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USE OF EDUCATIONAL TECHNIQUES FOR CARETAKERS OF INSTITUTIONALIZED INDIVIDUALS TO INCREASE THE NUTRIENT INTAKES OF THE DEVELOPMENTALLY DISABLED

The University of North Carolina at Greensboro PH.D. 1983

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USE OF EDUCATIONAL TECHNIQUES FOR CARETAKERS OF INSTITUTIONALIZED INDIVIDUALS TO INCREASE THE NUTRIENT INTAKES OF THE DEVELOPMENTALLY DISABLED

by

Mary Demarest Litchford

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
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Doctor of Philosophy

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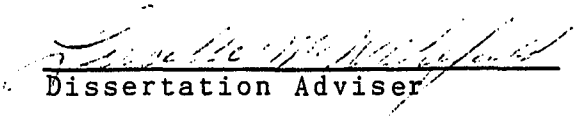

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APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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June 23,1983
Date of Acceptance by Committee

June 23,1983
Date of Final Oral Examination

LITCHFORD, MARY DEMAREST. Use of Educational Techniques for Caretakers of Institutionalized Individuals to Increase the Nutrient Intakes of the Developmentally Disabled. (1983) Directed by: Dr. Lucille Wakefield. Pp. 117.

Thirty-one female and forty-nine male developmentally disabled residents aged 15-36 years and living at the Western Carolina Center in Morganton, North Carolina were assessed for height, weight, mid-arm circumference, triceps fatfold, and dietary intake using a three-day food record. Fifty-four female and sixteen male staff members working at the Western Carolina Center were assessed for knowledge of nutrition and food practices and participated in a series of nutrition education inservice programs. Pretest and posttest scores for knowledge of nutrition and food practices were determined. Nutrition education inservice programs resulted in increased knowledge of nutrition, but did not increase the nutritional quality of the residents' dietary intake. However, statistically significant differences were noted in residents' diets for calories ($p < .05$), iron ($p < .05$), and niacin ($p < .05$) attributable to the nutrition education inservice programs for staff.

ACKNOWLEDGEMENTS

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My deepest gratitude goes to my husband, Henry E. Litchford, to my parents John and Julia Demarest, and to my sister Sarah Demarest-Guthrie for their prayers, encouragement, and continued support.

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CHAPTER I

INTRODUCTION

The plight of the developmentally disabled has come to public attention largely through action of the President's Committee on Mental Retardation in 1976. This Committee estimated that 126,000 babies born each year will have some degree of mental impairment (President's Committee on Mental Retardation, 1976).

The developmentally disabled are defined as those individuals whose handicaps may be attributed to mental retardation, cerebral palsy, epilepsy, or other neurological condition which originates in childhood and is likely to constitute a substantial handicap throughout life. (Grossman, 1977).

There are approximately three million handicapped children and adolescents in the United States of which five sixths has orthopedic problems. The remainder have other disorders such as cleft palate, cerebral palsy, metabolic defects, and Down's syndrome (Calvert & Davis, 1978). Many of these individuals require institutionalized care.

Institutions funded by state and federal governments house a majority of the developmentally disabled population. North Carolina provides residential care for 3,169 individuals at four mental retardation centers. The resident population has declined 28% since 1967. The trend towards mainstreaming individuals has contributed to the occurrence (Dickerson, 1981).

Providing quality care for developmentally disabled individuals is a challenge to the health care professional (Bandini, 1982; McCartney-Siddall, 1982). Gaps exist in knowledge about all aspects of care.

Numerous articles have appeared correlating anthropometric data to intelligence and the physical differences in this population to standards for normal individuals. It has been recognized that the child with Down's syndrome (a neurological condition) is usually from two to four standard deviations below the mean for height and often overweight (Cronk, 1978). Standards for caloric requirements based on height have been proposed (Culley, Goyal, Jolly, & Mertz, 1965).

Despite an increasing awareness of the importance of nutritional well-being of the developmentally disabled in promoting growth and development (Wallace, 1972), little research exists in the area of actual nutrient intakes and biochemical indexes. The developmentally disabled are susceptible to nutritional disorders such as low intake of nutrients, anemia, underweight, short stature, and overweight (Bryan & Anderson, 1965; Roberts & Clayton, 1969). Mechanical feeding problems such as difficulty sucking at all age levels, swallowing, chewing, self-feeding, and food acceptance are linked to the nutritional disorders (Gouge & Ekvall, 1975).

Purposes of the Study

The purposes of the study were threefold: (1) to assess the effects of a series of nutrition education inservice programs for developmental technicians and educational personnel on knowledge of nutrition and food practices; (2) to assess the nutritional status of a sample of developmentally disabled individuals aged 15-36 living at the Western Carolina Center, Morganton, North Carolina; (3) to assess the effect of the series of nutrition education inservice programs for staff on the energy and nutrient intakes of the sample of developmentally disabled individuals. The specific objectives in order of completion were the following:

1. Measure height, weight, mid-arm circumference, and triceps fat fold for each resident.
2. Measure hemoglobin for each resident.
3. Identify a diagnosis for each resident.
4. Identify medical and psychological influences on dietary intake for each resident.
5. Measure nutrient and energy intake for each resident.
6. Determine the perceived nutrition knowledge and level of accuracy of nutrition knowledge of the staff.
7. Determine food practices of staff.
8. Determine the effects of the nutrition education inservice programs on the knowledge of nutrition and food practices of staff.
9. Measure the nutrient and energy intakes of the residents following the nutrition education inservice programs.
10. Analyze statistically the relationship between job classification of staff members, age of staff, educational level, use of vitamin supplements, and nutrition knowledge scores.
11. Analyze statistically the relationship between the position of staff members, age of staff, job classification level of staff, and use of vitamin supplements and food practices.
12. Analyze statistically the differences in consumption of high-sodium foods, high-refined-sugar foods, alcoholic beverages, and high-caffeine foods following the nutrition education inservice programs.
13. Analyze statistically the relationship between changes in nutrition knowledge, changes in food practices of staff on the actual nutrient, and energy intakes of resident.

Statement of Hypothesis

The following hypotheses were presented for this study:

H_1 No differences exist in experimental and control groups on pretest and posttest scores for knowledge of nutrition and food practices for staff attributable to nutrition education inservice programs.

H_2 No differences exist in experimental and control groups of staff on scores for knowledge of nutrition and food practices related to (a) educational level, (b) job classification, (c) use of vitamin supplements, and (d) age.

H_3 No differences exist between experimental and control groups of staff on pretest and posttest consumption of (a) high-sodium foods, (b) high-sugar foods, (c) alcoholic beverages, (d) high-caffeine foods.

H_4 No differences exist between experimental and control groups of residents on anthropometric measurements and hemoglobin levels.

H_5 No differences exist between experimental and control groups of residents on nutrient and energy intakes before and after the intervention program.

H_6 No differences exist between experimental and control groups of residents for iron status as defined by hemoglobin and iron intake from food.

Definition of Terms

The following definitions are provided to assure understanding of certain terms throughout the study:

Adaptive behavior refers to the degree with which the individual meets the standards of personal independence and social responsibility.

Activities of daily living refers to self-care in terms of self-feeding and personal hygiene.

Caretakers include health care technicians and developmental personnel involved in the care of the resident.

Developmentally disabled refers to an individual whose handicap may be attributed to mental retardation, cerebral palsy, epilepsy, or other neurological condition which originates in childhood and is likely to constitute a substantial handicap throughout life.

Educational personnel are employees with some college training or a college degree in areas related to handicapped individuals. Some serve as teachers and others as educational assistants.

Developmental Technicians (DT) are employees with a high school education trained in programming basic care and health-related duties for the developmentally disabled.

Food practices describes the method of selecting one food choice over another food choice when that food was available.

Influences on dietary intake include medical and psychological characteristics which adversely affect the dietary intake of the resident or influence the dietary intake of residents eating together.

Nutritional status includes an assessment of anthropometric measurements, biochemical indexes, clinical observations, and dietary intakes.

Qualified Mental Retardation Professional (QMRP) is a professional employed by a mental retardation center who is responsible for the care of a group of designated residents.

Profoundly impaired is a term used to describe individuals with intelligence testing scores more than five standard deviations below the norm. This individual requires continuing and close supervision (Grossman, 1977).

Residents are developmentally disabled individuals living at the Western Carolina Center, Morganton, North Carolina.

Staff includes developmental technicians, educational personnel, and qualified mental retardation professionals working at the Western Carolina Center, Morganton, North Carolina.

Limitations of the Study

Several limitations were acknowledged. The study was limited to individuals living in the H area at the Western Carolina Center, Morganton, North Carolina. Characteristics of institutionalized populations are often unrepresentative of the population residing in noninstitutionalized settings. The staff members were selected based on their job assignment and were required to attend the nutrition education inservice programs.

The difficulty in obtaining reliable dietary information on ambulatory residents further limited this study. The majority of residents receive a weekly allowance which is primarily used to purchase food at local eating establishments. Residents on reducing or therapeutic diets are known to pay other residents to purchase disallowed foods for them. Some residents were known to steal food from other residents and garbage cans. No attempt was made to collect dietary information on residents who purchased foods off campus without a staff member, stole food, or secured food from garbage

cans. Residents who went home or left campus during meals included in the food record study were dropped from the study. Other possible limitations to the study involved laboratory error in hemoglobin analyses and coding errors in analyzing dietary data.

This study was limited to the current population at the Western Carolina Center residing in the H area and the level of knowledge of the staff involved.

CHAPTER II

REVIEW OF RELATED LITERATURE

Historical Profile of Developmentally Disabled

Every cultural group has among its members individuals who by virtue of physical or intellectual impairments are unable to function within the realm of normal living. Since the early writings of man, references may be found in which "fools, idiots and those without reason" are described. Court jesters, who by today's standards would be classified as developmentally disabled, were retained by noblemen for entertainment. Some were believed to be possessed by gods and received special reverence, while others were thought to be possessed by demons and were victims of witch hunts (Ingalls, 1978).

During the 1800's attitudes towards the developmentally disabled ranged from advocating support for humane living conditions and education to advocating death as their presence only served to degenerate the human race (Ingalls, 1978). However, attitudes towards the developmentally disabled became more positive after World War II. Federal monies were alloted during the 1960's and 1970's for basic research in the assessment of health status and education of the developmentally disabled (Ingalls, 1978).

Population Characteristics of the Developmentally Disabled

The President's Committee on Mental Retardation estimated that 126,000 babies born each year will have some degree of mental impairment (President's

Committee on Mental Retardation, 1976). There are approximately three million handicapped children and adolescents in the United States of which five sixths have orthopedic problems. The remiander have other disorders such as cleft palate, cerebral palsy, metabolic defects, and Down's syndrome (Calvert & Davis, 1978).

North Carolina provides residential care for the developmentally disabled for 3,169 individuals at four mental retardation centers. Over 70% of the residents are under 35 years of age. Approximately 70% are white and 30% non-white. Males account for 57% and females account for 43% of the resident population.

Almost half of the residents were admitted between the ages of six and twelve years of age. The minimum age for admission is six years old. The mean and median length of stay for the resident population was 15.7 years.

Over 60% of the resident population was profoundly impaired in both intellectual functioning and adaptive behavior. Almost 90% of the residents had multiple handicaps. The most frequently occurring neurological disorders were epilepsy and cerebral palsy. Ambulatory problems affect 30% of the resident population. Of these residents 36% were nonambulatory mobile and 64% were nonambulatory nonmobile. The nonambulatory population was unable to deal with activities of daily living such as self-feeding.

The resident population at the mental retardation centers has declined 28% since 1967. The trend towards mainstreaming individuals has contributed to this occurrence (Dickerson, 1981).

Nutritional Assessment: Comparison of Developmentally Disabled to Standards

The role of nutrition in achieving optimum health and well-being for the developmentally disabled child has been a source of controversy. It was once believed that "nutrition is neither the cause of mental deficiency nor is it the cure" (Walker, 1955). However, it is now recognized that early nutritional intervention can prevent or minimize the extent of the damage (Ekvall, 1978).

Anthropometric Data

Several studies beginning with the Tarbell Paper (1883) have indicated that many handicapped children do not attain physical growth of normal children (Garn & Weir, 1971; Kugel & Mohr, 1963). The early studies investigated physical impairment (Goddard, 1912; Tarbell, 1883). However, mental retardation does not directly cause abnormal growth; rather, small or excessive stature may be due to the same cause as the low intelligence (Marshall, 1965).

During the 1960's growth standards for normal children were used to assess the health status of the developmentally disabled. The growth retardation of this population has been discussed in several reviews (Barlet & Whelan, 1967; Culley, Jolly, & Mertz, 1963; Gouge & Ekvall, 1975; Roberts & Clayton, 1969; Rundle & Sylveston, 1965). Posonyl and Lobb (1967) found both linear growth and skeletal development are delayed compared with controls. Mean heights and weights for institutionalized children were from .7 standard deviations above the mean for weight and 1.7 standard deviations below the mean for height (Barlet & Whelan, 1967). Chromosomal aberrations such as in Down's syndrome and an unfavorable fetal environment

appear to induce the most significant growth retardation (Posonyl & Lobb, 1967; Pryor & Thelander, 1967).

Many studies document growth retardation in the Down's syndrome population (Cronk, 1978; Rarick & Seefeldt, 1974; Roche, 1965). The degree of physical retardation appears to be related to the severity of the disability. Poor nutrition and lack of attention during the early years of life are confounding factors (Kugel & Mohr, 1963). Shortness may be attributed to malfunctions of the endocrine systems controlling growth (Culley et al., 1963; Moiser et al., 1965).

Rundle and Sylveston (1965) studied the gross body measurements of female mental defectives and noted a marked underdevelopment, but the annual percentage increase was similar to normal American girls. The studies suggested that the rate of growth of the developmentally disabled individual proceeds at a slower rate over a longer period of time (Moiser et al., 1965; Rundle & Sylveston, 1965).

Growth patterns of children with multiple congenital anomalies do not follow a consistent pattern. Normal growth occurs from birth to the fifth birthday, after which observable growth retardation becomes apparent. Weight to height ratios are usually normal (Moiser et al., 1965).

Although many handicapped children are growth retarded, some develop normally or exhibit accelerated growth. Each developmentally disabled child displays an individual growth pattern which reflects the genetic, neurophysical, endocrinologic, and nutritional aspects of growth (Calvert & Davis, 1978).

