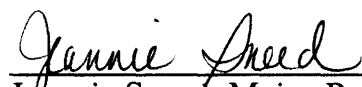
Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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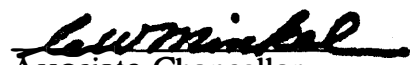
  
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Jeannie Sneed, Major Professor

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and recommend its acceptance:

  
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Accepted for the Council:

  
\_\_\_\_\_  
Associate Chancellor  
and Dean of The Graduate School

COMPLIANCE TO DIETARY GUIDELINES IN  
ELEMENTARY SCHOOL FOOD SERVICE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Martha Anne Henry

August 1991

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I also wish to express appreciation to my committee members, Dr. Jean Skinner and Dr. Betty Ruth Carruth, for their direction and assistance in advising me throughout this study.

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## ABSTRACT

The purpose of this study was to determine compliance to the Dietary Guidelines for Americans and to Recommend Dietary Allowances in Tennessee elementary school lunch programs and to determine training practices as they are related to nutrition. Fifty six of the 145 school food service supervisors in Tennessee participated in the study, a response rate 39%.

A four-part questionnaire was developed for all school food service supervisors in the state of Tennessee. The first three parts of the questionnaire consisted of items about types of food products used in cooking, the school food service supervisors' participation in training, and demographic information about the supervisors. In the fourth part of the questionnaire, menus were requested from each school for comparisons with Recommended Dietary Allowances (RDA) and Dietary Guidelines.

Using 1/3 of the RDA as a standard of adequacy, nutritional analysis of the menus, using Nutritionist III, showed more than adequate amounts of protein, vitamin A, vitamin C, vitamin B<sub>6</sub>, folate, sodium, magnesium, calcium, iron, and zinc. Kilocalories were adequate for elementary school aged children. Fat intake was above the 30% recommended amount of kilocalories, fat represented 35.7% in this study. Sodium intake was  $1000.9 \pm 492.1$  mg.

The study identified that some of the barriers to implementing the Dietary Guidelines were financial constraints, high saturated fat content of government

commodities, lack of support for training, and lack of classroom nutrition education in the schools.

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## CHAPTER I

### INTRODUCTION

"School lunch menus based on Dietary Guidelines for Americans may assist in the development of life-long eating habits more conducive to good health" (Sandoval, Lockner, & Adkins, 1986, p. 32). The Dietary Guidelines for Americans make seven recommendations related to nutrition and health (U.S. Department of Agriculture [USDA], 1990b).

The Surgeon General's Report on Nutrition and Health (U.S. Department of Health and Human Services [USDHHS], 1988) stated that "Educational efforts should begin in primary school and continue throughout the secondary grades and should focus on the dietary principles outlined in this Report" (p. 17). The report stated that there are potential health benefits of eating a diet that is lower in fat (especially saturated fat) and rich in complex carbohydrate and fiber. The main conclusion reached from the Report is that overconsumption of certain dietary components is now a major concern for Americans; scientific research over the past few decades indicates that diet can play an important role in prevention of diseases, such as coronary heart disease, stroke, cancer, and diabetes (USDHHS, 1988).

There is a definite need for trained food service personnel to provide nutritious and healthful school lunches and to help school children learn proper eating habits (Brown & Hanna, 1988; Child Nutrition Programs: Issues for the

101st Congress, 1989). The Master Plan for Education developed by the American School Food Service Association supports the concept that comprehensive professional development of personnel is the key to accomplishing the goal of providing wholesome meals to school children (Flanagan, 1987).

### Purpose

The purposes of this study were to determine the nutritional content of school lunch menus served in Tennessee elementary schools, to determine modifications made to improve the nutritional quality of those meals, and to determine training practices related to nutrition. Specifically, the objectives were to:

1. Determine the nutritional content of school lunch meals in Tennessee and compare the nutrients provided in those meals with the Recommended Dietary Allowances (RDA, 1989) and the Dietary Guidelines for Americans (USDA, 1990a & b).
2. Determine the use of selected food items such as type of fat (corn oil, other oils, hydrogenated shortening, lard, butter, margarine), type of flour (white flour or whole wheat flour), and type of milk (skim milk, whole milk, buttermilk, 2% milk) in school lunch meals served in elementary schools in Tennessee.
3. Determine the increase in food cost to school food service if low fat/low cholesterol substitutes were used for commodities that are high in fat and cholesterol.

4. Determine school lunch supervisors' certification status and participation in training programs.

5. Determine nutrition education activities and sources of nutrition education materials used by school food service personnel.

### Research Hypotheses

The following research hypotheses were tested:

Hypothesis 1. Menus for the elementary schools will meet or exceed the Recommended Dietary Allowances for selected nutrients for children 7 to 10 years old.

Hypothesis 2. The fat content of these menus will exceed the 30% of calories recommended in the RDA.

Hypothesis 3. The majority of the school food service supervisors will participate in training activities during the year studied.

### Assumptions

The assumptions of this study include:

Assumption I. There will continue to be increased emphasis on nutrition for school age children by the federal government and consumer groups.

Assumption II. Nutrition will continue to be an important factor in the health of Americans of all ages.

## Limitations

The limitations of this study, which should be recognized when interpreting the study results, include:

1. The sample was restricted geographically to the state of Tennessee.
2. Non-respondents may differ from respondents.
3. Due to different organization of school systems, all schools may not have grades K-5 as separate entities.

## Definition of Terms

Compliance--performance according to an established standard.

Dietary Guidelines for Americans--A U.S. Department of Agriculture publication which identifies seven guidelines to be used in planning meals to meet the nutritional health of Americans (USDA, 1990b).

Elementary Schools--Schools attended by children in grades kindergarten through 5.

School Lunch Guidelines--U.S. Department of Agriculture recommended requirements and guidelines for school lunch programs in America (USDA, 1983).

Supervisor--an administrative officer in charge of school food service operations and school food service employees at the city and/or county level.

Training--the process of acquiring and developing skills, knowledge, and attitudes through instructional activities (Canter, 1988).

## CHAPTER II

### REVIEW OF RELATED LITERATURE

School food service programs are important to the nutritional health of children. "Since eating habits are formed early in life, foods served at school can be helpful in directing children toward wise choices that can be implemented into long-term habits" (Frank, Nicklas, Forcier, & Berenson, 1989, pp. 130-131). School food service supervisors, in planning and implementing menus which comply with the Dietary Guidelines for Americans (USDA, 1990b), the Recommended Dietary Allowances (RDA, 1989), and the Menu Planning Guide for School Food Service, may influence eating habits of young children (USDA, 1983). This review of literature will present the history, need for nutritional programs, and nutrition recommendations related to child nutrition programs as well as research related to the importance of training for school food service personnel.

#### Child Nutrition Programs

##### History

Four events in the history of nutrition were important factors in developing healthier diets for Child Nutrition Programs: passage of the National School Lunch Act in 1946, publication of the first edition of the Recommended Dietary Allowances in 1943, publication of Nutrition and Your Health: Dietary Guidelines

for Americans in 1980, and publication of the first Surgeon General's Report on Nutrition and Health in 1988.

The first important event in the establishment of child nutrition programs was the National School Lunch Act of 1946. The purpose of the National School Lunch Program, established by the Act, is to safeguard the health and well-being of the nation's children, and to encourage the consumption of agricultural commodities (Lilly, Davis, Wilkening, & Shank, 1980). The United States Congress implemented the program to provide nutritious and reasonably priced lunches to school children, improve understanding of nutrition, and improve habits in relation to health (Child Nutrition Programs, 1989).

The second event was the publication of the first edition of the Recommended Dietary Allowances in 1943. The Food and Nutrition Board's Recommended Dietary Allowances are recognized in the food and health fields as the accepted source on nutrient allowances for the maintenance of good health (RDA, 1989). The initial publication has been revised periodically to incorporate new scientific knowledge and interpretations.

The third event was the publication of Nutrition and Your Health: Dietary Guidelines for Americans. These nonquantitative guidelines were published by the U.S. Department of Agriculture and U.S. Department of Health and Human Services in 1980 as guidelines that would provide help for people as they made daily food choices (USDA, 1990a). Nutritionists in government have provided advice to Americans about what to eat for over a century (USDA, 1990a; RDA,



1989). In addition, a number of national professional and health organizations have published dietary guidance for healthy Americans that considers diet as it relates to certain chronic diseases as well as to the promotion of health (National Institutes of Health, National Heart, Lung, and Blood Institute, 1990).

The fourth event was the publication of the first Surgeon General's Report on Nutrition and Health (USDHHS, 1988). It reflects the increasing interest of scientists, health professionals, and the American people in the role of diet and in health promotion.

### Need for Nutritional Programs

The National School Lunch Program has a significant influence on the nutritional health of school-aged children in the United States. School food service can play a major role in influencing students' lifelong eating habits (Wolford & Allensworth, 1988; Sandoval et al., 1986; Brown & Hanna, 1988; Frank et al., 1989; Cresanta, Farris, Croft, Webber, Frank & Berenson, 1988). Students who buy a school lunch have a better nutritional profile than those who do not eat a school lunch (Hans, Vermeesch, & Gale, 1984). Besides serving nutritionally adequate meals, school food service programs provide nutrition education through two basic models. The first uses the cafeteria as a learning laboratory within the nutrition curriculum. The alternative is a free-standing supplemental nutrition education program planned and implemented by school food service personnel (Wolford & Allensworth, 1988). Regardless of which

model a school district chooses, the food service staff plays a critical role in nutrition education.

