

THE UNIVERSITY OF MANITOBA

THE DEVELOPMENT AND EVALUATION OF A
NUTRITION EDUCATION PROGRAM DESIGNED TO
MODIFY THE FOOD HABITS OF YOUNG FAMILIES

WITH APPLICATION TO PRIMARY
PREVENTION OF CORONARY HEART DISEASE

by

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ABSTRACT

THE DEVELOPMENT AND EVALUATION OF A NUTRITION EDUCATION PROGRAM DESIGNED TO MODIFY THE FOOD HABITS OF YOUNG FAMILIES

WITH APPLICATION TO PRIMARY PREVENTION OF CORONARY HEART DISEASE

In September, 1973, the Manitoba Heart Foundation initiated a pilot project, PROJECT NUFIT, with the objective of demonstrating that young families, through an intensive education program, can be motivated to modify behavior to reduce their intake of total fat, saturated fat, and simple sugars, and to improve their physical fitness thereby decreasing two factors of risk for coronary heart disease (CHD). Ten families, each of which included at least two children between the ages of six to ten, were selected from a Winnipeg school district. The families met with the nutritionist over a six-month period; bimonthly and then monthly. Nutrient and caloric information was presented but emphasis was placed on the type and amount of fat in the diet. Educational techniques used were films, programmed instruction, nutrition games, and individual diet analysis. Dietary change was assessed from two seven-day food records kept for each of the four designated family members in October, 1973, and April, 1974. The records were analyzed for kilocalories and ten nutrients. On the basis of the seven-day food records, it was shown that total fat intake declined an average of 12.4% for the male subjects and 18.3% for the females. Saturated fat consumption decreased in both groups, 13.2% for the men and 21.8% for the women, while the linoleic acid content of the diets increased 10.3% and 26.0% for the males and females, respectively. Total energy intake decreased 6.9% for the male subjects and 10.0% for the females. Protein intake for the males decreased slightly by 1.7% and increased by 13.1% for the females. Vitamin and mineral intakes increased for most adults and children. A nutrition knowledge quiz and subjective evaluation of the program were also completed by the adult participants. Changes in dietary intake, weight loss by overweight individuals and reduction in serum triglycerides demonstrated that the program was successful at modifying the dietary habits of young families over a six-month period.

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INTRODUCTION

Some of the factors associated with the development of atherosclerosis which were identified by the National Heart and Lung Task Force on Arteriosclerosis (1) were the amount and type of fat and the amount of cholesterol in the diet as well as lack of physical exercise. It has been suggested that preventative programs can affect these factors and thus decrease the incidence of heart disease in the population (2). In order to demonstrate that these two factors can be reduced by a public education program, the Manitoba Heart Foundation, in September 1973, initiated a pilot project, PROJECT NUFIT, which combined nutrition and physical fitness programs. The objective of the program was to demonstrate that family groups, through an intensive education program, can modify behavior so that the incidence of obesity and hyperlipidemia would be reduced. An evaluation of the program was planned in order to identify techniques which proved to be effective in changing food and exercise patterns.

For purposes of the pilot project, it was intended that the program be directed at the primary prevention of coronary heart disease (CHD) in young adults and children. In order to select a population of adults in the preferred age category, 30 to 40 years, families were selected in

which there were two children registered in grades one to four. It was also anticipated that the involvement of the family unit in the program would have a motivating effect and that the children would benefit from changes instigated by the parents. An intensive educational program was to be conducted over a six-month period and an evaluation was to be made of the modifications of food habits and exercise patterns by the adult family members at the end of six months, one year, and two years.

There are few reports of studies related to the primary prevention of CHD which have been conducted with young adults, therefore more information for program development is needed if the approach to the control of CHD is to be truly preventative. The following study conducted over a six-month period describes the development and evaluation of a nutrition education program designed for young adults.

REVIEW OF LITERATURE

Coronary heart disease (CHD) is the foremost cause of death in Canada; 1969 data prepared by the Canadian Dominion Bureau of Statistics attributed 49.17% of deaths in males and 51.67% of deaths in females in all age groups to this cause (3). Although several factors have been identified which predispose an individual to CHD (4), epidemiological research has shown that there has been an increase in the consumption of diets contributing to a prevalence of hyperlipidemia in the adult population. These diets have been excessive in calories in relation to energy utilization, excessive in total fat, saturated fat, cholesterol and simple sugars (4). Changes in retail market food supplies in the United States show that consumption of simple carbohydrates, sugars and syrups, has more than doubled in a seven decade period from 1889 to 1961, a 218% increase (5). At the same time there has been a steady decline in the consumption of complex carbohydrates in the form of flour, cereal, and potatoes. Canadian statistics for the period of 1947 to 1971 show similar trends (6); total cereal consumption declined from 177.4 pounds per capita to 146.1 pounds while the total intake of sugars and syrups increased from 103.9 pounds to 117.2 pounds per capita. There has been a slight increase in total fat consumption in the United

States (7) attributed mainly to an increased intake of unsaturated fatty acids. Consumption of total oils and fats in Canada (excluding butter) has similarly increased from 19.4 pounds per capita in 1947 to 38.0 pounds per capita in 1971. A decline in the consumption of dairy products has also occurred; 488.8 to 356.5 pounds per capita. The beneficial effects of an increased intake of polyunsaturated fatty acids with respect to prevention of heart disease appears to be offset by the increase in total fat consumption (1947 to 1971) from 47.4 to 53.7 pounds per capita. However, changes which have occurred in the type of dietary carbohydrate may also be a factor since carbohydrate can be metabolized to lipid constituents. Excessive caloric intake, a contributing factor in CHD, appears to be characteristic of the Canadian diet. In the adult population surveyed by Nutrition Canada in 1970 (8) over one-half were reported to be overweight. On the basis of median caloric intake, the daily consumption of excess calories did not account for the increase in body weight; rather the problem was attributed to small caloric excesses over a long period of time and a sedentary life style which resulted in a decreased need for calories so that excesses were converted to adipose tissue even when caloric intake was relatively low.

In 1963, the Central Committee for the Medical and Community Program of the American Heart Association and the Council on Foods and Nutrition of the American Medical Association made independent recommendations for physicians for

the treatment of hyperlipidemia by dietary modification (9, 10). Diets representing severe and moderate reduction of fat, 10% and 25% of total calories, respectively, were devised for caloric levels of 1200, 1800, and 2400. Total fat reduction was achieved by elimination of fat containing foods and modification of methods of food preparation. To increase the ratio of polyunsaturated to saturated fatty acids from 1.1:1 to 1.5:1 the use of vegetable oils with a high linoleic acid content was recommended. Modified margarines consisting of a high proportion of polyunsaturated fatty acids were also recommended. These guide lines were not for the general public but were only to be applied in cases of known cardiovascular disease. By limiting counselling for dietary modification to persons with elevated blood lipids, a very large segment of the population is being denied preventative health care. A primary preventative approach, that is, education of the public to modify eating habits before symptoms of cardiovascular disease are present, seems to be a preferable solution to the problem. Accordingly, in 1965 the recommendations of the American Heart Association were revised to encourage the general public to adopt measures which would reduce dietary cholesterol to less than 300 mg per day and to reduce the intake of saturated fats to 10% of total calories (9).