Biochemical Data

Biochemical tests provide a more quantitative method of evaluating nutritional status, but do not always correlate with dietary data and

clinical symptoms. Biochemical tests may reveal marginal nutritional deficiencies before overt clinical signs appear and thus may strengthen other methods of assessing nutritional status (Christakis, 1973).

Iron is frequently inadequate in the diets of young children (Owens, Kram, Garry, Lowe, & Lubin, 1974; U.S. Department of Health, Education, & Welfare, 1972). Low intakes of iron as well as low serum iron levels are problems of developmentally disabled children (Kalisz & Ekvall, 1978). This may be due in part to prolonged use of soft, milk-based diets which are low in iron (Caliendo, Booth, & Moser, 1982). Hemoglobins of less than 12 grams per deciliter have been reported in small, underweight, handicapped children with mechanical feeding problems (Gouge & Ekvall, 1975). Nutrient deficiencies of iron, calcium, ascorbic acid, folic acid, vitamin A, and vitamin D have been reported in underweight children, but no biochemical confirmation has been done due to budgetary constraints (Ekvall, 1978). Normal mean values for hematocrit, total serum protein, and serum albumin/globulin ratio were found for a Down's syndrome population (Culley et al., 1965). A lack of correlation was found between reported dietary iron intake using a 24-hour recall and 2-day food record and serum ferritin levels (Caliendo et al., 1982).

Many factors associated with the developmentally disabled population enhance the risk of nutritional deficiencies. The process of eating may be complicated by physical impairments and the utilization of nutrients altered by inherent or drug-induced metabolic alterations. Use of biochemical data is essential for the evaluation of nutritional status of the developmentally disabled (Ekvall, 1978).

Dietary Survey Methods

An integral part of a nutritional assessment is the dietary intake. Actual food intakes are measured during a specified time frame. Dietary studies are not absolute indicators of nutrient deficiencies or excesses of individuals or groups. The data may be useful in explaining clinical and biochemical values (Christakis, 1973).

The purpose of a dietary study is to extract the most accurate nutrient intake data at the lowest cost. Usual dietary intake measured over longer time periods is a reliable method to assess factors related to health (Burk & Pao, 1976). The 24-hour recall or two- or three-day recall-record combination is most frequently used in large surveys of nutritional status (Abraham, Lowenstein & Johnson, 1974; Chassey, Van Veen & Young, 1967).

Various survey methods have been cited in the literature in terms of design problems and procedures, data collection, analysis, and interpretation of data (Beaton, Milner, Corey, McGuire, Cousins, Stewart, deRamos, Hewitt, Grambsch, Kassim & Little, 1979; Christakis, 1973; Garn, Larkin & Cole, 1978; Gersovitz,Madden & Smicklas-Wright, 1978). No one method has proven to be superior to all other methods (Burk & Pao, 1976). The most common survey methods to measure nutrient intake are (1) recall of past food intake, including 24-hour recall, dietary history, and food frequencies; (2) record of current food intake including weighed or visual estimation; or (3) combination method (Burk & Pao, 1976).

The 24-hour recall is the simplest, quickest method requiring the presence of an interviewer. Response rates are generally higher and more representative than for other methods (Beaton et al., 1979). The method relies on the memory of the subject and may result in under-estimation of

food intake (Christakis, 1973). Gersovitz et al. (1978) found the 24-hour recall tended to overestimate small intakes and underestimate large intakes. Use of the dietary history along with the 24-hour recall provides additional information about the food practices (Burke, 1947).

Food frequencies have been used to evaluate food patterns over a specified period of time. Certain biochemical values have correlated well with amounts of foods consumed (Abramsom, Stone & Kosovosky, 1963). However, these data are not useful for measuring nutritional status (Burk & Pao, 1976).

Food records may be either weighed or visually assessed and amounts recorded for a specified time frame. Weighed food records require more time of the subject and may result in an alteration of typical food patterns (Burk & Pao, 1976). In school lunch programs and other institutions, individual plate waste is weighed by the researcher. However, this is a costly, time-consuming procedure. Aggregate plate waste provides an accurate measure of total or mean waste, but does not give individual plate-waste data. Visual estimations of waste have been highly correlated with true percentage of waste and were quite accurate (Comstock, St. Pierre & Mackiernan, 1981). Percentage waste of a given food is more accurately represented by the proportion of individuals who consumed all or almost all and none or almost none of a serving than by mean percentage of waste. Visual estimations provide a less costly method for measuring nutrient intake (Comstock & Symington, 1982).

Food records for one-, three-, or seven-day time periods may be used to estimate food intake. These records are most appropriately used for sample means (Burk & Pao, 1976). However, accuracy in the food record de-

clines after the fifth, sixth, and seventh days and may underestimate food intake (Gersovitz et al., 1978).

Nutrient intakes of the developmentally disabled have been assessed using the 24-hour recall, weighed food record, and visually estimated food records kept by the subject's mother. Caloric intake of Down's syndrome children was determined using a weighed food record for seven consecutive days. None consumed the recommended allowances for calories for this age group. However, they did consume a normal number of calories per unit of body weight, height, and surface area. Caloric needs for Down's syndrome children are most effectively estimated in terms of body height (Culley et al., 1965).

Mentally retarded children with and without motor dysfunction were assessed for caloric intakes using a ten-day weighed food record. Motor dysfunctions alter caloric requirements in such a way that expressing caloric needs in terms of body size and motor status is preferred rather than age (Culley & Middleton, 1969).

Nutrient and calorie intakes for noninstitutionalized children with Down's syndrome were evaluated using visually estimated two-day food records kept by mothers. Intakes were usually less than the Recommended Dietary Allowances for calories, but the majority of children were overweight. The most frequent dietary deficiencies were iron, calcium, vitamin A, and thiamin. Three fourths of the children exceeded the Recommended Dietary Allowances for protein and ascorbic acid (Calvert, Vivian & Calvert, 1976). Pipes (1980) used a seven-day food record on Down's syndrome children and found inadequate intakes of calcium, ascorbic acid, iron, and vitamin D. The 24-hour recall has been used to assess nutrient intakes of all children referred to a development center for evaluation.

The most common dietary deficiencies identified were ascorbic acid, iron, fluoride, and good quality protein (Gouge & Ekvall, 1975).

The ultimate goal of the selected dietary survey method is to identify real differences in the usual diet of the individuals in the study. Respondent error, observer error, or instrument error are prevalent in all known methods of dietary assessment, but can be minimized (Stallones, 1982).

Other Related Problems

Nutrient deficiencies in the developmentally disabled are compounded by other nutritional disorders including overweight, underweight, bizarre food habits, metabolic disorders, mechanical feeding problems, growth retardation, and constipation (Coffey & Crawford, 1971). Many of these problems reflect limited food choices, retention of infantile behaviors, motor dysfunction, and inappropriate parental feeding practices (Calvert et al., 1976; Culley & Middleton, 1969; Pipes, 1980).

Actual food consumed as opposed to amount offered is of prime importance. Food spillage either due to mechanical feeding difficulties or behavioral problems may account for a large portion of the food (Ekvall, 1978).

Nutrition Inservice Programs

Utilization of the work place as a site to provide continuing education has increased. This has occurred in part by the expanding requirements of Joint Commission on Hospital Accreditation and similar licensing agencies for inservice training (Mier, 1980; Jernigan, 1978). Qualified personnel are available to provide nutrition education inservice programs

(Mier, 1980); however, the link between knowledge and application is weak (Briggs, 1969).

Inservice education for nutrition-related jobs may serve three purposes: (1) workers gain a better understanding of why they prepare food in a certain way; (2) workers relate what they learn to their own health needs; and (3) job performance and satisfaction may be enhanced (Looker, Walker, Hamilton & Shannon, 1982).

Nutrition educators must provide valid useful instruction in a cost-effective manner (Boren, Dixon & Harden, 1982). It cannot be effective unless it utilizes real-world situations which provide the learner with tools to select appropriate food choices in the market place (Peterson, 1980).

The case study approach has been reported as the more effective method for developing problem-solving skills. Programmed instruction enhances knowledge retention. Training experts report negligible attitudinal changes regardless of training method (Neider, 1981).

The Expanded Food and Nutrition Education Program (EFNEP) utilizes the paraprofessional to improve the diets and nutritional practices of low-income families. A home-based individualized instruction format is used. The program effectiveness was evaluated by a diet score from the 24-hour recall and a food behavior score derived from observed food practices. Trends toward improved nutritional practices were noted, but were not statistically significant (Murphy, Smiciklas-Wright, Heasley & Hamilton, 1980).

Employees at Union Carbide were exposed to a variety of visual and written nutrition education materials by the contract food service. Observers reported the employees altered food selection to meet daily nutrient requirements (Contract Services Casebook No. 170, 1981).

Professionals and paraprofessionals who work to improve the nutritional status of the developmentally disabled face additional problems. Disabled children are often provided with high calorie, low nutrient density foods by parents and relatives who believe food will compensate for their handicaps. As the developmentally disabled individual matures, a high carbohydrate, high-fat, nonnutritious dietary pattern becomes ingrained (Kaliaz & Ekvall, 1978).

Caliendo et al. (1982) noted a positive correlation between a developmentally delayed child's dietary intake and the mother's nutrition knowledge. The findings contrast with those of many other researchers who have reported that nutrition knowledge is not an indicator of dietary quality (Emmons & Hayes, 1973; Petersen & Kies, 1972). Elkin (1981) reported that high levels of nutrition knowledge were associated with high quality dietary scores.

The permissiveness of mothers of normal children has been negatively correlated with attitude toward nutrition and nutrition knowledge. Children of these mothers consumed low nutrient, high energy foods. Knowledge of nutrition was highly and positively related with attitude toward nutrition (Eppright, Fox, Fryer, Lamkin & Vivian, 1972). Nursing home staff members receiving nutrition inservice programs showed positive changes in knowledge of nutrition and attitudes about assuming responsibility of food choices of residents (Holme & Kim, 1981).

Summary

Based on this review of literature, it can be concluded that developmentally disabled children are very vulnerable to nutritional problems.

There are considerable gaps in knowledge of actual nutrient intakes and nutrient requirements of this population. Many nutritional assessment studies are limited to relatively few types of developmentally disabled children. Expansion of efforts to evaluate children with other diagnostic criteria is imperative (Kalisz & Ekvall, 1978).

The Recommended Dietary Allowance has been used as a yardstick to assess nutrient intake. While these data are of value, they may not reflect the nutrient requirements of this population.

The role of the caretaker or feeder in enhancing nutrient intake has not been adequately addressed. Many view the paraprofessionals as merely facilitators of feeding, not as nutrition educators providing guidance in making appropriate food choices (Holme & Kim, 1981).

Many studies of the nutritional status of the developmentally disabled population were conducted prior to the expanded role of the dietitian as an integrated member of the medical team. The impact of the changes in professional roles is reflected in the foods provided and technical assistance provided to other members of the health team, but have not been fully examined and described for this population (Calvert, Vivian & Calvert, 1976; Culley & Middleton, 1969).

Research findings support the need for a more thorough assessment of the nutritional status of the developmentally disabled individual. Rapid, reliable, and cost-effective methods are needed for assessing the nutritional status and nutrient intakes of the developmentally disabled population.

CHAPTER III

METHODS OF PROCEDURE

Sample and Selection of Subjects

Residents

Eighty developmentally disabled individuals aged 15-36 living in the H area of the Western Carolina Center, Morganton, North Carolina, were selected for the sample population of residents. These residents were housed in cottages and represented the highest mental age group at the Western Carolina Center. Designation of residents into a control or experimental group was determined by arbitrary assignment by cottage of residence. Residents living in Ashe and Mimosa cottages served as the experimental group and residents living in Poplar and Maple cottages served as the control group. There were 40 residents in the control group and 40 residents in the experimental group. All residents required encouragement in food selection. Some residents required assistance in feeding while others needed to be fed. Residents lived together in cottages which simulated a family living setting and they ate together in family groups.

Staff

Seventy developmental technicians and members of the educational staff assigned to the H area of the Western Carolina Center were selected as the sample population of staff. These staff members were responsible for the care and management of the developmentally disabled adults. They assisted in feeding and offered encouragement in food selection. Staff

members working with residents in Ashe and Mimosa cottages served as the experimental group. Staff members working with residents in Maple and Poplar cottages served as the control group. Table 1 records resident and staff participation in the experimental and control groups by cottage.

Table 1

Resident and Staff Participants

Cottage	Residents	Staff
Experimental		
Ashe	16	19
Mimosa	24	16
Control		
Maple	19	21
Poplar	21	14

Nutritional Assessment of Residents

The components of a nutritional assessment for a developmentally disabled individual include (1) clinical data: medical history, diagnosis, level of functioning, ambulatory abilities, medications, and therapeutic diet; (2) biochemical data: hemoglobin; (3) anthropometric data: height, weight, percentile ranks for triceps fat fold, mid-arm circumference, percentage overweight or percentage underweight; (4) dietary factors: three-day food record to assess nutrient intake, dental status, gastrointestinal status, feeding skills, and other medical or psychological influences on dietary intake. Appropriate instruments and procedures for collection of hemoglobin and anthropometric data are located in Appendix A.

Food Record Studies

An initial three-day food intake record was completed in the experimental and control cottages to establish baseline data. An inservice program for the staff members collecting data was conducted by the researcher, the Director of Nursing, the Director of Food Service, and clinical dietitians.

Data forms for each resident were placed on the tables by food service staff. Trained food service staff ladled out portions into serving bowls each of which contained six servings. Breads, salads, and desserts were served in individual containers. Meats were cut according to specified portion size prior to cooking. Foods were served family style at tables seating six residents. Portion sizes were visually assessed by food service staff and discrepancies noted on food record forms.

After meals, trays were visually estimated by the staff for none eaten or just tasted, half eaten, or all or most eaten. The staff estimated the amount spilled as none, half, or most. The researcher and staff dietitians monitored plate waste study. Menu items, portion sizes, food consumed and food spilled were recorded on the Three-Day Food Record form by the staff. The forms were turned in to the food service supervisors at the end of each meal. Food service supervisors checked food record forms for accuracy. At the end of the three-day food record study, the completed forms were turned in to the researcher.

Staff members taking residents to eat off campus or for meals at school or for picnics were instructed to record food consumption and turn the data in to the researcher. Residents who left campus to eat without a staff member or went home were not included in the sample population.