Within recent years, concern about nutrition and health education has expanded beyond the need to merely prevent deficiencies (USDHHS, 1988). This concern has expanded to encompass the effects of typical American dietary patterns on the incidence of chronic diseases that are leading causes of death and disability in this country. Many Americans diets have dietary excesses and/or imbalances that can relate to chronic diseases (USDHHS, 1988). The Surgeon General's Report on Nutrition and Health, (USDHHS, 1988), the Dietary Guidelines for Americans (USDA, 1990a & b), and the Recommended Dietary Allowances (RDA, 1989) recommend dietary changes that can potentially improve the future health of Americans. Priorities for dietary modifications are to reduce intake of foods high in fats, to reduce the amount of sodium intake in the diet and to increase intake of foods high in complex carbohydrates and fiber, (USDA, 1990a; RDA, 1989; & USDHHS, 1988).

### Nutrition Recommendations

The Surgeon General's Report on Nutrition and Health (USDHHS, 1988) included in its recommendations some guidelines to follow regarding fat and cholesterol, energy and weight control, complex carbohydrates and fiber, and sodium that should be considered and implemented in school lunch programs. These guidelines include:

**Fat and Cholesterol:** Reduce consumption of fat (especially saturated fat) and cholesterol. Choose foods relatively low in these substances, such as vegetables, fruits, whole grain foods, fish, poultry, lean meats, and low-fat dairy products. Use food preparation methods that add little or no fat.

**Energy and weight control:** Achieve and maintain a desirable body weight. To do so, choose a dietary pattern in which energy (caloric) intake is consistent with energy expenditure. To reduce energy intake, limit consumption of foods relatively high in calories, fats, and sugars.

**Complex carbohydrates and fiber:** Increase consumption of whole grain foods and cereal products, vegetables (including dried beans and peas), and fruits.

**Sodium:** Reduce intake of sodium by choosing foods relatively low in sodium and limiting the amount of salt added in food preparation and at the table.

In 1988, the Dietary Guideline Advisory Committee submitted to the U.S. Department of Agriculture and U.S. Department of Health and Human Services revisions to the existing Dietary Guidelines for Americans. These revisions were accepted and have been published for the use by Americans to select healthful diets (USDA, 1990b). Even though the Dietary Guidelines for Americans do not give recommended nutrient intakes for each age group, they give information that is pertinent to all age groups with the exception of children under two years of age and infants. The new guidelines have a more positive emphasis as to what should

be eaten, rather than what should not be eaten. The new guidelines suggest goals for total fat and saturated fatty acids in the diets of adults. These guidelines can be used as a basis for menu planning in school food service even though no specific goal is mentioned for children. "Many American diets have too many calories and too much fat (especially saturated fat), cholesterol, and sodium, and are also low in complex carbohydrates and fiber. Such diets contribute to America's high rates of certain chronic diseases, such as heart disease, high blood pressure, strokes, diabetes, and some forms of cancer" (USDA, 1990a). Observations show that precursors of heart disease begin at an early age with many children already possessing one or more of the known clinical risk factors including hypertension, obesity, and hypercholesterolemia (Berenson, McMahan, Voors, Webber, Srinivasan, Frank, Foster, & Blonde, 1980).

The seven Dietary Guidelines for Americans are (USDA, 1990b, p. 1).

1. Eat a variety of foods.
2. Maintain healthy weight.
3. Choose a diet low in fat, saturated fat, and cholesterol.
4. Choose a diet with plenty of vegetables, fruits, and grain products.
5. Use sugars in moderation.
6. Use salt and sodium in moderation.
7. If you drink alcoholic beverages, do so in moderation.

The Dietary Guidelines for Americans suggests that in a 2000 calorie per day diet for adults an upper limit for fat is 600 calories or about 67 grams of fat.

The amount of fat that should be in the diet depends on the calories the person needs for healthy weight. If a person is more active, and calorie needs are higher, his/her diet can contain more fat. Children over two years of age can grow and develop normally when eating a nutritious diet containing 30 percent of calories as fat (USDA, 1990a).

The Dietary Guidelines for Americans (1990b) also recommend eating a variety of foods which include plenty of vegetables, fruits, and grain products. The guidelines recommend that adults eat at least three servings of vegetables, two servings of fruits, and six servings of grain products each day. Children should be encouraged to develop similar practices (USDA, 1990b).

Another important point stressed in the Dietary Guidelines for Americans (1990a) is that about one in three adults in the United States has high blood pressure. If these people restrict their salt and/or sodium intake, usually their blood pressure will fall (USDA, 1990a). Eating a diet with less sodium may help some people reduce their risk of developing high blood pressure (USDA, 1990a).

In the Bogalusa Heart Study, Frank, Webber, Nicklas, & Berenson (1988) reported sodium intakes in excess of recommended ranges, as were low levels of potential hypotensive dietary agents. In this study electrolyte and mineral intakes assessed by 24-hour dietary recall were examined for race and sex differences in cohorts of infants and school-age children at 6 months and at 1, 2, 3, 4, 10, 13, 15, and 17 years. Sodium increased from 0.88 g at 6 months to 3.21 g at 4 years to 3.67 g by 17 years. Boys had higher intakes of sodium and sodium per kilogram

body weight than did girls. At ages 1 to 10 years, 90 to 100% of the children in the study exceeded the National Research Council's recommended range for sodium. "A suggested association between high sodium intakes and high blood pressure appears, but is inconsistent across ages of children" (Frank et al., 1988, p. 801). Creative approaches to moderate sodium intake to achieve the recommended dietary range of the National Academy of Sciences are needed (RDA, 1980; Farris, Frank, Webber, & Berenson, 1985).

In the Bogalusa Heart Study, the early natural history of coronary artery disease has been examined in a total community since 1973 (Berenson et al., 1980). The Bogalusa study (Cresanta et al., 1988) examined cholesterol, fat, and fatty acid intakes of four cohorts of 10-year olds in Bogalusa, LA during the decade of 1973 to 1983. Total fat intake provided 38% of the calories in each survey, but the changes in proportions of fatty acids paralleled national trends in food consumption patterns and nutrient sources. The study showed that the Bogalusa diet, when compared to the U.S. Dietary Guidelines, had much higher levels of simple sugars and total fat than recommended (Cresanta et al., 1988). "Dietary modification to decrease intake of total fat, saturated fat and cholesterol has been shown to be effective in reducing serum total cholesterol and LDL-cholesterol . . . . Because both the atherosclerotic process and the establishment of eating habits begin during childhood, safe and effective dietary modification to lower coronary heart disease risk in the pediatric population would be most effective (Cresanta et al., 1988, p. 183).

Critics state that school food service operators are not moving quickly enough to provide school meals that are in line with U.S. Dietary Guidelines (Honson, 1989). "School food service operators are frustrated by a public that doesn't understand nutrition, the program, or the progress being made. The American School Food Service Association has had to defend the ideals of the program without disrupting its fragile political support" (Honson, 1989, p. 65). All parties are frustrated by a program that attempts to serve two masters: the ideals of improved nutrition for children and a political system designed to support American agriculture. Critics of the commodities program have suggested that schools have become dumping grounds for the high-fat products retail merchants do not want (Schuster & Zuckerman, 1989). School lunch program survival at the local level depends on the ability of food service managers to maximize the use of commodities, many of which are high fat foods, because of the increased cost factors involved if commodities are not used. "Citizens' lobbies allied with school food service personnel should be supporters of the Child Nutrition Program ideals while working to correct program deficiencies" (Honson, 1989, p. 65).

DeMicco identified barriers that impede school food services from implementing the Dietary Guidelines for Americans (DeMicco, 1990, p. 12):

- Student's resistance to change.
- Present government commodity and vendor food products are inconsistent with the Dietary Guidelines for Americans.

- Emphasis on maintaining participation rates in school food service programs.
- Cost considerations.
- Popular food items are often high in fat, salt, sugar, and cholesterol.
- Lack of reinforcement for the Dietary Guidelines for Americans at home.
- Peer pressure.
- Inadequate staff to implement the Dietary Guidelines for Americans.
- Insufficient classroom education to reinforce the selection of menu items that reflect the Dietary Guidelines for Americans.
- Lack of student interest in nutrition.
- Lack of nutrient composition information on commodity and vendor food products.
- Recipe modification needed prior to implementing the Dietary Guidelines for Americans.

These barriers to implementing the Dietary Guidelines provide a foundation for educational programs for school food service. Food service business managers, directors, managers, and cooks voiced concern about government commodities being inconsistent with the Dietary Guidelines for Americans (DeMicco, 1990). "Specific to the government food commodities, research efforts aimed at working with USDA and the Food and Nutrition Service to improve labeling on commodities seems plausible" (DeMicco, 1990, p. 13).



As reported in Food Management ('Directors Struggle', 1989), the Palm Beach County, Florida School District has been commended for its efforts to provide school meals that meet the Dietary Guidelines for Americans. The district's idea was to adopt a program designed to bring school meals in the school district within suggested levels of sugar, salt, and fat. Under this program, salt in all recipes was reduced by 50% and salt shakers and salt packets were removed from school cafeterias. In addition, for recipes such as chili or meatloaf that call for ground beef, a 50% ground beef and 50% ground turkey mixture is now used. All entrees which, when combined with fruit, vegetables, and low fat beverages, exceeded the 30% fat level were removed from the menu.

