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Effects of a nutrition-based health promotion program on nutritional adequacy, planned physical activity, body composition, job performance, and absenteeism among female airline reservationists

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EFFECTS OF A NUTRITION-BASED HEALTH PROMOTION PROGRAM ON NUTRITIONAL ADEQUACY, PLANNED PHYSICAL ACTIVITY, BODY COMPOSITION, JOB PERFORMANCE, AND ABSENTEEISM AMONG FEMALE AIRLINE RESERVATIONISTS

by

Patricia Fenstermaker McKenzie

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
1986

Approved by

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APPROVAL PAGE

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ABSTRACT

MCKENZIE, PATRICIA FENSTERMAKER, PhD. Effects of a Nutrition-Based Health Promotion Program on Nutritional Adequacy, Planned Physical Activity, Body Composition, Job Performance, and Absenteeism Among Female Airline Reservationists. (1986)
Directed by Dr. Lucille Wakefield. 156 pp.

A quasi-experimental, nonequivalent control group, pretest-posttest study was conducted with 84 female reservation employees of Piedmont Airlines in Winston-Salem, North Carolina, and Nashville, Tennessee. The purposes were to assess: the dietary levels of kilocalories and certain nutrients including protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin; hemoglobin; time spent in planned physical activity; cardiovascular fitness measured by heart rate after exercise; body composition by percentage of body fat, Body Mass Index, and percentage of desirable body weight; job performance and absenteeism; and to evaluate the effectiveness of a nutrition-based health promotion program in achieving improvements in nutritional adequacy, hemoglobin, time spent in planned physical activity, body composition, job performance and absenteeism. The subjects included only full-time employees, ranging in age from 19 to 60 years. The Winston-Salem group served as the experimental group and were involved in a seven-month worksite nutrition-based health promotion program which emphasized basic nutrition, the dietary guidelines, stress control, and exercise. The Nashville group served as the control group and they were not exposed to the health promotion program. Data collection included anthropometric measurements, a nutrition and health habits inventory, a 24-hour dietary recall, a 3-day food record, a job performance rating, company records of attendance, and hemoglobin measures.

On initial tests of the total group (N = 84) subjects tended to consume diets less than two-thirds of the RDA in kilocalories, vitamin A, vitamin C, iron, calcium and riboflavin. The percentage of kilocalories from protein was above the dietary goals recommendation. The nutrient density per 1,000 kilocalories for iron and calcium was lower, and for protein was much higher than the suggested allowances. A majority of the subjects had acceptable hemoglobin values. Almost three-fourths of the subjects spent less than 90 minutes per week in planned physical activity (considered "unacceptable" aerobically). Half of the subjects were in the "high fat" category according to skinfold measurements, and one-fifth of the subjects were in the "overweight" category according to the Body Mass Index. The mean job performance score was slightly better than the potential mean score. Almost two-thirds of the subjects were absent from work 1 to 12 days in a six-month period, which is twice the national average.

Using pre and poststudy data, participation in the nutrition-based health promotion program resulted in no improvements in nutritional adequacy, hemoglobin, time spent in planned physical activity, body composition, job performance or absenteeism. Using prestudy data, no significant differences were observed in the following variables: nutritional adequacy, planned physical activity, job performance or absenteeism. Using poststudy data, no significant relationship was found between levels of nutritional adequacy and hemoglobin, and participation in the health promotion program.

ACKNOWLEDGEMENTS

Sincere appreciation is expressed to my advisor, Dr. Lucille Wakefield, for her encouragement, wise suggestions, and guidance throughout the duration of graduate study and this research. Appreciation is also extended to committee members, Dr. Terry Bazzarre, Dr. Elizabeth Schiller, and Dr. William Purkey, for their interest, constructive evaluation, and encouragement. Special thanks is extended to Ms. Judy Lipinski of the UNC-G Statistical Consulting Center for her expertise and valuable assistance in statistical analysis. Special thanks is also extended to Debbie Sidden for her assistance in typing the document. Special thanks is also extended to Dr. Ruby Cox, the coworker in this research project.

Deepest gratitude is extended to the Piedmont Airlines Reservation Centers in Winston-Salem, North Carolina, and Nashville, Tennessee, for the time granted to their employees and for financial assistance in conducting this research. Special thanks is extended to Ms. Debbie Brown, Ms. Phyllis Hutchins, Ms. Nancy Frazier, and Ms. Carolyn Matthews for their kindness, cooperation, and patient assistance.

My deepest gratitude goes to my husband, Phillip E. McKenzie, and our son, Peter, for their patience, encouragement, and assistance throughout graduate study and this research. I give praise and thanks to the Lord for providing me with wisdom and perserverence to complete this project.

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CHAPTER 1

INTRODUCTION

Health promotion in the workplace is a recent and promising initiative. Considering the number of centuries that people have worked, the irony is that health promotion in the workplace is a relatively new (circa 1976) concept (Chen, 1982). This concept is simple: employers should intentionally sponsor programs for their employees to enhance health and well-being. The "bottom line" to business and industry is the amount of profit returned on its expenditure (Chen, 1982). The "bottom line" then needs to be considered to "sell" the merits of health promotion efforts to industry (Brennan, 1982). Businesses willing to devote venture capital to health promotion can expect to reduce costs associated with absenteeism, hospitalization, disability, excessive job turnover and premature death (Brennan, 1982). Much illness, particularly heart disease, stroke and cancer is highly influenced by lifestyle. Employees who adopt and maintain a "healthier" lifestyle tend to have longer, more productive careers because they reduce or eliminate health risks (Brennan, 1982). The consequences of health promotion in the work place are higher productivity and profit (Chen, 1982).

The subject matter and scope of the existing worksite health promotion programs varies widely; however, Novelli and Ziska (1982) report that most programs can be described as falling into one of four categories:

1. "One-shot activity" program frequently consists of a single screening effort, with little or no attendant counselling or follow-up referral and education.

2. In the "fitness-first" program, a company first becomes interested in promoting wellness, probably because it is highly visible and enjoyable, and has little association among management or employees with illness and disease. "Fitness-first" programs often are centered on an individual's physical well-being and improvement through nutrition counselling, weight control and cardiovascular fitness. Sports and exercise programs frequently are included. The health promotion program may be expanded from physical activities into smoking cessation and high blood pressure control. These interventions have the potential to significantly reduce employee health care disability costs.

3. A "mixed-bag" program involves a variety of programs, but lacks cohesion or overall health promotion objectives.

4. A "comprehensive approach" consists of a well-planned, well-funded program with long-range objectives, broad-based participation and both cost and behavioral assessments. (p. 21-22)

Exercise programs predominate at the present time in the workplace. Hypertension control and smoking cessation programs are the most frequently reported intervention programs besides fitness and exercise programs. Other areas of intervention include weight control and nutrition, reducing cardiovascular risk factors, diabetes and cancer screening and stress management.

Only a limited number of companies have incorporated more comprehensive nutrition programs and recruited nutritionists to implement the program. Most of the nutrition education programs used films, company newsletters, handouts and posters without any nutrition professional available to assist the employees on a long term basis.

Many of the health promotion programs have installed physical fitness facilities, but these are primarily available to executives.

Most of the corporations involved in health promotion are large employment settings. But only about 32% of the American working population is employed by large corporations (Merwin & Northrop, 1982). The rest of the working population is employed in settings of 250 or fewer employees (Merwin & Northrop, 1982). The problems of developing health promotion programs for these smaller companies are cost and the lack of available resources. There is a need to develop and test low-cost health promotion programs that can use the available resources and services of the community.

The present study was directed toward the development and testing of a nutrition-based health promotion program which would be affordable and feasible for smaller companies. Also, larger companies who wish to initially try a low-cost health promotion effort in order to justify larger expenditures to management might use the nutrition-based program developed in this study.

There are many factors that justify the need to develop a nutrition-based health promotion program. One factor is the considerable interest in nutrition information as reported in the literature. But nutrition education seems to be a minor part of the typical wellness program, and is generally not taught by a trained nutrition professional, but rather a recreation or fitness director, health educator or counsellor (Murphy, 1983). Nutrition professionals clearly need to demonstrate their qualifications and willingness to serve as health promotion educators in the workplace.

A second factor that justifies the need for a nutrition-based health promotion program is the fact that it can bring a new perspective to

health promotion programs by integrating nutrition in with physical fitness, stress management, improved job performance and job satisfaction, and decreased absenteeism, as well as prevention or control of chronic diseases, improved diet and weight control. The program may also be effective in convincing employees of the need to reduce consumption of certain harmful substances such as alcohol, certain medications, excess caffeine, and to reduce cigarette smoking, which are related in various ways to eating practices and nutritional risk factors and are legitimate concerns for the nutrition professional (The American Dietetic Association, 1982; Hamilton and Whitney, 1982). Because of their training in physiology and biochemistry, nutrition professionals would be in excellent positions to communicate the message as to how these substances harm the human body.

If a company is unable to hire its own nutrition professional, the company could contact its local health department or Cooperative Extension office which have nutritionists and home economists on staff who can assist a company at a minimal fee. As a previous health department nutritionist, the author has been a part of many successful programs for community groups on many of the same topics that are addressed in industry health promotion programs. There is a need for objective data to support the feasibility of using local health department and Extension nutrition professionals in planning and implementing health promotion programs in small business and industries.

Background of the Study

The original idea for a nutrition-based health promotion program for Piedmont Airlines was created by one of the company's personnel officers who contacted the author's coworker. The company was interested in testing a pilot program in Winston-Salem, NC for its effectiveness among a small group of its 650 reservationists before considering funding a larger scale program. According to the personnel officer, the employees' records indicated a higher than average rate of absenteeism as well as low morale, possibly due to poor eating habits, psychological stress, and lack of physical activity among these employees.

Because of the wide variety of questions to be answered by the overall study, a decision was made to address the study in two parts by two doctoral students as researchers. The present dissertation research addressed the following questions:

1. What are the levels of nutrient intake, physical activity, iron status, and body composition among female reservation employees?

2. Is there a relationship between nutritional adequacy, planned physical activity, iron status, and body composition and measures of absenteeism and job performance among female reservation employees?

3. Will a nutrition-based health promotion program result in desired changes in nutritional adequacy, level of planned physical activity, body composition, absenteeism, and job performance among female reservation employees?

The part of the study completed by another student addressed questions dealing with whether a nutrition-based health promotion program would result in desired changes in certain chronic disease risk factors, anxiety, depression, and job satisfaction among female reservation employees (Cox, 1985). Both students were involved in planning and

implementing the overall health promotion program, but each student tested different hypotheses for her respective dissertation.

Purposes of the Study

The purposes of the study were to determine whether certain health characteristics of female reservation employees would be improved by a company sponsored nutrition-based health promotion program. The specific objectives of the study were:

1. To measure the levels of nutritional adequacy of kilocalories (kcalories) and selected nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin), and hemoglobin.
2. To measure the levels of planned physical activity.
3. To measure cardiovascular fitness.
4. To obtain job performance scores and absenteeism rates.
5. To measure body composition.
6. To evaluate if participation in a nutrition-based health promotion program resulted in changes in: (1) levels of nutritional adequacy; (2) measures of hemoglobin; (3) levels of planned physical activity; (4) measures of cardiovascular fitness; (5) job performance scores and absenteeism rates; (6) measures of body composition.
7. To analyze differences between the levels of planned physical activity and job performance and absenteeism.
8. To analyze differences between the levels of nutritional adequacy and job performance and absenteeism.

Statement of Hypotheses

The following hypotheses were presented for the study:

H1: Participation in a nutrition-based health promotion program will result in no differences in pre and poststudy measures of nutritional adequacy in relation to kcalories and the selected nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin) as well as hemoglobin as a variable for iron status.

H2: There is no relationship between levels of nutritional adequacy and hemoglobin and participation in a nutrition-based health promotion program.

H3: Participation in a nutrition-based health promotion program will result in no changes in 1) measures of planned physical activity levels; 2) measures of cardiovascular capacity.

H4: Participation in a nutrition-based health promotion program will result in no changes in 1) job performance scores; or 2) absenteeism rates.

H5: Participation in a nutrition-based health promotion program will result in no changes in pre and poststudy measures of body composition as measured by 1) percentage of body fat; 2) Body Mass Index (BMI); and 3) percentage of desirable body weight.

H6: 1) There is no difference between the level of planned physical activity and job performance; 2) There is no association between the level of planned physical activity and absenteeism.

H7: There is no difference between the level of nutritional adequacy and hemoglobin and job performance; 2) There is no association between the level of nutritional adequacy and hemoglobin and absenteeism.

Definition of Terms

1. Absenteeism: the number of hours missed for personal illness over the six-month period prior to the initiation of the program, and the six-month period after the education program. The number of hours missed were then grouped in the following categories: (1) 0 hours; (2) > 0 hours to 96 hours; (3) > 96 hours (Morgan & Baker, 1984).

2. Body composition: an indicator of leanness. Determined in this study by BMI (body mass index; weight/height^2), and skinfold measurements to determine percentage of body fat and computation of desirable body weight.

3. Desirable body weight: the body weight that should be maintained to avoid obesity. Determined using a formula developed by Katch and McArdle (1983), and using the BMI.

4. Job performance: appraised by supervisor evaluating six key job element areas of Piedmont Airlines "Performance Appraisal and Development Program": job knowledge, productivity, quality of work, salesmanship, and professionalism, attendance and team effort.

5. Nutrition-based health promotion program: a seven-month education program at the worksite emphasizing nutrition principles included in the U. S. Dietary Goals and the Guidelines for American, information on the importance of physical activity and stress management.

6. Nutritional adequacy: intake of certain nutrients (kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin) as compared to the Recommended Dietary Allowances (1980). The level of adequacy used was: less than 66% of the RDA was considered inadequate; 66% or greater of the RDA was considered adequate (Hamilton & Whitney, 1982).

7. Percentage of body fat: the percentage of total body mass which is adipose tissue, determined in this study by the Durnin method (Durnin & Wormersley, 1973; see description in Appendix A).

8. Planned physical activity: aerobic exercise performed consciously by an individual to promote a moderate to high level of cardiovascular fitness; measured by sections D, E, F and G of Part II of the Nutrition and Health Habits Inventory (Appendix A).

Limitations of the Study

Several limitations of the study were acknowledged. The study was limited to full-time female employees, and results cannot be generalized to part-time or male employees, or to the general population of adult females. The available pool of subjects was limited to those employees who volunteered to serve as subjects. Subjects may have indicated an interest in a health promotion program based on the assumption that volunteering would imply time off from work. Subjects could not be randomly assigned to either the experimental or the control group; therefore, pretest equivalence could not be assumed. Statistical procedures were used to account for the non-equivalence. Representativeness was a concern since true random sampling was not used.

Other limitations were noted. A major problem was that seminar attendance was lower than expected by the researcher, attributed to an unexpected, yet steady, increased work load for the employees. Also, the

company provided no compensatory time for employees to attend seminars. Measures were taken to improve attendance by the use of tape recordings of the seminars. Other methods such as newsletters and handouts were used to distribute nutrition and other health-related information.

Another limitation was the control group knew that they were a control group for the health promotion program. The control group also knew from the letter they received informing them of the program in Winston-Salem, and from clues in the pretest, what areas of nutrition and fitness to improve on for the posttest.

Other limitations include the difficulty in obtaining reliable dietary information, errors in coding of food, and errors in collecting other types of information such as activity level and skinfold measurements. There may have been some bias in posttest dietary information due to the data collection time which was just before and just after the Christmas holidays. Absenteeism was based on the hours (workdays) of personal illness. For some subjects, these values may not be related to poor health habits but rather a car or work related accident or personal illness not related to poor health habits.

The assumptions were made for this research study that the subjects actually listened to the tape recordings of the seminars or attended the seminars, and that the subjects actually read the educational materials (i.e., newsletters, handouts, posters and cafeteria table cards) provided by the researchers.

CHAPTER II

REVIEW OF RELATED LITERATURE

Health Promotion Programs

In 1982, the U.S. spent over $300 billion on health care; this figure is almost 11% of the gross national product (Rosen, 1984). Per capita costs of medical care climbed from $211 in 1965 to $1,365 in 1982 ("Wellness," 1984). Corporations paid more than $77 billion of that bill in the form of employee-sponsored health insurance, absenteeism costs and productivity decrements (Rosen, 1984). Fifty-two million workdays are lost each year because of heart disease, and common backaches cost almost $1 billion a year (Pearson, 1983). These figures indicate a very poor return on the health care dollar. "How does it affect the bottom line?" is a popular query from business managers asked to consider new products, services or projects (Brennan, 1982). To get the bottom line in better shape, business must promote health and educate employees about health. Work site health promotion programs are one strategy for remedying the situation.

Since eight out of 10 cases of chronic illness, disability, and early death are related to personal health habits such as smoking, overeating, poor nutrition and lack of exercise, work site health promotion programs should motivate employees to assume personal responsibility for their health (Pearson, 1983; Seidel, 1983). Employees who succeed in adopting and maintaining a positive lifestyle can expect to feel better and live longer. The Surgeon General (1979) reported conscious changes in health habits, at any age, can lead to significant

reductions in many health risks. From a business standpoint, this translates into less absenteeism, greater productivity and increased morale.

During the past 40 years, work site health promotion programs have undergone significant changes (Kiefhaber & Goldbeck, 1983). First generation programs were initiated for a variety of reasons, most unrelated to health. Smoking policies, safety regulations and recreation programs were implemented for morale and product quality reasons, not for health benefits (Kiefhaber & Goldbeck, 1983).

The second generation of work site health promotion programs expanded this focus by emphasizing the importance of health benefits and risk factor intervention, but were characterized by attention to a single illness, such as alcoholism or by programs offered to a specific sector of the work force, such as executives. As early as the 1940's, Consolidated Edison and DuPont began overseeing the total rehabilitation of the "diseased alcoholic" by offering early identification, referral and follow-up services to alcoholic employees and their families. By following the entire treatment process, these companies managed the delivery of health care services more effectively (Kiefhaber & Goldbeck, 1983; Rosen, 1984).

In recent years the work place has gained prominence over more traditional community-based settings for health promotion activities. Programs of this third generation have expanded to include all companies and deliver a more comprehensive range of interventions for a variety of risk factors. Superficial employee assistance programs, health risk appraisals, behavior modification classes and educational programs

characterize the third generation (Rosen, 1984). The most important reason for this change has been the inflationary costs of health benefits and the need to manage these costs more prudently.

Currently, exercise programs predominate as the preventive health measure most frequently selected by corporations (Seidel, 1983). Some companies have comprehensive programs; others concentrate on a few areas. Rosen (1984) reports most programs fall in one of the following categories:

1. Early detection of disease. Examples include hypertension screening (Ford Motor Company), breast self-exam (AT&T) and periodic physical exams.

2. Control of biological risks (designed to treat or control the illness identified through early screening). Examples include hypertension treatment (Massachusetts Mutual Life Insurance Company), substance abuse and employee assistance counseling (General Motors), and cardiac rehabilitation (Kimberly-Clark).

3. Detection of high risk behavior. Certain behaviors have known or suspected negative health consequences, including inactivity, poor nutrition, smoking, inappropriate reactions to stress and obesity. Leading companies in this area include IBM, Johnson & Johnson, and New York Telephone Company.

4. Reduction of high risk behavior. Programs of this type seek to assist individuals who want to modify their risk behavior. Specific examples include: smoking cessation classes (Campbell Soup, Scherer Brothers), weight management programs (Metropolitan Life), fitness activities (Pepsico, Xerox and Tenneco) and stress reduction seminars (Equitable Life Assurance Company).

5. Healthy corporate culture. Corporate culture contributes positively or negatively to health related behavior. Smoking restrictions, time for exercise classes, flex-time, job sharing, part-time employment, availability of nutritious foods, relaxation room, day care facilities, healthy management practices and attractive work environments all promote good health. Companies that have made one or more of these cultural changes include Control Data Corporation, Rodale Press and Johnson & Johnson. (pp. 29-30)

Good health makes good sense, is good business, and saves more than just cents (Wellness, 1984, p.25). New York Telephone Company reported that it saved $645,000 just from a non-smoking campaign. Their overall net gain from nine programs made available to 80,000 employees was $2,700,000 by conservative estimates ("Wellness," 1984). The Hospital Corporation of America actually pays its employees to exercise as a reward for keeping fit. Results of one study showed that 76% of the 300 participants were eligible to receive all or part of an original $500 incentive. In their plan, money is subtracted for medical claims. The savings in group insurance paid for the costs of the program ("Wellness," 1984). Kimberly Clark Corporation reported a 65% "rehabilitation success rate" in job performance for employees with chemical dependency problems who sought treatment in the company programs (Cunningham, 1982).

Many corporations also include nutrition education in some form for their employees. Xerox, in addition to their sports complex, provides booklets addressing health topics including nutrition (Seidel, 1983). Control Data Corporation started a "Staywell" program that provides individual screening and health education counseling (including nutritional counseling) for its employees (Seidel, 1983). Boeing Company asked its ARA food service to motivate and help its employees meet the U.S. Dietary Goals. The nutrition education campaign included posters, articles in the company newsletter, and alternative foods available in the company cafeteria (Seidel, 1983). Evaluation data from Johnson & Johnson's comprehensive health promotion program shows significant reductions in self-reported sick days and small improvements in job satisfaction (Rosen, 1984).

Nutritional Adequacy

The U.S. first became nutrition conscious in the 1930's when President Roosevelt expressed his concern that as many as one- third of the nation's people might be poorly fed (Hamilton & Whitney, 1982). A 1936 food consumption survey confirmed Roosevelt's suspicions and led to corrective programs (including the Enrichment Act and the School Lunch Program). In the following three decades, many surveys of the U.S. population were conducted (Hamilton & Whitney, 1982). In the mid 1960's, the U.S. Department of Agriculture collected data on food consumption of 15,000 households across the country, the broadest survey yet undertaken, and concluded only 50% of the households surveyed had good diets, and 21% had poor diets. As expected, people with limited incomes had the poorest diets, but even those with ample incomes often missed out on nutrients they needed. The nutrients most often lacking were calcium and iron, in all age groups; thiamin, in girls and women; riboflavin, in women and elderly men; vitamin A, in teenage girls and elderly men and women; and occasionally vitamin C, in elderly men (Hamilton & Whitney, 1982).

The Ten State Survey was conducted from 1968 to 1970 and established the need for better guidelines for the U.S. people to follow in selecting foods. The Ten State Survey was biased because the proportion of low income people were over-represented. The Health and Nutrition Examination Survey (HANES) was conducted from 1971 to 1974 and avoided the bias of the Ten State survey. Nutrient deficiencies were observed for protein, in low income adolescents, women and older men, and for middle and upper income black women, older black men and older white women; for calcium, in adult black women of all income groups; for

vitamin A, in low income white adolescents, and young adult women and for adolescent black women of all income groups. HANES identified infants, adolescents and women of child-bearing years at most risk and the nutrient iron as being low enough in the U. S. diet to be a major public health concern (Hamilton & Whitney, 1982; Goodhart & Shils, 1980).

The dietary standards most commonly used in the U.S. are the Recommended Dietary Allowances (RDA) established by the Food and Nutrition Board of the National Research Council. Except for energy (kcalories), the RDA's are estimated to exceed the requirements of most adults and thereby to ensure that the needs of nearly all in the population are met (National Research Council [NRC], 1980). Recommended allowances for energy are estimates of the average needs of population groups, not recommended intakes for individuals. These needs vary from person to person and are not easily predictable without detailed information about physical characteristics and activity of the individual (NRC, 1980). The Food and Nutrition Board of the National Research Council (1980) has stated that intakes below the recommended allowances for a nutrient cannot necessarily be interpreted as a dietary deficiency; however, when the proportion of individuals with low intakes is high, the risk of deficiency in the population is increased.

Nutrient consumption research in the U.S. has focused upon determining estimates of the average amounts of energy and nutrients consumed by various sex-age groups in the population for comparison with the appropriate RDA for each group (Windham, Wyse, Hurst & Hansen, 1981). RDAs are expressed separately for males and females of different ages because of differences in growth rate or body weight and body

composition. However, conversion of the RDA table into recorded levels per unit of energy illustrates that the variability in the recommendations per kcalorie is not very great considering the reliability of the estimated need (Windham et al, 1981). Hansen and Wyse (1980) recently demonstrated that allowances for many nutrients per 1,000 kcalories are nearly constant across all sex-age categories. Hansen and Wyse (1980) have derived single-value nutrient allowances per 1,000 kcalories designed to meet the needs of all groups in the population when the energy needs of each group are met. Expressing dietary allowances and the nutritional composition of foods or diets on the same basis, i.e., nutrients per 1,000 kcalories, allows for a direct comparison between the two parameters from which quality judgements may be derived (Windham et al, 1981). Diets can be examined and compared with respect to their ability to meet dietary allowances in terms of the kcalories provided (Windham et al, 1981).

In the 1970's, the interest in nutrition seemed to become widespread. In 1977, the U.S. Select Committee on Nutrition and Human Needs (headed by George McGovern) established the U. S. Dietary Goals, which are:

1. Increase carbohydrate consumption to account for 55 to 60% of the energy (kcaloric) intake.

2. Reduce overall fat consumption from approximately 40 to 30% of energy intake.

3. Reduce saturated fat consumption to account for about 10% of total energy intake; and balance that with poly-unsaturated and monounsaturated fats, which should account for about 10% of energy intake each.

4. Reduce cholesterol consumption to about 300 mg per day.

5. Reduce sugar consumption by about 40% to account for about 15% of total energy intake.

6. Reduce salt consumption by about 50 to 85% to approximately 3 gm per day (Select Committee on Nutrition and Human Needs, 1977, p. 12)

In addition to these goals, protein consumption should account for 12% of the total energy intake.

These dietary goals brought out much lively scientific debate. So, the U. S. Department of Agriculture and the U. S. Department of Health and Human Services modified the dietary goals in 1979-80 with what they called the Dietary Guidelines for Americans (1980). These guidelines are more general. They do not list exact nutrients and percentages. The Guidelines are as follows:

1. Eat a variety of foods.
2. Maintain desirable weight.
3. Avoid too much fat, saturated fat, and cholesterol.
4. Eat foods with adequate starch and fiber.
5. Avoid too much sugar.
6. Avoid too much salt.
7. If you drink alcoholic beverages, do so in moderation (U. S. Department of Agriculture and U. S. Department of Health and Human Services, 1985, p. 5)

These recommendations were designed for average healthy Americans. They do not take into account any medical conditions or chronic diseases. The guidelines are just that—guidelines to help Americans to have an adequate diet and to have good health and nutrition.

Dietary Methodology

Dietary studies are used to determine food sources and amounts of nutrients consumed and are usually an integral part of most nutritional assessment surveys (Christakis, 1974). Dietary studies cannot be taken

as absolute indicators of adequate nutrition, but they are widely used to obtain presumptive evidence of dietary inadequacies or excesses of groups and individuals (Christakis, 1974).