Data on between-meal snacks was collected by educational personnel and snack bar employees. These employees were instructed to keep a list of foods given to residents as educational reinforcers or foods purchased by the residents. Snack records were completed daily and turned in to the researcher at the end of the study.

The second three-day food intake record was completed ten days after the last nutrition education inservice program following the same procedures as the initial plate waste study. Appropriate instruments for data collection are located in Appendix A.

Nutrition assessment data including height, weight, diagnosis, hemoglobin, triceps fat fold, mid-arm circumference, ambulation ability, dental status, gastrointestinal status, feeding skills, and other medical or psychological influences on dietary intake were collected by the researcher and dietitians. Data were compiled on the Nutritional Assessment form located in Appendix A. Standard procedures for nutritional assessment data collection are located in Appendix A.

Nutrition Education Inservice Programs

One week following the first food record study, a series of four 50- to 60-minute nutrition education inservice programs began. Developmental technicians and educational personnel were scheduled by their QMRP's to attend each inservice program. Each inservice program was offered at four different times to include staff assigned to first and second shifts. Make-up classes were scheduled for staff who missed inservice programs.

Prior to the first inservice education program, consent for participation was obtained from the staff members in both experimental and control groups. The researcher discussed the research proposal and procedures for

consent forms and answered questions of participants, who were asked to sign consent forms at this time. A copy is located in Appendix B. Consent forms were collected by the researcher.

To establish baseline data for nutrition knowledge, a nutrition knowledge test was developed by the researcher. The multiple-choice test consisted of thirty-seven items of equal weight. All questions pertained to material covered in the nutrition education inservice calsses. Each question offered a "don't know" choice. Staff members were encouraged to mark "don't know" rather than guess, if they were unfamiliar with the topic. The test was evaluated for clarity by a panel of fifteen UNC-G graduate students in foods and nutrition. A revised version was pilot-tested with 22 North Carolina Agricultural and Technical State University sophomores majoring in clothing and textiles. Their raw scores ranged from 3-34. Reliability of .723 was measured using Cronbach Alpha (Ary, Jacobs, & Razavich, 1972).

Baseline data for food practices of staff were collected using a food practices record developed by Elkins (1981). The food practices record included 14 foods or food groups which supply significant amounts of essential nutrients plus six low-nutrient density foods. Staff members were asked to indicate with an "X" in the appropriate area according to the frequency choices were never or less than once a week, one to four times per week, five to seven times per week, and more than once per day.

A point system for scoring was based on the recommended number of servings per day from the Basic Four food groups according to Guthrie and Scheer (1981). Use of the dietary score for assessing nutrient adequacy was found to be internally valid by this method. Scores ranged from 0 to

16 for the overall checklist. A perfect score of 16 indicated a dietary intake of at least four-fifths of the RDA for the 12 nutrients examined (Guthrie & Scheer, 1981). See Appendix B for instrument and point scale.

Useability of this format and clarity of the form was pilot tested using 22 North Carolina Agricultural and Technical State University sophomores majoring in clothing and textiles. Raw scores ranged from 3 to 16.

During the first nutrition education inservice program, pretest data on nutrition knowledge and food practices were completed by the experimental group. The control group was scheduled to complete pretest data on nutrition knowledge and food practices on the same day at a different time. Appropriate instruments and procedures for administration are located in Appendix A. Staff members were assigned a numerical code for all pretest data to safeguard confidentiality.

Nutrition education inservice programs focused on common misconceptions about nutrition. The following inservice education programs were presented:

1. Wellness: The Wave of the Future
2. Keys to Better Health:
    Part I. Energy Nutrients
    Part II. Vitamins and Minerals
3. Battle of the Bulge
    Part I. Food Fads
    Part II. The Sensible Approach
4. A Toast to Good Health

Inservice programs utilized lecture, group discussions, and case studies as teaching methods. Specific learning objectives, learning activities, class outlines, and evaluation methods are located in Appendix A.

Following the final nutrition inservice education program, all staff members completed the posttest for nutrition knowledge and food practices records. This test was a reordered version of the pretest. Thirty-five staff members in the experimental group and thirty-five staff members in the control group completed pretests and posttests and attended all of the nutrition education inservice programs.

Analysis of Data

The experimental design utilized in this study appears in Table 2. The analysis of data for nutrition knowledge, food practices records, and nutrients are discussed in this section.

Nutrition Knowledge Scores

The nutrition knowledge test assessed perceived knowledge as well as accuracy of knowledge by providing a "don't know" item for each question. It has been proposed that for individuals with limited nutrition knowledge, they perceive themselves to be highly accurate when in fact their accuracy is limited (Dugdale, Chandler, & Baghurst, 1979). Perceived knowledge was determined by dividing the number of item responses minus the "don't know" choices by the total number of questions. The staff members' levels of accuracy were determined by dividing the number of correct items by the number of item responses minus the "don't know" choices. Means were determined for pretest and posttest perceived levels and for levels of accuracy.

Raw scores for pretests and posttests for experimental and control groups were determined and statistical differences examined using a *t* test on knowledge gain scores.

Table 2

Experimental Design

Week 1	Week 2	Week 8	Week 9	Week 10
Nutritional Assessment of Residents	Pretest All Staff	Posttest Experimental Staff	3-Day Food Record	Posttest Control Staff
3-Day Food Record	Nutrition Education Inservice for Experimental Staff			Nutrition Education Inservice for Control Staff

Food Practice Records

Food practices were determined for staff using a point system score assigned to specific frequencies of food intake. Points varied for each food category according to the recommended number of servings per day and the density of nutrients in food or food groups listed. Food group scores were totaled to determine the food practices score. Foods were divided into 14 categories. Frequency choices were never or less than once a week, one to four times per week, five to seven times per week, and more than once per day. A dietary score was calculated by summing totals from each food group.

Raw scores for pretests and posttests for experimental and control groups were determined, and statistical differences examined using a *t* test on gain scores.

Six categories for low nutrient density foods were included plus a category of vitamin mineral supplements. These seven categories were scored as follows: (1) low frequency - never or less than once per week; (2) medium frequency - one to four times per week; (3) higher frequency - five or more times per week. High-sodium foods including potato chips, corn chips, and pizza were grouped together. High-sugar foods including pies, cakes, candy, sugar-containing carbonated beverages, fruit drinks, and Koolaid were grouped together. High-caffeine foods included coffee and tea. All alcoholic beverages were included as alcoholic intake. Pretest and posttest frequencies were determined. Statistical differences were determined using Chi-square analysis.

Nutrient Analysis

Nutrient intake of residents was determined by evaluating the pre-inservice program three-day food record study and the post-inservice pro-

gram three-day food record study. A percentage of the Recommended Dietary Allowance (RDA) for daily intakes of calories, protein, vitamin A, ascorbic acid, thiamin, niacin, calcium, and iron was determined (Adams, 1975). Mean percentages for each nutrient during each three-day food record were determined using 100% RDA as the maximum value. Statistical differences in prenutrient and postnutrient intakes were determined using the t test.

Statistical Analysis

A statistician from the Academic Computer Center of the University of North Carolina at Greensboro was consulted for the statistical analysis of the data. Items on the nutrition knowledge tests, food practices record, nutritional assessment data, and nutrient intakes were analyzed using the statistical package SPSS - Statistical Package for the Social Sciences (Hull, C.H., Nie, N.H., Jenkins, J.G., Steinbrenner, K., & Bent, D.H., 1975).

Descriptive and inferential statistics, including t tests, analysis of variance, and Chi-square tests of independents were used to analyze the data. A .05 level of significance was used throughout the study.

CHAPTER IV

RESULTS AND DISCUSSION

The purposes of this study were (1) to assess the effects of a series of nutrition education inservice programs for staff, (2) to assess the nutritional status of a sample of developmentally disabled individuals, and (3) to assess the effect of the nutrition education inservice programs for staff on the energy and nutrient intakes of the sample of developmentally disabled individuals. Eighty residents and seventy staff members from the Western Carolina Center, Morganton, North Carolina, were included for data collection.

Description of the Staff

The demographic data from this study described staff according to job classification, educational level, age, and sex. Each of these characteristics was examined. The sample was primarily rural since most staff lived in Burke County or the surrounding area. Individual data for job classification, education level, age, and sex are included in Table A.

The study limited participation to staff assigned to work in the H area. A majority of participants were developmental technicians, high school graduates, and females. Table 3 compares the demographic makeup of the experimental and control groups for the seventy staff participants.

Table 3

Demographic Characteristics of Staff

Variable	Experimental Group %	Control Group %
Job classification		
Developmental technician	60.0	54.2
Educational personnel	40.0	42.9
Qualified mental retardation professional	0.0	2.9
Educational level		
Less than high school grad.	5.7	5.7
High school graduate	40.0	34.3
Some college or technical school	28.6	40.0
College graduate	17.1	11.4
Graduate	8.6	8.6
Age Category		
20-29 years	25.7	14.3
30-39 years	34.3	51.4
40-49 years	22.9	11.4
50-59 years	17.1	22.9
Sex		
Females	65.7	88.6
Males	34.3	11.4

Description of Residents

The study was limited to the residents living in the H area at the Western Carolina Center, Morganton, North Carolina. Individual data for sex, chronological age, mental age, height, weight, mid-arm circumference, hemoglobin, and mean nutrient intakes are included in Tables B, C, D.

Group data for influences on dietary intake and diagnosis are included in Tables E and F. Each of these characteristics was examined.

Sex, Chronological Age, and Mental Age

Approximately 53% of the experimental residents were female and 47% males. The control group consisted of 70% males and 30% females.

Residents ranged in chronological age from 15 to 36 years and in mental age from nine months to ten years. Means for chronological age and mental age by experimental and control group are recorded in Table 4. The sample population represented the highest functioning group of residents at the center.

Table 4

Mean Chronological Ages and Mental Ages of Residents

Variable	Experimental Group $\bar{x}$ (years)	SD	Control Group $\bar{x}$ (years)	SD
Chronological age	23.65	5.33	25.75	4.63
Mental age	3.70	1.77	4.94	2.77

Anthropometric Measures

The males and females in the experimental and control groups were similar for means in height and weight and percentiles for mid-arm circumberence and triceps fat fold utilizing standards for the adult population at large. The means for anthropometric data are included in Tables 5 and 6. Individual data are recorded on Table C in the appendixes.

Table 5

Mean Heights and Weights of Residents

Variable	Experimental				Control			
	Males		Females		Males		Females	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Height (inches)	66.2	4.0	62.8	3.0	66.6	3.6	61.6	3.8
Weight (pounds)	139.1	22.0	120.5	19.0	129.8	20.9	125.0	22.5

Table 6

Frequencies for Percentile Ranks for Mid-Arm Circumference and Triceps Fat Fold

	Mid-Arm Circumference		Triceps fat fold	
	Males	Females	Males	Females
Experimental				
5% <	8	4	3	5
5% to 15%	7	2	5	1
15% to 50%	5	7	4	6
51% >	1	6	9	7
Control				
5% <	12	3	4	2
5% to 15%	5	1	8	1
15% to 50%	8	3	9	6
51% >	3	5	7	3

Tests of Hypotheses for Staff

Increases in knowledge of nutrition and improved food practices were the expected outcomes of the nutrition education inservice programs. Descriptive statistics for the experimental and control samples in this study are presented in the following discussion. Individual data is presented in Table G.

Hypothesis One

The hypothesis that no differences exist in experimental and control groups on pretest and posttest scores for knowledge of nutrition and food practices for staff attributable to nutrition education inservice programs was rejected.

Nutrition Knowledge Scores

Nutrition knowledge was determined using a pretest posttest model. Mean pretest scores for the experimental group were 25.74 $\pm$ 5.893 and for the control group were 27.51 $\pm$ 3.853. Perceived knowledge of nutrition for the experimental group was .884 $\pm$ .122 and .925 $\pm$ .097 for the control group. A perceived score of 1.0 is a perfect score. However, the mean level of accuracy for the experimental group was .780 $\pm$ .139 and .803 $\pm$ .072 for the control group. In both groups, staff perceived themselves as more knowledgeable than was actually the case.

Mean posttest scores for experimental and control groups were 28.37 $\pm$ 3.843 and 27.9 $\pm$ 4.540, respectively. Perceived knowledge of both groups increased to means of .971 $\pm$ .058 in the experimental group and .936 $\pm$ .090 in the control group, even though only the experimental group had attended the nutrition education inservice programs. Mean levels of accuracy were .799 $\pm$ .091 and .800 $\pm$ .092 for the experimental and control groups, respectively. The experimental group demonstrated a statistically significant ($p < .01$) knowledge gain using the t test. Table 7 includes t test values, means, and level of significance for nutrition knowledge scores.

Table 7

t Test Values, Means, and Levels of Significance for Nutrition Knowledge Scores

Variable	Experimental $\bar{x}$	Control $\bar{x}$	*t*	*p*
Pretest scores	25.74	27.51		
Posttest scores	28.37	27.91		
Gain scores	2.63	.41	2.66	$<.01$

Food Practices Record

Changes in food practices were determined using a pretest and posttest format. Mean pretest scores for the experimental group were 10.27 $\pm$ 3.18 and for the control group were 11.41 $\pm$ 3.14. Posttest means for the experimental and control groups were 10.221 $\pm$ 3.43 and 10.936 $\pm$ 3.69, respectively. There was no statistically significant difference ($p \geq .05$) using the *t* test for change in food practices between the two groups.

The mean dietary scores indicated that the diets of staff may have been inadequate in some essential nutrients; however, specific deficiencies could not be determined by using only the total score. Table 8 records the *t* test values, means, and level of significance for food practices scores.

Table 8

t Test Values, Means, and Level of Significance

for Food Practices Scores

Variable	Experimental $\bar{x}$	Experimental SD	Control $\bar{x}$	Control SD	t	p
Pretest scores	10.27	3.18	11.41	3.14		
Posttest scores	10.22	3.43	10.94	3.69		
Gain scores	- .05		- .47		.69	.494

Hypothesis Two

The null hypothesis that no differences exist in experimental and control groups of staff on scores for knowledge of nutrition and food practices related (1) education levels, (2) job classification, (3) vitamin supplements, and (4) age was not rejected.

