THE EFFECT OF A NUTRITION EDUCATION TOOL ON THE NUTRITION KNOWLEDGE AND DIETARY INTAKES OF A GROUP OF STUDENT ARMY AVIATORS

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(a) The need to know more about the ways in which people

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by

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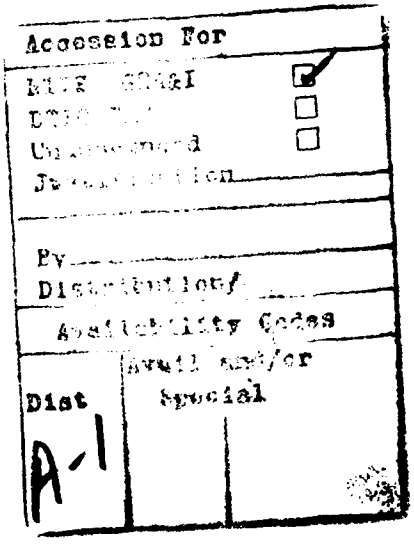

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INTRODUCTION

On May 6, 1969 President Richard M. Nixon, speaking to the Congress, stated:

> People must be educated in the choosing of proper foods. All persons, poor and non-poor alike, must be reminded that a proper diet is a basic determinant of good health.

Later that year President Nixon told the White House Conference on Food, Nutrition and Health that ". . . a great many Americans are not eating well enough to sustain life (28,45)." These statements emanating from the President of the United States, emphasizing nutrition education, gave birth to the national nutrition policy.

The ultimate goal of nutrition education is to promote optimum health. In 1969, the White House Conference on Food, Nutrition and Health set forth certain objectives designed to provide each American with the information necessary to make wise decisions in good selection (67,75,76,77,78,86,87). The Conference noted that nutrition has economic, social and political connotations which extend beyond the knowledge and understanding of the public. This assertion is consistent with statements by other experts on nutrition that educators in the 1970's have the duty and responsibility to inform the nation's citizens about nutrition (27).

It is a fundamental truth that nutrition education is a universal need. Todhunter (73) stated that no instinct exists to guide man in the proper selection of foods. Youmans (90) emphasized the need for

nutrition education as a fundamental and necessary part of all life, bearing on every aspect of human existence from the most basic need of the individual to the numerous aspects of our society. Nutrition education must be a continuing process throughout the life cycle as new research brings additional knowledge (2,37,78,80).

Nutrition education for the general public has been defined as the process by which beliefs, attitudes and understandings about food lead to habits that are nutritionally sound, practical, and consistent with individual needs and available food resources (2,69,73,89). It is the individual need for nutrition education that must be underscored, because the body of facts which makes up the science of nutrition is an evolving one. There is a requirement that each new generation be taught to use an existing food supply intelligently (85).

Nutrition experts have stated that only through various types of nutrition education programs can we hope to improve human health. The development of such programs must be thoroughly researched and then effectively adapted according to such demographic factors as age, socio-economic and cultural backgrounds (75,85).

An aggressive approach is essential if this nation is to materially strengthen the various programs of nutrition education. There is sufficient knowledge on which to conduct such programs, but, historically, application of that knowledge has been inadequate (6,51).

The purpose of this study was to develop a nutrition education tool which could be used as one possible means of upgrading food habits

and knowledge of nutrition. More specifically this study involved:

(a) Evaluation of a nutrition education tool administered in a classroom setting to a group of student army aviators.

(b) Determination of the present nutrition knowledge and perceptions of nutrition of a group of student army aviators.

(c) Assessment of the nutrition knowledge and perceptions of the group after the experimental group had been exposed to the nutrition education tool.

(d) Evaluation of the dietary intakes of the group prior to and following exposure of the experimental group to the educational tool.

(e) Determination of eating habits and nutritional beliefs of this group of student army aviators.

REVIEW OF LITERATURE

Those who are versed in the science of nutrition have established nutrition education as a universal need regardless of income, geographic location, cultural, social or economic patterns, or level of education. Todhunter (73) has asserted that no instinct exists to guide man in the selection of foods which meet the nutritional needs of the body. Nutrition knowledge, she emphasized, is not inherited. Each new generation must be taught what foods to choose, and why and how food affects health and well-being. Population growth and the health of our economy have influenced the patterns of food consumption (29).

Unfortunately, the word 'nutrition' has little or no meaning to the vast majority of the population (6). The lack of nutrition knowledge is believed by some investigators to be the major contributor to the hunger and malnutrition in both affluent and developing countries of the world. Furthermore, nutrition methodology has had but meager effect upon dietary habits and nutritional status (85).

What is the solution to the lack of nutrition education? Todhunter (73) isolated four requirements as prerequisites to a solution:

(a) The need to discover how to make the public aware of the importance of nutrition.

(b) The need to develop the desire to apply nutrition knowledge.

(c) The need to know more about the ways in which people absorb the kind of teaching that leads to action and what is necessary to motivate people.

(d) The need to discover how and what to communicate about nutrition and what specific factors are conducive to building desirable food habits and to modifying poorer ones.

More simply, nutrition education is dependent on communication, whether by word, deed or example and on the facts and ideas that are sent through the communication process (43).

Nutrition education research

Research projects in nutrition education must include adequate controls, methods for evaluating each step, and procedure and methods for evaluating both the immediate and long-term effects of the program (38,73). In Langworthy's "Laws of Nutrition", published in the Experiment Station Record in 1898, the following basic concepts of human nutrition were postulated:

(a) A certain amount of food material, that is protein, fat and carbohydrate, is required for maintenance. Mineral matter is also essential, but very little is known regarding the kind and amount necessary.

(b) A more abundant ration is required for muscular work, fattening and milk production.

(c) Food supplied in excess of all needs is stored, in part at least, as reserve material, principally as fat and glycogen.

(d) Body fat may be formed from food fat or from carbohydrate, and doubtless from protein also.

(e) As furnishers of energy, the different nutrients may replace each other in approximately the following ratios: protein:fat:carbohydrate, 1:2.5:1.

(f) The nutrients of the food combine within the body with oxygen of the air and undergo combustion, thus liberating energy for the body.

(g) All nitrogen (the hallmark of protein) is supplied by food and none is excreted as gaseous nitrogen in respiration.

(h) An animal adjusts itself to its nitrogen intake and comes into nitrogen equilibrium at different levels of protein intake.

Although subsequent research has expanded and extended these concepts, they have never been contradicted (43,44).

The need for nutrition education

Nutrition is a new science, and its educational aspect is one of its most recently developed areas. The best methods of teaching others, however, have not yet been established. The need exists to develop more complete programs which will include a determination of nutritional needs, a resolution of the conditions which may be improved and the development of an educational program which will aid in solving the problems. Such a program must be planned for a particular demographic situation so that an evaluation of "what will work" for that group can be made (3,17). Particular emphasis should be given to the social and psychological aspects of food consumption and nutrition (26).

Sinacore and Harrison (65) quoted the goal developed by Nolte that nutrition education should be directed toward the individual and his behavior. This goal must focus upon the individual, the family, the community, and how they think, feel and act in relation to nutrition. It cannot be a program based on physiology alone. Such a program would provide an incomplete picture.

Use of mass media in nutrition education

A massive cooperative program utilizing the most sophisticated techniques of communications to motivate people to adopt good eating

habits and to eradicate ignorance and misinformation about nutrition is urgently needed. Joint efforts of both private and public sectors to mount a nutrition education program could greatly improve the eating patterns of vast numbers of persons over the next five years. Television is indicated as the most important medium in terms of shaping attitudes and motivating people to action (62). Medved (54) found that the use of television for teaching nutrition was an effective tool. This being the case, it logically follows that various tools to convey nutrition education must be explored (89). If the food industry allocated a fraction of their advertising budget to nutrition education, they would play a major role in improving the nutritional knowledge of the population and in motivating people to better eating patterns (62).

Perhaps if nutrition educators could effectively use a combination of mass media propaganda and psychological principles of learning, the ultimate goal of nutrition education might be achieved (58). More nutrition education could be disseminated through commercial advertising in the nation's mass media (48). Simple education, however, is not enough, because food practices do not change just because people have accurate, meaningful facts (18). Nutrition educators must sell good nutrition with as much sophistication as the fun-food manufacturers now sell malnutrition (24). Manoff (47) has made extensive use of mass media to communicate nutrition information.

Nutrition education in public health programs

The establishment of some means of conveying sound nutrition education as an integral part of public health programs is necessary (7). Nutrition education is considered a multi-disciplinary process that

involves the transfer of information, the development of motivation and the modification of food habits where needed (46). The task of providing such education is of paramount importance, and it cannot be accomplished by a single discipline. It must be done through teamwork (72).

Several national programs have been implemented to disseminate nutrition information to various income groups. One such program is the Expanded Food and Nutrition Education Program (EFNEP). Its prime concept is a people-to-people relationship (13,39).

Dwyer and Stare (15) reported on the importance of incorporating nutrition education into the curricula of schools of public health. Such a program would better qualify the professional in public health to convey sound nutrition information to the public.

Evaluation of nutrition education problems

Huenemann (32) stated five basic concepts to delineate nutrition problems. First, the definition of nutrition as the science of food and its effect on the body is stated. Food requirements vary with each individual and these differences require a consideration of nutritional status. Secondly, nutritional status considering nutrition as part of a total health picture cannot be thought of as an isolate, since it is affected by environmental, physical, biological, and social factors. Also, nutrients rather than specific foods are important. Many combinations of food can provide the proper nutrients and their required amounts. Next, nutrition status is a continuum. It is essential to the identification of nutrition problems in a community or country. Finally, nutrition is basic to health. It is a part and parcel of

total health. Without it, the physical body will suffer through reverse metabolism. These five concepts can be grouped according to the period of a person's life with which they tend to be associated.

Challenges of nutrition education

Consumers are deluged with a barrage of nutrition misinformation and misleading claims concerning food. Thus, nutrition educators are faced with many challenges and responsibilities to help people further their understanding of what constitutes good nutrition, its importance to man, and how it can be incorporated in the daily diet. The many challenges of false and exaggerated claims about foods must be dealt with on a recurring basis (27). Good nutrition should be an essential to optimum health (14).

Nutrition educators of this era have the responsibility of educating the public to judge when claims are false and exaggerated and to choose foods to fit the individual's size, developmental stage and activity. Additionally, the public must be taught to not only prepare, reconstitute or thaw foods to feed themselves, but also to understand that body needs can be met by a variety of ordinary foods. An important part of this education is to impress upon the individual that food should be enjoyed for its social and cultural contributions (27).

Two major aspects have contributed to inadequate eating habits. First, dieting and weight control result in skipping or skimping breakfast or lunch. A second factor is the breakdown of the traditional three meals a day pattern of eating behavior. An important behavioral consequence of the breakdown of the traditional three meal eating pattern was the

deprivation of the housewife's means of connecting her knowledge of nutrition with the eating habits of her family. The data indicated that most nutrition education was based on three traditional meals a day. Such tradition-based education ignored the facts of life and attempted to turn back the clock (4).

If education related toward the improvement of dietary practices is to be meaningful, it must be specific for time, place, persons and a multitude of changing circumstances (5). One of the many challenges facing nutrition educators is said to be the "now" generation culture (20). Basic nutrition research developments certainly have an impact on effective nutrition education (84). Ethnic cultures have been shown to affect food habits (60), as has increasing urbanization, greater mobility, and new modes of living (61). Other demographic factors may also be relevant.

Another challenge that has faced the nutrition educator has been the changing food market. Five major problems have been presented in this area. These are safety of food supply, nutritional quality of food supply, an adequate diet, quality of American diet, and nutrition knowledge and information (9,53,64).

Understanding basic nutrition

Nutrition education is concerned with the interpretation of nutrition research and the motivation of people to use it to their benefit. The main goal is to help people learn and to better use the information that is basic to nutritional health and the selection of foods to meet nutrient and energy needs (33,74). Nutrition educators are concerned with helping people understand why basic nutrition is

essential (25,31). However, before basic concepts can be effective, the misinformation must be combated (59).

The Interagency Committee on Nutrition Education developed four concepts of nutrition which are basic to wise and satisfying food selection (30,31,43). These concepts were as follows.

> (a) Nutrition is the food you eat and how the body uses it. We eat food to live, to grow, to keep healthy and well and to get energy for work and play.
>
> (b) Food is made up of different nutrients needed for health and growth. All nutrients needed by the body are available through food. Many kinds and combinations of food can lead to a well-balanced diet. No food, by itself, has all the nutrients needed for full growth and health. Each nutrient has specific uses in the body. Most nutrients do their best work in the body when teamed with other nutrients.
>
> (c) All persons, throughout life, have need for the same nutrients, but in varying amounts. The amounts of nutrients needed are influenced by age, sex, size, activity and state of health. Suggestions for the kinds and amounts of food needed are made by trained scientists.
>
> (d) The way food is handled influences the amount of nutrients in food, its safety, appearance and taste. Handling means everything that happens to food while it is being grown, processed, stored, and prepared for eating.

A balanced diet has been cited as the primary goal of nutrition education. There have been many different approaches to teaching balanced diets; however, food grouping systems have become almost universal (1). Mayer (50) proposed a 12-year nutrition education cycle. The cycle would emphasize the diversity of food available, the human body and how it functions, an understanding of the basic reason we eat and an understanding of weight control.

Nutrition education as an approach to behavior modification

Since the ultimate goal of nutrition education has been stated to be behavioral, some nutrition educators have contended that its effectiveness cannot be properly measured by achievement tests but only by assessment of its effect on the maintenance or improvement of good dietary practices; that is, optimum intakes of nutrients. Future studies to measure the effectiveness of nutrition education should measure objective increases in nutrition knowledge, variations in attitude, and any behavioral changes which occur in eating habits or intakes of nutrients as a result of the instruction (10,11,16). Thus, the fundamental task of nutrition education has been stated to be the necessity of reducing the existing gap between the discovery of nutrition knowledge and its application to food practices (21,23,49)

Mills (55) quoted Fleming's principles of learning as being helpful in nutrition education. These learning principles are: it occurs more readily when emphasis is placed on the learner's perception of tasks to be accomplished; is facilitated as emphasis is placed on human relation factors; is facilitated as the learner is involved in an active way; and is facilitated as emphasis is placed on the wise use of materials and resources.

It is contended that man is an easy victim of superstition and fear about anything for which he lacks the facts. Nutrition is found to be no exception. Many people do not know the facts about nutrition and, therefore, often hold misconceptions (40). One approach to combating food faddism is to present valid nutritional information in a form that has popular appeal (35). Jalso et al (35) conducted a

study to determine if there was an association between food faddist beliefs and practices and age, socio-economic level, educational level and personality rigidity. The results suggested that one approach to combating food "faddism" was to present valid nutrition information in a form that has popular appeal, such as magazines and newspapers.

Attitude change has been considered the primary goal of teaching. Attitude toward learning must be positive before any learning can take place. When an attitude receptive to learning has been established and old patterns have been upset, one is ready to begin developing a feeling of need for the changed behavior (8,81).

Butterworth (8) quoted Whitehead's theory that attempting to educate by reason without understanding and dealing with the emotional contexts was one of the most fatal conceptions ever introduced into the theory of education. Two goals of communication in education were to create a motive or decision to change and to build an action structure to link attitudes to behavior (42). Walbek (83) indicated an increase in both attitudes and general nutritional information occurred following classroom instruction.