Blount County and Hamilton County school systems in Tennessee implemented a more nutritious school menu in order to provide meals which would be lower in sodium, sugar, and fat, and higher in fiber. The new menu model was developed by twenty physicians and nutritionists from The University of Tennessee, Memphis. Dr. Mary Ann Smith, director of the Division of Clinical Nutrition at The University of Tennessee, Memphis, said the menu was specifically designed as a preventive health measure, not as a therapeutic diet. The menu plan included a guide for eating and menus with recipes that have been modified to be limited in total fat, cholesterol, sodium, and sugar, and high in fiber and complex carbohydrates. It meets the criteria of the Dietary Guidelines for Americans and the nutrient recommendations set forth by the National Research Council's Recommended Dietary Allowances. The menu was further refined to

meet the guidelines of the National School Lunch Program (Smith & Dundas, 1988).

These school systems are trying to provide the types of food that children want, but at the same time train food service employees to cut down on the use of fat and sugar. The main changes do not focus on choosing different types of foods, but on the way foods are prepared. With the use of the new menu and nutrition education in the classroom, it is hoped that some permanent habits that will be established in children's eating habits that will extend into adulthood (Smith & Dundas, 1988).

Many school food services, both in elementary and secondary schools, have used the "offer versus serve" or the a la carte lunch menu as an incentive to increase participation in school lunch programs (Harris, Lanzidelle, & McKinney, 1990). In this study, findings suggested that adolescents could be at risk for inadequate nutrient intake if they do not purchase combinations of a la carte foods or supplement their single purchases with food brought from home. The nutrient adequacy was based on one-third of the RDA, the percentage required for the standard school lunch. This study indicated that students tend to select single foods rather than combinations of foods in an a la carte program. This means that the traditional lunch period may become another snack time. Ezell, Skinner, & Penfield (1985) reported that snacks provide one-third of the RDA for adolescents and that availability rather than preference is more important in their choice of snacks. Morgan & Goungetas (1986) stressed that snacking and eating

away from home are associated with the over consumption of problem dietary components such as fat, cholesterol, refined carbohydrates, and sodium.

"Providing students with nutritious choices then becomes essential in an a la carte lunch program" (Harris et al., 1990).

A study of children ages 5 to 12 years from middle- and upper-middle income families assessed the role of snacking in the childrens' diets. Snacks contributed positively to the childrens' diets by providing greater than 20% of the 1980 Recommended Dietary Allowances for some nutrients. The nutrients for which snacks made a significant contribution were protein, riboflavin, vitamins B<sub>12</sub>, C, and A, calcium, phosphorus, and magnesium. However, when no snacks were consumed there was a decreased intake of fat, sodium, and sugars (Cala, Morgan, & Zabik, 1981).

### Strategies for Implementing Nutrition Education

The school food service staff plays an important role in the implementation of nutrition education in child nutrition programs. "Healthy, nutritional behavior is imperative during growth and development stages when habits are established and learning skills developed . . . The long term return is establishment of lifelong healthy nutritional behaviors" (Wolford & Allensworth, 1988 p. 38).

Wolford & Allensworth (1988) suggested nutrition education strategies that might be implemented by school food service supervisors:

1. Prepare and promote meals following United States Department of Agriculture and Department of Health and Human Services' Guidelines.
2. Label foods which are low in salt, cholesterol, and calories by using signs on the serving line.
3. Label foods which are high in fiber by using signs on the serving line.
4. Substitute salt packets at condiment tables for salt shakers on tables.
5. Coordinate nutrition education in the cafeteria with posters, bulletin boards, microcomputer displays, and exhibitions.
6. Establish a student nutrition action committee to help with menu modification and nutrition education.
7. Solicit and use community-based instructional resources from agencies.
8. Cooperate in planning and implementing a sequential nutrition instruction program at school.
9. Use the cafeteria and kitchen facilities as a nutrition learning laboratory.
10. Display student-generated health promotional materials.
11. Integrate nutrition instruction during National Nutrition Month and National School Lunch Week.

School food service directors do not have to be nutrition teachers, but they should provide support in school cafeterias so that those facilities can become nutrition laboratories where children can learn to make healthful choices (Schuster

& Zuckerman, 1989). The Food Research and Action Center executive director, Robert J. Fersh, believes that school is the place to set good eating examples and develop good eating habits among children (Schuster & Zuckerman, 1989). It is important that the food is nutritious because many school children depend on school meals as their main food source of the day (Schuster & Zuckerman, 1989; Child Nutrition Programs: Issues for the 101st Congress, 1989; Frank, Vaden, & Martin, 1987).

### Training Programs for Personnel

One of the major goals of the American School Food Service Association is to improve the quality of school nutrition programs and increase acceptability of nutritious foods (Allington, Matthews, & Johnson, 1982). "With more than 27 million children participating in the school lunch program, school cafeterias and classrooms are logical places to incorporate teaching and establish preventive approaches" (Frank et al., 1989, p. 131). According to Allington et al. (1982), attainment of this goal depends largely on the abilities of trained personnel responsible for the day-to-day activities of planning, preparing, and serving meals. Quality of food is very important in attaining and maintaining an optimal level of participation in the school lunch program and proper employee training can help to achieve this goal.

Not only is quality important in school lunch programs, but supervisors also must be sure that school lunch meals continue to meet the nutritional needs of

students. In order to accomplish these goals, school food service personnel must be well-trained in nutrition, production of quality food, and institutional management. There is a need for trained school food service workers (Jones & Baird, 1981; Kende, Perkowski, Lackey, & Kolasa, 1980; Martin, 1984; & Trivette, Brouillette, & Bezdek, 1985). The Master Plan for Education developed by the American School Food Service Association supports the concept that comprehensive professional development of personnel is the key to accomplishing the goal of providing wholesome meals to school children (Flanagan, 1987). Staying current in institutional food service is no easy task, especially in a federally-funded program where change in government regulations is constant (Temple, 1983; Hamlett, 1987).

One survey of 97 individuals associated with the school lunch program in Connecticut indicated that about 42% of those responding do not provide meetings or training sessions for their school food service personnel (Jensen, Remick, & Ricci, 1980). One reason cited for not conducting needed training was a lack of funds. Fifty-six percent and 47% of respondents indicated that they would like to attend training sessions on nutrition education and menu planning, respectively (Jensen et al., 1980).

Employee training is not undertaken readily in school food service because of the high initial cost of developing effective training programs, the lack of time, and more often the lack of manager expertise (Oglesby, 1979; Benford, Brooks, Doyle, & Tedd, 1979). In addition, the number of food service employees in each

school can vary greatly. Many schools employ less than five food service employees, thereby making training a costly undertaking for each facility. A survey of Kansas school food service personnel indicated that two-thirds of the 464 respondents had not completed any type of nutrition training (Bowden, Vaden, Newell, & Dayton, 1982). Similarly in Connecticut, most school food service personnel had no formal training in nutrition or institutional food service (Jensen et al., 1980). It is important that food service employees provide a model of healthful meals and nutrition education to help children make better food choices and help to establish healthful, lifelong eating habits (Schuster & Zuckerman, 1989).

Group instruction is an alternative to individual school food service training programs shown to be efficient and economical (Harger, Shuggart, & Payne-Palacio, 1988). Participants have the opportunity to share their experiences and problems with each other. Qualified instructors can be hired to do the training. Education and training also help school food service employees deal with change. Training school food service workers, teachers, and students to become active components in a health education intervention program is one way of providing school lunches with less sodium, sugar, and fat (Frank et al., 1989). In one school-based health promotion program, the Bogalusa Heart Study (Frank et al., 1989), health-risk eating behaviors of children were addressed and monitored to measure positive change. "Individual health goals for reducing heart disease risk factors may become permanent tenets of the school environment and enhance

achievement of national health objectives beginning in childhood "(p. 130). The Bogalusa Heart Study is an institutional model that involves training for school lunch managers, administrators, teachers, nurses, counselors and child nutrition workers. An institutional model that involves school lunch management and curriculum components within the school environment is necessary to affect health promotion. The Heart Smart nutrition component of the Bogalusa Heart Study provides both the education and the resources to promote healthy eating practices of today's children and tomorrow's adults (Frank et al., 1989).

Nance & Alford (1987) showed that elementary students experienced statistically significant gains in nutrition and food knowledge, food attitudes, and food practices when classroom teachers and food service employees cooperated and coordinated nutrition education efforts. The teachers and food service employees were trained and given ready-prepared teaching materials that were designed with current nutrition issues in mind (Nance & Alford, 1987). The school food service program was used as a laboratory for teaching nutrition education. In the Bogalusa Study (Frank et al., 1989), the knowledge and skills of food service staff were crucial to menu modification.

### Summary

Since food habits are established early in life (Frank et al., 1989), exposure to the types of foods recommended by the Dietary Guidelines for Americans may promote appropriate lifelong food choices while meeting the RDA. In recent



years there has been increased emphasis on education and training of school food service personnel (Allington et al., 1982). One of the steps in the development of a coordinated training effort is identification of desired end-point competencies. Training is an important means to assist school food service employees in functioning more effectively and meeting the goals of the child nutrition program (Rufael, Gregorie, & Spears, 1988). Trained staff in school food service is a key to meeting childrens' nutritional needs and the goals of the Child Nutrition Program (Jones & Baird, 1981).