While no differences exist between the control and experimental groups, statistically significant differences in the total population existed on vitamin supplement usage and food practices ($F(1,66) = 6.420$) and on age and food practices ($F(3,62) = 4.903$). Users of vitamin supplements and staff members between the ages of 30-39 and 50-59 scored higher on the post-food practices record than nonusers and other age groups. Summaries of findings are presented in Tables 9 and 10.

Table 9

ANOVA for Vitamin Supplement Usage,

Age, and Food Practices of Staff

Variable	SS	MS	F	p
Vitamin usage [a]	75.96	75.96	6.42	$< .05$
Age [b]	157.90	52.63	4.90	$< .05$

[a] df = 1,66

[b] df = 3,62

Table 10

Use of Vitamin Supplements by Staff

Variable	Pretest frequency	Posttest frequency
Experimental		
Yes	15	14
No	20	21
Control		
Yes	12	12
No	23	23

Hypothesis Three

No differences exist between experimental and control groups of staff on pretest and posttest consumption of 1) high-sodium foods, 2) high-refined-sugar foods, 3) alcoholic beverages, and 4) high-caffeine foods was rejected. The sample population was not large enough to make Chi-square valid.

Consumption of six low-nutrient density foods were determined using the food practices record. Approximately 94% of staff in experimental and control groups reported low and medium intakes of high-sodium foods, and alcoholic beverages. Approximately 80% of staff in experimental and control groups reported medium to high intakes of high-refined-sugar foods. Approximately 66% of the experimental group and 60% of the control group reported high intakes of caffeine-rich beverages. Table 11 summarizes the data.

Tests of Hypotheses for Residents

Descriptive statistics for anthropometric measurements and hemoglobin characterize the developmentally disabled population in the study.

Hypothesis Four

The null hypothesis that no differences exist between experimental and control groups of residents on anthropometric measurements and hemoglobin was not rejected. Table 5 outlines the mean heights and weights for experimental and control groups. Frequencies for percentile ranks for mid-arm circumference and triceps fat fold are recorded in Table 6.

Table 11

Use of High-Sodium Foods, High-Refined-Sugar Foods, Alcoholic Beverages and High-Caffeine Beverages

	Pretest frequency			Posttest frequency		
Variable	Low	Med	High	Low	Med	High
Experimental						
Sodium	25	9	1	18	17	0
Sugar	7	12	16	6	15	14
Alcohol	27	7	1	24	10	1
Caffeine	4	8	23	5	7	23
Control						
Sodium	19	16	0	20	15	0
Sugar	7	13	15	7	13	15
Alcohol	31	2	2	31	2	2
Caffeine	9	5	21	9	5	21

Hypothesis Five

The hypothesis stating that there are no differences between experimental and control groups of residents on preintervention and postintervention intakes was rejected. The premean and postmean, t test values, and the level of significance for the experimental and control groups are presented in Tables 12 and 13.

A positive difference in the premean and postmean for calories ($p < .05$), iron ($p < .05$), and niacin ($p < .05$) were statistically

significant in the experimental group. In the control group a negative difference in the premean and postmean for vitamin A was statistically significant ($p < .05$). However, in both experimental and control groups the mean nutrient intakes were greater than two-thirds of the RDA. Individual data are recorded in Table H.

Table 12

t test Values, Means, Standard Deviations and Levels of Significance for Energy and Nutrient Intakes of Experimental Group

Nutrient	Mean (% RDA)	SD	*t*	*p*
Calories 1 [a]	74.9663	15.115		
Calories 2 [b]	87.3913	16.816	-4.99	.0001
Protein 1	100.0000	0.000		
Protein 2	99.5850	1.932	1.36	.182
Calcium 1	97.1917	7.531		
Calcium 2	95.9000	9.660	.89	.376
Iron 1	80.5170	19.621		
Iron 2	87.9688	16.285	-2.77	.009
Vitamin A 1	98.6583	7.573		
Vitamin A 2	95.1168	16.786	1.67	.085
Thiamin 1	97.0967	7.521		
Thiamin 2	98.3145	7.469	- .91	.370
Riboflavin 1	99.1507	4.434		
Riboflavin 2	99.4915	2.805	- .40	.688
Niacin 1	87.9877	13.366		
Niacin 2	95.2042	14.372	-3.13	.0003
Ascorbic Acid 1	99.2000	3.539		
Ascorbic Acid 2	97.0752	10.096	1.57	.124

Table 13

t test Values, Means, Standard Deviations and Levels of Significance for Energy and Nutrient Intakes of Control Group

Nutrient	Mean (% RDA)	SD	*t*	*p*
Calories 1 [a]	75.5250	15.267		
Calories 2 [b]	78.6850	15.070	-1.40	.168
Protein 1	99.9625	.237		
Protein 2	99.9625	.237	0.00	1.00
Calcium 1	98.9415	4.196		
Calcium 2	98.6750	8.380	.18	.860
Iron 1	89.9140	17.535		
Iron 2	91.2802	14.914	- .58	.567
Vitamin A 1	99.5915	2.036		
Vitamin A 2	87.0665	22.566	3.55	.001
Thiamin 1	96.2828	10.172		
Thimain 2	96.5670	8.343	- .17	.864
Riboflavin 1	99.0150	4.434		
Riboflavin 2	98.3665	5.583	.70	.491
Niacin 1	88.2305	13.468		
Niacin 2	87.2995	16.878	.34	.734
Ascorbic Acid 1	98.8083	7.117		
Ascorbid Acid 2	96.8268	12.613	.86	.394

Hypothesis Six

The null hypothesis stating that no differences exist between the experimental and control groups of residents for iron status as defined by hemoglobin and iron intakes from food was not rejected. However, for the total population there was a statistically significant relationship $F(1,75) = 17.78$ ($p = .0001$) between mean iron intakes of residents and hemoglobin levels. This suggests that meeting two-thirds of the RDA for iron resulted in the adequate hemoglobin levels for the sample of developmentally disabled individuals.

Discussion

The results of this study of staff were based on pretest and posttest scores for nutrition knowledge and food practices. For residents, they are based on anthropometric measurements, hemoglobin concentrations, assessments by the resident's nurse and physician, and two three-day food record studies. Individual data related to nutrition knowledge and food practices of staff are shown in Appendix C. Findings for residents are also included in Appendix C.

Staff

Staff members in the experimental group demonstrated a statistically significant ($p < .01$) knowledge gain but did not demonstrate a change in food practices. Other researchers have reported that nutrition knowledge is not an indicator of dietary quality (Emmons & Hayes, 1973; Petersen & Kies, 1972). Two factors affected the dietary score for the staff as a whole. Staff members reporting use of vitamin supplements scored higher on dietary practices record which may have indicated a preexisting interest

in nutrition. Approximately 37% of the staff reported use of vitamin supplements.

Staff members aged 30-39 and 50-59 representing 63% of the total population also scored higher on dietary scores than did staff in other age categories.

No changes were noted for use of vitamins, consumption of high-sodium foods, high-refined-sugar foods, alcoholic beverages and high-caffeine foods attributable to the participation in the nutrition education inservice programs. In both groups, consumption of high-sodium foods and alcoholic beverages was relatively low, while the consumption of high-refined-sugar foods was higher. A large number of staff indicated religious beliefs prohibiting the comsumption of alcoholic beverages. Some were offended by that item on the food practices record.

All residents appeared to be in good nutritional status. Mean heights indicated that the population was shorter than the general population as reported by others (Barlet & Whelan, 1967; Culley et al., 1963; Gouge & Ekvall, 1975; Krepke & Sanders, 1970; Mosier, Grossman & Dinghan, 1965; Roberts & Clayton, 1969; Rundle & Sylveston, 1965). Approximately 22% of the residents were 20% or more above ideal body weight and 28.8% were 10% or more under ideal body weight. This finding has been reported by other researchers (Bryan & Anderson, 1965; Roberts & Clayton, 1969).

Iron deficiency anemia was not found in the sample population of residents. Four residents had had a history of iron deficiency anemia. Mean iron intakes of greater than 75% of the RDA were associated with adequate hemoglobin levels ($p < .05$). These findings for normal hemoglobin levels support previous reports (Culley et al., 1965).

Nutrient intakes were determined by an average over a three-day period. In some subjects daily intakes varied dramatically. Medical and psychological influences reported in Table E appeared to have had an impact on the total nutrients consumed daily. The use of the three-day record was necessary to prevent the chance reporting of a dietary intake for a period of medical or psychological stress.

Residents in the experimental group did consume significantly more calories ($p < .05$), iron ($p < .05$), and niacin ($p < .05$) in the food record study following the intervention program. However, preintervention levels of these three nutrients were within adequate ranges of the RDA. This finding suggests that the staff can influence the nutrient intake of residents even though they may not practice adequate nutritional habits themselves.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of this study were (1) to assess the effects of a series of nutrition education inservice programs for staff, (2) to assess the nutritional status of a sample of developmentally disabled individuals, and (3) to assess the effect of the nutrition education inservice programs for staff on the energy and nutrient intakes of the sample of developmentally disabled individuals. This study included measurement of preintervention and postintervention nutrition knowledge and food practices for staff and anthropometric measures, hemoglobin, and nutrient intakes for residents. Data were also recorded on residents' diagnosis and influences on dietary intake.

The sample consisted of 70 staff and 80 developmentally disabled individuals working and living at the Western Carolina Center, Morganton, North Carolina. The researcher worked with registered dietitians, food service workers, and registered nurses to collect data on residents. Data on staff was collected by the researcher during weekly visits to the center.

Significant relationships were noted for two of six null hypotheses formulated and tested by this research. Summarized below are the results of the hypotheses tested.

1. The hypothesis tested for differences in experimental and control groups on pretest and posttests for knowledge of nutrition and food

practices for staff attributable to nutrition education inservice programs was rejected for knowledge of nutrition.

2. The hypothesis tested for the differences in experimental and control group of staff on scores for knowledge of nutrition and food practices related to (1) educational level, (2) job classification, (3) use of vitamin supplements, and (4) age was accepted. Differences for the total population were noted for use of vitamin supplements and age in relationship to food practices suggesting a preexisting interest in nutrition.
3. The hypothesis tested for differences between experimental and control groups of staff on pretest and posttest consumption of (1) high-sodium food, (2) high-sugar foods, (3) alcoholic beverages, and (4) high-caffeine foods was not rejected.
4. The hypothesis tested for differences between experimental and control groups of residents on anthropometric measurements and hemoglobin levels was not rejected.
5. The hypothesis tested for differences between experimental and control groups of residents before and after nutrients and energy intakes was rejected. Differences were noted in calories, iron, and niacin.
6. The hypothesis tested for differences between experimental and control groups of residents for iron status as defined by hemoglobin and iron intake from food was not rejected.

Conclusions

The following conclusions were drawn:

1. The nutrition inservice education program for staff resulted in in-

creased knowledge gain for staff but did not increase the nutritional quality of their diets.

2. Staff assist residents in feeding and in food selection. More knowledgeable staff assisted residents to consume more of the nutrients routinely provided by the institution. The nutritional quality of residents' diets was improved significantly for calories ($p < .05$), iron ($p < .05$), and niacin ($p < .05$).
3. All residents had adequate hemoglobin levels probably indicating adequate mean iron intake.
4. Residents did not differ from the standards for the normal population except for height. The developmentally disabled were shorter than the normal population.
5. Staff members reporting use of vitamin supplements scored higher on dietary practices scores perhaps indicating preexisting interest in nutrition.
6. Developmentally disabled residents at the Western Carolina Center are receiving quality nutritional care.

Recommendations

The role of the caretaker in influencing the nutritional quality of a developmentally disabled individual's dietary intake has been tested by this research. After considering the overall findings, the writer offers these recommendations for development and study.

1. Analyze for differences in dietary intakes of the developmentally disabled by grouping subjects according to diagnosis, mental age, and sex.

2. Analyze for differences in dietary intakes of the developmentally disabled by grouping subjects according to medical or psychological influences on dietary intakes.
3. Analyze for correlations between specific nutrients noted for marginal intake and medical or psychological influences on dietary intakes.
4. Develop methods for collecting more accurate data on residents eating meals off-campus.
5. Develop nutrition education classes for residents and analyze for differences in nutrient intakes.
6. Develop an ongoing nutrition education inservice program for staff as a part of dietary services at the center.

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APPENDIX A
DATA COLLECTION FOR STAFF

North Carolina
Department of
Human Resources

Division of
Mental Health,
Mental Retardation,
Substance Abuse Services
A. Eugene Douglas, M.D., Director

James B. Hunt, Jr.
Governor
Sarah T. Morrow, M.D., M.P.H.
Secretary

January 10, 1983

Iverson Riddle, M.D., Director
Western Carolina Center
Morganton, N.C. 28655

Dear Dr. Riddle:

It is a pleasure to write this letter of support for the research proposal submitted to you by Ms. Mary Litchford, Director of the Dietetic Consortium, at A & T and U.N.C. in Greensboro. Your interest and support of research projects has been forthcoming in the past and is certainly appreciated. I feel certain that Ms. Litchford's work will benefit the residents of Western Carolina Center and provide data beneficial for program development.

I look forward to hearing the results of the study and to working with you on future projects.

Sincerely,

Evalyn K. Brendel

Evalyn K. Brendel, R.D., M.S.
Chief, Nutrition and Dietetics

EKB/vh

cc: Mary Litchford, R.D., M.P.H.
Lucille Wakefield, Ph.D.
David Langmeyer, Ph.D.

January 25, 1983

Ms. Mary Litchford, Director
Dietetic Consortium
University of North Carolina
School of Home Economics
Greensboro, NC 27412

Dear Ms. Litchford:

I have discussed your research proposal with our Research Director, Dr. Jim Favell, and with the Program Director, Mr. Dave Beck, and both are enthusiastic and willing for you to go ahead as planned. I am enclosing the Job Description for QMRP and Developmental Technician (HCT). At present, there are 4 QMRPs in the Lakeside Area and 95 Developmental Technicians. I think I should also mention that there are 32 education personnel that work with residents in the Lakeside Area and these staff also participate in breakfast and lunch meals.

We look forward to working with you and are very enthusiastic about the possible results, especially since we are focusing on food and mealtimes in efforts to improve the quality of life for the residents at Western Carolina Center.

Thank you for your interest and we look forward to seeing you in February.

Sincerely,

Helen C. Wilson, R.N.
Director of Nursing & Nutrition

cew

Enclosures

January 26, 1983

Ms. Mary D. Litchford, Director
Dietetic Consortium
University of North Carolina
Greensboro, North Carolina 21412

Dear Ms. Litchford:

I am very pleased to hear of your interest in doing your research project at Western Carolina Center. The area of food and mealtime is of special interest to me, and I am interested in every possible sorce of information which may help us improve in this important area.