Nutrition as a science has played an important role in life situations. Education and other programs to promote effective use of foods for good nutrition must assess the nation's current dietary situation. This encompasses what people are eating and why, the nutritive content of their diets, what families spend for food and family food management practices (70).

The objective of nutrition education was stated by Stiebeling (70) as the achievement of a condition whereby everyone would share in the benefits from nutritional improvement of life. This is the great potential of our tomorrow. Therefore, there must be a search for more truth about nutrition; a means of disseminating these truths to the public as they are discovered; and advancing the use of these truths in practical programs for human well-being immediately (70). People must learn which foods will supplement their customary diets for nutritional betterment (71).

Nutrition teaching should be designed to match the complexity of the teaching tool to the developmental stage of the individual (63). When an individual has a background of nutrition information concerning his nutrient needs and the best food sources of these nutrients, he can then use a discovery or problem solving approach to select the foods which will best assure his nutritional well-being. He can "make up his own rules", rules which have meaning for him (63).

Three key concepts have exemplified the processes of health and have served as the unifying threads of the health education curriculum. They are: growing and developing as a dynamic life process; interacting as an on-going process which affects the individual; and decision making as a process of choosing one alternative rather than another (68). There has been a dynamic interrelationship of these three concepts. Every individual grows and develops from conception to death, each makes decisions, and all individuals interact with other individuals within a family, community, or with their environment. Applying these

concepts to nutrition, an individual may make a decision of what to eat, which is governed by his stage of growth and development and which in turn affects the way he grows and develops. Likewise, his relationship or interaction with other individuals, his peer group, family and his social, economic and cultural environment may affect his nutritional choices (68).

Assessment of nutrition education

Nutritional assessment and awareness should be an integral part of any medical care system. According to Nichaman (57), the vehicle to develop this nutritional awareness is the nutritional surveillance system. One important way the nutritional surveillance system can be utilized is to provide information for evaluating intervention and preventive programs for both the individual and population groups (57). Jacobson (34) used a food rating scale as a means of nutrition education and, in turn, intervention evaluation.

Nutritional needs of an individual are physiologic, influenced by age, sex, occupation and activity, and individual variability. Consideration must be given to social, economic and cultural needs. Available food resources are those within the limits of the food supply with further limitations imposed by personal or family economic factors (73).

Gifft and co-workers (21) stated that one method of analyzing the task of nutrition education was to view it as an effort at planned change. Planned change was defined as a conscious effort to alter food practices or attitudes when the need exists. This change must be based on sound information. Intervention programs have been effective in

planned change (2,21). Evaluation of nutrition programs has had impact on the improvement of nutrition education for the public (22,56).

In determining the nutritional needs of a community, the nutritional status of the community must be assessed. There must also be individual assessment of nutritional status. According to Christakis (11), this is accomplished by three basic methods: first, dietary studies which compare the nutrient intake with accepted standards and help explain possible reasons for clinical and laboratory findings; secondly, clinical studies which evaluate the physical signs of nutritional health or disease; and lastly, laboratory investigations which provide biochemical measurement of nutrients within the body. Assessments of nutritional status provides a basis for the development of nutrition education programs (11).

Eating behavior is psychologically motivated but is culturally and biologically determined. Effective nutrition education programs must recognize this interaction even though it may deal with only one part. The solutions to nutrition problems must be diversified in approach if they are to have a significant overall effect (2,21).

Now is the time for effective nutrition education

The objective of any nutrition program should be aimed at the prevention of ill-health due to diet and improvements of health through dietary means (80). Nutrition is a vital factor in health. Health problems arising from inadequate nutrition may worsen with the rapid increases in population growth (36). To be effective, nutrition educators must understand why people eat as they do and why food is accepted or rejected (41).

The need for wider dissemination of sound nutritional information is a problem that cannot be dealt with adequately without the sustained efforts of all responsible individuals. There are many avenues to present nutritional information if nutritionists are willing to accept the responsibility (66). The grassroots of nutrition and health care need more attention. The ultimate value of nutrition programs is thought to lie in their application (88).

METHODS AND PROCEDURES

Statement of objectives

The purpose of the present study was to develop a nutrition education tool which could be used as one possible means of upgrading food habits and knowledge of nutrition. The objectives were:

(a) Evaluation of a nutrition education tool administered in a classroom setting to a group of student army aviators.

(b) Determination of the present nutrition knowledge and perceptions of nutrition of a group of student army aviators.

(c) Assessment of the nutrition knowledge and perceptions of the group after the experimental group had been exposed to the nutrition education tool.

(d) Evaluation of the dietary intakes of the group prior to and following exposure of the experimental group to the education tool.

(e) Determination of eating habits and nutritional beliefs of this group of student army aviators.

Selection of subjects

The subjects selected for this study were 105 student aviators in the 65th Company, 6th Battalion, School Brigade, US Army Aviation Center, Fort Rucker, Alabama. The investigator was previously assigned as an army dietitian at Fort Rucker, Alabama, and became interested in

nutrition education and the nutritional intakes of the army aviator. The students who participated in this study were selected because the phase of training allowed enough time to complete the study. The population of four classes was used for the study. A random sampling was used to select the 46 subjects for the experimental group and the remaining 59 were considered the control group.

A letter requesting permission to conduct the study was sent to the Commander, US Army Aviation Center, on 7 November 1974 (Appendix 1). Written approval to conduct the study was granted on 25 November 1974 (Appendix 2).

Method of data collection

Data were collected from each group of subjects utilizing a series of instruments designed to assess their eating habits, dietary intake, nutrition knowledge and perceptions of nutrition. Data collection began 26 February 1975 and was completed 21 April 1975.

Without any prior discussion of the study, each subject was asked to complete a 24-hour dietary recall. The instructions (Appendix 3) and appropriate form for recording the 24-hour dietary recall (Appendix 4) were provided each subject. The subjects were asked to complete this portion of the study in approximately 25 minutes. Information obtained from the 24-hour dietary recall was calculated by computer using the Composition of Foods--Raw, Processed, Prepared; Agriculture Handbook No. 8(82). The data were coded manually using Church and Church (12) as a guide for portion sizes. Then the data were assembled by adding individual nutrients for each subject and calculated on a UNIVAC 1110 computer at The University of Alabama Computer Center.

The investigator gave a brief discussion of the purpose of the study to the subjects. The second tool used in this study was a dietary history questionnaire (Appendix 5). This questionnaire was designed to obtain information concerning influences of dietary practices and some of the present eating habits. Pertinent data received from this questionnaire were summarized and tabulated by using frequency distributions, means, and standard deviations of the experimental and control groups.

Next, a detailed instruction sheet for a three-day dietary intake (Appendix 6), similar in design to one by McLeroy (52), was given each subject. The content of this instruction sheet was illustrated by using food models. Each subject was given the necessary recording sheets for the three-day dietary intake (Appendix 4). When completed, the subjects returned the records of the three-day dietary intakes to their class leader. Nutrient data obtained from the three-day dietary intake were calculated by the UNIVAC 1110 computer using Agriculture Handbook No. 8 (82).

Both the experimental and the control groups were given a nutrition knowledge test consisting of 40 statements (Appendix 7). Answers to this test (Appendix 8) are based on a scale of five: true, partly true, doubtful, false and uncertain. Mean scores were calculated by computer using the "test scoring, item analysis and test reliability program SPEC07".

The experimental group was exposed to a nutrition education tool designed to improve the food habits and knowledge of nutrition; whereas, the control group received no nutrition education. This tool consisted

of 33 slides (35 mm) (Appendix 9), accompanied by a 12 minute audio-cassette, depicting the various aspects of the nutrition knowledge test. The script for the audio-cassette is shown in Appendix 10. Due to a problem in coordination of classroom time, the nutrition education tool was not shown until 2 April 1975. Each subject of the experimental group was shown the slides and listened to the tape. If a subject desired to view the nutrition education tool a second time, it was available in the company classroom. The effectiveness of this educational tool was evaluated by changes apparent in the nutrition knowledge post-test.

The final phase of this study was completed 21 April 1975, at which time both the experimental and the control groups were asked to complete another 24-hour dietary recall and a three-day dietary intake. There was approximately a six weeks time lapse between the first and second administration. Data obtained were calculated by computer to obtain mean intakes for each nutrient and were compared with the Recommended Dietary Allowances (19) for this age group.

Both groups were administered the nutrition knowledge post-test. There were six weeks lapse between the two tests and three weeks lapse between exposure of the experimental group to the nutrition education tool and the post-test. Matched pairs t-test, Pearson's product moment correlation and analysis of various tests were applied to show correlations in the pre- and post-test nutrition knowledge scores.

The series of instruments for this study were tested with 23 senior cadets of The University of Alabama ROTC 6 February 1975. Only minor corrections in the format of the questionnaire were necessary.

Analysis of data

To detect significant differences resulting from this study, the data collected were treated with test reliability and mean score techniques. Simple analysis of frequency was applied to data on the dietary history questionnaire to evaluate responses to demographic information and dietary history. Analysis of variance, correlation tests and t-tests were applied to the nutrition knowledge test scores to determine if significant differences existed due to the exposure of the experimental group to the nutrition education tool. Significance levels ($P<0.05$) were considered valid. Programs related to this study were calculated using the UNIVAC 1110 computer at The University of Alabama. The food control constants and the program for using these constants are available from the Department of Foods, Nutrition and Institution Management, School of Home Economics, University, Alabama.

RESULTS AND DISCUSSION

The results presented in this study were based on information obtained from the series of instruments completed by 105 student army aviators at Fort Rucker, Alabama, during the period 26 February 1975 through 21 April 1975.

Description of subjects

The subjects in this study consisted of 105 student aviators at Fort Rucker, Alabama. There were 104 males and one female. The percentage and the total number of students who completed the various instruments for the study are shown in Table 1. The variations in number of both the experimental and the control groups for each instrument were attributed to schedule conflicts and attrition. The low percentage of completion of both three-day dietary intakes was believed to be influenced by their completion outside the classroom; whereas, all the other instruments were completed in the classroom and turned in immediately. Some subjects were missed on the second 24-hour dietary recall due to classes being dismissed as a result of inclement weather.

The description of the subjects obtained from the dietary history questionnaire is shown in Table 2. All demographic data for both groups were similar.

TABLE 1. Number and percentage of students who completed instruments for the study.

Instrument	Control Group N=59		Experimental Group N=46		Total N=105	
	N	% of group	N	% of group	N	% of group
24-hour dietary recall I	52	88.1	45	97.8	97	92.4
Dietary history questionnaire	52	88.1	44	95.7	96	91.4
Three-day dietary intake I	41	69.5	39	84.8	80	76.2
Nutrition knowledge pre-test	50	84.7	44	95.7	94	89.5
24-hour dietary recall II	45	76.3	38	82.6	83	79.0
Three-day dietary intake II	37	62.7	38	82.6	75	71.4
Nutrition knowledge post-test	52	88.1	40	86.9	92	87.6

TABLE 2. Description of subjects.

Characteristic	Control N=52	Experimental N=52
	Mean ± S.D.	Mean ± S.D.
Age (yr)	24.6 ± 2.2	24.2 ± 2.0
Weight (lb)	170.2 ± 30.2	171.7 ± 19.4
Height (in)	69.1 ± 10.2	70.0 ± 6.4
Military service (mo)	24.1 ± 22.1	27.7 ± 26.3

Family background data for both groups as presented in Table 3 were similar. Noteworthy is the number in both groups who spent most of their life prior to age 18 in the southeast and central south as well as after the age of 18 in the same area. Worthy of mention is the fact that Fort Rucker, Alabama, is the training post for army aviators. Thirty-seven of the control group and 24 of the experimental group had American family backgrounds. Other family backgrounds indicated by both groups were similar.

The estimated amount of money spent for food each month indicated that the control group and the experimental group were spending approximately the same amount (Table 4). Both groups had a high percentage of bachelors living in the bachelor officers' quarters as well as structured families living in homes.

TABLE 3. Family background data.

Characteristic	Control N=52	Experimental N=44
	No.	No.
Ethnic group		
White	52	41
Non-white	0	3
Family background		
American	32	24
German	7	7
English	2	1
Swedish	1	0
Italian	6	3
Negro	0	1
Spanish	1	2
Scottish-Irish	3	3
Other	0	3
Geographical area prior to age 18		
New England	3	1
Southeast	12	11
Central south	12	8
North central	9	7
West	7	7
Other	9	10
Geographical area after age 18		
New England	4	5
Southeast	16	11
Central south	10	11
North central	8	5
West	6	4
Other	8	8

TABLE 4. Number who spent various amounts of money for food each month.

Amount	Control N=52	Experimental N=44
	No.	No.
Less than $50	1	4
$50-100	25	17
$100-150	13	14
$150-200	9	6
More than $200	4	3

Eating patterns of student army aviators

Of the 52 subjects in the control group who completed the dietary history questionnaire, 27 reported having a regular eating pattern. Of the 44 subjects in the experimental group, only 16 reported having a regular eating pattern. Fifteen subjects in the control group and six subjects in the experimental group ate breakfast every day. Twenty-seven in the control group and 17 in the experimental group ate lunch daily. Both groups were more likely to eat the evening meal than any other meal of the day (Table 5).

The frequency of snacks by both the control and the experimental groups varied. Twenty-one and 17 subjects in the control and experimental groups, respectively, had snacks in midmorning between two and seven times per week. Thirty-three subjects in the control group had snacks two to seven times per week in mid-afternoon; whereas, there were 27 in the experimental group. Thirty-three in the control group and 28 in the

TABLE 5. Eating patterns of student army aviators.

Eating pattern	Control	Experimental
	No.	No.
Has a regular eating pattern	27	16
Eats breakfast daily	15	6
Eats lunch daily	27	17
Eats an evening meal daily	38	30

experimental group reported having snacks in the evening two to seven times per week. Sixteen of the control group and 14 of the experimental group had snacks during the night two to seven times per week. Snacking is probably somewhat dependent on the time schedule of classes and the student aviator being on the flight line.

Use of nutritional supplements

Fifty-two of the control group and 44 of the experimental group completed the portion of the dietary history questionnaire pertaining to nutritional supplements. Responses to the use of nutritional supplements for both groups were generally either "never used" or "no answer". Three subjects in both the control group and the experimental group reported using vitamin A, vitamin E, iron and protein supplements daily. Seven in the control group and two in the experimental group used vitamin C daily. Nine in the control group and four in the experimental group used multivitamins daily (Appendix 11).

When asked the conditions under which nutritional supplements were taken, the most frequent answer was "never taken". However, some aviators in both groups reported taking nutritional supplements "all the time". Responses to taking nutritional supplements "when ill or under stress" and "when prescribed" were reported by both groups. Only one subject in the control group reported taking a multivitamin "when flying" (Appendix 12).