Information about the dietary intake of individuals can be categorized into two general methods. The first method assesses intakes by recall including the 24-hour recall and the use of food frequencies. The second method assesses intake by records of foods eaten by an individual kept by household measurements or by estimated quantities over a stated period of time. Some methods, such as diet histories, may be combinations of recall and recording procedures (Simko, Cowell & Gilbride, 1984; Bazzarre & Meyers, 1979).

In a food recall the subject is asked to recall all of the foods and beverages (sizes and amounts) consumed over a certain period of time. Little time and money, subject cooperation and professional personnel are needed for the recall method. Another advantage is the high response rate. Twenty-four to 48-hour recalls are the most common and provide the most accurate and reliable information (Bazzarre & Meyers, 1979). One limitation of the food recall is in its interpretation: the recall may not be representative of the individuals usual food intake (Simko et al, 1984). But because of higher response rates, more representativeness and predictive validity exist for the 24-hour recall than for other methods (Burk & Pao, 1976). Another concern is that subjects may withhold or alter information because of poor memory, embarrassment or preconceived ideas about what foods the individual thinks they should be eating (Bazzarre & Meyers, 1979). Another disadvantage is the reliance on memory. However, memory for recall limited to 24 hours appears quite

good except perhaps in young children or older adults (Young, 1981). Also, individuals have a tendecy to overestimate actual intake when consumption was low and underestimate when consumption was high which is commonly referred to as the "flat slope syndrome" (Young, 1981; Madden, Goodman & Guthrie, 1976; Gersovitz, Madden & Smiciklas-Wright, 1978; Karvetti & Knuts, 1985).

Food recalls may also be accomplished by using food frequency checklists or questionnaires, either self-administered or interviewer-administered. Subjects are asked about their usual intake of various foods (usually 40 to 80 items) consumed over a certain period of time. Sizes and amounts are not included, so the food frequency method is generally considered to be a descriptive, qualitative assessment tool (Simko et al, 1984). Advantages of the method include ease of administration, relatively low cost and ease of application to large scale surveys. The main disadvantage is that it does not allow evaluation of specific nutrients, just food items. So it is not appropriate for measuring nutritional status (Burk & Pao, 1976).

Food or dietary records are intended to describe an individual's current food intake. Generally, foods are recorded in household measures and include one to seven days (Simko et al, 1984). There is no consensus on the period required to quantify food consumption in individuals. The 7-day record is commonly used and was found to be the most practical period over which intake should be measured to determine "habitual" food intake (Acheson, Campbell, Edholm, Miller & Stock, 1980). Guthrie and Crocetti (1985) concluded that 1-day food records alone are of limited value in assessing nutrient adequacy of an individual. On the other

hand, Pao, Mickle and Burk (1985) concluded that 1-day intakes provide nearly as reliable a base as 3-day intakes for computing mean intakes of large groups. Cooperation rates of this method are fairly low due to poor motivation and loss of interest in recordkeeping, so the time period for data collection should be determined with this point in mind. One of the handicaps in food records is the inability of subjects to estimate portion sizes of food accurately (Young, 1981). The quality of data is best when the subjects are cooperative, reasonably intelligent and highly motivated so the subjects can be adequtely instructed for increased accuracy (Bazzarre & Meyers, 1979).

The diet history is designed to determine a person's usual intake over a period of time. The most common method is the Burke history which includes the 24-hour recall, the food frequency checklist and a 3 to 7-day food record (Bazzarre & Meyers, 1979; Young, 1981). The diet history correlates well with clinical and biochemical measures (Young, 1981). The need for more time (1 to 2 hours) and more money, more well trained personnel and low response rates limit the method's usefulness on a practical basis.

In conclusion, each of the assessment methods can provide information about individual dietary intakes. However, there is no one method which is consistently advantageous over the others.

The dietary intake studies help to identify apparent dietary deficiencies or excesses. Researchers need to decide what trade-offs are most relevant to their objectives (Burk & Pao, 1976; Bazzarre & Meyers, 1979). According to Christakis (1974) the method selected should be no more detailed, no more cumbersome and no more expensive than necessary.

The Use of Dietary Intake Data

An evaluation of dietary adequacy has two major components according to Simko et al (1984): The collection of information about the kinds and amounts of foods consumed, and the translation of that information into nutritional terms. The analysis of dietary intakes ranges from relatively simple food scoring methods to burdensome computations of food records (Simko et al, 1984).

Food scoring systems are based on scores from food groups and specific foods. Using a scoring system from the U. S. Department of Agriculture "Basic 4 Food Guide," an evaluation of 212 24-hour dietary intakes showed that assessment using a nutritional adequacy score and comparing actual nutrient intakes to RDA's was similar to an assessment with a dietary score based on food groupings (Guthrie & Scheer, 1981). This similarity suggests that the simple dietary score can be substituted for the more complete and time consuming dietary analysis when program effectiveness is evaluated (Guthrie & Scheer, 1981; Simko et al, 1984).

Evaluations of food records may be made on the basis of the food composition tables. The standard reference tables are contained in the U.S. Department of Agriculture's Composition of Foods, Raw, Processed and Prepared, Handbook No. 8 or Church and Church's Food Values of Portions Commonly Used. Nutrient calculations may be made by hand or by computer using the food tables. There are many software packages available for nutrient analysis, generally using foods listed in the U.S. Department of Agriculture's Handbook No. 8. There are limitations to the use of food tables. Human error may occur when applying data from food consumption tables to dietary intake data. Current data on food composition may be

considered incomplete. Flaws in the tables may exist due to errors inherent in the laboratory methods of chemical analysis. Nutrient content for a given food represents an estimate obtained for different varieties of the same food, produced or prepared under a variety of conditions (Bazzarre & Meyers, 1979).

Once dietary nutrients have been determined, they are generally compared to some standard. The dietary standard in the U. S. is the recommended dietary allowance (RDA), and has been discussed earlier in this chapter.

Planned Physical Activity

Sound nutrition and a sensible program of physical activity are two of the chief requirements for health. Most people are aware of the need for a good diet, whether or not they have one, but few people seem to realize how important exercise is to their general well-being. Exercise is a dominant variable in energy balance (total energy expenditure). Energy intake is not adequately regulated to prevent obesity unless physical work is done (Briggs & Calloway, 1984).

Planned physical activity was defined as aerobic exercise performed consciously by an individual to promote a moderate to high level of cardiovascular fitness. To determine the adequacy of physical exercise, one needs to examine the frequency, duration and intensity of the activity. Frequency refers to the number of exercise sessions per week. How often one needs to exercise for optimal fitness has not been clearly established, but it is dependent to a large degree on the objectives of the training program as well as the intensity and duration of the workout (Stull, 1980). Duration refers to the length of time the individual

exercises at the prescribed intensity. The duration of effort is closely related to the intensity of effort (Stull, 1980). In general, it can be stated that the magnitude of the gains in physical fitness are roughly proportionate to the duration of effort if intensity and frequency remain constant (Stull, 1980). The American College of Sports Medicine (1978) recommends 15 to 60 minutes of continuous aerobic activity three to five days per week. The intensity of exertion refers to the percentage of maximum capacity that is achieved during the physical activity (Stull, 1980). Intensity has been measured by heart rate after exercise to determine cardiovascular capacity. Shapiro, Shapiro and Magazanik (1976) developed a simple bench step test of aerobic capacity. The validity of this test was determined by comparing the correlation coefficient between the predicted maximum oxygen uptake measured on a bicycle ergometer and the step tests recovery pulses. Maximum oxygen uptake is the greatest amount of oxygen a person can take in during exercise and so reflects the ability to transport oxygen to the tissues. Thus, maximum oxygen uptake is one index of fitness (Briggs & Calloway, 1984). Since low to moderate intensity exercise (of longer duration) is recommended for non-athlete adults (which describes the study population), most of the research is supportive of the 60 to 80% range of optimal intensity, adjusted for level of aerobic capacity (maximum oxygen uptake) as recommended by the American College of Sports Medicine (1975) in its guidelines.

Body Composition

Obesity carries with its increased risk of illness and death from a number of diseases: heart disease, high blood pressure, stroke, kidney disease, gallstones, cirrhosis of the liver and diabetes. The health

hazards that accompany overweight are naturally increased with a larger excess of weight and with advancing years. Even to the unpracticed eye, body measurements are a fair indication of the stores of fat, and thus of relative body composition. Body weight has been used as such a measure, and can often give a fair indication of the magnitude of adipose stores in an individual (Pike & Brown, 1975). However, if standard height-weight tables are used to determine desirable body weight, individuals who conform to these standards actually vary widely in the proportions of lean and fatty tissue. Therefore, body composition is a better indicator of leanness than is body weight (The American Dietetic Association, 1980).

Several methods are available for meauring body composition (Jackson & Pollock, 1985). The methods most often used are laboratory techniques, of which hydrostatic weighing is the most popular, and anthropometric techniques, which include height-weight indexes, skinfold fat, body circumferences, and bone diameters (Jackson & Pollock, 1985). The laboratory methods are accurate, but expensive in terms of time, equipment and trained technicians. For these reasons, the hydrostatic methods are usually not used in the clinical setting or for mass testing (Jackson & Pollock, 1985). Various height-weight ratios have been used often to evaluate body fatness. However, research has shown that skinfold variables provide more accurate estimates of hydrostatically measured body density than height-weight ratios (Lohman, 1982; Pollock, Schmidt & Jackson, 1980). The researcher in this study used weight-height^2 ratios (body mass index) and skinfold measurements to

determine percentage of body fat and computation of desirable body weight.

Skinfold thicknesses at four sites: triceps, biceps, subscapular and suprailiac, and total body density (by underwater weighing) were measured on 209 males and 272 females by Durnin and Wormersley (1974). These researchers developed and tested a method for estimating prcentage of body fat using the skinfold thickness measurements. The researchers compared the values of percentage of body fat with the skinfold thickness measurements to total body density. A significant positive linear relationship was found between the two techniques of measuring percentage of body fat. The Durnin method is based on the assumption that approximately one-half of the total body fat is subcutaneous and that a good estimate of body fat can be obtained by measuring the skinfold thickness at various sites (Durnin & Wormersley, 1974).

The fat and lean components of the human body are determined indirectly using skinfold measurements with Lange Skinfold Calipers applied at constant pressure at selected body sites: triceps, biceps, subscapular and suprailiac. This method is practical, inexpensive and a reliable predictor of fatness. Acceptable levels of body fat range from 7 to 15% for men and from 12 to 25% for women (Fox, 1979). A fat content in excess of 20% for men and 30% for women is regarded as obesity (Davidson, Truswell, Passmore & Brock, 1975; Buskirk, 1974). With aging, total body fat for both sexes gradually increases, with the greater increase occurring in women (Young, Blondin, Tensuan & Fryer, 1963; Keys & Brozek, 1953).

Consistency or reliability of skinfold thickness measurements to determine percentage of body fat may be of concern. According to Gavan (1950), consistency increases as: the number of technicians decreases, the amount of subcutaneous tissue decreases, the experience of the technician increases and the landmarks are more clearly defined.

Although large quantities of body fat are undesirable for good health and fitness, precise statements cannot be made as to an optimum level of body fat or body weight for a particular individual (Katch & McArdle, 1983). More than likely, this optimum varies from person to person, and is influenced by a variety of genetic factors. Based on data from active young adults and competitive athletes, however, it does appear that it would be desirable to maintain body fat at about 15% of body weight for men and 25% or less for women (Katch & McArdle, 1983). A procedure for determining "optimal" or desirable body weight has been developed by Katch and McArdle (1983).

Probably the simplest method for rating accurately the degree of obesity is the Body Mass Index (BMI) (Briggs & Calloway, 1984). This index is easily computed by dividing the body weight (kg) by the square of height (M). The BMI offers the advantage of providing a continuous quantitative scale for relative weight which facilitates comparisons of individuals with population norms (Thomas, McKay, & Cutlip, 1976). A nomograph developed by Thomas et al. (1976) was used to facilitate use of the BMI in clinical settings. The nomograph has indications of "desirable weights" that correspond to the life insurance company tables.

Job Performance and Absenteeism

Corporate America is becoming cognizant of the benefits linked with health promotion: increased productivity, reduced absenteeism and turnover, improved morale, more appropriate utilization of medical services, and decreased disability and premature death (Brennan, 1982). Approximately 97 million Americans are employed, and therefore, the workplace can affect lifestyle habits. These habits do have a significant effect on how long Americans live and their everyday level of health (Laughlin, 1982).

Absenteeism is a major factor in the decline of productivity of employees in many organizations (Vassar & Gines, 1985). According to Howard and Mikalachki (1979) the effect of absenteeism on productivity is both direct and indirect. Directly, there is lost productivity of either no one doing the job or a less experienced person doing the job. Indirectly, there is the cost of employee benefit plans, the excess workforce carried in anticipation of absenteeism, the staff "infra-structure" needed to plan for and manage absenteeism, and similar such costs. The importance of absenteeism as a cost is beginning to get the attention of industry and government. In 1980 an estimated 339 million productive work days were lost as a result of health conditions, most of which may be preventable (Brennan, 1982).

It is estimated that the average U.S. employee takes from seven to 12 workdays of unscheduled absences every year, and that absenteeism costs the nation about $26.4 billion annually (Morgan & Baker, 1984). This amount does not include the financial losses from lowered productivity, poor product quality due to the substitution of untrained

workers, replacement training, payroll for standby employees and recordkeeping (Morgan & Baker, 1984).

There are many causes of absenteeism, and they may be grouped into three broad categories. The first and most common cause of absences are personal problems, including illnesses, marital problems and family responsibilities. Illnesses alone account for nearly 60% of all absences. The second problem area covers internal or work related problems that affect the attitudes of workers toward attendance. The third area involves external or environmental problems that occur away from the job but have impact on the employee's ability to attend work (Morgan & Baker, 1984).

All of these causes are directly or indirectly due to poor health. Note that illnesses alone account for nearly 60% of all absences. Eight out of 10 cases of chronic illness, disability, and early death are related to personal health habits, such as smoking, overeating, poor nutrition, and lack of exercise (Pearson, 1983). Health promotion programs should help to motivate employees to assume personal responsibility for their health.

The factors influencing employee turnover and absenteeism are complex (Shephard, 1983). Ability to attend work may increase with gains of cardiorespiratory power (reduction of fatigue, willingness to continue work during minor illness) and an elevation of mood, while a fitness/lifestyle program may also improve motivation through an impact upon work satisfaction or organizational loyalty (Shephard, 1983).

Linden (1969) found a significant relationship between absenteeism and maximum oxygen uptake in customs officers, but not in firemen or

office workers; moreover, there were frequent absences of workers in all three occupations with poor aerobic power. Collis (1977) noted a 50% reduction of absenteeism when an employee lifestyle/fitness program was introduced at a Goodyear plant in Sweden. Toronto employees of Canada Life Assurance Company who were classified as "high adherents" in the company's employee fitness and lifestyle program had a 42% decline in absenteeism over an 8 month period.

In theory, an employee fitness/lifestyle program could enhance productivity through an increase in physical work capacity; a reduction of absenteeism and accidents; relief of boredom, anxiety, or pent-up aggression; and an increase in alertness (Shephard, 1983). In reality, these results are difficult to measure and to prove.

Performance, as defined by Webster's New Collegiate Dictionary (1956), is the execution of the functions required of one (p. 625). Therefore, job performance would be the execution of job functions required by the employer. Ratings of performance are known as performance appraisals. When rating employees, supervisors need to be concerned with accuracy, consistency and objectivity (Sears, 1984). To achieve these goals, supervisors may have to adapt the performance appraisal system to the demands of the situation. According to Sears (1984), appraisal methods fall into one of two general categories: ranking methods or methods involving some kind of absolute standard. Ranking methods are just what the term implies: employees in a unit or division are compared in terms of performance criteria and ranked in some fashion. The other appraisal methods (ie, those with absolute standards) can be divided into three categories:

1. Attributes. These methods use personal or work attributes such as leadership ability, knowledge, and attendance as appraisal standards, and require that the employee be evaluated in terms of "how much" of these attributes he or she possesses. Also in this category are adjective checklists. Raters check adjective descriptions - for example, punctual, cooperative, aggressive, or tempermental-that best fit the employee's performance.

2. Behaviors. Systems that appraise behaviors are really variations of attribute appraisal methods. The difference is that scale levels ("below average" and "above average") are "anchored" or described by specific examples of job behavior. These examples, developed by supervisors who know the job, represent instances of behavior against which an employees' behavior can be judged.

3. Objectives. Management by objectives (MBO) is the most popular of this category. It is both a planning and appraisal process in which organization goals are determined by management, and work objectives that support the goals are identified at each level of the organization. (Sears, 1984, p. 7-8)

Smith and Wing (1983) developed a five step model for improving employee performance, which was shown to be 75% effective:

1. Looking at a subordinate's total performance and focusing on significant behavior requiring improvement.
2. Agreeing on a description of current performance.
3. Finding out why expectations are not being met.
4. Developing a performance improvement plan.
5. Making sure improvement provides a payoff. (p.36)

Smith and Wing (1983) also note seven causes of poor performance:

1. Subordinate doesn't know what is expected.
2. Subordinate doesn't get feedback about the level and the quality of actual performance.
3. Expected performance is difficult, "punishing," or in some way less desirable for the subordinate.
4. Subordinate knows how to do what is expected but is "out of practice."
5. Subordinate doesn't know how to do what is expected.
6. Something in the work environment interferes with performance.
7. Performing below expectations is easier,"rewarding," or in some way more desirable for the subordinate. (p. 40-41)

Once causes like these are identified, it is much easier to work with the subordinate on improving performance.

Another method for improving performance may be in participating in regular exercise. Donoghue (1977) asked the question of whether or not the employee who exercises regularly demonstrates a better work performance. Donoghue (1977) identified numerous researchers who have found that regular exercise does correlate with better work performance. Dr. Kenneth Cooper (1968) performed a study on students at the squadron officers school at West Point which showed a correlation between performance on the treadmill test and academic and leadership qualities. Improved endurance performance may make the body less susceptible to fatique and less likely to commit errors. Briggs (1975) conducted an exercise program with Electrohome employees at the University of Waterloo. This exercise program resulted in better memory, improved muscle control, improved work performance and decreased anxiety among employees. Donoghue (1977) reported that the Canadian Post Office pilot project found that 81% of the participants felt their work performance had improved due to reported exercise workouts. Donoghue (1977) also reported that the Department of Health and Welfare of Canada also

sponsored a pilot employee fitness program which began in 1973. Over 59% of the participants reported improved work performance, 58% claimed a more positive work attitude, while 78% stated that they felt less stress and tension. So health promotion programs which include and/or encourage regular physical exercise may see improvment in performances when rating performance appraisals.

To improve work performance, one should consider nutritional status. It has been demonstrated by many researchers that overall nutritional status affects work performance (Goodhart & Shils, 1980; Briggs & Calloway, 1984) but limited research is available on individual nutrient adequacy and the effects on performance. Two key nutrients that affect workers in sedentary jobs are iron and energy. If iron and energy are insufficient, fatigue, apathy, and poorer work performance result (Goodhart & Shils, 1980). Poor iron status has been associated with decreased work capacity (Gardner, Edgerton, Barnard & Bernauer, 1975). More research is needed on the effects of nutrient deficiencies on work performance of women in sedentary jobs.

Summary

Based on this review of literature, it can be concluded that women (ages 23 to 60 years) are vulnerable to nutritional deficiencies. Studies indicate that women in this age bracket tend to be most deficient in dietary intakes of iron, calcium, kcalories, vitamin A and vitamin C. Nutritional needs are more difficult to meet adequately with lower kcaloric intakes as demonstrated by studies of women with lower dietary iron and calcium levels per 1,000 kcalories. The poorer diets may be due to the great concern women have for weight control as evidenced by the

popularity and increased numbers of diet centers and health spas (Kerwin, 1981). The two factors which must be considered in helping women achieve acceptable body weights are kcaloric intake and activity level. Many women, particularly those working in "sit-down" jobs, tend to decrease or limit the kcaloric intake, but for various reasons do not increase their physical activity level. Many women may be able to maintain a desirable weight range, but are overfat because they do not exercise.

A nutrition-based health promotion program, with an exercise component, could benefit employees in improving nutritional status, physical fitness, and reduce body fat. From a business standpoint, these improvements could benefit companies by improved job performance and reduced absenteeism and possibly improved morale. No reports in the literature describe a nutrition-based health promotion program as the one proposed, so further research is needed in the area of health promotion programs emphasizing nutrition and physical activity for clerical-type working women (such as airline reservationists).

CHAPTER III

METHODS AND PROCEDURES

The purpose of this study was to determine whether certain health characteristics of female reservation agents were improved by introducing a company sponsored nutrition-based health promotion program. The variables measured included kilocalories and selected nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin); hemoglobin; time spent in planned physical activity; body composition; skinfold thicknesses for percentage body fat; estimates of desirable body weight; Body Mass Index (BMI); height, and weight; job performance and absenteeism.

A quasi-experimental, non-equivalent control group, pretest posttest design was used for this study. This design was described by Campbell and Stanley (1963) and is one of the most widespread experimental designs used in education research. An experimental group was selected from among Piedmont Airlines reservation employees working in one location in Winston-Salem, NC. A control group was selected from among Piedmont reservation employees working in another location in Nashville, TN. Though a matching procedure was used to select the control subjects, the two groups did not have complete pre-experimental sampling equivalence. Analysis of covariance procedures were used in some of the statistical analyses to allow for preprogram nonequivalence of the two groups. This procedure has been recommended by several researchers (Ary, Jacobs, & Razavieh, 1979; Campbell & Stanley, 1963).

Contrary to the suggestion of Campbell and Stanley (1963), subjects were not assigned by random method to the experimental or control groups.

Due to the distance and cost that would have been involved in conducting the educational program in Nashville, that group was used as the control group. There was no other group of reservation employees available in Winston-Salem that could have been used as a control group. Both experimental and control subjects could not be from the Winston-Salem group because the nature of the educational program was such that the total group of 600 reservation employees received some exposure to the treatment through displays and posters at the worksite.

Recruitment of Subjects and Sample Selection

The population for this study included approximately 400 female, full-time reservation employees of Piedmont Airlines' Winston-Salem Reservation Center and approximately 200 in the Nashville, TN, Reservation Center who had expressed an interest in participating in a health promotion program at the worksite. These employees ranged in age from 19 to 60 years. All had at least a high school education and many had some college background. Each employee had received special training by the company before assuming her job as a reservation agent. The pay range of the group was above the average salary of other employed females in the same geographic area.

The job of reservationist consists primarily of sitting at a desk, receiving phone calls, and using a computer terminal to arrange flight reservations for customers throughout the Southeastern section of the U.S. Full-time agents work from six to nine hours per shift. Shifts begin and end at many times during the day. Part-time and male employees were not included in the sample since they represented only a small

percentage of the total workforce and because of the difficulty in matching with control subjects.

In order to insure representation of certain subgroups, a stratified random sampling procedure was used to select experimental subjects. The sampling frame for experimental subjects consisted of approximately 200 employees in the Winston-Salem office who had responded to a company memorandum (Frazier, November 11, 1983, Appendix B) and who had indicated on the attached form that they wanted to participate in the educational program and would be willing to serve in the experimental group. The sampling procedure for selection of subjects was as follows:

1. All members of the accessible population were asked to complete Form 001 (Appendix A) giving information by which they would be statified.
2. The information was then used to stratify the population into 8 subgroups according to three variables:
   a. Two work periods (1) Day Shift - those coming in between 6:00 and 10:00 a.m. morning and getting off no later than 7:00 p.m. and (2) Evening Shift - those coming in at 1:00 p.m. or after and getting off after 7:00 p.m.
   b. Two body weight categories (1) Normal Weight - those who reported they desired to lose 5 pounds or less of weight (2) Overweight - those who desired to lose 6 pounds or more;
   c. Two age categories (1) less than age 35 and (2) age 35 or older.
3. Nine subjects were drawn by random selection from each of the eight subgroups of employees providing a total of 72 potential experimental subjects.
4. Potential subjects were notified by letter of their selection and of the dates on which measurements would take place.

The group of potential control subjects were selected from all full-time, female reservation agents in the Nashville office who had responded to a letter (Carolyn Matthews, November 14, 1983, Appendix B) indicating they would be interested in participating in a health promotion program at some future date and were willing to serve in the

control group. From the potential group of 200 employees, control subjects were handpicked to match the experimental subjects as closely as possible on the three variables by which the stratification was made: age, workshift, and perceived weight category. Reports in the literature indicate that age influences job satisfaction scores, caloric and nutrient requirements, and percentage of body fat (Katch & McArdle, 1983; NRC, 1980). It was believed that workshift would influence physical activity and eating patterns. It was expected that motivation to participate in seminars and exercise would be affected by whether the subject perceived herself to be overweight and how much she desired to lose.

Complete sets of pretest (baseline) data were collected on 59 experimental subjects in the Winston-Salem group and 53 control subjects from the Nashville group. Those subjects in the initial sample (72 experimentals and 72 controls) who did not return complete sets of forms were not included in the final sample. Complete sets of postdata were obtained on 42 experimental and 42 control subjects. The return rate of subjects for which postdata were obtained was 72% for the experimental group and 78% for the control group. The final sample of 42 experimental and 42 control subjects is shown in Table 1 according to the eight stratifying characteristics.

Table 1 Stratification of Experimental and Control Subjects (N = 42 for each group).

	Less than age 35				Age 35 or older			
	Normal weight		Overweight		Normal Weight		Overweight	
Shift	Exper.	Control	Exper.	Control	Exper.	Control	Exper.	Control
Day	6	8	6	6	4	5	6	7
Evening	6	4	4	5	4	3	6	4
Totals	12	12	10	11	8	8	12	11

Instrumentation

Nutritional adequacy was defined for purposes of this study as the intake of kcalories and certain nutrients (protein, calcium, iron, vitamin A, vitamin C, thiamin, riboflavin and niacin) as compared to the RDA's. The nutrients were assessed on each of the subjects using a standard 3-day food record and a 24-hour dietary recall. The 24-hour dietary recall was used as a training method for the 3-day food record. The subjects were also instructed by the researchers on how to accurately complete the 3-day food record. These data were analyzed for nutrient content using the Nutri-Calc (1979) microcomputer program. The program uses as a data base the entire list of 730 foods in Nutritive Value of Foods: Home and Garden Bulletin # 72 (Science and Education Administration, 1981). In addition, it includes 91 brand name products consisting of soft drinks and cereals. Subjects were asked to supply recipes for some homemade mixed dishes appearing on their 3-day food records, which were analyzed by the Nutri-Calc program and added to its

data base. An average of each nutrient from the 3-day food record and the 24-hour dietary recall were computed. A diet providing two-thirds of the RDA for a set of seven indicator nutrients (protein, calcium, iron, vitamin A, vitamin C, thiamin and riboflavin) as well as niacin was rated "good" (Hamilton & Whitney, 1982). Two-thirds of the 1980 RDA is one of the standards used in surveys of the U. S. population to determine people's nutritional status (Hamilton & Whitney, 1982).

Iron status was also assessed using hemoglobin. A registered nurse used an autolet to "prick" the finger to release a drop of blood. Then the nurse used a hemoglobinometer to measure the hemoglobin value, which was then recorded on form 008, Appendix A. Hemoglobin values less than 10.0g/100 ml were considered deficient, suggesting individuals had iron deficiency anemia (Grant, 1979).