Patterns of food selection cannot be readily altered, since familial and social circumstances must also be considered in diets of infants who become habituated to the consump-

tion of diets that will predispose them to CHD (11). Therefore, a program of behavior modification may be more successful at changing food habits in the young adult population (12). Many factors are involved in motivating behavioral change. The need or drive to change must be established; the individual must understand the importance of altered behavior; he must have a change in attitude; and then must act in the direction of the desired change (12, 13, 14, 15). The methods used to initiate these changes will vary depending upon the target group. Several research projects utilizing such motivational methods have been developed to modify eating habits of the population in an effort to decrease the risk of CHD. One such successful program is the Anti-Coronary Club project initiated in 1957 by the Bureau of Nutrition of the New York City Department of Health (16). Researchers studied 814 male subjects aged 40 to 59 years with the following objectives: to develop practical diets for use by the general public; to determine whether blood lipid patterns of males below 60 years of age could be favorably modified by diet and maintained over an extended period of time; and to determine whether this change was associated with decreased morbidity and mortality from CHD (17). Following an initial orientation, in which the purpose and function of the Anti-Coronary Club was described, a diet history was obtained from each volunteer by recall and dietary records from which a nutrient analysis was done and an estimation was made of saturated, monounsaturated,

and polyunsaturated fatty acid intake. The basis for dietary modification was the Prudent Diet which limited total fat, cholesterol and saturated fat. An increase in the intake of polyunsaturated fat was recommended. Caloric intake was restricted for the obese participants who comprised about 50% of the experimental group. The adherence to the dietary program was judged to be successful on the basis of dietary interviews, weight loss by obese subjects, decline in serum cholesterol and an increase of linoleic acid in adipose tissue. Serum cholesterol levels decreased an average of 12.2% over a three year period while linoleic acid content of adipose tissue increased from 9.7 to 18.9%. After four years of participation in the program, only 17.2% of the obese subjects had not attained ideal weight (16). These changes served to validate the dietary interview as a measurement of adherence to the program (18). As of November, 1967, 290 of the initial 814 volunteers had assumed "inactive status", that is, they were either unable to adhere strictly to the dietary recommendations or could not devote sufficient time to the study. An attempt was made to continue follow-up of these individuals either by telephone or through mailed dietary questionnaires. However, since it is difficult to determine adherence by these methods, incidence of new coronary events served as a measurement. On the basis of a population of 100,000, the incidence rate of coronary events for the active group was less for men aged 50 to 59 years; 379 for the active group as compared to

919 for the inactive group. The subjects were highly motivated to attend the clinics; after a period of 15 months of regular attendance every five weeks, only 46 subjects discontinued all contact with the study. Although results of the Anti-Coronary Club have only been reported to 1967, the project is continuing with referrals being made through present membership. Emphasis is placed on the research objectives of the Club rather than on those related to service. Consequently, all volunteers remain under the care of their private physicians.

Several parallels can be drawn between the Anti-Coronary Club and the Coronary Prevention Evaluation Program (CPEP). The latter project was initiated as part of the Heart Disease Control Program of the Chicago Board of Health in May, 1958, with the aim of achieving primary prevention of CHD by a nutrition and medical education program for men aged 40 to 59 years considered to be at high risk (19). Unlike the Anti-Coronary Club project in which only diet modification was attempted, the CPEP undertook to plan a program for the correction of five coronary risk factors: hypercholesterolemia, obesity, and hypertension as well as cigarette smoking and physical inactivity (19). Participants were recruited from among the employees of the industrial sector of Chicago and were chosen on the basis of proneness for coronary disease as determined by hypercholesterolemia, hypertension, and electrocardiogram abnormalities (20). A total of 519 high risk men were selected who met these cri-

teria. In order to motivate subjects to alter existing patterns of food selection, the role of diet in the etiology of CHD was explained at an initial orientation session. Dietary information was obtained from a seven-day food record kept by each of the participants who had been taught by the nutritionist to accurately estimate quantities of food consumed. In addition, a questionnaire related to food preparation practices was completed by the wives of the participants. As in the Anti-Coronary Club, individuals were instructed in specific dietary regimens, with the seven-day food record and questionnaire providing guidelines for planning individualized diets for weight loss and reduction of serum cholesterol. It was intended that participants would adopt the modified diets as permanent eating habits. In order to motivate and educate participants, each couple was seen by the nutritionist weekly, then biweekly, monthly, and finally bimonthly. Procedures for estimating desirable weight, caloric requirements and time required to achieve a desirable weight level was explained. Discussion of the dietary pattern to be followed included suggestions for food selection for snacks, lunch boxes, and social outings. At each subsequent visit a record of all foods eaten in the previous 24 hours was obtained. Participants were classified as excellent plus good and fair plus poor adherers. The former classification consisted of subjects whose total fat, saturated fat, and cholesterol intake was reflected in an average decrease in serum cholesterol of 16.1% over the seven year period. A moderate weight reduction was achieved

for those who had previously been classified as overweight or obese, 15% and 25% respectively, above desirable weight. However, success was rarely achieved during the seven years of the study to the extent that the majority of subjects reached desirable weight (20).

The assumption may be made that subjects who are at risk with respect to CHD may be more highly motivated to change food habits in order to reduce serum lipids. However, decreases in serum lipids for subjects who had experienced myocardial infarction were not significantly greater than for control subjects (21, 22, 23, 24). In these studies, intensive long-term education programs were conducted which were similar to those programs utilized in the CPEP and the Anti-Coronary Club studies (16, 20). Although subjects who had experienced one myocardial infarction showed a greater decrease in serum cholesterol, 21.6%, than subjects in the CPEP, 16.1%, and the Anti-Coronary Club, 12.2%, it must be emphasized that the experience of myocardial infarction alone does not motivate patients to modify individual diets. These patients also benefit from follow-up and counselling.

On the basis of experience gained from the Anti-Coronary Club, the CPEP, and the National Diet-Heart Study, Keller and associates (25) initiated a six-year study in 1966 designed to evaluate the effectiveness of a community health program for identification and counselling of coronary prone individuals. One thousand males, aged 40 to 59 years, employed in Franklin County, Ohio, were chosen as subjects

for the study. Although the subjects did not have a diagnosis of coronary artery disease, a combination of elevated blood pressure (160/95 or greater) and elevated serum cholesterol (250 mg % or more) served as the criteria for subject selection. Volunteers were randomly assigned to either a "risk-mitigation" counselling group or "biennial examination group". Participants assigned to the latter group were given a cardiovascular examination twice yearly with no attempt at treatment intervention other than referral to private physicians. The "risk-mitigation" program was directed at dietary control of weight and serum lipids, improvement in physical fitness and smoking withdrawal. In order to determine the initial nutrient intake and food habits of the subjects, participants were instructed to keep a three-day food diary including one week-end day. As was the case in the CPEP and the Anti-Coronary Club, the food records also served as a basis for planning individual diets to reduce the intake of total fat and cholesterol. Preparation of foods with this objective was demonstrated by a nutritionist. Following the period assigned for keeping food records, subjects and their wives attended an orientation lecture designed to motivate participants and familiarize them with the objectives of the study. The timing of the orientation session may have an effect on dietary practices. In the CPEP, the orientation session was held prior to the recording of food intake. In this case food records may not have reflected usual intakes

because of self-imposed restrictions which the participants assumed were beneficial for CHD prevention, on the basis of information presented in the orientation lecture.