Use of fad diets

Both the control and the experimental groups generally checked that they had "never heard of" the diets or that they had "heard of but never used" most of the diets (Appendix 13). One in the control group stated that the "Atkins diet" was not successful and four found it successful. Two in the control group and one in the experimental group found "Stillman's diet" unsuccessful. Two in the control group found "Stillman's diet" successful; another one stated that it was hard to follow. Nine in the control group and one in the experimental group stated that the "drinking man's diet" was successful. Four in both groups stated that the "calorie-restricted diet" was successful. Three in the control group and one in the experimental group responded that the "grapefruit diet" was successful. Three in the control group found the "Mayo diet" successful. Three in both groups stated that the "vegetarian diet" was not successful; whereas, five in the control group stated that it was successful. Four in the experimental group and two in the control group found the "starvation diet" unsuccessful; however, three in the experimental group and one in the control group

stated that it was successful. Fifteen in the control group compared to one in the experimental group found the "organic or health foods diet" hard to follow. Four in the control group and one in the experimental group found the "organic or health foods diet" successful.

Food consumption practices of student army aviators

To determine food consumption practices, the subjects were asked to recall various foods eaten daily (Table 6).

TABLE 6. Number of subjects who consumed selected foods daily.

Food group	Control	Experimental
	No.	No.
MILK GROUP		
Milk	47	38
MEAT GROUP		
Eggs	38	38
VEGETABLE AND FRUIT GROUP		
Fruit juice	19	12
Fruit	12	8
BREAD AND CEREAL GROUP		
Bread	48	39
Cereal	4	4
BEVERAGES		
Carbonated beverages	41	38
Beer	30	22

Milk. Forty-seven of the control group and 38 of the experimental group indicated they drank milk daily. Daily consumption of milk for the control group ranged from one to 12 cups; whereas, the experimental group indicated from one to eight cups. The high

consumption of milk contributed to the high levels of dietary calcium (Tables 7 and 8).

Meat. Thirty-eight subjects in both the control and the experimental group indicated they ate one to four eggs for breakfast. Meat intakes were estimated on a weekly basis rather than a daily basis, therefore, meat is not discussed in this section.

Vegetable and fruit. Nineteen of the control group stated they had fruit juice each day; whereas, 12 of the experimental group reported having fruit juice each day. Fruit was eaten each day by 12 subjects of the control group and eight subjects of the experimental group.

Bread and cereal. From one to 12 slices of bread were reported to be eaten daily by the 48 subjects in the control group. Thirty-nine of the experimental group reported eating from one to 15 slices of bread each day. The remaining subjects in both groups gave no answer for daily consumption of bread. Only four subjects in each group stated they ate cereal every day.

Beverages. Thirty of the control group and 22 of the experimental group reported having beer daily. Forty-one of the control group and 38 of the experimental group reported drinking at least one carbonated beverage per day.

Miscellaneous information requested on the dietary history questionnaire was incomplete and was considered invalid. It was felt that the accuracy of information was influenced by the length of the questionnaire, and the fact that time was critical the day it was completed. The first three pages appeared to be completed by most subjects, but the last three pages were often haphazardly completed.

Intakes of nutrients and food energy

Forty-five subjects in the control group and 39 subjects in the experimental group completed the 24-hour dietary recalls I and II (Table 7). Those subjects who completed only one of the two dietary recalls were not included in this compilation. The mean intakes of food energy and nutrients were compared to the 1974 National Research Council Recommended Dietary Allowances (RDA) for males 23-50 years (19). The calculated intakes of food energy (kcal) exceeded the RDA for both groups in the 24-hour dietary recall I; however, in the 24-hour dietary recall II, the food energy was less than the RDA for both groups. The mean intakes for protein in both the 24-hour dietary recalls far exceeded the recommendations. Fat and carbohydrate contributed approximately 900 calories each to the total food energy. The average intake of the experimental group for vitamin A was below recommendations in the 24-hour dietary recall I but exceeded the recommendations in the 24-hour dietary recall II. Vitamin A intake for the control group exceeded recommendations in both 24-hour dietary recalls. The intakes were above the recommendations for calcium, phosphorus, iron, riboflavin, niacin and ascorbic acid. The average intake for thiamin was below recommendations for the experimental group in the 24-hour dietary recall II, but exceeded the recommendations for the dietary recall I. Recommendations were exceeded in both 24-hour dietary recalls for the control group.

Three-day dietary intakes I and II were completed by 35 subjects in both the control group and the experimental group (Table 8). Those subjects who completed only one of the three-day dietary intakes were not included in this compilation. The mean intakes of food energy and nutrients were compared to the 1974 RDA for males 23-50 years.

TABLE 7. Nutrient intakes for 24-hour dietary recall I and II[a].

Group	N[b]	Food energy	Protein	Fat	Carbohydrates	Calcium	Phosphorus	Iron	Vitamin A	Thiamin	Riboflavin	Niacin	Ascorbic acid
		kcal	g	g	g	mg	mg	mg	IU	mg	mg	mg	mg
Experimental													
I	39	3314	152.9	135.4	332.7	921	2162	23.0	3683	1.50	2.26	40.8	93
II		2409	106.3	94.9	271.4	897	1780	16.7	6045	1.21	1.91	28.0	102
Control													
I	45	2901	175.6	121.4	247.0	904	2256	26.2	5220	1.67	2.43	41.1	123
II		2593	130.6	111.2	246.2	1396	1841	79.8	8761	1.53	2.25	30.4	163
RDA (23-50)[c]		2700	56.0	--	--	800	800	10.0	5000	1.4	1.6	18.0	45

[a]Does not include nutrients contributed by vitamin and/or mineral supplements.

[b]Averages only for those subjects who completed both 24-hour dietary intakes.

[c]RDA for age group.

The mean intakes of food energy for both groups for both three-day dietary intakes were below the RDA. The mean intakes of protein, calcium, phosphorus and iron exceeded the recommendations. The mean intakes of vitamin A exceeded the recommendations for the experimental group in both three-day dietary intakes; however, vitamin A intake was below the RDA for the control group in both three-day dietary intakes. The intake of thiamin was below recommendations for both groups in both intakes. The dietary intakes showed that the mean intakes of riboflavin, niacin and ascorbic acid exceeded the RDA.

In comparison, both groups in the 24-hour recall I exceeded the RDA for food energy; whereas, the mean food energy for both groups in the three-day intake I was below the RDA. Both groups in the 24-hour recall II and three-day dietary intake II were below the RDA for food energy. Average intakes of protein exceeded the RDA for both the 24-hour dietary recalls and the three-day dietary intakes. Intakes of calcium, phosphorus, iron, riboflavin, niacin and ascorbic acid exceeded the RDA. Vitamin A was below the RDA in all intakes for the experimental group and in both three-day dietary intakes for the control group. Thiamin was below RDA for the experimental group in the 24-hour dietary recall II and below RDA for both groups in both three-day dietary intakes. The dietary intakes of both groups were influenced by class, flight, and physical examination schedules.

The RDA should not be interpreted as nutritional requirements for all individuals but as the levels of essential nutrients considered to be adequate to meet known nutritional needs. Intakes of nutrients below the RDA, alone, are not indicative of nutritional inadequacy. According

TABLE 8. Averages of nutrient intakes for three-day dietary intakes I and II[a].

Group	N[b]	Food energy	Protein	Fat	Carbohydrates	Calcium	Phosphorus	Iron	Vitamin A	Thiamin	Riboflavin	Niacin	Ascorbic acid
		kcal	g	g	g	mg	mg	mg	IU	mg	mg	mg	mg
Experimental													
I	35	2688	114.3	105.7	299.9	870	1718	16.0	6153	1.36	2.16	32.9	105
II		2244	94.8	94.8	244.2	827	1481	13.8	5704	1.23	2.09	26.8	92
Control													
I	35	2563	124.6	113.8	253.8	954	1849	18.4	4828	1.26	2.14	27.7	97
II		2209	111.5	97.7	220.4	894	1604	16.0	3873	1.24	1.83	21.9	97
RDA (23-50)[c]		2700	56.0	—	--	800	800	10	5000	1.4	1.6	18.0	45

[a]Does not include nutrients contributed by vitamin and/or mineral supplements.

[b]Averages only for those subjects who completed both three-day dietary intakes.

[c]RDA for age group.

to the comparisons, this group was generally below the RDA for intakes of calories, vitamin A and thiamin. Nutritional status assessment of an individual requires considering not only the nutritional intakes but also the results of clinical and biochemical tests (11). There was no collection of clinical or biochemical data in this study.

Nutrition knowledge test scores

The mean scores obtained on the nutrition knowledge test for both the control and the experimental groups for the pre- and post-tests are shown in Table 9.

TABLE 9. Mean scores on nutrition knowledge test.

Test	Experimental			Control		
	N[a]	Mean[b] ± S.D.	Coefficient alpha	N[a]	Mean[b] ± S.D.	Coefficient alpha
Pre-test	44	24.20±5.77	.8146	50	25.22±5.24	.7651
Post-test	40	30.12±7.11	.9035	52	25.50±6.43	.8587

[a]Includes total number who took either or both pre-test and post-test.

[b]Maximum score = 40.

The maximum possible score on the nutrition knowledge test was 40. The mean nutrition knowledge test score for the control group on the pre-test was 25.22; whereas, the mean score for the experimental group on the pre-test was 24.20.

The mean nutrition knowledge test scores for the experimental group post-test (30.12) was significantly higher ($P<0.001$) than the mean for the control group (25.50). Those who were expected to do well on the

post-test did so, and their scores appeared to reflect, to some degree, the effect of the nutrition education tool to which they had been exposed. Similarly, the control group was expected to remain about the same, the mean score so indicated.

The reliability of the test was satisfactory for the population as indicated by the values of coefficient alpha in Table 9. The reliability coefficient of the nutrition knowledge test assured that most subjects would find some questions which they could answer easily and others would be quite difficult, thus the test was challenging.

The mean scores comparing the post-test scores to the pre-test scores in both groups are shown in Table 10.

TABLE 10. Comparison of score results[a] of pre- and post-nutrition knowledge tests taken by the same subjects.

Group	N[b]	Pre-test	Post-test	t ratio	P
		Mean ± S.D.	Mean ± S.D.		
Control	43	24.81±5.46	24.72±6.79	- .162	NS
Experimental	39	24.53±5.76	30.33±7.21	6.538	0.0001

[a]Maximum score = 40.
[b]Total number who had taken both pre-test and post-test.

Mean scores for the experimental group were significantly higher ($P<0.0001$) on the post-test than on the pre-test. There was no significant difference observed between the scores for the control group.

The 43 subjects in the control group and the 39 subjects in the experimental group were tested on two occasions and correlation coefficients comparing individual scores between the first and second administration are shown in Table 11. The P values indicated are for Pearson correlations.

TABLE 11. Mean scores[a] and correlation coefficients on nutrition knowledge test.

Group	N[b]	Pre-test	Post-test	Pearson correlation coefficient	P
		Mean ± S.D.	Mean ± S.D.		
Control	43	24.84±5.46	24.93±6.81	.811	0.001
Experimental	39	24.74±5.78	30.24±7.22	.647	0.001

[a]Maximum score = 40.
[b]Total number who had taken both pre-test and post-test.

The mean scores were not significantly different in the control group, but were in the experimental group. The Pearson correlation coefficients between test scores were significant ($P<0.001$).

The analysis of variance for the control and experimental group pre- and post-test scores are shown in Table 12 and Figure 1.

TABLE 12. Analysis of variance for nutrition knowledge test scores.

Source of variation	Sum of squares	d.f.	Mean square	F	P
Between rows	282.724	1	282.724	4.10	0.05
Error (between)	5518.325	80	68.979		
Total (between)	5801.049	81			
Between columns	295.121	1	295.121	25.34	0.001
Rows X columns	303.219	1	303.219	26.04	0.001
Error (within)	931.660	80	11.646		
Total (within)	1530.000	82			

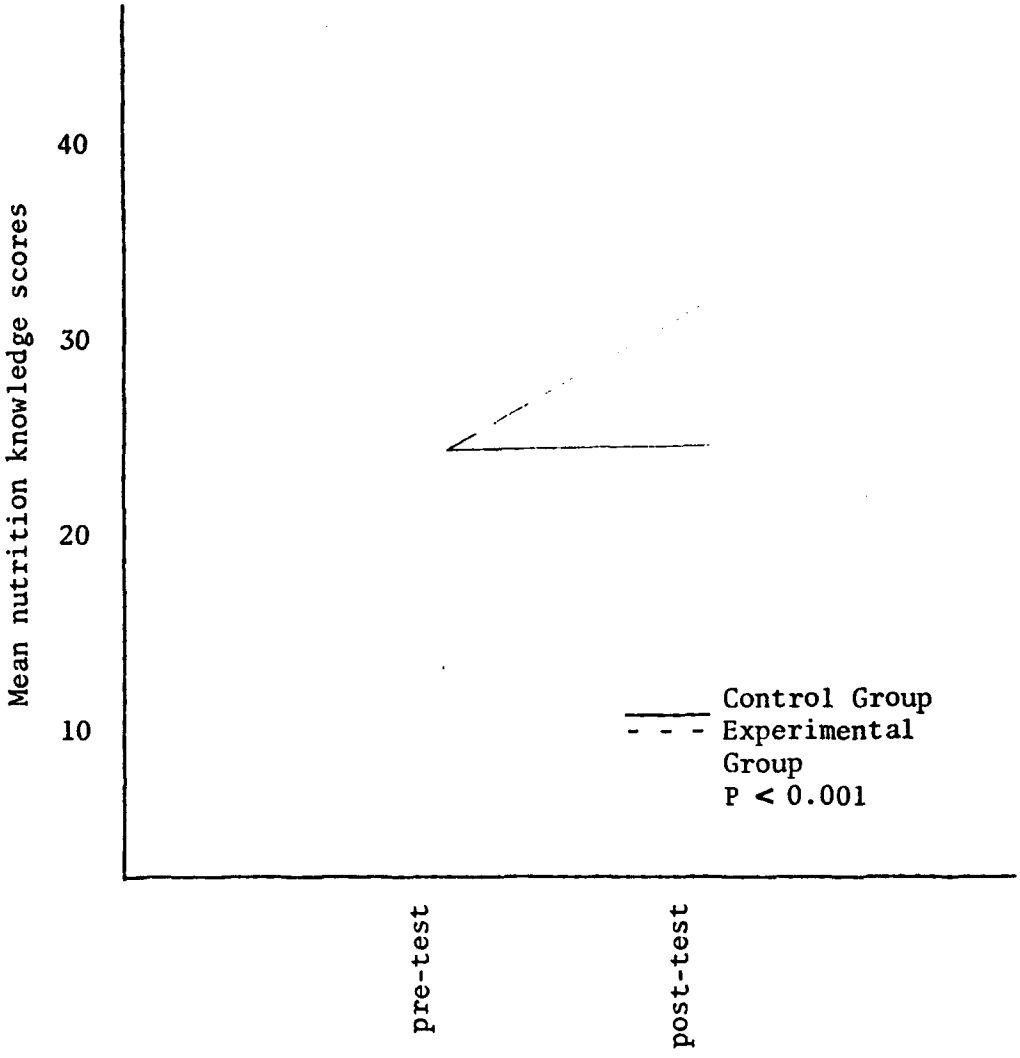


Figure 1. Analysis of variance for nutrition knowledge test.

The variances indicate a significant difference ($P<0.05$) existed between the experimental and control group. A highly significant difference ($P<0.001$) in the interaction existed between the pre- and post-test scores for the experimental group. This interaction is believed to be attributed to the impact of the nutrition education tool.

