Using Computerized Dietary Analysis to Educate and Motivate:
A Minimal Intervention Study

by

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Abstract

Using Computerized Dietary Analysis to Educate and Motivate: A Minimal Intervention Study

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Background. There is increased interest in preventive medicine and the role nutrition can play. Diseases such as cancer and heart disease have a nutrient component in their etiologies. Unfortunately, surveys still show many nutrient deficiencies and excesses in the population. People need to be educated about their diet, and motivated to make any necessary changes. Question: will the personalized results of a dietary analysis serve those purposes?

Methods. In a large shopping mall, 110 subjects signed-up for a study that included a nutrition survey, a food frequency questionnaire, a follow-up nutrition survey given 1 month later, and an evaluation of the computerized food frequency analysis printout. No direct contact was made by the researcher with the subjects. Besides the surveys, the subjects received a 2-page diet analysis printout, and a 2-page list of nutrients and their food sources.

Results. Forty-five subjects completed the study: 15 males and 30 females, with a median age of 40 years, and an education level ranging from high school student to college graduate degree. One series of questions asked the subjects to rate their intake of four nutrients (cholesterol, fat, fiber, and sodium). In the 1st survey, 20% of the subjects reported not knowing their intake of at least 1 of these nutrients, while there was only 5% in the 2nd survey. From the 1st survey to the 2nd survey, more than twice as many subjects (23 *vs.* 10) indicated that they planned on making changes in their diet in the next 30 days ($P=<0.01$), and 68% gave "Computer analysis" as the reason for their decision. Not limited to "...the next 30 days," 32 subjects reported that, because of their diet analysis, they were planning on making changes in their diet. The diet printout consisted of 5 sections: 2 horizontal bar charts, 1 vertical bar chart, and 2 text-only sections. Of these, the bar charts were rated as being the least difficult and confusing, and the most educational and motivational.

Conclusions. More people might be motivated to change their dietary habits if they were aware of their potential nutrient deficiencies and excesses. Subjects in this study became educated and motivated about their diet, even though no direct instruction took place.

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INTRODUCTION

Within the last two decades, the U.S. Congress and various federal agencies have exhibited greatly increased interest in nutrition in general, and in particular, the connection between nutrition and disease.[1] This is due partly to rising health costs and the role preventive medicine (read nutrition) can play in their reduction, and partly to individuals wanting to take a more active role in their own health maintenance and disease prevention.[2] Unfortunately, very few people receive formal nutrition instruction, especially in a form that addresses their unique dietary habits. A lay person may receive general nutrition information from the popular media, such as "Americans should consume more high-fiber foods," or from their own physician, such as "You should consume more high-fiber foods." However, at best, most people, or their physicians, have only qualitative information about their diet. For example, some of their patients may need to consume more fiber, but how much are these patients currently getting, and how much more should they get?

Surveys of Nutrient Deficiencies and Excesses

The above would be moot if few people had nutritional deficiencies or excesses, but surveys show that that is not the case. Kant *et al.*[3] conducted a study using a subset of data from the Second National Health and Nutrition Examination Survey (NHANES II). This subset (n=11,529) included all black and white individuals aged 19 to 74, except where those 24-recalls were considered unsatisfactory, incomplete, imputed, or obtained from surrogates. The investigators created ten patterns of food group intake (combinations of dairy, meat, grain, fruit, vegetable) and ranked them in order of prevalence. The proportion of the population reporting the five most prevalent food intake patterns were: all food groups, 33.6%; no fruit, 23.9%; no dairy and fruit, 9.0%; no dairy, 8.0%; and no fruit and vegetable, 5.6%. Only in the highest group, where all food groups were reported as being consumed, were the mean consumption of the key vitamins and minerals equal to, or in excess of, the Recommended Dietary Allowances (RDA).

Pennington and Young[4] selected 234 core foods of the US food supply, based on data from the Nationwide Food Consumption Survey (NFCS) and NHANES II. The foods were analyzed and the daily intakes of eleven minerals were evaluated for eight age-sex groups. Teenage girls were most likely to have low intakes of minerals (Ca, Mg, Fe, Cu, Mn), followed by adult women (Ca, Mg, Fe, Cu,), older women (Ca, Mg, Zn, Cu), two-year-olds (Ca, Zn, Cu), older males and teenage boys (Mg, Cu), and infants and adult men (Cu).

Block and Subar[5] reviewed the data from the 1987 National Health Interview Survey (NHIS). This study showed that 10% to 25% of the population may regularly consume considerably less than the RDA (or other goals) for several nutrients (vitamins A, E, and C, folate, Ca, Fe, K, and fiber), and excesses for other nutrients (fat, cholesterol, sodium).

Ryan *et al.*,[6] using a design and methodology similar to that of the United States Department of Agriculture's (USDA) Continuing Survey of Food Intakes by Individuals (CSFII), surveyed 474 older individuals (65–98 yrs). Over 20% of males had nutrient intakes below two-thirds of the RDA for vitamins A, E, C, and B-6, folate, Ca, Mg, and Zn. Over 20% of females had nutrient intakes below two-thirds of the RDA for vitamins A, E, and B-6, Ca, Mg, and Zn.

Block[7] compared the *Dietary Guidelines for Americans* that recommends five or more servings of vegetables and fruits daily, with data from NHANES II. The data showed that 41% of the population had no fruit on the survey day, and only 25% had a fruit or vegetable rich in vitamins A or C. Just 10% consumed the recommended five servings of fruits and vegetables.

In summary, many surveys have shown that a significant portion of the population has one or more deficiencies of important vitamins and minerals, and excesses of fat and sodium. Whether any particular nutrient deficiency or excess is indeed a problem must be considered at the individual level. The RDAs have a built-in safety factor, such that 97.5% (+2 standard deviations) of a population's need for any given nutrient should be met by it's RDA. Consequently, there are individuals whose needs are met, or exceeded, by RDA levels. On the other hand, the RDAs are not necessarily optimal levels, and "... are judged by the Food and Nutrition Board to be adequate to meet the *known* nutrient needs of *practically* all *healthy* persons [italics added for emphasis]."[8] Although the RDAs can err on the low or high side, for the sake of this discussion, the actual RDAs are considered as appropriate.

Selected Diseases Related to Nutrient Deficiencies and Excesses

The various nutrient deficiencies and excesses contribute to morbidity and mortality. Just considering a few leading diseases, such as cancer and heart disease, there is strong evidence linking disease with nutrition.

Nestle[9] stated that most of the dietary recommendations for cancer prevention (reduce fat intake; increase fruit, vegetable, and grain intake; and moderate intake of alcohol, and salt-cured, salt-pickled, and smoked foods) are essentially identical to those of other public health agencies for the prevention and treatment of coronary heart disease, diabetes, hypertension, and other chronic diseases.

Kant *et al.*[10] evaluated data from NHANES I Epidemiologic Follow-up Study (NHEFS, 1982–1987) for variety among the five major food groups. Males who consumed two or fewer food groups had a relative risk (RR) of mortality of 1.5 (95% CI 1.2–1.8). Females had a RR of 1.4 (95% CI 1.1–1.9).

Leis[11] reviewed the literature pertaining to the association of diet to cancer and heart disease. He stated that the evidence indicates that diet may cause 50% of all cancers. Elevated amounts of some nutrients (fat) and low amounts of others (fiber, vitamins A, B-6, C, E, and the minerals Se and Zn) may decrease host resistance, increasing the risk for some cancers. A low-fat and high-fiber diet may also play a role in decreasing the occurrence of cardiovascular disease.

Cancer and Diet

The National Cancer Institute[12] (NCI) estimated that lifestyle and environmental factors are related to the development of about 90% of cancer incidence. Approximately 35% of cancer deaths may be related to dietary components, which would mean that, annually, about 150,000 lives could be saved through dietary changes.

In Meyskens'[13] review, he referred to the epidemiologic and laboratory data that support the view that the majority of cancers could be avoided. Meyskens described the nutritional components in the three levels of cancer prevention. In primary prevention, genetic lesions are prevented from occurring. Some nutrients, such as β-carotene, α-tocopherol, selenium, and soybean extract (protease inhibitors), inhibit genetic damage. Secondary prevention is concerned with decreasing exposure to cancer promoters. Dietary strategies include decreasing fat, and increasing fiber, ascorbate, and vitamin A. In tertiary prevention, retinoids may act as differentiation agents, preventing the cancerous lesion from progressing to a more malignant condition.

Schapira[14] echoed Meyskens, stating that in the United States, possibly one third of all cancers are caused by dietary elements, and thus may be preventable. For example, high-fat diets are associated with several common cancers: colorectal, pancreatic, prostatic, and uterine. In contrast, dietary factors found in fruits and vegetables, plus fiber, may offer protection against some cancers.

Heber[15] wrote that the evidence from population studies and animal feeding experiments convincingly demonstrates that certain dietary patterns are involved in the process of cancer promotion of the breast, colon, uterus, and prostate. In this country, particular aspects of lifestyle, including diet, and tobacco and alcohol use, may account for as much as 70% of avoidable cancers. Heber noted that, according to NHANES II data, only a minority of individuals consume sufficient quantities of foods that may be cancer preventive.

Block *et al.*,[16] in a review of dietary studies that had examined the connection between and fruit and vegetable consumption, and various cancers, 128 of 156 studies found

statistically significant protective effects of fruits and vegetables. Persons in the lowest quartile of fruit and vegetable intake had approximately twice the risk for most cancers when compared with the highest quartile of intake. Protective effects were found for the following cancers: lung, esophagus, oral cavity, larynx, pancreas, stomach, colorectal, bladder, cervix, ovary, endometrium, and breast.

Patterson and Block,[17] using data from NHANES II, compared the diets of 11,658 adults with the cancer dietary guidelines from the National Academy of Sciences (NAS) and the American Cancer Society (ACS). The percent of people consuming cancer preventive foods was low, while the percent consuming foods associated with cancer risk was high. The following were the percentages of respondents consuming food groups considered as cancer protective: cruciferous vegetables (18%), fruits and vegetables high in vitamin A (21%), high fiber breads and cereals (16%). The percentages of respondents consuming food groups that may increase the risk of cancer were: red meat (55%), bacon and lunch meats (43%).

High fat and low fiber diets are associated with several cancers, especially cancer of the colon. Suzuki *et al.*[18] studied the colonic effects of fat and fiber. Healthy subjects (n=8) were exposed to low-fat (14 E%), high-fat (53 E%), and fiber-supplemented high-fat (25 g, 52 E%) diets. Colonic nuclear aberration assay, the Ames Salmonella test, and measurement of bile acids and calcium soaps, were used to assess colon cancer risk factors in feces. In the colonic epithelium, nuclear aberrations increased during the high-fat diet phase, but decreased when supplemented with fiber. Reddy *et al.*[19] found that different sources of fiber (wheat, oat, corn) caused different alterations in the colonic environment, with possibly dissimilar effects in relation to colon cancer. Trock *et al.*[20] used data from 37 observational epidemiologic studies, and meta-analyses of data from 16 of 23 case-control studies. When the highest and lowest quantiles were compared, an estimated combined odds ratio (OR) of 0.57 (95% CI 0.50–0.64) was obtained for the highest fiber intake. Iscovich *et al.*[21] and Arbman *et al.*[22] also found fiber to be protective in colon cancer, while Thun[23] found vegetables and grains to be protective. Goodman *et al.*[24] studied the role of fat in lung cancer, and Correa[25] reviewed the positive and negative effects of various foods on gastric cancer.

There may be more active components, other than fiber, in food that can prevent cancer. Dragsted *et al.*[26] listed some of the many factors in fruits and vegetables that have cancer prevention and inhibition potential. Some of these components include: carotenoids and retinoids, thiols, polyphenols, trace minerals, tocopherols, terpenes, and degradation products of glucosinolates. Block[27] made a case for the potential of dietary antioxidants in protecting against cancers of the stomach, esophagus, oral cavity, and lung.

In summary, the epidemiologic evidence shows that a diet that is lower in fat, and

contains significant amounts of unrefined cereals, fruits, and vegetables (good fiber sources), may be protective in preventing various cancers. Whole grains, fruits, and vegetables contain antioxidant vitamins and minerals (vitamin A, β-carotene, vitamin C, vitamin E, selenium) that may inhibit carcinogenesis. Other food factors, such as the indoles found in cruciferous vegetables (broccoli, cabbage, cauliflower) may also inhibit certain carcinogens.[28,29]

Heart Disease and Diet

Shrapnel *et al.*[30] concluded from a review of the literature that saturated fatty acids (SFAs), trans fatty acids (TFAs), dietary cholesterol, and sodium (salt-sensitive hypertensives) increase coronary risk, while n-3 polyunsaturated fatty acids (PUFAs), moderate alcohol, vegetarianism, potassium (salt-sensitive hypertensives), and possibly n-6 PUFAs and monounsaturated fatty acids (MUFAs), decrease coronary risk.

In addition to their influences on cancer, fat and fiber have effects on heart disease. In an extensive review of the literature, Anderson *et al.*[31] reported that the major modifiable cardiovascular disease factors that are related to diet are hyperlipidemia, hypertension, obesity, and diabetes. An increased intake of fiber can modify high serum cholesterol, triacylglycerols, and low-density lipoprotein cholesterol (LDL-C), abnormal apolipoproteins, diabetes, and hypertension. Additionally, they report, dietary fiber may also modify low serum high-density lipoprotein cholesterol (HDL-C), and high serum fibrinogen and von Willebrand factor.

Anderson *et al.*[32] investigated the effects of fat and fiber on serum lipid concentrations. They found that fiber reduced serum cholesterol independent of reduced fat intake. Clevidence *et al.*[33] reported that men who switched to a low-fat/high-fiber diet had significant decreases in total cholesterol, LDL, and HDL. Ginsberg *et al.*[34] studied the effects of switching from an average American diet to the American Heart Association's Step 1 Diet or to a monounsaturated fat-enriched Step 1 diet. There were statistically significant reductions in the plasma total cholesterol level in the groups on the Step 1 diet and the monounsaturated fat-enriched Step 1 diet. Marckmann *et al.*[35] also studied the effects of fat and fiber, but instead of looking at serum lipids, they examined coagulation and fibrinolysis. They found that men who switched from a high saturated fat diet to a low-fat, high-fiber diet exhibited a permanent increase in plasma fibrinolytic activity, and a biphasic decrease in plasma factor VII coagulant activity.

Hypertension is an important risk factor in coronary heart disease. There is a great deal of interest in the roles of calcium, magnesium, potassium, and sodium with respect to hypertension. This attention is directed to the minerals separately, or to the interactions

between the minerals, such as calcium and magnesium,[36,37,38,39,40] and sodium and potassium.[41,42,43,44,45] The minerals in these pairs can be antagonistic to each other, so that a person who does not have an absolute deficiency (i.e., not below the RDA), could have a relative deficiency if the mineral's antagonistic counterpart is excessive.

In summary, as in the prevention of cancer, a reduction of fat intake (total and saturated) and an increase in fiber intake (soluble and insoluble) may prevent, or delay, the incidence of heart disease. In addition, reducing dietary cholesterol and increasing fish oils (omega-3 fatty acids), and the proper management of hypertension, may also help.[46,47,48]

The Purpose of this Study

From the above discussion, it is clear that not only do many people have nutrient deficiencies and excesses, but that these dietary imbalances can have negative health consequences. Well over one million people in the United States die each year from heart disease and cancer, two diseases that are linked to nutrient deficiencies and excesses. Various segments of the population, especially those who rely on convenience foods, may not be getting enough fiber, antioxidant vitamins, and some minerals, while on the other hand, be getting too much fat and sodium. Additionally, there may be instances where important mineral relationships are out-of-balance.

Nutritionally related health problems are avoidable, but they require knowledge and motivation at the individual level. Unfortunately, the majority of people have little or no knowledge about the nutrient content of their diets. However, with the advent of computerized dietary analysis programs, it is now relatively easy to get at least a moderately accurate account of nutrient intake, along with various nutrient ratios (e.g., sodium/potassium). Computer printouts can present the data in numerous formats, presumably making it easier to understand the results.

The objective of this study was not to learn whether or not a diet analysis printout could be a stand-alone nutrition intervention, but how meaningful a contribution it can make toward nutrition knowledge and motivation. If the computer printout is an effective instrument for nutrition education and motivation, then nutrition intervention programs, when feasible, should incorporate it.

This research study addressed two questions. First, would people learn about their diet from solely having seen a detailed printout of their diet? Secondly, and more importantly, would that knowledge motivate them to make changes in their diet? An additional component of this study examined which of the five data presentation formats would be effective in introducing the dietary information.

LITERATURE REVIEW

This research project focused primarily on motivation, that is, intention to make dietary changes. Because of time and monetary constraints, it was not possible to assess how many subjects may have eventually made the leap from intention to change dietary habits, to actually doing so. A search of the literature concerning intervention studies revealed that reported results usually dealt with measurement of *actual* change, not just *intention* to change. Nevertheless, motivation is the essential link between knowledge and action.

In the current study, the two-page food frequency questionnaire (FFQ) printout provided to the subject, albeit in a limited way, an explanation and guide to their diet analysis. This was a self-learning experience in its most narrow sense. In a more elaborate program, Tani and Hankin[49] showed that diabetic patients could learn from a self-help program. They presented to the experimental group a program consisting of slides and tape recordings. The subject matter provided theoretical and practical information on the control of diabetes. The control group received the usual one-on-one dietary instruction. A questionnaire was used to assess any gains in knowledge. The results indicated that the self-learning program was as effective as the traditional method for teaching diabetic patients dietary management.

Finnegan *et al.*[50] developed a home-study program that consisted of six booklets that were mailed weekly to the 3,711 persons who signed up. Each booklet highlighted a single dietary topic, all with the intention of reducing cancer risk. All the booklets contained a pretest, an action plan, refrigerator reminder sheets, shopping and cooking tips, and recipes.

A survey was mailed to randomly selected course participants (n=300), with 226 completed surveys returned. Among other things, the survey assessed knowledge and behavior. The subjects averaged 80% in giving correct answers to nine true-false statements on nutrition knowledge. On the average, across all 18 behaviors, 60% of the respondents reported trying each one.

A high proportion of women and the higher educated participated in the program. While these people may be less in need for this information, they may affect those more in need. For example, many women act as family health gatekeepers, thus affecting their spouses who may benefit more from the information.

On three groups of subjects, Schapira *et al.*[51] tested a three-tiered intervention program involving cancer prevention through dietary changes (decrease fat; increase fiber, fruits, and vegetables). The minimum intervention group (n=28) received two hours of

instruction. The intermediate group (n=33) received an additional two hours that focused on behavioral tasks and problem solving. The maximum intervention group (n=13) received twenty-six weeks of instruction that followed the National Cancer Institute's (NCI) Women's Health Trial Nutrition Study.

All three intervention groups showed significant reductions in fat and calorie intake, and increases in fiber intake. Even in the minimum intervention group, there was a decrease in fat intake to <30 E% for 51% of the participants.

The health locus of control did not affect dietary change in this study. The authors referred to research that indicated that "...subjects with an external locus respond more easily to structure, whereas subjects with an internal locus prefer to assume responsibility and work independently." People who are internally oriented engage in more preventive health behaviors than people who are more affected by external influences. The success of all three interventions led the researchers to believe that the interventions met the needs of both the internally and externally oriented subjects.

Baron *et al.*[52] tested the effects of a nutrition intervention study on 187 subjects (181 controls) who were randomly selected from a group general practice. The intervention group received instruction in diet and lifestyle modification by a nurse. A booklet was given that summarized the advice. Besides the initial instruction, follow-up sessions were given at one and three months after entry to the study. Each session lasted about 30 minutes.

At three months and at one year, the subjects were asked about their efforts to increase fiber intake and decrease saturated fat intake. At three months, over 65% reported increased fiber intake, and over 75% decreased fat intake. At one year, over 45% reported increased fiber intake, and over 45% decreased fat intake. Changes in blood lipid levels confirmed the reported dietary changes. The controls reported essentially no changes in fiber and fat intakes. The authors concluded that "...despite the relatively brief intervention, there was substantial reported compliance with the recommendations at one year."

Beresford *et al.*[53] conducted a minimal intervention study using self-help materials. The self-help materials were presented by a nurse (limited to five minutes) to 120 patients (122 controls) in two primary care clinics. The materials consisted of cards and a booklet that focused on reducing fat intake and increasing fiber intake. The self-help information packet included a checklist to record desirable changes in fat and fiber consumption; a fat and fiber counter booklet; and low-fat and high-fiber menus. A FFQ was administered at baseline, and at three months, to assess fat and fiber intake. A behavioral questionnaire was also given.

The intervention group had small decreases in fat intake and small increases in fiber intake. For the subgroup of patients that had full or shared responsibility for meal preparation, the decrease in fat intake was significant. For the behavioral questionnaire, the percentage with a desirable response to the questions was consistently greater in the intervention group.

Mojonnier *et al.* [54] developed the Nutrition Education Project (NEP), a program intended to modify the eating behavior of 224 free-living, hyperlipidemic adults (69 controls). The intervention group received about three hours of instruction via slide-tape units. They were also given two booklets, "The Heart Saver Eating Style" and "Weight Control the Heart Saver Way." The intervention group was divided into four subgroups: self-teaching, group-teaching, individual-teaching, and multi-method (a combination of the preceding three). After the teaching sessions, the intervention group returned for follow-ups at one, two, four, six, and nine months. The usefulness of the program was assessed by changes in nutrient intake, serum cholesterol values, and scores on a nutrition quiz.

At the end of the program (6-9 months), in the intervention group, there were the following significant changes: improvement in nutritional information scores; decreases in serum cholesterol; decreases in intake of calories, dietary cholesterol, and percent of calories from fat and saturated fat; and increases in the percent of calories from polyunsaturated fat. There were no significant differences between the four teaching groups. Adherence to the recommended dietary program was greater in women than in men, and greater in blacks than in whites.

A study by Gould *et al.*[55] showed that sufficient changes in diet and exercise could have a dramatic impact on cardiovascular disease (CVD). This was a follow-up study to the Lifestyle Heart Trial (Ornish *et al.*[56]), and was a randomized, controlled, blinded, arteriographic trial. The treated group was on a low-cholesterol, low-fat (<10 E%), vegetarian diet, plus they underwent stress management and moderate aerobic exercise. The control group had a statistically significant worsening of stenosis flow reserve. The treated group had a significant improvement in stenosis flow reserve, thus showing that coronary artery disease in humans can be reversed.

In the Women's Health Trial (WHT), Urban *et al.*[57] showed that not only could women lower their dietary fat intake, but that the changes lasted well beyond the end of the intervention period. The program consisted of group sessions where the women were taught

to keep track of their fat intake by counting grams of fat, with the intent on reducing fat intake to 20% of total energy (20 E%).

After completion of the trial, for a period of 5–20 months, a follow-up food frequency questionnaire (FFQ) was mailed to a random sample of women who had participated in the WHT. At the beginning of the study, baseline mean percentage of fat was 40.0 E%, and at the end of the trial, it was 26.3 E%. When follow-up FFQs were given twenty months after the end of the study, the energy from fat had increased to 27.7 E%.