Dietary adherence was then assessed at three month intervals and further three-day food records were kept from which the nutritionist estimated the percentage of calories from protein, fat, and carbohydrate, and the P/S ratio. The records also indicated if additional counselling was required. Over a nine month period, several notable changes in daily intakes were reported; total fat and saturated fat intake declined, 116.8 to 84.1 g and 37.5 to 20.8 g respectively; cholesterol intake decreased from 340.4 mg to 198.1 mg; linoleic acid intake increased from 10.8 to 22.1 g; and the P/S ratio changed from 0.30 to 1.15. A 15 to 20% decrease in serum cholesterol for the majority of subjects was similar to the 16.1% average decline reported by Stamler and associates (20) in the Chicago study. A 9.2% drop-out rate from the "risk-mitigation" group was reported at the end of the first year. The authors did not report any reasons for subjects withdrawing from the project. It is of interest to note that successful modification of dietary habits was possible even when subjects were counselled every three months as compared to the more intensive follow-up programs of the Anti-Coronary Club Project and the CPEP at five week and bimonthly intervals, respectively.

The foregoing studies directed efforts at decreasing coronary risk in males, 40 to 59 years of age, since the incidence of CHD is greatest for this age group. Only

recently has research been directed at the prevention of CHD in young adults before clinical symptoms are manifested. It has been suggested, however, that this group may be particularly difficult to motivate for that very reason, that is, younger adults without clinical symptoms of CHD may see little reason for modifying food habits (26). A study conducted by Shorey and coworkers (27) successfully modified dietary habits of 50 married male volunteers, 21 to 46 years of age, over a three month period with continued follow-up for six months. Individuals at risk with respect to CHD were chosen on the basis of serum cholesterol values greater than 201 mg/100 ml or serum triglyceride levels greater than 141 mg/100 ml. Each individual was also classified according to one of the recognized types of hyperlipidemia as described by Lees and Wilson (28). Only volunteers exhibiting type II, IIb and type IV hyperlipidemia were used for purposes of this study. Seven meetings were held for both participants and their wives over a 14 week period commencing in February, 1972. At the first meeting subjects were asked to complete a questionnaire to provide information about methods of food preparation and types of food purchased, including brand names. Following the initial meeting, a seven-day food record was completed to determine participants' present dietary habits. To improve the accuracy of records, subjects were given written instructions and shown color slides and food models to illustrate portion sizes. Instructions for specific diets for the hyperlipidemia types

were given at the second meeting. In addition to the group meetings appointments were made with the project dietitian for individual diet counselling. Information was presented using lectures and discussions, films and printed hand-outs. Topics included weight control, the etiology of heart disease, food preparation and purchasing, and menu planning.

In order to evaluate adherence to the prescribed diets and the subsequent change in food patterns, a second seven-day food record was completed at the end of three months. Close adherence to the cholesterol restriction inherent in the diet prescriptions was shown by a 67 to 69% decrease in daily cholesterol intake by the type II and IIb groups. Although the type IV group was given instructions which would result in only a moderate decrease in cholesterol consumption, the dietary records indicated that a more severe restriction was self-imposed. This is surprising in view of the fact that the type IV diet was restricted in simple carbohydrates and therefore, the limited foods permitted within the diet made adherence to the diet more difficult. The initial ratio of linoleic acid to saturated fatty acids was approximately 0.3 for all groups. The final ratios attained were 1.1, 0.7 and 0.6 for types II, IIb, and IV, respectively. Participants who followed the type IV diet with the simple carbohydrate restrictions, showed a decrease in total daily carbohydrate consumption of 42% and in simple carbohydrate intake of 68%. Adherence to an 1800 calorie restriction for all groups varied with individuals;

initially approximately 50% of the type II group and 90% of type IIb and IV groups exhibited body weights that were 10 or more pounds above desirable weight. A mean reduction in serum cholesterol of approximately 19% was achieved for all groups while the type IV group showed a 57% decrease in serum triglycerides. The mean percentage decrease in serum cholesterol was similar to the 16.1% decrease for subjects reported by the CPEP (20), the 12.2% decrease reported by the Anti-Coronary Club (18), and the 15 to 20% decrease in the Franklin County Study (27). The results further demonstrated that an intensive counselling program contributed to a reduction in serum cholesterol and thus to a change in diet which was beneficial. It should be noted, however, that the subjects were only followed for a three month period, whereas other studies (18, 20, 27) have been successful at maintaining dietary modification from six to eight years.

In order to test the effectiveness of diet instruction alone in lowering serum cholesterol, a two year feasibility study was initiated in Minneapolis-St. Paul by the Executive Committee on Diet and Heart Disease of the American Heart Association in 1963 (29). This study, the National Diet-Heart (D-H) study, included 54 male volunteers, aged 45 to 54 years, in a free-living population. From a seven-day food record kept by participants, nutritionists planned individual diets, designated as diet X, in which 25-30% of total calories were fat, the P/S ratio was 1.0 and dietary

cholesterol was limited to 350 mg daily. Instructions were given for food preparation in order to decrease the fat content of the diet. The saturated fatty acid composition of the diet was decreased by the substitution of polyunsaturated fats and the selection of lean meat cuts. Subjects met with the nutritionist ten times during the next 52 weeks of the study.

In order to evaluate changes in food intake, subjects were required to keep three seven-day food records for the 12th, 28th and 44th weeks and three-day food records for the remaining seven visits. Total fat, saturated fat and cholesterol consumption were determined from the records. Subjective appraisals were also made by the nutritionists concerning food preparation methods and food consumption. In addition biochemical determinations were made for serum cholesterol and fatty acid composition of red blood cells. The mean serum cholesterol decrease was reported to be 11.1% while the linoleic acid content of the red blood cells increased from 17 to 19%. These results compare favorably with reports of similar studies (18, 20, 25). Twenty-five percent of the subjects were rated as excellent adherers to the diet and approximately 25% as poor adherers. Participation in the program was good; only eight men discontinued participation in the D-H program before the end of the first year. Twenty-eight of the remaining 46 participants agreed to continue the program for an additional year. Only one drop-out and one exclusion were reported.

As an extension to this study a new group of 38 volunteers were recruited and given additional diet instruction specifically for the selection of retail lean meat cuts since participants needed more information in this area. Instructions were illustrated by colored slides showing visual estimation of maturity, marbling, and grading of meat cuts. Serum cholesterol responses were similar to the first D-H study group and showed a 10.0% decline. Investigators anticipated a better adherence to the diet since the information provided had been improved. However, presentation techniques and group rapport are factors to be considered in motivating individuals.