Individual questions on nutrition knowledge test

The concepts contained in the nutrition knowledge test are listed in Table 13 as positive statements. Comparison of correct responses by the control and experimental groups in the pre- and post-tests are indicated. Examination of pre- and post-test responses to individual questions indicated that many students in both groups had some incorrect nutritional concepts.

Most students recognized that food is a basic need and affects health as well as growth and energy. The responses relating to vitamins varied; however, many students believed that vitamin supplementation was routinely necessary. The nutrition education tool appeared to have no effect on the answers of the experimental group on vitamin supplementation.

Concepts relating to a balanced diet were generally understood; however, few students understood that carbohydrate, fat and protein supplied energy to the body. Many students responded correctly that a rule for losing weight was to examine and understand one's own food habits; however, most students felt that skipping breakfast was an effective way to lose weight. Generally, questions relating to weight loss were incorrectly answered. Most recognized that exercise influenced weight loss. Questions relating to mineral functions were generally answered correctly. Approximately one-quarter of the subjects incorrectly

answered the question concerning cholesterol. The questions relating to nutritive values of foods were seldom answered correctly. Only a few students responded correctly to questions relating to food faddism.

Judged by nutrition knowledge post-test scores, the nutrition education tool had a positive impact on the responses of the experimental group. The nutrition education tool appeared to positively affect the responses of the experimental group in questions relating to food faddism. Correct responses also increased in the area of food energy and weight control. Questions relating to nutritive values were generally answered correctly. Although answers to questions relating to vitamins varied, the response to the use of vitamin supplements remained about the same. It is postulated that responses to the questions on vitamins remained the same because of the misconception that vitamin supplementation is needed.

Dwyer and associates (16) stated that wrong answers on nutrition tests are often indicative of misinformation or wrong learning rather than a total lack of knowledge because of the prevalence of unfounded beliefs based on misinformation, folklore, tradition and superstitious beliefs. The distinction between misinformation and lack of knowledge was not made in this study.

The effectiveness of nutrition education must measure objective increases in nutrition knowledge, attitudinal variations and positive (or negative) behavioral changes which occur in eating habits or intakes of nutritents as a result of the instruction (16). Dwyer and associates (16) have stated that nutrition knowledge tests can contribute to effective nutrition education by pointing up some of the cognitive

and attitudinal deficits and stimulating more effective teaching of nutrition. For further validation of the effectiveness of the nutrition education tool, another nutrition knowledge test and dietary intake should be taken. It is recommended that we, as nutrition educators, accept the challenge of nutrition education and attempt to provide sound information concerning nutrition to the lay public. From the results gleaned from this study, the investigator recommends that the challenge of nutrition education be met by the assessment of the nutritional status of various populations and the development of various nutrition education tools adapted for use by these populations for improving food habits and nutrition knowledge.

TABLE 13. Percentage of correct responses to nutrition knowledge test.

Statement	Correct responses			
	Control		Experimental	
	Pre-test	Post-test	Pre-test	Post-test
	%	%	%	%
1. Food is a basic need of the human race because a variety of foods contain the nutrients essential to life.	98	96	98	95
2. Vitamin pills should not be taken by people who continually fail to eat a variety of foods.	28	10	11	10
3. A good rule for losing weight is to examine and understand your own food habits.	88	92	84	90
4. A reducing diet should not consist of largely fruits and vegetables.	34	25	32	52
5. Food use relates the cultural, social, economic and psychological aspects of living as well as the physiological.	78	77	82	72
6. Exercise plays an important role in weight loss.	88	90	84	90
7. Toast does not have fewer calories than bread.	38	38	23	72
8. A calorie is a unit of measure of energy needed by the body.	54	63	73	87
9. A balanced diet includes carbohydrate, protein, fat, vitamins and minerals.	90	88	80	90

TABLE 13. Percentages of correct responses to nutrition knowledge test (Continued).

Statement	Correct responses			
	Control		Experimental	
	Pre-test	Post-test	Pre-test	Post-test
	%	%	%	%
10. All persons throughout life have need for about the same nutrients but in varying amounts.	74	77	68	87
11. Margarine does not have fewer calories than butter.	14	10	11	70
12. The best way to improve your food habits is not to change them all at once.	82	75	86	85
13. Fat is important for everyone's diet including people who are overweight.	50	37	52	55
14. Nutrition affects health, as well as growth and energy.	96	94	100	97
15. Protein is needed in the body to build and repair body tissues.	86	85	82	90
16. Skipping breakfast is not a good way to lose weight.	90	81	89	92
17. One pound of body fat is equivalent to 3500 calories.	18	19	16	47
18. Sodium and certain hormones regulate the amount of fluid in the body.	48	48	36	60

TABLE 13. Percentages of correct responses to nutrition knowledge test (Continued).

Statement	Correct responses			
	Control		Experimental	
	Pre-test	Post-test	Pre-test	Post-test
	%	%	%	%
19. Vitamin supplements are not necessary to supply the body adequately with vitamins.	58	50	43	60
20. Sunshine and fortified milk products should provide adequate Vitamin D.	46	62	41	82
21. Enriched bread means that the major nutrients lost in processing are added back to the product.	52	60	43	75
22. Carbohydrate supplies energy to the body.	54	71	59	77
23. Egg yolk and whole milk have a high cholesterol content.	74	77	77	85
24. One of the best methods to lose weight is simply eat less.	48	50	50	47
25. Vitamin E supplements are not necessary to insure adequate intake of this vitamin.	48	46	36	55
26. Calcium is the most plentiful mineral of the body and is found in the bones.	80	87	73	87
27. Vitamin C is necessary to prevent infections and aids in wound healing.	50	67	41	72
28. Milk is a good source of both calcium and vitamin D.	90	92	91	97

TABLE 13. Percentages of correct responses to nutrition knowledge test (Continued).

Statement	Correct responses			
	Control		Experimental	
	Pre-test	Post-test	Pre-test	Post-test
	%	%	%	%
29. Enriched breads and cereals have nutritive value.	80	79	70	85
30. Inexpensive cuts of meat are as nutritious as expensive cuts.	70	65	59	77
31. Vitamin A is found in yellow vegetables and aids in good vision.	48	54	61	82
32. Grapefruit does not burn up calories.	38	27	32	57
33. Cooking vegetables for extended periods of time results in loss of nutrients.	84	79	86	87
34. Iron is necessary for the formation of hemoglobin.	78	85	82	87
35. Eating a well-balanced diet contributes to good health.	96	94	98	95
36. The best way to lose weight is not to take off pounds quickly.	88	85	82	87
37. Dietary fiber or roughage is necessary in the diet.	66	73	70	82
38. Milk is not a perfect food.	34	29	36	32
39. Dried beans, eggs, cheese and peanut butter are good sources of protein.	76	85	75	87

TABLE 13. Percentages of correct responses to nutrition knowledge test (Continued).

Statement	Correct responses			
	Control		Experimental	
	Pre-test	Post-test	Pre-test	Post-test
	%	%	%	%
40. To insure an adequate diet, four or more servings of fruits and vegetables should be included each day.	20	29	14	67

SUMMARY

This study was conducted primarily to evaluate a proposed nutrition education tool; in so doing, it was necessary to obtain information concerning nutritional knowledge, nutritional intakes and dietary practices of 105 student army aviators from the 65th Company, 6th Battalion, School Brigade, Fort Rucker, Alabama. Data were obtained from the subjects by use of dietary intake records, dietary history questionnaires and nutrition knowledge tests.

These 105 student army aviators were selected because the phase of training allowed enough time to complete the study. A random sampling was used to determine the 46 subjects who were exposed to the nutrition education tool and designated as the experimental group. The remaining 59 subjects were considered the control group and received no exposure to nutrition education. Dietary history questionnaires were used to obtain demographic information and information concerning food beliefs and eating patterns. Twenty-seven of the control group and 16 of the experimental group reported having a regular eating pattern. Based on observations of the investigator, eating patterns of these groups tended to vary widely depending on individual schedules.

Mean nutrient intakes of the student army aviator met or exceeded the RDA for food energy (kcal) on both 24-hour dietary recalls. However, the mean intakes for food energy (kcal) on both the three-day dietary intakes were below the RDA. The mean intakes of protein, calcium,

phosphorus, iron, riboflavin, niacin and ascorbic acid exceeded the RDA. Thiamin was below recommendations for the experimental group in the 24-hour dietary recall II. Vitamin A was below recommendations for the experimental group in the 24-hour dietary recall I and for the control group in both three-day dietary intakes.

A nutrition education tool was developed to evaluate the effect on the nutrition knowledge of the experimental group. This tool consisted of 33 slides and a 12 minute audio-cassette which depicted the various aspects of nutrition presented on the nutrition knowledge test.

Nutrition knowledge test scores were determined for both the control and the experimental groups during a pre- and post-test with a time lapse of six weeks between tests. In contrast with the control group, the experimental group was exposed to the nutrition education tool three weeks prior to the post-test. Mean scores on the nutrition knowledge test were analyzed for significance by t-test, Pearson's correlation coefficient and analysis of variance. The post-test mean score for the experimental group was significantly higher ($P<0.0001$) than the mean pre-test score as well as the mean pre- and post-test scores for the control group. This interaction was believed to be attributed to the impact of the nutrition education tool. Although the change in average dietary intake for the experimental group could be attributed to the nutrition education tool, a similar change noted in the control group suggested that other factors were influential, such as classroom and flight schedules.

Based on the results of this study and the information found in the literature, nutrition education does affect the nutrition knowledge

and dietary intakes of individuals. A follow-up study might be warranted to determine if the nutrition education tool has any long-term effects on the eating habits and nutrition knowledge of this group.

It is recommended that we, as nutrition educators, accept the challenge of nutrition education and attempt to provide sound information to the lay public so that they may make wise food selections. The investigator recommends that this challenge be met by the assessment of the nutritional status of various populations and the development of various nutrition education tools adapted for use by these populations for improving food habits and nutrition knowledge.

REFERENCES CITED

1. Ahlstrom, A., and L. Rasanen. 1973. Review of food grouping systems in nutrition education. J. Nutr. Educ. 5:13-17.

2. Anonymous. 1973. Position paper on nutrition education for the public. J. Am. Diet. Assoc. 62:429-430.

3. Archibald, J. H. 1950. Some comments on nutrition education. Can. J. Public Health 41:193-195.

4. Bauman, H. E. 1973. What does the consumer know about nutrition? J. Am. Med. Assoc. 225:61-62.

5. Beeuwkes, A. M. 1965. Nutrition education in an affluent society. Food & Nutr. News 37(1):1,4.

6. Briggs, G. M. 1969. The need for nutrition education. J. Nutr. Educ. 1(1):7-8.

7. Burgess, A. 1961. Nutrition education in public health programs-what have we learned? Am. J. Public Health 51:1715-1726.

8. Butterworth, T. H. 1966. Learning-principles, practices and peanuts. J. Am. Diet. Assoc. 49:15-19.

9. Call, D. L. 1972. The changing food market-nutrition in a revolution. J. Am. Diet. Assoc. 60:384-388.

10. Cho, M., and B. A. Fryer. 1974. Nutritional knowledge of collegiate physical education majors. J. Am. Diet. Assoc. 65:30-34.

11. Christakis, G. 1973. Nutritional assessment in health programs. Am. J. Public Health 63(Suppl):1-81.

12. Church, C. F., and H. N. Church. 1970. Food values of portions commonly used. 11th ed. J. B. Lippincott Co., Philadelphia, Pa. 180 pp.

13. Cook, F. 1969. Nutrition education via people-to-people. J. Nutr. Educ. 1(2):9-11.

14. Deringer, S. K. 1973. Much ado about nutrition. J. Sch. Health 43:528-529.

15. Dwyer, J., and F. J. Stare. 1974. Observations on nutrition education and training in schools of public health. Am. J. Public Health 64:983-990.

16. Dwyer, J. T., J. J. Feldman, and J. Mayer. 1970. Nutrition literacy of high school students. J. Nutr. Educ. 2:59-66.

17. Eppright, E. J. 1971. Urgent need for nutrition education. J. Nutr. Educ. 2:113.

18. Eppright, E., M. Pattison, and H. Barbour. 1973. Teaching nutrition. 2nd ed. The Iowa State Univ. Press, Ames, Iowa. 345 pp.

19. Food and Nutrition Board. 1974. Recommended dietary allowances. 8th ed. National Academy Science, Washington, D.C. 128 pp.

20. Erhard, D. 1971. Nutrition education for the 'now' generation. J. Nutr. Educ. 2:135-139.

21. Gifft, H. H., M. B. Washbon, and G. G. Harrison. 1972. Nutrition, behavior and change. Prentice-Hall, Englewood Cliffs, N. J. pp. 254-370.

22. Gordon, J. E., and N. S. Scrimshaw. 1972. Evaluating nutrition intervention programs. Nutr. Rev. 30:263-265.

23. Griffith, W. H. 1967. The scope of nutrition. Fed. Proc. 26:153-157.

24. Gussow, J. D. 1973. Improving the American diet. J. Home Econ. 65:6-10.

25. Hardin, C. M. 1970. On diets and data. Sci. Teach. 37(3):12-13.

26. Hardwick, G. 1975. Critical need for nutrition education. Teacher 92:28,32-33.

27. Harker, C. S., and P. E. Kupsinel. 1971. Nutrition education for today. J. Home Econ. 63:15-18.

28. Hawkins, M. E. 1970. White House conference on food, nutrition and health illuminates inequities and stresses urgency. Sci. Teach. 37(3):20-21.

29. Henderson, L. M. 1972. Nutritional problems growing out of new patterns of food consumption. Am. J. Public Health 62:1194-1198.

30. Hill, M. M. 1966. A conceptual approach to nutrition education. J. Am. Diet. Assoc. 49:20-22.

31. Hill, M. M. 1966. Nutrition education basic to good eating habits for all. Food & Nutr. News 37(4):1,4.

32. Huenemann, R. L. 1966. Current American nutrition problems. J. Sch. Health 36:104-109.

33. Huenemann, R. L. 1973. Interpretation of nutritional status. J. Am. Diet. Assoc. 63;123-124.

34. Jacobson, M. F. 1974. Accentuate the positive. Instructor 83(5):50-51.

35. Jalso, S. B., M. M. Burns, and J. M. Rivers. 1965. Nutritional beliefs and practices. J. Am. Diet. Assoc. 47:263-268.

36. Jayasuriya, J. E. 1973. The inclusion of population education in the curriculum of medical education. Br. J. Med. Educ. 7:157-161.

37. Johnson, M. J., and J. L. Butler. 1975. Where is nutrition education in U. S. public schools? J. Nutr. Educ. 7:20-21.

38. Johnson, O. C. 1965. Nutrition education-what is the goal? Nutr. Rev. 23:353-356.

39. Jones, E. M. 1970. Program evaluation as an operational tool. J. Nutr. Educ. 2:19-22.

40. Kilander, H. F. 1964. The public's beliefs in nutrition facts and fallacies. J. Sch. Health 34:218-221.

41. Lamb, M. W. 1969. Food acceptance, a challenge to nutrition education--a review. J. Nutr. Educ. 1(2):20-22.

42. Leventhal, H. 1973. Changing attitudes and habits to reduce risk factors in chronic disease. Am. J. Cardiol. 31:571-580.