In this study, the female reservation agents were encouraged to change/improve health behaviors through the use of lectures, short exercise sessions during seminars, pamphlets, and posters and to participate in some level of planned physical activity whether accomplished at work, at home or at a community facility. No specific physical activity program was conducted as such in the nutrition-based health promotion program.

Participation in planned physical activity (minutes per week) was self-reported using Part II of the Nutrition and Health Habits Inventory (Form 009, Appendix A) and was evaluated for the study. This instrument was developed by the researcher and the coworker. Since the purpose of the instrument was to gather information about habits and practices, without resulting in a score, no tests were conducted to establish

validity or reliability. A pilot test was conducted with the instrument by five volunteer airline reservationists to insure that its use would result in the collection of appropriate information needed in the study, and that it could be completed with little difficulty by the subjects. Planned physical activity was then arbitrarily classified into three categories: (1) less than 90 minutes per week; (2) 90 to 150 minutes per week; (3) and greater than 150 minutes per week. These categories were determined using the American College of Sports Medicine (1978) recommendation of approximately 30 minutes of continuous aerobic activity three to five days (or 90 to 150 minutes) per week. Thus, subjects in categories 2 and 3 would be engaged in acceptable levels of planned physical activity.

Cardiovascular fitness was measured by taking the heart rate after a simple step test. Shapiro, Shapiro and Magazanik (1976) developed a simple bench step test of aerobic capacity. The validity of this test was determined by comparing the correlation coefficient between the predicted maximal oxygen uptake measured on a bicycle ergometer and the recovery pulses during the step tests. A 12 inch step test was used in this study. Each test lasted six minutes at a rate of 25 steps per minute (or 100 beats per minute). Prior to the step test, subjects received instruction in locating and counting their pulse at the carotid artery for 10 seconds. Each step consisted of "up-up-down-down." The subjects were given 15 seconds of practice stepping to adjust to the cadence of the metronome. Immediately following recovery, the pulse was counted at the carotid artery for 10 seconds and recorded (form 010, Appendix A). This 10 second pulse rate was multiplied by 6 to give the

heart rate score in beats per minute. Comparison of pre and poststudy heart rates were made between the experimental and control groups.

Body composition was estimated by weight/height squared ratios (Body Mass Index), skinfold measurements to determine percentage of bodyfat, and computation of percentage of desirable body weight. Pre and poststudy values were compared.

The subjects were weighed in underclothing, without shoes, on a double beam balance, and the weight was recorded on form 010 (Appendix A). Height measurements were taken using the following procedure. The subject stood against a wall (without shoes) with heels together and in contact with the wall with the back in contact with the wall, looking directly forward and head held straight. A right angle block was positioned until the bottom surface touched the subject's head. The height was read using the tape measure on the wall to the nearest inch, and recorded (form 010, Appendix A).

Triceps, biceps, subscapular and suprailiac skinfolds were measured twice by the researcher for pre and postmeasures according to standard techniques established for these specific measurements ("Durnin Method of Estimating Percentage Body Fat," Appendix A) and an average of each skinfold was taken on each of the subjects. The sum of the four skinfolds was used to estimate the percentage of body fat using the table constructed by Durnin and Womrsley, 1974 (Appendix A). All values were recorded on Form 010 in Appendix A.

Desirable body weight was estimated by the formula of Katch and McArdle (1983) and computed as follows:

$$\text{Desirable Body Weight (lb)} = \frac{\text{Lean Body Weight (lb)}}{1 - \text{\% Body Fat Desired}}$$

where,

Fat Weight = Present Body Weight (lbs) x % Fat Desired

and,

Lean Body Weight = Present Body Weight (lbs) - Fat Weight

Then

Desirable Fat Loss = Present Body Weight (lbs) - Desirable Body Weight

This study used the value of 25% as the percentage of fat desired for women (Katch & McArdle, 1983).

Body Mass Index (BMI) was computed by dividing the body weight (Kg) by the square of height (meters). A nomograph developed by Thomas, McKay and Cutlip (1976) was used to indicate the cut-off points for desirable weight (19 to 24), overweight (greater than 24), and underweight (less than 19).

Job performance in this study was assessed using Piedmont Airlines, "Performance Appraisal and Development Program." This tool is used by the company at the present time. The Piedmont appraisal is a combination of using attributes and behaviors as referred to by Sears (1984). The appraisal is designed to evaluate employees' performance and to develop plans of action for improving performance or assisting employees in reaching career goals. The supervisor of the employee evaluates six key job element areas: job knowledge, productivity, quality of work, salesmanship and professionalism, attendance, and team effort. Attendance in this appraisal considers punctuality, dependability and the effort the employee makes to be at work. The performance is then coded 1 (outstanding) through 5 (needs improvement). Pre and posttest scores were compared to determine if the treatment group had any improvement in performance.

Attendance was measured by records kept by Piedmont of the number of workdays missed for personal illness over the six month period prior to the initiation of the program, and the six month period after the education program. Then the number of days (hours) missed were classified in the following categories: 0 hours; >0 to 96 hours (Morgan & Baker, 1984) and > 96 hours, and then compared between the experimental and the control group.

Procedures and Time Schedule

Between August 25 and December 29, 1983, several sessions were conducted by the author and the coworker with personnel and management officers of Piedmont Airline Reservation Center in Winston-Salem, NC, to work out details of the data collection and health promotion program (see Phyllis Hutchens, December 29, 1983, Appendix B). Data were collected at two different times, with a seven-month experimental educational program being conducted between the first and second series of measurements. On November 11, 1983 a memorandum from a Piedmont Airlines personnel representative was distributed to all reservation employees (approximately 600) at the Piedmont Airlines' Reservation Center in Winston-Salem, NC. A copy of the memorandum (Frazier, November 11, 1983) is located in Appendix B. The memorandum gave a brief description of the purposes and tentative plans for the health promotion program. Each employee was asked to return a form attached to the bottom of the memorandum by November 28th, to indicate her interest in participating in the health promotion program to begin in March, 1984. Approximately 200 employees responded that they would like to participate. As described earlier, experimental subjects were drawn from this group of 200 and were

notified by letter of their selection. This procedure was completed in early January, 1984.

On January 31, 1984, all instruments to be used in the total study (Parts I and II) were pretested in a pilot study with six Piedmont Airline employees who were not in the main study sample. These employees came to a conference room at the Winston-Salem facility as a group. The purposes of the study were explained and cooperation of the participants was solicited. Subjects completed the various data collection forms in the presence of the researchers and anthropometric measures were taken. Forms and procedures of measurement were evaluated for clarity, ease of completion, and time to complete. Some adjustments were made in the forms and procedures before use in the main study.

Prestudy measures were collected on the experimental subjects during the period between February 6 and March 9, 1984. Anthropometric measures, hemoglobins, and 24-hour recalls were measured at the work site in a room normally used as a "sick room", which provided needed privacy. Hemoglobins were measured by a registered nurse. Skinfold measurements were collected by the author, trained in anthropometric measurement. Twenty-four hour recalls were collected on each subject by the coworker. All other data were collected with forms completed by the subjects, either during working hours or at home.

Before being measured, each subject signed a consent form, which listed mutual obligations of the subject and the researcher. Copies of the consent forms signed by both the experimental and controls subjects are located in Appendix A.

Prestudy measures of the control subjects were conducted during the period between March 14 and March 30, 1984. A letter was sent to the Nashville site manager in advance which gave details of the planned measurement procedures (letter to Carolyn Matthews, February 27, 1984, Appendix B). Hemoglobins, skinfolds, and 24-hour recalls were taken at the work site (Piedmont Reservation Center, Nashville, Tennessee). Subjects completed forms for all other data, either at home or while on duty at their jobs. Data were collected jointly by the author and another graduate student, with the assistance of a registered nurse who normally worked for the company as a reservation agent. The registered nurse, who measured the hemoglobins of controls, was not the same one who measured the experimental subjects. However, the same instrument and procedures were used for both groups.

The experimental educational program was conducted in the Winston-Salem facility during the seven-month period between March 1 and September 28, 1984. Twelve different seminar topics were presented over the first six months (two per month) with each seminar being repeated seven times over a two-day period. Each seminar was 30 minutes long. Company policy did not allow subjects to attend seminars during work hours; however, all efforts were made to offer seminars before and after work shifts in order to make attendance more convenient.

In addition to the seminars, four different newsletters were distributed to subjects using the company interoffice mail system. The last newsletter was distributed during the seventh month of the program (September, 1984). Posters with nutrition and wellness messages were placed at strategic loations in halls and eating areas. Table tents

(standing cards), containing nutrition and health messages, were placed on tables in the lunch and break rooms. Posters and table tents were changed periodically.

A problem developed very early in the treatment phase of the study (health promotion educational program) in that subjects did not attend seminars regularly. To increase this participation, several steps were taken. A questionnaire (Form 011, Appendix A) was sent to each experimental subject to obtain information of whether the seminar topics and times were acceptable to the subjects. The questionnaire also contained a question asking subjects to state the reasons, if they did not plan to attend the remaining seminars. The questionnaire was placed in employee mail folders, along with a cover letter from the personnel manager (Debbie Brown, April 25, 1984, Appendix B).

Approximately 75% of the subjects returned the questionnaires, indicating that they were very pleased with seminar topics and did not desire changes. Some slight adjustments in seminar times were requested and were made where possible. Most of the subjects' reasons for not attending seminars were in the following categories: required by company to work overtime; extreme fatigue at end of work shift due to increased work demands and longer working hours; obligations at home which prevented them from remaining after work for seminars, such as child care, illness in family, home care requirements; being away on vacation or personal sick leave.

To encourage attendance at seminars, times were adjusted as requested by the subjects on the questionnaire. Letters were sent to subjects at various times from the coworker, to remind them of seminar

topics and times (Letters to Wellness Program Study Participants, Appendix B). In an attempt to compensate for nonattendance at seminars, various other educational methods were used including the following:

1. After each round of seminars was completed on a topic, handouts from the seminar were placed in the mail boxes of study participants who had not attended the seminar.

2. Self-learning packets were prepared on each seminar, containing a cassette recording of the seminar and visuals. These packets were made available for participants to check out and take home overnight. Sign-out sheets indicated that subjects did check out these learning packets on a fairly regular basis.

The titles of the 12 seminars in the educational program were as follows:

1. Wellness Profile
2. Exercise Your Way to Fitness and Health
3. Let's Get Physical
4. Vitamins, Minerals, and Calories: What do they do for Me?
5. The Stress Connection
6. Coping With Stress
7. Eat For The Health of It
8. Cut The Fat
9. Carbohydrates Count
10. What Fiber Can Do For You
11. One For The Road (Alcohol, Medications, and Nutrition)
12. How much is too much? Caffeine and Cigarette Smoking

Copies of seminars, handouts, newsletters, and table tents involved in the educational program are available on request from the author.

During the period between October 11, 1984, and February 1, 1985, after the educational program had ended, all tests were repeated on the experimental and control subjects. Posttest measures were conducted at the work sites in both Winston-Salem and Nashville in a similar fashion as the pretest measures. The same people collected the measurements, with the exception that the registered nurse who took hemoglobins on the experimental group during posttests was not the same one who measured during the pretests. Several letters were written to the Nashville reservation manager, Carolyn Matthews, and to both the control and experimental subjects giving details of dates and procedures for posttest measurement. These letters appear in Appendix B in the order written.

Data Compilation and Analysis

Analysis of food recalls, scoring, and compiling of data from questionnaires were conducted between December 1, 1984 and February 28, 1985. The coding of foods from the 24-hour dietary recall and the 3-day food record was done by both researchers. Scoring of the percentage of body fat was done by the author. Piedmont Airlines data on job performance scores and absenteeism rates was gathered by the author. Scoring of planned physical activity was done by the coworker (who did Part II of the overall study). Final scores and values for each individual subject were recorded on a special form designed by the author (Form 012, Appendix A). Data were entered into the computer directly from these forms by the coworker.

Statistical analyses were conducted at the Computer Center at the University of North Carolina at Greensboro during March, 1984. The SAS (Statistical Analysis System) package was used in analyses. A consultant

with the UNC-G Computer Consulting Center assisted the researcher. The following statistical procedures were used:

1. Descriptive statistics including range, means, frequencies, percentages of

   a. daily intake of selected nutrients: kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin, and the percentage of subjects on pre and posttest who were less than 66% of the RDA or 66% or greater than the RDA in these selected nutrients.

   b. subjects on pretest and posttest who had hemoglobins less than 10 gm/100 ml or 10 gm/100 ml or greater.

   c. time (minutes per week) spent in planned physical activity and percentage of subjects in each of the three levels of planned physical activity.

   d. subjects on pretest and posttest who had percentages of body fat < 30% or 30% or greater.

   e. subjects on pretest and posttest who had body mass indexes <19, 19 to 24, or >24.

   f. subjects on pretest and posttest who had percentage of desirable body weights <100%, 100% or >100%.

2. Analysis of covariance on pre and poststudy scores on experimental and control subjects (using prestudy scores as the covariate) with the following variables: kcalories and the selected nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin) for H1; hemoglobin for H1; job performance for H4; percentage of body fat and Body Mass Index for H5.

3. Chi-Square test on posttest scores on experimental and control subjects on levels of nutritional adequacy (kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin) and hemoglobin for H2.

4. Chi-Square test on pre and posttest scores on experimental and control subjects for the following variables: planned physical activity categories (low, medium and high) for H3; absenteeism for H4.

5. Chi-Square test on pretest scores on experimental and control subjects for the following variables: between planned physical activity categories and absenteeism for H6; between the levels of nutritional adequacy and hemoglobin, and absenteeism for H7.

6. Analysis of variance on pretest scores on experimental and control subjects between planned physical activity categories and job performance for H6.

7. T-test on pretest scores on experimental and control subjects between the levels of nutritional adequacy and hemoglobin, and job performance for H7.

The Recommended Dietary Allowances (NRC, 1980) were used as the standard to make judgements on adequacy or excesses of intake of certain nutrients. Food intake was analyzed for nutrient content using the Nutri-Calc microcomputrer program (Nutri-Calc, 1979). All coding was done by the author and four other people, who were carefully trained to insure consistency and accuracy in coding foods for nutrient analysis.

Hemoglobin was measured from a blood sample using a hemoglobinometer. Time spent in planned physical activity was estimated from the Nutrition and Health Habits Inventory (Part II, Form 009) by adding the minutes of time reported in activities D through G, then averaging the amount by two to obtain the time for one week. Cardiovascular capacity was measured by heart rate after a simple step test (Shapiro, Shapiro & Magazanik, 1976). Job performance was evaluated by Piedmont Airlines supervisors using their "Performance Appraisal and Development Program" form.

On many of the variables, the subjects' values were compared to certain recommended levels or standards of normal, based on a review of the literature. The standards used in this study are listed in Table 2 and Table 5.

Table 2

Recommended Values and Standards Used in Evaluating Variables

Variable	Standard or recommended value	Reference
Hemoglobin	10 g/100 ml	Grant, 1979
Cardiovascular capacity	60-80% maximum oxygen uptake	American College of Sports Medicine, 1978
% Body fat	30% and greater considered obese	Buskirk, 1974
Desirable body weight	> 100% considered overfat	Katch & McArdle, 1983
Body Mass Index	> 24 considered overweight < 19 considered underweight	Thomas, McKay & Cutlip, 1976
Job performance	30 low, 0 high	Piedmont Airlines
Absenteeism	0-12 workdays (0-96 hours) considered acceptable > 12 days considered unacceptable	Morgan & Baker, 1984

Nutrients and the Recommended Dietary Allowances are located in Table 5.

CHAPTER IV

RESULTS AND DISCUSSION

The purposes of this study were (a) to assess dietary levels of kcalories and certain nutrients, including protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin as well as hemoglobin values among female airline employees; (b) to assess levels of time spent in planned physical activity and to assess changes in cardiovascular fitness as measured by heart rate; (c) to assess body composition by percentage of body fat, computation of percentage of desirable body weight and Body Mass Index; (d) to assess levels of job performance and absenteeism; (e) to analyze the nutritional adequacy of the diet and its relationship to job performance and absenteeism; (f) to analyze time spent in planned physical activity and its relationship to job performance and absenteeism; (g) to assess the effectiveness of a nutrition-based health promotion program in producing desired changes in diet, time spent in physical activity and body composition. Complete sets of data were obtained on a total of 84 adult female subjects, with 42 from the experimental group and 42 from the control group. The following variables were measured on all subjects and used in testing hypotheses: daily dietary intake of kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin; hemoglobin; weekly physical activity; percentage of body fat and of desirable body weight; body mass index; heart rate after exercise; job performance and absenteeism. Individual data for subjects are located in Appendix C, Tables C-1 and C-2. Except for two variables, data for each variable were normally distributed. The data for absenteeism did not follow a

normal distribution, so the data were categorized into three levels of the number of hours missed. The data for the time spent weekly in planned physical activity were also not normally distributed, so the data were categorized into three levels of the number of minutes spent in activity representing low, medium and high levels of response.

Analysis of covariance procedures (ANOCOVA) were used to test hypothesis 1, part 1 of hypothesis 4, and hypothesis 5. As defined by Gay (1981), analysis of covariance is a statistical method for equating groups on one or more variables and for increasing the power of a statistical test; the procedure adjusts posttest scores on a dependent variable for initial differences on some variable such as pretest performance. (p. 429) Chi-square procedures were used to test hypothesis 2, 3, and part 2 of hypotheses 4, 6 and 7. According to Gay (1981) chi-square is a nonparametric test of significance appropriate when the data are in the form of frequency counts; it compares proportions actually observed in a study with proportions expected to see if they are significantly different. (p. 430) The chi-square can be used to compare frequencies occurring in different categories or the categories may be groups, so that the chi-square is comparing groups with respect to frequency of occurence of different events (Gay, 1981). An analysis of variance procedure (ANOVA) was used to test part 1 of hypothesis 6. ANOVA is a parametric test of significance used to determine whether there is a significant difference between or among two or more means at a selected probability level (Gay, 1981). A t-test procedure was used to test part 1 of hypothesis 7. The t-test is used to determine whether two

means are significantly different at a selected probability level (Gay, 1981).

This dissertation evaluated specific nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin) and kcalories (determined from fat, carbohydrate, protein and alcohol intake of the subjects). The author of this study evaluated specific levels of nutritional adequacy, while the coworker evaluated the effect of these variables on chronic diseases. The author felt that if attempts were made by the subjects to make behavioral changes in specific chronic disease factors such as cholesterol or fiber, then an improvement in the overall diet would result as demonstrated by an improvement in the level of nutritional adequacy.

The results for this research study will be presented in the following sequence:

1. Description of subject participation in the nutrition-based health program.
2. Description of the level of nutritional adequacy for the total group and related tests of hypotheses (H1 and H2).
3. Description of the time spent weekly in planned physical activity for the total group and the related test of hypothesis (H3).
4. Description of job performance and absenteeism for the total group and the related test of hypothesis (H4).
5. Description of body composition for the total group and the related test of hypothesis (H5).

6. Results of the analyses which deal with the interrelationships between the time spent weekly in planned physical activity for the total group and job performance and absenteeism (H6).
7. Results of the analyses which deal with the level of nutritional adequacy for the total group and job performance and absenteeism (H7).
8. Discussion.

Description of Subject Participation in the Nutrition-Based Health Promotion Program

The nutrition-based health promotion program consisted of 12 educational seminars, newsletters, handouts, posters and cafeteria table cards which were all developed by the author and the coworker. The seminars were made available to the subjects in two forms, live lecture and tape recorded. The visuals were available for both methods of delivery. The two forms of delivering the seminars were necessary because of the varied shifts of the 24-hour work schedules and job demands of the participants which could not guarantee attendance to seminars at a fixed time. One of the 12 seminar topics was introductory (topic 1), five were nutrition-related (topics 4, 7, 8, 9 and 10), two were related to physical activity (topics 2 and 3), two were health-related variables (topics 11 and 12), and two were stress-related (topics 5 and 6). The frequency of distribution and the percentage of subjects who attended seminars are presented in Table 3. Job constraints reduced attendance. The most frequently used seminar materials were topics 1, 3, 4, 5, 6 and 7. The seminars directly related to this study were topics

2, 3, 4, 7, 8, 9 and 10. Twelve subjects (28.6%) attended 4 or more seminars of this grouping (see Table 4). The data from these 12 subjects were further analyzed for the level of nutritional adequacy (refer to the results for hypothesis two) and the body mass index (refer to the results for hypothesis five).

Table 3

The Frequency Distribution and Percentage of Those Subjects who Attended Seminars*

Seminar Topic	Frequency	%
1: Wellness Profile	14	33.3
2: Exercise your way to fitness and health	10	23.8
3: Let's get physical	19	45.2
4: Vitamins, Minerals and kcalories	22	52.4
5: The Stress Connection	23	54.8
6: Coping with Stress	18	42.9
7: Eat for the Health of it	15	35.7
8: Cut the Fat	10	23.8
9: Carbohydrates Count	7	16.7
10: What Fiber Can Do For You	9	21.4
11: One for the Road - Alcohol, Medications	5	11.9
12: How much is too much - Caffeine, Cigarettes	3	7.1

*Attendance includes those subjects who used the tape recorded seminars.

Table 4

The Number of Subjects (and percentages) who Attended Seminars Directly Related to this Study (i.e., topics 2, 3, 4, 7, 8, 9 and 10).

Number of Seminars	Number of Subjects Who Attended (N)	%
0	10	23.8
1	11	26.2
2	6	14.3
3	3	7.1
4	4	9.5
5	4	9.5
6	4	9.5
7	0	0

Description of Nutritional Adequacy

Nutritional adequacy for purposes of this study was defined as the dietary intake of kcalories and certain nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin) as compared to the Recommended Dietary Allowances (1980). The level of adequacy used was: less than 66% of the RDA was considered inadequate; 66% or greater than the RDA was considered adequate. Hemoglobin was also used to estimate iron status. The level of adequacy for hemoglobin was: less than 10 gm/100ml was considered deficient; 10 gm/100ml or greater was considered acceptable.

Nutrient Intake

Nutrient intake assessed in the study included kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin. Nutritional analysis was performed using a microcomputer program (Nutri-Calc, 1979) on four days of food intake collected by a combination of one 24-hour recall and a 3-day food record. The RDA's, means, standard

deviations, medians and percentage of subjects less than 66% of the RDA for kcalories and the selected nutrients based on pre and posttest values on all 84 subjects are presented in Table 5. Of the total group, 56% were deficient in iron, 41% in calcium, 30% in energy, 29% in vitamin A, 25% in vitamin C, 24% in riboflavin, 19% in thiamin, 12% in niacin and 0% in protein. No significant differences were noted from pre to posttest. Thirteen of the subjects (15.5%) were adequate in all nine of the selected nutrients. Sixty-six of the subjects (78.6%) were adquate in five or more of the nine nutrients. None of the subjects were deficient in all of the nutrients. A table of these specific values is located in Appendix D.

Nutrient density values are given in Table 6 for the total group (pre and poststudy values are combined). Nutrient density values were above the allowance per 1,000 kcalories as derived by Hansen and Wyse (1980) except for the iron and calcium values which fell below the allowances. The percentage of kcalories from protein was 15% of the total kcaloric intake.

Table 5

Dietary Intake of the Total Population (N = 84)

Nutrient	RDA*	Prestudy (N = 84)					Poststudy (N = 84)				
		$\bar{x}$ ± SD		Median	% < 66% RDA	N	$\bar{x}$ ± SD		Median	% < 66% RDA	N
Energy (kcalories)	2000 kcal/day	1570.00 ±	422.17	1540.25	29.8	(25)	1473.86 ±	374.30	1449.50	33.4	(28)
Protein (gm)	.8 g/kg Body wt/day	60.50 ±	18.16	62.25	0.0	(0)	61.63 ±	16.13	60.50	0.0	(0)
Vitamin A (IU)	4000 IU/day	4860.50 ±	2957.37	4070.75	28.6	(24)	4714.99 ±	2612.58	4015.00	25.0	(21)
Vitamin C (mg)	60 mg/day	84.00 ±	59.96	74.50	25.0	(21)	71.28 ±	52.64	61.50	32.2	(27)
Iron (mg)	18 mg/day	11.35 ±	4.67	10.50	56.0	(47)	11.33 ±	4.56	10.50	59.6	(50)
Calcium (mg)	800 mg/day	629.00 ±	267.91	577.75	40.5	(34)	557.67 ±	264.28	522.00	51.2	(43)
Thiamin (mg)	1.0 mg/day	1.03 ±	0.37	1.01	19.0	(16)	0.98 ±	0.38	0.99	22.6	(19)
Riboflavin (mg)	1.2 mg/day	1.41 ±	0.60	1.39	23.8	(20)	1.27 ±	0.49	1.16	21.5	(18)
Niacin (mg)	13 mg NE/day	14.32 ±	14.20	14.20	11.9	(10)	15.01 ±	5.49	14.31	7.1	(6)

*RDA, National Research Council, 1980, for Women Ages 23 to 50 years.

Table 6

Nutrients per 1,000 Kcalories for the Total Group. (N=84)

Nutrient	Nutrient Density	Standard*
protein (gm)	40.90	25.00
vitamin A (IU)	3284.80	2000.00
vitamin C (mg)	53.40	30.00
iron (mg)	7.60	8.00
calcium (mg)	395.40	450.00
thiamin (mg)	0.67	0.50
riboflavin (mg)	0.88	0.60
niacin (mg)	9.80	7.00

*Allowances per 1,000 kcalories derived by Hansen and Wyse, 1980.

Hemoglobin

Hemoglobin was measured to clinically estimate iron status. The standard to measure the level of adequacy (Grant, 1979), mean, standard deviation, and percentage of those subjects with hemoglobin values less than 10 gm/100 ml based on pre and posttest measures on all 84 subjects are presented in Table 7. About 4% at pretest and about 29% at posttest had deficient hemoglobin levels.

Table 7

Summary of Hemoglobin Values for the Total Group at Pre and Posttest (N=84).

Clinical Measure	Standard*	x ± SD		% < 10 g/ml			
		pretest	posttest	pretest		posttest	
				%	(N)	%	(N)
Hemoglobin	10g/100ml	13.2 ± 1.2	12.3 ± 1.5	3.6	(3)	28.6	(24)

* < 10g/100ml considered deficient by Grant (1979).

Tests of Hypotheses for Nutritional Adequacy

The results of analyses for testing hypotheses 1 and 2 are presented in this section. Several different statistical tests were used to analyze nutritional adequacy. The analysis of covariance procedure was used to examine improved measures of nutritional adequacy of kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin, as well as hemoglobin (comparing the experimental group to the control group). Chi-square was used to examine relationships between nutritional adequacy levels and participation in a nutrition-based health promotion program (by comparing the experimental group to the control group using posttest data).

Hypothesis One

Participation in a nutrition-based health promotion program will result in no differences in pre and poststudy measures of nutritional adequacy in relation to kcalories and the selected nutrients (protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin) as well as hemoglobin as an index of iron status.