A similar study was conducted by Heber *et al*.[58] Their Women's Nutrition Program was patterned after the Women's Health Trial. The dietary intervention involved eight weekly and four monthly group sessions over a six-month period. The women were taught by dietitians to monitor their fat intake by a fat gram counting method, with a fat reduction goal of 20 E%. Four-day diet records were used to measure dietary fat at the time of enrollment, and at six months into the intervention. The subjects were not asked to compensate any reduction in fat calories with calories from other sources.

At baseline, based on data from the four-day diet records, the energy from fat was 38.2 E%, and at six months, was 21.7 E%. This represented a 43% reduction in fat intake. However, the authors noted that diet records have been shown to initially overestimate food intake, while succeeding diet records are inclined to underestimate food intake. Nordevang *et al.*[59] had similar results in a comparable study.

Mitic[60] showed that senior citizens are amenable to making dietary changes. His study incorporated an Activated Health Education Model (Dennison[61]) that was based on assisting individuals to become more *active* in maintaining their health, more *aware* of the elements that impact on their health, and more *responsible* for formulating and executing their own health maintenance plan.

Subjects were selected from senior citizens who ate lunch at a Salvation Army Center. They were given a 24-hour dietary recall (pre-test), and those who had intakes of at least one nutrient below 67% of the RDA, were randomly divided into an experimental group and a control group. The experimental group received a four-week nutrition education program, while the control group received no training. Both groups were given 24-hour dietary recalls at the end of the education program (post-test 1), and once more six weeks later (post-test 2).

The nutrition education program consisted of three phases. Phase I (nutrition skills experiences) was the *active* phase of the Activated Health Education Model. The subjects

were first taught how to evaluate their current eating practices, and then were shown how to prepare more balanced and complete meals. Phase II (cognitive nutrition instruction) was the *aware* phase, where the participants were taught basic nutrition, including the connection between nutrition and health. Phase III (affective instruction) was the *responsible* phase, where the subjects took responsibility for designing and executing their own plan for eating nutritionally sound meals.

As per the selection of the subjects, no one was classified as eating satisfactorily for the pre-test. For post-test 1, 62% of the experimental group was categorized as eating adequately (9% for the controls), and for post-test 2, 73% of the experimental group was categorized as eating adequately (9% for the controls).

Dennison *et al.*,[62] conducted a study that incorporated a computerized dietary analysis program. Senior citizens were divided into three groups. Group 1 received four 60-minute nutrition classes, and also used a nutrient analysis computer program during class. Group 2 also attended the four nutrition classes, but did not use the computer program. Group 3 received no instruction, nor used the computer program.

For each class, the subjects in groups 1 and 2 received data from their own three-day food records. The seniors were prompted to modify their dietary habits, based on the results of their dietary analyses. The subjects were also given a program-satisfaction questionnaire to survey satisfaction with the course content and method of instruction.

Group 1 seniors reduced their monounsaturated fat intake from 11.6 E% to 9.9 E%, and their saturated fat intake from 11.2 E% to 9.4 E%. Group 2 seniors reduced their monounsaturated fat intake from 12.5 E% to 9.9 E%, and their saturated fat intake from 11.7 E% to 9.2 E%. There were essentially no changes in the control group.

Rosander and Sims[63] investigated the influence of feelings on nutrition education. The authors considered the writings of social psychologists that propose that behavior change may be dependent on attitude change, and further, that attitude change must come before knowledge acquisition and behavior change. If the preceding were true, the authors hypothesized that an affective-based nutrition education program that incorporates the learners feelings about food, in addition to knowledge acquisition, could be more productive than an exclusively cognitive-based approach.

From the Special Supplemental Food Program for Women, Infants, and Children (WIC), 69 women were offered the opportunity to participate in the nutrition education intervention and post-testing segments of the study, and 23 accepted (instructed group).

Another group of 22 women (uninstructed group) completed pre- and post-testing, but did not attend any of the nutrition education sessions. The cognitive component related proper intakes of calcium, iron, and folacin to the health and well-being of pregnant women, highlighting the food sources and functions of these three nutrients. The affective component featured the developmental stages of self-esteem, belief in personal control, and decision-making ability. Evaluation was done through a nutrition knowledge test, two attitude scales, and a food frequency questionnaire.

Nutrition knowledge was measured through a combination of true-false and multiple-choice questions. Attitude was assessed using questions that dealt with how the respondent felt about particular food and health issues.

Regarding the attitude scores, the instructed group had significantly greater mean post-testing scores than either their pre-test scores, or those of the uninstructed group, pre- and post-test. Considering the nutrition education intervention, the instructed group showed improved scores for all food groups, but significantly only for the bread and cereal group. Rosander and Sims concluded that "...the affective-based approach to nutrition education is effective, not only in improving knowledge and attitudes, but also in our most important objective, dietary behavior."

Walt and Forgione[64] designed a study that was partially analogous to the present study. Two hundred people registered in the Computer Nutrition Analysis (CNA) program. The participants recorded food intake and activity for three days. After their diets had been analyzed, the subjects received their CNA printout, which included a report providing nutrient sources and functions. Within a week of receiving their CNA report, the participants were asked if they had any questions, and were also offered information on nutrition counseling workshops (1 per month, for 4 months).

Of the two hundred who registered for the CNA program, half completed the food and activity records. The follow-up personal counseling sessions were used by 58 participants, and 55 attended the educational workshops. The analysis indicated that 89% of the participants had at least one dietary risk factor.

A six-month evaluation questionnaire was mailed. Thirty-six forms were returned, with 28 (78%) reporting no problems in comprehending their CNA results, while 8 (22%) had difficulty understanding the information. Of these thirty-six respondents, 13 (36%) stated that they had decreased their intake of cholesterol, 11 (31%) their intake of total fat, 10 (27%) their intake of saturated fat, 11 (31%) their intake of sodium, and 12 (33%) increased their fiber intake.

The preceding review demonstrates that people can indeed change their dietary habits. Interventions ranging from a few hours of nutrition instruction to more complex programs certainly have short-term effects on nutrition knowledge and nutrient intake, and may have long-lived consequences.

From a national public health standpoint, the above interventions, such as individualized instruction or multi-session courses, would be prohibitive in both cost and manpower. However, a simplified, self-help program could be devised that would not require a major investment in materials and personnel. A self-contained program could be offered in public school systems and primary care practices, two places where significant numbers of people would be reached.

In a minimal intervention program, change at the individual level would be small, but in terms of its affect on the U.S. population as a whole, the savings in cost alone could be significant. This would be especially true if the intervention programs were instituted early enough, possibly before students enter high school. For example, with the development of coronary heart disease reaching its "endpoint" after thirty or more years, even a small reduction in fat intake, along with a modest increase in fiber intake, may delay cardiac events, such as myocardial infarctions, to the point where they have caught up to, and are "competing" with, other less avoidable mortal events. The preceding would also apply to cancer, and possibly to some degenerative diseases. This would serve to rectangularize the life cycle, making the final, mortal degeneration of organ systems a steeper decline. The steeper the decline, the shorter in duration, and thus the lower in financial costs for both the individual and the nation.

I believe that the cornerstone of a nutrition self-help program should be computerized dietary analysis. In the past, any large-scale nutrition intervention program that included dietary analysis would have been costly, but if computer programs are used where the data can be automatically scanned, even that cost would be minimal. (In fact, a new optical recognition system is about to be introduced that is low-cost and 99% accurate, and would be ideal for reading food frequency questionnaires.)

This study attempted to find out if, when faced with the results of their computerized dietary analysis, would subjects learn about their diet, and would this knowledge motivate them to intend on making changes in their diet. If such a simple process is effective in educating and motivating people, then some form of routine public health program should be developed that incorporates computerized dietary analysis. This act would then take general nutritional advice and personalize the message.

METHODS

Study Outline

Phase I: Contact between U.S. Research Company and potential subjects

A. 969 mall customers approached in the public shopping area

B. 279 screened while in the public shopping area

C. 140 qualified and taken to U.S. Research's screening office

D. Potential subjects review what is expected of them

E. 110 subjects sign up and take home the initial forms packet

Phase II: Contact between investigator and subjects

A. 56 subjects complete the initial forms packet and mail back to the investigator

B. The FFQ printout, with the second forms packet, is mailed to the subjects

C. 45 subjects complete the 2nd forms packet and mail back to the investigator

Human Subjects

Phase I: Selection of Subjects and the Initial Forms Packet

U.S. Research Company was contracted to contact and screen potential subjects at a large shopping mall. U.S. Research conducts consumer surveys in shopping malls for numerous companies around the country. Mall customers (n=969) were approached and asked if they would like to participate in a nutrition research study. If they answered yes (n=279), they were then asked ten screening questions developed by the investigator (Appendix 1, page 56). The screening questions addressed several areas, including 1) would they be in the area during the time of the study? 2) did they have any previous nutrition experience? 3) were they on a restricted diet? and 4) did they have any influence in food purchases or preparation? It was especially important, for obvious reasons, that the subjects had not had their diet previously analyzed. It was also important that the subjects have some control over the food they consume. Otherwise, there would be little reason to educate and motivate them.

The potential subjects that were not disqualified (n=140) during the initial screening, were brought to U.S. Research's screening office. They were directed to a booth and were shown a notebook (Appendix 1, pages 57–67) that contained a single sheet of information describing the phases of the program and what was expected of them. The notebook also contained a sample of one of the surveys and a sample of the food frequency questionnaire that they would be asked to complete during the course of the study. Potential subjects that were still interested in participating in the study were asked to 1) read and sign a University of Washington Human Subjects Review Committee Consent Form (Appendix 1 page 68); 2) complete a sign-up sheet (Appendix 1, page 69); and 3) take with them their initial forms packet (Appendix 2, pages 70–81). This packet contained 1) a cover letter; 2) general

instructions; 3) a two-page nutrition survey; 4) two pages of instructions for completing the food frequency questionnaire (FFQ); and 5) a six-page, 142 food FFQ.

Instructions in the packet asked that the forms be completed and mailed back to the investigator within one week. A stamped and addressed envelope was provided. A total of 110 subjects completed the screening process and took the initial forms packet with them.

Phase II: The Second Forms Packet

After the initial contact between the U.S. Research personnel and the subjects, all subsequent contact was between the subjects and the investigator via the United States Postal Service. After receiving the completed forms from the subjects initial forms packet, the food frequency questionnaire component was analyzed. The results were inserted into the second forms packet (Appendix 3, pages 82–92) and mailed back to the subjects. This packet contained 1) a cover letter; 2) general instructions; 3) instructions for adjusting, if needed, their FFQ results; 4) their two-page dietary analysis printout; 5) two pages listing the common sources of the nutrients found on the printout; 6) a second two-page nutrition survey; and 7) a two-page form for the subjects to evaluate the five sections of the dietary analysis printout.

The subjects were again asked that the forms be completed and mailed back to the investigator within one week. A stamped and addressed envelope was provided.

The second survey did not duplicate the first survey for three reasons. First, several questions referred to the subject's own FFQ results, and therefore applied only to the second survey. Second, by appearing in a different form, it would be more difficult for the subjects to "learn" the survey. There can be a "learning effect" when a person repeats exams. A similar effect can arise with surveys, whereby the person may answer a question repeated on a successive survey the same way as on the first survey, even though changes may have taken place. The result is that the test taker does "better" on the successive exam, and the survey taker answers questions out of habit, without giving enough thought to the question. However, since there were only two surveys, separated by approximately one month, that may not have been very likely, regardless if the surveys were the same or different. Third, the first survey duplicated some of the initial screening questions (Appendix 1, page 56). It is possible that, while being screened on-the-floor, the potential subjects could be somewhat distracted, and therefore "miss" some of the screening questions. The duplicated screening questions asked whether the subjects had ever had their diet analyzed, and if they had any physical or emotional conditions that restricted their food choices.

The two nutrition surveys contained a number of duplicate key questions to measure changes from before to after the intervention. These included questions 32–36 (1st survey, page 73) and questions 61–65 (2nd survey, page 90). These questions asked the subjects to rate their intakes of cholesterol, fat, fiber, and sodium, and also rate their overall diet. Questions 9 and 41 (1st and 2nd surveys, respectively) asked the subjects if they were planning on making dietary changes in the next 30 days.

The most important question (Q67) was asked on the second survey. It asked the subjects "Because of having seen the results of your food frequency dietary analysis, are you planning on making any changes in your diet?" This was the only question that directly asked the subjects if their computer printout had any effect on them.

The subjects were asked to rate their dietary analysis printout using a two-page evaluation form (Appendix 2, pages 91–92). Each of the five sections from the FFQ printout were represented, each followed by the same questions. The questions asked the subjects to rate, on a 1–5 scale (Not to Very), how difficult, confusing, educational, and motivational each section was. This made for a rather cramped form, but I thought it was necessary for this evaluation form to mirror the actual printout, that is, the first three sections on the first page, and the last two sections on the second page. In this way, it would be easier for the subjects to connect each section on the evaluation form with its corresponding section on the printout.

By limiting the evaluation form to two pages, a compromise was made that could be potentially confusing. The questions that asked how difficult and confusing the printout section was were combined with the questions that asked how educational and motivational the printout section was. If the section was effective, the former questions (difficult and confusing) would have been given a low number (1–5 scale) by the subjects, whereas the latter questions (educational and motivational) would have been given a high number (1–5 scale) by the subjects.

With a combined total of twenty-one pages for the two forms packets, I did not want to add any more pages. In particular, I thought that the advantages of having the FFQ evaluation form mirror the actual FFQ printout outweighed the possible confusion generated by combining the four questions on the same 1–5 scale.

The Computerized Dietary Analysis Program

The food frequency questionnaire in N-Squared Computing's Nutritionist IV version 2.0 was used to analyze the diets. The original questionnaire was developed by Loma Linda University in 1986 by reviewing existing FFQs and adapting various components to create

a new FFQ. The questionnaire has been periodically updated by N-Squared Computing since then. The directions for this semiquantitative FFQ were modified by the investigator, and one food item was added, so that the questionnaire contained 142 food selections.

Since this study focused on the subject's motivation to change, not on analyses of specific nutrient intakes, the FFQ was not specifically validated for this study. However, eight nutrients from the current study were compared with data from a FFQ conducted by Willett[65] on 27 men and women using a 116-item FFQ. Most of the means from the current study fell within 5% of Willett's. Food frequency data from the current study was not used in any of the analyses. The FFQ was done solely to give the subjects a frame of reference to draw conclusions about their diet.

There are at least four methods for estimating dietary intake: 1) food records; 2) 24-hour recall; 3) food frequency; and 4) diet history. There are advantages and disadvantages for each method. The food frequency method was chosen primarily to reduce the workload for the investigator. The following are the advantages and disadvantages of food frequency methods, taken from Pao and Cypel:[66]

Advantages:

1. An indication of usual dietary intake may be obtained.
2. Highly trained interviewers are not required.
3. Method can be interviewer administered or self-administered.
4. Administration may be simple.
5. Customary eating patterns are not affected.
6. Individuals may be ranked or classified by food intake.
7. Response rates are high.
8. Respondent burden is usually light.
9. Relationship between diet and disease may be examined in epidemiological studies.

Disadvantages:

1. Memory of food patterns in the past is required.
2. Recall period may be imprecise.
3. Quantification of food intake may be imprecise because of poor estimation of recall of portions or use of standard sizes.
4. Respondent burden is governed by number and complexity of foods listed and quantification procedure.
5. Recall of past diets may be biased by current diets.
6. Heterogeneity of populations influences the reliability of the method.

7. Suitability is questionable for certain segments of the population, such as individuals consuming atypical diets or foods not on the list.
8. Intakes tend to be overestimated compared with some other methods.
9. Validation of the method is difficult.

The dietary analysis printout (Appendix 3, pages 85–86) used in this study is a slightly altered version of the standard Nutritionist IV printout. It is two pages long and consists of five sections. The first section is a horizontal bar graph that depicts eighteen nutrients graphically and gives their percentage of the RDA. Information is given stating that most people should get at least 75% of the RDA for these nutrients. The RDA for each subject was based on gender and age.

The second section, also a horizontal bar graph, presents six nutrients that have important public health concerns (total fat; saturated, mono, and poly fat; cholesterol; sodium). It is explained that it is better to not exceed 100% of the "RDA" for these nutrients.

The third section, which is text-only, identifies the food item from the FFQ that is the single largest contributor of each of the nutrients from section two that exceeded 100% of the RDA. The number of food items listed here will correspond to the number of nutrients in section two that exceed 100% of the RDA.

The fourth section, a vertical bar graph, takes the subjects' percent of kilocalories from protein, carbohydrates, and fat, and compares them to the dietary goals.

The fifth, and last section, is text-only, and lists all the nutrients from the FFQ printout. Included are the nutrients' actual weight and their percent of the RDA.

The standard Nutritionist IV printout was modified by the investigator. Modifications were made to improve the clarity of the program's data presentation, principally section two. The three subgroups of fat were indented and listed directly under total fat (formally, just fat). The descriptions before each section were rewritten for clarity, or added where none had previously existed (sections 4 & 5).

To make it easier for the subjects to evaluate the five sections of the printout, each section was given an identification letter and was bolded. For example, whereas the first section did not begin with a title, the altered section began: **SECTION A: RDA Goal Bar Graph**.

It was not possible to alter Nutritionist IV's computer output. Instead, the output was captured using a printer capture program. This output was imported into WordPerfect 5.1 word processing program. A series of eight macros were created and linked together. The

linked macros were then run on each of the 56 FFQ printouts, thus producing the altered printout.

Statistical Analysis: Programs and Procedures Used

Initial data entry and basic statistical analyses were done using Raosoft's SurveyFirst Version 2.0. Subsequent analyses were performed using Minitab Release 8, and SPSS for Windows Release 6.0.

The majority of the data were nonparametric. Analyses included cross-tabulations, McNemar Test, 1-Sample Wilcoxon Signed-Rank Sum test, and Wilcoxon Matched-Pairs Signed-Ranks test.

RESULTS AND ANALYSES (See Appendix 4 for the raw data.)

Demographics (See Tables 1–3 for details on age, sex, and education.)

Initial Subjects' Screening

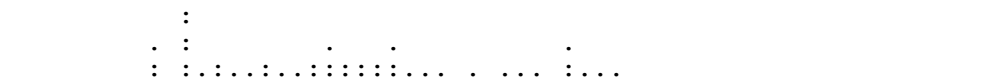
In the mall shopping area, 690 shoppers waved off the interviewer when asked if they would like to take part in a University of Washington nutrition research study. There were 279 mall shoppers who did not wave off, and were screened (Appendix 1, page 56) in the shopping area. A total of 109 were disqualified, predominately because they had previously had their diet analyzed, did not live in Snohomish or King counties, were planning on a vacation in the next 30 days, or because they were on a restricted diet. There were 30 shoppers who were qualified, but subsequently refused to participate after the screening No data was collected on them. Of the 140 mall shoppers who were qualified and initially willing to participate, 110 signed up for the study.

Comparison of Completes* versus *Dropouts

At the shopping mall, 110 potential subjects picked-up the initial forms packet. Forty-five people completed both phases of the study. There were differences between the subjects who completed both phases of the study (n=45) and those who dropped out of Phase I (n=56). Nine subjects completed Phase I, but did not complete Phase II.

The group of subjects who completed the study (Table 1) differed from those who dropped out of Phase I (Table 2) in the following ways. They were older (median age 40.0 *vs.* 30.0), had a higher percentage of females (67% *vs.* 55%), and were more educated (51% had 2 or more years of college *vs.* 34%).

Table 1. Subjects who completed Phase I and Phase II.

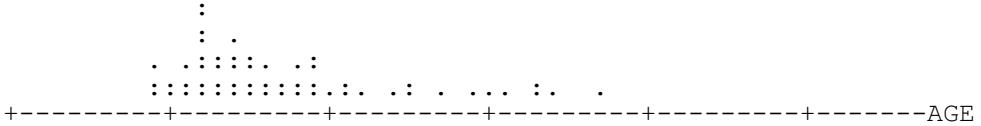


		N	MEAN	MEDIAN	STD DEV
AGE		45	41.6	40.0	17.4

	SEX	N	MEAN	MEDIAN	STD DEV
AGE	33% M	15	40.0	37.0	18.6
	67% F	30	42.4	40.5	17.0

Some HS	High school	2yr college	4yr college	Grad degree
13% (6)	36% (16)	18% (8)	22% (10)	11% (5)

Table 2. Subjects who did not complete Phase I.



```
0         20         40         60         80        100

                     N      MEAN   MEDIAN   STD DEV
AGE                 56      34.6     30.0      14.3

          SEX        N      MEAN   MEDIAN   STD DEV
AGE     45% M       25      34.2     30.0      12.8
        55% F       31      34.9     30.0      15.5

Some HS     High school     2yr college     4yr college     Grad degree
5% (3)      61% (34)        14% (8)         14% (8)         5% (3)
```

There were 54 subjects who completed Phase I and received the results of their diet analysis. Forty-five went on to complete Phase II. The 45 who did (Table 1), differed from the nine who did not (Table 3). They were younger (median age 40.0 *vs.* 45.0), had a higher percentage of females (67% *vs.* 22%), and were less educated (51% had 2 or more years of college *vs.* 67%).

Table 3. Subjects who completed Phase I, but not Phase II.

```
         .       .    ...: .           .
+---------+---------+---------+---------+---------+-------AGE
0         20         40         60         80        100

                     N      MEAN   MEDIAN   STDEV
AGE                  9      44.0     45.0    15.8

          SEX        N      MEAN   MEDIAN   STDEV
AGE     78% M        7      43.4     43.0    18.2
        22% F        2      46.0     46.0     1.4

Some HS     High school     2yr college     4yr college     Grad degree
11% (1)     22% (2)         33% (3)         22% (2)         11% (1)
```

Age

The overall median age of the subjects completing the entire study (n=45) was 40.0 years, with 37.0 for males and 40.5 for females. The ages ranged from 17 to 75 years.

Sex

The sample consisted of 15 males and 30 females.

Education

Approximately half of the subjects had at least two years of college. Females were somewhat more educated (≥2 years of college: 53% *vs.* 47%), but their median age was 3.5 years greater than for the males. The 1990 census of Snohomish and King counties showed the education breakdown as: some high school (14.0%), high school diploma (26.8%), 2 year college (8.1%), 4 year college (17.2%), graduate degree (6.7%). The subjects in the current

study were more educated. The census data show that 32% of the residents had at least two years of college, whereas 51% of the subjects from this study (Table 1) had at least two years of college.

Residence

The subjects came from 16 cities, with a median round-trip travel distance to the shopping mall of 10 miles. The mean round-trip travel distance was 18 miles.

Influence on Dietary Education

For each section (influence on education, influence on motivation, miscellaneous analyses), the questions are analyzed sequentially, that is, as they appear on the survey form. Also note that, for discussions comparing questions, if there is an accompanying table, the questions are listed in that table.

Questions 31 (1st survey, Nutrition Research Survey, Appendix 2) and 58 (2nd survey, Follow-up Nutrition Survey, Appendix 3) asked, "Please rate your level of knowledge about your own diet?", using a five-level scale, from very low to very high (Q31: $\bar{x}$=3.02; Q58: $\bar{x}$=3.16). The Wilcoxon Matched-Pairs Signed-Ranks test measured no significant difference between the subjects, before and after seeing their FFQ results. One reason may be that, even though the subjects increased their knowledge about their diet, some may have discovered that they knew less than they thought they did. Consequently, their past lack of knowledge about their diet may have had a residual attenuating effect on their new found knowledge.