43. Leverton, R. M. 1967. Basic nutrition concepts for use in nutrition education. J. Home Econ. 59:346-348.

44. Leverton, R. M. 1969. Facts and fallacies about nutrition and learning. J. Nutr. Educ. 1(2):7-9.

45. Leverton, R. M. 1970. How good is American nutrition? Sci. Teach. 37(3):16-19.

46. Leverton, R. M. 1974. What is nutrition education? J. Am. Diet. Assoc. 64:17-18.

47. Manoff, R. K. 1971. The role of the communications specialist; the "reach-and-frequency" use of mass media. Proceedings Western Hemisphere Nutrition Congress III. 1971. Futura Publ. Co., Inc., Mt. Kiscoe, N. Y. pp. 156-168.

48. Manoff, R. K. 1973. Potential uses of mass media in nutrition programs. J. Nutr. Educ. 5:125-129.

49. Marshall, W. H. 1971. Educational directions. J. Am. Diet. Assoc. 58:509-511.

50. Mayer, J. 1974. What to teach-when and why? Instructor 83(5):53.

51. McKenzie, J.C., and P. Mumford. 1965. The evaluation of nutrition education programmes; a review of the present situation. World Rev. Nutr. Diet. 5:21-31.

52. McLeroy, V. J. W. 1971. The effect of synthetic sex hormones on serum protein and ascorbic acid concentrations in women. Unpublished dissertation. The Florida State University, Tallahassee, Fla. pp. 94-99.

53. Mead, M. 1970. Changing significance of food. J. Nutr. Educ. 2:17-19.

54. Medved, E. 1966. Television in nutrition education. J. Home Econ. 58:167-170.

55. Mills, E. R. 1972. Applying learning theory in teaching nutrition. J. Nutr. Educ. 4:106-107.

56. Neumann, A. K., C. G. Neumann, and A. E. Ifekwunigive. 1973. Evaluation of small-scale nutrition programs. Am. J. Clin. Nutr. 26:446-452.

57. Nichaman, M. Z. 1974. Developing a nutritional surveillance system. J. Am. Diet. Assoc. 65:15-17.

58. Osman, J. D. 1972. Nutrition education: too much, too little, or too bad? J. Sch. Health 42:592-596.

59. Osman, J. D. 1974. Instruct with misconceptions. Instructor 83(5):48-49.

60. Pangburn, R. M., and C. M. Bruhn, 1971. Concepts of food habits of 'other' ethnic groups. J. Nutr. Educ. 2:106-110.

61. Parrish, J. B. 1971. Implications of changing food habits for nutrition educators. J. Nutr. Educ. 2:140-146.

62. Pearson, P. B. 1972. Nutrition perspectives in the seventies. Nutr. Rev. 30:31-34.

63. Poolton, M. A. 1972. Predicting application of nutrition education. J. Nutr. Educ. 4:110-113.

64. Schottenstein, G. J. 1974. Investigate and evaluate. Instructor 83(5):52-53.

65. Sinacore, J. S., and G. Harrison. 1971. The place of nutrition in the health education curriculum. Am. J. Public Health 61:2282-2289.

66. Sipple, H. L. 1963. Opportunities in nutrition education. J. Am. Diet. Assoc. 42:140-142.

67. Sipple, H. L. 1971. Problems and progress in nutrition education. J. Am. Diet. Assoc. 59:18-21.

68. Sliepcevich, E. M., and W. H. Creswell. 1968. A conceptual approach to health education: implications for nutrition education. Am. J. Public Health 58:684-692.

69. Stare, F. J., and M. Myers. 1965. Proceedings Western Hemisphere Nutrition Congress. American Medical Association, Chicago, Ill. pp. 152-156.

70. Stiebeling, H. K. 1964. Improved uses of nutritional knowledge-progress and problems. J. Am. Diet. Assoc. 44:321-326.

71. Stiebeling, H. K. 1964. Our share in better world nutrition. J. Am. Diet. Assoc. 44:315-320.

72. Stiebeling, H. K. 1967. How far have we come? J. Home Econ. 59:341-345.

73. Todhunter, E. N. 1969. Approaches to nutrition education. J. Nutr. Educ. 1(1):8-9.

74. Todhunter, E. N. 1974. A summary of practical thoughts. Instructor 83(5):54.

75. U.S. Department of Agriculture. 1968. Proceedings of nutrition education conference. Misc. Publ. 1075, U. S. Gov't Printing Office, Washington, D. C. 57 pp.

76. U. S. Department of Health, Education and Welfare, Public Health Service. 1970. White House Conference on food, nutrition and health. U.S. Department of Health, Education and Welfare, Washington, D. C. pp. 147-191.

77. U.S. Department of Health, Education and Welfare. Public Health Service. 1970. White House conference on food, nutrition and health. Summary report. U.S. Department of Health, Education and Welfare, Washington, D. C. 14 pp.

78. Vaden, A. 1974. Revitalize existing practices. Instructor 83(5): 46-47.

79. Vargas, J. S. 1971. Teaching as changing behavior. J. Am. Diet. Assoc. 58:512-515.

80. Wadsworth, G. R. 1971. International work in nutrition: applied nutrition programmes. J. Trop. Med. Hyg. 74:211-214.

81. Wagner, F. E. 1965. Some principles of adult education. J. Am. Diet. Assoc. 44:34-35.

82. Watt, B., and A. Merrill. 1963. Composition of foods-raw, processed, prepared. Rev. ed. Agric. Handbook 8. U.S. Dept. of Agric., Washington, D. C. pp. 1-67.

83. Walbek, N. H. 1973. Precepts, paragons and practice: the effects of various methods of nutrition instruction on attitudes, knowledge and behavior. J. Soc. Psychol. 91:197-205.

84. Weininger, J., and G. M. Briggs. 1974. Nutrition update, 1974. J. Nutr. Educ. 6:141-143.

85. Whitehead, F. E. 1973. Nutrition education research. World Rev. Nutr. Diet. 17:91-149.

86. White House Conference on Food, Nutrition and Health. 1970. Recommendations of panels on nutrition teaching and education. J. Nutr. Educ. 1(3):24-39.

87. White House Conference on Food, Nutrition and Health. 1970. Supplementary report from panel on popular education. J. Nutr. Educ. 1(4):19-24.

88. Williams, C. D. 1973. Grassroots nutrition--or, consumer participation. J. Am. Diet. Assoc. 63:125-129.

89. Wolgamot, I. H. 1970. What do you know about foods and nutrition? Sci. Teach. 37(3):49-52.

90. Youmans, J. B. 1967. Nutrition society symposium: nutrition education. Fed. Proc. 26:152.

APPENDIX 1

Letter requesting permission to conduct study.

SCHOOL OF HOME ECONOMICS
THE UNIVERSITY OF ALABAMA
UNIVERSITY, ALABAMA 35486

DEPARTMENT OF
FOODS, NUTRITION AND
INSTITUTION MANAGEMENT

KATHLEEN R. STITT, HEAD
DOSTER HALL
TELEPHONE: 348-6157

November 7, 1974

MG William J. Maddox, Jr.
Commander
U. S. Army Aviation Center
Fort Rucker, AL 36360

Dear General Maddox:

As part of the requirements for my Master of Science degree in Food and Nutrition at The University of Alabama, I am preparing my thesis on "Nutrition Education and its impact on the Military." Through my review of this topic, I hope to develop some tool of communication that can be utilized in the military training program.

Your permission is requested to do my study with aviators in the various training courses at Ft. Rucker. As it looks now, there will be a pretest to evaluate the present nutritional knowledge of the group, some tool of communication to facilitate learning, and a post test to determine the effect of the tool of communication utilized. This data will probably be collected in January and February, 1975. Coordination concerning this project will be made as soon as all materials are finalized. I have some other ideas of information that could be gained from such a study, but at this point, they are rather premature.

Thank you for your interest and cooperation.

Sincerely,

Juanita J. Clausen
CPT, AMSC

Kathleen Stitt
Kathleen Stitt, Ph.D., R. D.
Professor and Head
Project Director

P. O. Box 1488
University, AL 35486

JJC:KRS:gh

APPENDIX 2

Letter granting approval to conduct study.

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY AVIATION CENTER AND FORT RUCKER
FORT RUCKER, ALABAMA 36360

ATZQ-CG

25 November 1974

Captain Juanita J. Clausen
P. O. Box 1488
University, Alabama 35486

Dear Captain Clausen:

This is in reply to your request of 7 November 1974 to use aviators at Fort Rucker in completing your thesis "Nutrition Education and its Impact on the Military."

Permission is granted to conduct such a study here at Fort Rucker. Your point of contact is LTC Bruce Gibbons, Commander, 6th Battalion, USAAVNC, telephone 255-2815. He will work with you in identifying classes for evaluation, scheduling testing to avoid conflict with flight training and collecting test material.

I am pleased that you have chosen to study an area which has potential for enhancing the capabilities of Army Aviation. We would be interested in seeing the results of your study.

Sincerely,

WILLIAM J. MADDOX, JR.
Major General, USA
Commanding

CF:
Kathleen Stitt, PH.D., R. D.
Department of Foods, Nutrition and
Institution Management
The University of Alabama
University, Alabama 35486

APPENDIX 3

Instructions for 24-hour dietary recall.

INSTRUCTIONS FOR 24 HOUR DIETARY RECALL

Please tell me what you put in your mouth yesterday--everything you ate or drank from the time you got up in the morning until the time you went to bed. Be sure to mention everything you ate or drank at home, at work, etc. Include snacks and drinks of all kinds and everything edible that you put in your mouth, including chewing gum. I also need to know the foods, the amount, the method of preparation and where you ate the food and with whom. Please be very complete and detailed. You have 25 minutes to complete this form.

APPENDIX 4

Three-day dietary record and 24-hour dietary recall.

THREE DAY DIETARY RECORD & 24 HOUR DIETARY RECALL

NAME _____ SSN _____
LAST NAME FIRST NAME MI

YEAR OF BIRTH _____ CLASS _____

DAY AND DATE _____

BREAKFAST

MEAL EATEN WITH WHOM _____ PLACE OF MEAL _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

SNACK

SNACK EATEN WITH WHOM _____ PLACE OF SNACK _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

LUNCH

MEAL EATEN WITH WHOM _____ PLACE OF MEAL _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

SNACK

SNACK EATEN WITH WHOM _____ PLACE OF SNACK _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

DINNER

MEAL EATEN WITH WHOM _____ PLACE OF MEAL _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

SNACK

SNACK EATEN WITH WHOM _____ PLACE OF SNACK _____

LIST FOODS	AMOUNT	METHOD OF PREPARATION

APPETITE

LESS THAN USUAL _____

USUAL _____

GREATER THAN USUAL_____

SICKNESS OR INDISPOSITION

SPECIFY _____

_____

REMARKS

_____

_____

_____

_____

_____

APPENDIX 5

Dietary history questionnaire.

DIETARY HISTORY QUESTIONNAIRE

Name _____ SSN _____
Last name First name MI

Rank _____ Length of service _____ Class _____

Year of birth _____ Age _____ Height _____ Weight _____

Marital status _____ Single _____ Married _____ Divorced _____ Other

Ethnic group _____ White _____ Non-white

State your family background _____
(ex. Italian, German, American, etc)

What is your home state? _____
(your home of record)

In which one geographical area did you spend most of your life from childhood up to age 18?

_____ New England _____ Southeast _____ Central south _____ North Central _____ West _____ Other, please specify _____

What is the estimated amount of money you spend for food each month?

_____ Less than $50 _____ $50-100 _____ $100-150 _____ $150-200 _____ more than $200

How many persons are in your household, not including yourself? _____

THE PURPOSE OF THIS QUESTIONNAIRE IS TO OBTAIN A HISTORY OF YOUR EATING HABITS AND SOME OF THE POSSIBLE INFLUENCES.

INSTRUCTIONS: PLEASE ANSWER EVERY QUESTION AS TRUTHFULLY AND COMPLETELY AS POSSIBLE. CIRCLE THE APPROPRIATE ANSWERS OR FILL IN THE APPROPRIATE BLANK.

1. Do you have a regular eating pattern (the same number of meals and snacks per day)?
_____ Yes _____ No _____ Usually

2. How long have you had this regular eating pattern? _____

3. Would you maintain this regular eating pattern is you were at liberty to do so?
_____Yes _____No

4. Would you say your appetite is: (a) very good (b) good (c) fair (d) poor?

5. Do you eat breakfast everyday? _____Yes _____No _____Usually

6. How many days a week do you eat a regular meal? Circle the number.

a morning meal?	0 1 2 3 4 5 6 7
a lunch or mid-day meal?	0 1 2 3 4 5 6 7
an evening meal?	0 1 2 3 4 5 6 7
a meal after 10 p.m. during the evening or night?	0 1 2 3 4 5 6 7

7. How many days a week do you have snacks? Circle the number.

in mid-morning?	0 1 2 3 4 5 6 7
in mid-afternoon?	0 1 2 3 4 5 6 7
in evening?	0 1 2 3 4 5 6 7
during the night?	0 1 2 3 4 5 6 7

8. With whom do you usually eat the following meals? Choose (a) wife (b) family (c) friend (d) alone (e) other

morning _____
mid-day _____
evening _____

9. Select the following where you usually eat your meals. Choose (a) home (b) officer's club (c) restaurant (d) PX cafeteria (e) dining facility (f) vending machine (g) other, please specify _____

morning _____
mid-day _____
evening _____

10. How many meals a week do you usually eat away from home? (a) 1 (b) 2 (c) 3-5 (d) 10-14 (e) more than 14 (f) none

11. Do you prepare your own meals when eating at home? _____Yes _____No _____Usually

12. How many meals do you eat a day, not including snacks? (a) none (b) 1 (c) 2 (d) 3 (e) more than 3

13. When do you eat your meals if less than three? (a) before going to work (b) during work (c) after work (d) not applicable

14. How many times do you eat between meals per day? (a) none (b) 1 (c) 2 (d) 3 (e) 4 (f) more than 4

15. What time of day do you eat between meals? (a) morning (b) afternoon (c) evening (d) no specific time

16. Are you taking vitamins or mineral pills suggested by your (a) doctor (b) friends (c) relatives (d) self (e) other, please specify _____

17. Have you recently read any books, articles or magazines pertaining to nutrition?
____Yes ____No. What are these sources? Please specify _____

_____

_____

_____

18. Did you follow the advice or information you found in the sources mentioned in question 17? _____Yes _____No _____Usually

19. Did you purchase any foods from the health food stores? _____Yes _____No. If so, what are the names of these foods? _____

_____

_____

20. Why do you purchase the foods mentioned in question 19? _____

_____

_____

21. Do you find yourself eating more when you are under stress? _____Yes _____No _____Usually

22. Have you been on a reduction diet at anytime? _____Yes _____No

23. Do you add salt to your food at the table? ____Yes ____No ____Usually

24. Do you eat at regular times each day? _____Yes _____No _____Usually

25. How often do you take the following nutritional supplements? Check the appropriate column.

Nutritional supplement	Never	Daily	Once a week	Approx 3 times per week	12-15 times per month
a. Vitamin A					
b. Vitamin D					
c. Vitamin E					
d. Vitamin C					
e. Iron supplement					
f. Calcium supplement					
g. Multivitamin					
h. Protein supplement					
i. Lecithin capsule					
j. Vitamin B complex					
k. Other, specify					