## CHAPTER III

### METHODS

#### Sample

The sample included school food service supervisors in all city and/or county elementary school systems (grades K-5) in the state of Tennessee (no.=145). Prior to data collection, permission to mail the questionnaire to school food service supervisors was obtained from the state director of Child Nutrition Programs. Also, because this research involved human subjects, approval by the University of Tennessee, Knoxville, Human Subjects Research Review Committee was obtained prior to data collection (Appendix A).

#### Research Instrument

A four-part questionnaire was developed for administration to school food service supervisors in Tennessee (Appendix B). Each supervisor was requested to send a copy of his/her elementary school (grades K-5) menu for the one-week period of April 3-7. These menus were analyzed to determine the nutritional content of meals served (to meet Objective 1).

Part I of the questionnaire consisted of items to determine types of food products used in food preparation in elementary schools in 1988-1989. Respondents were asked to estimate the percent of butter used compared to margarine, the percent of white flour used compared to whole wheat flour,

percent of skim milk used compared to whole milk, 2% milk, and buttermilk, and percent of saturated shortening used compared to unsaturated shortening or oil (to meet Objective 2). Also in Part I, amounts of selected commodities used in food preparation in elementary schools during the specified school year were requested. These quantities served as a basis for cost determination if these food items had been purchased by the school systems (to meet Objective 3).

Part II consisted of eight questions to determine training activities for food service personnel and nutrition education activities provided to elementary school children for the school year 1988-1989. Questions were asked to determine the attendance of the food service supervisor at local, state, and national workshops, and to determine if nutrition education is being promoted in the school system's elementary school food service. This provided information to meet Objectives 4 and 5.

Part III included demographic questions about supervisors' certification status, education level, gender, age, and years of experience in foodservice. Questions about their school food service system including source of menus, type of service, type of production system, and location also were included.

### Pilot Test

The questionnaire was reviewed by a group of eight University of Tennessee graduate students majoring in either nutrition and food science or food systems administration as well as by two University of Tennessee professors in the

same area of interest to determine content validity, clarity of questions, and layout. The pilot test was administered to the East Tennessee District School Food Service Supervisor, three college professors, three college food service directors, and three county and/or city school food service supervisors to determine content validity, clarity, and length of time required to complete the questionnaire. Based on suggestions from the pilot test, revisions were made to clarify the meaning of certain items on the questionnaire. Restructuring of some questions was done to make them more readable. For example, items used to determine the percent of product usage were grouped into four categories for ease in response: fat for table use, flour, milk, and fat used in food preparation.

### Data Collection

Data collection was done during November 1989. Early November was chosen as an appropriate time for data collection because it is a rather uneventful time in school food service. At this time of year, there are no opening or closing procedures, no budget preparations, and no special events such as holidays which might interfere with the time required to complete the questionnaire. The questionnaire (Appendix B), a cover letter (Appendix C), and a postage-paid return envelope were sent to each school food service supervisor in the state of Tennessee. The cover letter explained the purpose of the study and requested cooperation of the supervisors in completing the questionnaire. The supervisors were assured that all responses would remain anonymous and that participation

was voluntary. It was emphasized that group data, rather than individual data, would be reported in the results, and that no one would have access to the completed surveys with the exception of the researcher and her major professor. Two weeks after the surveys were mailed, a follow-up post card was sent to each school food service supervisor in the sample to encourage participation in the study (Appendix D).

### Data Analysis

Data were analyzed using the Statistical Analysis System (SAS, 1985). Nutritionist III (N-Squared Computing, 1988) was used for nutritional analysis of each menu, and SAS was used to determine means and standard deviations for each nutrient. For vitamin A, the RDA units are retinol equivalents (RE) and for Nutritionist III the units are International Units (IU). For comparison, the RE in the RDA was multiplied by 5 to estimate IU recommendations.

### Questionnaire Part I (Appendix B)

Frequency and percentages were determined for the questions related to products used in cooking. Means and standard deviations were determined for the questions related to commodity usage and percent of food product usage. Means for commodity usage were used to cost the commodity products provided to the schools. Current bid prices per item from the University of Tennessee Food Services at UTK were used to place a value on government commodities.

This was considered the cost of using alternate food products in the place of government commodities.

### Questionnaire Parts II and III

Frequency and percentage of responses were calculated for each item in part II that related to training and education activities and for the demographic items in part III. Open-ended items were summarized by the researcher.

### Questionnaire Part IV

The nutritional content of menus for two randomly selected days from the five-day menus submitted by the supervisors was determined using the Nutritionist III computerized nutritional analysis program (N-Squared Computing, 1988). Means and standard deviations were calculated for each nutrient and for total calories. Means were compared to the 1989 Recommended Dietary Allowances.

Kilocalories provided by protein, fat, and carbohydrate as a percent of total kilocalories/day were calculated using the following formulas:

$$\% \text{ Kcal from Protein} = \frac{\text{g protein} \times 4 \text{ Kcal/g}}{\text{total Kcal}} \times 100$$

$$\% \text{ Kcal from Fat} = \frac{\text{g fat} \times 9 \text{ Kcal/g}}{\text{total Kcal}} \times 100$$

$$\% \text{ Kcal from Carbohydrate} = \frac{\text{g carbohydrate} \times 4 \text{ Kcal/g}}{\text{total Kcal}} \times 100$$

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Sample Characteristics

Completed questionnaires were returned by 56 school food service supervisors for a response rate of 39%. A possible reason for the low response rate could have been the request for amount of usage of certain food products. The required usage amounts for a one-year period for specific items could have been time consuming, especially if the school food supervisors did not have access to computers. Therefore, they may not have responded because of the time required to find the previous records and calculate the amounts of the products used. Characteristics of respondents are summarized in Table 1. Characteristics of the school food service systems of participants are summarized in Table 2.

#### Representativeness of Sample

As shown in Table 1, 56% of the respondents (no. = 31) are certified school food supervisors compared to 46% of the school food service supervisors in Tennessee who are certified (M.L. Marshall personal communication, February 11, 1991). Thus, a higher percentage of respondents were certified than the overall state percentage. Also, the number of respondents who had a college degree may be higher than the average for the state. These differences could be possible sources of bias in the study.

Table 1. Characteristics of school foodservice supervisors in study<sup>a</sup>

Characteristic	Frequency	% <sup>b</sup>
<u>Certified</u>		
Yes	31	56
No	24	44
<u>Education Level</u>		
some high school	1	2
completed high school	2	4
completed technical school	1	2
some college	8	14
completed college	7	13
graduate coursework	15	27
graduate degree	22	39
<u>Gender</u>		
Male	4	7
Female	51	93
<u>Age</u>		
20-29	1	2
30-39	13	24
40-49	21	38
50-59	16	29
over 60	4	7
<u>Develop own menus</u>		
always	42	76
frequently	3	6
sometimes	3	6
never	7	13
<u>Years food service experience</u>		
5 or less	7	13
6-10	17	31
11-15	12	22
16-20	9	16
21-25	6	11
26 or more	4	7

<sup>a</sup>no.=56

<sup>b</sup>percent may be greater than 100 due to rounding error



Table 2. Characteristics of schools food service system represented in the study<sup>a</sup>

Characteristic	Frequency	% <sup>b</sup>
<u>Source of menus</u>		
Develop Own	42	75
Child Nutrition Program Supervisor	1	2
Other	13	23
<u>Salad Bar</u>		
Yes	38	69
No	13	24
Some	4	7
<u>Type of Service</u>		
Serve	8	14
Offer	40	71
Both	8	15
<u>Use of Standard Menu</u>		
Yes	39	70
No	17	30
<u>Type of Production System</u>		
Conventional	52	93
Combination	4	7
<u>Location</u>		
Rural	44	79
Urban	12	22

<sup>a</sup>no. = 56

<sup>b</sup>percent may be greater than 100 due to rounding error

In this survey, the largest percentage (91%) of school food supervisors fell within the age group ranging from 30 to 59 years of age. The state percentage of 90% is about the same (M.L. Marshall personal communication, February 11, 1991). Of the returned surveys, 93% of the school food service supervisors were female and 7% were male as compared to 88% female and 12% male for the entire state of Tennessee (M.L. Marshall personal communication, February 11, 1991).

In this survey, 76% of school food supervisors developed their own menus. This is approximately the same percentage as for the state (M.L. Marshall personal communication, February 11, 1991). Thus, the sample is similar in certification status, age, gender, and menu planning responsibility to the total population of school food service supervisors in Tennessee.

## Nutritional Quality of School Meals

### Nutritional Content of Menus

Table 3 shows the comparison of nutrients provided in the elementary school lunches with the Recommended Dietary Allowances (1989). School lunch programs should provide one third of the RDA requirements for students (USDA, 1983). The results of this survey showed that the menus from participating schools met or exceeded the standard one-third RDA for energy and all of the selected nutrients. Thus, hypothesis 1, which stated that menus for the elementary schools will meet or exceed the one-third Recommended Dietary Allowances for

Table 3. Comparison of nutrients provided in school lunches with Recommended Dietary Allowances (no. = 56 schools)

	Recommended Dietary Allowances <sup>a</sup>		Actual Menu <sup>b</sup> mean ± SD		
	Daily	1/3 Daily			
Kilocalories	2000	667	675	±	186
Carbohydrate, g			80	±	21
Protein, g	28	8.3	31	±	13
Fat, g			27	±	10
Fat, saturated, g			11	±	4
Fat, monounsaturated, g			8	±	4
Fat, polyunsaturated, g			2	±	2
Cholesterol, mg			91	±	54
Vitamin A, IU	3500 <sup>c</sup>	1167	2057	±	1777
Vitamin B <sub>6</sub> , mg	1.4	0.47	0.5	±	0.3
Vitamin C, mg	45	15	29	±	24
Folate, µg	100	33	71	±	35
Sodium, mg	400	133	1001	±	492
Magnesium, mg	170	56.7	90	±	107
Calcium, mg	800	267	446	±	107
Iron, mg	10	3.3	4	±	1
Zinc, mg	5	1.7	3	±	2

<sup>a</sup>Based on Recommended Dietary Allowances for children aged 7-10 years old. The school lunch should provide one-third of the RDA (USDA, 1983).