Questions 32–35 (1st survey) asked the subjects what they *thought* their intakes of cholesterol, fat, fiber, and sodium, were. They could rate their intake as "Don't know," "Poor," "Fair," "Good," or "Excellent." Questions 61–64 (2nd survey) asked the subjects to use the results of their diet analysis to determine what their intake of cholesterol, fat, fiber, and sodium, *actually* was.

Comparing the answers in the 2nd survey to the 1st survey, fewer subjects reported that they did not know their intake of cholesterol (0% *vs.* 11%), fat (0% *vs.* 4%), fiber (5% *vs.* 11%), and sodium (0% *vs.* 2%). In the 1st survey, nine subjects (20%) reported not knowing their intake of at least one of the above four nutrients, while there were only two subjects (5%) in the 2nd survey who answered with a "Don't know." For questions 36 and 65 (Overall, my diet is...), there were two "Don't knows" for the 1st survey, and none for the 2nd survey.

There was within-person change between the answers to questions 32–35 and

questions 61–64. An attempt was made to determine if these changes tracked the subjects' actual diet analysis results. First, the diet analysis results were categorized, based on percent of "RDA" for cholesterol, fat, fiber, and sodium. These categories were arbitrarily established as being <90%, 90–110%, and >110% of the RDA.

Next, the following scoring system was designed to measure deviation from expected outcome:

EXPECTED CHANGE	ACTUAL CHANGE	DEVIATION
↑	↑	0
↑	–	-1
↑	↓	-2
–	↑	+1
–	–	0
–	↓	-1
↓	↑	+2
↓	–	+1
↓	↓	0

For example, for the 1st survey, a subject reported that she thought her cholesterol intake was fair (presumably too much), and her diet analysis printout indicated her actual cholesterol intake was low (<90% of the "RDA"). It would be expected that, for the 2nd survey, since she now knows her cholesterol intake, she would report her actual intake as being better than fair, more likely as good or excellent. For the 2nd survey, if she did report her intake as being good or excellent, then since she did not deviate from the expected answer, she would be given a score of 0. However, if she had reported the same answer (fair) for the 2nd survey as she had for the 1st survey, she would be given a score of –1, or if her answer had actually gone down, i.e., from fair to poor, a –2.

If a subject had answered "Don't know" for the 1st survey, but had an answer for the 2nd survey that correlated with the analysis printout, he was scored with a 0. If the answer was below what was expected, he was given a –1, and if the answer was above what was expected, a +1.

Based on the above scoring system, deviation from expected outcome could range from –2 to +2, with a 0 for no deviation. The closer the mean of the deviations was to zero, the better the subjects understood, and learned from, their diet analysis printout.

The mean deviation from the expected answer (0) for cholesterol (n=43) was –0.326, for fat (n=44) –0.250, fiber (n=42) +0.143, and sodium (n=44) –0.273. The mean of these four scores was –0.177. The slightly negative mean indicates that the subjects rated their

intakes somewhat lower than what would have been expected from their printout. A possibility is that some of the subjects may have interpreted an "RDA" value below 100% for cholesterol, fat, and sodium, as being less than ideal. Indeed, 62% of the subjects' FFQ results for cholesterol had values <90% of the RDA, and 22% had values between 90% and 110% of the RDA. Yet, for the subjects who rated their "actual" cholesterol intake for the 2nd survey (Q61) as being "Poor", "Fair", "Good", or "Excellent" (1-4 scale), the mean was 2.32 ("Don't knows" excluded). This means that, while 84% of the subjects had FFQ cholesterol values <110% of the RDA, most of the subjects rated their intake as being between "Fair" and "Good", but should have rated it between "Good" and "Excellent". Cholesterol was the nutrient that tracked farthest away from zero.

In summary, there is no quantitative significance to these tracking numbers since these variables are not continuous and are not free to move about the mean. But since they are close to zero, it "seems" that most of the subjects knew how to interpret their FFQ printout. The small deviation from zero could mean that some of the subjects had difficulty interpreting their FFQ printout, or that they misinterpreted an "RDA" value below 100% for cholesterol, fat, and sodium, as being undesirable.

Influence on Dietary Motivation

Questions 8 and 41 (1st and 2nd survey, respectively) asked, "Are you planning on making changes in your diet in the next 30 days?" (Table 4). In the 1st survey, 32 subjects reported that they *did not* intend on changing their diet in the next 30 days. In the 2nd survey, 41% (n=13) of those subjects (from Q8) now reported that they *did* intend on changing their diet in the next 30 days. Using the McNemar test, the difference in the response from the 1st survey to the 2nd survey was significant (P=<0.01).

Table 4. Dietary change in the next 30 days.
Q8. Are you planning on making changes in your diet in the next 30 days?
Q41. Are you planning on making changes in your diet in the next 30 days?

		Question 8 (1st survey)		
		Yes	No	Total
Question 41 (2nd survey)	Yes	10	13	23
	No	2	19	21
	Total	12	32	44

Questions 9 and 42 followed by asking, "If you answered Yes to question 8 (or Q41), which information sources influenced your decision?" In the 1st survey, 12 subjects answered "Yes" to question 8. The information sources they checked in question 9 included Friends (6), Magazines (5), Doctor (4), Books (3), TV (3), Relatives (3), and Health club (1).

In the 2nd survey, 24 subjects (23 in the above cross-tabulation because of 1 missing value in Q8) answered "Yes" to question 41. The information sources they checked in question 42 were similar in frequency and distribution to question 9, except that now 15 subjects (63%) also checked "Computer analysis."

Questions 16–30 (1st survey) and questions 43–57 (2nd survey) followed the question and statement, "What dietary changes are you thinking about? In the next 3 months, I plan on eating...." The questions asked about changes in consumption of cholesterol-, fat-, fiber-, and sodium-containing foods, plus eleven food categories (meat, fish, poultry, whole grain foods, vegetables, fruits, dairy products, eggs, fats and oils, desserts and sweets, fast foods or convenience foods). Using the Wilcoxon Matched-Pairs Signed-Ranks test, the only nutrient for which there was significant change (decrease) was sodium ($P=<0.05$). Of these two sets of questions, the subjects received direct feedback (FFQ results) only on their intake of cholesterol, fat, fiber, and sodium. Of these four nutrients, more subjects (47%) had sodium intakes >110% of the RDA than of the other three nutrients, thus making sodium the greatest potential stimulus for change. There were no significant changes in the eleven food categories from the 1st to the 2nd survey, apparently because most of the subjects could not transpose any of their nutrient deficiencies and excesses to the eleven food categories.

In answer to Question 67, "Because of having seen the results of your diet analysis, are you planning on making any changes in your diet?", 71% or 32 of the 45 subjects (10 males, 22 females) answered "Yes." A higher percentage of the total females than the total males (73% *vs.* 67%) answered "Yes" to this question. There was also an eight-year difference between the median age of the subjects who answered "Yes" to Q67 (37 years old) and the subjects who answered "No" (45 years old).

Questions 68–71 were in response to the question, "If you answered Yes to Q67, what changes will you be making?" For cholesterol, fat, fiber, and sodium, "Decrease" was scored as 1, "No change" as 2, and "Increase" as 3. If there were equal responses for each choice (Decrease, No change, or Increase), or if everyone chose "No change," then the mean would be 2. In other words, the closer the mean was to 1 (e.g., 1.19 for fat), the greater the number of subjects that chose "Decrease." The closer the mean was to 3 (e.g., 2.69 for fiber), the greater the number of subjects that chose "Increase." The means for the subjects (n=32) who answered "Yes" to Q67 were 1.44 for cholesterol (59% answered decrease intake), 1.19 for fat (84% answered decrease intake), 2.69 for fiber (69% answered increase intake), and 1.34 for sodium (66% answered decrease intake). Using the Wilcoxon Signed-Rank Sum test (test of median 2.000 *vs.* median ≠2.000) , all four nutrients had p-values of <0.001. Fifteen subjects also wrote-in additional nutrients or food categories (Q72-Q79) that they planned on decreasing or increasing (Appendix 4, page 100).

In summary, whereas only sodium was significantly different from Q16-30 to Q43-57, for Q68-71, when the subset of subjects who answered "Yes" to Q67 is considered, the selections for changes in intake for cholesterol, fat, fiber, and sodium all become significant. For the 32 subjects who answered "Yes" to Q67, all identified areas (cholesterol, fat, fiber, and sodium) where they intended on making changes, and 15 subjects wrote-in additional food categories for making changes.

Evaluation of the Food Frequency Dietary Analysis Printout

Attached to the Follow-up Nutrition Survey was a two-page form (pages 91–92) for the subjects to evaluate the five sections of their food frequency questionnaire printout. The results are presented in Table 5 (next page). The five sections were A: RDA Goal Bar Graph, B: Excessive Nutrients Bar Graph, C: Excessive Nutrients Sources, D: Caloric Components Bar Graph, and E: Nutrient Values and % of RDA.

The five sections were evaluated in four areas: Difficult (I didn't understand what this meant.), Confusing (I didn't know how to compare this to the way I eat.), Educational (I learned about the way I eat.), and Motivational (I will make changes in the way I eat.).

Each of the five sections, for each of the four questions, was tested with the 1-Sample Wilcoxon Signed-Rank Sum test. For questions 1 and 2 (Difficult and Confusing), the test median of 3.000 was tested against a median <3.000. That is, the hypothesis was that the printout sections would not be difficult or confusing. For questions 3 and 4 (Educational and Motivational), the test median of 3.000 was tested against a median >3.000. That is, the hypothesis was that the printout sections would be educational and motivational. The p-values are included in Table 5.

In summary, all the sections were significantly not difficult or confusing. The three graphical sections, A, B, and D, were significantly educational. Finally, the two horizontal bar graph sections, A and B, were significantly motivational.

Table 5. Evaluation of the FFQ dietary analysis printout.*
1-5 scale: 1=Not, 5=Very

	1	2	3	4	5	Mean	Med.	N**	P-value***
1. Difficult									
SECTION A	27	9	6	1	1	1.64	1.0	n=44	<0.001
SECTION D	28	7	4	3	1	1.65	1.0	n=43	<0.001
SECTION B	28	9	4	2	2	1.69	1.0	n=45	<0.001
SECTION C	17	6	8	4	4	2.28	2.0	n=39	0.003
SECTION E	20	7	7	4	6	2.30	2.0	n=44	0.003
2. Confusing									
SECTION D	27	7	3	4	0	1.61	1.0	n=41	<0.001
SECTION B	26	9	5	1	2	1.70	1.0	n=43	<0.001
SECTION A	23	10	4	3	2	1.83	1.0	n=42	<0.001
SECTION C	16	8	5	5	3	2.22	2.0	n=37	0.001
SECTION E	19	6	6	6	5	2.33	2.0	n=42	0.004
3. Educational									
SECTION A	0	5	8	18	10	3.80	4.0	n=41	<0.001
SECTION B	1	7	11	11	13	3.65	4.0	n=43	0.001
SECTION D	0	9	8	13	11	3.63	4.0	n=41	0.001
SECTION C	4	5	12	9	7	3.27	3.0	n=37	0.116
SECTION E	2	11	11	7	9	3.25	3.0	n=40	0.082
4. Motivational									
SECTION B	2	7	13	12	9	3.44	3.0	n=43	0.011
SECTION A	3	10	8	11	10	3.36	3.5	n=42	0.039
SECTION D	5	9	8	13	7	3.19	3.0	n=42	0.192
SECTION C	5	8	11	6	8	3.11	3.0	n=38	0.286
SECTION E	5	11	10	8	7	3.02	3.0	n=41	0.422
Overall, I found my dietary analysis printout to be:									
USEFUL	2	6	12	14	10	3.55	4.0	n=44	0.003
INFORMATIVE	0	2	10	17	14	4.00	4.0	n=43	<0.001
INFLUENTIAL	1	9	11	11	11	3.51	4.0	n=43	0.004

*SECTION A: RDA Goal Bar Graph
SECTION B: Excessive Nutrients Bar Graph
SECTION C: Excessive Nutrients Sources
SECTION D: Caloric Components Bar Graph
SECTION E: Nutrient Values and % of RDA

**For Wilcoxon Test, sample size was adjusted for missing values.

***1-Sample Wilcoxon Signed-Rank Sum Test: Test of median 3.000 *vs.* median <3.000 for Difficult and Confusing, and >3.000 for Educational, Motivational, Useful, Informative, and Influential.

From Table 5, question 1 (Difficult) and question 2 (Confusing) were recoded, so that, on the 1–5 scale, 1=Very (Difficult or Confusing) and 5=Not (Difficult or Confusing). The means from each section (A–E) for each question (Difficult, Confusing, Educational, Motivational) were then averaged and ranked for Table 6 (next page).

Table 6. Overall ranking of each FFQ printout section.

SECTION	OVERALL MEAN	OVERALL MEDIAN	OVERALL P-VALUE
Graph and Text			
A: RDA Goal Bar Graph	3.9	4.0	<0.001
B: Excessive Nutrients Bar Graph	3.9	4.0	<0.001
D: Caloric Components Bar Graph	3.9	4.0	<0.001
Text-Only			
C: Excessive Nutrients Sources	3.5	4.0	<0.001
E: Nutrient Values and % of RDA	3.4	3.0	<0.001

The overall means for the three graphical sections (A, B, & D) were essentially the same, and were distinctly greater than the overall means for the text-only sections (C & E). Using the 1-Sample Wilcoxon Signed-Rank Sum test (test of median 3.000 *vs.* median >3.000), the results for all five sections were highly significant. These results agree with those of Geiger *et al.*[67] The horizontal bar graphs (Sections A and B) and the vertical bar graph (Section D) were apparently more effective in presenting the information.

At the end of the evaluation form, the subjects were asked to rate (1 – 5 scale: 1=Not, 5=Very) their FFQ printout, overall, on how Useful (It contained practical information I will use.), Informative (I gained new information about the way I eat.), and Influential (I plan on making changes in the way I eat.) it was. On the 1 – 5 scale, the subjects rated, as a 3 or better, their printout as useful (36 or 82%), informative (41 or 95%), and influential (33 or 77%). The means and p-values for these three categories (Table 5) indicate that the FFQ printout, taken as a whole, was rated by the subjects as an effective educational and motivational tool.

Miscellaneous Analyses

For Table 7, question 10 (1st survey) was cross-tabulated with question 67 (2nd survey). Subjects (n=11) who checked "Agree" (Good nutrition is necessary for good health.) seemed to be more influenced by their FFQ results than those subjects (n=33) who checked "Strongly agree" (91% *vs.* 67%). Perhaps those subjects who checked "Strongly agree" already had good diets, so their FFQ results held few surprises.

Table 7. Rated importance of nutrition to health *vs.* FFQ influence.
Q10. Good nutrition is necessary for good health.
Q67. Because of having seen the results of your FFQ analysis...

		Question 10					
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Q67	Yes	22	10	0	0	0	32
	No	11	1	1	0	0	13
	Total	33	11	1	0	0	45

For Table 8, question 11 (1st survey) was cross-tabulated with question 67 (2nd survey). Subjects (n=24) who checked "Agree" or "Neutral" (Good nutrition is important to me.) seemed to be more influenced by their FFQ results than those subjects (n=20) who checked "Strongly agree" (75% *vs.* 70%).

Table 8. Rated importance of nutrition to subject *vs.* FFQ influence.
Q11. Good nutrition is important to me.
Q67. Because of having seen the results of your FFQ analysis...

		Question 11					
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Q67	Yes	14	13	5	0	0	32
	No	6	4	2	1	0	13
	Total	20	17	7	1	0	45

For Table 9, question 65 (2nd survey) was cross-tabulated with question 67 (2nd survey). Subjects (n=26) who checked "Poor" or "Fair" (Overall, my diet is...) seemed to be more influenced by their FFQ results than those subjects (n=17) who checked "Good" or "Excellent" (77% *vs.* 59%). Those subjects who rated their diet less favorably may indeed have had poor or fair diets. If this were case, their FFQ results would have dramatically spotlighted their poor dietary habits, thus confronting their beliefs with the reality of the computer printout.

Table 9. Rated overall diet *vs.* FFQ influence.
Q65. Overall, my diet is...
Q67. Because of having seen the results of your FFQ analysis...

		Question 65					
		Don't know	Poor	Fair	Good	Excellent	Total
Q67	Yes	0	9	11	9	1	30
	No	0	1	5	7	0	13
	Total	0	10	16	16	1	43

For Table 10, question 66 (2nd survey) was cross-tabulated with question 67 (2nd survey). Subjects (n=11) who checked "Poor" or "Fair" (Overall, my level of health is...) seemed to be more influenced by their FFQ results than those subjects (n=33) who checked "Good" or "Excellent" (82% *vs.* 70%).

Table 10. Rated overall health *vs.* FFQ influence.
Q66. Overall, my level of health is...
Q67. Because of having seen the results of your FFQ analysis...

		Question 66					
		Don't know	Poor	Fair	Good	Excellent	Total
Q67	Yes	0	1	8	15	8	32
	No	0	0	2	7	3	12
	Total	0	1	10	22	11	44

Question 10 (Good nutrition is necessary for good health.) was compared with question 11 (Good nutrition is important to me.). The subjects could rate their answers from "Strongly agree" to "Strongly disagree." There was a difference between Q10 ($\bar{x}$=4.7) and Q11 ($\bar{x}$=4.2) in the strength of agreement for the importance of nutrition (P=<0.001), as measured by the Wilcoxon Matched-Pairs Signed-Ranks test. The response to these questions (actually statements) indicates that the subjects were more in agreement with Q10, a more general statement, than with Q11, a statement that is more personal.

For Table 11, question 4 (1st survey) was cross-tabulated with question 67 (2nd survey). Subjects (n=22) with less education (≤ high school diploma) seemed to be more influenced by their FFQ results than those subjects (n=23) with more education (≥ 2 years of college) (77% *vs.* 65%).

Table 11. Education level *vs.* FFQ influence.
Q4. Highest education level:
Q67. Because of having seen the results of your FFQ analysis...

		Question 4					
		Some HS	High school	2 year college	4 year college	Graduate degree	Total
Q67	Yes	5	12	5	7	3	32
	No	1	4	3	3	2	13
	Total	6	16	8	10	5	45

Question 5 asked, "From which information sources have you ever received nutrition information?" Forty-four subjects made selections from this question. Seventeen specific information sources were available for selection. Favored sources [selected by at least 18 (40%) of the subjects] included Magazines (82%), Books (68%), TV (64%), Newspapers (48%), Relatives (48%), Friends (45%), School (43%), and Doctor (41%). Only 11% had received nutrition information from a nutritionist, and only 5% from a dietitian.

Question 7 asked (In response to Q6, "In the last 2 years, have you changed your diet for general health reasons?"), "If you answered Yes to question 6, which information sources influenced you?" Seventeen subjects made selections from this question. Seventeen specific information sources were available for selection. The only favored source (selected by at least 40% of the subjects) was Doctor (41%).

Question 9 provided the same 17 information sources, but this time in response to Q8 (Are you planning on making changes in your diet in the next 30 days?). Twelve subjects made selections from this question. Favored sources (selected by at least 40% of the subjects) included Friends (50%) and Magazines (42%).

Regarding question 42 (identical to Q9), "Computer analysis" was chosen by 15 (68%) of the subjects (n=22). The next closest influential sources of information were "Friends" or "Magazines" (23% each). Whereas "Friends" and "Magazines" were first and second as influential information sources in Q9, in Q42, "Computer analysis" was chosen three times as much. This question was used as a control to identify influential information sources other than the FFQ printout. During the time of this study, other information sources may have influenced the subjects' decision to make dietary changes in the next 30 days, but

their FFQ printout was obviously the predominate information source.

Question 3 (Sex) was cross-tabulated with question 42 (If you answered Yes to Q41, which information sources influenced your decision?). Question 42 was in response to Q41 (Are you planning on making changes in your diet in the 30 days?). Twenty-two subjects (6 male, 16 female) had answered "Yes" to Q41. All six males chose "Computer analysis" as an information source that influenced their decision, whereas 9 (56%) of the females chose "Computer analysis." It is possible that the males were more technology-minded, and therefore more receptive to information derived from a more technological source.

A sixteen-question survey (Appendix 5, page 109) was sent to the 51 subjects who dropped out of Phase I (5 of the 56 subjects gave incorrect or unreadable addresses when they signed up.). Thirteen (27%) completed surveys were returned (n=48, 3 of the 51 surveys were returned as undeliverable.). The results of this survey are included at the end of Appendix 4 (page 108). Over 20% of the respondents reported that (highest to lowest frequency):

1. I'm very busy and I just didn't have the time to spend on this research study.
2. It was too difficult trying to remember all the foods that I normally eat.
3. I decided that participating in the research study would be just too much work.
4. If my doctor, nurse, dietician, or other health professional had asked me, I would have completed the research study.
5. The questionnaires were too complicated to take the time to understand.
6. The questionnaires were too confusing.
7. I already know about the kinds and amounts of nutrients in my diet.

In summary, it is difficult to draw many conclusions about the subjects who dropped out of Phase I. One wonders why at least seven subjects took the trouble of going through the screening process, read the materials that explained what was expected of them, read and sign the Human Subjects Consent Form, and then give the wrong address on the sign up sheet. The same could be said for the 62% of the respondents who answered that they were too busy and didn't have the time to spend on the research study. It may be that if the subjects had not been approached during their hustle and bustle activity at the mall, but rather in the controlled environment of a physician's office, fewer would have signed up, or more would have followed through (see response #4). The other point to keep in mind is that there was no direct contact between the subjects and the investigator. It is possible that there would have been a lower dropout rate if there had been multiple, direct contacts with the subjects. In fact, two of the respondents did answer that it would have made a difference.

DISCUSSION

The subjects who participated in this study were self-selected, producing a population that was not representative of the general population. The subjects knew that they would be participating in a nutrition study, and what was expected of them. Even so, there was a dropout rate of 59% from the original 110 who had signed-up at the shopping mall. Other nutrition studies, such as by Nordevang *et al.*[59] and Walt and Forgione,[64] experienced similar dropout rates.

The subjects who completed this study (Table 1, page 25) tended to be female and better educated. This is not surprising since women are inclined to be the nutrition gatekeeper in their family, and that the more affluent and educated attend to their health more. This is also a population one would expect to see at a large, well-kept, suburban shopping mall.

The subjects came from sixteen cities, and had a ten mile median round-trip travel distance to the shopping mall. In a region with many shopping malls, strip plazas, and free-standing stores, this shows the drawing power of the subject-source mall. While no questions were asked concerning race, from the names of the subjects it is apparent that a number of cultures were represented in the study.

The first main inquiry of the study asked if a computer printout of a dietary analysis would contribute to the subjects' dietary education. There were two areas of questions to assess changes in education.

The first asked the subjects, using a five-level scale (very low to very high), to rate their level of knowledge about their own diet (Q31 and Q58). Seeing the results of their diet analysis had no significant effect on their knowledge (page 27).