I know that you will find cooperation from the staff and wish you much success. We will look forward with you to knowing and utilizing the results of your study.

Thank you.

Sincerely yours,

Iverson Riddle, M. D.
Director

wc

STATE OF NORTH CAROLINA
DEPARTMENT OF HUMAN RESOURCES
DIVISION OF MENTAL HEALTH SERVICES

WESTERN CAROLINA CENTER
ENOLA ROAD
MORGANTON, N. C. 28655

J IVERSON RIDDLE, M.D.
Director

February 4, 1983

Ms. Mary D. Litchford
Director of The Dietetic Consortium
University of North Carolina
Greensboro, North Carolina 27412

Dear Ms. Litchford:

I have reviewed your research proposal entitled "Educational Techniques to Increase Nutrient Intakes of the Developmentally Disabled" and find it very interesting. It appears to hold considerable possibility for providing us with valuable information on how to improve dietary services to our residents.

Since your research will involve only non-intrusive observations and data collection with no manipulation of subjects, it will not be necessary to obtain residents' consent for participation. Naturally, the usual professional measures should be taken to assure the confidentiality of the data you collect, assuring that any publication of the results does not reveal individual subjects' identities.

You have my best wishes for success in this research, and I will be looking forward to reading your report of the results.

Sincerely,

Jim Favell

James E. Favell, Ph.D.
Director of Research

ms

cc: Mrs. Helen Wilson

Consent for Participation

I have received an explanation of the nutrition study to be conducted at the North Carolina Mental Retardation Centers. The project will be directed by Mary Litchford, faculty member in the Department of Food, Nutrition and Food Service Management in the School of Home Economics, University of North Carolina, Greensboro.

The study objectives are 1) to assess the nutritional status of a population of young adults living at a North Carolina Mental Retardation Center, and 2) to evaluate educational techniques to increase the nutrient intakes of the young adult population.

I understand that I will be asked to take tests which are designed to assess my nutrition knowledge, my attitudes toward food and nutrition. I understand I will be asked to answer questions about my food habits. I understand I will be asked questions about my educational background and my current job status.

I understand that I will be participating in a series of nutrition inservice programs. The potential risks of this study (such as stress during tests and questionnaires) have been explained to me.

I understand that I am free to withdraw from the study at any time. I understand that all information will be considered private, will be treated confidentially and will not be revealed so as to cause embarrassment. Mary Litchford or one of the therapeutic dietitians will be free to answer any questions I may have regarding this study.

The potential benefits include increased knowledge about my health and nutrition. Understanding the above, I agree to participate.

_____

Signature, Subject Date

_____

Social Security Number

_____

Signature of Researcher

Nutrition Knowledge Test

DIRECTIONS : Read each of the following items carefully and select the correct answer. Select only one answer for each question. Mark your choice on the answer sheet. If you do not know the correct answer mark the choice " Don't Know".

---

1. Besides food, what else is needed for normal growth and development?
   * A. Rest and exercise
   B. Vitamin and mineral supplements
   C. Sports and friends
   D. Sunshine
   E. Don't know

2. Protein is primarily responsible for
   * A. Growth and repair of body tissues
   B. Maintenance of energy level
   C. Prevention of dental cavities
   D. Control of appetite
   E. Don't know

3. A function of Ascorbic Acid is to:
   * A. Promote wound healing
   B. Help in weight reduction
   C. Provide energy
   D. Transport oxygen
   E. Don't know

4. The most common cause of being overweight is:
   A. Too much protein
   B. Too much exercise
   * C. Too much food
   D. Too much Vitamin A
   E. Don't know

5. Too much sugar in the diet can cause:
   A. Diabetes
   B. Overweight
   C. Tooth decay
   * D. B and C
   E. Don't know

6. Which snack has the MOST fiber?
   A. Gum drops
   * B. Peanuts
   C. Orange juice
   D. Milkshake
   E. Don't know

7. People who exercise regularly:
   * A. Feel better and have more energy
   B. Feel tired and sleep alot
   C. Feel better but gain weight
   D. Retain water and feel sleepy
   E. Don't know

8. Quick weight loss diets usually result in:
   * A. Quick weight gain when the normal diet is resumed
   B. Maintance of weight loss when normal diet is resumed
   C. Continued weight loss when the normal diet is resumed
   D. Water retention when normal diet is resumed
   E. Don't know

9. Which vitamin helps in night vision?
   *A. Vitamin A
   B. Vitamin D
   C. Ascorbic Acid
   D. B-complex vitamins
   E. Don't know

10. How long we live is related to:
   A. The foods we eat
   B. The amount of rest and exercise we get
   C. Smoking and use of alcohol
   * D. All of the above
   E. Don't know

11. Which nutrient provides for both growth and energy?
   A. Vitamins
   B. Minerals
   C. Water
   * D. Protein
   E. Don't know

12. Bones have the highest amount of which of the following minerals?
   A. Iron
   * B. Calcium
   C. Fluoride
   D. Zinc
   E. Don't know

13. The ketogenic diet is a:
   * A. High protein, low carbohydrate diet
   B. High carbohydrate, low fat diet
   C. High protein, low fat diet
   D. Low protein, low fat diet
   E. Don't know

14. Select the LOWEST calorie snack.
   * A. Orange
   B. Vanilla pudding
   C. Peanuts
   D. Milkshake
   E. Don't know

15. Alcohol in the diet contributes:
   * A. Calories
   B. Protein
   C. Fat
   D. Vitamins
   E. Don't know

16. People usually do not need to take vitamin pills if they:
   A. Eat only foods bought in health food stores
   B. Get plenty of sunshine
   C. Get plenty of exercise
   * D. Maintain a balanced diet
   E. Don't know

17. A person needs more food for energy when:
   A. He watches TV
   B. He is fat
   * C. He gets more exercise
   D. He reads alot
   E. Don't know

18. A function of the B-complex vitamins is to:
   A. Help in weight reduction
   * B. Release energy from food
   C. Transport oxygen
   D. Build strong blood
   E. Don't know

19. Breakfast is a very important meal because:
A. It is the only meal that provides ascorbic acid
B. Families have their only chance to eat together
*C. Our bodies have gone without food for a long time
D. It is the most balanced meal
E. Don't know

20. The body needs vitamin D to:
A. Release food energy
* B. Build strong blood
C. Build strong bones
D. Help blood clot
E. Don't know

21. Fiber in the diet may prevent:
A. High blood pressure
* B. Constipation
C. Vericose veins
D. Baldness
E. Don't know

22. People are most likely to be healthy if they:
* A. Eat a variety of foods
B. Eat only foods they like
C. Eat what looks good
D. Eat no fats
E. Don't know

23. The major use of carbohydrates by the human body is for:
A. Growth
B. Regulation
* C. Energy
D. Repair
E. Don't know

24. The body needs iron to:
A. Release food energy
* B. Build strong blood
C. Build strong bones
D. Help blood clot
E. Don't know

25. Which food has the MOST calories?
A. Baked chicken
* B. Fried chicken
C. Roasted chicken
D. Boiled chicken
E. Don't know

26. The major use of fat by the human body is:
* A. Concentrated source of energy
B. Concentrated source of vitamins and minerals
C. Growth and repair of tissues
D. Control of appetite
E. Don't know

27. Rapid weight loss is usually caused by a:
* A. Loss of body water
B. Loss of body fat
C. Loss of bone
D. Loss of cellulite
E. Don't know

28. Which snack has the LEAST amount of sodium?
A. Potato chips
B. Buttered popcorn
C. Pretzels
* D. Carrot sticks
E. Don't know

29. The most sensible way to lose weight is to:
   * A. Eat a variety of low calorie foods and get regular exercise
   B. Eat only meats, fruits, and vegetables
   C. Eat only raw foods
   D. Eat only fruits and vegetables
   E. Don't know

30. Which vitamin do we get from sunshine?
   A. B-complex
   B. Ascorbic Acid
   * C. Vitamin D
   D. Vitamin A
   E. Don't know

31. The Cambridge diet is:
   A. A safe diet for quick weight loss
   * B. A very low calorie powdered diet with adequate protein
   C. A liquid low carbohydrate low protein diet
   D. Low calorie diet using English foods
   E. Don't know

32. Too much sodium in the diet can cause:
   A. Diabetes
   B. Tooth decay
   * C. High blood pressure
   D. Cancer
   E. Don't know

33. A sensible weight loss per week on a low calorie diet would be:
   A. 3-5 pounds/week
   B. 6-8 pounds/week
   * C. 1-2 pounds/week
   D. 9-10 pounds/week
   E. Don't know

34. Which of the following would be a well-balanced meal?
   A. Grilled cheese sandwich and ice cream
   * B. Peanut butter sandwich, tossed salad, apple, milk
   C. Hamburger, french fries and soft drink
   D. Hot dog, potato chips, and milk,
   E. Don't know

35. Adults generally need:
   A. The same amount of calories as teenagers
   * B. Fewer calories than teenagers
   C. More calories than teenagers
   D. More caloires and protein than teenagers
   E. Don't know

36. Most quick weight loss diet plans may include
   A. A variety of nutritious foods
   B. The same foods every day
   C. Special foods which taste differently from regular foods
   * D. B and C
   E. Don't know

37. Which nutrient provides us with the MOST energy per gram.
   A. Protein
   B. Carbohydrate
   C. Vitamins
   * D. Fat
   E. Don't know

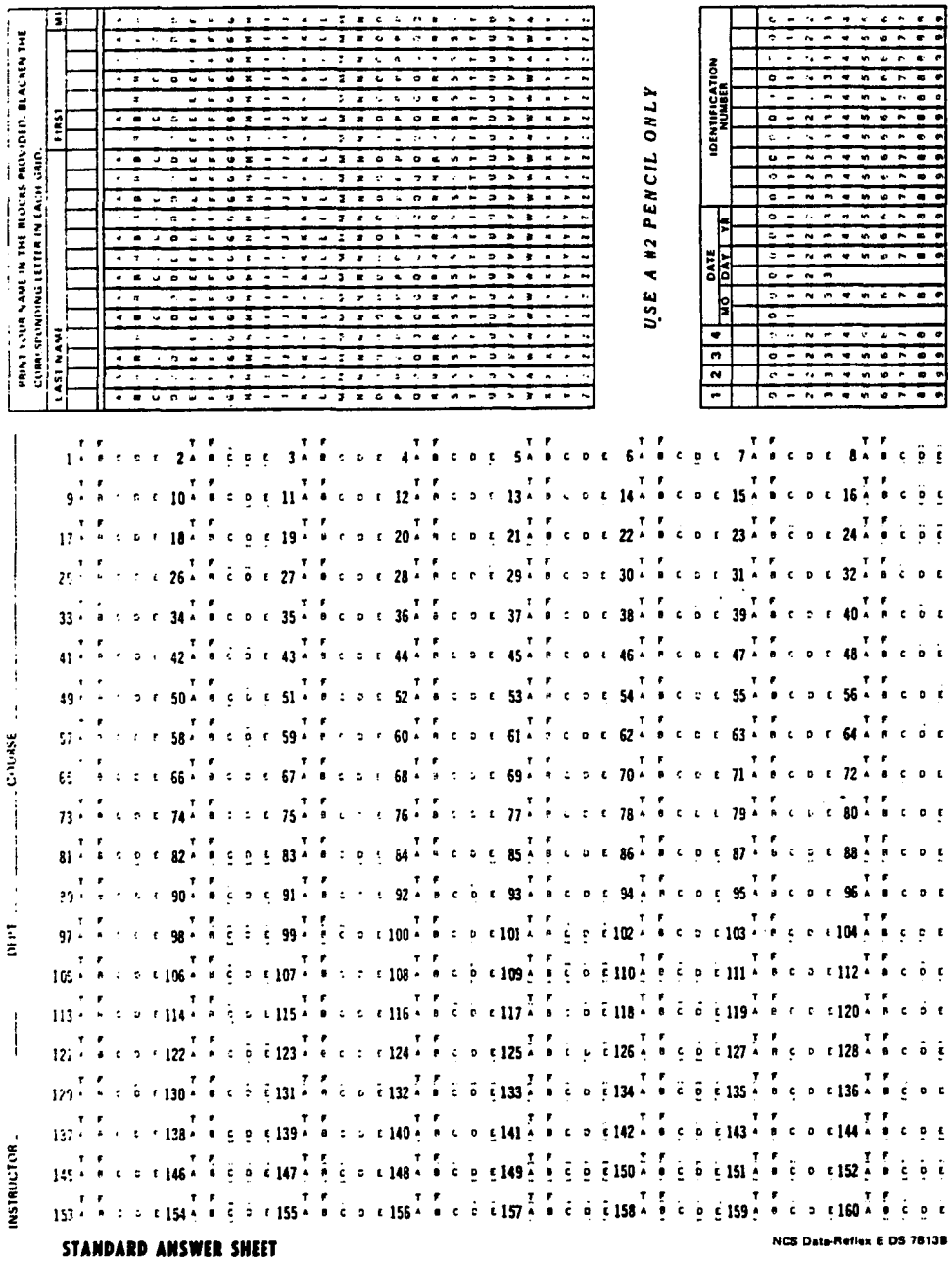
38. The highest grade I completed in school
    A. Less than high school
    B. High school graduate
    C. Some college or technical school
    D. College graduate
    E. Advanced degree

39. My job at this facility is
    A. Developmental Technician
    B. Qualified Mental Retardation Professional
    C. Educational Personnel

40. My age category is
    A. 20-29 years
    B. 30-39 years
    C. 40-49 years
    D. 50-59 years

* denotes correct answer

Standard Answer Sheet



Name_____

Social Security Number

_____

Food Practices Record

Directions: Below is a list of foods/food groups. Please make an "X" in the appropriate column indicating how frequently you eat these foods.