<sup>b</sup>Means and standard deviations based on two randomly selected lunch menus for each school for a total of 119 lunches. When selective menus were used, analysis was done for each selection; thus, the total number was greater than two menus for each school.

<sup>c</sup>Retinol equivalents (RE) were converted to International Units (IU) by multiplying the RE by 5. This allowed comparisons to be made since Nutritionist III data base for vitamin A is in IU.

children 7 to 10 years old for selected nutrients, was accepted. A study of school lunches done in Hawaii (Britten, 1989) showed similar results. Britten's study (1989) indicated more than adequate amounts of protein, calcium, iron, vitamins A and C, thiamin, riboflavin, and niacin. The calculated kilocalorie values of lunches were slightly lower than desirable. Fat and sodium intakes were found to be higher than the recommended levels, as they were the results in the study.

The mean number of kilocalories in school lunches was  $675 \pm 186$  compared to the RDA allowance of 667. Protein and carbohydrates represented 18 and 47% of the kilocalories, respectively.

The total percentage of kilocalories provided by fat in the school lunch menus was 35%, slightly above the 30% recommended in the Dietary Guidelines for Americans (USDA, 1990b). Since the percentage of fat exceeded the 30% recommendation, hypothesis 2 was accepted. In comparing saturated fat, monounsaturated fat, and polyunsaturated fat as a percent of total fat, 41% was saturated fat, 30% was monounsaturated fat, and 9% was polyunsaturated fat. These percentages are not completely accurate because Nutritionist III has an incomplete data base for fats; therefore, care should be taken when interpreting these results. However, the amount of saturated fat in these menus exceeded the recommended 10% or less of total kilocalories (USDA, 1990a); saturated fat accounted for 99 kilocalories whereas 10% of total kilocalories is 67.

If the fat content of the school lunch menus were to be lowered, then the kilocalories from carbohydrates must be increased in order to compensate for the decreased fat in the diet. Harris (1988) argued that this would often require more food than a child can eat. In this study, lowering the fat content by 5% would account for 41 calories which is equivalent to substituting one-half medium apple for 1 teaspoon of butter. Thus, the percentage of fat calories could easily be reduced.

As to the amount of minerals in school lunches, all minerals studied exceeded the recommended amounts. The amount of sodium was high in comparison to the minimum requirement of 400 mg (RDA, 1989) but was within the range of .37-1.1 g (this represents one-third of recommended amount) recommended by Surgeon General's Report on Nutrition and Health (USDHHS, 1988) as a safe and adequate amount of sodium. The calculations of sodium requirements in the Recommended Dietary Allowances (1989) are based on estimates of what is needed for growth and for replacement of obligatory losses. Amounts needed to support growth depend on the rate at which extracellular fluid volume is expanded, a rate that varies with age and reproductive status (RDA, 1989). There is no evidence that higher than recommended amounts confer any health benefit, but these are clear disadvantages to those susceptible to hypertension (RDA, 1989). In the ninth edition of Recommended Dietary Allowances (1980) and in The Surgeon General's Report on Nutrition and Health (USDHHS, 1988), it is stated that when adults have free access to sodium chloride

in the diet, the usual daily intake of sodium is between 2300 and 6900 mg. Britten (1989) used 600 mg sodium as the ideal for school lunches. In this study, the mean sodium intake was 1000 mg compared to 940 mg actual sodium intake in Britten's study (1989). The sodium levels in both studies exceeded the minimum recommendation of 400 mg as described in the 1989 RDA.

Even though no numerical standard has been established for dietary fiber in the diet for adults or children, it is the subject of considerable interest and extensive reviews. In the United States, mean fiber intake is estimated to be 12 g/day (Lanza, Jones, Block, & Kessler, 1987). Over the last decade, many health organizations have recommended increasing the intake of complex carbohydrates in general. The Department of Health and Human Services and the National Research Council recommended that a desirable fiber intake be achieved not by adding fiber concentrates to the diet, but by consumption of fruits, vegetables, legumes, and whole-grain products that also provide minerals and vitamins (USDHHS, 1986; National Research Council, 1982). It is important, then, that school food service supervisors consider foods high in fiber content when planning school lunches. The school lunch menus analyzed had a mean of  $4.9 \pm 3.2$  grams fiber. This is nearly half of the 12 g/day estimated average intake of adults. There is no RDA for fiber, but the Committee on RDA acknowledged the need for fiber and stated that it should be met by adding a variety of unprocessed, fiber-containing foods to the diet and not by adding refined fiber such as bran (RDA, 1989; Hamilton, Whitney, & Sizer, 1991). Although uncertainties remain,

the American Dietetic Association (1988) recommended 20 to 35 grams of dietary fiber daily as a desirable intake. Since this study focuses on elementary school children, no recommendations can be made at this time for fiber intake for children because presently the only recommendations are for adults. The guideline to choose a diet with plenty of vegetables, fruits and grain products in the Dietary Guidelines for Americans (1990a) are for anyone above two years of age, but no specific fiber intake is recommended.

Even though the study showed adequate amounts of nutrients in school lunches, there were no plate waste studies done to evaluate actual consumption. "Poor nutrient consumption has been inferred from plate waste seen in the school lunch program" (Green & Munroe, 1987, p. 112). In a study done by Frank et al. (1989), the overall plate waste studies indicated similar plate waste for cardiovascular-healthy foods and those non-cardiovascular healthy foods. The study indicated that children appear to select foods that they intend to eat. In the Frank et al. (1989) study, schools experienced 15%-20% waste of entrees, 40%-45% for vegetables and starches, and 35%-40% for desserts. Therefore, if plate waste of the elementary schools in Tennessee were comparable to the study by Frank et al. (1989), the recommended kilocalories, nutrients, vitamins, and minerals might not be adequate to meet school lunch guidelines. However, lower consumption of certain foods also would decrease the amount of fat, sodium, and sugar content of the school lunch.

The use of a nutrient-based curriculum in a study involving 806 students in kindergarten through sixth grade resulted in an increased acceptance of foods with high nutrient density values (Brown, Wyse, & Jansen, 1979). This could mean that the loss of nutrients by plate waste might not significantly affect the students' nutrient needs. "Plate waste assessment should be an integral part of nutrition education evaluations" (Brown et al., 1979, p. 27). Failure to consume any one component of the school lunch could result in the child not obtaining an adequate intake of essential nutrients (Kimbrough, Shanklin, & Gench, 1990).

#### Implementation of Dietary Guidelines for Americans

Tables 4 and 5 summarize practices used by school food service supervisors concerning usage of various forms of selected food products such as oil, shortening, flour, and milk. In efforts to improve nutritional quality of school lunches, 37% of respondents often or always substitute corn oil for shortening or lard; 77% often or always substitute skim, low fat, or buttermilk for whole milk in recipes; 11% often or always substitute whole wheat flour for white flour; but only 5% substitute margarine for butter in seasoning of foods. The percentage of school food service supervisors who use butter is 84% as compared to 10% who use margarine. The use of white flour was 89% as compared to 6% for whole wheat flour. Results showed 72% of those surveyed used skim, 2% milk, or buttermilk rather than whole milk. Shortening and oil made up 48% of the fat used. Lard was used by only 1% of those surveyed. Some respondents indicated



Table 4. Substitutes of selected products used by school food supervisors to implement the Dietary Guidelines<sup>a</sup>

Practices	Frequency (%)			
	Always	Often	Sometimes	Never
1. Substitute corn <sup>b</sup> oil for shortening or lard	4(8)	15(29)	13(25)	20(38)
2. Substitute skim, <sup>b</sup> buttermilk, or low fat milk for whole milk in recipes	24(43)	19(34)	13(23)	0(0)
3. Substitute whole <sup>c</sup> wheat flour for white flour in breads and baked foods	1(2)	5(9)	35(63)	15(27)
4. Substitute margarine <sup>b</sup> for butter for use in seasoning of foods	--	3(5)	19(34)	34(61)

<sup>a</sup>Dietary Guidelines for Americans (USDA, 1990b).

<sup>b</sup>The Dietary Guidelines for Americans (USDA, 1990b) recommends lowering fat, saturated fat, and cholesterol in the diet.

<sup>c</sup>The Dietary Guidelines for Americans (USDA, 1990b) recommends choosing whole grain products for a more healthful diet.