Since a significant number of subjects had rated their diet analysis as being useful and informative (from the FFQ evaluation), it is conceivable that, for some of the subjects who decreased their rated knowledge of their diet in the 2nd survey, they were thinking that they knew less about their diet than they had thought. If this were the case, then the discovery that they knew less about their diet may have reduced their knowledge rating, even though they in fact now knew more about their diet. Alternatively, since this was a minimal intervention, its impact on the subjects' consciousness may have been too subtle to be measured, at least in the short interval between the 1st and 2nd surveys (1 month). Another reason may be that some of the subjects may have mistrusted their FFQ results, and thus thought their knowledge of their diet had not increased.

Also measuring dietary education (pages 27-28) were two sets of questions, Q32–Q35 (1st survey) and Q61–Q64 (2nd survey). The first set (1st survey) asked the

subjects what they *thought* their intakes of cholesterol, fat, fiber, and sodium, were. The second set of questions (2nd survey) asked the subjects what their *actual* intakes of cholesterol, fat, fiber, and sodium, were, based on the results of their diet analysis. From the 1st to the 2nd surveys, there was a significant decrease in the number of subjects who reported "Don't know." Additionally, questions 36 and 65 asked the subjects to rate their overall diet. There were two "Don't knows" for the 1st survey, and none for the 2nd survey. In summary, based on the subjects' responses (number of "Don't knows"), the FFQ results added to the rated self-knowledge for a significant number of the subjects.

A tracking scheme was developed to see if the changes in nutrient intake ratings for questions 61-64 tracked their actual values, as represented in the FFQ printout. While the tracking system was subjectively designed by the investigator, it was the only way to measure the subjects' understanding of their results. An exit quiz was not considered by the investigator.

The subjects' own rated intake (Poor, Fair, Good, Excellent) for each of the four nutrients (cholesterol, fat, fiber, sodium) was compared with the corresponding nutrient value on the FFQ printout. The FFQ values were arbitrarily divided into three levels, <90% RDA, 90-110% RDA, and >110% RDA. The responses to Q61-Q64 were scored by determining how close they were to their respective values on the FFQ. The subjects were given a score any where from +2 to −2, depending on whether they tracked above or below the expected nutrient rating. The tracking scheme attempted to compare and measure expected responses to Q61-Q64 with the subjects' actual responses.

The means of the tracking scores for the four nutrients were close to zero. The relatively small mean values indicates that the subjects' actual responses to Q61-Q64 tracked fairly closely to the actual nutrient values on their diet analysis printouts.

The overall negative mean (0.177) indicates that, on the average, the subjects underrated the quality of their intakes of the four nutrients. There are several possible reasons for this mistracking: 1) the subjects had some difficulty understanding their FFQ printout; 2) they did not realize that values moderately below 100% of the "RDA" for cholesterol, fat, and sodium, are healthy; and 3) the middle level, 90-110% RDA, may have been too narrow. If the three levels had been <80%, 80-120%, and >120%, more subjects would have tracked with their expected responses. Overall though, it appears that the subjects understood their FFQ results, and learned from them.

For the second main inquiry of the study, there were a number of questions that focused on the motivating effects of the computer analysis on the subjects. Questions 8 and 41 (Table 4, page 30) asked, "Are you planning on making changes in your diet in the next 30 days?" Twice as many subjects answered "Yes" in the second survey, which was a statistically significant increase.

The questions (Q9 and Q42, page 30) that immediately followed Q8 and Q41 asked what information sources influenced their decision to make changes in their diet. For Q9, no subjects chose "Computer analysis," while for Q42, one third of the subjects now gave their computer printout as a source of influence.

The most meaningful question (Q67, page 31) directly asked "Because of having seen the results of your diet analysis, are you planning on making any changes in your diet?" The majority of the subjects answered "Yes." This question alone shows that just a diet analysis printout can have a significantly motivating effect on people. It is interesting that the median age of the subjects who answered "Yes" to Q67 was lower than for the subjects who answered "No." Either the older subjects knew more about their diet, and thus were less influenced by their printout information, or that the younger subjects were more receptive to the technologically presented information, having been exposed, directly or indirectly, to computers at a younger age. Alternatively, the diets of the older subjects may have been better overall, thus less change was necessary.

There was a discrepancy between the numbers of subjects selecting "Computer analysis" for Q42 (page 30), and those answering "Yes" for Q67 (page 31). One possibility is that Q42 was limited to "...the next 30 days..." whereas Q67 was not limited to a specific time period. Another possibility is that, for Q42, many subjects may not have connected the information source "Computer analysis" with being the same as their FFQ printout. It is also possible that, because Q42 contained nineteen information sources to choose from, some of the subjects may have simply not noticed the selection "Computer analysis."

The subjects who had answered "Yes" to question 67 (Because of having seen the results of your diet analysis, are you planning on making any changes in your diet?) were then asked (Q68-Q71, page 31) if they would be making any changes (Decrease, No change, or Increase) in their intakes of foods that contain cholesterol, fat, fiber, and sodium. The reported intentions to change intakes for the four nutrients were all statistically significant. This indicates that these subjects could translate their diet analysis results into a motivating force for making dietary change, and not just for these four nutrients alone. Half of the subjects wrote-in additional nutrients or food categories (see page 100) in the spaces

provided (Q72-Q79).

In summary, most of the subjects reported that their diet analysis results motivated them enough to plan on making changes in their diet, specifically to decrease intakes of cholesterol-, fat-, and sodium-containing foods, and to increase their intake of fiber-containing foods. And half of those subjects were motivated enough to list additional areas where they intended on making changes in their diet. For this majority of subjects, the dietary analysis printout was indeed a motivating force.

When it comes to making changes in behavior, especially in areas as personal and fundamental as diet, motivation that is driven by a person's beliefs, is paramount. According to the Ajzen and Fishbein theory of reasoned action,[68] behavior can be predicted by a person's intention to perform that behavior. There are two factors that lead to this intention. One is the individual's own beliefs about the behavior and its consequences. The other is the expectation of the individual's behavior by external influences, such as family members, or authoritative individuals or groups. In other words, does the individual think that other people condone, or not condone, the intended behavior?

This study showed that just the results of the FFQ printout could affect the individual's own beliefs about his or her diet, and thus create an intention to change unhealthy dietary behaviors. The second component, not addressed in this study, would be the added influence of a health professional's expectations for the behavioral change.

According to a study by Saunders and Rahilly,[69] people who are already interested in health, such as college health majors, may depend more on personal beliefs and values concerning nutrition (i.e., rely on attitudinal motivation) than people who have no prior knowledge or opinions (i.e., rely on social motivation). The latter group, according to Saunders and Rahilly, needs to be approached with interventions that include social influences, comprised of support groups, family members, or health professionals. However, an education program that incorporates social learning and motivation is more complex, and may not relate to the uniqueness of the intervention group, as Olson and Kelly[70] found out.

Many of the subjects in this study answered "Yes" to the question, "Because of having seen the results of your dietary analysis, are you planning on making any changes in your diet?" This may be an indication of the extent of their prior beliefs in the importance of nutrition, even though they had no formal nutrition education. To the statement, "Good nutrition is necessary for good health," 98% answered "Agree" or "Strongly agree." And to the statement, "Good nutrition is important to me," 82% answered "Agree" or "Strongly

agree." It would seem that the subjects in this study, because of an apparent previous interest in health and nutrition, relied more on attitudinal motivation (the thrust of this study) than social motivation.

The third main inquiry of the study dealt with the diet analysis printout, and its presentation of the data. The two-page printout (pages 85-86) displayed the diet analysis data in five sections, three in a graph format (2 with horizontal bars and 1 with vertical bars), and two in a text-only format. The three graphical formats proved to be less difficult and confusing, and more educational and motivational, than the two text-only sections (Tables 5 and 6, pages 33-34). These results should not be too surprising. For nonhealth professionals, columns of numerical data presented as `Poly Fat, 21.81 Gm, 67%`, are probably too confusing. To the layperson, one bar graph may be worth a thousand lines of spread sheet data. Geiger *et al.*[67] had similar results.

The subjects were also asked to rate (1–5 scale), on an overall basis, their dietary analysis printout in three areas (Tables 5 and 6, pages 33-34). The subjects graded their printout as being useful, informative, and influential. The results for all three categories were statistically significant. It is interesting that, while 71% of the subjects planned on making changes in their diet because of their FFQ results (Q67), 95% of the subjects gave their printout a 3 or better (1–5 scale) for being informative, and 82% and 77%, for being useful and influential, respectively. It may be that some of the subjects who answered "No" to Q67 may have been satisfied enough with their diet (as represented in their printout). Indeed, one subject commented that, if her diet analysis had shown important deficiencies or excesses (her diet did, in fact, appear to be "perfect"), she would have answered "Yes" to Q67.

Numerous miscellaneous analyses were performed. Considering questions 10 and 11 (Tables 7 and 8, page 35), it was found that subjects who did not "Strongly agree" that good nutrition is necessary for good health (or is important to me) were more influenced (Q67) by the results of their diet analysis printout. Perhaps these subjects had given less thought to their diet, and consequently were more surprised, and influenced, by the results. And conversely, the subjects who had answered "Strongly agree" may have already been working on improving their diet, and thus the diet analysis offered little unexpected information. Similarly, for questions 65 and 66 (Tables 9 and 10, page 36), subjects who rated their overall diet or level of health as being "Poor" or "Fair" were more influenced by their diet analysis (Q67) than those subjects who chose "Good" or "Excellent."

Questions 5, 7, and 9 (pages 37-38) were concerned with sources of nutrition information. Sources used (chosen by at least 40% of the subjects) included magazines, books, TV, newspapers, relatives, friends, school, and doctor. Few of the subjects had ever received nutrition information from a nutritionist, and fewer still from a dietitian. It is surprising that, in a time when the importance of nutrition is discussed so frequently, so few of the study's subjects had taken advantage of the services of a nutritionist or a dietitian.

Finally, a greater percentage of males chose "Computer analysis" as the reason why they were planning on making dietary changes in the next 30 days (Q42, page 38). It is possible that males tend to be more interested in high-tech things (possibly because females are often discouraged to show interest), and were thus more influenced by the computer printout. However, in contradiction to the previous reasoning, a slightly higher percentage of females answered "Yes" to the question "Because of having seen the results of your diet analysis, are you planning on making any changes in your diet?" (Q67). The disparity between these two results could be an anomaly because of the relatively small sample size of this study.

CONCLUSIONS

There were a number of shortcomings in this study. The first of which was the sample itself. It was not representative of the general population. Given the importance of nutrition in general, and in particular, the predominate role food plays in meeting physical and emotional needs, it is not surprising that not everyone would want to participate in a nutrition study. It is hard enough to get people to floss their teeth, let alone swap their twinkies for spinach. Consequently, subjects who enlist in nutrition intervention studies will rarely, if ever, represent the population at large.

Even with the self-selection, this study would have been more meaningful if there had been a larger sample size. Unfortunately, given the time and monetary constraints, it was not possible to recruit more subjects. There may have been ways to increase the sample size by decreasing the dropout rate. Some subjects may have been discouraged by the quantity of the questions asked in this study (almost 100). If there had been personal contact between the investigator and the subjects, more subjects may have remained in the study. It is also possible that if, during the initial selection process, the expense to the investigator (a poor graduate student) had been mentioned, maybe only the more committed subjects would have signed up.

In retrospect, maybe this study was overly ambitious in considering educational and motivational effects, in addition to evaluating the computer printout itself. Maybe it would have been a stronger and less diffused study if it had concentrated solely on educational effects, measured by an exit quiz. In effect, each of these areas warrants enough interest for its own investigation.

Although the use of food frequency questionnaires seems to be in vogue now, their directions may be more complicated than diet records for the subjects to follow. This would be an especially important factor to consider when there is no contact between the subjects and the investigator. This was made apparent by the spread in total energy intake of the subjects (25% to 218% of the RDA), as measured by the FFQ. A three- or four-day diet record would have been more invasive to the subjects, but the results would probably have shown less variation. The actual diet analysis results were not used in any of the analyses, so there was no direct impact on the study, but the difficulty in recalling dietary habits, without any counsel, may have frustrated and discouraged some of the subjects. The use of food frequency questionnaires was chosen over diet records to reduce the workload of the investigator.

One oversight by the investigator pertains to question 67, "Because of having seen the results of your food frequency dietary analysis, are you planning on making any changes in your diet?" For the subjects who had answered "Yes," a follow-up question asked what

those changes would be. There should also have been a follow-up question for those subjects who had answered "No" to Q67. These subjects should have been asked why their diet analysis did not influence them to plan on making changes in their diet.

A unique aspect of this nutrition intervention study was that no direct contact was made between the researcher (or any health professional) and the subjects. Indeed, in the survey of the dropouts from Phase I (Appendix 4, page 108) six of the thirteen respondents (46%) indicated that they would have completed the study if they had been asked to by their doctor, nurse, dietitian, or other health professional, or if they had met the researcher. However, the intention of this study was to see if computerized dietary results, presented in a relative vacuum, could have significant educational and motivational effects.

There are many possibilities for future studies. Some potential ones are: 1) diet analysis printouts could be further developed, to the point where they are self-contained, personalized, mini-courses in nutrition; 2) the effects of the presenter of a diet questionnaire could be studied, that is, is a person more apt to complete a diet analysis if they are asked by an educator, nurse, dietitian, physician, et cetera; 3) more diet analysis printout formats could be developed, testing which ones are more effective in presenting the information.

In conclusion, there is certainly a segment of the population that may respond to a nutrition intervention consisting of no more than a computer printout of their diet. These are the people who already know that nutrition is important, and may have initiated their own course of nutrition education through popular health magazines and books. They are also the people who are surprised to learn that, in spite of their interest in nutrition, their diet still contains nutrient deficiencies and excesses, and when they learn this, they are motivated to act on this knowledge. For other people, seeing the results of their diet analysis may be the stimulus to take an interest in nutrition. Many people may assume that they have an adequate diet, and thus have no interest in the impersonal nutrition information that they are constantly bombarded with. The diet analysis, on the other hand, makes it personal.

With their ease of implementation, computerized dietary analysis programs are finding a place in nutrition intervention programs.[62,64,71] To take this two small steps further, the incorporation of the printout into a self-guided nutrition instruction booklet that is presented by an accepted individual or institution, could be a low-cost nutrition screening and intervention tool. It is not meant that it should replace dietitians, but to generate the motivation to make dietary changes, with the nutritionist available to offer guidance and additional information. Since it is important to start good dietary habits early, the ideal situation would be for a school dietitian to offer diet analyses as part of a general health course, perhaps at the high school level.

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APPENDIX 1: Human Subjects Selection Process

University of Washington
Nutrition Research Study

Would you like to take part in a University of Washington nutrition research study?

It will require, on your own, only several hours in your own home. If you decide to be in this study, you will find out about your diet, such as fat and cholesterol intake.

		Yes	No
For question 1, a No response *excludes* the person.			
1.	Do you live in Snohomish or King counties?	○	●
For questions 2-8, *one* Yes response *excludes* the person.			
2.	Are you pregnant?	○	●
3.	Have you ever had your diet analyzed?. . . . . (By a nutritionist, dietician, health club, diet center, computer)	●	○
4.	Do you have a college degree in nutrition or dietetics?	●	○
5.	Are you planning any major surgeries or hospital stays in the next 30 days?	○	●
6.	Are you planning on a change of address in the next 2 months? . . .	●	○
7.	Are you planning on a vacation in the next 30 days? . . . . . (More than 3 days)	●	○
8.	Are you on a restricted diet? . . . . . (Strict weight loss, diabetic, etc)	○	●
For questions 9 & 10, *two* No responses *excludes* the person.			
9.	Do *you* buy your own food or influence food purchases?. . . . . (That is, do they have *any* control over the food they eat?)	○	●
10.	Do *you* prepare your own meals or influence food preparation? . . . (That is, do they have *any* control over the food they eat?)	○	●

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E.
4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665.

University of Washington
Nutrition Research Study

IMPORTANT: Please read the following to see if you will be able to complete this research study. Since this study will have a small number of participants, it's critical that people who sign up will actually complete the project. To help you understand what you'll be asked to do, sample forms follow this page.

WHY ARE WE DOING THIS STUDY?

Nutrition is being looked at more and more by people in many health fields. We are testing how important a computerized diet analysis can be in health education and promotion.

WHAT WILL I GET OUT OF IT?

You will receive a computerized dietary analysis, which can show your nutrient intake patterns, including cholesterol, fat, fiber, and many other nutrients. You may learn about your diet, and at the same time, be part of an important research study.

HOW LONG WILL THIS TAKE?

Your total involvement, at home, should be no more than 2 hours (1 hour this week and 1 hour several weeks later).

WHAT DO I NEED TO DO?

You will take home a packet containing a simple survey and a food frequency questionnaire. You need to complete the forms and mail them back within 1 week. An addressed and stamped envelope is included.

Several weeks later a second packet will be mailed to you. This packet will contain your computerized diet analysis printout and a second survey. You will be asked to complete the survey, evaluate the diet analysis printout, and mail them back within 1 week. An addressed and stamped envelope will be included.

HOW DO I PARTICIPATE?

If you would like to be in this study, ask an interviewer for the University of Washington Consent Form. Please read and sign 2 copies. Then hand in 1 copy of the Consent Form to an interviewer and pick up your initial forms packet. Make sure you leave your name, address, and phone number on a sign-up sheet.

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E. 4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665.

1st Survey

Nutrition Research Survey

Complete this survey first, then complete the Food Frequency Questionnaire. *Please* PRINT *carefully.*
Answer all questions that apply with an X in the ☐. Thank you for your participation.

Name:
1. First _ MI _ _ _ _
Last_____

2. Date of birth: _____-_____-_____ mm-dd-yy

3. Sex: ☐ Male ☐ Female

4. Highest education level:

☐ Some high school ☐ Completed high school ☐ 2 yr col. ☐ 4 yr col. ☐ Graduate degree

5. From which information sources have you ever received nutrition information?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

6. In the last 2 yrs, have you changed your diet for general health reasons? ☐ Yes . ☐ No

7. If you answered Yes to question 6, which information sources influenced you?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

8. Are you planning on making changes in your diet in the next 30 days? ☐ Yes☐ No

9. If you answered Yes to question 8, which information sources influenced your decision?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Disagree
10. Good nutrition is necessary for good health.	☐	☐	☐	☐	☐
11. Good nutrition is important to me.	☐	☐	☐	☐	☐

12. Have you ever had your diet analyzed by a dietician, nutritionist, Yes No
diet center, health club, or by anyone else? . . . . . ☐ ☐
13. Have you ever had your diet analyzed by a computer? . . . . . ☐ ☐
14. Would you like to improve your diet? . . . . . ☐ ☐
15. Do you have any physical or emotional conditions that restrict your food choices? ☐ ☐

What dietary changes are you thinking about?

In the next 3 months, I plan on eating:	Lot less	Less	No change	More	Lot more
16. Cholesterol containing foods	☐	☐	☐	☐	☐
17. Fat containing foods	☐	☐	☐	☐	☐
18. Fiber containing foods	☐	☐	☐	☐	☐
19. Sodium (salt) containing foods. . . .	☐	☐	☐	☐	☐
20. Meat	☐	☐	☐	☐	☐
21. Fish	☐	☐	☐	☐	☐
22. Poultry	☐	☐	☐	☐	☐
23. Whole grain foods	☐	☐	☐	☐	☐
24. Vegetables	☐	☐	☐	☐	☐
25. Fruits	☐	☐	☐	☐	☐
26. Dairy products	☐	☐	☐	☐	☐
27. Eggs	☐	☐	☐	☐	☐
28. Fats and oils	☐	☐	☐	☐	☐
29. Desserts and sweets	☐	☐	☐	☐	☐
30. Fast foods or convenience foods . .	☐	☐	☐	☐	☐

	Very low	Low	Average	High	Very high
31. Please rate your level of knowledge about your own diet?	☐	☐	☐	☐	☐

For the questions below, mark what you <u>think</u> your intake is. Excellent means not too low or too high, but at the recommended level for good health. Poor could mean not enough of a good thing, or too much of a "bad" thing.

	Don't know	Poor	Fair	Good	Excellent
32. My cholesterol intake is	☐	☐	☐	☐	☐

33. My fat intake is . . . . . ☐ ☐ ☐ ☐ ☐
34. My fiber intake is . . . . . ☐ ☐ ☐ ☐ ☐
35. My sodium (salt) intake is . . . . . ☐ ☐ ☐ ☐ ☐
36. Overall, my diet is . . . . . ☐ ☐ ☐ ☐ ☐
37. Overall, my level of health is . . . . . ☐ ☐ ☐ ☐ ☐

IMPORTANT: Instructions for Completing the Food Frequency Questionnaire

For each numbered row, put down how many servings you ate (last 30 days), either per day, per week, or per month. Most importantly, be as accurate as possible. Pay special attention to the PORTION SIZE of each food item listed. When your portion is different from the one listed in the form, adjust your answer accordingly.

Put numbers in either the per day, per week, or per month column. Do not put check marks. You must use numbers or your nutrition report can't be processed. If you don't eat the food at all, leave it blank.

Please put only one number per row, even if the Food Name/Description box has multiple entries. Round all entries to the nearest whole number.

Please include every food listed on this form that you ate at least once in the last 30 days. If a food is eaten less than once per day, but 1 or more times per week, enter your servings in the week column of that row. If a food is eaten less than once per week, but 1 or more times per month, enter your servings in the month column of that row.

This is a food frequency questionnaire. Because of the limited food selection, it will not measure exactly what you eat, but it can identify important dietary trends, including fat, cholesterol, and salt intake.

Examples:
1. To calculate, compare your usual serving size to the one listed. If you had 1 cup of Lowfat (2%) milk every day, then you would enter a 1 in the day box. Likewise, if you have 1 cup of milk once a week or once a month, you would enter a 1 in the week box or in the month box:

	Servings per:				Milk and Yogurt
No.	Day	Week	Month	Serving Size	Food Name / Description
57.				1 cup	Lowfat (2%) milk

2. If you had twice as much, you would double the number of servings entered in the day, week, or month box. For example, if you had lowfat milk once per day, every day, but your serving size was two cups (16 fl. oz.), enter a 2 in the box for per day. Or if you had lowfat milk twice per day, every day, and your serving size was one cup, then you would also enter a 2 in the box for per day.

3. Let's say that, every week in the last 30 days, you had 1 peach, 1 nectarine, and 4 plums. The peach is 1 serving (per week), the nectarine is another serving (per week), and the plums are 2 more (4 plums ÷ 2 for serving size). The total would then be 1 + 1 + 2 = 4 servings per week:

	Quantity eaten ÷	Divided by the serving size =	Number of servings per: Day	Week	Month
Peaches:	1/week	1 each			1
Nectarines:	1/week	1 each			1
Plums:	4/week	2 each			2
Total Servings:					4

	Servings per:				Fruits
No.	Day	Week	Month	Serving Size	Food Name / Description

25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums

4. A complicated example would be if you ate 1 peach every day in the last 30 days, 1 nectarine every week in the last 30 days, and 4 plums once in the last 30 days. The peach is 1 serving (per day), the nectarine is 1 serving (per week), and the plums are 2 servings (per month). The total would then be:

	Quantity eaten ÷	Serving size =	Number of servings per: Day	Week	Month	Monthly total
Peaches:	1/day	1 each	1x30 =			30
Nectarines:	1/week	1 each			1x4 =	4
Plums:	4/month	2 each				2x1 = 2
Total Servings:						36

In the above example, there are servings per day, week, and month. You can enter your servings only once per numbered row (day or week or month). You can't reduce your servings of plums to per day or week, and you can't reduce your servings of nectarines to per day. However, you can expand your servings of peaches to servings per month (1/day x 30 days), and your servings of nectarines to servings per month (1/week x 4 weeks). (Of course, if you only ate 25 peaches in the last 30 days, you would have to put 25 in the month column for your calculations, not 1 in the day column.)