Although the foregoing studies using educational methods have met with some success, investigators in the National Diet Heart Study predicted that food selection patterns would be more easily altered if fat-modified foods were more available. To evaluate the feasibility of providing fat-modified foods for the primary prevention of CHD, the D-H study recruited 1211 males, aged 45-54 years, from Boston, Chicago, Oakland, Minneapolis-St. Paul, and Baltimore. Orientation sessions were held in each city to familiarize participants with the objectives of the study and to provide an opportunity for them to examine and taste the modified food products. To decrease the drop-out rate during the study by ensuring acceptability of the modified foods, volunteers were assigned to a "mixed diet" for one month which consisted of a wide

variety of the D-H food products. For purposes of determining food intake at the beginning of the study, a seven-day food record was kept by the participants and mean daily intakes of calories, total fat, cholesterol, carbohydrate, and alcohol were calculated. Subjects were then randomly assigned to one of three fat-modified diets adapted to individual eating patterns. To ensure a double-blind experimental design, neither participants nor the nutritionists were informed about the amount or type of fat in any of the three diets. Foods purchased at the D-H center were coded to correspond to the assigned diets. Methods used in diet instruction were similar to those given to participants who were selecting foods from the retail market, diet X. In addition, all individuals were given an illustrated copy of "The Diet-Heart Study Guide (29)." This booklet outlined important information pertaining to the dietary restrictions and was written for the layman. Participants were interviewed ten times over the following 52 weeks at two week intervals for the first six weeks, then at four, six, and eight week intervals. Dietary adherence was assessed on the basis of three seven-day food records kept during the study and by biochemical determinations of serum cholesterol and fatty acid composition of red blood cells; subjective ratings were also made by the nutritionists regarding adherence. On the basis of dietary records individuals were shown to have modified dietary intakes. The intake of calories and

saturated fat decreased significantly; a mean serum cholesterol decrease of 14.7% was reported for the group consuming the fat modified food and a 15% decrease was reported for the group consuming diet X. Participants who were following the two diets which contained the highest levels of polyunsaturated fat, showed an increase in linoleic acid content of red blood cells from 16 to 19% and 17 to 20% over one year. To maintain interest and enthusiasm among participants, most centers distributed newsletters, flyers, recipes, and suggestions submitted by the subjects. Some centers sponsored social events as well.

Results showed that individuals can select foods and modify dietary intakes if they are knowledgeable about nutrients and food. Participation by the subjects in the study was good; the overall drop-out rate during the first year was 9.7% compared to an approximate 11% drop-out rate for the group who were selecting foods from the retail market, diet X. Reasons given for the termination of the study were: program interference with social or business life; dislike of D-H foods; problems with wives' participation; rigidity and complexity of the diet program; and desire for foods which were prohibited or restricted. The double-blind design was also thought to be a handicap in fully motivating and educating participants for the most effective sustained adherence to the dietary program. The investigators concluded that motivation would have been better if the participants had been informed of their

medical progress during the study. To make the program more practical for the general public, the nutrition education program was altered to help participants select and prepare meats from the retail market which contained lesser amounts of fat. Less rigid diet plans without the use of exchange lists were also devised. In addition, D-H fat-modified foods, with the exception of meats, were used. Results from food records and subjective evaluation indicated that there was no significant difference in the consumption of total fat, saturated and polyunsaturated fats or dietary cholesterol between the men who had purchased meats in the retail market compared to those who had used D-H meats. Also, mean serum cholesterol responses were not significantly different between the two groups. The unstructured diet plan was as effective at lowering serum cholesterol as was the defined diet plan. The authors have therefore concluded that an education program with continuous reinforcement is the most important aspect of sustained dietary modification.

Since the incidence of CHD in the population has reached epidemic proportions, preventative education programs must be implemented. It has been demonstrated that it is possible to change food selection patterns through nutrition education programs which initiate dietary change and maintain change with planned follow-up and evaluation.

METHODOLOGY

Families contacted to participate in the NUFIT project were selected by school personnel from the records of Westgrove School District. The criteria for selection was the registration of two children in each family in grades one to four. It was anticipated that each family would consist of two adults and two children. However, family composition was not carefully considered and respondents included one-parent families and families with more than two children. Ninety-three families were contacted by letter (APPENDIX A) and were asked to attend an orientation meeting to obtain more information about the project. It was hoped that only "highly motivated" persons would respond so that the program could be tested under the best possible circumstances, and later be adapted for the general public. Because the initial response was below expectation, it was decided not to include a control group in the study. It was not possible to increase the size of the group because the data collection had been planned to begin in October.

At the orientation meeting, the medical director of the project discussed the incidence of CHD and its prevention by dietary measures and improved physical fitness. The nutritionist and physical fitness educator outlined the respective programs to be followed and explained the degree of involvement that the program would require from the participants.

The parents were asked to complete a registration form (APPENDIX B) if they were interested in participating in the project. The following week volunteer families were examined by a medical team from the Health Sciences Center (HSC) in Winnipeg. The fitness level of participants was also assessed by a team from the Recreation-Nutrition (ReNu) Project. Blood samples were taken in the laboratory of the HSC for serum cholesterol and triglyceride determinations.

At the time of the medical and physical fitness assessment, the nutritionist showed each family how to record their food intake for seven days for each of the four designated family members (APPENDIX C). The nutritionist also visited each of the families in their homes during the seven day period to ensure that food records were kept accurately. Food models¹ were used to assist with estimation of quantities of food. Food records were analyzed for ten nutrients and kilocalories with the aid of a computer. A second seven-day food record, kept six months later in April, was used to assess changes in food intake and thus formed the basis of the evaluation of the nutrition education program. The months of October and April were chosen since seasonal variation of foods is limited in Winnipeg for those six months. Seven-day food records were used to assess changes in food intake since Trulson (30) had reported that the seven-day dietary record provided more accurate information about food intake over

¹Nutrition Canada Food Models

an extended period of time than does several 24-hour recalls. Serum triglyceride and cholesterol determinations done at the beginning of the study and six months later served as a biochemical indicator of dietary modification. A test of nutrition knowledge and a subjective evaluation was also completed by the parents following the education program (APPENDIX D).

Since the education program was to decrease in intensity during the six month period, group nutrition counselling was held initially every two weeks for the first two months followed by less frequent counselling on a monthly basis for the following four months. Several studies (16, 20, 21, 22, 23, 24, 25, 27, 29) have shown that motivation to change dietary habits is most effective when frequent counselling sessions are conducted. Also, since the families would be dependent on their own resources following the counselling program, the project was designed so that a gradual transition was made from very intensive counselling, at two week intervals, to less frequent meetings on a monthly basis. Group sessions utilizing films, nutrition games, programmed learning, and discussion were the basis for transmitting nutrition information. Other investigators (31, 32, 33, 34) have reported that these techniques have enhanced learning. An outline of discussion topics and teaching aids is given in APPENDIX E.

The results of the seven-day food records were discussed with each family to show how their diets could be

improved with respect to the Canadian Dietary Standard (35). The adults were taught the relationship between obesity and heart disease and were assisted in determining activity levels, caloric requirements, and desirable weights (36). Knutson and Newton (37), Todhunter (38) and Butterworth (39) have suggested that individuals are more strongly motivated to adopt new habits if information provided is made meaningful to those concerned.

On the basis of weight and caloric intake determined from the initial food records, participants who were overweight were encouraged to have reducing diets planned for them by the nutritionist. Those persons choosing to follow such diets were given individual counselling.

Group discussion sessions also included information about food composition and preparation so that the saturated fat content of the diet could be reduced by purchasing and preparing meat with reduced fat content, by using low fat dairy products, by reading labels to determine the saturated and polyunsaturated fat content, and by choosing foods when eating away from home. The meaning of terms commonly used in discussions of CHD (APPENDIX F) was also explained. In addition, individuals were provided with names of reliable sources of nutrition information which they could refer to once the project was completed.

At each group meeting a nutrition education program was planned for the children, but this program was not part of the total evaluation. Teaching aids used in this program are listed in APPENDIX G.