FOOD/FOOD GROUP FREQUENCY OF DIETARY INTAKE

	Never or less than 1x/week	1-4x/wk	5-7x/wk	more than 1x/day
Milk (on cereal or as beverage)	0	1	2	4
Ice cream/ice milk	0	.5	1	2
Yogurt, cheese, cottage cheese	0	1	2	4
Eggs	0	1	2	3
Meat, poultry, fish	0	1	2	3
Beans (lima, pinto, navy, etc.), nuts, seeds, peanut butter	0	.5	1	2
Potatoes-white (baked, french fried, etc.)	0	.25	.5	1
Dark green or yellow/ orange vegetables (greens, spinach, broccoli, carrots, sweet potatoes)	0	.5	1	2
Tossed salads	0	.25	.5	1
Other vegetables/ veg. juice	0	.25	.5	1
Citrus fruit/juice	0	.5	1	2
Other fruit/juice	0	.25	.5	1

Name_____

Social Security Number

_____

Food Practices Record

FOOD/FOOD GROUP	FREQUENCY OF DIETARY INTAKE			
	Never or less than 1x/week	1-4x/wk	5-7x/wk	more than 1x/day
Bread or toast, biscuits, rolls, cornbread, crackers	0	1	2	4
Cereal (hot or cold)	0	.25	.5	1
Potato chips, corn chips, etc.				
Pizza				
Pies, cakes, cookies				
Coffee or tea				
Carbonated beverages (sugar-containing), fruit drinks, koolaid				
Alcoholic beverages				
Vitamin/mineral supplement				

NUTRITION INSERVICE PROGRAMS

Class 1: Wellness and You

Objectives:

1.Describe the relationship between good health practices and longevity.

2 Identify poor health practices.

3.Discuss personal responsibility in promotion of good health practices.

Outline:

I. Wellness- a definition

- A. Role of good health in longevity
- B. Finger test

II. Possible results of poor health practices

- A. Poor diet
- B. Lack of exercise

III. Personal responsibility for health

- A. You
- B. Loved ones

Evaluation:

1. Make a contract with instructor listing at least two way you will promote good health for yourself during the next four weeks.

2. Compare participants responses to class material for accuracy.

3. Return in four weeks after training sessions for a report on progress.

Class 1: Handout

PERSONAL WELLNESS PLAN

I, _____, being of sound mind and possessed of free will, do hereby commit myself to the following goals and activities for the next six weeks. This agreement with myself shall be in effect from _____ (dates) until _____ (dates).

GOALS FOR WELLNESS

1.

2.

3.

4.

5.

PLAN TO ACHIEVE MY GOALS

Goal 1.-

Goal 2.-

Goal 3.-

Goal 4.-

Goal 5.-

Signed _____

Date _____

Class 2 : Keys to Better Health: Part I and Part II

Objectives:

1. Identify key nutrients.

2. Discuss the role of key nutrients in bodily functions.

3. Identify food sources of key nutrients

Outline:

I. Introduction (Have class members write out a 24 hour recall) Part I

II. Nutrient- a definition

- A. Energy nutrients
  - 1. Carbohydrate
  - 2. Protein
  - 3. Fat
- B. Vitamins and minerals Part II
  - 1. B-complex
  - 2. Vitamin A
  - 3. Vitamin D
  - 4. Ascorbic Acid
  - 5. Calcium
  - 6. Iron

III. Functions of nutrients in body

VI. Food sources

Evaluation:

1. Using 24 hour recall identify food from recall that contain key nutrients.

2. Identify nutrients not represented in 24 hour recall.

Class 3 ; Battle of the Holiday Buldge: Part I and Part II

Objectives:

1. Identify causes of overweight.

2. Identify high calorie foods.

3. Discuss popular diets.

4. Identify pitfalls with fad diets.

Outline:

I.Causes of overweight Part I

A. Poor diet

B. Lack of exercise

II. Popular diets

A. Cambridge diet

b. Ketogenic diets

III.Pitfalls of popular diets

VI. Sensible approach to weight control Part II

A. Good diet

B. Exercise

Evaluation:

1. Each participant will be given a high calorie menu and asked to suggest alternate foods or preparation methods to reduce caloric density.

Class 4: Toast to Good Health

Objectives:

1. Identify US Dietary Guidelines.

2. Discuss rational for guidelines.

3. Plan diets using guidelines.

Outline:

I.Introduction (class will write out a 24 hour recall)

II. History of US Dietary Guidelines

III. Identification of guidelines

VI. Application of guidelines in participants food pattern

V. Wellness as it relates to guidelines

Evaluation:

1. Look at 24 hour recall and identify application or lack of application of US Dietary Guidelines.

2. Review wellness contracts and identify areas of sucess.

APPENDIX B
DATA COLLECTION FOR RESIDENTS

Procedures for Anthropometric Measurements for Residents

Height for Ambulatory Residents

Equipment

1. Metal measuring tape affixed to a vertical flat surface.
2. Movable block.

Procedure

1. Residents, without shoes, stand on bare floor with heels together, back as straight as possible; the heels, buttocks, shoulders and head should touch vertical flat surface.
2. Residents line of sight straight ahead.
3. Place movable block on crown of head.
4. Measurement read from tape and record to the nearest one-eighth inch.

Height for Non-Ambulatory Residents

Equipment

1. Metal measuring tape.

Procedure

1. Residents lie as straight as possible on side in bed.
2. Metal tape extended from crown of head to heels.
3. Measurement read from tape and record to the nearest one-eighth inch.

Weight for Ambulatory Residents

Equipment

1. Single beam balance scale calibrated to zero.

Procedure

1. Residents were dressed in light clothing, without shoes.
2. Residents stood on platform of scale.
3. Measurement read from scale and recorded to the nearest one-quarter pound.

Weight for Non-Ambulatory Residents

Equipment

1. Single beam balance scale calibrated to zero with a chair seat instead of standing platform.

Procedure

1. Residents were dressed in light clothing, without shoes.
2. Residents were placed in chair seat.
3. Measurements read from scale and recorded to the nearest one-quarter pound.

Mid-Arm Circumference for all Residents

Equipment

1. Metal measuring tape.
2. Midpoint measuring tape.

Procedure

1. Resident's left arm was bent at the elbow at a 90° angle, palm up.
2. Midpoint measuring tape was adjusted vertically along posterior side of arm until same measurement appears at the acromial process of the scapula and the olecranon process of the elbow.
3. Midpoints were marked with a pen.
4. Resident's left arm was allowed to hang loosely by the side.
5. Metal tape was slipped around arm at the midpoint and tightened snugly.
6. Measurement read and recorded to the nearest one-hundredth of a centimeter.

Triceps Fat Fold Thickness for all Residents

Equipment

1. Lange skinfold calipers.

Procedure

1. Locate midpoint marking used for mid-arm circumference measurement.
2. Resident's left arm was allowed to hang loosely by the side.
3. Grasp a vertical pinch of skin and subcutaneous fat between thumb and forefinger, 1 centimeter above the midpoint mark.

4. The skinfold should be gently pulled away from underlying muscle tissue
5. Large calipers should be placed over the fat fold at the midpoint mark while maintaining grasp of fat fold
6. Read the measurement and record to the nearest one-tenth of a millimeter

[1]Cambridge Scientific Instruments, Box 265, Moose Lodge Road, Cambridge, MD, 21612.

Procedures for Hemoglobin Levels for Residents

Equipment

1. Lancets.
2. Hemosticks.
3. Hemoglobinometer.

Procedure

1. A small amount of blood is drawn from the second finger of the left hand using a lancet.
2. Blood is placed on a slide using a hemostick to prevent clotting.
3. Hemoglobin level is read using a hemoglobinometer and recorded to the nearest one-tenth of a gram.

Nutritional Assessment

Name _____ Date _____
Cottage _____ Nutritional Supplements
Age _____ _____
Functioning level _____ Diet_____
_____

Clinical Diagnoses or Medical Problems of nutritional concern	Medications

Biochemical
Hgb _____

Anthropometric
Height_____
Weight_____ _____ Ambulatory _____ 10%+ overwt.
_____ 20%+ overwt.
Mid Arm Cm. _____ _____ Non-ambulatory _____ 10%+ underwt.
Triceps fat fold
_____

Dietary Factors

Dental Status
____ Good
____ Poor Gums
____ Missing Teeth
____ Edentulous

G.I. Status
____ Constipation
____ Vomiting
____ Diarrhea
____ Allergies

Feeding Skills
____ Chews food
____ Partially chews
____ Swallows food whole
____ Has difficulty swallowing
____ Feeds self fluid
____ Needs help to eat
____ Spoonfed
____ Syringe-fed
____ Tubefed
____ Gastrostomy fed

DIRECTIONS FOR THREE-DAY FOOD RECORD

1. Complete menu items for each meal and snack from the cycle menus prior to meal or snack time.

2. Compare portion size listed on the food record form and the actual portion served. Note any differences on the food record form.

3. Following meals or snacks ,visually estimate plate waste for each menu item as NONE OR TASTED, HALF or ALL OR MOST. Check the appropriate block for each menu item.

4. Ask feeder or if you observed resident being fed, visually estimate the amount spilled. Write in the block labeled AMOUNT SPILLED , NONE, HALF or MOST based on your best estimation.

5. After each meal or snack return the Three Day Food Record form to the designated place.

Three-Day Food Record

REGULAR 4-28-87

Name _____ ID Number _____

Breakfast	Portion	Tasted/ None	Half	Most/ All	Amt. Spilled
Grapefruit juice	4 oz				
Coffeecake	1 piece				
Eggs, scrambled	3 oz				
Loafbread, white (2x for M)	1 slice				
Bacon	1 slice				
Milk low fat	8 oz.				
Lunch					
Barbecue beef	3 oz.				
Whipped potatoes	4 oz.				
Coleslaw	2 oz.				
Loaf bread, whole wheat (2x for M)	1 slice				
Chocolate pudding	2 oz.				
Milk low fat	8 oz.				
Iced tea	8 oz.				
Supper					
Sheppard pie	4 oz.				
Carrots	3 oz.				
Fruit salad	2 oz.				
Roll- Whole wheat (2x for M)	1				
Iced tea	8 oz.				
Milk low fat	8 oz.				

4-29-87

Breakfast					
Stewed prunes	2 oz.				
Buttered grits	4 oz.				
Eggs, fried	3 oz.				
Loafbread, white (2x for M)	1 slice				
Grape jelly	1 tsp.				
Milk low fat	8 oz.				
Coffee	8 oz.				
Lunch					
Meat loaf	3 oz.				
Blackeyed peas	4 oz.				
Turnip greens	3 oz.				
Loafbread, white (2x for M)	1 slice				
Peach whip	3 oz.				
Milk low fat	8 oz.				
Iced tea	8 oz.				
Supper					
Ham	3 oz.				
Whipped potatoes	4 oz.				
English peas	3 oz.				
Loaf bread, whole wheat (2x for M)	1 slice				
Oatmeal cookie	1				
Pear half	1				
Milk low fat	8 oz.				

Three-Day Food Record

REGULAR 4-30-83

Name _____ ID Number _____

Breakfast	Portion	Tasted/ None	Half	Most/ All	Amt. Spilled
Orange juice	4 oz.				
Oatmeal	4 oz.				
Eggs, fried	1				
Toast	1				
Milk low fat	8 oz.				
Coffee	8 oz.				
Lunch					
Roast pork	3 oz.				
Dressing with gravy	2 oz.				
Broccoli	2 oz.				
Peach half	1				
Spice cake	1 piece				
Milk, low fat	8 oz.				
Supper					
Macaroni and cheese	3 oz.				
Pinto beans	4 oz.				
Hot slaw	2 oz.				
WW loaf bread	1 slice				
Apple	1 med.				
Milk, low fat	8 oz.				
Punch	8 oz.				

Snacks and Foods Used for Educational Purposes

Name	Food	Portion	Tasted	Half	All	Amt. Spilled

APPENDIX C
SUPPLEMENTARY ANALYSIS TABLES

Table A

Individual Data for Job Classification, Educational Level, and Age of Staff

Staff	Age Classification[a]	Educational Level[b]	Age[c]	Sex[d]
Experimental				
13002	1	1	4	1
13003	3	3	3	1
13004	3	5	2	1
13005	1	3	1	1
13006	1	2	1	1
13007	1	3	1	1
13008	1	2	3	1
13010	3	2	3	1
13012	1	3	1	1
13013	1	2	2	1
13014	1	2	1	1
13015	3	5	4	1
13016	3	4	1	1
13017	1	2	4	1
13018	1	2	3	1
13019	1	2	4	1
13020	1	2	4	1
13021	1	2	3	1
13022	1	2	1	1
13023	3	4	1	1
13024	1	2	2	1
13026	3	2	4	1
13027	1	2	3	1

Table A (continued)

Staff	Age Classification[a]	Educational Level[b]	Age[c]	Sex[d]
23001	1	3	2	2
23002	1	4	3	2
23003	1	4	2	2
23004	3	1	2	2
23005	3	4	2	2
23006	3	3	3	2
23007	3	4	2	2
23010	1	3	2	2
23011	1	3	1	2
23012	3	5	2	2
23014	3	3	4	2
23016	3	3	2	2
Control				
14001	3	5	2	1
14002	1	2	4	1
14003	2	4	1	1
14004	3	3	4	1
14005	3	5	2	1
14006	1	2	4	1
14007	1	3	2	1
14008	3	3	2	1
14009	1	2	2	1
14010	1	2	2	1
14012	3	3	2	1
14013	1	3	2	1
14014	1	1	4	1
14015	1	3	1	1
14017	3	4	1	1
14018	1	2	2	1
14019	3	5	2	1

Table A (continued)

Staff	Age Classification[a]	Educational Level[b]	Age[c]	Sex[d]
14020	1	2	3	1
14021	1	3	1	1
14022	1	4	2	1
14023	3	2	3	1
14026	3	4	2	1
14027	1	2	2	1
14028	3	4	1	1
14030	1	3	4	1
14031	1	3	4	1
14032	3	3	2	1
14033	1	3	3	1
14034	1	2	2	1
14035	1	2	4	1
14036	1	3	1	1
24002	3	3	2	2
24004	3	3	2	2
24005	1	2	3	2
24008	3	3	2	2

[a]Job classification
Developmental Technician = 1
Qualified Mental Retardation Professional = 2
Educational Personnel = 3

[b]Educational level
Less than high school = 1
High school graduate = 2
Some college or technical school = 3
College graduate = 4
Graduate degree = 5