Servings per: Fruits

No.	Day	Week	Month	Serving Size	Food Name / Description
25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums

For any multiple food rows like the above, you can use the following table to assist you in your calculations; then transfer the total to the appropriate section on the form that begins after this page.

Food item	Quantity eaten ÷	Serving size =	Servings/ day x 30	Servings/ week x 4	Servings/ month x 1	Total/ month

*BEFORE YOU START, first look over the entire questionnaire (especially the Miscellaneous section) so you know the types of foods listed and their location. If you regularly eat certain combination foods that are not listed here, such as casseroles, you may be able to break them down into their component parts, if they are listed on this form. Also try to remember the foods that you add extra salt, butter, etc., to.

Then try to remember any places and activities in the last 30 days where you had anything to eat. Remember to include snacks. This is important–the more carefully and completely you do this, the more accurate will be your diet analysis.

Computerized Food Frequency Questionnaire
* Please PRINT Carefully *

Name
First_____ MI____ Last_____

Address_____

City_____ State_____ Zip_____

Phone_____ Age____ Height____inches Weight_____lbs. Sex___M/F

How often did you eat (or drink) the following in the last 30 days?

Servings per: Breads, Cereals, Grain Products

No.	D	W	M	Serving Size	Food Name / Description
1.				1 slice	Whole wheat bread
2.				1 slice, 1 each	Sourdough or French bread/roll
3.				1 slice, ½ bun	White bread, hamburger or hot dog bun
4.				4 to 6 each	Whole grain crackers (Triscuits, Wheat Thins, Ry Krisp, etc.)
5.				4 to 6 each, 40 each	Refined crackers (Saltines, cheese, Ritz, etc.), or Oyster crackers
6.				2 each, 7 each	Graham crackers, or Animal crackers
7.				1 each	Tortilla, corn, 6" diameter
8.				1 each	Tortilla, flour, medium
9.				1 each	Muffins (corn, bran, blueberry, etc.)
10.				½ each	English muffin, bagel, pita bread
11.				3 each, or 1 each	Pancakes, or Waffles, 7" diameter
12.				½ cup	Whole grain hot cereal (rolled oats, rolled wheat, Roman Meal)
13.				½ cup	Refined hot cereal (cream of wheat, cream of rice)
14.				½ cup or 1 package	Instant hot cereal
15.				¾ cup, or ¼ cup	Cold cereals, no sugar (shredded wheat, Nutrigrain, etc.), or Grapenuts
16.				¾ cup	Bran type cold cereals (raisin bran, bran flakes, All Bran, etc.)
17.				¾ cup	Sweetened cold cereals (Frosted Flakes, Sugar Smacks, etc.)
18.				½ cup	Granola
19.				½ cup	Brown rice, cooked
20.				½ cup	White rice, cooked
21.				½ cup	Pastas, cooked (macaroni, spaghetti, noodles, etc.)

Servings per: Fruits

No.	D	W	M	Serving Size	Food Name / Description
22.				1 each	Apples, fresh, medium
23.				1 each	Bananas, medium
24.				1 each, or ½ each	Citrus fruit Grapefruit

25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums
26.				¾ cup	Berries
27.				¼ cup	Cantaloupe, medium
28.				1 cup	Melons (watermelon, honeydew, casaba)
29.				1 each	Pears, fresh, medium
30.				½ cup	Pineapple, fresh
31.				1 cup	Grapes, fresh
32.				2 tbsp 2 each 2 each 4 each	Dried fruits: Raisins Dates Prunes Apricots
33.				½ cup	Canned or frozen unsweetened fruit
34.				½ cup	Canned or frozen sweetened fruit

Servings per: Juices

No.	D	W	M	Serving Size	Food Name / Description
35.				½ cup	Orange or grapefruit, unsweetened
36.				½ cup	Tomato or V-8
37.				½ cup	Other, unsweetened (apple, grape, pineapple, etc.)
38.				½ cup	Sweetened juices, or nectars

Servings per: Fats and Oils

No.	D	W	M	Serving Size	Food Name / Description
39.				1 tbsp	Vegetable oils (corn, safflower, soy)
40.				1 tbsp	Olive oil
41.				1 tbsp	Shortening, vegetable
42.				1 tbsp	Lard
43.				1 tsp	Margarine

Servings per: Fats and Oils, con't

44.				1 tsp	Butter
45.				5 each	Olives
46.				1/8 each	Avocado
47.				1 tbsp	Mayonnaise
48.				1 tbsp	Regular salad dressings
49.				1 tbsp	Low-calorie dressings
50.				1 tbsp	Sour cream
51.				1 tbsp	Cream cheese
52.				1 tbsp	Half & Half
53.				1 tbsp	Whipping cream
54.				1 tbsp	Coffee whitener, imitation cream
55.				2 slices	Bacon

Servings per: Milk and Yogurt

No.	D	W	M	Serving Size	Food Name / Description
56.				1 cup	Nonfat milk
57.				1 cup	Lowfat (2%) milk
58.				1 cup	Whole milk
59.				1 cup	Chocolate lowfat milk
60.				1 cup	Buttermilk
61.				1 cup	Yogurt, lowfat plain

62.				1 cup	Yogurt, lowfat with fruit
63.				1 cup	Yogurt, nonfat plain

Servings per: Vegetables

No.	D	W	M	Serving Size	Food Name / Description
64.				1 to 1½ cups	Salads (lettuce, celery, green peppers, onions)
65.				½ cup	Dark green leafy vegetables (spinach, romaine lettuce, kale, etc.)
66.				1 each, or ½ cup	Carrots, raw or cooked
67.				1 each	Tomatoes, fresh, medium
68.				½ cup	Starchy vegetables (corn, peas, mixed vegetables, succotash)
69.				½ cup	Other cooked vegetables (green beans, cauliflower, beets, asparagus, summer squash, etc.)
70.				1 each	White potato, baked, boiled or mashed

Servings per: Vegetables, con't

No.	D	W	M	Serving Size	Food Name / Description
71.				½ cup	Sweet potatoes or yams
72.				½ cup	Winter squash (acorn, butternut, hubbard)

Servings per: Beverages

No.	D	W	M	Serving Size	Food Name / Description
73.				1 cup	Lemonade, punch, Koolaid
74.				12 fl. oz.	Cola drinks with sugar (Coke, Pepsi, RC, etc.)
75.				12 fl. oz.	Diet cola drinks
76.				12 fl. oz.	Non-cola drinks with sugar (7-Up, Sprite, Slice, etc.)
77.				12 fl. oz.	Diet non-cola drinks
78.				1 cup	Regular coffee and tea
79.				1 cup	Decaffeinated or non-caffeinated hot drinks (Sanka, herbal tea)
80.				1 cup	Hot chocolate or cocoa
81.				12 fl. oz.	Regular beer
82.				12 fl. oz.	Light beer
83.				4 fl. oz.	Wine, sweet or dessert (sherry, port, muscatel, etc.)
84.				4 fl. oz.	Wine dry or table
85.				1½ fl. oz.	Liquor (vodka, whiskey, gin, rum, etc.)

Servings per: Protein Foods

No.	D	W	M	Serving Size	Food Name / Description
86.				1 cup	Legumes (lentils, pinto beans, navy beans), cooked
87.				¼ cup	Nuts, seed (peanuts, almonds, cashews, sunflower seeds, etc.)
88.				1 tbsp	Peanut butter, other nut butters
89.				4 ounces	Tofu
90.				3 ounces	Vegetarian meat substitutes, low fat (Skallops, Choplets, etc.)
91.				3 ounces	Vegetarian meat substitutes, medium fat (meatless chicken, etc.)
92.				3 ounces	Vegetarian meat substitutes, high fat (Wham, Prosage, etc.)
93.				3 ounces	Beef (rib roast, steak, pot roast, veal, etc.)

94.				3 ounces	Beef, ground, cooked
95.				3 ounces	Pork (chops, roast, ham)
96.				3 ounces	Lamb (chops, roast)
97.				3 ounces	Poultry (chicken, turkey, duck)
98.				3 ounces	Fish, canned with oil (tuna, sardines)

Servings per: Protein Foods, con't

No.	D	W	M	Serving Size	Food Name / Description
99.				3 ounces	Tuna, water pack
100.				3 ounces	Fish, fresh or frozen, no breading (trout, halibut, sole, etc.)
101.				3 ounces	Shellfish (shrimp, scallops, lobster, clams, crab)
102.				1 each	Eggs, whole, large
103.				2 each	Eggs, whites only, large
104.				¼ cup	Egg substitutes
105.				1 ounce	Cheeses (cheddar, colby, american, monterey jack)
106.				1 ounce	Cheeses, lower fat (swiss, mozzarella, ricotta, string)
107.				½ cup	Cottage cheese, regular
108.				½ cup	Cottage cheese, lowfat
109.				1 ounce	Lunch meats (bologna, salami, etc.)
110.				1 each, or 2 each	Frankfurters, or sausage links

Servings per: Desserts & Sweets

No.	D	W	M	Serving Size	Food Name / Description
111.				2 each	Cookies (chocolate chip, oatmeal, peanut butter, etc.)
112.				1 each	Brownies, 1½ inch by 1 inch
113.				1 each	Doughnut or sweetroll
114.				1 each	Cake without icing, 3 inches by 2 inches
115.				1 each	Cake with icing, 3 inches by 2 inches
116.				1 each	Granola bars
117.				1 each	Pie, 1/8 of whole pie
118.				½ cup	Jello, regular, sugar-sweetened
119.				½ cup	Jello, diet, no sugar
120.				½ cup	Pudding or custard
121.				½ cup	Ice cream
122.				½ cup	Ice milk
123.				½ cup	Sherbet
124.				1 each	Popsicles
125.				1½ ounce	Candy bar, chocolate, M&Ms
126.				1½ ounce	Hard candy, gum drops, Lifesavers
127.				12 fl. oz.	Milkshake

Servings per: Miscellaneous

No.	D	W	M	Serving Size	Food Name / Description
128.				1 slice	Pizza
129.				2 cups	Popcorn, popped without oil
130.				2 cups	Popcorn, popped with oil
131.				1 ounce, or 10 to 15 each	Potato chips, corn chips, tortilla chips
132.				1 tbsp	Catsup or chili sauce
133.				½ cup	Tomato sauce

134.				5 slices, or 1 tbsp	Pickles, or Pickle relish
135.				1 stick	Chewing gum
136.				1 tbsp	Sauces (soy sauce, steak sauce, barbecue sauce)
137.				¼ cup	Gravy (brown, giblet, white sauce)
138.				1 cup	Soups (vegetable or noodle type)
139.				1 cup	Soups (cream type)
140.				1 each	Fast foods (hamburgers, burritos, tacos, etc.)
141.				1 tbsp	Sugar, honey, jam, jelly, syrups
142.				1/8 tsp	Table salt

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E.
4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665

UNIVERSITY OF WASHINGTON CONSENT FORM

Computerized Dietary Analysis Research

Investigator: John A. Pillepich, graduate student, Nutritional Sciences, 670-2665. UW research appl. no. 23-618-E

Investigator's statement:

PURPOSE AND BENEFITS
The purpose of this research is to determine the effectiveness of using a computer to analyze people's diets. People who participate in this study will benefit by learning about their dietary habits. They will see estimates of the kinds and amounts of nutrients they consume with their food.

PROCEDURE
1. After receiving the first packet, within 1 week, complete and mail back:
   A. The 1st Nutrition Research Survey (about 10-20 min.)
   B. The Food Frequency Questionnaire (about 30 min.)
2. After receiving the second packet, within 1 week, complete and mail back:
   A. Review your Food Frequency Dietary Analysis Printout (about 15-30 min.)
   B. The 2nd Nutrition Research Survey (about 10-20 min.)
   C. The Food Frequency Dietary Analysis Printout Evaluation form (about 10-20 min.)

RISKS, STRESS, OR DISCOMFORT
There are no perceived risks in this investigation. There should be little or no stress or discomfort. The surveys contain questions that are answered by simply checking off boxes. There might be some inconvenience in completing the food frequency questionnaire in that it will be necessary to think about what you ate for the last 30 days.

OTHER INFORMATION
The collected information will be kept confidential. Only you and the investigator will see the individual results. Your computer printout will contain only your name, no address or phone number. The published data will consist of averages of the results of all the participants. However, the forms will require your complete name and address so your individual results can be mailed back to you. The completed survey forms will be kept in a locked safe. You may refuse to participate in the study or may withdraw at any time without penalty or loss of benefits.

_____

Signature of investigator Date

Subject's statement:
The study described above has been explained to me. I voluntarily consent to participate in this activity. I have had an opportunity to ask questions. I understand that future questions I may have about the research or about my rights as a subject will be answered by the investigator listed above.

_____

Signature of subject Date

Copies to: Subject
Investigator's file

Nutrition Research Study Sign-up Sheet
* Please PRINT Carefully *

Name
First_____ MI____ Last_____

Address_____

City_____ State_____ Zip_____

Phone #_____ When is the best time to call?_____

Date of birth: _____-_____-_____ mm-dd-yy Sex: ☐ Male ☐ Female

Highest education level:

Some high school	Completed high school	2 yr col.	4 yr col.	Graduate degree
☐	☐	☐	☐	☐

****

APPENDIX 2: Phase I– The Initial Forms Packet

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Nutritional Sciences, DL-10

April 29, 1993

Dear Research Study Participant:

Nutrition, in health promotion and disease prevention, is gaining more attention throughout the health care spectrum. With the rising cost of health care, nutrition's role in preventive medicine is increasing in importance. Many approaches are being explored to aid in this process. We are studying how effective a computer can be in nutrition education.

Your help is very much needed in this project. It's vital that we receive feedback from people with a variety of backgrounds and interests. We need your assistance in improving the computer program, so that it can contribute to the quality and effectiveness of health care programs.

Thank you for deciding to be in this significant University of Washington research study. It is very important that you complete the Nutrition Research Survey and the Food Frequency Questionnaire, and mail both back within one week.

If you have additional questions, I can be reached at the following phone number most mornings and evenings:

John A. Pillepich
4400 231st Place SW
Mountlake Terrace, WA 98043
(206) 670-2665

Sincerely,

John A. Pillepich
Research Investigator

Telephone: (206) 543-1730

Directions for Completing the Enclosed Forms

Included in this packet are:

1. The 1st Nutrition Research Survey form (yellow).
2. Instructions for completing the Food Frequency Questionnaire (pink).
3. The Food Frequency Questionnaire (pink).

First, complete the 1st Nutrition Research Survey form.

Second, read the instructions for completing the Food Frequency Questionnaire.

Third, complete the Food Frequency Questionnaire.

Finally, within 1 week, mail back your completed 1st Nutrition Research Survey form, and your completed Food Frequency Questionnaire, in the stamped and addressed 9x12 envelope.

If you have additional questions, you can call the investigator at the phone number at the bottom of this page. It would be best to call in the evening, but most mornings would also be okay.

Thank you for your participation.

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E.
4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665

1st Survey

Nutrition Research Survey

Complete this survey first, then complete the Food Frequency Questionnaire. *Please* PRINT *carefully.*
Answer all questions that apply with an X in the ☐. Thank you for your participation.

Name:
1. First _ MI _ _ _ _
Last_____

2. Date of birth: _____-_____-_____ mm-dd-yy

3. Sex: ☐ Male ☐ Female

4. Highest education level:

☐ Some high school ☐ Completed high school ☐ 2 yr col. ☐ 4 yr col. ☐ Graduate degree

5. From which information sources have you ever received nutrition information?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

6. In the last 2 yrs, have you changed your diet for general health reasons? ☐ Yes . ☐ No

7. If you answered Yes to question 6, which information sources influenced you?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

8. Are you planning on making changes in your diet in the next 30 days? ☐ Yes☐ No

9. If you answered Yes to question 8, which information sources influenced your decision?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
☐ Dietician	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
	☐ Health club	☐ Nurse	☐ Relatives	☐ None

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Disagree
10. Good nutrition is necessary for good health.	☐	☐	☐	☐	☐
11. Good nutrition is important to me.	☐	☐	☐	☐	☐

12. Have you ever had your diet analyzed by a dietician, nutritionist, Yes No
diet center, health club, or by anyone else? . . . . . ☐ ☐
13. Have you ever had your diet analyzed by a computer? . . . . . ☐ ☐
14. Would you like to improve your diet? . . . . . ☐ ☐
15. Do you have any physical or emotional conditions that restrict your food choices? ☐ ☐

What dietary changes are you thinking about?

In the next 3 months, I plan on eating:	Lot less	Less	No change	More	Lot more
16. Cholesterol containing foods	☐	☐	☐	☐	☐
17. Fat containing foods	☐	☐	☐	☐	☐
18. Fiber containing foods	☐	☐	☐	☐	☐
19. Sodium (salt) containing foods. . . .	☐	☐	☐	☐	☐
20. Meat	☐	☐	☐	☐	☐
21. Fish	☐	☐	☐	☐	☐
22. Poultry	☐	☐	☐	☐	☐
23. Whole grain foods	☐	☐	☐	☐	☐
24. Vegetables	☐	☐	☐	☐	☐
25. Fruits	☐	☐	☐	☐	☐
26. Dairy products	☐	☐	☐	☐	☐
27. Eggs	☐	☐	☐	☐	☐
28. Fats and oils	☐	☐	☐	☐	☐
29. Desserts and sweets	☐	☐	☐	☐	☐
30. Fast foods or convenience foods . .	☐	☐	☐	☐	☐

	Very low	Low	Average	High	Very high
31. Please rate your level of knowledge about your own diet?	☐	☐	☐	☐	☐

For the questions below, mark what you <u>think</u> your intake is. Excellent means not too low or too high, but at the recommended level for good health. Poor could mean not enough of a good thing, or too much of a "bad" thing.

	Don't know	Poor	Fair	Good	Excellent
32. My cholesterol intake is	☐	☐	☐	☐	☐

33. My fat intake is . . . . . ☐ ☐ ☐ ☐ ☐
34. My fiber intake is . . . . . ☐ ☐ ☐ ☐ ☐
35. My sodium (salt) intake is . . . . . ☐ ☐ ☐ ☐ ☐
36. Overall, my diet is . . . . . ☐ ☐ ☐ ☐ ☐
37. Overall, my level of health is . . . . . ☐ ☐ ☐ ☐ ☐

IMPORTANT: Instructions for Completing the Food Frequency Questionnaire

For each numbered row, put down how many servings you ate (last 30 days), either per day, per week, or per month. Most importantly, be as accurate as possible. Pay special attention to the PORTION SIZE of each food item listed. When your portion is different from the one listed in the form, adjust your answer accordingly.

Put numbers in either the per day, per week, or per month column. Do not put check marks. You must use numbers or your nutrition report can't be processed. If you don't eat the food at all, leave it blank.

Please put only one number per row, even if the Food Name/Description box has multiple entries. Round all entries to the nearest whole number.

Please include every food listed on this form that you ate at least once in the last 30 days. If a food is eaten less than once per day, but 1 or more times per week, enter your servings in the week column of that row. If a food is eaten less than once per week, but 1 or more times per month, enter your servings in the month column of that row.

This is a food frequency questionnaire. Because of the limited food selection, it will not measure exactly what you eat, but it can identify important dietary trends, including fat, cholesterol, and salt intake.

Examples:
1. To calculate, compare your usual serving size to the one listed. If you had 1 cup of Lowfat (2%) milk every day, then you would enter a 1 in the day box. Likewise, if you have 1 cup of milk once a week or once a month, you would enter a 1 in the week box or in the month box:

	Servings per:				Milk and Yogurt
No.	Day	Week	Month	Serving Size	Food Name / Description
57.				1 cup	Lowfat (2%) milk

2. If you had twice as much, you would double the number of servings entered in the day, week, or month box. For example, if you had lowfat milk once per day, every day, but your serving size was two cups (16 fl. oz.), enter a 2 in the box for per day. Or if you had lowfat milk twice per day, every day, and your serving size was one cup, then you would also enter a 2 in the box for per day.

3. Let's say that, every week in the last 30 days, you had 1 peach, 1 nectarine, and 4 plums. The peach is 1 serving (per week), the nectarine is another serving (per week), and the plums are 2 more (4 plums ÷ 2 for serving size). The total would then be 1 + 1 + 2 = 4 servings per week:

	Quantity eaten ÷	Divided by the serving size =	Number of servings per: Day	Week	Month
Peaches:	1/week	1 each			1
Nectarines:	1/week	1 each			1
Plums:	4/week	2 each			2
Total Servings:					4

	Servings per:				Fruits
No.	Day	Week	Month	Serving Size	Food Name / Description

25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums

4. A complicated example would be if you ate 1 peach every day in the last 30 days, 1 nectarine every week in the last 30 days, and 4 plums once in the last 30 days. The peach is 1 serving (per day), the nectarine is 1 serving (per week), and the plums are 2 servings (per month). The total would then be:

	Quantity eaten ÷	Serving size =	Number of servings per: Day	Week	Month	Monthly total
Peaches:	1/day	1 each	1x30 =			30
Nectarines:	1/week	1 each			1x4 =	4
Plums:	4/month	2 each				2x1 = 2
Total Servings:						36

In the above example, there are servings per day, week, and month. You can enter your servings only once per numbered row (day or week or month). You can't reduce your servings of plums to per day or week, and you can't reduce your servings of nectarines to per day. However, you can expand your servings of peaches to servings per month (1/day x 30 days), and your servings of nectarines to servings per month (1/week x 4 weeks). (Of course, if you only ate 25 peaches in the last 30 days, you would have to put 25 in the month column for your calculations, not 1 in the day column.)

Servings per: Fruits

No.	Day	Week	Month	Serving Size	Food Name / Description
25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums

For any multiple food rows like the above, you can use the following table to assist you in your calculations; then transfer the total to the appropriate section on the form that begins after this page.

Food item	Quantity eaten ÷	Serving size =	Servings/ day x 30	Servings/ week x 4	Servings/ month x 1	Total/ month

*BEFORE YOU START, first look over the entire questionnaire (especially the Miscellaneous section) so you know the types of foods listed and their location. If you regularly eat certain combination foods that are not listed here, such as casseroles, you may be able to break them down into their component parts, if they are listed on this form. Also try to remember the foods that you add extra salt, butter, etc., to.

Then try to remember any places and activities in the last 30 days where you had anything to eat. Remember to include snacks. This is important–the more carefully and completely you do this, the more accurate will be your diet analysis.