Table 5. Different forms of food products used by food service supervisors in elementary school food service<sup>a</sup>

Food Product	% ± sd
Butter vs. Margarine	84 ± 33 10 ± 25
White flour vs. Whole wheat flour	89 ± 23 6 ± 9
Skim Milk vs. 2% Milk vs. Whole Milk vs. Buttermilk	9 ± 22 57 ± 30 33 ± 26 6 ± 16
Shortening vs. Lard vs. Corn Oil vs. Other Oil	22 ± 16 1 ± 8 4 ± 13 26 ± 24

<sup>a</sup>56 schools out of 145 food service supervisors provided information about different forms of fat, flour, milk and shortening.

<sup>b</sup>Respondents were asked to compare products in each group and estimate the percentage of total usage for each product.

<sup>c</sup>Percentages do not always total 100 because some respondents did not answer all questions.

that they would use corn oil if it were available through government commodities, but the expense of purchasing this product would be prohibitive.

In Table 6, usage of some commodity foods is shown. If these commodities were purchased from vendors at the current bid prices for schools, the costs for items that are used most frequently would be substantial. For instance, the average cost to the school of not using commodity butter and hydrogenated shortening that are high in saturated fat and purchasing products which are low in saturated fats would cost \$24,399 for an average school year.

The survey question that asked if government commodities were not available, would school food supervisors use the same ingredients in food preparation elicited some interesting responses. Sixteen of the 56 respondents said they would use the same products. Thirty-eight said they would not use the same products in food preparation if commodities were not available for use in school lunch programs. If commodities were not available, school food service supervisors would not purchase butter, figs, dates, and ground pork.

The supervisors indicated that they would purchase corn oil, low-cholesterol margarine, and ground turkey if commodities were not available. The main reason for not purchasing low cholesterol fats and oils was related to price when butter is supplied free as a commodity. Similarly, ground pork would not be purchased because of its fat and cholesterol content. Poor student acceptance was the reason for not purchasing dates and figs. One school system reported that they received cash in lieu of commodities and stated that they were able to

Table 6. Usage of commodity food products in school food service during 1988-89 school year (no.=56)

Food Product	Maximum per school <sup>a</sup>	Unit per school system <sup>a</sup> (mean $\pm$ standard deviation)	Mean cost <sup>b</sup> of product if purchased (\$)
Butter	288,000	16,881 $\pm$ 43,736	22,621
Non-fat dry milk	25,350	2,583 $\pm$ 4,620	2,570
Hydrogenated vegetable shortening	38,500	4,040 $\pm$ 6,466	1,778
Whole wheat flour	175,000	4,316 $\pm$ 24,524	906
White flour	223,500	24,340 $\pm$ 39,736	4,138
Oats or oat bran	6,000	840 $\pm$ 1,384	836
Cooking oil	16,500	1,873 $\pm$ 2,444	8,522

<sup>a</sup>All units are reported in pounds except cooking oil which is in gallons.

<sup>b</sup>The following unit prices were used for cost estimates: butter \$1.34, nonfat dry milk \$.995, hydrogenated vegetable shortening \$.44, whole wheat flour \$.21, white flour \$.17, oats \$1.04, cooking oil \$4.55.

purchase foods that more closely met Dietary Guidelines for Americans and that were more acceptable to students.

Results of a recent survey by the advocacy group, Public Voice for Food and Health Policy, painted a negative picture of school food service (Directors' Struggle, 1989). This survey reported that 50% of school food service supervisors in their study indicated that if the USDA commodity distribution would diminish the percentage of fat-laden foods, their biggest obstacle to reducing the fat content in school lunches would be removed. Twenty-six percent of these school food service supervisors stated that the need for nutrition education of school food service personnel was the single most effective tactic for reducing fat in meals (Directors' Struggle, 1989). A study done by DeMicco (1990) showed that one of the barriers to implementation of the Dietary Guidelines for Americans was that present government commodity and vendor food products are inconsistent with the Dietary Guidelines for Americans.

A primary goal of the American School Food Service Association's (ASFSA) Five-Year Strategic Plan is implementation of the Dietary Guidelines for Americans (DeMicco, 1990). In order to do this, school food services must overcome the barriers that impede implementing the Dietary Guidelines for Americans. Some of these barriers include lack of awareness of the Dietary Guidelines for Americans; lack of knowledge regarding the guidelines; apathy toward use; non support by school administrators, teachers and parents; fear of financial risk of trying new menu items, if students reject these foods; lack of

culinary, nutrition, and/or food science skills to develop, modify, or prepare appropriate recipes; and constraints imposed by technology such as kitchen equipment (USDHHS, 1984). Identification of the barriers that impede school food service personnel is an initial step toward implementing the Dietary Guidelines for Americans and for promoting health and wellness for elementary school children and the community (USDHHS, 1984).

In DeMicco's study (1990) school food service business managers, directors, managers, and cooks all expressed concern about government commodities being inconsistent with the Dietary Guidelines for Americans. Typically, major commodity items include processed cheese, butter, and meat items such as ground beef and ground pork; all items relatively high in fat. Some participants in DeMicco's study (1990) believed that current commodity labeling did not provide adequate nutrition information needed by school food service directors to plan menus consistent with the Dietary Guidelines for Americans.

### Training and Nutrition Education Activities

Table 7 shows the training activities reported by school food service supervisors from 56 elementary schools in Tennessee. A large percentage (86%) of school food service supervisors participated in local and state workshops and training sessions. Thirty-eight percent attended national food service meetings and 56% attended workshops sponsored by Nutrition Education Training (NET). Hypothesis 3, which stated the majority of the school food service supervisors

Table 7. Training activities reported by school food service supervisors in 56 elementary schools in Tennessee.

	<u>Yes</u> Frequency <sup>a</sup>	<u>No</u> Frequency
<u>Training Activities</u>		
1. Attended summer workshop in 1989	47	8
2. Attended district school food service meetings	51	4
3. Attended state school food service meetings	44	11
4. Attended American school food service meetings	21	34
5. Attended workshop(s) sponsored by NET	31	44
6. Received information on compliance to dietary guidelines	52	2
7. Offered training to employees on compliance to dietary guidelines	52	3

<sup>a</sup>Totals do not always add up to 56 schools because some respondents did not answer all questions.

participated in training activities during the year studied, was accepted. Ninety six percent of the school food service supervisors received information on compliance to Dietary Guidelines for Americans and 95% of the respondents offered training to their employees regarding the Dietary Guidelines for Americans. Since the majority of respondents do the menu planning for their school system, it is important that these school food service supervisors are properly trained to develop menus which meet requirements for school lunch programs which take into account the RDAs and Dietary Guidelines for Americans. Nutritional standards must be met by the school food service in order to receive federal assistance for the school system.

Table 8 summarizes nutrition education activities reported by school food service supervisors. Some sources given by the school food service supervisors as aids to nutrition for elementary children were charts and posters.

Table 9 illustrates types and sources of nutrition education materials used by school food service supervisors. Among the most used sources were USDA materials, self-developed materials, Dairy Council materials, and vendor information sheets. Youth Advisory Councils (YAC) and teachers were cited as being involved in developing and implementing nutrition education.



Table 8. Nutrition education activities reported by school food service supervisors in 56 elementary schools in Tennessee.

	<u>Yes</u> Frequency <sup>a</sup>	<u>No</u> Frequency
<u>Nutrition Education Activities</u>		
1. Provided the school with charts stating nutritional values of foods being served	36	19
2. Provided the school with posters related to nutritional content of food such as sodium, fat cholesterol or fiber	43	11

<sup>a</sup>Totals do not always add up to 56 schools because some respondents did not answer all questions.

Table 9. Sources of nutrition education materials reported by school food supervisors in elementary schools in Tennessee (no.=56)

Sources of Materials	No.
Dairy Council	47
U. S. Department of Agriculture	34
Self-developed materials	21
Vendor Information Sheets	15
Team-developed Materials	7
State Department of Education	7
Southeast United Dairy Industry Association	7
American Dietetic Association	6
Nutrition Education Training Materials	5
American Institute for Cancer Research	1
American Heart Association	1

## CHAPTER V

### SUMMARY AND RECOMMENDATIONS

#### Summary

In many childrens' diets, school meals are a major source of nutritious foods. This study was done to compare the foods served in school lunches for grades K-5 in the state of Tennessee to the standard or the "ideal" one-third of the Recommended Dietary Allowance (RDA) for 7 to 10 year old children. This age group was chosen because food habits are established during childhood and it is important to provide food choices that will be appropriate for lifelong eating habits (Frank et al., 1989).

The results of this study showed that the school lunch menus from the elementary schools provided more than adequate amounts of kilocalories, protein, vitamin A, vitamin C, vitamin B<sub>6</sub>, folate, magnesium, calcium, iron, and zinc. Fat was higher than the recommended level; fat represented 35% of total kilocalories. The Dietary Guidelines for Americans (1990a) recommend that fat kilocalorie intake should not exceed 30% of the total kilocalorie intake. Sodium levels were  $1001 \pm 492$  mg, higher than recommended levels. The minimum level of sodium intake suggested for normal, body maintenance for a 6-9 year old child is 400 mg (RDA, 1989). However, the Surgeon General's Report on Nutrition and Health (1988) suggests a 1.1 g quantity as the lower end of the range recommended for adults.

It was found in this study that school food service supervisors surveyed were interested in training to better implement Dietary Guidelines for Americans and to ensure meeting the RDAs; but because of budget limitations, it was prohibitive. Not only did monetary factors influence formal training, but in many cases lack of money did not permit school food service supervisors to use foods such as unsaturated fats in their menus because fats from government commodities were provided.