RESULTS AND DISCUSSION

Of 93 letters mailed to prospective subjects, ten families volunteered for the project, a volunteer rate of approximately nine percent. This compares favorably with the volunteer rate of 10.4 percent reported for the National Diet-Heart Study (29). Data for nine families are reported since one family left Winnipeg during the study. Adult male participants ranged in age from 31 to 38 years while the female age range was from 28 to 37 years. One woman was pregnant at the beginning of the study. Since school records were used to select participants, it was not possible to know in advance the total family size and ages, therefore most families participating in the study consisted of more than two children, ranging in age from four to ten years. The adult males tended to be employed in semi-professional and professional occupations and two of the men were frequently away from home, a factor which affected their eating habits.

Comparison of the nutrient intakes from the seven-day food records obtained in October and April, indicated that changes had occurred in the diets of all the adults, 17 in number, although an analysis of variance indicated that the only statistically significant changes were in total fat, saturated fat, and linoleic acid content of the diets. Table I shows the changes in consumption of protein, fat,

TABLE I

MEAN INTAKES FOR ADULTS
FROM SEVEN-DAY FOOD RECORDS
(N = 17)

	OCTOBER 1973		APRIL 1974			
	MALES	FEMALES	MALES	% CHANGE	FEMALES	% CHANGE
ENERGY (KILOCALORIES)	2529 ±741	2058 ±289	2354 ±495	6.9 ↓	1853 ±369	10.0 ↓
PROTEIN (Gm)	97.3 ±20.2	61.4 ±22.3	95.7 ±18.5	1.7 ↓	70.7 ±15.4	13.1 ↑
FAT (Gm)	117.7 ±32.5	93.0 ±29.5	103.2 ±25.0	12.4* ↓	76.0 ±17.5	18.3* ↓
SATURATED FAT (Gm)	42.0 ±16.8	31.2 ±10.2	34.8 ±12.1	17.1* ↓	22.9 ±5.4	26.6* ↓
LINOLEIC ACID (Gm)	11.4 ±3.34	8.6 ±3.1	12.3 ±5.4	7.9 ↑	10.9 ±5.4	26.7* ↑
CHO (Gm)	262.7 ±98.3	222.5 ±44.5	239.4 ±80.3	8.9 ↓	196.3 ±40.3	11.8 ↓

*Significant (P<0.05)

carbohydrate, and kilocalories. During the six-month period total fat intake declined 12.4% for male subjects and 18.3% for females. Saturated fat consumption decreased in both groups, 17.1% for the males and 26.6% for the females, while the linoleic acid content of the diets increased 7.9% and 26.7% for the males and females, respectively. It appears that dietary modification was greater for the female participants than for the males, however, the dietary intakes of the two males who ate in restaurants more frequently than the other subjects showed a greater consumption of total fat and saturated fat and a lower intake of linoleic acid. Excluding these two subjects, mean fat intakes for all the male subjects are comparable with those for the females; an average decline in total fat intake of 19.5%, a 21.0% decrease in saturated fat, and a mean increase of 22.0% for linoleic acid. Since other studies (4, 16, 21, 22, 23, 24, 25, 27, 29) have limited fat intake by dietary prescription, reported changes in fat consumption in these studies are substantially greater than those observed in the NUFIT project. Keller and associates (25) reported a 28.0% decrease in saturated fat intake and a 41.8% increase in linoleic acid content in the diets of male subjects following an intensive nutrition education program. The reductions in the total fat and saturated fat content of the diets of NUFIT participants were made primarily by the substitution of low fat dairy products for those with a higher fat content. Prior to the nutrition education program, four families were using whole milk, three families were using

milk with two percent butterfat content and two families were using skim milk. Food records kept in April showed that only one of the nine families was still using whole milk while the number of families consuming skim milk remained the same. Use of low fat cheeses increased, although most families still consumed higher fat-containing cheeses for variety. The October food records indicated that butter was used as the principle dairy spread in three households while solid margarines were used by the other six families. Following the counselling program, all nine families were using a soft margarine with 35 percent polyunsaturated fat content. Fruit replaced many fat-containing desserts and snacks in the diets of the adult participants. Methods of meat preparation were not greatly altered since most families were already broiling or roasting meats in preference to frying.

Values for serum cholesterol and triglyceride determinations for six of the subjects are reported in Table II. Data were incomplete for the remaining subjects. Few changes were observed in the individual serum cholesterol values. It should be noted that initial values were below the normal range (220 ± 20 mg/100 ml serum). Although other investigators (16, 19, 21, 23, 24, 25, 27, 29) have reported reductions up to 21.6% in serum cholesterol as a result of decreased intakes of total fat and saturated fat, the blood lipids of the subjects were above normal.

Because the data reported here is incomplete, it is difficult to assess the total effect of decreased fat intake

TABLE II

SERUM CHOLESTEROL AND TRIGLYCERIDE
DETERMINATIONS FOR ADULT PARTICIPANTS
(N = 6)

	OCTOBER 1973		APRIL 1974	
	SERUM CHOLESTEROL mg/100ml	SERUM TRIGLYCERIDE mg/100ml	SERUM CHOLESTEROL mg/100ml	SERUM TRIGLYCERIDES mg/100ml
MALES				
SUBJECT I	165	150	193	150
SUBJECT II	155	185	140	125
SUBJECT III	160	204	220	185
FEMALES				
SUBJECT IV	190	95	178	75
SUBJECT V	145	60	165	50
SUBJECT VI	135	76	150	80

on serum cholesterol. However, it appears that serum cholesterol values for six of the seventeen subjects remained within normal limits during the six-month study period. It should also be noted that serum lipid determinations were not made until three weeks after the program was begun, consequently initial values may have reflected some dietary modification.

Results reported for serum triglycerides showed a decrease in four individuals, while results for one individual remained stable. The decreases in serum triglycerides coincide with an average decrease for all subjects in carbohydrate consumption of 8.9% for the males and 11.8% for the females, mainly in the form of refined sugar. The decrease in carbohydrate consumption for the group is comparable to that reported by Keller and associates (25), an 11.2% decrease, while Shorey and co-workers (27) reported a 42% decrease in carbohydrate intake for young male subjects.

The mean energy intake for the participants decreased, 6.9% for the male subjects and 10.0% for the females. Caloric consumption decreased by reducing fat intake as outlined previously. As well, decreased use of high-calorie snack foods and refined sugar accounted for the remainder of caloric reduction in the males, as protein intake for that group declined only slightly by 1.7%. However, the average protein intake for the females increased by 13.1%, mainly as a result of better snack selections of milk, meat and cheese. It appears that since calories from carbohydrate decreased by a similar

magnitude as protein increased (11.8%), reduction in dietary fat accounted for the greatest change in calories for the females.

The ages and weights for all adults in the project appears in Table III. Five of the seventeen participants were overweight at the beginning of the study. Two males and three females elected to follow reducing diets planned for them by the nutritionist. Three subjects successfully attained desirable weights and one subject lost weight but did not reach desirable weight. The latter subject (subject IV) gained weight during the study but the 99.1 kg shown in Table III actually represents a weight loss since this subject weighed more than this prior to April, 1974. Subject XVI gained weight and discontinued smoking during the period when weight reduction was attempted.

Most of the diets compared favorably with recommended allowances for vitamins and minerals at the beginning and end of the study. However, the diets of four of the seventeen adults were below the CDS for the entire study; riboflavin intake increased for two diets which were low in that nutrient, as was the case with one diet which was low in vitamin C. The three diets which were low in iron at the beginning of the study were at similar levels at the end of the six-month period.