Computerized Food Frequency Questionnaire
* Please PRINT Carefully *

Name
First_____ MI____ Last_____

Address_____

City_____ State_____ Zip_____

Phone_____ Age____ Height____inches Weight_____lbs. Sex___M/F

How often did you eat (or drink) the following in the last 30 days?

Servings per: Breads, Cereals, Grain Products

No.	D	W	M	Serving Size	Food Name / Description
1.				1 slice	Whole wheat bread
2.				1 slice, 1 each	Sourdough or French bread/roll
3.				1 slice, ½ bun	White bread, hamburger or hot dog bun
4.				4 to 6 each	Whole grain crackers (Triscuits, Wheat Thins, Ry Krisp, etc.)
5.				4 to 6 each, 40 each	Refined crackers (Saltines, cheese, Ritz, etc.), or Oyster crackers
6.				2 each, 7 each	Graham crackers, or Animal crackers
7.				1 each	Tortilla, corn, 6" diameter
8.				1 each	Tortilla, flour, medium
9.				1 each	Muffins (corn, bran, blueberry, etc.)
10.				½ each	English muffin, bagel, pita bread
11.				3 each, or 1 each	Pancakes, or Waffles, 7" diameter
12.				½ cup	Whole grain hot cereal (rolled oats, rolled wheat, Roman Meal)
13.				½ cup	Refined hot cereal (cream of wheat, cream of rice)
14.				½ cup or 1 package	Instant hot cereal
15.				¾ cup, or ¼ cup	Cold cereals, no sugar (shredded wheat, Nutrigrain, etc.), or Grapenuts
16.				¾ cup	Bran type cold cereals (raisin bran, bran flakes, All Bran, etc.)
17.				¾ cup	Sweetened cold cereals (Frosted Flakes, Sugar Smacks, etc.)
18.				½ cup	Granola
19.				½ cup	Brown rice, cooked
20.				½ cup	White rice, cooked
21.				½ cup	Pastas, cooked (macaroni, spaghetti, noodles, etc.)

Servings per: Fruits

No.	D	W	M	Serving Size	Food Name / Description
22.				1 each	Apples, fresh, medium
23.				1 each	Bananas, medium
24.				1 each, or ½ each	Citrus fruit Grapefruit

25.				1 each, or 1 each 3 each 2 each	Peaches Nectarines Apricots Plums
26.				¾ cup	Berries
27.				¼ cup	Cantaloupe, medium
28.				1 cup	Melons (watermelon, honeydew, casaba)
29.				1 each	Pears, fresh, medium
30.				½ cup	Pineapple, fresh
31.				1 cup	Grapes, fresh
32.				2 tbsp 2 each 2 each 4 each	Dried fruits: Raisins Dates Prunes Apricots
33.				½ cup	Canned or frozen unsweetened fruit
34.				½ cup	Canned or frozen sweetened fruit

Servings per: Juices

No.	D	W	M	Serving Size	Food Name / Description
35.				½ cup	Orange or grapefruit, unsweetened
36.				½ cup	Tomato or V-8
37.				½ cup	Other, unsweetened (apple, grape, pineapple, etc.)
38.				½ cup	Sweetened juices, or nectars

Servings per: Fats and Oils

No.	D	W	M	Serving Size	Food Name / Description
39.				1 tbsp	Vegetable oils (corn, safflower, soy)
40.				1 tbsp	Olive oil
41.				1 tbsp	Shortening, vegetable
42.				1 tbsp	Lard
43.				1 tsp	Margarine

Servings per: Fats and Oils, con't

44.				1 tsp	Butter
45.				5 each	Olives
46.				1/8 each	Avocado
47.				1 tbsp	Mayonnaise
48.				1 tbsp	Regular salad dressings
49.				1 tbsp	Low-calorie dressings
50.				1 tbsp	Sour cream
51.				1 tbsp	Cream cheese
52.				1 tbsp	Half & Half
53.				1 tbsp	Whipping cream
54.				1 tbsp	Coffee whitener, imitation cream
55.				2 slices	Bacon

Servings per: Milk and Yogurt

No.	D	W	M	Serving Size	Food Name / Description
56.				1 cup	Nonfat milk
57.				1 cup	Lowfat (2%) milk
58.				1 cup	Whole milk
59.				1 cup	Chocolate lowfat milk
60.				1 cup	Buttermilk
61.				1 cup	Yogurt, lowfat plain

62.				1 cup	Yogurt, lowfat with fruit
63.				1 cup	Yogurt, nonfat plain

Servings per: Vegetables

No.	D	W	M	Serving Size	Food Name / Description
64.				1 to 1½ cups	Salads (lettuce, celery, green peppers, onions)
65.				½ cup	Dark green leafy vegetables (spinach, romaine lettuce, kale, etc.)
66.				1 each, or ½ cup	Carrots, raw or cooked
67.				1 each	Tomatoes, fresh, medium
68.				½ cup	Starchy vegetables (corn, peas, mixed vegetables, succotash)
69.				½ cup	Other cooked vegetables (green beans, cauliflower, beets, asparagus, summer squash, etc.)
70.				1 each	White potato, baked, boiled or mashed

Servings per: Vegetables, con't

No.	D	W	M	Serving Size	Food Name / Description
71.				½ cup	Sweet potatoes or yams
72.				½ cup	Winter squash (acorn, butternut, hubbard)

Servings per: Beverages

No.	D	W	M	Serving Size	Food Name / Description
73.				1 cup	Lemonade, punch, Koolaid
74.				12 fl. oz.	Cola drinks with sugar (Coke, Pepsi, RC, etc.)
75.				12 fl. oz.	Diet cola drinks
76.				12 fl. oz.	Non-cola drinks with sugar (7-Up, Sprite, Slice, etc.)
77.				12 fl. oz.	Diet non-cola drinks
78.				1 cup	Regular coffee and tea
79.				1 cup	Decaffeinated or non-caffeinated hot drinks (Sanka, herbal tea)
80.				1 cup	Hot chocolate or cocoa
81.				12 fl. oz.	Regular beer
82.				12 fl. oz.	Light beer
83.				4 fl. oz.	Wine, sweet or dessert (sherry, port, muscatel, etc.)
84.				4 fl. oz.	Wine dry or table
85.				1½ fl. oz.	Liquor (vodka, whiskey, gin, rum, etc.)

Servings per: Protein Foods

No.	D	W	M	Serving Size	Food Name / Description
86.				1 cup	Legumes (lentils, pinto beans, navy beans), cooked
87.				¼ cup	Nuts, seed (peanuts, almonds, cashews, sunflower seeds, etc.)
88.				1 tbsp	Peanut butter, other nut butters
89.				4 ounces	Tofu
90.				3 ounces	Vegetarian meat substitutes, low fat (Skallops, Choplets, etc.)
91.				3 ounces	Vegetarian meat substitutes, medium fat (meatless chicken, etc.)
92.				3 ounces	Vegetarian meat substitutes, high fat (Wham, Prosage, etc.)
93.				3 ounces	Beef (rib roast, steak, pot roast, veal, etc.)

94.				3 ounces	Beef, ground, cooked
95.				3 ounces	Pork (chops, roast, ham)
96.				3 ounces	Lamb (chops, roast)
97.				3 ounces	Poultry (chicken, turkey, duck)
98.				3 ounces	Fish, canned with oil (tuna, sardines)

Servings per: Protein Foods, con't

No.	D	W	M	Serving Size	Food Name / Description
99.				3 ounces	Tuna, water pack
100.				3 ounces	Fish, fresh or frozen, no breading (trout, halibut, sole, etc.)
101.				3 ounces	Shellfish (shrimp, scallops, lobster, clams, crab)
102.				1 each	Eggs, whole, large
103.				2 each	Eggs, whites only, large
104.				¼ cup	Egg substitutes
105.				1 ounce	Cheeses (cheddar, colby, american, monterey jack)
106.				1 ounce	Cheeses, lower fat (swiss, mozzarella, ricotta, string)
107.				½ cup	Cottage cheese, regular
108.				½ cup	Cottage cheese, lowfat
109.				1 ounce	Lunch meats (bologna, salami, etc.)
110.				1 each, or 2 each	Frankfurters, or sausage links

Servings per: Desserts & Sweets

No.	D	W	M	Serving Size	Food Name / Description
111.				2 each	Cookies (chocolate chip, oatmeal, peanut butter, etc.)
112.				1 each	Brownies, 1½ inch by 1 inch
113.				1 each	Doughnut or sweetroll
114.				1 each	Cake without icing, 3 inches by 2 inches
115.				1 each	Cake with icing, 3 inches by 2 inches
116.				1 each	Granola bars
117.				1 each	Pie, 1/8 of whole pie
118.				½ cup	Jello, regular, sugar-sweetened
119.				½ cup	Jello, diet, no sugar
120.				½ cup	Pudding or custard
121.				½ cup	Ice cream
122.				½ cup	Ice milk
123.				½ cup	Sherbet
124.				1 each	Popsicles
125.				1½ ounce	Candy bar, chocolate, M&Ms
126.				1½ ounce	Hard candy, gum drops, Lifesavers
127.				12 fl. oz.	Milkshake

Servings per: Miscellaneous

No.	D	W	M	Serving Size	Food Name / Description
128.				1 slice	Pizza
129.				2 cups	Popcorn, popped without oil
130.				2 cups	Popcorn, popped with oil
131.				1 ounce, or 10 to 15 each	Potato chips, corn chips, tortilla chips
132.				1 tbsp	Catsup or chili sauce
133.				½ cup	Tomato sauce

134.				5 slices, or 1 tbsp	Pickles, or Pickle relish
135.				1 stick	Chewing gum
136.				1 tbsp	Sauces (soy sauce, steak sauce, barbecue sauce)
137.				¼ cup	Gravy (brown, giblet, white sauce)
138.				1 cup	Soups (vegetable or noodle type)
139.				1 cup	Soups (cream type)
140.				1 each	Fast foods (hamburgers, burritos, tacos, etc.)
141.				1 tbsp	Sugar, honey, jam, jelly, syrups
142.				1/8 tsp	Table salt

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E.
4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665

APPENDIX 3: Phase II – The Second Forms Packet

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Nutritional Sciences, DL-10

February 18, 2026

John Q. Smith
123 Main St.
City, State Zip

Dear Mr Smith:

Thank you for completing the first half of this important University of Washington Nutrition Research Study. We appreciate the interest you have shown in this project. To fulfill this research study, we need to have everybody who completed the first half to also do the second half. This is very, very important.

In the second half of this study, we ask that you review the results of your diet analysis, and complete and mail back the Follow-up Nutrition Survey and the Evaluation of the Food Frequency Dietary Analysis Printout.

If you have any questions, I can be reached at 670-2665 most mornings and evenings.

Thank you again for your continued interest in this important project.

Sincerely,

John A. Pillepich
Research Investigator

Telephone: (206) 543-1730

Directions for Completing the Enclosed Forms

Included in this packet are:

1. Your Food Frequency Dietary Analysis printout (white).
   a. Take some time to review the two pages of the computer printout of your dietary analysis.
   b. The two blue pages (see #2 below) that come after your diet printout will give you more helpful information.

2. The Common Sources of Nutrients (blue).
   These two pages contain the important nutrients found on your computer dietary analysis. After each nutrient are a dozen or more food sources for it.

3. The Follow-up Nutrition Survey form (pink).

4. The Evaluation of the Food Frequency Dietary Analysis Printout form (green).

First, please take some time to review your printout. You can use the Common Sources of Nutrients (blue) to see what foods you may want to decrease or increase in your diet.

Second, after you have taken the time to review your dietary analysis printout, complete the Follow-up Nutrition Survey form (pink).

Third, complete the Evaluation of the Food Frequency Dietary Analysis Printout form (green).

Finally, within 1 week, mail back your completed Follow-up Nutrition Survey form (pink) and your Evaluation of the Food Frequency Dietary Analysis Printout form (green), in the stamped and addressed 9x12 envelope. These two forms are stapled together. You can keep your printout (white) and the Common Sources of Nutrients (blue).

If you have additional questions, you can call the investigator at the phone number at the bottom of this page. It would be best to call in the evening, but most mornings are okay also.

Thank you for your continued participation.

Investigator: John A. Pillepich. University of Washington research application no. 23-618-E.
4400 231st PL SW, Mountlake Terrace, WA 98043 Ph: 670-2665

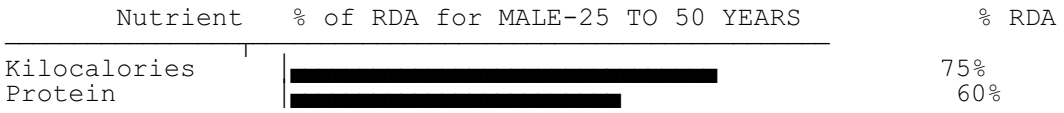
Computerized Food Frequency Dietary Analysis

Food Frequency Questionnaires (FFQ) are meant to measure the way people usually eat. A FFQ analysis can be reasonably accurate in measuring dietary intake. A measure of how correct the analysis is to a person, is how close the total calories (kilocalories) are to the RDA for calories for that person. If your analysis shows that your calorie intake is considerably below or above the RDA, there are several possible reasons. One is that the RDA is based on an *average* person, and few people are exactly average. Other reasons why your calorie intake may vary from the RDA include:

Kilocalories below the RDA:
1. You are on a weight loss diet.
2. You have a 'slow' metabolism and you need fewer than the 'normal' amount of calories.
3. You are not physically active.
4. You *under*estimated the amount of your usual food intake.
5. You omitted foods that you eat regularly.
6. There were foods you eat regularly that were not listed on the FFQ form.

Kilocalories above the RDA:
1. You are on a weight gain diet.
2. You have a 'fast' metabolism and you need more than the 'normal' amount of calories.
3. You are very physically active.
4. You *over*estimated the amount of your usual food intake.

If your calorie intake was *considerably* below (80% or less) or above (120% or more) the RDA, and you think this was *only* because you underestimated or overestimated your usual food intake, you can make some easy adjustments if you want to. These adjustments will convert any other nutrient value to a value you would get if you had a calorie intake of 100% of the RDA. Near the top of the first page of your printout, find the % RDA of Kilocalories. For example:



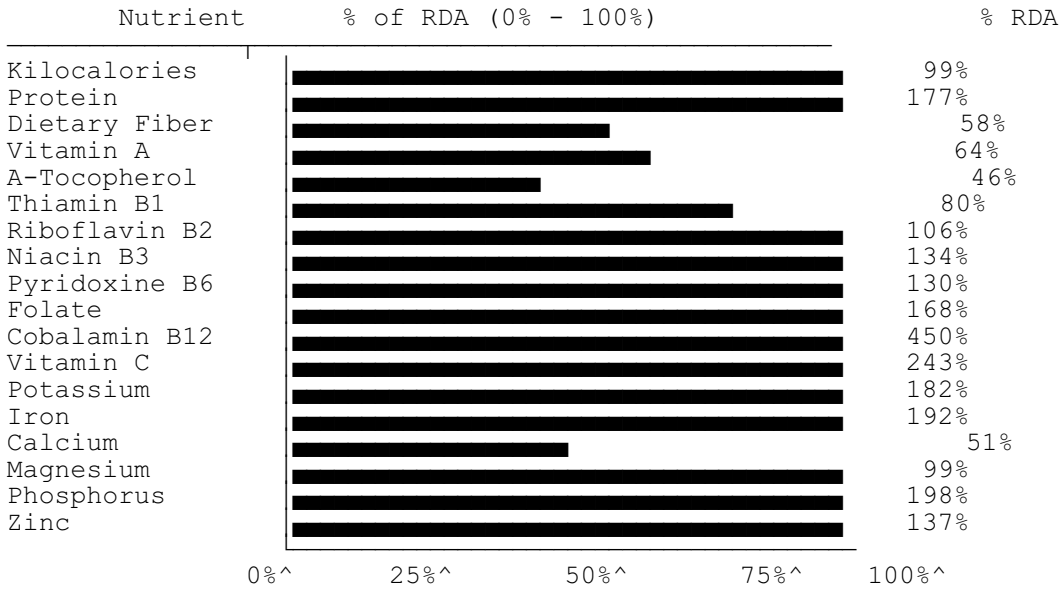
Simply convert the % RDA of Kilocalories to a decimal: 75% converted to a decimal is .75. All you do is add a decimal point two places to the left of the % sign. If your % RDA of Kilocalories is 120%, you would convert it to 1.20 by moving the decimal point two places to the left.

Now all you have to do is divide any nutrient value you are interested in by the converted Kilocalorie % RDA. If I thought that the *only* reason my kilocalories computed as 75% of the RDA was because I underestimated my usual food intake, and I wanted to see what my protein intake probably is, I would simply divide 60% by .75: 60% ÷ .75 = 80%. This means that if I thought my calorie intake is more likely to be closer to 100% of the RDA, then my protein intake is really closer to 80% of the RDA, not 60%.

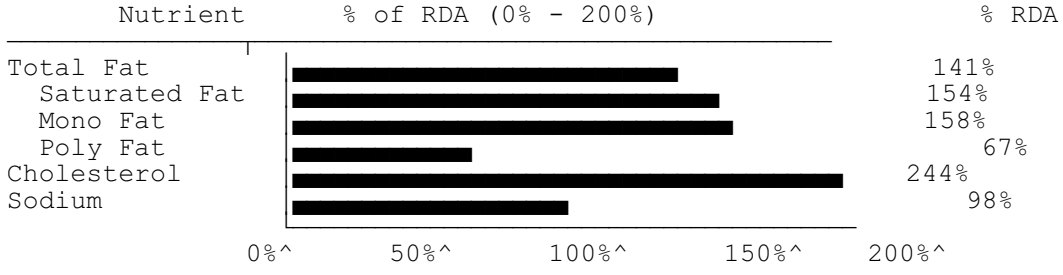
If you have questions about the above information, please call me at 670-2665.

General Dietary Analysis of Diet for John Q. Smith

SECTION A: RDA Goal Bar Graph
The graph below shows the nutrients that you should be getting to meet the Recommended Dietary Allowance (RDA) goals. For most people, an intake of at least 75% of the RDA should be enough. For most nutrients, it's okay to exceed 100% of the RDA.



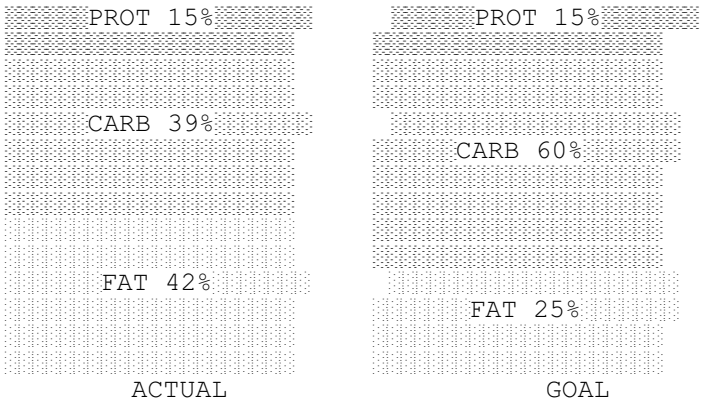
SECTION B: Excessive Nutrients Bar Graph
The graph below shows six important nutrients that should not go above 100% of the RDA goal. If these nutrients exceed the RDA goal, they may be excessive for some people.



SECTION C: Excessive Nutrients Sources

FAT	: BURGER KING-BARBECUE BACON DOUBLE C	1.000	ITEM
CHOLESTEROL	: EGG-FRIED IN BUTTER-WHOLE-LARGE-CHI	2.000	ITEMS
SATURATED FAT	: BURGER KING-BARBECUE BACON DOUBLE C	1.000	ITEM
MONO FAT	: STEAK-SIRLOIN-BROILED-LEAN AND FAT	6.000	OUNCES

SECTION D: Caloric Components Bar Graph vs. Dietary Goals
Because of space limitations, the sections of this bar graph are only estimated. Refer to the numbers within each section to make a more accurate comparison. The numbers represent the percent of kilocalories from protein, carbohydrates, and fat.



SECTION E: Nutrient Values and % of RDA
Below is a list of nutrients from your Food Frequency Questionnaire. Keep in mind that a food frequency analysis only approximates what your average daily nutrient intake may be. The list starts with calories, protein, carbohydrates, and fat. Then follow the fat-soluble vitamins, the water-soluble vitamins, and finally the minerals.

Kilocalories	2890 Kc	99%	Cobalamin B12	9.005 Ug	450%
Protein	111.9 Gm	177%	Biotin	25.18 Ug	38%
Carbohydrate	285.2 Gm	78%	Folate	336.2 Ug	168%
Dietary Fiber	16.82 Gm	58%	Pant. Acid	4.167 mg	75%
Fat	137.0 Gm	141%	Vitamin C	145.9 mg	243%
Saturated Fat	49.82 Gm	154%	Calcium	411.1 mg	51%
Mono Fat	51.17 Gm	158%	Chromium	0.109 mg	87%
Poly Fat	21.81 Gm	67%	Copper	2.034 mg	90%
Cholesterol	732.7 mg	244%	Iodine	24.00 Ug	16%
Vitamin A	644.6 RE	64%	Iron	19.23 mg	192%
Vitamin D	1.354 Ug	27%	Magnesium	347.9 mg	99%
A-Tocopherol	4.695 mg	46%	Manganese	1.247 mg	35%
Vitamin K	318.4 Ug	398%	Phosphorus	1588 mg	198%
Thiamin B1	1.204 mg	80%	Potassium	3647 mg	182%
Riboflavin B2	1.815 mg	106%	Selenium	0.107 mg	152%
Niacin B3	25.63 mg	134%	Sodium	2362 mg	98%
Pyridoxine B6	2.617 mg	130%	Zinc	20.67 mg	137%

If you would like to see what foods contain these nutrients, refer to the Common Sources of Nutrients list.

COMMON SOURCES OF NUTRIENTS

CARBOHYDRATES

Simple (sugars): Cane and beet sugars, molasses, maple syrup, honey, corn syrup, fruits (especially dried).

Complex: Whole grain cereals, pastas, and breads, legumes (beans: lentils, kidney, soy, pea, etc.), starchy vegetables (potatoes, corn, yams).

Fiber: Soluble: oat bran, legumes, gums (guar, psyllium), barley, apples, pears, citrus fruits. Insoluble: whole wheat bran, vegetables (especially raw).

PROTEINS

Lower fat: Baked or broiled lean beef, poultry (without skin), pork, and fish. Legumes, tofu, low fat dairy products (skim and 1% milk, non-fat yogurt, cottage and diet cheeses), egg white.

Higher fat: Fried beef, poultry, pork, and fish. Sausage, luncheon meats, hot dogs, hamburgers, nut butters, eggs, whole milk, cheeses. Most fast foods and convenience foods.

FATS & OILS

Saturated: Butter, bacon, animal fats (chicken, lard, tallow), coconut, cream, sour cream, cream cheese, egg yolk.

Monounsaturated: Olive, canola, and peanut oils. Animal fats (chicken, lard, tallow), hard margarines (stick), soybean oil margarine, avocado, nuts (peanuts, almonds, cashews, pistachio, macadamia), vegetable shortenings, egg yolk.