To determine if the nutrient intake of the experimental group improved as compared to the control group, an analysis of covariance procedure was used. The pretest scores for each individual nutrient were used as the covariate. Alpha was set at .01 to control for experimental-wise error.

The only analysis of covariance procedure demonstrating significance was the hemoglobin difference scores which resulted in an F value of 13.64 (DF = 2.58), and was significant at the .01 level (p = .0005).

These results are presented in Appendix D. The null hypothesis (H1) could not be rejected for all variables except hemoglobin. It was concluded that hemoglobin values decreased significantly.

Hypothesis Two

There is no relationship between levels of nutritional adequacy and hemoglobin and participation in a nutrition-based health promotion program. To determine if there was a relationship between nutritional adequacy and the treatment, a Chi-square (Goodness of Fit) test was done since the levels of nutritional adequacy were grouped (ie., categorical). The chisquare test was performed using just posttest data. Alpha was set at .01 to control for experimental-wise error. The levels of adequacy were already defined: 1) less than 66% of the RDA was considered deficient; 2) 66% or more of the RDA was considered adequate.

None of the Chi-square values were significant at the .01 level; therefore, the null hypothesis (H2) could not be rejected. It was concluded that there was no significant relationship between levels of nutritional adequacy and participation in a nutrition-based health promotion program.

Hypothesis two was reanalyzed using the 12 subjects who attended at least four of the seven nutrition and physical activity related seminars as referred to in part one of the results chapter. To determine if there was a relationship between the levels of nutritional adequacy of this group of 12 subjects and the treatment, a Chi-square test was performed using just posttest data. Alpha was set at .01 to control for experimental-wise error. None of the Chi-square values were significant at the .01 level; therefore the null hypothesis (H2) could not be

rejected. It was concluded that there was no significant relationship between levels of nutritional adequacy and those who participated in a nutrition-based health promotion program.

Description of Participation in Planned Physical Activity

Planned physical activity for the purposes of this study was defined as aerobic exercise performed consciously by an individual to promote a moderate to high level of cardiovascular fitness. The participation in planned physical activity was grouped into three categories: 1) less than 90 minutes per week; 2) 90 to 150 minutes per week; and 3) greater than 150 minutes per week. Categories 2 and 3 would be considered acceptable, while category 1 would be considered unacceptable (American College of Sports Medicine, 1978). Levels of planned physical activity of the experimental and control subjects by frequency and percentages at pre and posttest are presented in Table 8.

Table 8

Levels of Planned Physical Activity of Experimental and Control Subjects by Frequency at Pre and Posttest

Levels of Activity (minutes per week)	Experimental				Control			
	Pretest N = 39		Posttest N = 40		Pretest N = 42		Posttest N = 41	
1. < 90 minutes weekly	28	(71.8)[1]	31	(77.5)	18	(42.9)	29	(70.7)
2. 90-150 minutes weekly	4	(10.3)	6	(15.0)	10	(23.8)	6	(14.6)
3. > 150 minutes weekly	7	(17.9)	3	(7.5)	14	(33.3)	6	(14.6)

[1]Percentages in parentheses.

Hypothesis Three

Participation in a nutrition-based health promotion program will result in no changes in 1) measures of planned physical activity levels; 2) measures of cardiovascular fitness. The Chi-Square (Goodness of Fit) test was performed on levels of planned physical activity to determine if any changes to improve (or increase) were made on the part of the subjects. A chi-square test was done since the levels of physical activity were categorical. The chi-square test was performed using pre and posttest scores of the experimental and control subjects. Alpha was set at .05 to control for experimental-wise error.

The three categories of activity were regrouped into three new categories by the number of minutes of planned physical activity as follows: Category 1: a change in activity greater than or equal to 30 minutes; Category -1: a change in activity less than or equal to -30 minutes; and Category 0: a change in activity less than 30 minutes and greater than -30 minutes. So Category 1 represented individuals with the greatest improvement, Category -1 the least improvement, and Category 0 minimal change. The number of subjects in these groups is presented in Table 9. The chi-square value of 0.984 (DF = 2) was not significant at the .05 level ($p = 0.611$); therefore, part one of the null hypothesis (H3) could not be rejected. It was concluded that there was no significant difference in levels of planned physical activity between the experimental and control groups as a result of the health promotion program.

Table 9

The Number of Subjects and Percentages in the New Categories of Planned Physical Activity as used for Hypothesis Three. (N per group equals 42).

Level of Activity	Treatment		Control	
Category	Frequency	%	Frequency	%
Category -1	20	47.6	22	52.4
Category 0	14	33.3	10	23.8
Category 1	8	19.1	10	23.8

Cardiovascular Fitness

Cardiovascular fitness was measured by taking the heart rate after a simple step test on the experimental and control subjects at pre and posttest. The experimental group began with 35 subjects at pretest, and ended with 25 subjects at posttest. The control group began with 28 subjects at pretest, and ended with 20 subjects at posttest. Seventeen percent of the experimental group did not perform the step test at pretest and 60% did not at posttest. Ten percent of the experimental group at pretest, and 10% at posttest attempted but failed to complete the 6-minute step test. Seven percent of the experimental subjects at pretest, and 24% at posttest were unable to attempt the step test for medical reasons. At posttest, 7% of the experimental subjects refused to attempt the step test. For those of the experimental group who completed the 6-minute step test (83% at pretest, and 60% at posttest) the pretest heart rate range was 120 to 204 beats per minute. At posttest, the range was 132 to 210 beats per minute, which may imply the group's heart rate worsened. Since more than half of the subjects were lost, a decision was

made not to evaluate changes in cardiovascular fitness (measured by heart rate) during the study.

Description of Job Performance and Absenteeism

Job performance for the purposes of this study was appraised by the Piedmont supervisor evaluating six key job element areas of Piedmont Airlines "Performance Appraisal and Development Program": job knowledge, productivity, quality of work, salesmanship and professionalism, attendance, and team effort. This appraisal resulted in a total score in which 0 = highest, and 30 = lowest score. Absenteeism for the purposes of the study was the number of workdays (hours) missed for personal illness over the six-month period prior to the initiation of the program, and the six-month period after the education program. The number of workdays (hours) missed were then grouped in the following categories: 1) 0 hours; 2) > 0 to 96 hours; 3) > than 96 hours (Morgan & Baker, 1984).

Hypothesis Four

Participation in a nutrition-based health promotion program will result in no changes in (1) job performance scores or (2) absenteeism rates. To determine if job performance scores of the experimental group improved as compared to the control group, an analysis of covariance procedure was used. The pretest scores of job performance were used as the covariate. Alpha was set at .025 to control for experimental-wise error. Job performance scores for the experimental and control subjects are presented in Table 10 for pre and posttest according to means, standard deviations, and difference score means.

Table 10

A Comparison of Experimental and Control Subjects on Pre and Posttest Job Performance Scores

	Pretest Mean ± SD	Posttest Mean ± SD	Difference Score Mean
Experimental N = 36	13 ± 3.4	12 ± 3.5	-0.9
Controls N = 30	13 ± 2.6	12 ± 2.6	-0.7

"Difference Scores": Posttest Score minus Pretest Score.

The analysis of covariance procedure using job performance scores resulted in an F value of 0.11 (DF = 2,63), which was not significant at the .025 level (p = .74). Therefore, Part 1 of the null hypothesis (H4) could not be rejected, and it was concluded that no improvements occurred in job performance scores as a result of the health promotion program.

The Chi-Square (Goodness of Fit) test was performed using pre and posttest data to determine whether absenteeism rates of the experimental group differed from the control group after the treatment. Alpha was set at .025 to control for experimental-wise error. Absenteeism categories for the experimental and control subjects by frequency and percentages are presented in Table 11 for pre and posttest values.

Table 11

Absenteeism Categories of Experimental and Control Subjects by Frequency and Percentages at Pre and Posttest.

Hours Absent	Experimental Group				Control Group			
	Pretest N = 41		Posttest N = 41		Pretest N = 42		Posttest N = 42	
0	15	(36.6[1])	9	(22.0)	13	(31.0)	16	(38.1)
1 - 96	26	(63.4)	30	(73.2)	25	(59.5)	21	(50.0)
Greater than 96	0	(0)	2	(4.9)	4	(9.5)	5	(11.9)

[1]Percentages in parentheses

For the Chi-Square analysis, absenteeism rates were re-grouped into three new categories by the number of hours absent from pre to posttest and are as follows: Category -1: a change in absenteeism less than or equal to 5 hours; and Category 0: a change in absenteeism less than 5 hours and greater than -5 hours; and Category 1: a change in absenteeism greater than or equal to 5 hours. So, Category 1 indicated the greatest improvement, Category -1 the least improvement, and Category 0 minimal change. The number of subjects and percentages in these groups is presented in Table 12.

The Chi-Square value of 2.711 (DF = 2) was not significant at the .05 level (p = .258); therefore, Part 2 of the null hypothesis (H4) could not be rejected, and it was concluded that there was no significant difference in absenteeism rates between the experimental and control groups as a result of the health promotion program.

Table 12

The Number of Subjects and Percentages in the New Categories of Absenteeism as Used in Hypothesis Four (N per group equals 42).

Hours Absent Category	Treatment Frequency	%	Control Frequency	%
Category -1	15	35.7	20	47.6
Category 0	10	23.8	12	28.6
Category 1	17	40.5	10	23.8

Description of Body Composition

Body composition for the purposes of this study was determined by BMI skinfold measurements to determine percentage of body fat, and computation of desirable body weight. These values for body composition are indicators of leaness. BMI was computed by dividing the body weight (kg) by the square of height (m). Values of 19-24 indicated desirable body weight; values greater than 24 indicated overweight. Percentage of body fat was determined using the Durnin method (see Appendix A). Subjects with levels of body fat above 30% were classified as "high fat," while 25% was the desired percentage of body fat for women. Eighty percent of the subjects (N = 67) at pretest had a body fat measurement of 30% or more, and thus, could be considered to have excessive body fat. Desirable body weight was computed by using a formula developed by Katch & McArdle (1983), which uses percentage of body fat desired (25% for this study) and present body weight in its calculation. Approximately 86% of the subjects (N = 84) were greater than their desirable body weight at pretest.

Hypothesis Five

Participation in a nutrition-based health promotion program will result in no changes in pre and poststudy measures of body composition by (1) percentage of body fat, (2) Body Mass Index (BMI), and (3) percentage of desirable body weight.

Correlation techniques were used to examine relationships between the three variables: percentage of body fat, BMI, and percentage of desirable body weight. Percentage of body fat and BMI were highly correlated ($r = .83$) and was significant at the .01 level ($p = .001$). Percentage of body fat and percentage of desirable body weight were also highly correlated ($r = .995$) and was significant at the .01 level ($p=.001$). This latter correlation indicated an almost perfect correlation, implying they were identical variables. Thus, the percentage of desirable body weight was not used in further analysis since it was a calculated value; percentage of body fat was used since skinfolds used in calculation were actually measured.

To determine if the mean percentage of body fat and the mean BMI decreased as compared to the control group, two analyses of covariance procedures were used. The pretest scores of each variable were used as the covariate. Alpha was set at .025 to control for experimental-wise error. Percentage of body fat and BMI for the experimental and control subjects are presented in Table 13 for pre and posttest according to means, standard deviations, and difference scores.

The first analysis of covariance procedure using percentage of body fat resulted in an F value of 3.87 ($DF = 2,64$), which was not significant at the .025 level ($p = .05$). Therefore, part one of the null hypothesis

(H5) could not be rejected, and it was concluded that no reductions occurred in percentage of body fat as a result of the health promotion program.

Table 13

A Comparison of Experimental and Control Subjects on Percentage of Body Fat and Body Mass Index at Pretest

		Pretest Mean ± SD	Posttest Mean ± SD	Difference Scores Mean
Experimental (N = 35)	Percentage of Body Fat	32.31 ± 5.22	30.26 ± 4.59	-2.05
	BMI	22.17 ± 4.11	21.64 ± 3.66	-0.53
Control (N = 42)	Percentage of Body Fat	35.64 ± 5.54	32.13 ± 6.20	-3.51
	BMI	22.73 ± 3.04	22.86 ± 2.76	0.13

"Difference Score": Posttest minus Pretest

The second analysis of covariance procedure using body mass index (BMI) resulted in an F value of 2.90 (DF = 2,61), which was not significant at the .025 level (p = .09). Therefore, part two of the null hypothesis (H5) could not be rejected. It was concluded that no significant reductions occurred in the body mass index as a result of the health promotion program.

Hypothesis five was reanalyzed using the 12 subjects who attended at least four of the seven nutrition and physical activity related seminars as referred to in part one of the results chapter. An anlysis of variance procedure (ANOVA) was performed to determine if any changes occurred in the body mass index from pre to posttest. Alpha was set at

.05. The ANOVA using the BMI resulted in an F-value of 1.43 (DF = 2,64), which was not significant at the .05 levels (p = .25). Therefore, part 2 of the null hypothesis (H5) could not be rejected, and it was concluded that no reductions occurred in the BMI as a result of the nutrition-based health promotion program.

Results of the Analyses which Deal with the Interrelationships Between the Time Spent Weekly in Planned Physical Activity for the Total Group and Job Performance and Absenteeism

Hypothesis Six

1) There is no difference between the level of planned physical activity and job performance; 2) There is no association between the level of planned physical activity and absenteeism.

An analysis of variance (ANOVA) procedure was performed to test the difference between the level of planned physical activity and job performance scores. The ANOVA used pretest scores. Alpha was set at .025 to control for experimental-wise error. Planned physical activity was categorized as low, medium and high. The F-value of 0.67 (DF = 2,60) was not significant at the .025 level (p = .51). Thus, the null hypothesis could not be rejected. It was concluded that there was no difference between the level of planned physical activity and job performance.

The Chi-Square (Goodness of Fit) test was performed to test the association between the level of planned physical activity and absenteeism rates. The Chi-Square used pretest scores. Alpha was set at .025 to control for experimental-wise error. Both of these variables were categorical. The Chi-Square value of 8.062 (DF = 4) was not significant at the .025 level (p = 0.089). Therefore, the null

hypothesis could not be rejected. It was concluded that there was no association between level of planned physical activity and absenteeism rates.

Results of the Analyses which Deal with the Level of Nutritional Adequacy for the Total Group and Job Performance and Absenteeism

Hypothesis Seven

1) There is no difference between the level of nutritional adequacy and hemoglobin (adequate or inadequate) and job performance; 2) there is no association between the level of nutritional adequacy and hemoglobin (adequate or inadequate) and absenteeism.

T-test procedures were performed on each nutrient and hemoglobin to test the differences between the levels of nutritional adequacy and job performance scores. All ten of the T-tests used pretest scores. Alpha was set at .01 to control for experimental-wise error. The results are presented in Appendix D. None of the T-values were significant at the .01 level. Thus, the null hypothesis could not be rejected, and it was concluded that there was no difference between the levels of nutritional adequacy and job performance scores.

The Chi-Square (Goodness of Fit) test was performed to test the association between level of nutritional adequacy and absenteeism rates. The Chi-Square used pretest scores of each nutrient, hemoglobin, and absenteeism levels. Alpha was set at .01 to control for experimental-wise error. None of the Chi-Square values were significant at the .01 level. Thus, the null hypothesis could not be rejected, and it was concluded that there was no relationship between levels of nutritional adequacy and absenteeism rates.

Hypothesis seven was reanalyzed by categorizing subjects according to adequacy levels of three performance-related nutrients, iron, vitamin C and kcalories. Category 1: those subjects adequate in all three of the performance-related nutrients (N = 30); Category 2: those subjects deficient in all three of the nutrients (N = 9); Category 3: those subjects deficient in less than 3 of the nutrients (N = 45). An analysis of variance procedure (ANOVA) was performed to determine if the job performance scores were different for the three categories. Alpha was set at .025. The ANOVA resulted in an F-value of 1.79 (DF = 2,63), which was not significant at the .025 level (p = .18). Therefore, part 1 of the null hypothesis (H4) could not be rejected, and it was concluded that no differences existed in job performance scores between the three categories. A Chi-Square test was performed to determine if absenteeism rates were different for the three categories. The Chi-Square value of 0.992 (DF = 4) was not significant at the .025 level (p = .911), therefore, part 2 of the null hypothesis (H4) could not be rejected. It was concluded that no differences existed in absenteeism rates between the three categories.

Discussion

The findings of this study were based on the Nutrition and Health Habit Inventory (Appendix A, Form 009), 24-hour dietary recalls, 3-day food records, skinfold, height and weight measurements, performance appraisals and records of absenteeism. Subjects were measured before and following a 7-month health promotion program at the worksite. Summaries of the findings in regard to pretreatment relationships between nutritional adequacy and job performance and absenteeism and other

variables, and between levels of planned physical activity and job performance and absenteeism, and in regard to the effect of the health promotion program in producing desired changes on selected variables are presented in Tables 24 and 25.

Using 66% of the RDA as the point below which subjects were judged to have an inadequate intake of a nutrient, using pretest values, 30% were low in kcalories, 29% were low in vitamin A, 25% were low in vitamin C, 56% were low in iron, 41% were low in calcium, 19% were low in thiamin, 24% were low in riboflavin, and 12% were low in niacin, while 0% were low in protein. Thus, of the nutrients studied, kcalories, vitamin A, vitamin C, riboflavin, iron and calcium were most often deficient. Protein and niacin were the least often deficient nutrients. The nutrients that were the most often deficient in the present study were also the nutrients that were the most often deficient in the Health and Nutrition Examination Survey (Abraham, Carrol, Johnson & Villa-Dresser, 1977) and a recent U.S.D.A. Nationwide Food Consumption Survey (Pao & Mickle, 1980). The finding of low intakes of calcium and iron among the subjects is consistent with the results of the Beltsville One-Year Dietary Intake Study (Kim, Kelsay, Judd, Marshall, Mertz & Prather, 1984). However, unlike the present study, the Beltsville study did not find low mean intakes of kcalories, vitamin A and vitamin C among females, 23 to 50 years of age.

The finding of a high percentage of subjects (56%) with an inadequate iron intake is consistent with the findings of the HANES survey (i.e., the iron intake of 40 to 50% of females was below 100% of the RDA 18 mg of iron per day). The mean calcium intake among the

subjects was similar to the findings of HANES (48 to 63% of females, ages 18 to 64 years were below the RDA for calcium, 800 mg of Calcium per day).

Twenty-four percent of the subjects in this study were low in riboflavin as compared to 39% of the subjects surveyed by Roe, Campbell, Sheu, Hale-Wickham & Jackson (1982). This deficiency may be due to a low intake of milk which is a good source of riboflavin. Twenty-nine percent of the subjects were deficient in vitamin A which was a much lower incidence as compared to 57% to 68% of upper income females, white and black, that were deficient in HANES. The finding that 25% of the subjects were deficient in vitamin C intake in the present study as compared to 49% to 54% of all females ages 12 to 54 in HANES were below the standard for vitamin C of 55 mg per day).

Sixty two percent of the subjects were below the minimum range of the RDA for kcalories (1700 per day) and 19% consumed less than 1200 kcalories per day. The mean kcaloric intake for the present study was 1507 kcalories per day. These findings are similar to the results of the HANES survey in which the median intake of kcalories for women was 1600 at age 20 to 24, but steadily decreased to 1250 at 65 years of age (Abraham et al, 1977). These intakes are less than the mean kcaloric intake of females aged 23-50 in the Beltsville study (Kim et al, 1984) which was 1848 kcalories per day. One possible explanation for this difference may be that the subjects in the present study were very sedentary in their jobs, and, at the same time, were very concerned about weight gain. Concern about weight control would encourage a low kcalorie intake.

The level of nutritional adequacy was based on two-thirds (66%) of the RDA. The dietary adequacy of each nutrient in this present study, kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin, was evaluated in this manner. Kcalories were calculated with this standard on the basis of consistency in evaluation with the other nutrients. The percentage of women consuming 66% or less of the RDA of energy (i.e., 1300 kcalories) increased from 31% at base line to 33% at the end of the program. The energy intake range in the present study was 755 kcalories to 2049 at pretest, and 756 to 2764 at posttest for the total population. Kcaloric need (energy) is a variable that should be determined on an individual basis, due to individual variability of sex, body size, basal metabolic rate and activity level. Many of the females in the present study, since they were so sedentary, may have only needed about 1300 (66% of the RDA) to 1700 kcalories (the minimum level of the RDA range) to maintain their body weight. Many women are so sedentary that this level of adequacy (66% of the RDA) may be sufficient to maintain an energy balance.

The finding that nutrient density for iron and calcium was lower than the allowances derived by Hansen and Wyse (1980) was also observed in the 1977 to 1978 1-day Nationwide Food Consumption Survey (NFCS). The nutrient density for protein was comparable to the value for the NFCS, which was more than one and one-half times the allowance derived by Hansen and Wyse (1980). The high nutrient density for protein may indicate that although kcaloric intakes were relatively low for this population, the protein levels were high. Protein consumption should account for 12% of the total energy intake as recommended by the Senate

Select Committee on Nutrition (1977) in the U.S. Dietary Goals. The percentage of kcalories from protein in this study (15%) was in agreement with the Beltsville study (Kim et al, 1977), and 3% higher than recommended in the U.S. Dietary Goals.

No significant difference was found in actual nutrient intake or in the level of nutrient adequacy for kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin of the experimental group compared to the control group as a result of the nutrition-based health promotion program. But there was a significant reduction ($p=.0005$) in hemoglobin for the experimental group as compared to the control group. The hemoglobin values declined instead of improving. The low dietary iron intakes (56% of all of the subjects were below 66% of the RDA) may be one possible reason why the hemoglobin decreased. Over time, these low dietary iron intakes will lead to low iron stores. Hemoglobin values demonstrate the last stage of iron storage implying iron deficiency anemia. No significant differences were found between nutritional adequacy levels of kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin, and niacin and participation in a nutrition-based health promotion program. It is very difficult to compare these dietary results of the present study with those of other worksite wellness programs, as most of the reports in the literature do not contain evaluations of changes in the specific dietary components, foods, or nutrients. Foreyt, Scott and Gotto (1980) reported that 50% of the subjects, who participated in a wellness program with Campbell in which they were instructed on the "Prudent Diet", were following the diet one year later. Murphy (1983) reported that experimental subjects in the

"Live for Life" program at Johnson & Johnson showed a 9% improvement in nutritional practices as compared to a 7% improvement in the control group. There is a need for more specific data to be gathered on the intake of nutrients and other food components by participants in the ongoing worksite wellness programs operating in several large companies, in order to more accurately assess changes in dietary practices.

No significant difference in minutes spent in planned physical activity resulted from participation in the health promotion program. An exercise program was not provided, but exercise was done during seminars and exercise was encouraged to be done during lunch breaks or outside of work hours. This result is maybe partly due to poor attendance at seminars and the lack of a company-sponsored fitness program. Song, Shephard and Cox (1982) reported, even with an on-going exercise program provided by a life insurance company, that adherence to the exercise program was poor (4.1%). So even a company-sponsored fitness program would require motivation on the part of the employees.

The results for changes in cardiovascular fitness as measured by heart rate after exercise were not evaluated due to the small sample size. Forty percent of the total group did not perform the step test. Ten percent of the total group failed to complete the step test. And 17% of the total group were unable to attempt the step test for medical reasons. Considering the inability to complete the step test, whether due to medical reasons or due to lack of cardiovascular fitness, a company-sponsored fitness program could improve the cardivascular fitness of the female airline reservationists.

No significant improvements in job performance or absenteeism occurred as a result of the nutrition-based health promotion program. These conclusions do not support previous reports that health promotion programs have resulted in improvements in job performance (measured as productivity) and reduce absenteeism (Donoghue, 1977; Shephard, 1983; Rosen, 1984). A possible reason for the lack of improvements may be due to poor seminar attendance.

It was noted by the researcher that job performance scores ranged from 7 to 19 at pretest, and from 6 to 19 at posttest. It was also noted that there was not much discrimination in scoring for the employees. There are no scores from 6 to 0 (0 being the highest score), which makes it difficult for the employee to strive toward improvement when there seems to be a limited opportunity to obtain a higher score than 6.

No relationships between the level of planned physical activity and job performance and absenteeism were found. These results do not support previous reports (Donoghue, 1977; Song et al, 1982; Shephard, 1983; Rosen, 1984). The possible explanation may be due to the lack of an organized fitness/exercise program sponsored by the company. Another reason may be due to the lack of seminar attendance where knowledge of the importance of physical exercise could have been gained and applied in action.

No relationships between measures of nutritional adequacy and job performance and absenteeism rates occurred. These conclusions do not support previous reports. For example, Gardner et al (1975) reported that levels of iron stores (measured by hemoglobin values) affected performance responses: poorer iron status resulted in poorer work

performance after a 5 minute step test. There are no reports in the literature of the effects of nutritional adequacy on performance in clerical type work. The possible explanation for results of this part of the study are most likely due to poor seminar attendance where nutrition information was disseminated. But without hearing this information, application of the information into their eating habits was unlikely.

No significant reductions occurred in percentage of body fat or in BMI as a result of the nutrition-based health promotion program. The mean BMI of this study was 22.17 at pretest and 21.64 at posttest for the experimental group. These values are in the "desirable" weight category (Thomas, et al, 1976). The values of the present study are slightly higher than those reported by Jackson and Pollock (1985): the mean BMI was 20.2, also in the "desirable" weight category. Fifty percent of the experimental subjects at pretest, and 50% at posttest were in the "desirable" weight range (BMI values of 19 to 24). Nineteen percent had BMI values greater than 24 (deemed "overweight") at pretest, and 17% had values greater than 24 at posttest for the experimental group.

The mean percentage of body fat at pretest was 32.31% and 30.26% at posttest for the experimental group. These values are considered "high fat" (i.e., greater than 30% body fat) by Buskirk (1974). The values from the present study are much higher than those reported by Jackson and Pollock (1985) of 24.4% body fat in women. Fifty percent of the experimental group at pretest, and 50% at posttest had percentages of body fat greater than or equal to 30%. Many individuals believe that if one is at their "desirable body weight," then they do not need to be concerned. But it is possible to be at the desirable body weight and be

overfat. This describes much of the study population. As airline reservationists, they are occupied in a sedentary environment. Unless the employees increase their physical activity, these measures of body composition will not change.

The inability to demonstrate change in the intake of the nine nutrients and other variables is most likely due to the poor attendance at seminars. Fifty percent of the subjects attended fewer than three seminars. Each of the subjects attended an average of 3.7 seminars. The seminar which had the highest attendance was Seminar #5 (The Stress Connection) with 23 subjects present. This is 55% of the experimental population. Next highest was Seminar #4 (Vitamins, Minerals and Kcalories) with 22 subjects present. The lowest attendance was for the last seminar (How Much is Too Much?) with 3 present. The frequencies and percentages for attendance are presented in Table 3.