A nutrition knowledge test completed at the end of the education program served as a measurement of how well the subjects had retained the material presented. On the

TABLE III

WEIGHT CHANGES OF ADULT SUBJECTS
OVER A SIX-MONTH PERIOD
(N = 17)

MALES	AGE	WEIGHT (Kg)	
		OCTOBER 1973	APRIL 1974
SUBJECT I	33	61.0	60.6
SUBJECT II	36	75.5	74.6
SUBJECT III	32	69.5	71.7
*SUBJECT IV	31	96.9	99.1
*SUBJECT V	38	104.8	95.5
SUBJECT VI	33	75.7	75.5
SUBJECT VII	32		82.5
SUBJECT VIII	37	77.7	
FEMALES			
SUBJECT IX	37	51.8	53.2
SUBJECT X	31		47.1
SUBJECT XI	34	55.1	55.5
SUBJECT XII	28	56.0	57.1
*SUBJECT XIII	31	56.8	54.2
*SUBJECT XIV	34	61.1	55.6
SUBJECT XV	32	57.3	57.9
*SUBJECT XVI	36	67.7	81.6
SUBJECT XVII	36	55.2	55.2

*Subjects who followed reducing diets

average, the women scored better than the men, 79% compared to 63%. This is not surprising in view of the fact that attendance at the group sessions was better for the women than the men. In fact, two of the men who did not attend regularly commented that they felt it was more important that their wives learn about nutrition, an opinion that is very difficult to alter. Comments from the subjective evaluation indicated that discussion served a useful purpose in transferring information and that the adults found the material presented helpful. However, two couples commented on the fact that the program could have been condensed to cover a shorter period of time.

Although evaluation of the nutrition education program for the children was not an objective of the study, results of the seven-day food records showed an improvement in the overall nutrient intakes. Prior to the program, eight of the seventeen children were consuming diets below the CDS for calcium, two diets were low in vitamin C, and one diet did not meet the CDS for iron. Following the nutrition education program, only three of the diets did not meet the CDS for calcium, while one diet was still low in iron. Milk and cheese consumption increased markedly for those children whose dietary calcium improved, while vitamin C was obtained by regular consumption of fresh oranges and orange juice for the two children who had previously had low vitamin C intakes. Many of the parents indicated at the outset of the program that lack of vegetable consumption for the children was a

particular problem. Although nutrient intakes did not reflect this, there was a lack of variety in vegetables consumed by the children. Following the education program which was designed to improve vegetable acceptance, dietary records showed an increased variety in raw vegetables consumed. According to the subjective evaluation by the parents, the children also ate more fresh fruits and dairy products for snacks in preference to sweets. Many of the parents also commented that their children had an increased awareness about foods and their effects on the body.

CONCLUSIONS

Data collected from the seven-day food records along with decreases in serum triglycerides and weight loss of overweight individuals shows that an intensive nutrition education program with follow-up has contributed to the modification in eating habits of young families over a six-month period. Some of the techniques which were used successfully in this study could be adapted to accommodate larger groups of approximately 50 people. Evaluation of participants' food intakes could remain an essential aspect of the program in order to make the information provided more meaningful to individuals involved and to serve as an assessment of dietary modification. This evaluation could be done successfully with the use of food guides which translate recommendations for nutrients into suggested servings of foods (40). The subject matter of the program concerning obesity and heart disease and techniques for reducing the fat content of the diet could remain the same, utilizing films, nutrition games, programmed instruction, and hand-outs. The program could be condensed to cover weekly sessions, five weeks in duration. It is recommended that more printed educational materials be developed and made available to the general public pertaining to primary preventative dietary measures in relation to heart disease. Although follow-up has been shown to be an essential aspect

of motivating sustained dietary change, it is not possible to predict the ideal period necessary for follow-up.

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APPENDIX A

PATRONS

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Lieut. Governor of Manitoba

THE HONOURABLE EDWARD SCHREYER
Premier of Manitoba



-42-
PRESIDENT

C. S. LECUYER, C.A.

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WINNIPEG, MANITOBA
R3B 2H8
943-8936

October 3, 1973

The Manitoba Heart Foundation is undertaking a very special education programme with a selected group of families. The project will be undertaken through Westgrove School and all families with children under grade 4 level are eligible to participate.

This programme is designed to keep you living healthier and happier and avoid coronary heart disease by better eating and fitness habits.

You and your family have been chosen to share in this programme. We hope that you will meet with us Wednesday, October 10th., at 8:00 p.m. at the Westgrove School, to discuss the programme fully and hopefully join in with other families in your area.

If you wish further information, please call June Singleton at 667-0461 or Mrs. Darwin at the Manitoba Heart Foundation office, 943-8936.

We look forward to hearing from you, and to meeting you.

Yours very truly,

*Clifford Lecuyer, C.A.,
President.*

**INTERESTED IN FAMILY NUTRITION
AND FITNESS ? ? ?**

Here's the info --

A Physical Educator and Nutritionist have a carefully planned regime of activities all geared to lead you and your family toward higher levels of health and well being. Sessions in the gymnasium, swimming pool, outdoors, should counsel you toward leading a more regular pattern of exercise. Guidance in your meal planning should better your diet habits.