Polyunsaturated: Safflower, sunflower, corn, and soybean oils. Soft safflower and corn oil margarines (tub), walnuts, brazil nuts, seeds (sunflower, sesame, pumpkin),

Cholesterol: Veal, lamb, beef, pork, chicken, organ meats, egg yolk, whole milk products, cheeses, ice cream, butter, cream, shrimp, lobster, clams.

VITAMINS

Fat-soluble

A (retinol/beta-carotene): Liver, oysters, milk, yogurt, cheddar cheese, egg yolk. Dark green and yellow vegetables and fruits: sweet potato, carrot, spinach, squash, dandelion greens, cantaloupe melon, mangoes, apricots, broccoli, parsley, papaya, tomatoes, asparagus, romaine lettuce, green beans.

D (calciferol): Fish and fish oil, fortified milk, exposure of skin to sunlight.

E (a-tocopherol): Vegetable oils (especially soybean and wheat germ), nuts and seeds, green leafy vegetables.

K: Green leafy vegetables, other vegetables, liver, green tea. Also manufactured in the intestines by bacteria.

Water-soluble

B_1 (thiamin): Brewer's yeast, pork chops, ham, sunflower seeds, peas, black beans, blackeyed peas, watermelon, hamburger, oatmeal, squash, potatoes, peanuts, asparagus, tofu, broccoli, kidney beans.

B_2 (riboflavin): Beef liver, sirloin steak, mushrooms, ricotta cheese, milk, oysters, cottage cheese, beet greens, spinach, brewer's yeast, broccoli, pork, peaches, ham, eggs, almonds, asparagus, bean sprouts, ground beef, dandelion greens, salmon, turkey.

B_3 (niacin): Tuna, beef liver, chicken breast, sirloin steak, hamburger, halibut, mushrooms, salmon, oysters, peaches, lamb, ground beef, turkey, sardines, pork chops, peanuts, potatoes, shrimp, brewer's yeast, crab, wheat bran, asparagus, cantaloupe, kidney beans.
B_6 (pyridoxine): Beef liver, oatmeal, sirloin steak, navy beans, potatoes, watermelon, salmon, bananas, chicken, soy beans, sunflower seeds, spinach, avocado, brewer's yeast, tuna, figs, trout, turkey, brown rice, ground beef, pork chops, cantaloupe, broccoli.

B_{12} (cobalamin): Animal proteins–beef liver, clams, oysters, crab, tuna, hamburger, milk, eggs.

Biotin: Kidney, liver, egg yolk, mushrooms, bananas, grapefruit, watermelon, strawberries, peanuts, brewer's yeast. Also manufactured in the intestines by bacteria.

Folate (folic acid, folacin): Brewer's yeast, spinach, asparagus, turnip greens, lima beans, beef liver, blackeyed peas, pinto beans, parsley, navy beans, broccoli, beets, sunflower seeds, kidney beans, dandelion greens, cantaloupe, romaine lettuce, bean sprouts.

Pantothenic acid (pantothenate): Widely distributed in animal proteins, whole grains, legumes. Highest in beef liver.

C (ascorbic acid, ascorbate): Fresh fruits and vegetables–papaya, oranges, cantaloupe, broccoli, green peppers, grapefruit, strawberries, oysters, cauliflower, mangoes, asparagus, watermelon, tomatoes, turnip greens, spinach, cabbage, squash.

MINERALS
Calcium: Sardines (canned w/bones), kefir, goat milk, shrimp, milk, yogurt, cheese, spinach, oysters, turnip greens, broccoli, salmon (canned w/bones), beet greens, dandelion greens, soy beans, collards, tofu, almonds, kidney beans, green beans, oranges.

Chromium: Brewer's yeast, oysters, liver, potatoes, seafood, whole grains, cheeses, chicken, beef, bran, fresh fruits and vegetables.

Copper: Shellfish, oysters, organ meats, legumes, dried fruits, nuts, poultry.

Iodine: Saltwater seafood such as clams, lobsters, oysters, sardines. Iodized salt, seaweeds (kelp, dulse).

Iron: Oysters, sirloin steak, spinach, lima beans, liver, dried peaches, navy beans, soy beans, hamburger, kidney beans, sauerkraut, peas, blackeyed peas, green peas, prunes, potatoes, beet greens, sardines, clams, tofu, shrimp, dandelion greens, broccoli, oatmeal.

Magnesium: Nuts (cashews, peanuts) and seeds, legumes (tofu, peas), whole grains, dark green vegetables, blackstrap molasses.

Manganese: Whole grains, legumes, nuts, and tea. Lower amounts in fruits and vegetables.

Phosphorus: Protein sources, such as meat, poultry, fish, and eggs. Also milk and milk products, nuts (almonds, cashews), legumes (peas, lentils, tofu), and grains.

Potassium: Fruits and vegetables. Peaches, lima beans, squash, pears, potatoes, pinto beans, spinach, cantaloupe, kidney beans, prunes, peas, blackeyed peas, watermelon, asparagus, beets, tomatoes, oranges, apricots, bananas, milk, yogurt, cauliflower.

Selenium: Brazil nuts, seafood, kidney, liver, meat, and poultry. Whole grains, depending where grown.

Sodium: Salt, animal proteins, MSG, smoked and processed meats and fish (ham, bacon,

corned beef, cold cuts, sausage, anchovies), salted foods, prepared condiments (barbecue sauce, soy sauce, salad dressings, catsup, pickles, mustard, olives), prepackaged frozen foods, canned foods (soups, meats, vegetables).

Zinc: Oysters, sirloin steak, crab, hamburger, liver, lamb, shrimp, blackeyed peas, wheat germ, turkey, pinto beans, sardines, kidney beans, clams, spinach, wheat bran, collards, peanuts, milk, yogurt, tofu, asparagus, cheese.

2nd Survey

Follow-up Nutrition Survey

Complete this survey after you have reviewed the results of your dietary analysis. *Please* PRINT *carefully.*
Answer all questions that apply with an X in the ☐. Thank you for your participation.

Name:
38. First _____ MI ____
Last_____

39. Date of birth: _____-_____-_____ mm-dd-yy 40.Sex: ☐ Male ☐ Female

41. Are you planning on making changes in your diet in the next 30 days? ☐ Yes ☐ No

42. If you answered Yes to question 41, which information sources influenced your decision?

☐ Books	☐ Diet center	☐ Lectures	☐ Nutritionist	☐ School
☐ Computer analysis	☐ Doctor	☐ Magazines	☐ Pamphlets	☐ TV
	☐ Friends	☐ Newspapers	☐ Radio	☐ Other
☐ Dietician	☐ Health club	☐ Nurse	☐ Relatives	☐ None

What dietary changes are you thinking about?

In the next 3 months, I plan on eating:	Lot less	Less	No change	More	Lot more
43. Cholesterol containing foods	☐	☐	☐	☐	☐
44. Fat containing foods	☐	☐	☐	☐	☐
45. Fiber containing foods	☐	☐	☐	☐	☐
46. Sodium (salt) containing foods	☐	☐	☐	☐	☐
47. Meat	☐	☐	☐	☐	☐
48. Fish	☐	☐	☐	☐	☐
49. Poultry	☐	☐	☐	☐	☐
50. Whole grain foods	☐	☐	☐	☐	☐
51. Vegetables	☐	☐	☐	☐	☐
52. Fruits	☐	☐	☐	☐	☐
53. Dairy products	☐	☐	☐	☐	☐
54. Eggs	☐	☐	☐	☐	☐
55. Fats and oils	☐	☐	☐	☐	☐
56. Desserts and sweets	☐	☐	☐	☐	☐
57. Fast foods or convenience foods	☐	☐	☐	☐	☐

	Very low	Low	Average	High	Very high
58. Please rate your level of knowledge about your own diet?	☐	☐	☐	☐	☐

59. Are you trying to lose weight? ☐ Yes ☐ No

60. Are you trying to gain weight? . . . . . □ Yes □No

IMPORTANT: For questions 61-65, use the results from *your* Food Frequency Dietary Analysis printout. Excellent means not too low or too high, but at the recommended level for good health. Poor could mean not enough of a good thing, or too much of a "bad" thing. For many nutrients (SECTION A of your printout), it's good to have an intake at, or above, the Recommended Dietary Allowance (RDA) goals. For some nutrients (SECTION B of your printout), it's better to be at, or a little below, the RDA goals.

	Don't know	Poor	Fair	Good	Excellent
61. My cholesterol intake is	☐	☐	☐	☐	☐
62. My fat intake is	☐	☐	☐	☐	☐
63. My fiber intake is	☐	☐	☐	☐	☐
64. My sodium (salt) intake is.	☐	☐	☐	☐	☐
65. Overall, my diet is.	☐	☐	☐	☐	☐
66. Overall, my level of health is	☐	☐	☐	☐	☐

67. Because of having seen the results of your Food Frequency Dietary Analysis, are you planning on making any changes in your diet? . . . . . ☐ Yes ☐ No

If you answered Yes to Question 67, what changes will you be making?

	Decrease	No change	Increase
68. Cholesterol containing foods	☐	☐	☐
69. Fat containing foods	☐	☐	☐
70. Fiber containing foods	☐	☐	☐
71. Sodium (salt) containing foods	☐	☐	☐
72. _____	☐	☐	☐
73. _____	☐	☐	☐
74. _____	☐	☐	☐
75. _____	☐	☐	☐
76. _____	☐	☐	☐

☐

77. _____ ☐ ☐

☐

78. _____ ☐ ☐

☐

79._____
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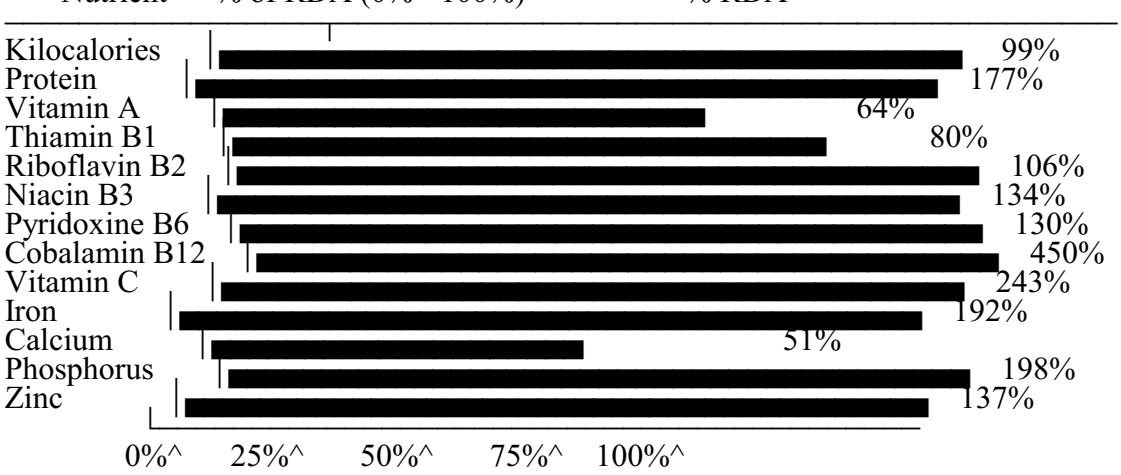
Evaluation of the Food Frequency Dietary Analysis Printout

After you have reviewed your own Food Frequency Dietary Analysis printout, please answer the following questions. For your convenience, sections from a sample printout are provided.

The graph below shows the nutrients that you should be getting to meet the Recommended Dietary Allowance (RDA) goals. For most people, an intake of at least 75% of the RDA should be enough. For most nutrients, it's okay to exceed 100% of the RDA.



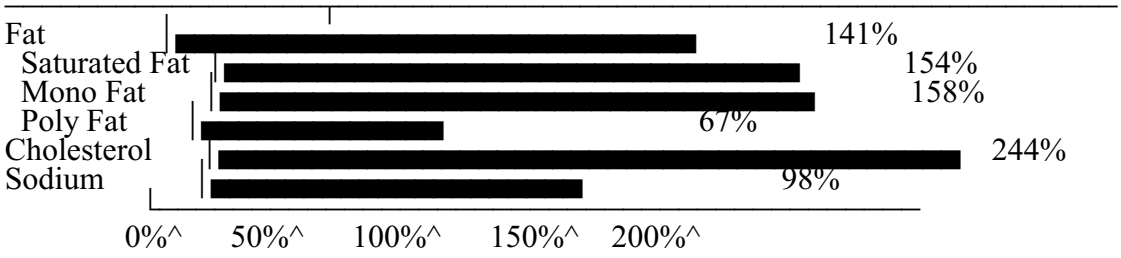
SECTION A: RDA Goal Bar Graph

Not Very

On a 1-5 scale (Not=least, Very=most), did you find the *above* graph: 1 2 3 4 5

1. Difficult (I didn't understand what this meant) . . . . . ☐ ☐ ☐ ☐ ☐
2. Confusing (I didn't know how to compare this to the way I eat) . . . ☐ ☐ ☐ ☐ ☐
3. Educational (I learned about the way I eat) . . . . . ☐ ☐ ☐ ☐ ☐
4. Motivational (I will make changes in the way I eat) . . . . . ☐ ☐ ☐ ☐ ☐

The graph below shows six important nutrients that should not go above 100% of the RDA goal. If these nutrients exceed the RDA goal, they may be excessive for some people.



SECTION B: Excessive Nutrients Bar Graph

Not Very

On a 1-5 scale (Not=least, Very=most), did you find the *above* graph: 1 2 3 4 5

1. Difficult (I didn't understand what this meant). . . . . ☐ ☐ ☐ ☐ ☐
2. Confusing (I didn't know how to compare this to the way I eat) . . . ☐ ☐ ☐ ☐ ☐
3. Educational (I learned about the way I eat). . . . . ☐ ☐ ☐ ☐ ☐
4. Motivational (I will make changes in the way I eat). . . . . ☐ ☐ ☐ ☐ ☐

==========

Sources of the most excessive nutrients:

FAT	: FAST FOODS-BURGERS/TACOS	3.000 ITEMS
CHOLESTEROL	: EGGS-WHOLE-LARGE	6.000 ITEMS
SATURATED FAT	: FAST FOODS-BURGERS/TACOS	3.000 ITEMS
MONO FAT	: BEEF-GROUND-COOKED	6.000 OUNCES

SECTION C: Excessive Nutrients Sources Not Very

On a 1-5 scale (Not=least, Very=most), did you find the *above* info: 1 2 3 4 5

1. Difficult (I didn't understand what this meant). . . . . ☐ ☐ ☐ ☐ ☐
2. Confusing (I didn't know how to compare this to the way I eat) . . . ☐ ☐ ☐ ☐ ☐
3. Educational (I learned about the way I eat). . . . . ☐ ☐ ☐ ☐ ☐
4. Motivational (I will make changes in the way I eat). . . . . ☐ ☐ ☐ ☐ ☐

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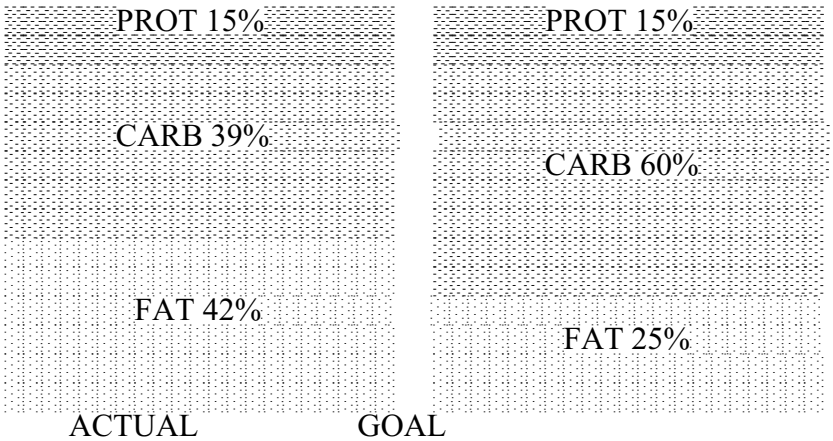
Caloric Components Bar Graph vs. Goals



SECTION D: Caloric Components Bar Graph Not Very

On a 1-5 scale (Not=least, Very=most), did you find the *above* graph: 1 2 3 4 5

1. Difficult (I didn't understand what this meant). . . . . ☐ ☐ ☐ ☐ ☐
2. Confusing (I didn't know how to compare this to the way I eat) . . . ☐ ☐ ☐ ☐ ☐
3. Educational (I learned about the way I eat). . . . . ☐ ☐ ☐ ☐ ☐
4. Motivational (I will make changes in the way I eat). . . . . ☐ ☐ ☐ ☐ ☐

==========

Nutrient Values and % of RDA for selected nutrients

Kilocalories	2890 Kc	99%	Cobalamin B12	9.005 Ug	450%
Protein	111.9 Gm	177%	Biotin	25.18 Ug	38%
Carbohydrate	285.2 Gm	78%	Folate	336.2 Ug	168%
Dietary Fiber	16.82 Gm	58%	Pant. Acid	4.167 mg	75%
Fat	137.0 Gm	141%	Vitamin C	145.9 mg	243%
Saturated Fat	49.82 Gm	154%	Calcium	411.1 mg	51%
Mono Fat	51.17 Gm	158%	Chromium	0.109 mg	87%
Poly Fat	21.81 Gm	67%	Copper	2.034 mg	90%
Cholesterol	732.7 mg	244%	Iodine	24.00 Ug	16%
Vitamin A	644.6 RE	64%	Iron	19.23 mg	192%
Vitamin D	1.354 Ug	27%	Magnesium	347.9 mg	99%
A-Tocopherol	4.695 mg	46%	Manganese	1.247 mg	35%
Vitamin K	318.4 Ug	398%	Phosphorus	1588 mg	198%
Thiamin B1	1.204 mg	80%	Potassium	3647 mg	182%
Riboflavin B2	1.815 mg	106%	Selenium	0.107 mg	152%
Niacin B3	25.63 mg	134%	Sodium	2362 mg	98%
Pyridoxine B6	2.617 mg	130%	Zinc	20.67 mg	137%

SECTION E: Nutrient Values and % of RDA

On a 1-5 scale (Not=least, Very=most), did you find the *above* info:	Not 1	2	3	4	Very 5
1. Difficult (I didn't understand what this meant)	☐	☐	☐	☐	☐
2. Confusing (I didn't know how to compare this to the way I eat) . . .	☐	☐	☐	☐	☐
3. Educational (I learned about the way I eat).	☐	☐	☐	☐	☐
4. Motivational (I will make changes in the way I eat).	☐	☐	☐	☐	☐

==========

Overall, I found my dietary analysis printout to be, on a 1-5 scale: . . .	Not 1	2	3	4	Very 5
1. Useful (It contained practical information I will use).	☐	☐	☐	☐	☐
2. Informative (I gained new information about the way I eat).	☐	☐	☐	☐	☐
3. Influential (I plan on making changes in the way I eat)	☐	☐	☐	☐	☐

4. Other comments (print or *write* carefully)_____

_____

_____

_____

_____

_____

APPENDIX 4: Survey Data

First Survey: Nutrition Research Survey (Actual survey in Appendix 2)

1. Name. n=45
2. Age (Date of birth). n=45; mean=41.62
3. Sex: Male 15; Female 30. n=45

4. Highest education level. n=45

Some HS	High school	2 yr col	4 yr col	Graduate degree
6	16	8	10	5

5. From which info sources have you ever received nutrition information? n=44

Books	Diet center	Lectures	Nutritionist	School
30	5	2	5	19
Computer analysis	Doctor	Magazines	Pamphlets	TV
0	18	36	11	28
	Friends	Newspaper	Radio	Other
	20	21	7	1
Dietician	Health club	Nurse	Relatives	None
2	3	4	21	0

6. In the last 2 years, have you changed your diet for health reasons? n=44

Yes	No
15	29

7. If you answered Yes to Q6, which information sources influenced you? n=17

Books	Diet center	Lectures	Nutritionist	School
3	0	0	1	1
Computer analysis	Doctor	Magazines	Pamphlets	TV
0	7	3	1	4
	Friends	Newspaper	Radio	Other
	2	3	2	3
Dietician	Health club	Nurse	Relatives	None
0	1	0	2	0

8. Are you planning on making changes in your diet in the next 30 days? n=44

Yes	No
12	32

9. If you answered Yes to question 8, which information sources influenced you? n=12

Books	Diet center	Lectures	Nutritionist	School
3	0	0	0	2
Computer analysis	Doctor	Magazines	Pamphlets	TV
0	4	5	0	3
	Friends	Newspaper	Radio	Other
	6	0	0	2
Dietician	Health club	Nurse	Relatives	None
0	1	0	3	0

10. Good nutrition is necessary for good health. n=45; 4.71

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
33	11	1	0	0

11. Good nutrition is important to me. n=45; 4.24

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
20	17	7	1	0

12. Have you ever had your diet analyzed by a dietician, nutritionist, etc? n=44

Yes	No
5	39

13. Have you ever had your diet analyzed by a computer? n=44

Yes	No
1	43

14. Would you like to improve your diet? n=44

Yes	No
39	5

15. Do you have any physical/emotional conditions that restrict your food choices? n=44

Yes	No
4	40

What dietary changes are you thinking about?
In the next 3 months, I plan on eating:

16. Cholesterol containing foods. n=45; 2.42

Lot less	Less	No change	More	Lot more
3	21	20	1	0

17. Fat containing foods. n=45; 2.04

Lot less	Less	No change	More	Lot more
9	26	9	1	0

18. Fiber containing foods. n=44; 3.57

Lot less	Less	No change	More	Lot more
0	0	22	19	3

19. Sodium containing foods. n=44; 2.70

Lot less	Less	No change	More	Lot more
2	10	31	1	0

20. Meat. n=44; 2.66

Lot less	Less	No change	More	Lot more
3	10	30	1	0

21. Fish. n=45; 3.49

Lot less	Less	No change	More	Lot more
0	0	24	20	1

22. Poultry. n=45; 3.22

Lot less	Less	No change	More	Lot more
0	1	33	11	0

23. Whole grain foods. n=45; 3.40

Lot less	Less	No change	More	Lot more
0	0	28	16	1

24. Vegetables. n=45; 3.69

Lot less	Less	No change	More	Lot more
0	0	17	25	3

25. Fruits. n=45; 3.67

Lot less	Less	No change	More	Lot more
0	1	15	27	2

26. Dairy products. n=45; 2.89

Lot less	Less	No change	More	Lot more
2	5	34	4	0

27. Eggs. n=45; 2.82

Lot less	Less	No change	More	Lot more
3	3	38	1	0

28. Fats and oils. n=45; 2.13

Lot less	Less	No change	More	Lot more
10	19	16	0	0

29. Desserts and sweets. n=45; 2.27

Lot less	Less	No change	More	Lot more
7	19	19	0	0

30. Fast foods or convenience foods. n=44; 2.30

Lot less	Less	No change	More	Lot more
10	11	23	0	0

31. Please rate your level of knowledge about your diet. n=45; 3.02

Very low	Low	Average	High	Very high
3	4	28	9	1

For the questions below, mark what you think your intake is. Excellent means not too low or too high, but at the recommended level for good health. Poor could mean not enough of a good thing, or too much of a "bad" thing.