In an attempt to learn the reasons for nonattendance and to identify ways to improve attendance, a questionnaire (Piedmont Wellness Program Participant Questionnaire, Appendix A) was mailed to all subjects to be returned anonymously. The subjects were pleased with the topics offered, as well as the method of presentation at seminars. The main reasons given for nonattendance were: 1) overtime work; 2) inability to remain at the worksite at the end of shifts because of extreme fatigue; 3) having small children to care for or other home obligations; 4) being out-of-town on vacation; and 5) personal or family illness.

Several efforts used to compensate for the low attendance at seminars included the use of handouts, mailouts, posters and table cards in break and lunch rooms, and the use of learning packets, containing

cassette recordings of seminars. The cassette recordings were made available for overnight checkout. The fact that no change occurred, in spite of the numerous efforts to disseminate information by means other than seminars, suggested that impersonal methods of disseminating nutrition and health information cannot be successfully substituted for the personal contact by the educator and individual counselling. This conclusion agrees with the findings of Ware (1982) who also concluded that health promotion programs must be based on interpersonal and interactive methods, rather than impersonal dissemination of information. Results indicate that attendance at seminars is very important and that achieving good attendance may require that companies allow employees to attend health promotion programs during working hours.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of this study were to evaluate the effects of a nutrition-based health promotion program on: (a) the nutritional adequacy of kcalories and selected nutrients, including protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin; (b) hemoglobin; (c) time spent in planned physical activity and cardiovascular fitness as measured by heart rate; (d) body composition as measured by percentage of body fat, computation of percentage of desirable body weight and the Body Mass Index; (e) job performance and absenteeism. A quasi-experimental, nonequivalent control group, pretest-posttest design was used in the study.

The sample consisted of 84 females, 19 to 60 years of age, who worked full-time as reservationists for Piedmont Airlines. Forty-two of the subjects served as experimental subjects and were located in the Winston-Salem, NC Reservation Center, and 42 served as control subjects and were located in the Nashville, TN Reservation Center. Anthropometric measurements and dietary recalls were taken at the work sites by the author, the coworker of this study (a trained graduate student), and two registered nurses. The subjects completed self-administered questionnaires including a nutrition and health habits inventory, and a 3-day food record. These questionnaires were completed at the worksite and at home. All measurements were taken before and after the 7-month treatment.

The treatment consisted of a 7-month health promotion program, involving the use of seminars, posters, table tents, handouts, mailouts, newsletters, learning packets, and cassette recordings. The goal of the health promotion program was to bring about improvement in related practices of nutrition, chronic disease prevention, exercise and fitness, and stress control among employees of the Piedmont Airlines Reservation Center, Winston-Salem, NC.

At the beginning of the study, the subjects tended to consume diets deficient in kcalories, vitamin A, vitamin C, iron, calcium and riboflavin, with calcium and iron being the most frequently deficient. The nutrient density per 1,000 kcalories for iron and calcium was lower, and for protein was higher than the suggested allowances. The percentage of kcalories from protein was above the percentage recommended in U.S. Dietary Goals. Half of the subjects were greater than 30% body fat according to skinfold measurements; 50% of the subjects were greater than 100% of the desirable body weight; and 19% of the subjects had BMI values greater than 24 ("overweight" catgory). Sixty- three percent of the subjects were absent 1 to 12 work (8 hour) days per six months, twice the national average, while 37% were absent 0 hours. Five percent of the subjects had deficient hemoglobin values. Job performance scores were slightly above the potential mean score. Seventy-one percent of the subjects spent less than a minimal "acceptable" level of 90 minutes per week in planned physical activity.

Of the seven hypotheses evaluated during this study, five hypotheses involved an assessment of the effect of the nutrition-based health promotion program in bringing about desired changes in various health and

nutrition factors. The other two hypotheses involved the assessment of relationships between job performance and absenteeism and other variables. None of the null hypotheses could be rejected except hypothesis one. Only the variable, hemoglobin, changed from pre to poststudy. Hemoglobin declined instead of the desired effect of improvement.

1. The hypothesis testing the effect of the health promotion program in bringing about improved intake of the following nutrients: kcalories, protein, vitamin A, vitamin C, iron, calcium, thiamin, riboflavin and niacin and improved hemoglobin levels was not rejected except for hemoglobin.

2. The hypothesis testing the relationship between levels of nutritional adequacy and participation in a nutrition-based health promotion program was not rejected.

3. The hypothesis testing the effect of the nutrition-based health promotion program in bringing about increases in time spent in physical activity was not rejected.

4. The hypothesis testing the effect of the nutrition-based health promotion program in bringing about improvements in job performance scores and absenteeism rates was not rejected.

5. The hypothesis testing the effect of the nutrition-based health promotion program in bringing about reductions in percentage of body fat and the Body Mass Index was not rejected.

6. The hypothesis testing the differences between levels of planned physical activity and job performance scores and absenteeism rates was not rejected.

7. The hypothesis testing the differences between the levels of nutritional adequacy and job performance scores and absenteeism rates was not rejected.

Conclusions

The following conclusions were drawn:

1. Female, full-time reservation employees in the Winston-Salem and Nashville locations generally consume poor diets, inadequate in kcalories, vitamin A, vitamin C, iron, calcium and riboflavin. Their diets tend to be adequate in protein. Most subjects had acceptable hemoglobin levels.

2. Subjects generally had body fat levels in the high-fat range but most subjects were in a desirable weight range using the Body Mass Index. Since kcalorie levels were not excessive, inadequate physical activity may be a major cause of high body fat.

3. Subjects generally made no efforts to spend time in planned physical activity. It is not known if a fitness/exercise program had been implemented, if this would have been successful in improving time spent with physical activity.

4. Mean job performance scores improved slightly, but supervisors discriminated very little when appraising the employees performance.

5. Most subjects were absent twice the national average of 0 to 12 work days per year. Higher levels were generally due to accidents or longer term medical conditions.

6. Implementation of a health promotion program, without giving employees time during the workday to attend educational activities, and without the company management giving employees full support in their involvement in the program, will generally result in poor participation among female full-time reservation workers, especially if work load is heavy. Poor attendance at educational activities, after regular work hours, may be partially due to other obligations such as child or home care and other family responsibilities.

7. Results of this study indicate that improvements in specific dietary and health factors will not occur, as a result of a health promotion program, if a situation exists in which seminar attendance is poor. It is not known whether the health promotion program would have resulted in more change if seminar attendance had been high.

8. Other methods, such as newsletters, handouts, and cassette recordings, used as substitutes for seminars, may be only partially successful in bringing about change.

Recommendations

Since attendance at seminars was a major problem in this study, it is recommended that future studies be conducted with groups who can attend educational activities during work hours. It is also recommended that companies consider giving employees time for such activities because there are potential benefits for the company if workers do reduce their health risk factors. Based on comments by a number of subjects in the study, the offering of a health promotion program by a company, without permitting employees to attend during work hours, may actually increase stress, and decrease job performance and satisfaction. This problem needs further investigation.

Another situation which arose was the increase in work load which required overtime work. This problem may have contributed to poor attendance at seminars. Poor attendance at seminars made it virtually impossible to administer the educational program in the manner as was originally intended. Since responses from subjects indicated that poor participation was not due to faults in the educational program, it is recommended that the present program be attempted with some other employee group where attendance at seminars may be more easily achieved and where other changes in the work environment can be controlled.

A high percentage of the subjects mentioned that they were too tired or had other obligations to be able to spend any outside time in planned physical activity. It is recommended that the company sponsor an

exercise/fitness program to be available during work hours, or that the company assist the employee in the cost of the use of community facilities such as the YMCA or YWCA to do their exercise. The company needs to support and encourage the employee in the need to exercise. This suggestion for increasing exercise would also improve the employees' problem of being in the high fat category.

Since the subjects had poor diets, it is recommended that the food service management and the company management encourage more variety of nutritious foods to be offered and the selection of more nutritious food choices that are presently available at the company cafeteria and vending machine area. Only through support of the company will the employees be motivated to make any changes in food habits.

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APPENDIX A

DATA COLLECTION FORMS AND PROCEDURES

Form 001

Interest Questionnaire

Wellness Program - Piedmont Airlines

NAME: _____ BIRTHDATE: _____

WORK SHIFT: (Hours) Begins: _____ Ends: _____

TOTAL YEARS OF SERVICE (Including any Part-time Service):

CLASSIFICATION: Check (✓) Full-time _____ Intermediate: ____ Part-time: __

---

1. List particular areas of fitness, exercise, nutrition, or health you would like seminars on.

2. Do you consider yourself overweight? Yes _____ No _____

   If yes, by _____ pounds for _____ years.
   (Fill in blanks with numbers)

3. Would you be interested in participating in a weight control program? Check (✓) Yes ____ No _____

***Note: All Activities of the Wellness Program will be held at the Central Reservation Office, Winston-Salem, N.C.

RHC/11/83

Form 005

I.D. NUMBER_____

DATE_____

FOOD QUESTIONNAIRE AND FREQUENCY CHECK LIST:

Use for Coding

1. Do you eat at regular times each day? (Please check (✓))
   ____Always ____Most of the time ____Rarely

2. How many days a week do you eat:
   a morning meal? _____
   a lunch or a midday meal? _____
   an evening meal? _____
   during the evening or night? _____

3. How many days a week do you have snacks and what do you have then?
   in mid morning _____
   in mid afternoon _____
   in the evening _____
   during the night _____

4. Where do you usually eat your meal?

Morning	Mid Day	Evening
_____	_____	_____

5. With whom do you usually eat?

Morning	Mid Day	Evening
_____	_____	_____

6. How many times a week do you usually eat away from home?_____

7. Would you say your appetite is Good? _____ Fair_____ Poor_____

8. What foods do you particularly dislike_____
   _____

9. Are you on a special diet? If yes, what kind? Who prescribed?
   _____
   _____

10. Are there foods you don't eat for other reasons? YES_____ NO_____
    List and explain reason you don't eat the food:_____
    _____
    _____
    _____

11. Do you add salt to your food at the table? YES_____ NO_____

12. Do you take vitamin or mineral supplements? YES_____ NO_____
    If yes, how many per day?_____ per week?_____
    If yes, what kind (give brand name if known)?
    Multivitamin a._____
    Iron b._____
    Ascorbic Acid c._____
    Other (list) d._____
    e._____
    f._____
    g._____

RHC/arw

FOOD FREQUENCY CHECKLIST

FOOD	CIRCLE NUMBER OF SERVINGS PER WEEK	MORE THAN 7 (SPECIFY)	SELDOM EAT	NEVER EAT	YOUR USUAL SERVING SIZE	USE FOR COOING
1. Dark green vegetables	0 1 2 3 4 5 6 7					
Dark yellow vegetables	0 1 2 3 4 5 6 7					
Other green vegetables	0 1 2 3 4 5 6 7					
Potatoes	0 1 2 3 4 5 6 7					
Other vegetables	0 1 2 3 4 5 6 7					
2. Bread (type)	0 1 2 3 4 5 6 7					
Wheat germ	0 1 2 3 4 5 6 7					
Cereal (type)	0 1 2 3 4 5 6 7					
Pasta (type)	0 1 2 3 4 5 6 7					
Potato	0 1 2 3 4 5 6 7					
Other grain (type)	0 1 2 3 4 5 6 7					
Pancake	0 1 2 3 4 5 6 7					
3. Citrus fruit or juice	0 1 2 3 4 5 6 7					
Other fruits	0 1 2 3 4 5 6 7					
Tomatoes	0 1 2 3 4 5 6 7					
Dried fruits	0 1 2 3 4 5 6 7					
4. Milk (type)	0 1 2 3 4 5 6 7					
Yogurt	0 1 2 3 4 5 6 7					
Cheese (type)	0 1 2 3 4 5 6 7					
5. Oil (type)	0 1 2 3 4 5 6 7					
Margarine	0 1 2 3 4 5 6 7					
Butter	0 1 2 3 4 5 6 7					
Salad dressing	0 1 2 3 4 5 6 7					
Bacon and sausage	0 1 2 3 4 5 6 7					
Fried foods	0 1 2 3 4 5 6 7					
Salt Pork	0 1 2 3 4 5 6 7					
Cream, sweet	0 1 2 3 4 5 6 7					
Cream, sour	0 1 2 3 4 5 6 7					
6. Beef, hamburger	0 1 2 3 4 5 6 7					
Pork, ham	0 1 2 3 4 5 6 7					
Liver	0 1 2 3 4 5 6 7					
Lunch meat	0 1 2 3 4 5 6 7					
Franks	0 1 2 3 4 5 6 7					
Pizza, spaghetti	0 1 2 3 4 5 6 7					
Poultry	0 1 2 3 4 5 6 7					
Eggs	0 1 2 3 4 5 6 7					
Peanut butter	0 1 2 3 4 5 6 7					
Dried peas/beans	0 1 2 3 4 5 6 7					
Nuts	0 1 2 3 4 5 6 7					
Seeds	0 1 2 3 4 5 6 7					
Sprouts	0 1 2 3 4 5 6 7					

CONTINUED ON NEXT PAGE

usual serving size = ¼ c., 1/3 c, ½ c, 3/4 c, 1 c, 1 tabsp., 3 oz., 1 whole, etc.

FOOD FREQUENCY CHECKLIST

FOOD	CIRCLE NUMBER OF SERVINGS PER WEEK	MORE THAN 7 (SPECIFY)	SELDOM EAT	NEVER EAT	YOUR USUAL SERVING SIZE	USE FOR CODING
7. Candy	0 1 2 3 4 5 6 7					
Pie, cake, cookies	0 1 2 3 4 5 6 7					
Potato chips, pretzels, popcorn, corn chips, etc.	0 1 2 3 4 5 6 7					
Teas	0 1 2 3 4 5 6 7					
Coffee with caffeine	0 1 2 3 4 5 6 7					
Carbonated drinks	0 1 2 3 4 5 6 7					
Kool-aid	0 1 2 3 4 5 6 7					
Wine	0 1 2 3 4 5 6 7					
Beer	0 1 2 3 4 5 6 7					
Hard liquor	0 1 2 3 4 5 6 7					
Ice cream	0 1 2 3 4 5 6 7					
Ice milk	0 1 2 3 4 5 6 7					
Sherbert	0 1 2 3 4 5 6 7					
Sugar added to beverages	0 1 2 3 4 5 6 7					
8. Other foods not listed that you eat regularly :	0 1 2 3 4 5 6 7					
_____	0 1 2 3 4 5 6 7					
_____	0 1 2 3 4 5 6 7					
_____	0 1 2 3 4 5 6 7					
_____	0 1 2 3 4 5 6 7					

RHC/arw

usual serving size = ¼ c., 1/3 c, ½ c, 3/4 c, 1 c, 1 tabsp., 3 oz., 1 whole, etc.

Form 006

A 24 HOUR RECALL FORM

NAME or I.D. NUMBER: _____ DATE _____
DAY OF WEEK OF RECALL _____

TIME*	FOOD ITEMS	TYPE AND PREPARATION**	AMOUNT	WHERE EATEN***	OFFICE USE ONLY		
					FOOD CODE	AMOUNT	CODE

* A.M. BREAKFAST
A.M. SNACK
MIDDAY LUNCH
AFTERNOON SNACK
P.M. SUPPER
EVENING SNACK

** FRIED, BAKED, BOILED
TOASTED
WHOLE WHEAT
FRESH, FROZEN, CANNED
CREAMED

*** HOME
RESTAURANT
CARRIED LUNCH
CAFETERIA AT WORK
SCHOOL
CHILD CARE CENTER, ETC.

Was intake unusual in any way? YES_____ NO_____

If yes, why (in what way)? _____

_____

RHC/arw

Form 007

FOOD RECORD

NAME OR I.D. NUMBER:____________________ DATE:____________________

DAY OF WEEK OF RECALL:______________________________

TIME*	FOOD ITEMS	TYPE AND PREPARATION**	AMOUNT	WHERE EATEN***	OFFICE USE ONLY FOOD CODE	

*GIVE APPROXIMATE TIME SUCH AS 7 a.m., 8:30 a.m.

**FRIED, BAKED, BOILED
TOASTED
WHOLE WHEAT
FRESH, FROZEN, CANNED
CREAMED

***HOME
RESTAURANT
CARRIED LUNCH
SCHOOL
WORK CAFETERIA
FRIEND'S HOUSE

RHC/ARW

DIRECTIONS FOR 3-DAY FOOD RECORD

1. Please keep a record for 3 days of everything you eat and drink from the time you get up until you go to bed. Use 2 WORK days and 1 NONWORK day. Record each day on a separate sheet.

2. Try to keep your eating pattern as usual as possible until you complete this 3-day record!

3. Record the amount you eat in household measurements, such as ¼ c., 1/3 c., ½ c., 7/8 c., 1 tsp., 1 Tbsp., 2 oz., 3 oz., etc. Meats may be recorded in ounces using a normal size hamburger pattie of 3 ozs. as a guide; or just record the size of the piece of meat (1 slice: 2"x3"x¼"). Record whole foods as follows: 1 med. apple, 1 lg. banana, 1 lg. potato, 1 (12 oz.) Diet Coke, 1 chicken leg, etc.

4. The best way to measure a plate of food is to prepare your plate first with the amounts you would normally eat; then measure each food separately with a measuring cup. For cake or cornbread, etc. give the size of slice (2"x3"x½"). For pie, record as 1/6 of 9" pie, etc.

5. Be sure to list all beverages, such as coffee, soft drinks, mixed drinks, etc. in ounces. A regular size coffee cup is usually 6 ounces; whereas, a mug may be 8 ounces. In the case of a mixed alcoholic drink, record the amount of liquor in ounces or jiggers, as well as the total size of the drink.

6. Be sure to describe all foods by listing all main ingredients and any added sugar, salt, mayonnaise, cream, margarine, butter, mustard, ketchup, etc. please indicate whether coffee, tea, and soft drinks are regular or decaffeinated and if drinks are "diet" or regular.

7. In case of mixed dishes: soup, sandwich, casserole, or salad, list all ingredients on the back of the form, OR - better yet- clip the recipe to the records when you turn them in. If you turn in a recipe for a mixed dish, please put your name on it and we'll return it to you later with a computer printout of its nutrient content. List the number of servings it makes. List the number of servings you ate on the food record.

8. Please complete the 3-day record this week (including the first day you are not working) and bring back to _____
_____.
A box will be placed there for collecting records. Clip together records and recipes before placing in box. Put your ID number on each page.

IT IS ESSENTIAL THAT YOU RETURN A COMPLETE 3-DAY RECORD BY MARCH 13TH. IF YOU WILL NOT BE WORKING THAT DAY, PLEASE BRING IT IN ON THE 14TH. WE NEED A COMPLETE SET OF RECORDS ON EACH PERSON OR IT WILL MESS UP OUR RESULTS. WE ARE COUNTING ON YOU !!!!

Ruby H. Cox

arw
2/29/84

PIEDMONT WELLNESS PROGRAM

DATA FORM 008

DATE: _____

SHIFT: _____

USE FOR CODING	Name	BLOOD PRESSURE 1	2	3	AVG. BP	PULSE RATE	HCT. %	USE FOR CODING
	1.							
	2.							
	3.							
	4.							
	5.							
	6.							
	7.							
	8.							
	9.							
	10.							
	11.							
	12.							
	13.							
	14.							
	15.							
	16.							
	17.							
	18.							

Form 009

NUTRITION AND HEALTH HABITS INVENTORY

ID Number: _____
Date: _____

PART I: DAILY/WEEKLY HOME AND JOB ACTIVITIES

1. How many hours do you sleep (or rest in bed) in a 24 hour period?
   Check one: 6 hours or less _____
   7 to 8 hours _____
   9 hours or more _____

2. Think about all of the home or job activities you do during a week while sitting, standing, and walking. (Do not include planned recreational or exercise type activity as in Part II).

   Read through the entire list and check (✓) "yes" or "no" as to whether you have done this activity in the past week (last 7 days).

   Next, please estimate the total amount of time in hours or minutes you spent doing each activity in the past week (last 7 days).

Type of Activity	Have you done this activity in the past 7 days? Check (✓) "yes" or "no" column. Yes	No	List the total time you spent doing this activity in the past 7 days. Total Time Spent Hours	Minutes	Use for Coding
Type A= While Sitting:					
1.Eating at mealtime					
2.Bathing, Grooming, Manicuring					
3.Socializing, Resting, Watching TV, Reading, Listening to music,					
4.Sitting in church and meetings					
5.Doing Handcrafts, Needlework, Painting, Sewing, Playing cards					
6.Working at desk (home or office) Typing, Writing, Talking on Phone					
7.Driving/riding in car or plane					
Type B= While Standing:					
8.Taking a shower					
9.Meal Preparation (including kitchen cleanup)					
10.Doing laundry (washing, ironing etc.					
11.Socializing					
12.Other (specify)					
Type C= While Walking					
13.House cleaning (Dusting, mopping, Vacuuming, etc.)					
14.Shopping (Grocery or Other Type)					
15.Walking between locations					
16.Going up and down Stairs					
17.Other (specify)					

ID Number: _____

PART II: RECREATIONAL AND PLANNED EXERCISE ACTIVITY

3. Think about the types of activities you usually do for exercise, recreation, or competition. Below is a list of common physical activities.
Read through the entire list and check (✓) "yes" or "no" as to whether you have done any of these activities in the past 6 months.

Next, think only of the past 2 weeks (last 14 days). Indicate with a check (✓) in the appropriate column the number of times you did each activity in the past two weeks. If more than 6 times, please list the number of times.

Next, please estimate the total amount of time in hours and/or minutes you spent doing each activity in the past 2 weeks and list in column T.

Have you done this activity in the past 6 months? Check (✓) "yes" or "No"	Yes	No	Number of times in past 2 weeks (14 days) you did activity? 0	1	2	3	4	5	6	Other Specify	T.List Total Time Spent Hrs	Min	Use for Coding
Type D activity:													
1. Calisthenics, Lift weights													
2 Golf													
3. Putt Putt Golf, Billiards													
4 Table Tennis (Ping Pong)													
5. Volleyball, Softball													
6. Walking, slow/norm. pace (as a planned exercise)													
Type E activity:													
7. Badminton													
8. Bicycling													
9. Bowling, skating													
10. Dancing (Social)													
11. Horseback Riding													
12. Walking, fast pace (as planned exercise)													
Type F activity:													
13. Basketball													
14. Hiking													
15. Skiing (snow or water)													
16. Swimming													
17. Tennis (Doubles)													
18. Tennis (Singles)													
Type G activity:													
19. Exercise to fast music													
20. Dancercise, Jazzercise													
21. Jogging (1 mile in 12 min.)													
22. Running (1 mile in 9 min.)													
23. Raquet ball, Handball,													
24. Rope Jumping													
25. Other (Specify): _____													

4. Think of one typical 24-hour period, from the time you go to bed on one day (night) until the time you go to bed on the following day. Estimate the number of hours (to the nearest 1/4 hour) that you usually spend in the following general types of activities:

Use for Coding

a. Sleeping — Hrs/day: _____

b. Sitting (includes activities in previous Question 2: Type A) — Hrs/day: _____

c. Standing (includes activities Question 2: Type B) — Hrs/day: _____

d. Walking (Includes activities in Question 2:Type C and Question 3:Type D) — Hrs/day: _____

e. Vigorous Activity (Includes Question 3: Types E, F, & G) — Hrs./day: _____

TOTAL HOURS: _____
(Should total 24 Hours)

5. When did you last have a physical examination by a physician? Month/year?

6. Do you have any type of physical problem that prevents you from participating in exercise? Please check: ___Yes ___No
If yes, Please describe:
_____
_____
_____

7. Do You Smoke? Please check: ___Yes ___No
If yes, number of cigarettes per day? _____

8. Do you ever take any type of over-the-counter or prescription medications for symptoms or health problems you believe are due to stress and tension, (such as tension headache, backache, muscle cramps, spasms in colon, stomach or esophagus, nervousness, depression, ulcer, indigestion, upset stomach, diarrhea, or constipation, etc.)?
Please check: ___Yes ___No
For what symptoms do you take each medication? (Please list)

Symptom:	Type & Name of Medication	No. Pills (dose) Daily	Weekly
a.			
b.			
c.			
d.			
e.			
f.			

ID Number: _____
Date: _____

PART III: BEVERAGES, SNACKS, VITAMIN/MINERAL SUPPLEMENTS, & MEDICATIONS.

9. Think about the types of beverages you usually drink throughout the day or on special occasions, especially during the past 6 months.

First, read through the list of beverages below and check (✓) the "yes" or "no" colum as to whether you have had each beverage in the past 6 months.
Next, think only of the past week (last 7 days). Circle the appropriate number in colum B that represents the number of days on which you drank each beverage.
Next, in colum C list the number of servings you estimate you averaged per day of that beverage.
In colum D list the size serving (in ounces) that you usually drink at any one time of this beverage.

A. Have you drunk this beverage in the past 6 months. Check(✓) "yes" or "no" colum	YES	NO	B NUMBER OF DAYS IN PAST WEEK ON WHICH YOU DRANK THIS BEVERAGE	C AVG. NO. SERVS. PER DAY (Number)	D AVG. SIZE EACH SERV. (OZS.)	Use for Coding
1.Coffee, brewed (with caffeine)			0 1 2 3 4 5 6 7			
2.Coffee, instant (with caffeine)			0 1 2 3 4 5 6 7			
3.Coffee, decaffeinated, either brewed or instant			0 1 2 3 4 5 6 7			
4.Tea, hot or iced, 1-4 min.brew			0 1 2 3 4 5 6 7			
5.Tea, hot or iced, 5-8 min.brew			0 1 2 3 4 5 6 7			
6.Herbal tea			0 1 2 3 4 5 6 7			
7.Bottled or canned soft drinks, Give brand & type:(Example:Diet Coke/caffeine free)_____			0 1 2 3 4 5 6 7			
8.Chocolate milk (hot or cold)_____			0 1 2 3 4 5 6 7			
9.Beer _____			0 1 2 3 4 5 6 7			
10.Wines, Champagne_____			0 1 2 3 4 5 6 7			
11.Mixed drinks, (Bourbon/Coke, Whiskey sour, Tom Collins, Daiquiri, Bloody Mary, etc.)_____			0 1 2 3 4 5 6 7			
12.Unmixed liquor: bourbon, rum, vodka, etc._____			0 1 2 3 4 5 6 7			
13.Soft drinks from mixes (Tang, Koolade, lemonade) List type:			0 1 2 3 4 5 6 7			
14.Canned or bottled fruit punch, (Hawaiian Punch, Hi-C, etc.)_____			0 1 2 3 4 5 6 7			
15.Real Fruit Juice, (apple, grape, orange, grapefruit, etc.)_____			0 1 2 3 4 5 6 7			
16.Milk, whole?___ or ___Skimmed?			0 1 2 3 4 5 6 7			
17.Plain water_____			0 1 2 3 4 5 6 7			
18.Other - List:_____			0 1 2 3 4 5 6 7			

Use for Coding

10. Do you usually add sugar to any of the above beverages?
Please check: ____ Yes ____ No
List beverages to which you usually add sugar for yourself.

_____

_____

How much sugar do you usually add to one 8-ounce (1 c.) serving?
Number of Teaspoons: _____

11. Do you usually add artificial sweetner to any foods or beverages?
Please check: ____ Yes ____ No
List beverages and foods you usually add it to:

_____

_____

_____

_____

12. In the past 2 years have you been diagnosed as having, or do you currently have, any of these conditions?
Please circle the number for your answer: 1=Yes or 2=No.