*We're looking forward to the programme.
Hope you're interested.*

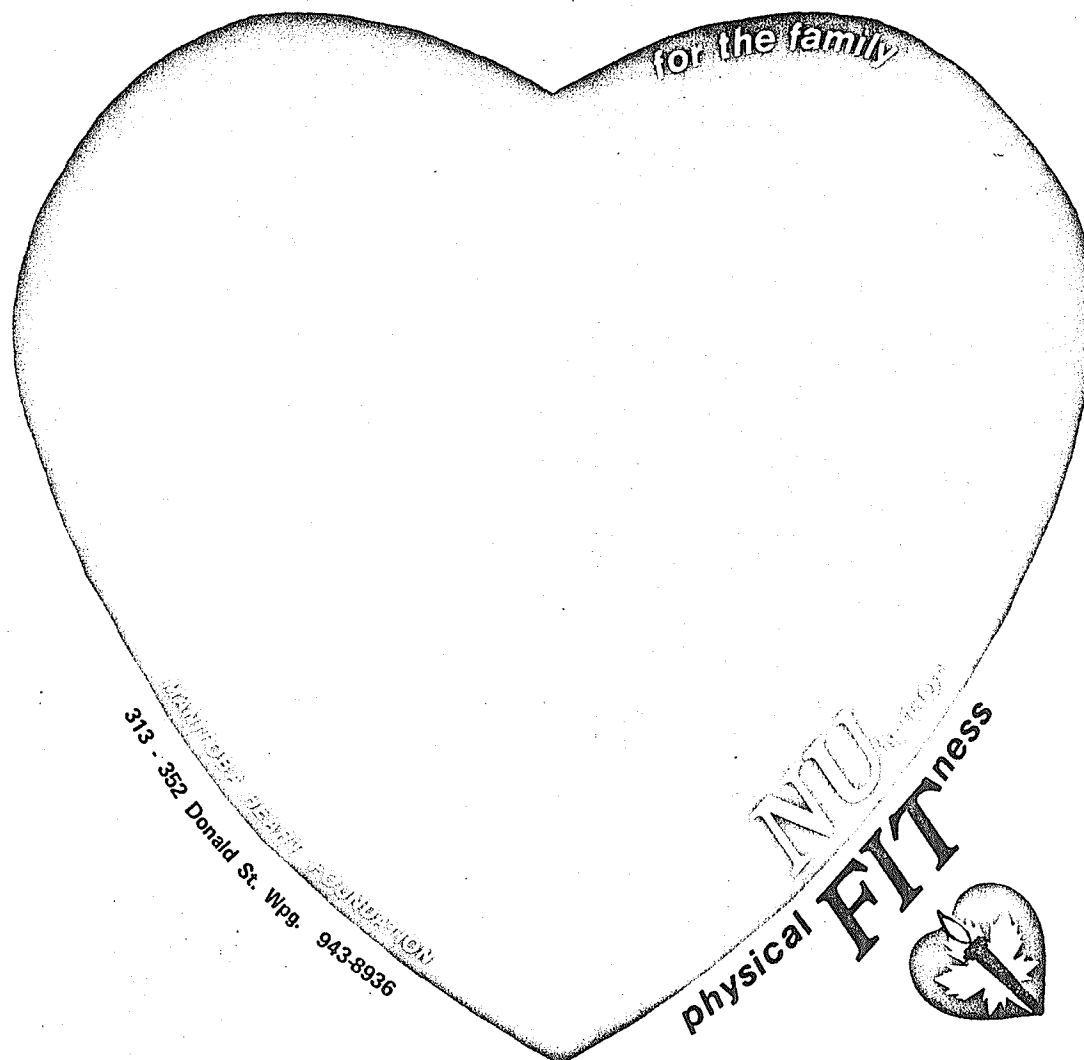
Sincerely,

JUNE SINGLETON (Physical Educator)

LINDA DIENER (Nutritionist)

For further info contact June at 667-0461

*Linda at 269-3439
or 474-9554*



Physical Recreation FACTS

Man was made to move. A basic amount of physical activity (work, etc.) is necessary to develop and maintain a good level of body functions such as blood circulation, breathing, and energy production. Individuals who are more fit have more energy and thus can enjoy a fuller life. Physical activity is often medically prescribed for patients, particularly for those with cardiovascular disease, a prime killer in North America today.

The benefits of physical activity cannot be stored. A one-half hour of activity every second day is a minimum requirement to insure optimal development or maintenance of the body systems. Daily activity is best.

Different kinds of activities develop certain specific fitness qualities such as endurance, flexibility, and strength. Endurance is the most important physical fitness quality. Activities such as walking, jogging, cycling, or swimming are the best activities to develop cardiovascular endurance. Develop an exercise habit!

The best kind of physical activity is free. You don't have to pay high fees to belong to clubs, or commercial gimmicks to get fit. Most of the claims of advertised gimmicks are either false, or very limited to a specific benefit. You can obtain the best benefits of physical activity without any equipment or extensive facilities.

A major cause of overweight is lack of activity. The best approach to weight control (maintenance, loss, or gain) is a combination of regular activity and sound eating habits to balance the energy expenditure with food intake.

Another bonus benefit of physical activity is the development of a better fuel system. Regular activity develops a better circulation and oxygen supply to all body cells and thus enables the body to get the most out of its food intake.

QUESTIONS About Physical RECREATION AND NUTRITION

What is the relationship of physical fitness, Nutrition and good health?

How much and what kind of food and exercise is best?

What are the costs of sound nutrition and physical activity?

What is the relationship of diet, exercise and weight control?

Nutrition FACTS

You are what you eat! Good eating habits are reflected in the appearance of all your body parts (skin, teeth, bones, hair, nails). A daily intake of all the essential nutrients will provide you with the physical and mental alertness that you need to enjoy life.

Each day we need to include a variety of foods in our meal and snack selection if we intend to get all the essential nutrients. Protein foods, such as meat, fish, poultry, eggs, cheese, dried peas and beans, need to be eaten at least once daily to give our body GROW power. Whole grain or enriched breads and cereals with butter or fortified margarine give our bodies GO power. Several servings of vegetables, especially green and yellow ones, and fruits, especially citrus ones, are needed daily to give our body GLOW power. Milk and other dairy products will round out our diet and also supply GO, GROW, and GLOW power.

Careful menu planning and wise shopping habits will keep us well nourished and within our food budget. Ignore specially foods and "health" foods which are more expensive and only provide the same nutrients as lower cost foods found in the supermarkets. It is more appetizing, less expensive, and safer to get your minerals and vitamins in food rather than from expensive pills and tonics. Fad diet programs should also be avoided as they may fail to develop sound eating habits, are generally high in cost, and are not necessarily well balanced nutritionally.

The answer is simple! If we eat more calories than we burn up, we gain weight. If we eat fewer calories than we burn up, then we lose weight. A healthy person is at his ideal weight and maintains this weight by balancing his food intake and his energy output.

APPENDIX B

Registration Form

NAME

ADDRESS

.....

PHONE

NUMBER OF CHILDREN AGES FATHER

AGES MOTHER

AGES MALE

AGES FEMALE

NUMBER ATTENDING ()

UNABLE TO ATTEND BUT INTERESTED ()

Please be advised that this form is not a commitment.

APPENDIX C

DIETARY SURVEY - GENERAL GUIDELINES

1. Food record is to be kept for seven (7) consecutive days. Please record EVERYTHING eaten including items added to, or eaten with foods, such as gravies, sauces, salad dressings, butter or margarine added to vegetables, sugar and cream in beverages, etc..

2. Specify which foods are consumed for breakfast, morning snack, luncheon, afternoon snack, dinner, evening snack. If nothing is eaten, write "NOTHING" under the particular period.

3. Each food consumed should be written on a separate line. Specify the amount in household measure, size, or number under "QUANTITY" column.

Give a complete description as to the method of cooking, or processing, whether the food is raw or cooked, etc..

For example:

3/4 cup	wax beans, canned
2	peach halves, canned, 20% syrup
1	pork chop, broiled, 3" x 4" x 1/2"
1	apple, medium, fresh, with skin

4. Give dimensions for baked goods, such as pies, cookies, cakes. Specify if they are iced, have whipped topping, etc..

5. For combination items list all ingredients in the recipe separately.

For example: 3/4 Cup Tuna Casserole

2 - 7 oz. tins	tuna, drained
1 - 10 oz. tin	cream of mushroom soup
1/2 cup	milk 2%
1/2 cup	egg noodles, cooked
1 tables.	diced onion
	chopped parsley
	salt & pepper

AGE: _____ GROUP: _____ CODE NO.: _____

OF WEEK: _____ **DATE:** _____

IS A USUAL DAY? IF NO, GIVE REASON: _____

[illegible]

APPENDIX D

NUFIT

Nutrition Program Evaluation

1. Plan a one day's menu to meet the nutrient requirements of any member of your family, following Canada's Food Guide.

Please specify age and sex of the person the menu is designed for and the amounts of food wherever appropriate.