32. My cholesterol intake is. n=45; 3.31

Don't know	Poor	Fair	Good	Excellent
5	6	10	18	6

33. My fat intake is. n=45; 3.00

Don't know	Poor	Fair	Good	Excellent
2	13	17	9	4

34. My fiber intake is. n=45; 2.89

Don't know	Poor	Fair	Good	Excellent
5	8	20	11	1

35. My sodium intake is. n=45; 3.36

Don't know	Poor	Fair	Good	Excellent
1	6	18	16	4

36. Overall, my diet is. n=45; 3.24

Don't know	Poor	Fair	Good	Excellent
2	8	15	17	3

37. Overall, my level of health is. n=45; 3.78

Don't know	Poor	Fair	Good	Excellent
1	3	11	20	10

Second Survey: Follow-up Nutrition Survey (Actual survey in Appendix 3)

38. Name
39. Date of birth
40. Sex

41. Are you planning on making changes in the next 30 days? n=45

Yes	No
24	21

42. If you answered Yes to Q41, which information sources influenced you? n=22

Books	Diet center	Lectures	Nutritionist	School
2	0	0	1	1
Computer analysis	Doctor	Magazines	Pamphlets	TV
15	3	5	3	3
	Friends	Newspaper	Radio	Other
	5	2	0	4
Dietician	Health club	Nurse	Relatives	None
0	0	1	4	0

What dietary changes are you thinking about?
In the next 3 months, I plan on eating:

43. Cholesterol containing foods. n=43; 2.35

Lot less	Less	No change	More	Lot more
7	15	20	1	0

44. Fat containing foods. n=43; 2.02

Lot less	Less	No change	More	Lot more
10	23	9	1	0

45. Fiber containing foods. n=43; 3.70

Lot less	Less	No change	More	Lot more
0	1	13	27	2

46. Sodium containing foods. n=43; 2.40

Lot less	Less	No change	More	Lot more
6	14	23	0	0

47. Meat. n=43; 2.67

Lot less	Less	No change	More	Lot more
2	11	29	1	0

48. Fish. n=43; 3.49

Lot less	Less	No change	More	Lot more
0	1	22	18	1

49. Poultry. n=43; 3.19

Lot less	Less	No change	More	Lot more
0	2	32	8	1

50. Whole grain foods. n=42; 3.52

Lot less	Less	No change	More	Lot more
0	1	20	19	2

51. Vegetables. n=42 3.71

Lot less	Less	No change	More	Lot more
0	0	18	18	6

52. Fruits. n=43; 3.60

Lot less	Less	No change	More	Lot more
0	0	19	22	2

53. Dairy products. n=43; 2.95

Lot less	Less	No change	More	Lot more
2	3	33	5	0

54. Eggs. n=43; 2.84

Lot less	Less	No change	More	Lot more
3	3	35	2	0

55. Fats and oils. n=43; 2.26

Lot less	Less	No change	More	Lot more
8	17	17	1	0

56. Desserts and sweets. n=43; 2.30

Lot less	Less	No change	More	Lot more
9	12	22	0	0

57. Fast foods or convenience foods. n=42; 2.29

Lot less	Less	No change	More	Lot more
7	16	19	0	0

58. Please rate your level of knowledge about your diet. n=45; 3.16

Very low	Low	Average	High	Very high
1	7	23	12	2

59. Are you trying to lose weight? n=45

Yes	No
30	15

60. Are you trying to gain weight? n=43

Yes	No
3	40

IMPORTANT: For questions 61-65, use the results from your Food Frequency Dietary Analysis printout. Excellent means not too low or too high, but at the recommended level for good health. Poor could mean not enough of a good thing, or too much of a "bad" thing. For many nutrients (SECTION A of your printout), it's good to have an intake at, or above, the Recommended Dietary Allowance (RDA) goals. For some nutrients (SECTION B of your printout), it's better to be at, or a little below, the RDA goals.

61. My cholesterol intake is. n=44; 3.34

Don't know	Poor	Fair	Good	Excellent
0	10	14	15	5

62. My fat intake is. n=44; 2.98

Don't know	Poor	Fair	Good	Excellent
0	16	15	11	2

63. My fiber intake is. n=44; 3.18

Don't know	Poor	Fair	Good	Excellent
2	11	12	15	4

64. My sodium intake is. n=44; 3.00

Don't know	Poor	Fair	Good	Excellent
0	15	17	9	3

65. Overall, my diet is. n=43; 3.19

Don't know	Poor	Fair	Good	Excellent
0	10	16	16	1

66. Overall, my level of health is. n=44; 3.98

Don't know	Poor	Fair	Good	Excellent
0	1	10	22	11

67. Because of having seen the results of your FFQ analysis, are you planning on making any changes in your diet? n=45

Yes	No
32	13

If you answered Yes to Q67, what changes will you be making?

68. Cholesterol containing foods. n=34; 1.44

Decrease	No change	Increase
20	13	1

69. Fat containing foods. n=34; 1.18

Decrease	No change	Increase
29	4	1

70. Fiber containing foods. n=34; 2.65

Decrease	No change	Increase
0	12	22

71. Sodium containing foods. n=34; 1.38

Decrease	No change	Increase
21	13	0

Write-in answers/comments for questions 72-79. n=15

Calcium - 1% milk: Increase
Vitamin D - 1% milk: Increase

Legumes: Increase
Cheese: Decrease
Butter: Decrease
Calcium: Increase

Calcium: Increase
Dairy products: Increase
Oils/saturated: Increase

A-tocopherol: Increase
Protein: Decrease
Vitamin A: Decrease
Iron: Decrease
Riboflavin: Decrease
B-12: Decrease
Saturated fat & mono fat: Decrease

Turkey: Increase
Ham: Decrease
Cheese: Decrease
Vegetables: Increase
Fruit: Increase
Tuna in water: Increase

Eat on regular basis: Increase

Calcium containing food: Increase

Calcium: Increase
A-tocopherol: Increase

Beer: Decrease
Chips: Decrease

Carbohydrates: Increase

White bread: Decrease
Vitamin E: Increase

Carbohydrates: Increase
Protein: Decrease

Vegetables: Increase
Fruits: Increase

Fast food: Decrease
Oil or butter: Decrease
Whole grain: Increase

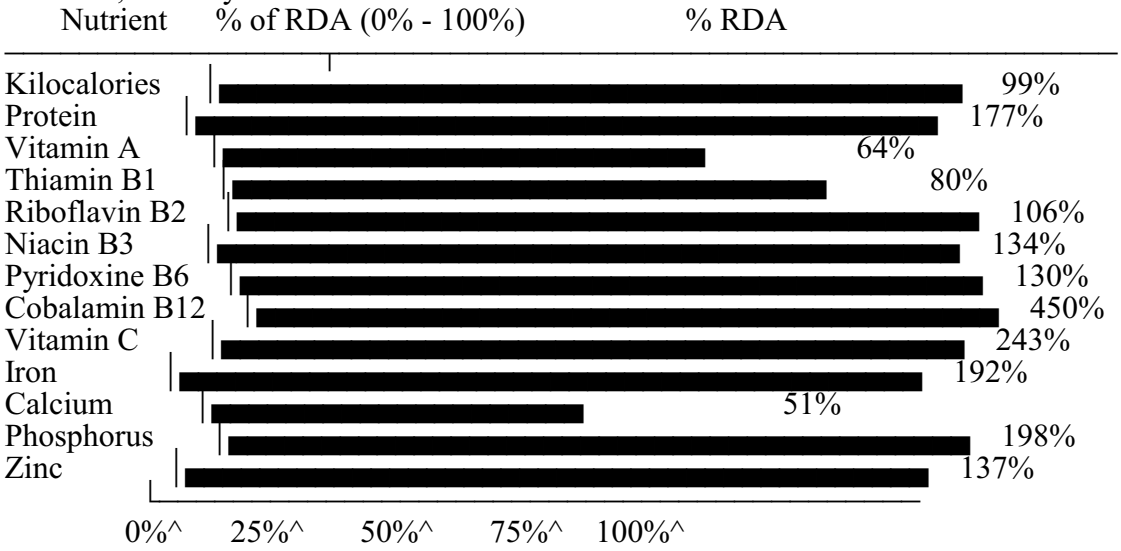
Red meat: Decrease
Fruits: Increase
Vegetables: Increase
Fast food: Decrease
Dairy products: Decrease

Some of your charts are meaningless to me without my initial answers in 1st packet. I have nothing to compare your charts and decisions about my foods intake. Such as what precise food should I cut down on to lower the "bad" foods >RDA.

I question the accuracy of my low a-tocopherol & dietary fiber intake, since I eat a lot of muesli/granola cereal mixed in with my yogurt (almost every day) and try to stick with whole grain bread. Don't remember if that was on 1st survey.

Evaluation of the FFQ Printout
(See sample printout in Appendix 2, and evaluation form in Appendix 3)

The graph below shows the nutrients that you should be getting to meet the Recommended Dietary Allowance (RDA) goals. For most people, an intake of at least 75% of the RDA should be enough. For most nutrients, it's okay to exceed 100% of the RDA.



SECTION A: RDA Goal Bar Graph

On a 1-5 scale (1=Not, 5=Very), did you find the above graph:

1. Difficult (I didn't understand what this meant). n=44; 1.64

1	2	3	4	5
27	9	6	1	1

2. Confusing (I didn't know how to compare this to the way I eat). n=42; 1.83

1	2	3	4	5
23	10	4	3	2

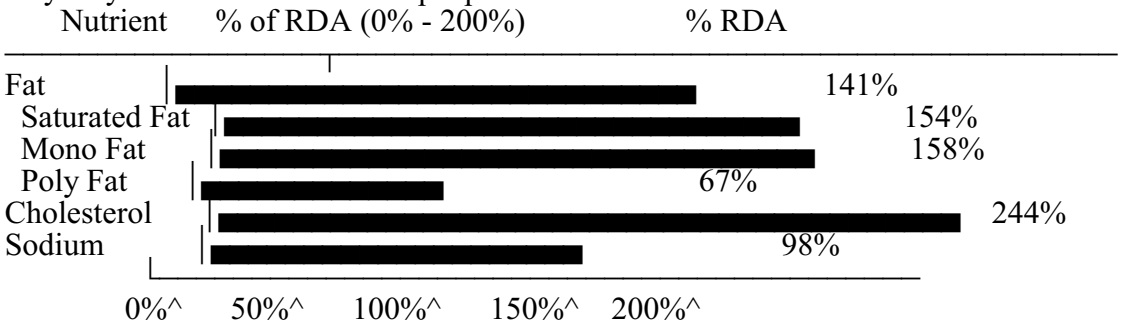
3. Educational (I learned about the way I eat). n=41; 3.80

1	2	3	4	5
0	5	8	18	10

4. Motivational (I will make changes in the way I eat). n=42; 3.36

1	2	3	4	5
3	10	8	11	10

The graph below shows six important nutrients that should not go above 100% of the RDA goal. If these nutrients exceed the RDA goal, they may be excessive for some people.



SECTION B: Excessive Nutrients Bar Graph

On a 1-5 scale (1=Not, 5=Very), did you find the above graph:

1. Difficult (I didn't understand what this meant). n=45; 1.69

1	2	3	4	5
28	9	4	2	2

2. Confusing (I didn't know how to compare this to the way I eat). n=43; 1.70

1	2	3	4	5
26	9	5	1	2

3. Educational (I learned about the way I eat). n=43; 3.65

1	2	3	4	5
1	7	11	11	13

4. Motivational (I will make changes in the way I eat). n=43; 3.44

1	2	3	4	5
2	7	8	12	9

Sources of the most excessive nutrients:
FAT : FAST FOODS-BURGERS/TACOS 3.000 ITEMS
CHOLESTEROL : EGGS-WHOLE-LARGE 6.000 ITEMS
SATURATED FAT : FAST FOODS-BURGERS/TACOS 3.000 ITEMS
MONO FAT : BEEF-GROUND-COOKED 6.000 OUNCES

SECTION C: Excessive Nutrients Sources

On a 1-5 scale (1=Not, 5=Very), did you find the above information:

1. Difficult (I didn't understand what this meant). n=39*; 2.28

1	2	3	4	5
17	6	8	4	4

2. Confusing (I didn't know how to compare this to the way I eat). n=37; 2.22

1	2	3	4	5
16	8	5	5	3

3. Educational (I learned about the way I eat). n=37; 3.27

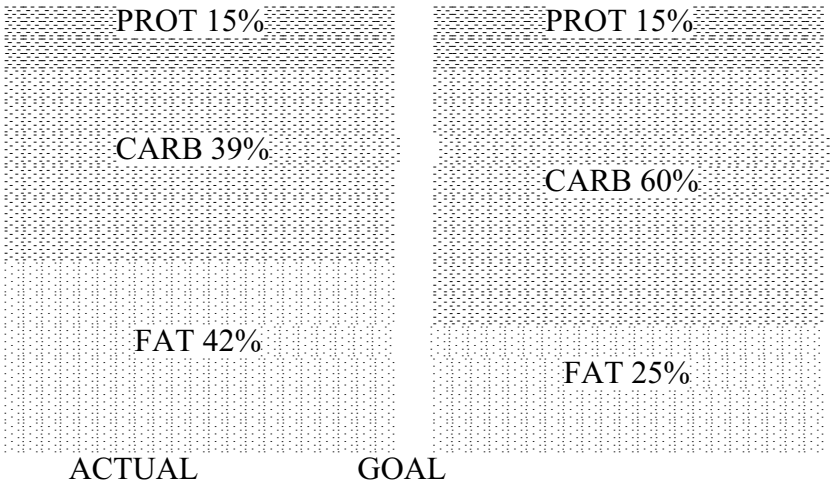
1	2	3	4	5
4	5	12	9	7

4. Motivational (I will make changes in the way I eat). n=38; 3.11

1	2	3	4	5
5	8	11	6	8

*The numbers of subjects who evaluated Section C are lower than for the other sections because not all subjects had excessive amounts of fat, cholesterol, or sodium.

Caloric Components Bar Graph vs. Goals



SECTION D: Caloric Components Bar Graph

On a 1-5 scale (1=Not, 5=Very), did you find the above graph:

1. Difficult (I didn't understand what this meant). n=43; 1.65

1	2	3	4	5
28	7	4	3	1

2. Confusing (I didn't know how to compare this to the way I eat). n=41; 1.61

1	2	3	4	5
27	7	3	4	0

3. Educational (I learned about the way I eat). n=41; 3.63

1	2	3	4	5
0	9	8	13	11

4. Motivational (I will make changes in the way I eat). n=42; 3.19

1	2	3	4	5
5	9	8	13	7

Nutrient Values and % of RDA for selected nutrients

Kilocalories	2890 Kc	99%	Cobalamin B12	9.005 Ug	450%
Protein	111.9 Gm	177%	Biotin	25.18 Ug	38%
Carbohydrate	285.2 Gm	78%	Folate	336.2 Ug	168%
Dietary Fiber	16.82 Gm	58%	Pant. Acid	4.167 mg	75%
Fat	137.0 Gm	141%	Vitamin C	145.9 mg	243%
Saturated Fat	49.82 Gm	154%	Calcium	411.1 mg	51%
Mono Fat	51.17 Gm	158%	Chromium	0.109 mg	87%
Poly Fat	21.81 Gm	67%	Copper	2.034 mg	90%
Cholesterol	732.7 mg	244%	Iodine	24.00 Ug	16%
Vitamin A	644.6 RE	64%	Iron	19.23 mg	192%
Vitamin D	1.354 Ug	27%	Magnesium	347.9 mg	99%
A-Tocopherol	4.695 mg	46%	Manganese	1.247 mg	35%
Vitamin K	318.4 Ug	398%	Phosphorus	1588 mg	198%
Thiamin B1	1.204 mg	80%	Potassium	3647 mg	182%
Riboflavin B2	1.815 mg	106%	Selenium	0.107 mg	152%
Niacin B3	25.63 mg	134%	Sodium	2362 mg	98%
Pyridoxine B6	2.617 mg	130%	Zinc	20.67 mg	137%

SECTION E: Nutrient Values and % of RDA

On a 1-5 scale (1=Not, 5=Very), did you find the above information:

1. Difficult (I didn't understand what this meant). n=44; 2.30

1	2	3	4	5
20	7	7	4	6

2. Confusing (I didn't know how to compare this to the way I eat). n=42; 2.33

1	2	3	4	5
19	6	6	6	5

3. Educational (I learned about the way I eat). n=40; 3.25

1	2	3	4	5
2	11	11	7	9

4. Motivational (I will make changes in the way I eat). n=41; 3.02

1	2	3	4	5
5	11	10	8	7

Overall, I found my dietary analysis printout to be, on a 1-5 scale (1=Not, 5=Very):

1. Useful (It contained practical information I will use). n=44; 3.55

1	2	3	4	5
2	6	12	14	10

2. Informative (I gained new information about the way I eat). n=43; 4.00

1	2	3	4	5
0	2	10	17	14

3. Influential (I plan on making changes in the way I eat). n=43; 3.51

1	2	3	4	5
1	9	11	11	11

4. Other comments. n=19

The charts & tables present information very clearly & are useful. Since I think my diet is pretty good, & the analysis seems to agree, I don't plan any changes. If, however, the analysis had indicated something really out-of balance, I probably would have tried some diet modification.

An overall summary would be helpful (which contains a few recommendations, eg, "you should consider increasing calcium intake") Why didn't you ask if we took any vitamins? Or don't they really matter? It took quite a bit of paging back and forth from the graphs to the blue pages (common sources of nutrients) to determine what foods were giving or not giving me. It would have been useful to have our original questionnaire back.

Where is rice? Carbohydrate? I'm only 60% of the RDA for fat, however, my caloric bar is 41% fat, target 25%, this is confusing. I'll add my new calories in carbohydrates. Should include a copy of the first questionnaire!

I thought your survey was very informative and I would like to do it again, now that I have changed my diet.

Section E is way too specific for your average person. How many people know how many mg of "selenium" you're supposed to have? Not much new info here for me - your basic low fat - high fiber, everything in moderation. It would only motivate me if I was off the chart in some area.

I found the info very confusing at first, but was able to figure it out. The info was helpful to me, but I think the computer analysis would be helpful as a tool and explained by a "wellness" person (nurse, nutritionist).

I think I am probably more educated & aware of my diet than the average person because my husband & I have read a lot about nutrition & and good diet. I believe this would be very informative to many. Thank you & good luck!

I am sorry, wording is a bit hard to understand in all sections. I included all baking oils, margarines, eggs, etc, for a month. Mostly all given away to organizations. I eat NO noodle soups etc. Nothing in restaurants, only a dash of salt in my food, which is home cooked, no convenience stuff. I just eat too large of a portion for my age, I'm very active, but slower as

I age.

While I tried to be accurate in filling out the survey, it seems the total fiber & kcal should be higher. I take a lot of vitamin supplements, so low counts there don't concern me. Maybe I forgot some foods, or didn't fill out the form correctly. Thanks.

Most of the graphs dealt in percentages which are difficult to apply to serving sizes. It would also be helpful to give a dietary intake outline to be able to apply this new knowledge to weight control (based on individuals age, present/goal weights, exercise)

I don't think I understood the 1st questionnaire too good. I eat a lot of rice and vegetables, wheat bread. But I hope I did this form more accurately.

I am not a mathematician (can't spell either) & have a hard time with numbers. I also don't understand what all the nutrients are. With 5 kids 8 & under, my brain is gone & we only eat what I don't have to think about.

I want to know what kinds of food contain which nutrients, so I can clearly understand what I need to eat more. Because some nutrients are unknown for me or unfamiliar.

Section E: I need more information to help me make this part useful.

Thanks for the diet analysis on me, it really taught me a lot about my diet.

This survey has helped me focus on good eating.

Didn't realize I was eating as poorly as I was. I never could figure out why I was so drained and tired. If you have any information on this problem, please send information. Thanks! Very informative. John.

I am a physician & have a better than average knowledge of nutrition. I am skeptical about the value of a retrospective analysis of a person's diet from memory. I probably will not make any change in my diet because I doubt my completion of your original survey is accurate. I tend to be "overly conscientious" and probably overestimated many items in an effort to be sure I did not "cheat." If you are doing a food-diary study to compare with a FFQ, I would be happy to participate

For Section D: Where did the "goal" come from? Is it mine or an average?

Survey of the Dropouts from Phase I

	Yes	No
1. The questionnaires were too confusing.	3	5
2. The questionnaires were too complicated to take the time to understand	5	4
3. It was too difficult trying to remember all the foods that I normally eat	3	7
4. I decided that participating in the research study would be just too much work	6	3
5. I'm very busy and I just didn't have the time to spend on this research study. .	1	9
6. I didn't want to give out personal information about myself	5	1
7. I decided that finding out about my diet wasn't that important.	5	1
8. I already know about the kinds and amounts of nutrients in my diet	5	3
9. I was afraid of learning about the "bad" things I might be eating.	7	0
10. I'm healthy, so my diet must be good.	4	2
11. If my doctor, nurse, dietician, or other health professional had asked me, I would have completed the research study	2	5
12. It would have made a difference if I had met the person conducting the research study	2	5
13. Even if I learned that my diet needed to be improved, I wouldn't make any changes	2	5

For questions 14-16, if you answered Yes to question 13, what is your reason?

14. It would be too much work to change the way I eat.	1	1
15. I don't know enough about nutrition to make the right changes	2	0
16. I don't think that nutrition is that important to good health	2	0

APPENDIX 5: Survey of the Dropouts from Phase I

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Nutritional Sciences, DL-10

A significant number of people decided not to continue with the Nutrition Research Study. Unless I can find out the reasons why people chose not to proceed with the project, the relevance of this research study will be jeopardized. Please take the time to answer the following simple questions. Your answers will be very helpful for future studies. Please try to mail back this form within one week. A postage-paid envelope is included. Thank you.

	Yes	No
1. The questionnaires were too confusing.	☐	☐
2. The questionnaires were too complicated to take the time to understand . . . . ☐		☐
3. It was too difficult trying to remember all the foods that I normally eat . . . . . ☐	☐	
4. I decided that participating in the research study would be just too much work ☐ . . . . . ☐		
5. I'm very busy and I just didn't have the time to spend on this research study. . ☐		☐
6. I didn't want to give out personal information about myself . . . . . ☐	☐	
7. I decided that finding out about my diet wasn't that important. . . . . ☐	☐	
8. I already know about the kinds and amounts of nutrients in my diet . . . . . ☐	☐	
9. I was afraid of learning about the "bad" things I might be eating. . . . . ☐	☐	
10. I'm healthy, so my diet must be good. . . . . ☐	☐	
11. If my doctor, nurse, dietician, or other health professional had asked me, I would have completed the research study . . . . . ☐	☐	
12. It would have made a difference if I had met the person conducting the research study	☐	☐
13. Even if I learned that my diet needed to be improved, I wouldn't make any changes	☐	☐

For questions 14-16, if you answered Yes to question 13, what is your reason?

14. It would be too much work to change the way I eat.	☐	☐
15. I don't know enough about nutrition to make the right changes . . . . . ☐	☐	
16. I don't think that nutrition is that important to good health . . . . . ☐	☐	

17. Comments
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_____
_____
. . . . . .
_____
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