	Yes	No
a. Diabetes	1	2
b. Bronchitis, emphysema, or asthma	1	2
c. Atherosclerosis (hardening of the arteries)	1	2
d. Elevated cholesterol	1	2
e. Elevated triglycerides	1	2
f. Heart Disease or defects	1	2
g. High Blood Pressure (Hypertension)	1	2
h. Anemia: Low hemoglobin or low hematocrit	1	2
i. Osteoporosis (brittle bones)	1	2
J. Spastic colon/esophagus, or nervous stomach	1	2
k. Ulcers or repeated stomach trouble	1	2
i. Migraine or other chronic headache	1	2
l. Back or joint problems	1	2
j. Food allergies (List foods)	1	2

_____

_____

_____

DATA FORM B

DATE:_____

SHIFT:_____

USE FOR CODING	ID #	HT	WT	HR	TRICEPS 1	TRICEPS 2	BICEPS 1	BICEPS 2	SUBSCAP 1	SUBSCAP 2	SUPRAIL 1	SUPRAIL 2	TRICEPS $\bar{x}$	BICEPS $\bar{x}$	SUBSC $\bar{x}$	SUPRAIL $\bar{x}$	SUM	% BF
	1.																	
	2.																	
	3.																	
	4.																	
	5.																	
	6.																	
	7.																	
	8.																	
	9.																	
	10.																	
	11.																	
	12.																	
	13.																	
	14.																	
	15.																	
	16.																	
	17.																	
	18.																	

HT: inches; WT: pounds; HR: 10 sec. after exercise; skinfolds: mm

PAF 2/84

Form 010

Form 011
PIEDMONT WELLNESS PROGRAM
PARTICIPANT QUESTIONNAIRE

Dear Study Participant: _____:

In order to increase participation in the Wellness Program seminars, we are attempting to determine if you desire some alterations in seminar topics or dates and times when seminars are offered. Please assist us in this effort by filling out the following questionnaire. Then return it to Debbie Brown's office by April 16, 1984. A box will be placed in the outer office, in which to place the questionnaires. You do not need to put your name on the questionnaire.

I. Below is a list of titles and dates of the remaining 10 seminars we plan to offer in the Wellness Program. We need to get a general idea of how many study participants plan to attend each seminar.

Please check the number beside the title of each seminar you plan to attend:

1. Let's Get Physical	_____	April 16 & 17
2. Vitamins, Minerals, Calories	_____	April 30 & May 1
3. The Stress Connection	_____	May 14 & 15
4. Coping With Stress	_____	May 28 & 29
5. Eat for the Health of it!	_____	June 11 & 12
6. Cut the Fat	_____	June 25 & 26
7. Carbohydrates Count	_____	July 9 & 10
8. The Carbohydrate Selection	_____	July 23 & 24
9. One For The Road?	_____	August 6 & 7
10. How Much Is Too Much?	_____	August 20 & 21

II. Following is a list of the Seminar Times. Please check the time you plan to come to most of the seminars.

Monday	1:30 PM	_____	Tuesday	8:30 AM	_____
Monday	3:30 PM	_____	Tuesday	3:00 PM	_____
Monday	7:30 PM	_____	Tuesday	4:30 PM	_____

III. I plan to attend at least 6 of the 10 seminars.
Please check ( ) Yes ___ No ___

If no, please tell us your reason(s): _____

IV. Are there other seminar topics you would prefer in place of some of the above topics? Please specify: _____

_____

_____

V. Are you interested in attending some weight control classes?
Please check ( ) Yes ___ No ___

If yes, please check ( ) one of the following:

___ a. I would like some weight control classes substituted for some of the above seminar topics.

___ b. I would like some weight control classes in addition to the above seminar topics.

Please list 3 different times (day and hour) you would be able to attend weight control classes.

1._____
2._____
3. _____

Thank you for completing this Questionnaire.

Sincerely,

Ruby H. Cox

Patty Fenstermaker

RHC 4/6/84

Form 012

CODE NO. _____

INDIVIDUAL SUBJECT DATA SUMMARY FORM

SUBJECT'S NAME: _____ I.D. NUMBER _____

SHIFT: _____ AGE: _____

DATA TYPE	PRE-TREATMENT	POST-TREATMENT
AVERAGE DAILY INTAKE OF:		
KCALORIES		
PROTEIN (gm)		
VITAMIN A (IU)		
VITAMIN C (mg)		
IRON (mg)		
CALCIUM (mg)		
THIAMIN (mg)		
RIBOFLAVIN (mg)		
NIACIN (mg)		
AVERAGE NO. MINUTES SPENT WEEKLY IN:		
LEISURE/RECREAT. ACTIVITIES		
VIGOROUS PHYSICAL ACTIVITY		
HEMOGLOBIN		
HEART RATE		
PERCENT BODY FAT		
HEIGHT IN INCHES		
WEIGHT IN POUNDS		
JOB PERFORNANCE SCORE		
ABSENTEEISM- NO. HRS.		

SCORING TABLE FOR TWENTY-FOUR HOUR DIET

To find the Twenty-four Hour Diet score:

1. Select the appropriate table (below) on the basis of the number of *milk* servings reported in Item 6, FAMILY RECORD-B (0, 1, ②, or more).
   NOTE: Circled numbers (②, ④) are the highest score possible in a food group. For number of servings larger than the circled number, use the circled number. Example, for 3 servings of milk, use the ② MILK SERVINGS table.
2. Select the proper column of the table on the basis of the number of *meat* servings reported in Item 7.
3. Select the proper area of the table on the basis of the number of *vegetable/fruit* servings reported in Item 8 (0, 1, 2, 3, ④, or more).
4. Find the proper line of the table on the basis of the number of *bread/cereal* servings reported in Item 9.

The number to the right of this (in **boldface** type) is the Twenty-four Hour Diet score.

Enter the diet score at the appropriate "Food Recall" number on the homemaker's FOOD AND NUTRITION PROGRESSION RECORD.

0 MILK SERVINGS

0 MEAT SERVINGS			1 MEAT SERVING			②MEAT SERVINGS		
Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	**0**	0	0	**8**	0	0	**8**
	1	**2**		1	**10**		1	**14**
	2	**4**		2	**12**		2	**17**
	3	**6**		3	**16**		3	**26**
	④	**8**		④	**22**		④	**29**
1	0	**8**	1	0	**10**	1	0	**14**
	1	**9**		1	**22**		1	**27**
	2	**11**		2	**28**		2	**35**
	3	**19**		3	**33**		3	**39**
	④	**21**		④	**37**		④	**42**
2	0	**4**	2	0	**12**	2	0	**17**
	1	**11**		1	**28**		1	**35**
	2	**19**		2	**33**		2	**39**
	3	**21**		3	**37**		3	**43**
	④	**28**		④	**41**		④	**47**
3	0	**8**	3	0	**16**	3	0	**25**
	1	**19**		1	**33**		1	**30**
	2	**21**		2	**37**		2	**43**
	3	**28**		3	**41**		3	**47**
	④	**29**		④	**48**		④	**60**
④	0	**8**	④	0	**23**	④	0	**29**
	1	**21**		1	**37**		1	**43**
	2	**28**		2	**41**		2	**47**
	3	**29**		3	**48**		3	**60**
	④	**33**		④	**56**		④	**68**

1 MILK SERVING

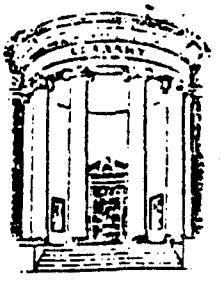
0 MEAT SERVINGS			1 MEAT SERVING			②MEAT SERVINGS		
Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	**8**	0	0	**11**	0	0	**16**
	1	**10**		1	**24**		1	**29**
	2	**12**		2	**27**		2	**37**
	3	**18**		3	**38**		3	**41**
	④	**23**		④	**39**		④	**48**
1	0	**10**	1	0	**24**	1	0	**29**
	1	**22**		1	**42**		1	**53**
	2	**28**		2	**50**		2	**56**
	3	**33**		3	**54**		3	**60**
	④	**37**		④	**58**		④	**64**
2	0	**12**	2	0	**27**	2	0	**37**
	1	**28**		1	**50**		1	**56**
	2	**33**		2	**58**		2	**63**
	3	**37**		3	**60**		3	**66**
	④	**41**		④	**64**		④	**70**
3	0	**16**	3	0	**35**	3	0	**41**
	1	**33**		1	**54**		1	**60**
	2	**37**		2	**60**		2	**66**
	3	**41**		3	**64**		3	**70**
	④	**48**		④	**77**		④	**85**
④	0	**23**	④	0	**39**	④	0	**48**
	1	**37**		1	**60**		1	**64**
	2	**41**		2	**64**		2	**70**
	3	**48**		3	**77**		3	**88**
	④	**56**		④	**88**		④	**91**

② MILK SERVINGS

0 MEAT SERVINGS			1 MEAT SERVING			②MEAT SERVINGS		
Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score	Veg Fruit	Bread Cereal	Score
0	0	**8**	0	0	**16**	0	0	**21**
	1	**14**		1	**29**		1	**30**
	2	**17**		2	**37**		2	**43**
	3	**26**		3	**41**		3	**47**
	④	**29**		④	**48**		④	**61**
1	0	**14**	1	0	**29**	1	0	**30**
	1	**27**		1	**53**		1	**56**
	2	**35**		2	**56**		2	**61**
	3	**39**		3	**60**		3	**66**
	④	**42**		④	**64**		④	**68**
2	0	**17**	2	0	**37**	2	0	**43**
	1	**35**		1	**56**		1	**62**
	2	**39**		2	**63**		2	**68**
	3	**43**		3	**66**		3	**72**
	④	**47**		④	**70**		④	**81**
3	0	**25**	3	0	**41**	3	0	**47**
	1	**39**		1	**60**		1	**62**
	2	**43**		2	**66**		2	**72**
	3	**47**		3	**70**		3	**81**
	④	**60**		④	**85**		④	**91**
④	0	**29**	④	0	**48**	④	0	**54**
	1	**43**		1	**64**		1	**70**
	2	**47**		2	**70**		2	**81**
	3	**60**		3	**88**		3	**94**
	④	**68**		④	**91**		④	**100**

Revised 10/83/JMc

COOPERATIVE EXTENSION SERVICE ⚙ CLEMSON UNIVERSITY



THE UNIVERSITY OF NORTH CAROLINA
AT GREENSBORO

School of Home Economics
Department of Food-Nutrition-Food Service Management
(919) 379-5332; 5313

Consent Form for Piedmont Airline Health Promotion Program Experimental Subjects

I understand that I will be participating in a 6-month project entitled "Effects of a Nutrition-based Health Promotion Program on Stress, Chronic Disease Risk Factors, Dietary Adequacy, Physical Activity, Body Composition, Job Satisfaction and Performance Among Female Airline Reservation Employees" and that the study is being conducted by Ruby H. Cox and Patty Fenstermaker, two (Ph.D.) graduate students at UNC-G and supervised by Dr. Lucille Wakefield in the Department of Food and Nutrition.

I understand that the overall purpose of this study is to evaluate the effectiveness of a 6-month work site health promotion program, including seminars on nutrition, physical fitness, and stress management. Also, I understand that an additional purpose is to evaluate the relationships among such factors as food intake, physical activity, anxiety, depression, job satisfaction, job performance and absenteeism.

I understand that I volunteer myself for the following procedures:

1. I will come to a designated room at my place of work at the beginning of the project (during February, 1984) to complete certain questionnaires and to have certain measures taken on me to include:
   a. A Nutrition and Health Habits Inventory
   b. Dietary intake
   c. Blood pressure
   d. Hemoglobin test (which will involve a finger prick to obtain a small sample of blood)
   e. Heart rate after exercising for 6 minutes
   f. Measurements of my anxiety, depression, and job satisfaction levels with paper/pencil tests
   g. My skinfold thickness, height, and weight
2. I will repeat the above procedure at the end of the project (late August and again in late October, 1984).
3. I will fill out a three-day food intake record at the beginning and at the end of the project.
4. I will attend approximately 2 seminars per month, lasting about 30 to 45 minutes each, which will be held at the Piedmont Reservation Center on Griffith Road, Winston-Salem, N. C.
5. I will make an effort to increase my level of physical activity by engaging in an exercise of my choice for 3 or more times per week.

Consent Form for Piedmont Airline Health Promotion
Program Experimental Subjects

6. I will make an effort to read most of the educational materials distributed as a part of the health promotion program.

I understand that if I am age 35 or older or have any suspected health problems (i.e., hypertension, heart disease, diabetes, obesity, orthopedic problems), I must check with my doctor before engaging in strenuous activity.

I understand that there are some risks such as discomfort and/or infection involved with the finger prick for the hemoglobin test, and discomfort and sore muscles with exercise, but that all precautions will be taken to protect me. The procedures will be conducted by trained personnel.

I understand that all information collected from me will be kept confidential by the two principal researchers and will be used only for summarized group data analyses and reports. ID numbers consisting of random numbers will be used instead of names on all questionnaires and data forms. The ID numbers will be printed on index cards and enclosed in envelopes. On the days of data collection, I will be handed an envelope to obtain my number. The ID cards will be kept in the possession of the principal researcher away from the work site and only the researcher will have access to the ID number. Only the principal researcher will see individual forms completed by me.

I understand that the benefits I will gain as a result of being in this project are:

a. Access to information concerning nutrition, self-health care, stress management, and physical fitness.

b. Opportunity for feedback on the adequacy of my food habits, body composition, and physical condition.

c. Access to a copy of the final results of this study.

I understand that the principal researchers will answer any questions I have at any time about any phase of the project and my participation in it. I understand that I am free to withdraw from the project at any time without prejudice and without jeopardizing my position with Piedmont Airlines.

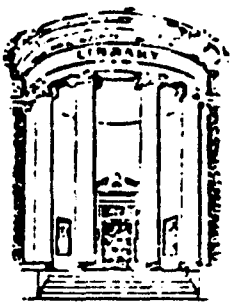
Dr. Lucille Wakefield
Dept. of Foods and Nutrition
UNC-G (Greensboro, N. C.)
(919) 379-5332

Signed:_____
Date:_____

Signed:_____
Ruby H. Cox
P. O. Box 205
Pilot Mountain, N. C. 27041
(919) 368-4123

Signed:_____
Patty Fenstermaker
3430 Kirklees Road
Winston-Salem, N. C. 27104
(919) 765-6438

RHC:PF/jec



THE UNIVERSITY OF NORTH CAROLINA
AT GREENSBORO

School of Home Economics
Department of Food-Nutrition-Food Service Management
(919) 379-5332; 5313

CONSENT FORM FOR PIEDMONT AIRLINE HEALTH PROMOTION CONTROL SUBJECTS

I understand that I will be participating as a control subject in a 6-month project entitled "Effects of a Nutrition-based Health Promotion Program on Stress, Chronic Disease Risk Factors, Dietary Adequacy, Physical Activity, Body Composition, Job Satisfaction and Performance Among Female Airline Reservation Employees" and that the study is being conducted by Ruby H. Cox and Patty Fenstermaker, two (Ph.D) graduate students at the University of N. C. at Greensboro and supervised by Dr. Lucille Wakefield in the Department of Foods and Nutrition.

I understand that the overall purpose of this study is to evaluate the effectiveness of a 6-month work site health promotion program, including seminars on nutrition, physical fitness, and stress management to be offered at the Piedmont Reservation Center in Winston-Salem, N. C. Also, I understand that an additional purpose is to evaluate the relationships among such factors as food intake, physical activity, anxiety, depression, job satisfaction, job performance, and absenteeism.

I understand that I volunteer myself for the following procedures:

1. I will come to a designated room at my place of work at the beginning of the project (during February, 1984) to complete certain questionnaires and to have certain measures taken on me to include:
   a. A Nutrition and Health Habits Inventory
   b. Dietary intake
   c. Blood pressure
   d. Hemoglobin test (which will involve a finger prick to obtain a small sample of blood)
   e. Heart rate after exercising for 6 minutes
   f. Measurements of my anxiety, depression, and job satisfaction levels with paper/pencil tests
   g. My skinfold thickness, height, and weight.
2. I will repeat the above procedures at the end of the project (late August and again in late October, 1984).
3. I will fill out a three-day food intake record at the beginning and at the end of the project.

I understand that, on completion of the study, I will receive some information regarding assessment of my own nutrition and physical condition and will have access to a report of the results of the study.

CONSENT FORM FOR PIEDMONT AIRLINE HEALTH PROMOTION CONTROL SUBJECTS

4. I will make an effort to read most of the educational materials distributed as part of the Health Promotion Program.

I understand that there are some risks such as discomfort and/or infection involved with the finger prick for the hemoglobin test, and discomfort and sore muscles with the exercise step test, but that all precautions will be taken to protect me. The procedures will be conducted by trained personnel.

I understand that all information collected from me will be kept confidential by the two principal researchers and will be used only for summarized group data analyses and reports. ID numbers consisting of random numbers will be used instead of names on all questionnaires and data forms. The ID numbers will be printed on index cards and enclosed in envelopes. On the days of data collection, I will be handed an envelope to obtain my number. The ID cards will be kept in the possession of the principal researcher away from the work site and only the researcher will have access to the ID number. Only the principal researcher will see individual forms completed by me.

I understand that the benefits I will gain as a result of being in this project are:

a. Opportunity for feedback on the adequacy of my food habits, body composition, and physical condition.

b. Access to a copy of the final results of this study.

I understand that the principal researchers will answer any questions I have at any time about any phase of the project and my participation in it. I understand that I am free to withdraw from the study at any time without prejudice and without jeopardizing my position with Piedmont Airlines.

Dr. Lucille Wakefield
Dept. of Foods and Nutrition
UNC-G (Greensboro, N. C.)
(919) 379-5332

Signed:_____

Date:_____

Signed:_____
Ruby H. Cox
P. O. Box 205
Pilot Mountain, N. C. 27041
(919) 368-4123

Signed:_____
Patty Fenstermaker
3430 Kirklees Road
Winston-Salem, N. C. 27104
(919) 765-6438

RHC:PF/jec

DURNIN METHOD OF ESTIMATING PERCENT BODY FAT

The Durnin method of estimating percent body fat involves the use of skinfold thickness at four sites, then using the sum of the skinfolds to find a percent body fat value in a special chart developed by Durnin and Womersley (1974). The Durnin method is based on the assumption that approximately half of the total body fat is subcutaneous and that a good estimate of body fat can be obtained by measuring the skin fold thickness at various sites.

In measuring skinfolds there are certain procedures that should be followed to assure obtaining accurate measurements. Skinfold calipers should be such that they exert a constant pressure of 10 grams/mm2, and are accurate to 0.1 mm. Two brands of calipers meeting this requirement are Lange Skinfold Calipers (Cambridge Scientific Industries, Cambridge, Maryland) and Harpenden Skinfold Calipers (British Indicators, St. Albans, Hertfordshire, England).

The skinfold measure to be obtained is the double thickness of the pinched, folded skin, plus the attached subcutaneous adipose tissue. The skinfold should be picked up and measured in a standard fashion as follows:

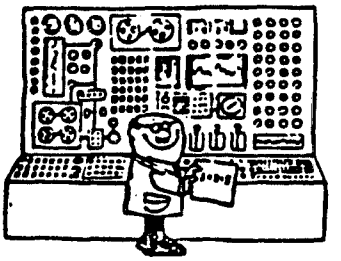
- Pinch up a full fold of skin and subcutaneous tissue between the thumb and forefinger, at a distance of about one centimeter from the site where calipers are to be placed.
- Pull the fold away from the underlying muscle. Continue to hold the skinfold during the full time the measurement is being taken.

-Apply the calipers to the fold about 1 centimeter below the fingers so that the pressure on the fold at the point measured is exerted by the faces of the calipers and not by the fingers.
-Release the handle of the caliper to permit full force of the caliper arm pressure.
-Read the dial to the nearest one-half millimeter.
-Repeat the measurement at least three times at the same site, and record the average value.

The sites measured and used in the Durnin method are the triceps, biceps, suprailiac, and subscapular. The four measurements are then summed and the tolal value is located in a conversion table, developed by Durnin and Womersley, to obtain the estimated percent body fat. The "Conversion Tables: % Fat" developed by Durnin and Womersley (1974) is located on the page following this discussion.

Durnin Method Continued

Conversion Tables: % Fat



SS= SUM OF 4 SKIN FOLDS (BICEPS, TRICEPS, SUBSCAPULAR, SUPRAILIAC)
DF = BODY DENSITY (ADULT FEMALES)
FF = % BODY WEIGHT AS FAT (FEMALES)
DM = BODY DENSITY (ADULT MALES)
FM = % BODY WEIGHT AS FAT (MALES)

SS	DF	FF	DM	FM
25	1.0574	18	1.0727	12
30	1.0517	20.5	1.0676	13.5
35	1.0469	23	1.0634	15.5
40	1.0428	24.5	1.0597	17
50	1.0358	28	1.0536	20
55	1.0328	29.5	1.0510	21
60	1.0301	30.5	1.0486	22
65	1.0276	32	1.0464	23
70	1.0253	33	1.0444	24
75	1.0231	34	1.0425	25
76	1.0227	34	1.0421	25
77	1.0223	34.5	1.0417	25
78	1.0219	34.5	1.0413	25.5
79	1.0215	35	1.0410	25.5
80	1.0211	35	1.0407	25.5
81	1.0207	35	1.0403	25.5
82	1.0203	35	1.0400	26
83	1.0199	35.5	1.0397	26
84	1.0195	35.5	1.0394	26
85	1.0192	36	1.0391	26.5
86	1.0188	36	1.0387	26.5
87	1.0185	36	1.0384	26.5
88	1.0182	36.5	1.0381	27
89	1.0178	36.5	1.0378	27
90	1.0174	36.5	1.0375	27
91	1.0170	36.5	1.0372	27
92	1.0166	37	1.0369	27.5
93	1.0163	37	1.0366	27.5
94	1.0160	37	1.0363	28
95	1.0157	37	1.0360	28
96	1.0153	37	1.0357	28
97	1.0150	37.5	1.0354	28
98	1.0147	37.5	1.0351	28
99	1.0144	38	1.0348	28.5

SS	DF	FF	DM	FM
100	1.0141	38	1.0346	28.
101	1.0138	38	1.0343	28.5
102	1.0135	38.5	1.0340	28.5
103	1.0132	38.5	1.0337	29
104	1.0129	39	1.0335	29
105	1.0126	39	1.0333	29
106	1.0123	39	1.0330	29
107	1.0120	39	1.0327	29.5
108	1.0117	39	1.0324	29.5
109	1.0114	39.5	1.0322	29.5
110	1.0111	39.5	1.0320	29.5
111	1.0108	39.5	1.0317	29.5
112	1.0105	39.5	1.0314	30
113	1.0102	40	1.0312	30
114	1.0099	40	1.0310	30
115	1.0097	40	1.0308	30
116	1.0094	40	1.0305	30.5
117	1.0091	40.5	1.0302	30.5
118	1.0088	40.5	1.0300	30.5
119	1.0086	41	1.0298	30.5
120	1.0084	41	1.0296	31
121	1.0081	41	1.0293	31
122	1.0078	41	1.0291	31
123	1.0075	41	1.0289	31
124	1.0073	41.5	1.0287	31
125	1.0071	41.5	1.0285	31.5
126	1.0068	41.5	1.0282	31.5
127	1.0065	41.5	1.0280	31.5
128	1.0063	42	1.0278	31.5
129	1.0061	42	1.0276	32
130	1.0059	42	1.0274	32
131	1.0056	42	1.0272	32
132	1.0053	42.5	1.0270	32
133	1.0051	42.5	1.0268	32
134	1.0049	42.5	1.0266	32
135	1.0047	42.5	1.0264	32.5
136	1.0044	43	1.0262	32.5
137	1.0042	43	1.0260	32.5
138	1.0040	43	1.0258	32.5
139	1.0038	43	1.0256	32.5
140	1.0036	43	1.0254	32.5
141	1.0033	43	1.0252	33
142	1.0031	43.5	1.0250	33
143	1.0029	43.5	1.0248	33
144	1.0029	44	1.0246	33
145	1.0025	44	1.0244	33
146	1.0022	44	1.0242	33.5
147	1.0020	44	1.0240	33.5
148	1.0018	44	1.0238	33.5
149	1.0016	44	1.0236	33.5

APPENDIX B

LETTERS TO SUBJECTS AND PIEDMONT AIRLINE OFFICIALS

MEMORANDUM . . .

TO: All Winston-Salem Reservations Employees

FROM: Nancy Frazier

SUBJECT: Wellness Program DATE: November 11, 1983

The interest shown in better health, disease prevention, self-care and self-help activities has greatly increased over the past several years. Your company is among those who are interested in these areas. Therefore, we would like to offer our Reservations employees an opportunity to participate in a "Wellness Program." This program will include seminars (classes) on several topics including nutrition, weight control, exercise, stress management, and prevention of aging and chronic disease (heart disease, high blood pressure, stroke, diabetes, etc.). Seminars and other activities will be conducted by two University of North Carolina at Greensboro Doctoral students in Nutrition: Ruby Cox and Patty Fenstermaker. Both are Registered Dieticians and have had wide experience in working with individuals and community groups in fitness, weight control, and nutrition.

This program will be free and totally voluntary. Since any participation in this program will be done on the employee's own time, it will be up to each individual to choose the activities and seminars they desire to attend and how often. A tentative plan is for the program to begin February 1, 1984 and run through July 1984. There will be two (2) different topics addressed monthly and several seminars conducted on each throughout the month. The seminars will last approximately 30-45 minutes each and will be held at various times throughout the day and early evening. Some of the major program emphasis will be:

1. Food Becomes You - How food affects the way we look and feel; nutrients and how they affect us; Maintaining ideal weight; the ideal eating pattern.

2. Let's Get Physical - How physical activity can help us achieve and maintain a desirable figure, increase endurance and energy level, slow the aging process, and decrease stress. This program will also include guidance on various types of exercise.

3. Understanding and coping with stress - How stress affects us internally; relationship of stress to nutrition and health; and ways to reduce stress.

4. Eat for the Health of it - Fats, cholesterol, sodium and coronary heart disease: Reducing risk factors of chronic disease.

5. Fiber, complex carbohydrates, sugar.

6. Alcohol, caffeine, smoking and excessive medications — How much is too much?

We urge each of you to participate in this program for we know it can be beneficial in helping you to learn information and methods to guard against health problems and to achieve a higher level of fitness and stamina. We also would like to use the program here in Winston-Salem as a model for developing similar programs in other locations.

Whether or not you plan to participate in the "Wellness Program," we would like for every employee to complete the section below and return it to your supervisor no later than November 23.

Thank you,

Nancy

Nancy Frazier
Manager - Reservations Personnel Relations

I would be interested in participating in the "Wellness Program."