### Implications

In order to implement the Dietary Guidelines for Americans, school food service supervisors need funding from government, state, and local sources to provide educational programs, reference materials, and expertise in providing new or modified recipes that meet the needed Dietary Guidelines for Americans standards. Harris (1988) stated that the USDA has published menu planning guides and a new series of recipes that are based on the Dietary Guidelines for Americans. She suggested that these guidelines are intended to help the school food service supervisor identify hidden sources of sugar, fat, and salt and to suggest ways of modifying recipes through ingredient substitution. Educational resources to facilitate implementation of the Dietary Guidelines for Americans should provide nutrition education for students and training for all school food service staff.

Future applications which could result from this study might include the following:

- a. develop educational programs for use by elementary school teachers to teach students about the Dietary Guidelines for Americans.
- b. conduct training programs for school food service employees on implementation of the Dietary Guidelines for Americans at local, regional, and state sites.
- c. continue developing and modifying recipes to reflect the Dietary Guidelines for Americans, especially recipes that resemble the "fast-food" type menu.
- d. continue cooperative research efforts with USDA and the Food and Nutrition Service to improve labeling on commodities.

"As a part of the effort to teach children heart-healthy eating practices, schools can set an excellent example by serving meals that are lower in sodium and saturated fat" (Capper, Witschi, Goldberg, & Ellison, 1990, p. 14). Future goals would be for school food service supervisors to accept the challenge of improving the nutritional qualities of school lunch programs and to inform their communities of the programs' importance to the lives of today's children.

Realistic goals must be set that encompass compromises and gradual adjustments.

"However, each improvement that can be implemented will be of benefit to the long-term health of young people by helping prevent or delay the onset of major chronic diseases of public health importance" (Capper et al., 1990, p. 17).

## Recommendations for Future Research

In implementing the Dietary Guidelines for Americans, it is hoped that the general health of students would be improved, and elementary school children would learn better nutritional habits through the school lunch program. Expected outcomes might include: acceptance of more nutritious foods in school lunches; stable or increased student participation, even with menu modifications; positive feedback from parents; and no financial losses. Future research could provide useful information regarding how to achieve these expected outcomes.

Follow-up studies to see if the Dietary Guidelines for Americans are being implemented could provide evidence to indicate if changes in school lunch programs are being implemented. These follow-up studies would need to be longitudinal studies similar to the Bogalusa Heart Studies. Longitudinal studies are difficult because of lack of funds to undertake such studies, and it is difficult to do extended studies because of the mobility of people in the United States.

As a part of the effort to teach children heart-healthy eating practices, school food service supervisors can set excellent examples by serving meals that are lower in sodium and saturated fat (Capper et al., 1990). "Individual health goals for reducing heart disease risk factors may become permanent tenets of the school environment and enhance achievement of national health objectives beginning in childhood" (Frank et al., 1989, p. 130).

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## APPENDIXES

**Appendix A**

**Certification of Exemption from Review for  
Research Involving Human Subjects**

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THE UNIVERSITY OF TENNESSEE  
KNOXVILLE

CRP #: 3081 A

DATE: 11/15/90

Title: The Effect of Training on Compliance to Dietary Guidelines in  
Elementary School Food Service

Research  
Administration  
Compliances  
Grants &  
Contracts  
Proposal  
Development  
Services

Henry, Martha Ann  
Nutrition & Food Sciences  
2200 Andy Holt Ave. (Purch.)  
Campus

Sneed, Dr. Jeannie  
Nutrition & Food Sciences  
229 Jessie Harris Bldg.  
Campus

This is to notify you that your request for renewal with no change in  
protocol of the above-captioned project has been approved.

This approval is for a period ending one year from the date of this  
letter. Please make timely submission of renewal or prompt  
notification of project termination (see item #3 below).

Responsibilities of the investigator during the conduct of this  
project include the following:

1. To retain signed consent forms from subjects for at least three  
years following completion of the project.
2. To obtain prior approval from the Committee before instituting  
any changes in the project (Form D).
3. To submit a Form D at 12-month or less intervals attesting to the  
current status of the project (protocol is still in effect,  
changes have been made, project is terminated, etc.)

We wish you continued success in your research endeavor.

Sincerely yours,

*Edith M. Szathmary*

Edith M. Szathmary  
Coordinator of Compliances

cc: Dr. James D. Moran  
229 Jessie Harris Bldg.

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THE UNIVERSITY OF TENNESSEE  
KNOXVILLE



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Office of the  
Vice Provost  
for Research

CRP #: 3081 A

DATE: 10/30/89

Title: The Effect of Training on Compliance to Dietary Guidelines in  
Elementary School Food Service

Henry, Martha Ann  
Nutrition & Food Sciences  
2200 Andy Holt Ave. (Purch.)  
Campus

Sneed, Dr. Jeannie  
Nutrition & Food Sciences  
229 Jessie Harris Bldg.  
Campus

Dear Ms. Henry:

The project listed above has been certified exempt from review by the  
Committee on Research Participation and is approved.

This certification is for a period ending one year from the date of  
this letter. Please make timely submission of renewal or prompt  
notification of project termination (see item #2 below).

The responsibilities of the project director include the following:

1. Prior approval from the Vice Provost for Research must be  
obtained before any changes in the project are instituted.
2. Submission of a Form D at 12-month intervals attesting to the  
current status of the project (protocol is still in effect,  
project is terminated, etc.).

We wish you success in your research endeavors.

Sincerely,

  
Sheadrick A. Tillman  
Associate Vice Provost

cc: Dr. William C. Morris  
229 Jessie Harris Bldg.

Attachment: Copy of Form A

(PLEASE TYPE ON THIS FORM)  
(Instructions on reverse  
side of this form)

FORM A  
Certification of Exemption from Review  
for Research Involving Human Subjects

CRF# 5081A  
Date Received  
in ORC SEP 12 1989

A. PROJECT DIRECTOR(s) and/or CO-DIRECTOR(s): (For student projects, list both the student and the advisor)

1. Martha Henry
2. Jeannie Sneed, PhD, RD

B. COMPLETE MAILING ADDRESS and PHONE NUMBER OF PD(s) and CO-PD:  
1. 2200 Andy Holt Avenue, Purchasing, Campus 974-0900  
2. 229 Jessie Harris Bldg., Campus 974-5445

C. TITLE OF PROJECT:  
The Effect of Training on Compliance to Dietary Guidelines in Elementary School Food Service

D. DEPARTMENT:  
Nutrition and Food Sciences, College of Human Ecology

E. EXTERNAL FUNDING AGENCY AND ID NUMBER (if applicable):

N/A

F. GRANT SUBMISSION DEADLINE (if applicable):

N/A

G. STARTING DATE: "Upon certification by Director of Research Compliances"  
(NO RESEARCH MAY BE INITIATED UNTIL CERTIFICATION IS GRANTED)

Planned to begin November 1, 1989

H. ESTIMATED COMPLETION DATE:

(Include all aspects of research and final write-up)  
December 1990

I. Objective(s) of Project: (see reverse or Flyer #3)

The major purpose of this study is to determine the effect of training of school food service personnel on the compliance to dietary guidelines. Secondary purposes include determining the use of targeted commodity foods (such as butter and hydrogenated vegetable shortening) and to determine nutrition activities in the cafeterias that encourage students to consume foods recommended in the dietary guidelines.

II. Subjects: (see reverse or Flyer #3)

Subjects will be 145 city/county child nutrition program directors in the State of Tennessee. The study will include the total population of city/county child nutrition program directors in the State. Participation for these subjects will include the completion of a written questionnaire and provision of a one week menu used in their school system, thus, duration of subject involvement in the study will be short.

III. Methods or Procedures: (see reverse or Flyer #3)

The only way in which human subjects will be involved is in the completion of a written questionnaire developed by the researchers to determine use of targeted food products (type of milk, type of fats, etc.), employee training activities, nutrition education activities, and demographic characteristics. The survey will be mailed to subjects and upon completion subjects will mail the survey back to the researcher in a postage-paid return envelope. Subjects will be asked NOT to sign their names on the survey. All surveys will remain anonymous. In addition, subjects will be requested to send a copy of the menu used in their program for a one week period in April, 1989. Should the menu have any name identification, the menus and surveys will be separated after coding has been done. ONLY the two researchers will see individual data and all data will be reported as group data. Supervisors of respondents WILL NOT have access to the individual data at any time. Participants will be given a summary of the group data at the

IV. CATEGORY(S) FOR EXEMPT RESEARCH PER 45 CFR 46: 3.5 (see reverse side for categories)

CERTIFICATION: The research described herein is in compliance with 45 CFR 46 101(b) and presents subjects with no more than minimal risk as defined by applicable regulations.