[c] Age
20-29 = 1
30-39 = 2
40-49 = 3
50-59 = 4

[d] Sex
Female = 1
Male = 2

Table B

Individual Data for Chronological Age, Mental Age, and Sex

Resident	Age (yrs) Chronological	Mental	Sex
Experimental			
13002	19.0	3.0	M
13003	22.0	2.5	M
13004	17.0	3.8	F
13005	18.0	3.0	M
13006	15.0	2.8	F
13007	16.0	2.9	F
13008	15.0	3.1	F
13010	16.0	4.1	M
13011	18.0	2.1	F
13012	18.0	1.5	F
13014	18.0	1.5	F
13016	19.0	3.8	F
13018	25.0	2.9	F
13020	17.0	7.3	F
13021	24.0	1.5	F
13022	19.0	1.5	M
13023	29.0	2.0	F
13025	35.0	4.5	M
13026	26.0	4.9	F
13027	28.0	1.9	M
13029	23.0	2.7	M
13030	23.0	4.0	M
13031	30.0	6.3	M
13032	22.0	10.0	M
13033	25.0	4.7	M
13036	25.0	4.0	F
13037	26.0	2.1	M

Table B (continued)

Resident	Age (yrs) Chronological	Mental	Sex
Experimental			
13038	29.0	4.1	M
13039	26.0	5.4	M
13040	28.0	2.1	F
13041	33.0	7.0	M
13042	22.0	4.9	M
13044	21.0	2.0	F
13045	31.0	3.5	F
13046	27.0	4.0	M
13047	26.0	3.8	M
13048	27.0	3.4	F
13049	27.0	5.5	F
13050	34.0	5.3	M
13051	25.0	3.0	F
Control			
12002	24.0	2.1	M
12003	22.0	2.5	M
12004	20.0	1.5	M
12005	21.0	4.8	M
12006	22.0	3.3	M
12007	28.0	3.5	M
12008	28.0	3.5	M
12008	36.0	2.5	M
12009	20.0	5.8	M
12010	21.0	5.3	M
12012	22.0	5.7	M
12013	29.0	3.9	M
12014	26.0	4.5	M
12015	18.0	2.2	M
12016	28.0	2.2	M

Table B (continued)

Resident	Age (yrs) Chronological	Mental	Sex
Control			
12017	20.0	5.5	M
12018	28.0	6.1	F
12019	25.0	0.9	M
12020	29.0	6.0	F
12021	33.0	2.0	F
12022	32.0	6.8	F
12023	21.0	3.4	M
12024	23.0	6.5	F
12027	30.0	4.0	M
12029	29.0	5.8	M
12030	23.0	4.9	F
12031	28.0	14.8	M
12032	23.0	9.3	M
12034	24.0	5.7	M
12036	29.0	6.5	M
12038	27.0	8.2	M
12039	28.0	2.5	F
12040	30.0	9.4	M
12041	20.0	2.4	M
12042	29.0	10.0	M
12043	26.0	6.4	F
12044	35.0	3.8	F
12045	26.0	1.9	F
12046	30.0	3.7	M
12047	18.0	7.3	F
12050	29.0	4.1	F

Table C

Individual Data for Height, Weight, Mid-Arm Circumference and Triceps Fat Fold

Resident	Height (inches)	Weight (pounds)	Mid-Arm Circumference (cm)	Triceps Fat Fold (mm)
Experimental				
13002	64.5	116.0	25.0	11.0
13003	58.0	114.0	26.8	13.0
13004	63.0	133.8	27.6	16.0
13005	61.0	115.0	26.4	15.0
13006	59.5	109.0	23.0	15.0
13007	63.5	124.5	28.8	19.0
13008	63.5	91.0	23.0	12.0
13010	64.0	115.0	26.8	14.0
13011	61.0	124.5	26.3	17.0
13012	63.5	114.2	23.5	14.0
13014	62.7	118.5	24.0	10.0
13016	61.7	142.0	26.8	14.6
13018	58.5	115.5	31.5	2.0
13020	62.0	115.2	24.8	19.0
13021	58.5	93.2	21.5	10.0
13022	60.5	89.0	21.6	6.0
13023	65.0	164.0	28.0	20.0
13025	72.0	120.0	24.0	5.0
13026	57.0	87.0	20.7	8.0
13027	68.0	144.0	28.0	10.0
13029	67.0	132.0	24.0	15.0
13030	62.5	138.5	29.85	13.0
13031	69.5	184.0	29.0	24.0
13032	67.0	145.0	26.5	5.0
13033	71.0	170.0	26.0	10.5
13036	63.0	118.0	23.0	10.0
13037	64.0	150.0	32.6	18.0

Table C(continued)

Resident	Height (inches)	Weight (pounds)	Mid-Arm Circumference (cm)	Triceps Fat Fold. (mm)
Experimental				
13038	68.0	180.0	30.0	13.0
13039	63.0	133.0	27.0	6.0
13040	65.0	117.0	24.7	12.0
13041	71.0	151.0	26.5	7.0
13042	62.0	141.0	25.5	15.0
13044	68.0	142.0	29.25	8.5
13045	69.0	138.0	26.5	22.0
13046	71.0	123.0	25.5	5.0
13047	70.0	163.0	30.0	16.0
13048	69.0	146.0	25.0	22.0
13049	65.0	129.0	28.0	4.0
13050	67.0	125.5	26.0	5.0
13051	62.0	138.0	26.5	22.0
Control				
12002	68.0	145.0	33.0	6.0
12003	67.5	163.0	28.0	12.0
12004	68.5	148.0	26.9	18.0
12005	67.0	107.5	24.8	9.0
12006	65.0	148.0	30.6	19.0
12007	62.0	119.0	25.1	8.0
12008	65.0	102.2	22.3	5.0
12009	71.0	127.0	22.5	5.0
12010	58.0	153.0	30.4	10.0
12012	64.0	142.5	31.7	5.0
12013	66.0	100.0	24.6	4.0
12014	60.0	103.5	23.4	5.0
12015	70.0	127.0	28.0	4.5
12016	71.0	112.0	28.4	9.0

Table C(continued)

Resident	Height (inches)	Weight (pounds)	Mid-Arm Circumference (cm)	Triceps Fat Fold (mm)
Control				
12017	63.0	98.0	21.9	8.0
12018	62.0	91.0	22.5	7.0
12019	69.0	117.0	26.6	9.0
12020	62.0	123.0	28.7	9.0
12021	53.0	112.0	27.7	15.0
12022	64.0	190.0	33.3	29.0
12023	70.0	116.0	23.7	4.0
12024	59.0	110.0	28.3	25.0
12027	68.5	136.0	27.8	9.0
12029	71.0	144.0	29.1	11.0
12030	57.0	112.0	27.1	17.0
12031	67.5	118.0	29.6	7.5
12032	66.7	132.0	26.0	10.5
12034	70.5	170.0	31.7	14.0
12036	72.0	145.0	29.1	7.5
12038	68.0	121.0	24.0	5.0
12039	64.0	115.0	24.6	14.0
12040	69.0	173.0	28.9	15.0
12041	64.0	114.0	25.0	5.0
12042	63.0	140.0	31.35	5.5
12043	64.0	124.0	22.3	13.0
12044	61.5	126.0	29.1	21.0
12045	58.5	129.0	26.5	20.0
12046	67.0	115.0	23.2	3.0
12047	63.0	130.0	29.4	19.0
12050	68.0	133.0	27.0	25.0

Table D

Individual Data for Hemoglobin

and Iron Intake

Resident	Hemoglobin gm/dl	Iron ($\bar{x}$ % of RDA)
Experimental		
13002	16.0	76.33
13003	17.7	100.00
13004	15.4	68.80
13005	14.2	100.00
13006	13.6	53.23
13007	12.0	58.97
13008	14.0	70.40
13010	16.8	80.87
13011	12.8	67.17
13012	14.2	64.67
13014	13.2	78.63
13016	13.8	61.10
13018	14.4	100.00
13020	14.4	51.26
13021	13.5	74.83
13022	15.2	81.67
13023	14.4	74.30
13025	15.0	100.00
13026	12.4	39.40
13027	15.1	100.00
13029	17.3	100.00
13030	13.6	100.00
13031	15.4	100.00
13032	16.0	100.00
13033	15.0	100.00
13036	13.2	100.00
13037	18.2	100.00

Table D(continued)

Resident	Hemoglobin gm/dl	Iron ($\bar{x}$ % of RDA)
Experimental		
13038	13.4	100.00
13039	15.6	100.00
13040	15.4	62.70
13041	17.0	100.00
13042	14.6	48.87
13044	14.8	100.00
13045	13.2	72.47
13046	16.6	100.00
13047	14.8	100.00
13048	13.8	68.53
13049	12.0	55.60
13050	16.0	100.00
13051	13.6	58.23
Group means	14.67	80.58
Control		
12002	15.4	100.00
12003	16.0	100.00
12004	15.1	100.00
12005	14.6	100.00
12006	16.0	100.00
12007	14.2	100.00
12008	16.8	100.00
12009	13.8	100.00
12010	15.2	100.00
12012	16.8	75.83
12013	15.0	100.00
12014	14.2	100.00

Table D (continued)

Resident	Hemoglobin gm/dl	Iron ($\bar{x}$ % of RDA)
Control		
12015	15.2	100.00
12016	13.7	100.00
12017	15.0	100.00
12018	12.0	58.00
12019	16.4	68.53
12020	14.0	100.00
12021	12.0	98.73
12022	15.0	59.24
12023	15.4	100.00
12024	15.0	63.40
12027	15.0	100.00
12029	17.0	49.37
12030	14.0	38.67
12031	16.5	95.70
12032	14.6	100.00
12034	15.3	100.00
12036	15.5	100.00
12038	15.8	100.00
12039	13.0	52.00
12040	14.6	100.00
12041	14.8	100.00
12042	16.0	100.00
12043	13.2	78.17
12044	15.2	85.73
12045	15.5	90.50
12046	15.0	100.00
12047	15.0	100.00
12050	13.4	82.70
Group means	14.86	89.91

Table E

Medical Influences on Dietary Intake

Influences	Frequency		Control	
	Experimental	Control	Experimental	Control
Athetoid	0	4	0	10.0
Chokes	1	0	2.5	0.0
Cleft palate	1	0	2.5	0.0
Degeneration of CNS or muscles	1	2	2.5	5.0
Dental or oral deformities	18	22	45.0	55.0
Diabetes mellitus	1	1	2.5	2.5
Drooling	2	2	5.0	5.0
Elevated blood pressure	1	3	2.5	7.5
Epilepsy	2	0	5.0	0.0
Hearing deficiency	3	7	7.5	17.5
Heart disease	3	0	7.5	0.0
History of anemia	2	1	5.0	2.5
Hyperactive	5	5	12.5	12.5
Infections	5	6	12.5	15.0
Kidney disease	1	3	2.5	7.5
Mouth breather	9	5	22.5	12.5
Pica	1	2	2.5	5.0

Table E (continued)

Influences	Frequency		Control	
	Experimental	Control	Experimental	Control
Poor head and neck control	2	2	5.0	5.0
Seizures	16	14	40.0	35.0
Spastic	2	14	5.0	35.0
Speech deficiency	2	8	5.0	20.0
Tongue thrust	1	0	2.5	0.0
Visual deficiency	9	12	22.5	30.0

Table E

Psychological Influences on Dietary Intake

Influences	Frequency		Percent	
	Experimental	Control	Experimental	Control
Aggressive	13	10	32.5	25.0
Autistic behaviors	10	6	25.0	15.0
Behavior problems	25	23	62.5	57.5
Bizarre behavior	1	2	2.5	5.0
Destructive	4	1	10.0	2.5
Excessive socialization	2	0	5.0	0.0
Schizophrenia	1	1	2.5	2.5
Self abuse	5	8	12.5	20.0
Steals foods	2	0	5.0	0.0

Table F

Diagnoses of Residents

Diagnosis	Frequency	Percent
Experimental		
Cerebral palsy	3	7.5
Down's syndrome	2	5.0
Fetal alcohol syndrome	2	5.0
Mental retardation - accident	0	0.0
Mental retardation - genetic	1	2.5
Mental retardation - premature	1	2.5
Mental retardation - prenatal origin	3	7.5
Mental retardation - unknown origin	24	60.0
Postnatal infection	3	7.5
Control		
Cerebral palsy	3	7.5
Down's syndrome	1	2.5
Fetal alcohol syndrome	0	0.0
Mental retardation - accident	0	0.0
Mental retardation - genetic	0	0.0
Mental retardation - premature	5	12.5
Mental retardation - prenatal origin	4	10.0
Mental retardation - unknown origin	20	50.0
Postnatal infection	4	10.0

Table G

Individual Data for Nutrition Knowledge Scores and Food Practice Scores for Staff

Staff	Nutrition Knowledge [a] Pre	Post	Food Practices [b] Pre	Post
Experimental				
13002	29	27	9.75	10.25
13003	33	31	16.00	14.25
13004	31	29	14.00	11.50
13005	31	30	8.00	9.25
13006	27	24	5.00	5.00
13007	27	28	8.25	9.75
13008	33	28	10.25	12.50
13010	22	28	7.00	8.75
13012	28	30	12.25	8.50
13013	19	20	10.50	8.50
13014	28	30	12.25	9.25
13015	3	16	16.00	16.00
13016	27	34	9.25	8.25
13017	28	26	14.50	11.00
13018	22	26	8.25	8.25
13019	24	29	14.00	12.75
13020	32	27	9.00	6.25
13021	20	32	6.75	7.25
13022	24	29	3.50	3.00
13023	29	27	6.50	11.75
13024	24	31	12.00	13.00
13026	31	31	13.25	10.00
13027	32	31	7.75	6.00
23001	29	31	11.50	11.25

Table G (continued)

Staff	Nutrition Knowledge[a] Pre	Post	Food Practices[b] Pre	Post
23002	21	24	8.25	8.75
23003	25	32	9.50	9.00
23004	19	28	10.00	11.25
23005	33	36	12.75	16.00
23006	26	29	7.50	4.50
23007	32	31	10.25	12.75
23010	25	31	9.50	15.75
23011	20	22	6.00	5.25
23012	22	26	16.00	15.75
23014	23	29	12.00	11.75
23016	22	30	12.25	14.75
Control				
14001	29	29	10.25	13.25
14002	29	29	10.00	7.75
14003	27	26	8.75	8.25
14004	33	33	16.00	14.75
14005	26	24	7.25	9.50
14006	21	21	10.25	10.25
14007	26	26	12.00	6.50
14008	25	28	15.50	16.00
14009	24	22	15.25	16.00
14010	29	32	8.00	13.00
14012	28	29	14.00	12.25
14013	30	32	8.75	5.25
14014	15	15	14.00	16.00
14015	29	33	11.75	9.25
14017	30	29	2.75	7.75
14018	21	23	10.50	8.75
14019	30	30	9.50	5.00