YES ____ NO ____

If yes, please fill in the area below:

NAME: _____

SHIFT: _____

FULL-TIME _____ INTERMEDIATE _____ PART-TIME _____

Winston-Salem, N.C.
November 14, 1983

To: Piedmont Reservation Employees, Nashville, Tennessee

From: Carolyn Matthews, Reservation Center Manager

Subject: Pilot Study of a Piedmont Health Promotion Program in Winston-Salem, N.C.

The interest shown in better health, disease prevention, self-care, and self-help has greatly increased over the past several years. Your company is among those who are interested in these areas. Plans are now being made to conduct a pilot study in Winston-Salem, N.C. to determine the effectiveness and feasibility of a health promotion program among Piedmonts' employees. An education program including nutrition, exercise, fitness, stress control, weight control, and disease prevention will be conducted over a five and one-half month period (February 27 - July 31, 1984) in the Winston-Salem reservation offices. All reservation employees who are interested will participate in seminars and activities on a voluntary basis.

Two nutrition PhD students from the University of North Carolina at Greensboro will conduct the seminars and other education activities. They are Ruby Cox and Patty Fenstermaker. Both have master's degrees in nutrition and have had varied experience in the area of nutrition and health education.

In conjunction with the health promotion education program, a study will be conducted by Ruby and Patty to determine if the program results in improved measures of nutrition, fitness, and health among the employees. If results are positive, Piedmont hopes to implement similar programs here in Nashville and in other locations. Ruby and Patty will also be using the study to write dissertations in meeting requirements for their doctorate degrees.

In order to scientifically evaluate the effects of the health promotion program in Winston-Salem, we need to obtain a control group of employees from this office for comparison purposes in evaluating the results. We are seeking your voluntary participation as control subjects. Becoming a control subject means that certain measures would be taken on you, but you will not receive an education program until the pilot study is completed.

We need a total of 72 female full-time or intermediate reservation employees who are between 24 and 60 years of age to serve as control subjects. Since some matching on age and other characteristics must be

done, we hope a larger number than 72 of you will volunteer. One advantage to you is that you would receive a complete evaluation of your nutrition and fitness status. If desired, you may also receive a written summary of the over-all results after the completion of the study.

If you volunteer and are ultimately selected as a control subject, you will be asked to fill out certain forms about yourself, which would take only a few hours, most of which would be done here at your worksite. This would be done in early February and again in August and October, 1984. In addition, Ruby Cox and Patty Fenstermaker will come to our offices in February, August, and October and make certain physical measurements such as height, weight, body fatness, blood pressure, and hematocrit. All information will be kept strictly confidential. Only Ruby and Patty will see individual records. Code numbers instead of employees' names will be used to identify imformation.

If you are willing to serve as a control subject, please fill out the attached form and return to:
by Novermber 30, 1983. Your participation is essential to the success of this endeavor. We will greatly appreciate your help.

I am willing to serve as a control subject for the Pilot Study on the Piedmont Health Promotion Program. Yes

Name:_____ Age:_____

Shift:Begins:_____ Ends:_____

Total Years of Service (including any Part-time service): _____

Current Classification: Full-time _____ Intermediate_____

Do you consider yourself overweight? Yes_____ No_____
If yes, by __ pounds for____ years (fill in no. pounds and years).

rhc/11/83

Pilot Mountain, N.C.
February 27, 1984

Mrs. Carolyn Matthews
Piedmont Reservation Center
322 Knapp Blvd.
Nashville, Tenn. 37211

Dear Carolyn:

Here is the list of people we have chosen so far to use as control subjects in the Wellness Program study. Would you check to see if I have the names spelled correctly? Also, you will notice I have left blanks for you to fill in the names of the additional subjects in the appropriate categories. Do have the additional people to fill out the original form as we will need to know their ages, etc. Just keep the forms until we get there.

Also enclosed is a form for the nurse to record hemoglobins and blood pressure. The hemoglobometer has been sent to you in the same mail as this letter. Hope it got there okay! You will need to purchase some more lancets and hemolysis sticks at a local orthopedic and surgical supply store or from the county health department. I thought I had obtained enough here, but we have used them all. If possible, the hemoglobins need to be completed by the time we leave there March 7, as we need to bring the instrument back with us. We have rented it from a local health department and are supposed to return it by March 12.

One thing we are concerned about is whether all the subjects will be working on the 3 days we are there. If any one is on vacation, do you suppose they would come in to be measured? It would be very helpful if you could go ahead and make a schedule for times subjects will come to be measured. We have learned by experience down here that the best routine is to schedule 2 subjects for measurement every half hour. Patty and I will first take certain measurements, such as height, weight, food recall, skinfold thickness, and exercise test. Then these 2 subject can go to a conference room and fill out several other forms while we measure 2 more people. Some people take longer to fill out the forms, so this procedure doesn't result in a delay in our schedule of doing the physical measurements. We can probably start taking people at 10:30 AM on Monday if there is no delay in our flight. Also, we would be willing to work a little later on Monday and Tuesday nights in order to get the evening shifts and finish in time for our 6:00 PM return flight on Wenesday.

It is best if subjects wear a loose fiting bloose and pants and bring jogging or low-heel, crepe bottom shoes on the day they are to be measured. The exercise test cannot be done in heels or a straight skirt. Also we have to measure the skinfold on the upper arm, back, and hip, which may require removal of the bloose.

We hope to see you March 5 by 8:30 or 9:00 AM. My home phone number is 919-368-4123, if you need to reach me. I am usually home by 4:00 PM your time.

Sincerely yours,

Ruby H. Cox

Patty Fenstermaker

rhc/2/84

Wellness Program

December 29, 1983

In Attendance: Nancy Frazier, John Martin, Gene Cox, Phyllis Hutchins, Debbie Brown, Ruby Cox, Patty Fenstermaker.

A planning session for the wellness program was held this date, December 29, 1983 with the above mentioned present. Following is a brief summary of that meeting to be used as a milepost for follow up of the program.

The wellness program will commence February 27, 1984 in its entirety and presently scheduled to end the end of July, 1984. Each week there will be three seminars to begin at 0800, 1500, 1700, and can be scheduled bi-weekly depending on the number of interested participants.

A select or control group of 72 participants will be randomly chosen by Ruby Cox and Patty Fenstermaker. A letter of congruence to the program will go out to these participants. Upon receipt of their agreeing to enter into the program, Tiny Griffin, registered nurse and INTRO agent, will begin checking blood pressure for this control group to be completed by January 23, 1984.

A tentative date of January 23-27, 1984 has been set up for Ruby and Patty to complete the following on the control group:

A. Seminar
B. Measure
C. Complete questionnaire

This will take place in the old PTA room and the sick room. These sessions should last approximately 1 hour using 6 participants at one time.

Two publications are being ordered for this program: Nutrition and Your Health: Dietary Guidelines for Americans" and "Stress and Your Health".

The meeting was adjourned.

Phyllis Hutchins
Reservation Manager

PH/klh

cc: Ruby Cox
Patty Fenstermaker

Winston-Salem, N.C.
April 4, 1984

Dear Wellness Program Participant;

We missed you at the last seminar. Enclosed you will find the handouts distributed at the seminar. We have placed two cassette recordings of the seminar in Debbie Brown's office which you can check-out overnight. Since you are a study participant, we would appreciate your taking the time to read the handouts and listen to the seminar recording.

Our next seminar will be held on
and is entitled . We hope to see you
then. Thank you.

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermaker, MS, RD

RHC/4/84

April 25, 1984

Dear_____:

I really do appreciate the interest you have shown in the Wellness Program. If you have been attending the meetings regularly, you are to be commended on your dependability.

There has been some concern over the lack of participation by the Sample Group. I cannot emphasize enough the importance of your participation. Not only does the success and continuation of this program depend on the Sample Group, but so does the completion of Patty and Ruby's doctorate. We encourage everyone, whether they are in the Sample Group or not, to attend. Data collected on the Sample Group is vital to this study.

Those who agreed to be in the Sample Group committed themselves to attend at least two meetings per month (one on each topic). Please follow through with this commitment so that you may learn and become a healthier person. Also, your participation is important so that this study will not have to be discontinued. Many long and difficult hours have gone into the planning of this program. Please support us in this activity and take advantage of a program that so many employees have requested for many years.

If you will, please fill out the attached form as soon as you can and place it in the box in my office.

Thank you,

Debbie Brown

P.S.: A schedule is also included in the attachment.

DBB:pab

Attachment

Winston-Salem, N.C.
May 17, 1984

Dear Wellness Program Study Participants:

We have now completed five of the Wellness Seminars and have seven remaining. Many of you have attended several of these seminars and we really appreciate your participation. We are sincerely hoping that all of you who have not attended any seminars yet will be able to attend most of the remaining semirars.

We have made two cassette recordings of each of the previous five seminars and have compiled a set of appropriate visuals to go with each. These seminar packets have been placed in the outer section of Debbie Brown's office. If you have missed any seminars, please go by and check-out the seminar packets over-night and listen to them.

Since you are a study participant, it is essential to the success of the study that you get the imformation from the seminars! We also believe that you can gain imformation that will be very helpful in improving your own wellness and fitness status from these recorded seminar packets.

Please check out only one packet at a time. If necessary, you may keep each packet for two days. Be sure to sign on the sign-out sheet and put the dates "checked out" and "checked in". We hope you will attend the seminars in the future. However in case you have to miss, additional recordings of each seminar will be placed in the box within a few days after each new seminar is held.

Sincerely yours.

Ruby H. Cox, MS, RD

Patty Fenstermaker, MS, RD

rhc/5/84

Winston-Salem, N.C.
July 5, 1984

Dear Wellness Program Study Participant:

Some of you have attended many of the wellness seminars or listened to the cassette recordings when you could not attend. We sincerely appreciate your faithful participation. To those of you who have not attended any seminars to date, we are making an urgent plea that you check-out the previous seminar cassettes and listen to as many as you possibly can by the middle of August.

We will again be measuring and collecting data for the study during the last part of August and early September. Even if you have not attended any seminars, we are asking that you please remain a study participant. A few have already had to officially drop out because of pregnancy or illness. If many more of you drop out, the study as well as our entire dissertations could be seriously jeapordized. We are counting on this study to meet requirements for our doctorates. Too high a drop-out rate can result in our having to abandon the project and to have to begin anew on our dissertations. This would mean an additional year of school, as well as much added expense for us to complete our doctorate programs.

However, to really give the study a legitimate chance, it is important for you to listen to the seminar recordings, read the handout materials, and attempt to put some of the information into practice. We feel that you will personally gain from this, as well as helping us to complete our dissertations.

Attendance at seminars during June was extremely low. We realize that many of you are taking vacation, or are working overtime, or have children at home from school, which prevents your attendance at this time. Due to this we have decided not to actually present the July seminars in person, but instead to place the handouts in each person's mailbox and to provide 4 or 5 cassette recordings and visual packets for each seminar. You can then check out a cassette packet and take it home over-night. We hope this will not prevent any of you from taking advantage of the imformation. If you feel you will be unable to attend the August seminars, we could do those seminars only by cassette recording as well. Please let Debbie Brown know how you feel about our just providing the cassette recordings and handouts for July and August, instead of presenting in person. We are certainly willing to come and do the seminars, but we realize this is a busy time for everybody.

Along with this letter you have received the handouts for the July 9th and 10th seminars. Several packets of the seminar, including a cassette recording and visuals, have been placed in the box in the front section of Debbie Brown's office. We hope all of you will make an extra effort to check out one of the packets over-night and listen to it. Please be sure to sign the check out sheet, as it is very important for us to know how many are listening to the seminars.

Handouts for the July 23rd and 24th seminars will be placed in your mail box by July 20th. Also the recordings will be placed in Debbie Brown's office at that time. Remember we will not be presenting any of the July seminars in person! Please let Debbie Brown know how you feel about this arrangement so we will know what to do about the August seminars.

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermaker, MS, RD

Winston-Salem, N.C.
August 2, 1984

Dear Wellness Program Participant:

Attached to this letter are the handouts for Seminar #11, which was scheculed to be presented on August 6th and 7th. This seminar will not be presented in person. However, four recorded cassettes of the seminar and visuals have been placed in Debbie Brown's office. Please check out one of the seminar packets and take it home and go through it during the next week.

The 12th (last) seminar scheduled for August 20th and 21st will also be recorded and made available by August 17th. Thank you.

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermaker, MS, RD

Pilot Mountain, N. C.
September 9, 1984

Mrs. Carolyn Matthews
Piedmont Reservation Office
322 Knapp Blvd.
Nashville, Tenn. 37211

Dear Carolyn:

We have completed the wellness program at the Winston-Salem Reservation Center and need to make plans for post-measurement of the control subjects there. Patty and I would like to come there to do these measurements on Thursday and Friday, October 11 and 12. Patty is still in school this semester and she is on Fall break at that time.

We would like to follow the same procedure as before with you sending out notices for two participants to come in every 30 minutes. We will do the weight, hemoglobin, blood pressure, and exercise step test during the appointments on the 11th and 12th. Then the subjects can take the written forms with them to fill out and return to us later. We would like Janice to measure blood pressure and hemoglobin as before.

There were approximately 54 people, from whom we obtained all measures before and on whom we will want to repeat the measures. I will send you a list of people we need to measure as soon as I can get it prepared.

Please let me know as soon as possible if these dates and plans are suitable with you. You can reach me by phone during the day at 919-368-4123 on the following dates: September 14, 20, and 21.
If you prefer, just write me at P.O. Box 205, Pilot Mountain, N.C. 27041.

Hope you have had a good summer. I will look forward to hearing from you.

Sincerely yours,

Ruby H. Cox

Patty Fenstermaker

rhc/9/84

Pilot Mountain, N.C.
September 22, 1984

Mrs. Carolyn Matthews
Piedmont Airlines Reservation Center
322 Knapp Blvd.
Nashville, Tenn. 37211

Dear Carolyn:

Enclosed you will find a list of the people we need to do a post-measurement on for the wellness study. There are fifty-four on the list. Three additional people (at end of list) did not return their record folders to us when we measured before; therefore, we will be unable to use them.

Please let me know as soon as possible if October 11 and 12 will be okay. If some of the subjects are off on those days, perhaps they would agree to come in. The measurement will not take more than 20 to 30 minutes, as they can complete and return the forms later. Will Janice be able to do the hemoglobins, if we bring the equipment? Just drop me a note since I am away from the telephone much of the time. My address is P.O. Box 205, Pilot Mountain, N.C. 27041.

Sincerely yours,

Ruby H. Cox

RHC/9/84

Pilot Mountain, N.C.
November 12, 1984

Dear Wellness Study Participant:

In order to complete the study connected with the Wellness Program and to finish our dissertations, we need to remeasure each of you who are study subjects. Measurements will be exactly like those we did in February and March before beginning the Wellness Program. We hope that all of you will help us in this important step.

Enclosed you will find the forms similar to those you completed before. Your I.D. number has been placed on each form. Please fill out each one within the next week, including keeping a 3-day food intake record. Please give as much imformation as possible on the amount and type of food eaten. Use 2 workdays and 1 non-workday for the food intake record. After completing all the forms, place them bach into the plain brown envelope. Remove the yellow slip containing your name and place the packet in the provided box in Debbie Brown's office.

We will do the measurements on your weight, blood pressure, hemoglobin, and exercise test later in November and early December. You will receive an appointment slip several days in advance.

Again we want to emphasize the urgency of your filling out the forms as soon as possible (within the next 7 days). If too many of you fail to do so, it could invalidate the study results. Please continue as a subject even if you did not come to seminars! Thank you.

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermakerl MS, RD

RHC/11/84

Winston-Salem, N.C.
November 30, 1984

To: Control Subjects, Piedmont Wellness Program Study

From: Ruby H. Cox, MS, RD and Patty Fenstermaker, MS, RD
Wellness Program Coordinators and Researchers
University of N. C. at Greensboro

Subject: Completion of Data Forms by Control Subjects

Enclosed You will find a new set of forms for collection of data for the Wellness Program Study. We urge each of you to complete these forms, place them back in the plain brown envelope, and return to Elaine Wells no later than December q3th. It is very vital to the successful completion of this study for each of you to fill out the forms, whether or not we got your physical measurements while we were there in Nashville. However, it would help us greatly if you would weigh yourself (without shoes) on the balance beam scales there and record your present weight on the blue form.

We are using this study to meet requirements for our dissertations in the doctorate program at UNC-G. We must have at least 50 control subjects from the Nashville group in order for the study to be valid. To date we have received only 25 completed sets of forms from your group. Please help us in this effort!!

As a part of the Wellness Program in Winston-Salem, We made cassette recordings and prepared learning packets of each seminar. Carolyn Matthews will be receiving two sets of each of the 12 Wellness Program seminars. These will be made available for you to checkout and take home overnight. We hope each of you will benefit form this. After we have had a chance to analyze each person's data, you will receive a confidential report of your own dietary and physical status.

RHC/12/84

Winston-Salem, N.C.
December 18, 1984

Dear _____:

As of today, we still have not received your completed forms as a participant in the Wellness Studyn It is possible you have turned in your forms and they were misplaced during the moving of materials for painting of Debbie`Brown's former office. We are very sorry if this has happened, but we very much need completed forms from each of you in order to reach our required quota for successful completion of the study.

If you still have your forms, please complete`and turn`them in by Saturday Morning, December 22. A box has been placed in Debbie Brown's old office for collecting the forms. If your set has`been misplaced, please sign in the designated space below and return this letter immediately to the box in Debbie Brown's office. A new set of forms will then be placed in your mail folder. We need these forms completed by each person receiving this letter regardless of how many seminars you attended and whether you were available for us to obtain your hemoglobin, blood pressure, and other measurements while we were recently at your worksite. Thank you for your cooperation!

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermaker,
MS, RD

I have misplaced my forms. Please put another set in my mail folder
(signed)

rhc/12/84

Winston-Salem, N.C.
January 7, 1985

Dear _____:

Enclosed you will find another set of data forms for the Wellness Study which we again urge you to complete. As you may remember, we are using this study for our dissertations to meet requirements for doctorate degrees at UNC-G. We must have a certain number of completed sets of forms in order for the study to be valid. To reach our quota, we must receive completed forms from each person receiving this letter, regardless of how many seminars you attended.

We realize the Christmas rush may have prevented many of you from filling out the forms before. Please take the time to complete these within the next week and return them to the designated box in Debbie Brown's former office. We need your help!!. Please don't let us down! Thanks.

Sincerely yours,

Ruby H. Cox, MS, RD

Patty Fenstermaker, MS, RD

rhc/1/85

APPENDIX C

RAW DATA ON EXPERIMENTAL AND CONTROL SUBJECTS

Table C-1

Raw Data For Experimental Subjects (Group 1) On All Variables

ID	Protein gm		Vitamin A IU		Vitamin C mg		Calcium mg		Iron mg		GMP* Category	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre.	Post	Pre	Post
01	63	72	4657	4132	65	80	895	1104	13	9	7	7
02	54	47	3377	7936	37	13	1179	1164	5	16	7	5
03	65	64	11677	1905	257	80	963	538	20	13	5	5
04	53	53	4367	2849	33	43	665	240	8	10	5	5
05	52	56	2956	2350	165	138	360	567	9	10	5	7
06	39	53	1459	1917	18	49	529	521	5	8	3	6
07	48	52	2108	3817	93	77	750	457	10	9	7	7
08	42	82	4423	5424	38	187	305	357	7	11	7	7
09	87	83	6152	5633	68	59	757	1061	21	33	5	7
10	65	45	6953	3340	65	21	671	377	9	7	5	7
11	34	46	8193	2751	130	58	301	319	33	9	5	8
12	83	57	26726	6752	108	83	1130	477	14	13	3	7
13	31	89	3890	3723	20	18	758	766	7	11	3	7
14	72	57	20838	3465	65	33	523	501	16	10	1	3
15	68	96	4721	5193	62	47	571	278	9	14	5	5
16	40	59	2650	3994	00	56	296	495	7	11	3	3
17	37	50	4347	1832	47	23	415	390	6	7	7	5
18	50	59	1698	3040	7	98	342	432	7	10	5	7
19	71	87	6638	8218	122	217	638	598	15	19	5	6
20	76	55	4837	8147	4	82	670	940	11	8	3	7
21	64	64	2604	1082	106	26	857	481	15	10	3	1
22	51	39	7803	1905	101	28	756	318	12	7	3	3
23	70	30	28199	1856	62	44	471	342	13	6	6	3
24	41	80	6814	2132	133	133	323	726	9	12	3	6
25	46	63	1269	3951	25	15	198	373	8	12	1	8
26	45	85	4884	6695	69	14	540	587	7	15	5	5
27	57	38	9556	3955	85	68	504	191	12	8	3	5
28	72	50	2252	2982	28	53	773	358	15	7	2	2
29	58	77	5383	1061	54	15	347	204	11	13	1	2
30	111	32	8355	4434	50	23	636	674	19	8	4	3
31	74	58	8245	9691	66	48	502	297	14	10	3	3
32	46	61	1900	9711	99	145	346	620	7	11	1	5
33	70	54	5802	9739	83	149	463	398	24	10	5	8
34	30	59	5360	2849	7	59	609	488	4	8	6	7
35	53	48	2794	3595	253	70	760	683	9	9	5	7
36	72	60	10397	10452	128	406	756	1257	16	10	7	7
37	59	64	1850	5856	53	56	546	570	12	29	7	5
38	69	62	2759	4596	94	65	446	338	12	11	5	5
39	59	70	5874	7095	228	124	567	761	10	14	7	7
40	41	58	4616	1672	2	43	424	231	8	10	3	3
41	76	56	13160	20291	150	179	803	483	15	14	8	7
42	54	68	7212	7173	102	130	973	709	14	12	7	7

*GMP = General Meal Patterning

Table C-1 Continued

GROUP=1

OBS	PBF1	PBF2	ACT1	ACT2	KCAL1	KCAL2	ALBEV1	ALBEV2	CAF1	CAF2
1	24	25	1	2	2056	1817	0	0	270	116
2	30	21	3	2	1217	1536	0	403	75	45
3	25	.	2	2	1979	1542	24	8	79	280
4	34	30	1	2	1669	1473	8	0	138	182
5	37	30	.	1	1461	1523	20	0	8	8
6	25	28	3	3	1155	1045	12	0	70	14
7	28	29	3	2	1857	1659	24	6	36	94
8	21	20	2	3	1241	1504	32	12	79	51
9	25	26	2	2	2071	2010	62	0	48	1
10	24	28	1	2	1654	1414	0	4	201	141
11	27	29	1	2	1395	1146	32	31	21	0
12	27	26	3	1	1823	1607	4	16	85	66
13	31	31	.	.	1284	1965	32	12	391	237
14	31	33	3	3	1403	1264	44	40	259	311
15	31	29	2	2	1353	1278	8	13	458	0
16	40	.	.	2	1088	1548	0	0	414	209
17	30	30	2	1	1045	1104	4	0	329	286
18	34	34	1	1	1287	1546	0	0	65	131
19	39	36	1	2	1939	1575	47	18	346	260
20	33	29	1	2	1371	1336	0	0	127	69
21	39	.	1	1	2049	1447	12	24	248	184
22	34	33	3	1	1338	1079	8	18	172	20
23	34	32	1	1	1505	855	92	32	687	691
24	38	37	1	1	1454	2018	4	0	310	235
25	28	.	1	1	1335	1971	0	8	329	243
26	30	25	2	2	1606	1528	0	32	341	506
27	35	31	1	1	1659	1087	0	0	568	246
28	33	30	1	2	1552	1017	0	0	239	180
29	31	31	1	.	1852	1747	26	8	133	80
30	35	30	3	2	2079	714	4	0	1053	505
31	33	35	3	2	1808	1319	0	0	608	575
32	43	.	2	2	810	1553	0	0	450	486
33	31	.	1	1	1529	1083	0	0	339	3
34	34	33	.	1	795	1488	0	0	305	14
35	39	36	2	2	1699	1481	22	6	127	62
36	36	.	3	3	1741	1573	2	0	684	65
37	35	34	3	2	1124	1259	12	0	626	708
38	33	28	3	3	1971	1336	0	0	528	576
39	36	32	2	3	1294	1408	24	14	262	373
40	27	22	.	1	1132	980	35	12	229	170
41	43	42	1	1	1375	1000	0	0	2298	350
42	34	34	3	3	1247	1459	0	6	117	384

Table C-1 Continued

----------GROUP=1----------

OBS	ANX1	ANX2	DEP1	DEP2	JOB1	JOB2
1	48	33	16	5	50	34
2	46	31	22	13	60	42
3	49	46	10	10	77	76
4	41	36	3	6	73	76
5	36	29	5	0	74	83
6	41	45	19	11	58	58
7	39	32	3	2	73	73
8	48	44	14	25	83	84
9	33	46	5	6	84	73
10	43	35	24	21	34	67
11	41	34	8	2	81	79
12	50	48	8	10	83	73
13	38	51	13	16	60	39
14	54	56	37	32	51	47
15	43	35	21	8	48	73
16	55	40	25	29	78	54
17	53	44	8	11	65	87
18	50	51	33	30	79	68
19	36	40	21	11	76	80
20	46	52	11	21	82	74
21	30	29	8	3	62	70
22	39	45	11	6	69	83
23	55	70	19	29	63	52
24	48	58	19	27	57	54
25	51	49	8	0	72	78
26	43	.	5	16	91	48
27	39	48	2	2	76	76
28	36	26	8	0	71	61
29	49	51	8	11	82	72
30	30	38	6	2	78	80
31	46	43	2	3	79	73
32	45	44	10	6	87	70
33	48	35	8	8	74	79
34	36	36	6	5	77	71
35	30	35	10	6	78	71
36	56	45	14	14	67	83
37	43	34	24	6	70	59
38	43	34	22	6	79	82
39	50	33	6	0	46	60
40	50	50	2	14	93	79
41	45	41	10	10	77	77
42	44	38	16	19	51	67