2. Which of the following foods is the best source of Vitamin A?
 - (a) Roasted peanuts
 - (b) Squash
 - (c) Baked sole
 - (d) Don't know
3. Which of the following foods is the best source of Thiamin (Vitamin B₁)?
 - (a) Rolled oats
 - (b) Cabbage
 - (c) Orange juice
 - (d) Don't know
4. What is the recommendation in Canada's Food Guide for amount of milk required daily for a child of age 7?
 - (a) 1/2 cup
 - (b) 4 cups
 - (c) 2 1/2 cups
 - (d) Don't know
5. If a member of your family did not like to drink milk, which of the following foods might he eat in order to obtain a good source of calcium?
 - (a) Liver
 - (b) Fresh pineapple
 - (c) Pizza
 - (d) Don't know
6. Which of the following foods is the best source of Iron?
 - (a) Turnip
 - (b) Bacon
 - (c) Kidney
 - (d) Don't know
7. A fat that is high in polyunsaturated fatty acids is _____.
8. Saturated fats tend to (raise), (lower) _____ blood cholesterol.
9. Butter is composed mostly of (saturated), (unsaturated) _____ fat.
10. Why is it advisable to remove visible fat from meat before cooking?

11. If you wanted to lose weight, why would you not completely eliminate bread from your diet?

12. Did you follow a weight reduction program suggested for you by the nutritionist?

_____ Yes _____ No

Were you successful at reducing weight?

_____ Yes _____ No

13. What did you enjoy most about the nutrition program? _____

What did you enjoy the least? _____

14. What do you think your children have learned about food from attending the sessions?

15. Would you volunteer to participate in another program of similar nature?

Yes _____ No _____

APPENDIX E

NUTRITION EDUCATION PROGRAM
OUTLINE FOR ADULTS

	PURPOSE	TEACHING AIDS
MEETING I	To stimulate an interest in learning basic nutrition principles	Film: "The Real Talking Singing Action Movie About Nutrition." Available from: Oxford Films, Inc., 1136 N. Las Palmas Ave., Los Angeles, California. 90038 The Calorie Game Cost: \$9.95 Available from: Games That Teach Graphics Company, P.O. Box 331, Urbana, Illinois. 61801
MEETINGS II III IV	To discuss the adequacy of individual diets in relation to the Canadian Dietary Standard	Computer Analysis of Seven-Day Food Records Canadian Dietary Standard Booklet: "What To Eat To Be Healthy." Available from: The Canadian Life Insurance Association, 44 King Street West Toronto, Ontario, M5H 1E9 No charge
MEETING V	To emphasize the relationship between caloric consumption, activity and energy requirements To illustrate the relationship between obesity and heart disease	Determination of desirable caloric intake, weight, and present activity level

PURPOSE

TEACHING AIDS

MEETING VI	To teach the relationship between type and amount of fat consumed and heart disease	Results of serum cholesterol and triglyceride determinations
	To discuss purchasing of meats and their preparation in decreasing fat content	Definition of terms
	To emphasize the importance of reading labels to determine food composition	Shopping and food preparation tips
MEETING VII	To point out dairy products with reduced saturated fat and cholesterol content	"Programmed Instruction For Fat Controlled Diets." Available from: The American Heart Association, 44 East 23rd Street, New York, N.Y. 10010
		"Recipes For Fat-Controlled, Low Cholesterol Meals" Available from: The American Heart Association.
		"The American Heart Association Cookbook" Cost \$7.95
MEETING VIII	To direct participants to reliable sources of nutrition education	Table I. Fat, Cholesterol and Protein Content of Selected Milk Products. <u>J. Amer. Dietet. Assn.</u> , 62:277, 1973.
		Program evaluation

APPENDIX F

N U F I T

Definitions

Cholesterol is a waxy material used in many of the body's chemical processes, and is essential in proper amounts for good health. Cholesterol is manufactured by the body, but may also be obtained in the diet from foods of animal origin. In certain instances blood cholesterol may be elevated above normal, resulting in cholesterol being deposited on the inside of some blood vessels, eventually narrowing the passage. If blood vessels become completely constricted, preventing blood from reaching vital organs, oxygen supply to those organs is cut off. This occurrence in blood vessels leading to the heart results in a heart attack.

Saturated Fats are fats of animal or plant origin which tend to raise the level of cholesterol in the blood. Saturated fats are usually solid at room temperature.

Animal Sources: Beef, lamb, pork and ham, shellfish
Butter, cream, whole milk
Cheeses made from cream and whole milk
Egg yolk

Plant Sources: Coconut oil, cocoa butter and palm oil.
These oils are often found in many hydrogenated shortenings, some margarines, commercially prepared cookies, pie fillings and nondairy milk and cream substitutes.

Polyunsaturated Fats are usually oils of vegetable origin which tend to lower the level of cholesterol in the blood. Oils such as corn, cottonseed, sesame seed, soybean and sunflower seed are high in polyunsaturated fat.

Monounsaturated Fats are fats which neither lower or increase blood cholesterol. Examples of monounsaturated fats are olive oil and peanut oil.

Triglycerides - fats of animal or vegetable origin, whether solid or liquid, are composed of triglycerides. The level of triglycerides in the blood therefore increases following a meal high in fat, but their presence also reflects the synthesis of fat from excess carbohydrate, particularly refined carbohydrate. This situation most likely occurs when caloric intake exceeds caloric expenditure.

Hydrogenation changes liquid fats to solid fats (example:

hydrogenated shortenings). Completely hydrogenated fats have a similar influence as do saturated fats in that they tend to increase blood cholesterol.

Atherosclerosis is a disease in which there is a thickening and narrowing of the major blood vessels, caused by a deposition of cholesterol, other lipids and connective tissue in the inner layer of the arterial wall which interferes with the normal flow of blood. This is the basic cause of most heart attacks and strokes.

Coronary Heart Disease is the most common form of adult heart disease in which the main (coronary) arteries of the heart have atherosclerotic deposits and normal blood flow of the heart is impaired.

APPENDIX G

NUTRITION EDUCATION PROGRAM
OUTLINE FOR CHILDREN

	PURPOSE	TEACHING AIDS
MEETING I	To stimulate interest in learning about nutrition	Film: "The Real Talking, Singing Action Movie About Nutrition." Available from: Oxford Films Inc., 1136 N. Las Palmas Ave. Los Angeles, California. 90038 The Calorie Game. Cost: \$9.95 Available from: Games That Teach Graphics Company, P.O. Box 331, Urbana, Illinois, 61801
MEETING II	To involve children in entertaining ways of learning about nutrients	Nutrition Crossword Puzzles Nutrition Pictures For Coloring
MEETING III	To encourage vegetable acceptance in the diet To encourage tasting unfamiliar foods	The Brown Paper Bag Game - Children felt a variety of familiar and unusual vegetables and tried to identify them without being able to see them Children then tasted the vegetables raw. Book "Green Eggs and Ham" By Dr. Seuss.

	PURPOSE	TEACHING AIDS
MEETING IV	To emphasize the importance of a good breakfast To be able to identify a well balanced breakfast	Plastic food models
MEETING V	To introduce the relationship between foods and the nutrients they contain	"Nutes To You" Kit Available from: Nutrition Dynamics, Inc. 10 South Riverside Plaza, Suite 645, Chicago, Illinois. 60606 Cost: \$29.00 Contains an enlarged milk carton and "stuffed nutrients" representing protein, fat, carbohydrate, vitamins, and minerals.
MEETING VI	To create an awareness of the importance of minerals to the health of the body	"Nutes To You" Kit - Stuffed toy representing minerals. Children tasted snacks of raisins and cheese containing iron and calcium.
MEETING VII	To summarize nutrition principles taught	Film: "You And Your Food" Walt Disney Production