Table G (continued)

Staff	Nutrition Knowledge [a] Pre	Post	Food Practices [b] Pre	Post
14020	30	32	7.75	7.25
14021	26	25	7.50	4.50
14022	29	29	12.25	11.75
14023	27	31	11.50	16.00
14026	32	30	12.25	14.25
14027	25	29	8.75	8.75
14028	30	30	16.00	16.00
14030	26	20	12.75	10.75
14031	32	36	13.00	9.75
14032	32	32	16.00	15.50
14033	27	27	11.50	9.00
14034	29	32	14.75	13.00
14035	27	25	13.50	7.50
14036	30	30	8.50	8.00
24002	34	33	10.25	16.00
24004	29	30	14.75	14.25
24005	24	23	15.25	14.00
24008	22	22	8.75	7.00

a. maximum raw score = 37

b. minimum raw score = 16

Table H

Individual Data for Nutrient Intakes of Residents

Residents	Calories $\bar{x}$ % RDA		Protein $\bar{x}$ % RDA		Calcium $\bar{x}$ % RDA		Iron $\bar{x}$ % RDA		Vitamin A $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Experimental										
13002	86.00	94.33	100.00	100.00	100.00	100.00	76.33	100.00	100.00	100.00
13003	54.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13004	91.33	100.00	100.00	100.00	100.00	100.00	68.80	91.60	100.00	100.00
13005	69.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13006	80.67	69.00	100.00	100.00	95.00	87.33	52.23	41.47	100.00	100.00
13007	83.67	100.00	100.00	100.00	100.00	92.00	58.97	100.00	100.00	100.00
13008	90.67	100.00	100.00	100.00	87.00	81.67	70.40	69.90	100.00	100.00
13010	100.00	100.00	100.00	100.00	100.00	100.00	80.87	100.00	100.00	100.00
13011	100.00	100.00	100.00	100.00	81.67	59.33	67.17	88.87	100.00	100.00
13012	89.67	100.00	100.00	100.00	100.00	100.00	64.67	66.30	94.00	100.00
13014	100.00	100.00	100.00	100.00	100.00	100.00	78.63	88.47	100.00	100.00
13016	80.33	100.00	100.00	100.00	100.00	100.00	61.10	100.00	100.00	100.00
13018	100.00	100.00	100.00	100.00	100.00	100.00	100.00	85.90	100.00	100.00
13020	71.33	100.00	100.00	100.00	76.33	79.33	51.26	78.17	100.00	100.00
13021	100.00	100.00	100.00	100.00	100.00	100.00	74.83	88.07	100.00	100.00
13022	74.33	82.67	100.00	100.00	100.00	100.00	81.67	100.00	100.00	100.00

Table H(continued)

Residents	Calories $\bar{x}$ % RDA		Protein $\bar{x}$ % RDA		Calcium $\bar{x}$ % RDA		Iron $\bar{x}$ % RDA		Vitamin A $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13023	87.00	100.00	100.00	100.00	100.00	100.00	74.30	90.77	100.00	100.00
13025	62.33	40.00	100.00	94.33	100.00	100.00	100.00	73.90	100.00	100.00
13026	56.33	58.00	100.00	100.00	100.00	82.67	39.40	43.60	100.00	33.67
13027	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13029	65.33	73.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13030	48.67	74.33	100.00	100.00	68.00	100.00	100.00	100.00	100.00	100.00
13031	63.67	85.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13032	66.00	97.67	100.00	100.00	100.00	64.67	100.00	100.00	100.00	100.00
13033	61.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13036	71.67	88.67	100.00	100.00	100.00	100.00	56.30	69.70	100.00	100.00
13037	72.66	72.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13038	68.66	91.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13039	65.33	81.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13040	85.00	99.33	100.00	100.00	100.00	100.00	62.70	72.80	100.00	64.00
13041	77.00	69.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13042	61.33	100.00	100.00	100.00	100.00	100.00	48.87	100.00	100.00	100.00
13044	73.00	77.66	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13045	90.33	79.00	100.00	100.00	100.00	100.00	72.47	63.93	100.00	100.00
13046	70.67	83.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table H (continued)

Residents	Calories $\bar{x}$ % RDA		Protein $\bar{x}$ % RDA		Calcium $\bar{x}$ % RDA		Iron $\bar{x}$ % RDA		Vitamin A $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13047	49.67	87.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13048	81.67	90.33	100.00	100.00	100.00	100.00	68.53	69.87	100.00	91.33
13049	55.67	67.66	100.00	100.00	79.67	78.00	55.60	75.00	100.00	100.00
13050	48.33	34.00	100.00	89.03	100.00	100.00	100.00	68.00	52.33	21.67
13051	70.00	100.00	100.00	100.00	100.00	100.00	58.23	92.43	100.00	100.00
Control										
12002	84.66	93.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12003	65.67	71.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12004	63.33	58.00	100.00	100.00	100.00	100.00	100.00	96.50	100.00	100.00
12005	54.00	65.66	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12006	73.67	43.00	100.00	98.50	100.00	100.00	100.00	100.00	100.00	100.00
12007	85.33	74.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12008	56.00	57.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12009	71.00	66.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12010	69.33	88.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12012	41.00	39.66	98.50	100.00	95.33	100.00	75.83	94.47	87.66	75.33
12013	67.00	76.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12014	64.00	74.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table H (continued)

Resident	Calories $\bar{x}$ % RDA		Protein $\bar{x}$ % RDA		Calcium $\bar{x}$ % RDA		Iron $\bar{x}$ % RDA		Vitamin A $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
12015	79.67	75.33	100.00	100.00	100.00	100.00	100.00	84.33	100.00	100.00
12016	72.67	69.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12017	63.00	57.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12018	70.00	100.00	100.00	100.00	100.00	100.00	58.00	100.00	100.00	36.67
12019	78.67	87.00	100.00	100.00	100.00	100.00	68.53	59.00	100.00	71.33
12020	99.67	79.00	100.00	100.00	100.00	100.00	100.00	64.40	100.00	35.00
12021	95.00	67.00	100.00	100.00	100.00	100.00	98.73	57.30	100.00	56.33
12022	75.33	100.00	100.00	100.00	100.00	100.00	59.24	73.77	100.00	32.33
12023	58.33	77.33	100.00	100.00	100.00	100.00	100.00	100.00	96.00	52.67
12024	96.00	100.00	100.00	100.00	100.00	100.00	63.40	89.70	100.00	100.00
12027	74.00	85.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12029	72.33	83.33	100.00	100.00	100.00	100.00	49.37	100.00	100.00	100.00
12030	70.00	86.67	100.00	100.00	81.33	100.00	38.67	67.17	100.00	39.00
12031	45.33	85.33	100.00	100.00	81.00	100.00	95.70	100.00	100.00	100.00
12032	78.00	58.67	100.00	100.00	100.00	47.00	100.00	100.00	100.00	98.00
12034	81.00	84.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12036	73.67	86.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	96.00

Table H (continued

Resident	Calories $\bar{x}$ % RDA		Protein $\bar{x}$ % RDA		Calcium $\bar{x}$ % RDA		Iron $\bar{x}$ % RDA		Vitamin A $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
12038	57.00	82.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12039	83.66	84.07	100.00	100.00	100.00	100.00	52.00	49.37	100.00	100.00
12040	74.67	82.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	93.67
12041	69.67	74.66	100.00	100.00	100.00	100.00	100.00	100.00	100.00	88.33
12042	78.67	86.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	56.00
12043	100.00	100.00	100.00	100.00	100.00	100.00	78.17	91.00	100.00	100.00
12044	100.00	100.00	100.00	100.00	100.00	100.00	85.73	67.00	100.00	100.00
12045	100.00	78.67	100.00	100.00	100.00	100.00	90.50	100.00	100.00	100.00
12046	79.67	91.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12047	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12050	100.00	100.00	100.00	100.00	100.00	100.00	82.70	95.37	100.00	52.00

Table H

Individual Data for Nutrient Intakes of Residents

Residents	Thiamin $\bar{x}$ % RDA		Riboflavin $\bar{x}$ % RDA		Niacin $\bar{x}$ % RDA		Ascorbic Acid $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Experimental								
13002	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13003	90.97	100.00	100.00	100.00	69.31	95.02	100.00	100.00
13004	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13005	100.00	100.00	100.00	100.00	85.38	100.00	100.00	100.00
13006	100.00	100.00	100.00	100.00	74.30	71.03	100.00	88.67
13007	100.00	100.00	100.00	100.00	85.56	100.00	100.00	100.00
13008	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13010	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13011	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13012	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13014	72.92	100.00	93.47	100.00	100.00	100.00	100.00	100.00
13016	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13018	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13020	100.00	100.00	100.00	100.00	78.17	100.00	100.00	100.00
13021	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13022	100.00	100.00	100.00	100.00	70.79	100.00	85.00	100.00

Table H (continued)

Resident	Thiamin $\bar{x}$ % RDA		Riboflavin $\bar{x}$ % RDA		Niacin $\bar{x}$ % RDA		Ascorbic Acid $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13023	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13025	100.00	69.18	100.00	97.26	70.40	43.62	100.00	100.00
13026	85.53	100.00	100.00	100.00	62.47	71.01	100.00	85.67
13027	100.00	100.00	100.00	100.00	88.78	100.00	100.00	100.00
13029	100.00	100.00	100.00	100.00	87.84	100.00	100.00	100.00
13030	72.89	100.00	72.56	100.00	61.51	100.00	100.00	100.00
13031	100.00	100.00	100.00	100.00	84.11	100.00	100.00	100.00
13032	100.00	100.00	100.00	100.00	75.34	100.00	100.00	66.00
13033	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13036	100.00	100.00	100.00	100.00	58.16	100.00	100.00	100.00
13037	100.00	100.00	100.00	100.00	91.84	100.00	100.00	100.00
13038	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13039	100.00	100.00	100.00	100.00	88.39	100.00	100.00	100.00
13040	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13041	100.00	100.00	100.00	100.00	100.00	90.80	100.00	95.67
13042	96.05	100.00	100.00	100.00	77.01	100.00	100.00	100.00
13044	100.00	100.00	100.00	100.00	93.24	100.00	100.00	100.00
13045	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13046	100.00	100.00	100.00	100.00	84.54	100.00	100.00	100.00

Table H (continued)

Resident	Thiamin $\bar{x}$ % RDA		Riboflavin $\bar{x}$ % RDA		Niacin $\bar{x}$ % RDA		Ascorbic Acid $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
13047	100.00	100.00	100.00	100.00	76.50	100.00	100.00	100.00
13048	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13049	83.38	100.00	100.00	100.00	100.00	100.00	100.00	100.00
13050	73.13	63.40	100.00	82.40	68.12	36.69	83.00	47.00
13051	100.00	100.00	100.00	100.00	87.17	100.00	100.00	100.00
Control								
12002	100.00	100.00	100.00	100.00	81.85	91.54	100.00	100.00
12003	100.00	100.00	100.00	100.00	81.25	77.21	100.00	100.00
12004	77.26	79.31	100.00	100.00	77.20	45.82	100.00	100.00
12005	100.00	82.03	100.00	100.00	81.99	59.69	55.00	99.00
12006	100.00	77.55	100.00	86.57	97.71	56.49	100.00	100.00
12007	100.00	100.00	100.00	100.00	100.00	56.05	100.00	100.00
12008	95.73	86.91	100.00	100.00	62.01	55.45	100.00	100.00
12009	100.00	100.00	98.36	100.00	83.47	69.78	100.00	100.00
12010	100.00	100.00	100.00	100.00	92.45	96.97	100.00	100.00
12012	62.53	67.27	74.60	85.14	53.24	61.83	100.00	100.00
12013	93.09	100.00	100.00	100.00	69.25	79.13	100.00	100.00
12014	100.00	100.00	100.00	100.00	75.63	74.33	100.00	100.00

Table H (continued)

Resident	Thiamin $\bar{x}$ % RDA		Riboflavin $\bar{x}$ % RDA		Niacin $\bar{x}$ % RDA		Ascorbic Acid $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
12015	100.00	100.00	100.00	100.00	99.25	90.05	100.00	100.00
12016	100.00	100.00	100.00	100.00	83.49	80.11	100.00	100.00
12017	100.00	74.16	100.00	92.31	77.20	54.41	100.00	100.00
12018	100.00	77.00	100.00	100.00	93.84	67.10	100.00	100.00
12019	100.00	100.00	100.00	100.00	91.61	100.00	100.00	100.00
12020	100.00	100.00	100.00	100.00	100.00	94.66	100.00	92.00
12021	100.00	100.00	100.00	100.00	100.00	93.88	100.00	95.00
12022	100.00	100.00	100.00	100.00	95.82	100.00	100.00	100.00
12023	90.42	100.00	100.00	100.00	69.41	96.00	100.00	100.00
12024	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12027	100.00	100.00	100.00	100.00	88.11	100.00	100.00	100.00
12029	100.00	100.00	100.00	100.00	85.36	100.00	100.00	100.00
12030	55.76	100.00	100.00	100.00	54.90	100.00	97.38	73.00
12031	76.51	100.00	87.44	100.00	63.27	100.00	100.00	100.00
12032	100.00	95.45	100.00	70.64	98.00	92.29	100.00	24.67
12034	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12036	100.00	100.00	100.00	100.00	86.05	100.00	100.00	100.00

Table H (continued)

Resident	Thiamin $\bar{x}$ % RDA		Riboflavin $\bar{x}$ % RDA		Niacin $\bar{x}$ % RDA		Ascorbic Acid $\bar{x}$ % RDA	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
12038	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12039	100.00	100.00	100.00	100.00	89.04	85.36	100.00	100.00
12040	100.00	100.00	100.00	100.00	93.00	100.00	100.00	100.00
12041	100.00	100.00	100.00	100.00	94.24	100.00	100.00	100.00
12042	100.00	100.00	100.00	100.00	100.00	87.56	100.00	100.00
12043	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12044	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12045	100.00	100.00	100.00	100.00	100.00	93.37	100.00	100.00
12046	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12047	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
12050	100.00	100.00	100.00	100.00	100.00	100.00	100.00	89.33