Investigator Name: Martha Anne Henry Signature: *Martha Anne Henry* DATE: Sept. 7, 1989

Advisor Name: Jeannie Sneed, PhD, RD Signature: *Jeannie Sneed* DATE: Sept. 7, 1989

Dept. Head Name: Bill Morris, PhD Signature: *Bill Morris* DATE: 9/8/89

CERTIFICATION BY: ~~RESEARCH~~ Name: *Sheadrick A. Tillman* Signature: *Sheadrick A. Tillman* DATE: 10-26-89

Associate Vice Provost Name: Sheadrick A. Tillman Signature: *Sheadrick A. Tillman* DATE: 10-26-89

Associate Vice Provost

Sheadrick A. Tillman

REVISED 9/87



**Appendix B**

**Survey Instrument for School Food**

**Service Supervisors**

# Serving Healthy Meals

Help us determine factors which influence  
menus and nutrition education in  
Child Nutrition Programs



Martha Anne Henry and Jeannie Sneed, PhD, RD  
Department of Nutrition and Food Sciences  
University of Tennessee, Knoxville  
Knoxville, TN 37996-1900

October 1989

Part I. PRODUCTS USED IN COOKING (School Year 1988-1989)

A. If government commodities were not available would you use the same ingredients in food preparation? (Circle one) Yes No

If "NO" which items would not be purchased? Why?

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B. During the past year, how much of the following commodities were used by your school food service?

\_\_\_\_\_ lbs. butter

\_\_\_\_\_ lbs. non fat dry milk

\_\_\_\_\_ lbs. hydrogenated vegetable shortening

\_\_\_\_\_ lbs. whole wheat flour

\_\_\_\_\_ lbs. white flour

\_\_\_\_\_ lbs. oats or oat bran

\_\_\_\_\_ gallons of cooking oil

C. For each category of food products, estimate the approximate percent of the following products which are used in your school food service cafeteria. For each category, the total should equal 100%.

1. FAT FOR TABLE USE

% \_\_\_\_\_ butter

% \_\_\_\_\_ margarine

2. FLOUR

% \_\_\_\_\_ white flour

% \_\_\_\_\_ whole wheat flour

3. MILK

% \_\_\_\_\_ skim milk

% \_\_\_\_\_ 2% milk

% \_\_\_\_\_ buttermilk

% \_\_\_\_\_ whole milk

4. FAT IN FOOD PREPARATION

% \_\_\_\_\_ hydrogenated shortening

% \_\_\_\_\_ corn oil

% \_\_\_\_\_ lard

% \_\_\_\_\_ other oil

% \_\_\_\_\_ butter

% \_\_\_\_\_ margarine

D. Please read the following questions related to food production practices in your operations. Indicate the frequency for which these practices are currently being used in your schools.

	<u>Always</u>	<u>Often</u>	<u>Sometimes</u>	<u>Never</u>
1. Substitute corn oil for shortening or lard	A	O	S	N
2. Substitute skim, buttermilk, or low fat milk for whole milk in recipes	A	O	S	N
3. Substitute whole wheat flour for white flour in breads and baked foods	A	O	S	N
4. Substitute margarine for butter for use in seasoning of foods	A	O	S	N

## Part II. TRAINING AND NUTRITION EDUCATION ACTIVITIES

Instructions: Read the following questions related to training and nutrition education. Please circle your response.

	Yes	No
<u>Training</u>		
1. Did you attend a summer workshop?	Y	N
2. Did you attend district school food service association meetings?	Y	N
3. Did you attend state school food service association meetings?	Y	N
4. Did you attend the annual meeting of the American School Food Service Association?	Y	N
5. Did you attend a workshop or workshops sponsored by Nutrition Education and Training (NET) Program?	Y	N
6. Did any of these conferences or workshops provide information on compliance of school food service programs to dietary guidelines?	Y	N
7. Did you offer training or workshops which included compliance of school food service programs to dietary guidelines to your school food service personnel?	Y	N

- |  |     |    |
|--|-----|----|
|  | Yes | No |
| 8. Do you feel that training programs help school food service directors, managers, and employees better comply with the dietary guidelines? | Y   | N  |

Nutrition Education

Do you provide schools with:

- |  |   |   |
|--|---|---|
| 1. Charts stating the nutritional value of foods being served?   | Y | N |
| 2. Charts or posters related to nutritional content of food such as sodium, sugar, fat, cholesterol or fiber?  | Y | N |
| 3. What sources of nutrition education materials are used in your system (i.e. USDA, self-developed, posters developed by students, Dairy Council, etc)? |   |   |

---



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Part III. DEMOGRAPHIC INFORMATION

Please answer the following questions about yourself and your school system which will help to interpret the results of this study. Please circle your response.

1. Are you a certified school food service director?
  - a. YES
  - b. NO
  
2. If the answer to question number one (1) above is "NO", are you presently working toward certification?
  - a. YES
  - b. NO
  
3. Your education level (circle one letter)
  - a. Completed grade school
  - b. Some high school
  - c. Completed high school
  - d. Some technical school
  - e. Completed technical school
  - f. Some college
  - g. Completed college
  - h. Advanced college coursework
  - i. Advanced college degree

4. Your gender
  - a. Male
  - b. Female
  
5. Your present age.
  - a. Less than 20
  - b. 20-29
  - c. 30-39
  - d. 40-49
  - e. 50-59
  - f. Over 60
  
6. Years foodservice experience
  - a. 5 or less
  - b. 6-10
  - c. 11-15
  - d. 16-20
  - e. 21-25
  - f. 26 or more
  
7. Do you develop your own menus?
  - a. Always
  - b. Frequently
  - c. Sometimes
  - d. Never
  
8. If you do not develop your own menus, what is the source your menus?
  - a. Menus developed by your district Child Nutrition Program supervisor
  - b. Menus developed by your state Child Nutrition Program supervisor
  - c. Other - specify \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
9. Do you have a salad bar in elementary schools?
  - a. Yes
  - b. No

10. Do you serve all elementary children the same items (serve) or do you offer them items from which they may select (offer)?

- a. serve
- b. offer

11. Do all elementary schools use a standard menu (the same menu items)?

- a. Yes
- b. No

↳ If no, what items would be different for the schools?

---

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12. Which of the following best describes where food production takes place for elementary schools in your system?

- a. conventional - all production takes place in the school where the food is served
- b. commissary - food production is done in a central kitchen and transported to schools where the food is served
- c. combination - some schools are conventional, some schools use central production

13. Is your school system in a rural or an urban area (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities)?

- a. rural
- b. urban

14. Is there financial support from your school system for your continuing education?

- a. yes, adequate support
- b. some support, but not adequate
- c. little or no support

Part IV. Please send with your completed questionnaire a copy of the menus which were used in your school system for grades K - 5 for the week of April 3 - 7, 1989. The menus are critical for completing the research project. (Do not identify your school system)

THANK YOU FOR YOUR ASSISTANCE

## Appendix C

### Cover Letter for Survey



---

THE UNIVERSITY OF TENNESSEE  
KNOXVILLE



November 3, 1989

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College of  
Human Ecology

---

Nutrition and  
Food Science

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Dear Food Service Supervisor,

In recent years there has been increased emphasis on education and training of school food service personnel. Training is an important means to assist school food service supervisors and employees to function more effectively and meet the goals of the child nutrition program. To better understand the importance of training, we are studying training practices as they relate to nutrition and to dietary guidelines.

Your response is critical to the success of this study. The results of this survey will provide information about how school food service can be most effective. Please respond at your earliest convenience.

Your responses to this survey will remain completely confidential and your participation is strictly voluntary. You are encouraged to be completely honest in your answers. Please do not sign your name and do not identify the school where you are presently employed.

All data will be compiled and used as group data. We will be happy to provide you with a summary of the results of the study upon request. Thank you for your participation in this study.

Sincerely,

*Martha Anne Henry*  
Martha Anne Henry  
Graduate Student

*Jeannie Sneed*  
Jeannie Sneed, PhD, RD  
Assistant Professor

enclosure: questionnaire

## Appendix D

### Follow-Up Card for Survey

November 27, 1989

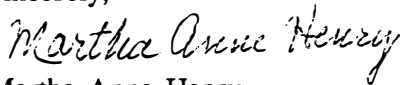
Dear Foodservice Supervisor:

You were recently sent a questionnaire to determine the effect of training on compliance to dietary guidelines in elementary school food service. Results of this study will serve as a basis to determine the need for training for school food service employees and supervisors.

If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, please take a few minutes to complete it and return it to us. Your response is important for completion of this study.

Your help in this study is greatly appreciated.

Sincerely,



Martha Anne Henry  
Graduate Student



Jeannie Sneed, PhD, RD  
Assistant Professor

## VITA

Martha Anne Henry is a buyer in the Purchasing Department at the University of Tennessee in Knoxville, Tennessee. She received a Bachelor of Science degree in Food Service and Institution Management from the University of Tennessee, Knoxville, Tennessee in 1959. She has worked as an instructor in Loudon County, Tennessee school system; as a research technician at the University of Tennessee Medical Center in Knoxville, Tennessee; as a therapeutic and production supervisor in Jackson-Madison County Hospital in Jackson, Tennessee; as an instructor and department head in Summerville School System, Summerville, South Carolina; as a school food supervisor at Heritage High School in Blount County, Tennessee; as Director of Auxiliary Services at Austin Peay State University, Clarksville, Tennessee.

In 1986, Ms. Henry began study toward a Master of Science Degree in Food Systems Administration at the University of Tennessee, Knoxville. During this time she worked as an adjunct instructor at the University of Tennessee, Knoxville, in the Department of Nutrition.

The author is a member of Alpha Delta Kappa, Phi Kappa Phi, Kappa Omicron Nu, Alpha Lambda Delta, and Mortar Board. Ms. Henry plans to utilize this degree in her present purchasing responsibilities in which she purchases a large amount of food and equipment for the University of Tennessee Food Services Department. She plans to utilize the degree to pursue further teaching opportunities in the future as well as the purchasing area.