26. Under what conditions do you take each of these supplements? Check the appropriate column.

Nutritional supplement	Never	When flying	When ill or under stress	When prescribed	All the time
a. Vitamin A					
b. Vitamin D					
c. Vitamin E					
d. Vitamin C					
e. Iron supplement					
f. Calcium supplement					
g. Multivitamin					
h. Protein supplement					
i. Lecithin capsule					
j. Vitamin B complex					
k. Other, specify					

27. How do you feel about the following diets? Check the appropriate column.

Diet	Never heard of	Heard of but never used	Not successful	Successful	Hard to follow
a. Atkins diet					
b. Stillman diet					
c. Drinking man's diet					
d. Calorie restricted					
e. Grapefruit diet					
f. "Mayo diet"					
g. Vegetarian diet					
h. Starvation diet					
i. Organic or health foods					

28. How long did you follow any of the diets mentioned in question 27? (a) 1-3 days (b) less than 7 days (c) 1-2 weeks (d) more than 2 weeks (e) month (f) other, specify _____

29. How many times per week do you eat the following? Circle the number.

a. Granola	0	1	2	3	4	5	6	7	more than 7	specify	_____
b. Wheat germ	0	1	2	3	4	5	6	7	more than 7	specify	_____
c. Ovaltine	0	1	2	3	4	5	6	7	more than 7	specify	_____
d. Brewer's yeast	0	1	2	3	4	5	6	7	more than 7	specify	_____
e. Honey	0	1	2	3	4	5	6	7	more than 7	specify	_____
f. Sunflower seeds	0	1	2	3	4	5	6	7	more than 7	specify	_____
g. Yogurt	0	1	2	3	4	5	6	7	more than 7	specify	_____
h. Eggs	0	1	2	3	4	5	6	7	more than 7	specify	_____
i. Soybean products	0	1	2	3	4	5	6	7	more than 7	specify	_____
j. Nuts	0	1	2	3	4	5	6	7	more than 7	specify	_____
k. Dried fruits	0	1	2	3	4	5	6	7	more than 7	specify	_____

MILK GROUP

30. How much milk do you drink per day? _____cups

31. Estimate how much of the following you eat per week.
Cheddar cheese _____oz per week
Cottage cheese _____cups per week
Cream cheese _____oz per week
Other kinds of cheese _____servings per week

32. How much ice cream do you eat per week? _____cups

MEAT GROUP

33. How many eggs do you usually eat for breakfast?_____

34. How many times per week do you eat eggs for breakfast? _____

35. How many times do you have the following for breakfast per week?
Bacon _____sausage _____ham_____other breakfast meat _____None _____

36. Estimate how many meals a week you have: Beef_____lamb_____ pork_____chicken/turkey_____fish_____dried beans or peas _____other_____.

VEGETABLES AND FRUITS GROUP

37. Do you drink fruit juice each day? _____Yes _____No _____Usually

38. Do you eat fruit each day? _____Yes _____No _____Usually

39. How many servings of the following do you have per week? Fresh fruit_____canned fruit_____dried fruit_____

40. How many servings of raw vegetables (not in salads) do you have per week?_____

41. How many servings of cooked vegetables do you have per week?_____

42. How many servings of potatoes do you eat per week?_____

43. Estimate how many times per week you have a raw vegetable salad. _____

BREADS AND CEREALS GROUP

44. How many slices of bread do you eat each day? _____

45. How many slices of bread or plain rolls do you eat in a week? _____

46. Do you eat cereal every day? _____Yes _____No _____Usually

47. How often do you eat the following?

Food	How many	Each day	Times per week
a. Sweet rolls	_____	_____	_____
b. Coffee cake	_____	_____	_____
c. Doughnuts	_____	_____	_____
d. Muffins	_____	_____	_____

48. Do you eat any of the following?

Food	How many	Times per week
a. Waffles	_____	_____
b. French toast	_____	_____
c. Pancakes	_____	_____

49. How many times per week do you eat cereal? _____

50. How many servings of the following do you average per week? Baked beans _____ rice, noodles, macaroni _____ spaghetti _____

FAT GROUP

51. How much of the following do you use (amount that is added to bread, vegetables, etc)?

_____ butter (tsp per day)
_____ margarine (tsp per day)
_____ cream (tbsp per day)

MISCELLANEOUS

52. Do you use meat tenderizer in cooking? _____ Yes ____ No ____ Usually

53. Estimate the number of times per week you eat the following and state amount of each.

Food	Number of times	Amount
a. Potato chips	_____	_____
b. Pretzels	_____	_____
c. Salted nuts	_____	_____
d. Relish	_____	_____
e. Pickles	_____	_____
f. Olives	_____	_____
g. Catsup	_____	_____
h. Mustard	_____	_____
i. Cold cuts	_____	_____
j. Frankfurters	_____	_____
k. Peanut butter	_____	_____
l. Pizza	_____	_____

54. How much beer do you drink per day? _____

55. What is the average number of drinks containing alcohol you have per day?
0 1 2 3 4 5 6 7 more than 7

56. How many carbonated beverages do you have per day? _____
What size are they?_____Are they regular?_____or diet?_____

57. Number of meals eaten. Circle one in each column.

I eat breakfast:	I eat lunch:	I eat dinner:
6-7 days per week	6-7 days per week	6-7 days per week
3-5 days per week	3-5 days per week	3-5 days per week
1-2 days per week	1-2 days per week	1-2 days per week
Never	Never	Never

58. Are your food habits now different from when you were in high school? _____Yes _____No When you entered the army? ____Yes
_____No Mention anything that influenced a change?_____

_____

_____

PLEASE FURNISH ANY ADDITIONAL COMMENTS THAT YOU FEEL WOULD BE HELPFUL IN DETERMINING YOUR EATING HABITS.

_____

_____

_____

_____

_____

_____

THANK YOU FOR YOUR COOPERATION IN COMPLETING THIS QUESTIONNAIRE.

APPENDIX 6

Instructions for recording food intake.

INSTRUCTIONS FOR RECORDING FOOD INTAKE

1. Record on three consecutive week days (Monday through Friday).

2. Eat as you ordinarily would if no records were being kept.
It is suggested that records be made during or immediately following a meal for accuracy. Don't forget to include snacks, amounts of "second helpings" and to deduct food left uneaten. Record everything you eat or drink. Also include place meal or snack was eaten such as: at home, at friend's house, at restaurant (name), at officer's club, at dining facility.

3. Helpful suggestions:
Type or kind of food - be as specific as possible.
If listing ingredients will help identify a specific dish (as casserole, salad, certain food combinations), please supply this information.
Additions to foods - in preparation or at the table.
Include sauces, catsup to meat, sugar, cream, butter to bread, potatoes, etc.
Methods of preparation - especially for vegetables (boiled, fried, etc); meat and fish (broiled, pot roast, baked, fried, etc) and eggs (scrambled, hard-cooked, fried, etc). Don't forget to note additions such as butter, fat, sauces, gravy, etc.
Brand names - help to identify foods, such as candy bars (ex. Hershey almond, etc), salad dressings, diet margarines, dessert toppings, etc.
Amounts of foods - are very important and must be recorded. Record as:
    1. Cups or fractions of cups (vegetables, coffee, juice, etc)
    2. Number (fruit vegetables, bacon, bread, etc)
    3. Ounces (meat, juices, beverages)
       cup (c) = measuring cup = 8 oz
       ordinary drinking glass = 3/4 cup = 6 oz
       tall glass (iced tea) = 1¼ c = 10 oz
       coffee or tea cup = 5 oz
       juice glass = 4 oz
       meat - see meat category below.
    4. Tablespoons (Tbsp) - cottage cheese, cream, peanut butter, etc.
       16 level Tbsp = 1 cup
    5. Teaspoon (tsp) - butter, sugar, jelly, etc.
       1 pat butter = 1 level tsp
       1 packet sugar = 1 tsp

6. Size portions(cake, pie, meat) - use dimensions.
   hamburger - (ex. 1 med. patty, ½ in thick)
   beef - slice (ex. 4 x 3 x ½ in)
   cake - (ex. 2 x 2½ x 1½ in)
   See individual foods below for other suggestions.

4. Individual foods and food groups
   A. Fruit
      1. State number and size such as:
         apple - 1 medium (med)
         applesauce - ½ c = 1 small sauce dish
         grapefruit - ½ med
      2. Juice in ounces.
      3. Other - state kind and size servings.
   B. Cereal
      1. State amount as measuring cup.
      2. State kind - raisin bran, granola, oatmeal, etc.
      3. Record additions just beneath the cereal, such as: sugar - 1 Tbsp, cream, light - ¼ cup or 4 Tbsp, etc.
   C. Bread
      1. State number of slices, and if regular or thin sliced.
      2. State kind and whether toasted or plain.

french bread	whole wheat bread
white bread	hamburger bun
rye bread	hot dog bun
diet bread	cornbread, muffin or give size

      3. If homebaked, give thickness of slice, as ½ or ¼ inch.
   D. Butter
      1. Record as level teaspoons. 1 pat = 1 tsp
      2. Record amounts added to toast, vegetables, such as potatoes, broccoli, etc.
   E. Eggs
      1. Note if the whole egg is not eaten. (ex. whole egg - 1 or egg yolk - 1).
      2. State how prepared such as scrambled (with butter), fried, soft-cooked, poached, hard-cooked.
   F. Bacon
      1. List number of slices - give whether long (full length) or ½ slices.
   G. Milk and beverages
      1. Give kind - whether whole, skim, buttermilk, etc.
      2. If you list cream, denote whether light, medium or heavy.
      3. Measures:
         1 cup refers to 1 measuring cup (8 oz) = 1 half-pint milk
         1 glass refers to ordinary drinking glass or 3/4 c (6 oz)
      4. Cocoa - note whether made with milk or what part milk (ex. cocoa (milk) - 1 c or cocoa (½ milk) - 1 c
      5. Be sure to include additions to coffee and tea, as: lemon, sugar, cream, etc.
      6. Include soft drinks, even diet colas.
      7. Include alcoholic beverages (ex. beer - 1 12 oz can, bourbon and cola - 1 jigger bourbon and 4 oz cola).

H. Meats
   1. Give in ounces and/or appropriate size.
      1 small serving (sm serv) meat or fish = 1 oz or 2 Tbsp
      1 average serving meat or fish = 3 oz
      1 large serving meat or fish = 4 oz

I. Vegetables
   1. Measure as fractions of cups or pieces.
      potato, baked - 1 med
      potatoes, mashed - ½ c (with butter and milk)
      peas, green - canned or fresh, drained ½ c
      celery, raw - 1 stalk
      asparagus, cooked - 3 stalks
      broccoli, cooked - 3 stalks or ½ c chopped and drained.
   2. Be sure to list all additions, as butter, sour cream, etc.

J. Sugar
   1. Record as level teaspoons.

K. Desserts
   1. Average serving - ½ cup.
   2. Milk, sauces, etc, should be recorded and amount stated.
   3. Pies - give dimensions or size, as 1/6 of 9 inch pie.
   4. Cake - give size and name, as angel food or yellow with chocolate icing, 2 x 2 x 3 inch.

L. Others
   1. Record as accurately as possible in ordinary household measures all foods eaten. Included are: potato chips, peanuts, peanut butter, salad dressings, gravy, jellies, etc.

M. Between meal snacks
   1. Be sure all these are included: colas, coffee, tea, ice cream, candy bars, potato chips, doughnuts, etc. Include chewing gum.

5. Helps to the investigator:
   A. At the end of each day on list, please check if the appetite was less than usual, usual, or greater than usual in the place provided.
   B. If you were sick (nausea, etc), please note this in place provided.
   C. Under remarks you may list special ingredients of certain dishes, or any other information which you consider might be helpful regarding the day's menu. (You might star these in the list for my convenience.)

AS SOON AS THE DIET RECORDS ARE FINISHED, PLEASE PLACE IN THE ENVELOPE PROVIDED AND RETURN TO THE INVESTIGATOR.

THANK YOU FOR YOUR COOPERATION.

APPENDIX 7

Nutrition knowledge test.

NUTRITION KNOWLEDGE TEST

Name _____SSN_____Class_____

ANSWER EACH QUESTION BY MARKING THE APPROPRIATE LETTER IN THE BLANK PROVIDED.

T = TRUE; you agree with the statement.
P = PARTLY TRUE; you believe the statement is partly true.
D = DOUBTFUL; you doubt the truth of the statement.
F = FALSE; you disagree with the statement.
U = UNCERTAIN; you are very uncertain whether the statement is true or false.

_____1. Food is a basic need of the human race because a variety of foods contain the nutrients essential to life.
_____2. Vitamin pills should be taken by people who continually do not eat a variety of foods.
_____3. A good rule for losing weight is to examine and understand your own food habits.
_____4. A reducing diet should consist of largely fruits and vegetables.

_____5. Food use relates the cultural, social, economic and psychological aspects of living as well as the physiological.
_____6. Exercise plays an important role in weight loss.

_____7. Toast has fewer calories than bread.

_____8. A calorie is a unit of measure of energy needed by the body.

_____9. A balanced diet includes carbohydrate, protein, fat, vitamins and minerals.
____10. All persons throughout life have need for about the same nutrients but in varying amounts.
____11. Margarine has fewer calories than butter.

____12. The best way to improve your food habits is to change them all at once.
____13. Fat is important for everyone's diet except people who are overweight.
____14. Nutrition affects health, as well as growth and energy.

____15. Protein is needed in the body to build and repair body tissues.

____16. A good way to lose weight is to skip breakfast.

_____17. One pound of body fat is equivalent to 3500 calories.

_____18. Sodium and certain hormones regulate the amount of fluid in the body.

_____19. Vitamin supplements are necessary to supply the body adequately with vitamins.

_____20. Sunshine and fortified milk products should provide adequate vitamin D.

_____21. Enriched bread means that the major nutrients lost in processing are added back to the product.

_____22. Carbohydrate supplies energy to the body.

_____23. Egg yolk and whole milk have a high cholesterol content.

_____24. One of the best methods to lose weight is simply eat less.

_____25. Vitamin E supplements are necessary to insure adequate intake of this vitamin.

_____26. Calcium is the most plentiful mineral of the body and is found in the bones and teeth.

_____27. Vitamin C is necessary to prevent infections and aids in wound healing.

_____28. Milk is a good source of both calcium and vitamin D.

_____29. Enriched breads and cereals have no nutritive value.

_____30. Inexpensive cuts of meats are less nutritious than expensive cuts.

_____31. Vitamin A is found in yellow vegetables and aids in good vision.

_____32. Grapefruit juice burns up calories.

_____33. Cooking vegetables for extended periods of time preserves the nutrients.

_____34. Iron is necessary for the formation of hemoglobin.

_____35. Eating a well-balanced diet contributes to good health.

_____36. The best way to lose weight is to take off pounds quickly.

_____37. Dietary fiber or roughage is necessary in the diet.

_____38. Milk is a perfect food.

_____39. Dried beans, eggs, cheese and peanut butter are good sources of protein.

_____40. To insure an adequate diet, four or more servings of fruits and vegetables should be included each day.

APPENDIX 8

Nutrition knowledge test key.