Table C-1 Continued

GROUP=1

OBS	SUG1	SUG2	FIB1	FIB2	TF1	TF2	SF1	SF2	CHOL1	CHOL2	NA1	NA2
1	130	96	16	17	85	85	31	35	537	298	4145	2379
2	66	101	12	19	32	57	16	28	250	324	2392	3738
3	55	86	40	12	94	67	34	17	474	242	2406	1666
4	113	116	14	23	81	41	46	14	406	228	2027	1941
5	57	58	13	14	55	56	17	30	291	145	1764	2291
6	62	33	6	11	52	42	21	14	153	174	1086	1110
7	80	79	13	19	77	76	28	28	223	313	1888	2698
8	81	46	9	15	49	66	20	23	201	374	1418	1882
9	76	74	20	54	71	91	16	36	405	642	1969	3915
10	88	140	12	6	75	52	28	13	520	304	2295	2364
11	109	36	16	6	53	44	17	12	216	326	2323	2382
12	68	61	14	15	85	67	38	26	792	264	6007	2333
13	10	118	3	15	63	83	25	38	758	643	3687	3273
14	27	20	14	14	67	57	26	26	685	309	2096	1952
15	13	4	28	6	78	61	36	23	516	362	1685	1644
16	14	64	1	11	80	67	22	22	644	398	1645	2795
17	30	91	9	5	48	49	26	18	449	228	1986	1227
18	29	37	6	10	71	77	28	29	251	165	2319	2175
19	59	21	25	18	80	57	29	12	549	366	2101	1930
20	30	24	10	17	67	67	26	29	706	707	1983	2592
21	143	85	18	6	83	58	34	18	366	229	4430	1849
22	57	72	35	7	49	51	20	18	484	244	2380	1932
23	46	46	21	11	78	41	22	12	313	316	1393	1884
24	119	86	11	19	56	84	22	35	385	434	2091	4125
25	71	59	10	16	60	71	24	22	256	282	1049	2928
26	107	16	12	13	51	69	16	20	251	302	1718	3842
27	86	31	21	13	66	51	22	14	244	122	2316	1912
28	45	24	14	9	76	44	28	16	570	325	2166	2298
29	154	44	17	8	78	70	26	22	329	238	3178	1214
30	59	25	69	15	82	29	28	15	619	277	3626	-960
31	56	18	14	10	95	75	30	23	786	495	2545	-1804
32	7	34	16	27	37	71	15	34	312	347	1606	2188
33	83	35	19	12	49	34	20	11	216	578	2743	2175
34	2	40	2	14	13	83	4	23	599	373	2719	2216
35	73	87	18	8	67	65	27	24	326	239	1891	2117
36	44	13	13	27	86	72	39	34	796	392	2283	2169
37	23	23	10	48	59	44	20	17	332	405	1525	2405
38	84	75	18	14	88	55	28	12	560	458	3216	1729
39	29	66	13	14	43	40	18	16	385	497	1762	2053
40	19	13	8	8	63	44	20	11	856	408	1549	1518
41	22	40	35	18	50	34	17	10	662	501	2656	1295
42	52	58	10	22	46	59	23	27	516	517	1400	2020

Table C-1 Continued

Raw Data for Experimental Subjects (Group 1)

ID	Age	Thiamin mg		Riboflavin mg		Niacin mg		Hgb g/100ml	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
01	34	1.09	0.95	1.77	1.50	16.27	11.00	12	11
02	27	0.97	1.44	1.88	1.78	10.33	13.47	13	13
03	33	----	0.78	1.78	0.97	12.45	12.34	12	--
04	34	0.77	0.69	----	0.88	10.61	15.95	12	11
05	34	0.96	1.16	0.93	1.07	15.06	12.31	11	12
06	31	0.51	0.91	0.91	1.08	09.03	12.25	12	14
07	22	0.93	0.79	1.35	1.01	13.11	11.35	12	12
08	26	0.83	0.96	0.66	1.31	09.07	24.53	13	10
09	26	1.24	----	1.89	2.46	24.23	20.22	13	11
10	25	0.87	0.74	1.06	0.73	14.28	13.76	--	10
11	29	2.79	0.80	3.22	1.04	36.67	12.04	12	13
12	33	1.02	0.89	3.71	1.16	17.13	15.70	12	11
13	32	0.57	1.20	0.86	1.62	06.20	22.19	12	11
14	31	0.93	0.80	2.96	0.86	15.05	11.33	13	10
15	33	1.11	----	1.13	1.13	16.28	17.47	10	--
16	35	0.60	0.97	0.92	1.10	04.60	13.58	13	--
17	32	0.60	0.51	0.79	0.93	07.06	13.74	10	12
18	30	0.76	1.04	0.81	1.03	12.15	16.09	15	11
19	34	1.23	1.51	1.70	2.08	18.55	32.04	13	11
20	31	0.78	1.19	----	1.66	11.92	11.60	14	10
21	28	1.67	0.77	1.74	0.94	18.35	21.97	15	--
22	30	0.97	0.56	1.42	0.67	09.42	11.14	12	11
23	45	0.91	0.56	2.59	0.60	20.97	10.03	16	13
24	46	0.79	0.88	1.16	1.18	09.20	14.52	13	13
25	43	0.84	1.85	0.71	1.41	14.22	20.38	11	--
26	42	1.07	1.08	1.29	1.19	13.27	11.69	13	12
27	37	1.10	0.79	1.61	1.71	19.21	10.30	13	10
28	35	0.97	0.58	1.53	0.83	12.36	07.10	12	09
29	40	1.27	1.41	1.00	0.86	13.82	19.90	13	12
30	40	1.28	0.53	----	1.09	15.15	05.02	13	11
31	49	1.15	0.81	1.90	1.19	19.45	14.20	14	13
32	38	0.58	1.05	0.59	1.28	08.82	13.04	13	--
33	46	0.96	----	1.48	1.21	12.88	17.46	11	--
34	38	0.55	1.07	1.03	1.29	04.34	14.86	12	12
35	60	1.09	1.00	1.53	1.25	09.79	10.69	14	12
36	39	1.21	1.32	2.13	1.72	16.17	10.43	13	--
37	36	1.71	0.75	2.39	----	24.01	09.77	13	10
38	38	1.31	0.90	1.33	1.01	16.76	17.42	12	11
39	45	1.35	1.83	1.58	2.63	19.03	21.82	12	11
40	54	0.59	0.81	0.91	0.89	04.55	13.12	14	11
41	56	1.25	0.99	1.64	1.69	16.13	18.17	13	13
42	38	1.30	----	2.33	----	15.93	-----	--	11

Table C-1 Continued

Raw Data for Experimental Subjects (Group 1)

ID	Vigor min		Heart Rate 10 sec		Ht in	Wt lb		JobPerf		Absent hrs	
	Pre	Post	Pre	Post		Pre	Post	Pre	Post	Pre	Post
01	005	110	30	30	63.75	107	105	14	11	000	084
02	225	075	24	25	66.13	109	109	--	--	000	008
03	015	000	28	--	63.25	---	---	12	13	052	036
04	000	000	34	26	63.00	---	110	19	19	009	001
05	000	---	30	23	63.00	132	128	13	12	054	012
06	210	090	32	--	64.00	---	125	16	16	068	025
07	205	073	29	31	65.88	130	127	14	15	000	004
08	195	150	29	--	63.88	093	089	08	08	000	000
09	120	065	--	--	65.63	114	118	--	--	006	000
10	000	000	30	35	64.50	105	111	--	--	006	000
11	000	035	27	25	64.13	112	116	18	19	041	060
12	120	000	26	32	62.63	104	106	09	08	011	000
13	---	---	32	--	64.00	130	133	14	11	055	037
14	150	000	34	29	63.50	---	140	12	11	000	027
15	160	000	31	--	61.00	---	---	10	08	000	072
16	---	090	32	29	58.13	148	126	--	--	---	---
17	090	000	34	--	63.25	108	112	19	17	034	009
18	040	000	32	32	64.00	134	138	18	10	018	024
19	030	030	29	30	64.88	140	147	16	16	012	033
20	000	000	29	--	64.00	124	125	11	09	000	016
21	000	000	31	--	66.25	151	---	11	10	016	019
22	150	000	29	27	61.75	121	119	14	13	000	000
23	015	000	33	--	70.14	142	120	13	12	005	022
24	010	000	--	--	65.75	139	140	13	11	000	272
25	000	000	26	--	63.75	110	---	15	15	022	006
26	000	045	29	26	65.25	117	118	12	10	008	016
27	000	030	--	29	64.37	121	117	14	14	005	016
28	000	000	29	--	65.25	122	122	18	15	006	000
29	000	---	--	--	65.00	115	114	08	07	016	008
30	080	090	20	--	66.00	137	135	18	19	000	000
31	480	180	--	--	64.00	149	151	12	10	000	006
32	015	045	--	--	64.75	189	---	07	08	016	015
33	000	000	--	--	64.25	---	---	--	--	016	016
34	---	000	27	26	64.13	131	131	--	--	000	000
35	150	150	--	--	65.00	154	158	09	10	024	016
36	000	503	--	--	63.00	144	---	19	18	000	016
37	210	045	30	32	65.25	138	142	10	09	000	010
38	135	105	--	--	67.63	144	131	14	12	012	033
39	045	300	--	--	61.25	130	133	09	10	016	048
40	---	000	26	23	61.75	106	102	13	12	016	008
41	000	000	--	--	62.25	199	198	14	15	000	000
42	000	120	28	22	62.13	119	121	14	15	012	012

Table C-2

Individual Data On Control Subjects (Group 2) On All Variables

ID	Protein gm		Vitamin A IU		Vitamin C mg		Calcium mg		Iron mg		GMP* Category	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
43	95	94	10512	7163	204	57	1458	1069	13	12	7	7
44	93	63	1784	2595	15	27	474	725	10	11	3	3
45	80	74	4051	2405	54	31	831	812	9	9	3	5
46	108	53	4927	11963	82	86	753	400	17	11	1	7
47	50	34	1121	2462	50	35	321	177	9	6	7	1
48	68	49	3391	7071	169	234	1100	541	10	8	5	3
49	67	53	18620	2746	165	27	560	570	8	11	3	5
50	35	72	6545	1421	15	25	341	663	9	10	5	5
51	62	67	9372	1367	109	65	532	568	11	17	7	3
52	51	57	6759	1917	257	70	730	508	19	13	5	5
53	64	63	3237	2017	42	39	624	521	15	12	1	1
54	76	59	3450	10305	78	70	480	660	12	8	3	5
55	72	59	2918	6500	37	62	470	395	10	10	7	7
56	83	89	7942	5036	95	65	1102	882	23	13	7	7
57	76	74	2784	7740	62	108	867	690	12	12	7	5
58	72	61	3147	4061	85	23	819	570	13	13	1	3
59	32	51	2959	6736	85	40	415	303	6	9	6	6
60	46	35	2255	3362	65	12	300	353	8	7	5	3
61	62	67	11569	3789	115	93	823	421	9	13	5	1
62	33	52	2323	2320	92	56	348	423	7	10	3	1
63	71	45	3993	3722	85	67	1213	629	12	7	6	7
64	39	33	3951	6468	134	75	895	574	7	4	3	5
65	42	48	1256	1283	4	22	393	881	8	4	3	1
66	42	80	3555	--	163	--	505	656	10	13	1	3
67	67	74	2374	5881	46	220	597	391	9	13	5	5
68	55	76	9688	6142	337	44	676	585	12	15	7	5
69	57	67	2833	3789	49	93	982	421	10	13	3	3
70	25	45	3554	3574	147	91	123	676	4	10	3	1
71	55	96	1480	3060	59	8	258	437	9	15	5	7
72	45	54	1601	5974	45	34	318	88	9	7	7	5
73	94	85	2632	6190	19	34	359	330	15	14	1	1
74	70	53	6029	5070	109	19	1270	537	10	9	7	6
75	78	65	4904	6642	92	93	1057	882	12	12	3	3
76	70	53	11451	3706	349	79	844	429	14	11	5	5
77	75	82	6744	7417	102	107	795	799	10	13	7	5
78	58	94	2155	4097	17	32	576	1395	8	11	5	3
79	46	47	10514	4870	51	95	443	349	9	16	6	5
80	33	28	789	1025	9	28	342	217	4	5	1	1
81	96	65	3675	3928	181	112	548	243	15	15	7	7
82	71	62	2311	3546	63	68	763	592	13	8	3	1
83	70	85	3356	10770	85	236	649	1262	12	26	5	7
84	70	76	6835	7085	134	78	521	549	13	12	6	4

*GMP = General Meal Patterning

Table C-2 Continued

GROUP=2

OBS	PBF1	PBF2	ACT1	ACT2	KCAL1	KCAL2	ALBEV1	ALBEV2	CAF1	CAF2
43	27	21	3	1	2612	2225	12	0	76	201
44	38	35	1	2	3057	1820	18	16	333	117
45	34	30	1	1	1753	1942	0	0	523	497
46	19	18	3	3	2341	1444	24	12	104	115
47	28	24	2	2	1227	1189	0	8	93	184
48	24	19	2	3	1657	1210	0	12	241	108
49	33	.	3	3	1493	1563	26	12	82	120
50	37	35	3	1	1559	2168	28	20	44	167
51	29	21	2	.	1590	2470	30	.	84	55
52	30	25	3	3	1278	1789	20	12	77	111
53	26	.	1	2	2193	1902	0	0	1617	1067
54	32	.	1	1	1832	1349	0	0	131	19
55	41	37	2	1	1708	1172	0	6	316	725
56	38	35	1	1	2246	2123	0	6	156	118
57	38	36	1	2	1909	1418	0	0	168	217
58	32	32	3	1	1923	1655	16	4	101	125
59	32	30	3	3	807	937	6	0	118	90
60	37	36	1	2	1087	1282	0	0	609	612
61	42	40	1	1	1579	1366	48	20	285	318
62	35	32	3	2	1023	1333	23	24	281	324
63	39	30	2	1	1875	1105	8	8	91	85
64	36	.	3	2	1088	787	0	0	153	184
65	43	.	2	1	1354	1089	0	24	228	169
66	36	35	2	1	1151	1803	0	0	714	906
67	32	29	2	2	1305	1774	40	32	375	75
68	34	29	3	2	1807	1422	4	16	0	0
69	36	34	2	3	2422	1366	0	0	352	318
70	38	37	2	2	827	1333	6	0	395	199
71	42	.	2	1	984	1328	0	0	730	80
72	36	.	3	3	1341	964	142	96	355	293
73	37	.	3	.	2130	1648	8	0	39	85
74	43	.	1	1	1367	1046	0	0	173	28
75	45	36	1	1	1812	1955	0	0	157	133
76	37	36	3	2	1845	2072	0	0	254	278
77	37	35	2	2	1461	1563	0	0	397	472
78	41	35	1	1	1817	2390	0	0	114	125
79	42	39	3	2	1040	1084	0	0	250	294
80	39	37	1	1	862	705	8	8	341	370
81	41	40	2	3	1887	1095	68	12	450	236
82	34	.	2	2	1778	1464	42	0	255	219
83	40	40	1	2	1461	2159	0	0	108	124
84	36	30	2	3	2081	1971	24	24	6	22

Table C-2 Continued

GROUP=2

OBS	ANX1	ANX2	DEP1	DEP2	JOB1	JOB2
43	46	64	11	24	90	87
44	35	44	10	8	86	90
45	29	28	.	0	81	80
46	34	34	0	8	76	72
47	41	45	5	6	76	73
48	31	35	5	3	78	79
49	51	46	14	10	56	52
50	35	39	10	22	64	67
51	38	43	5	11	66	71
52	45	31	14	6	43	74
53	59	55	17	10	71	66
54	39	35	10	8	68	71
55	39	40	22	21	78	94
56	58	55	44	43	53	52
57	35	29	6	3	78	80
58	25	34	2	2	76	73
59	40	36	11	3	59	69
60	38	35	17	14	78	80
61	38	41	8	19	70	58
62	39	34	3	5	71	77
63	30	31	5	5	82	83
64	56	50	22	10	41	46
65	55	49	27	32	61	53
66	26	28	6	8	82	81
67	31	35	2	0	81	78
68	35	30	10	2	71	59
69	53	53	17	10	47	46
70	35	31	0	6	76	71
71	39	45	5	5	77	57
72	54	36	10	10	63	73
73	36	35	2	0	64	69
74	44	48	10	10	56	61
75	40	35	17	25	62	68
76	14	.	28	.	74	.
77	29	34	8	8	88	90
78	39	38	8	5	78	92
79	31	25	0	3	60	61
80	48	49	24	8	48	42
81	53	49	10	2	79	79
82	41	35	30	16	81	74
83	44	40	13	3	67	70
84	46	45	18	16	71	70

Table C-2 Continued

GROUP=2

OBS	SUG1	SUG2	FIB1	FIB2	TF1	TF2	SF1	SF2	CHOL1	CHOL2	NA1	NA2
43	129	75	10	25	137	100	60	40	874	340	5392	2643
44	170	157	29	13	164	58	41	22	999	174	2761	1901
45	79	103	13	7	82	80	41	25	391	257	2729	2519
46	86	59	10	13	91	73	28	27	953	552	3903	1877
47	89	109	14	9	41	49	16	22	323	283	3399	1471
48	31	55	11	11	89	51	38	16	279	241	2169	1492
49	31	56	9	10	63	69	25	21	662	513	1983	3001
50	111	140	23	17	81	100	25	28	116	233	2870	2214
51	84	191	20	16	52	95	21	41	300	378	2570	3469
52	47	60	9	16	49	77	27	22	333	257	1903	2972
53	158	86	28	20	68	93	20	17	251	243	3311	2977
54	65	46	19	16	95	69	42	30	495	243	2479	1151
55	90	66	13	11	80	48	21	14	300	303	2091	2228
56	77	53	17	13	111	116	39	45	780	629	4205	3524
57	84	50	12	14	69	61	32	20	502	453	3053	2206
58	85	112	13	16	85	63	45	31	220	276	2496	2271
59	14	14	11	14	31	35	10	13	138	274	1034	1375
60	37	66	7	6	51	58	17	23	256	243	1979	1928
61	94	58	15	10	57	61	21	21	321	498	1523	2140
62	34	18	20	10	58	73	16	19	96	288	1685	2297
63	60	23	10	11	90	52	44	21	313	263	3679	2423
64	59	0	16	8	22	39	9	20	225	288	920	1101
65	125	113	7	7	53	37	18	14	302	189	1659	1510
66	37	43	13	10	61	87	18	44	108	493	1429	2761
67	52	19	10	13	48	98	22	39	188	663	1631	2694
68	72	53	18	26	66	49	20	14	362	296	3643	2202
69	135	58	9	10	120	61	50	21	691	498	3238	2140
70	61	59	6	15	26	67	7	29	88	165	613	2018
71	20	29	9	16	49	55	18	27	351	420	1321	3953
72	48	51	10	10	49	39	15	10	186	216	2351	630
73	78	39	14	24	115	89	31	24	666	508	2555	2988
74	76	22	17	14	63	43	29	17	512	287	1709	2510
75	62	45	21	35	91	118	29	43	547	462	2845	2655
76	109	140	24	13	89	83	32	24	409	367	2299	2063
77	50	59	13	15	74	68	30	23	388	541	1564	2519
78	106	128	9	12	92	112	37	58	263	549	3171	3608
79	23	36	19	34	35	59	10	12	418	262	1204	516
80	29	25	2	9	35	31	19	14	76	248	1344	1147
81	70	10	16	19	60	52	24	9	454	269	2080	1793
82	64	69	15	15	86	63	40	28	419	441	3991	2059
83	51	73	13	31	68	104	21	37	520	516	2088	2979
84	66	70	13	33	86	83	34	28	559	443	2326	3059

Table C-2 Continued

Raw Data for Control Subjects (Group 2)

ID	Age	Thiamin mg		Riboflavin mg		Niacin mg		Hgb g/100ml	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
43	32	1.23	1.54	2.13	1.88	07.25	24.43	14	14
44	34	1.17	1.48	1.04	1.74	27.10	21.18	15	14
45	32	0.83	1.26	1.34	1.59	12.19	18.43	13	15
46	34	1.37	1.10	1.65	0.96	24.09	11.90	14	--
47	34	0.65	0.44	0.69	0.66	08.59	09.20	13	14
48	33	1.10	0.82	1.32	1.04	11.78	11.58	12	15
49	28	1.20	0.82	1.27	1.61	17.23	15.28	--	--
50	34	0.94	1.14	0.79	1.26	14.99	21.76	13	--
51	25	1.07	----	1.19	1.20	19.17	17.26	15	14
52	29	1.90	1.14	2.45	1.81	21.36	15.67	14	13
53	27	1.48	1.20	1.77	1.09	18.71	18.86	15	--
54	23	0.94	0.61	1.17	0.77	15.60	13.06	14	--
55	24	0.82	0.99	1.09	0.86	16.17	16.26	13	14
56	30	----	1.26	2.02	1.84	13.03	15.73	14	15
57	33	1.16	1.28	1.59	----	18.80	13.98	14	15
58	28	1.28	1.14	1.80	1.28	18.62	16.71	14	12
59	29	0.58	0.50	0.76	1.00	06.84	10.72	15	14
60	32	0.68	0.52	0.77	----	12.30	06.57	16	14
61	33	1.11	0.41	1.73	0.71	16.38	12.52	13	08
62	25	0.90	0.85	0.72	0.86	11.18	14.25	14	--
63	26	1.38	0.76	1.87	0.91	14.37	09.74	13	13
64	24	0.71	0.44	1.39	0.60	06.09	03.53	16	--
65	33	0.46	0.37	0.68	0.71	06.97	05.18	15	--
66	47	1.42	1.36	0.97	1.56	10.63	18.13	12	11
67	39	0.66	0.93	1.03	1.44	13.72	18.24	11	12
68	40	1.62	1.07	1.34	----	14.37	15.49	13	09
69	42	1.41	1.13	1.62	1.51	11.06	19.56	15	13
70	38	0.50	0.89	0.31	1.19	07.02	09.42	14	14
71	36	0.51	1.20	0.68	1.12	13.70	15.57	13	--
72	36	1.05	0.30	0.82	0.63	13.12	10.77	16	--
73	39	1.11	1.09	1.13	1.07	21.02	19.66	14	--
74	40	0.81	0.74	----	1.15	10.45	12.04	14	--
75	37	1.22	1.22	1.70	1.42	14.19	13.53	11	11
76	51	1.15	1.14	----	1.27	14.62	13.92	14	13
77	41	0.85	1.38	1.33	----	16.06	14.94	14	13
78	41	0.78	1.06	1.26	1.81	12.43	14.74	14	16
79	48	0.83	----	1.19	----	15.60	12.07	13	12
80	49	0.45	0.43	0.45	0.54	10.06	08.90	15	14
81	40	0.91	0.87	1.32	1.19	19.54	20.10	14	13
82	36	1.15	0.72	1.37	1.21	17.66	15.13	11	--
83	40	0.92	1.16	----	3.16	16.43	28.98	13	13
84	42	1.10	2.29	1.41	2.40	18.35	35.02	15	14

Table C-2 Continued

Raw Data for Control Subjects (Group 2)

ID	Vigor min		Heart Rate 10 sec		Ht in	Wt lb		JobPerf		Absent hrs	
	Pre	Post	Pre	Post		Pre	Post	Pre	Post	Pre	Post
43	240	000	22	20	63.13	114	117	14	14	012	012
44	000	000	29	--	64.25	121	125	--	--	022	001
45	000	000	--	31	62.50	116	118	12	10	000	003
46	600	115	28	25	64.00	092	095	12	14	255	000
47	165	060	--	30	64.13	114	114	--	--	003	000
48	105	255	20	23	66.25	121	125	08	06	000	000
49	143	300	28	--	63.00	118	---	13	13	024	016
50	540	115	29	26	66.00	141	151	19	19	219	006
51	090	---	30	--	64.00	115	108	--	--	000	232
52	360	300	28	28	68.50	128	134	15	15	048	000
53	015	075	27	--	72.50	129	---	--	--	000	224
54	000	000	32	--	65.00	118	---	--	--	000	014
55	060	000	28	--	71.00	185	171	--	--	344	040
56	000	030	30	30	64.50	138	137	15	14	024	006
57	000	030	28	28	61.50	124	124	16	13	030	000
58	240	000	29	28	64.75	127	132	--	--	000	000
59	100	120	31	32	64.25	133	140	14	15	026	000
60	000	030	28	--	63.50	129	136	--	--	030	000
61	045	030	30	--	63.88	157	158	18	14	027	167
62	330	060	29	29	62.50	125	132	09	10	016	008
63	210	000	26	25	64.50	140	134	--	--	376	016
64	300	010	26	--	68.37	154	---	16	14	000	024
65	090	030	--	--	67.00	171	---	11	11	024	016
66	127	000	33	27	64.50	117	125	12	13	000	000
67	135	075	--	--	66.50	125	131	10	09	000	000
68	383	060	31	29	68.13	134	135	12	16	018	032
69	180	368	--	27	64.88	139	143	10	15	024	030
70	090	060	29	30	63.00	123	131	14	09	000	000
71	060	000	--	--	68.50	168	---	12	09	038	020
72	510	383	--	--	64.75	137	---	--	--	066	744
73	000	---	--	--	66.75	136	---	13	13	033	022
74	000	000	--	--	64.25	174	---	14	10	018	018
75	015	000	--	28	66.50	164	146	13	12	000	000
76	270	150	24	30	65.88	155	162	--	--	000	000
77	065	008	29	28	62.75	130	136	11	14	010	000
78	000	000	--	--	66.25	167	159	10	06	003	000
79	000	090	--	--	60.50	134	129	14	12	000	014
80	000	030	--	--	64.25	159	163	13	13	018	006
81	180	120	32	--	64.00	147	149	15	14	046	016
82	135	120	27	--	62.13	125	---	12	10	008	000
83	000	000	27	--	63.00	161	162	--	--	003	020
84	120	360	--	--	63.00	121	113	18	17	135	006

APPENDIX D

SUPPLEMENTARY ANALYSES TABLES

Table D-1

The Number of Nutrients at Adequate Levels on Baseline Data (N=84)

Number of Nutrients at Adequate Levels	Number of Subjects	Percentage %
Adequate on 2 nutrients	2	2.4
Adequate on 3 nutrients	8	9.5
Adequate on 4 nutrients	8	9.5
Adequate on 5 nutrients	3	3.6
Adequate on 6 nutrients	10	11.9
Adequate on 7 nutrients	13	15.5
Adequate on 8 nutrients	27	32.1
Adequate on 9 nutrients	13	15.5

Table D-2

Results of Analysis of Covariance (ANOCOVA) for Effect of Health Promotion Program on Nutritional Adequacy (Experimental versus Control Subjects: Hypothesis 1)

Dependent Variable	ANOCOVA (with one covariate)	(N)
Kcalories	$p < .3001$	(84)
Protein	$p < .6416$	(84)
Vitamin A	$p < .6972$	(80)
Vitamin C	$p < .7922$	(81)
Iron	$p < .8673$	(84)
Calcium	$p < .7712$	(84)
Thiamin	$p < .7398$	(77)
Riboflavin	$p < .8406$	(70)
Niacin	$p < .7553$	(83)
Hemoglobin	$p < .0005$*	(61)

*Covariate highly significant at the .01 level.

Table D-3

Results of Part 1 of Hypothesis 7

Variable	t-Value	DF	P-Value
Kcalories	0.51	1,64	0.
Protein (only 1 gp)	—	—	--
Vitamin A	2.93	1,64	0.0917
Vitamin C	1.16	1,64	0.2853
Iron	3.51	1,64	0.0656
Calcium	0.01	1,64	0.9150
Thiamin	0.06	1,64	0.8131
Riboflavin	0.01	1,64	0.9346
Niacin	1.23	1,64	0.2707
Hemoglobin	0.01	1,64	0.9099

Table D-4

Results of Part 2 of Hypothesis 7

Variable	Chi-Square Value	DF	P-Value
Kcalories	1.775	2	0.412
Protein (only 1 gp)	—	—	—
Vitamin A	7.175	2	0.028
Vitamin C	2.118	2	0.347
Iron	0.129	2	0.937
Calcium	2.245	2	0.325
Thiamin	2.932	2	0.231
Riboflavin	0.165	2	0.921
Niacin	0.532	2	0.767
Hemoglobin	1.953	2	0.377