NUTRITION KNOWLEDGE TEST KEY

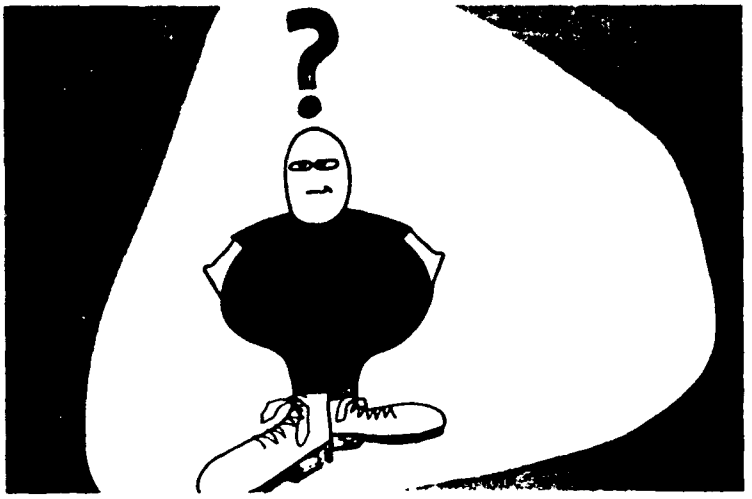
1. T
2. F
3. T
4. F
5. T
6. T
7. F
8. T
9. T
10. T
11. F
12. F
13. F
14. T
15. T
16. F
17. T
18. T
19. F
20. T
21. T
22. T
23. T
24. T
25. F
26. T
27. T
28. T
29. F
30. F
31. T
32. F
33. F
34. T
35. T
36. F
37. T
38. F
39. T
40. T

APPENDIX 9

Slides for nutrition education tool.

FLIGHT PLAN FOR GOOD NUTRITION

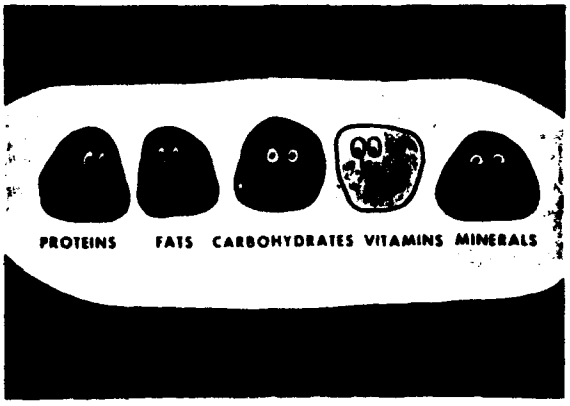
slide 1



slide 2

slide 3

slide 4



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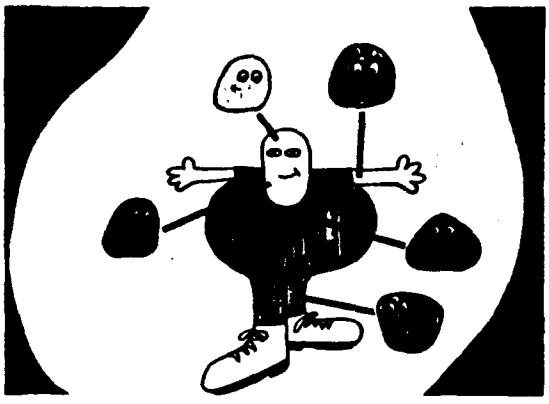

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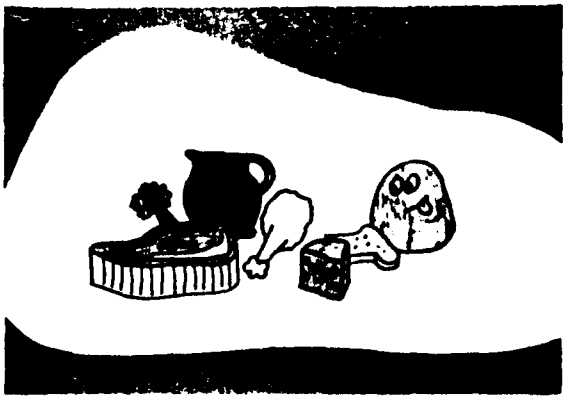
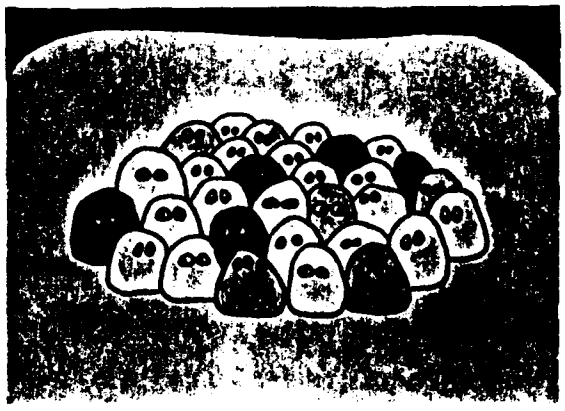


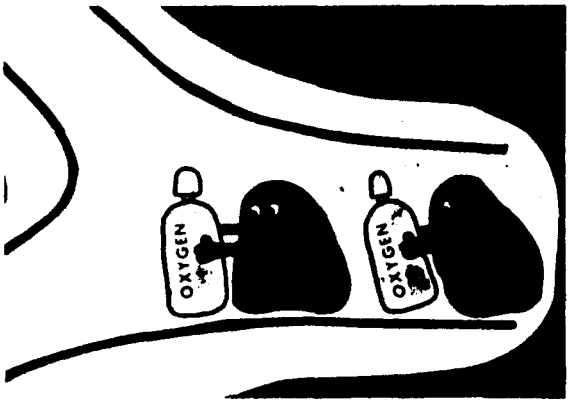
slide 7

slide 8



slide 9

slide 10



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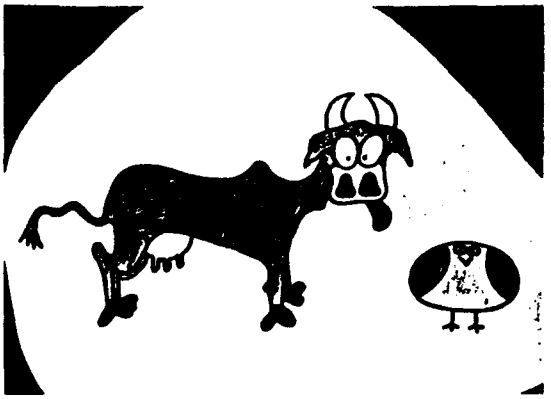

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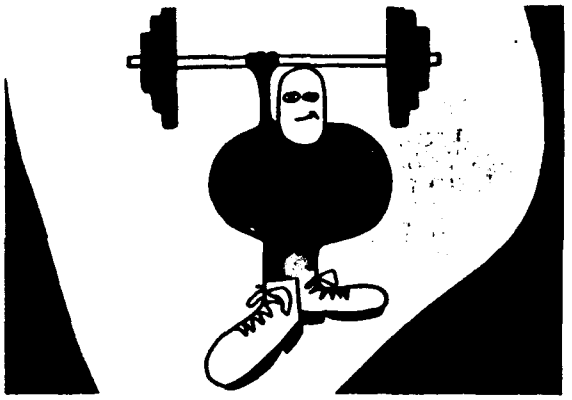

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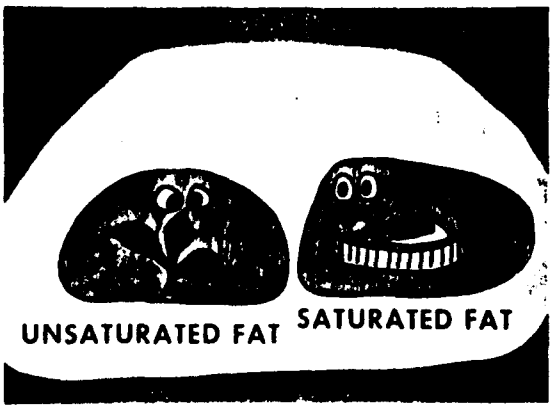
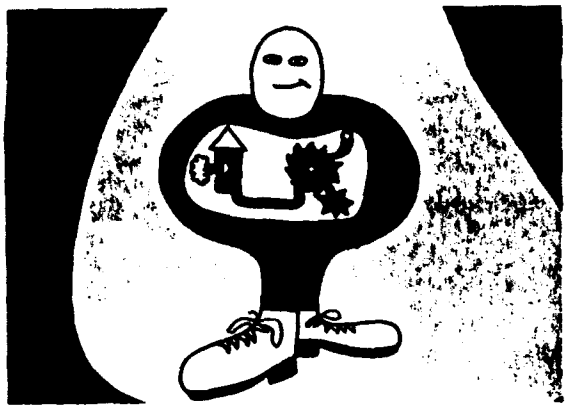


slide 14

slide 15



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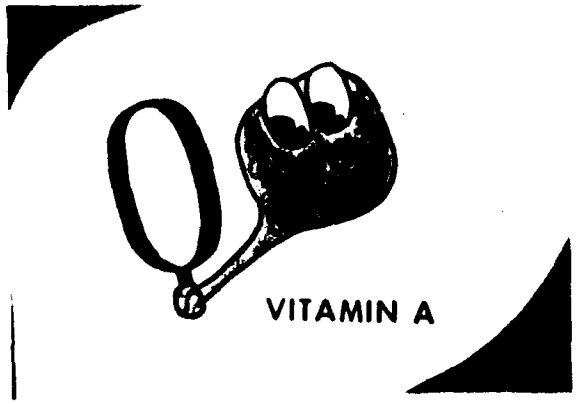

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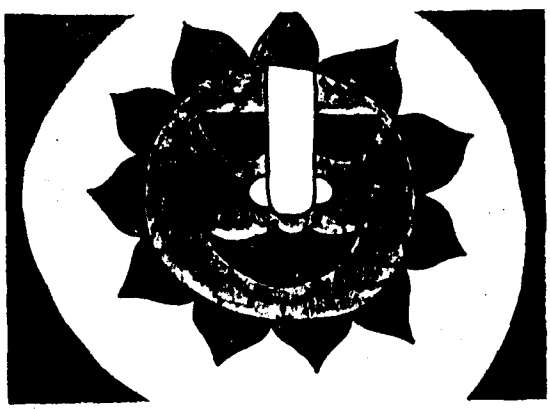

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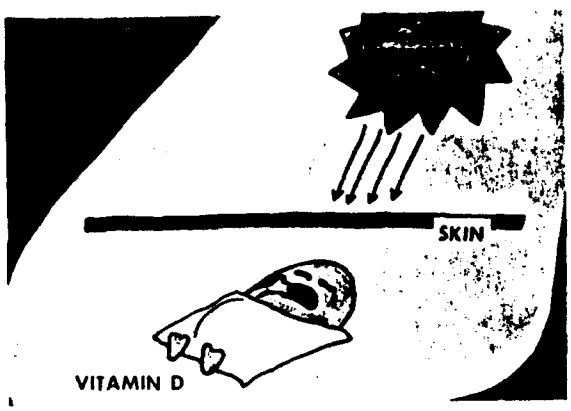

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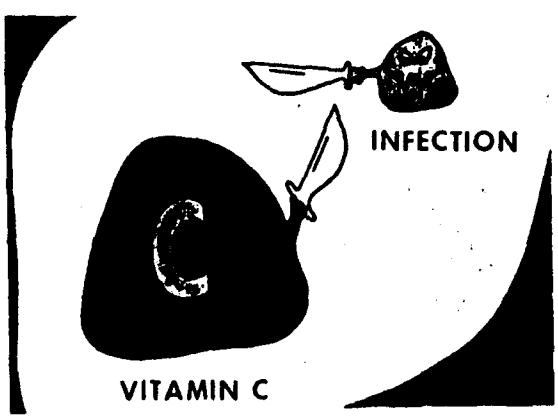

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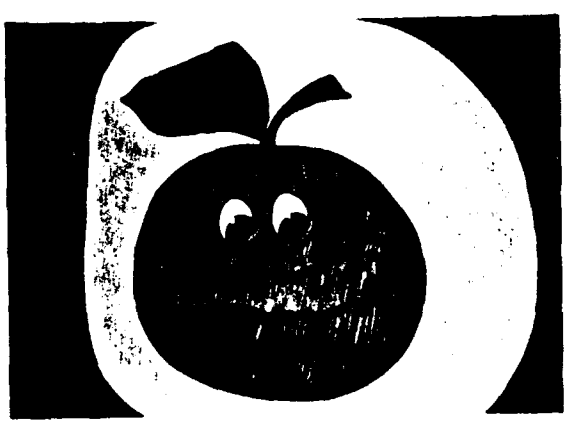

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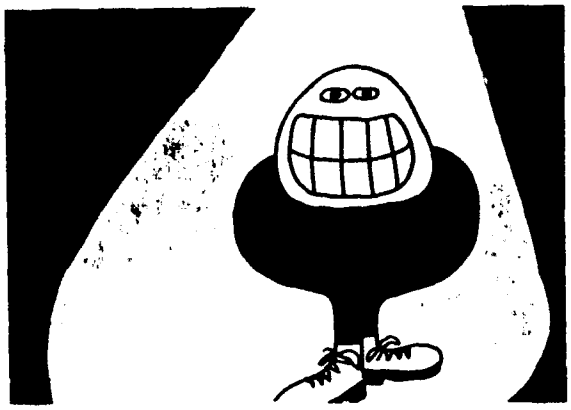

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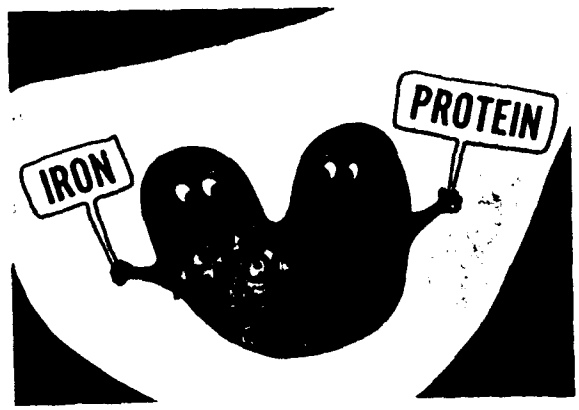

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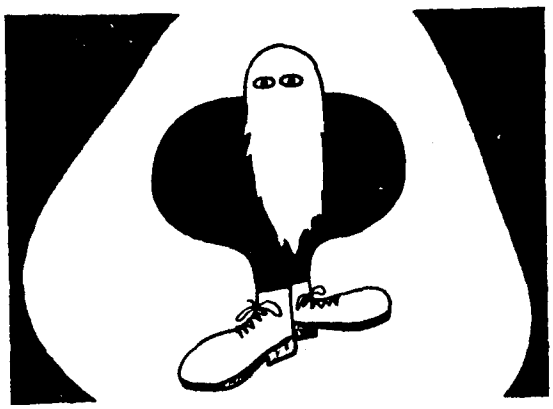
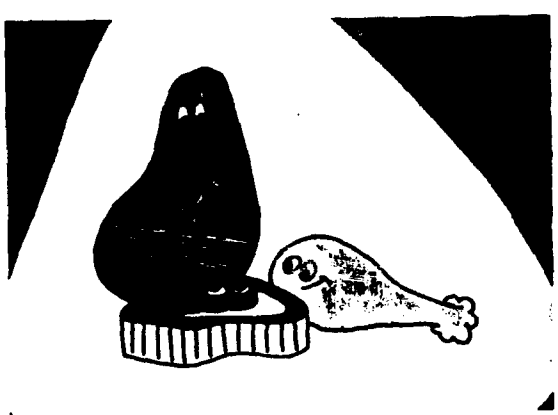


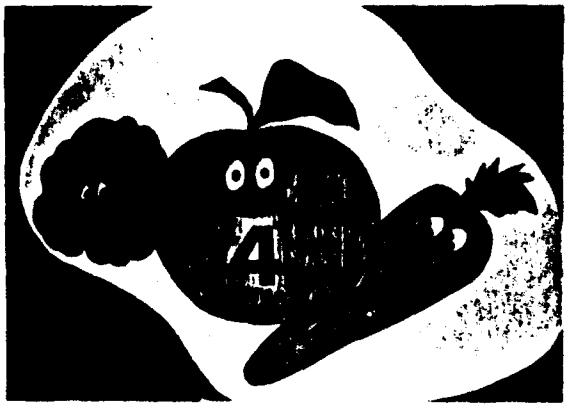
slide 24

slide 25



slide 26

slide 27



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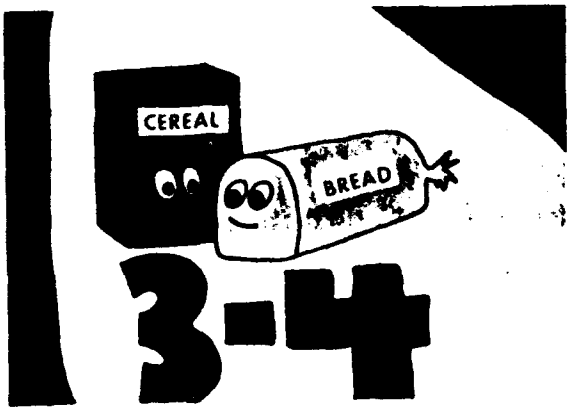

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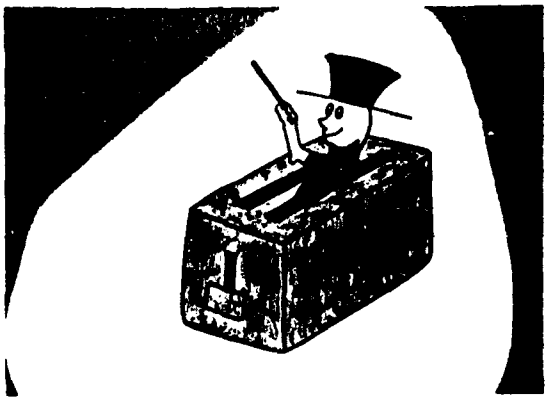

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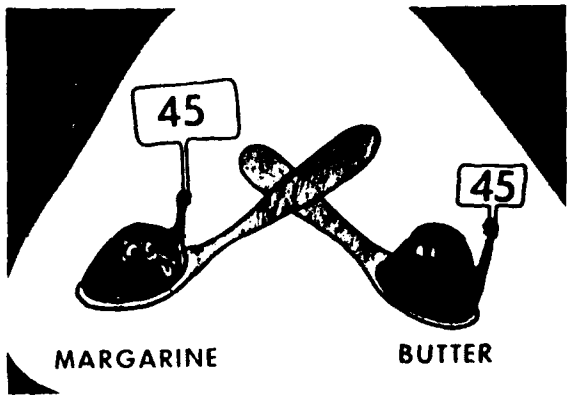

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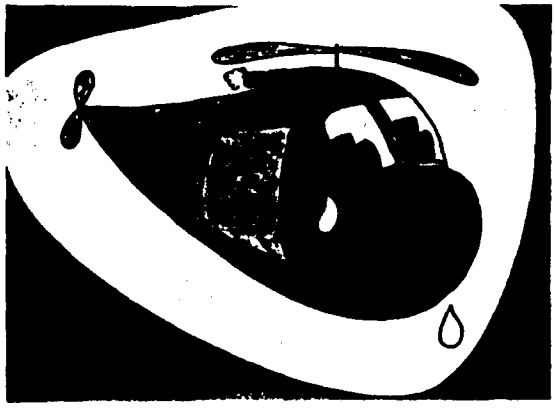

slide 32

slide 33

APPENDIX 10

Script for slide and tape presentation.

FLIGHT PLAN FOR GOOD NUTRITION

(Slide 1)

(Slide 2) Have you ever seriously considered the way you eat? How much snacking? How many meals you've skipped?

Don't feel too badly if you haven't really thought about these factors. Most people don't. Eating is a habit but that's reason enough to give your food some serious thought.

(Slide 3) Nutrition may sound puzzling, however, in simple terms it is what you eat and what happens to the food you eat.

(Slide 4) Food does more than satisfy hunger and provide pleasure; it is fundamental to health. It relates to the cultural, social and economic aspects of living as well as the physiological aspects. From food we obtain nutrients which are substances necessary to sustain life itself.

(Slide 5) The general classes of nutrients needed by the body are proteins, fats, carbohydrates, vitamins and minerals. Each nutrient performs particular (Slide 6) functions in the body, and works in conjunction with the others to promote health and growth. Throughout life, everyone needs the same nutrients but the amounts vary. (Slide 7) All of these essential nutrients are available and can be provided in needed quantities from many kinds and combinations of food.

Food also serves as a source of energy for the body just as JP-4 serves as a source of energy for the helicopter. The energy value of nutrients is measured in terms of calories, which are units of heat. (Slide 8) Carbohydrate, protein and fat are the nutrients that supply calories to the body. (Slide 9) Many kinds and combinations of food can provide a healthful nutritious diet.

We discussed the nutrients which were carbohydrate, fat, protein, vitamins and minerals. Just how do they work for you. Carbohydrate, fats and protein are the most abundant nutrients in food. Minerals and vitamins, both important for a nutritionally adequate diet, occur in smaller quantities. (Slide 10) Each nutrient has specific functions in the body just as each component of the helicopter has specific functions for its operation.

Protein is used in conjunction with vitamins and minerals for making substances called enzymes, which aid in digestion and oxidation processes; (Slide 11) as part of the hemoglobin molecule in red blood cells which transports oxygen in the body and to build muscle tissue. In the absence of adequate carbohydrate in the diet, protein is used to supply energy. (Slide 12) Many foods contain protein but animal sources such as meat, milk, cheese and eggs supply the greatest amount of protein. Dried beans and peanut butter are also good sources of protein.

(Slide 13) Carbohydrate and fats provide energy for everyday activities and heat to maintain the body temperature. Almost all foods

provide energy, which is measured in calories.

Fat is needed in the diet because it adds flavor and fullness to the meal, and because there are certain essential vitamins (A, D, E, K) which are absorbed by the body only in the presence of fat. (Slide 14) There are two types of fat. Saturated fats are of animal origin and contain cholesterol. Whole milk and egg yolk are high in cholesterol. Unsaturated fats are of plant origin. A good source of unsaturated fat is vegetable oil such as corn oil or safflower oil.

(Slide 15) More than a dozen vitamins proven essential to health occur naturally in food and can easily be obtained from a well-chosen assortment of everyday foods. Thus supplementation of the diet with vitamins is not necessary. (Slide 16) Vitamins work in conjunction with minerals and protein to control the body's internal processes just as the control panel functions to help control the helicopter.

(Slide 17) The deep yellow vegetables and fruits usually contain an abundance of yellow pigments, called carotenoids, which are partly converted to vitamin A in the human body. One of the functions of vitamin A in the body is to aid in good vision.

(Slide 18) We've all heard of the sunshine vitamin. Vitamin D can be obtained by exposure to sunlight. It is not usually found naturally in food. One of the best sources of this vitamin is fortified milk. (Slide 19) Vitamin D in its inactive form is stored in the body very close to the skin and possesses the unique characteristic of becoming active upon exposure to sunlight.

(Slide 20) Vitamin C or ascorbic acid helps the body to fight infection. It acts as a cementing substance that holds the cells of the tissues of the body together; therefore, it is necessary in wound healing. (Slide 21) Citrus fruits such as oranges and grapefruit are excellent sources of vitamin C.

There is much controversy concerning vitamin E. Although there is a recommended dietary allowance for vitamin E, there is no proven deficiency in man. Adequate vitamin E can be obtained from eating a well-balanced diet.

Minerals are of vital importance in the diet. (Slide 22) Calcium is a necessary component of the bones and teeth. The best source of calcium is milk, however a small amount may be obtained by eating green leafy vegetables.

(Slide 23) Iron found in organ meats, egg yolk and green leafy vegetables combines with protein to form hemoglobin in the body.

Sodium along with various hormones and protein help to regulate body fluids.

(Slide 24) Eating appropriate quantities of a wide variety of foods can influence the length and quality of life for all.

A balanced diet will normally supply enough of the essential nutrients for daily needs. If you choose the right number of servings from the four food groups each day, you will have a varied diet and (Slide 25) supplements in the form of vitamin pills or health foods will not be necessary.

(Slide 26) THE MEAT GROUP (2 servings are recommended per day which includes meat, poultry, fish, eggs and dried legumes.)

Did you know? Inexpensive cuts of meat are as nutritious as expensive cuts of meat.

(Slide 27) THE MILK GROUP (2 servings for adults per day are recommended which includes milk, cheese, ice cream and other dairy products.)

Did you know? Milk was fortified with vitamin D.

(Slide 28) THE FRUIT AND VEGETABLE GROUP (4 servings daily are recommended. Included in this group are fruits and green leafy and yellow vegetables.)

Did you know? This group provides fiber and roughage which is necessary in the diet.

Grapefruit juice does not burn up calories. It has approximately 40 calories per ½ cup.

Overcooking vegetables in excessive amounts of water destroys the nutrients.

(Slide 29) THE BREAD AND CEREAL GROUP (3-4 servings daily are recommended which includes breads, cereals and bread products.)

Did you know? Enrichment means adding the major nutrients back to a product that were lost in processing.

Enriched bread and cereals have approximately the same nutritive value as whole wheat.

SOME FOOD FALLACIES

(Slide 30) Toast has fewer calories than bread. Not unless there was a magician in your toaster. The only thing there is less of is moisture.

(Slide 31) Margarine has fewer calories than butter. Nonsense. One teaspoon of regular margarine has 45 calories, so does one teaspoon butter.

(Slide 32) Maintenance of proper weight is just as essential for your health as it is for safe flight of your helicopter. When a balance between calorie needs and calorie intake is achieved, one can usually maintain weight control. If excess calories are consumed, they are deposited as fat. Small increments of excess calories over a period of time can result in obesity. Consumption of 3500 calories beyond your caloric requirements will result in a weight increase of one pound.

Overweight and obesity are two factors that are often confusing in weight control. Overweight is a comparison of the weight above a given standard for height and weight. Obesity refers to an excessive accumulation of fat. An effective weight control program maintains a balance between energy need and energy intake. (Slide 33) One of the best methods to lose weight is simply eat less. Skipping meals is not an effective way to lose weight. To be effective, a weight control program should also include exercise. Treatment of obesity has been approached in all imaginable ways--drug therapy, starvation and fad

diets. Fad diets are usually popular since they claim swift easy weight reduction but do not promise any long range insurance plan of keeping the weight off. Maintenance of a desirable weight requires new lifelong patterns of activity and eating as well as an understanding of one's own food habits.

Good nutrition is an essential component for good health.

Why not draw up your flight plan and fly for action today for a healthier you?

APPENDIX 11

Frequency with which nutritional supplements are taken.

Appendix 11. Frequency with which nutritional supplements are taken.

Nutritional supplement	Never		Daily		Once a week		Approx. 3 times a week		12-15 times per month		No answer	
	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**
Vitamin A	35	36	3	3	0	0	1	0	1	0	4	13
Vitamin D	36	36	2	2	0	2	1	1	0	0	5	11
Vitamin E	35	36	2	3	0	2	1	1	1	1	5	9
Vitamin C	33	33	2	7	0	2	3	1	1	1	5	8
Iron supplement	36	36	3	3	0	1	1	0	0	1	4	11
Calcium supplement	37	37	1	1	0	0	0	0	0	1	6	13
Multivitamin	31	31	4	9	0	0	3	2	1	1	5	9
Protein supplement	36	36	0	3	0	2	2	1	0	0	6	10
Lecithin capsule	36	38	1	1	0	1	0	0	0	0	7	12
Vitamin B complex	35	38	2	0	0	1	1	0	1	0	5	13
Other	11	15	1	2	0	0	1	0	0	0	31	35

* 44 subjects in experimental group
**52 subjects in control group.

APPENDIX 12

Conditions under which nutritional supplements are taken.

Appendix 12. Conditions under which nutritional supplements are taken.

Nutritional supplement	Never		When flying		When ill or under stress		When prescribed		All the time		No answer	
	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**
Vitamin A	32	32	0	0	1	0	1	1	4	3	6	16
Vitamin D	32	32	0	0	0	0	1	1	3	3	8	16
Vitamin E	32	31	0	0	1	1	1	2	3	3	7	15
Vitamin C	30	29	0	0	1	4	1	1	4	7	8	11
Iron supplement	33	31	0	0	1	1	1	2	3	4	6	14
Calcium supplement	33	33	0	0	0	0	1	1	1	2	9	16
Multivitamin	28	28	0	1	2	0	1	1	8	10	5	12
Protein supplement	34	32	0	0	0	0	1	1	2	4	7	15
Lecithin capsule	33	34	0	0	1	0	1	1	1	1	8	16
Vitamin B complex	32	33	0	0	0	0	1	1	3	1	8	17
Other	10	16	0	0	0	0	0	0	3	2	31	34

*44 subjects in experimental group.
**52 subjects in control group.

APPENDIX 13

Responses to questions concerning "diets".

Appendix 13. Responses to questions concerning "diets".

Diet	Never heard of		Heard of but never used		Not successful		Successful		Hard to follow		No answer	
	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**	E*	C**
Atkins diet	29	26	12	20	0	1	0	4	0	0	3	1
Stillman's diet	24	13	17	27	1	2	0	2	0	1	2	3
Drinking man's diet	18	9	20	27	1	1	1	9	1	4	3	2
Calorie restricted	11	9	24	35	1	1	4	4	1	1	3	2
Grapefruit diet	17	29	22	16	1	0	1	3	0	0	3	4
Mayo diet	31	14	10	29	0	2	0	3	0	2	3	2
Vegetarian diet	13	6	26	32	3	3	0	5	0	3	2	3
Starvation diet	4	6	30	31	4	2	3	1	3	2	0	10
Organic or health foods	9	1	25	7	1	4	1	4	1	15	7	21

* 44 subjects in experimental group.
**52 subjects in control group.

VITAE

Juanita Jones Grabhorn was born 6 March 1944 in Vinegar Bend, Alabama. She attended Fruitdale High School, Fruitdale, Alabama, and graduated May 1962. MAJ Grabhorn graduated from the University of Southern Mississippi May 1966, with a Bachelor of Science degree in Home Economics. As an undergraduate, she was elected to Alpha Lambda Delta, a freshman honorary, and Kappa Omicron Phi, a national honorary and service fraternity. MAJ Grabhorn was commissioned in the United States Army Medical Specialist Corps May 1966. She completed her dietetic internship at Walter Reed General Hospital August 1967. She is a member of the American Dietetic Association and The Society for Nutrition Education.

She began her studies for the Master of Science degree in Foods and Nutrition in the School of Home Economics at the University of Alabama and completed her degree August 1975.