DIET AND CARDIOVASCULAR DISEASE:

INTERRELATIONSHIPS AMONG NUTRITION ATTITUDES, KNOWLEDGE, PRACTICE, AND BIODEMOGRAPHIC CHARACTERISTICS OF ADULT MEMBERS OF COMMUNITY CENTRES

by

ANN DOLORES SULLIVAN

B.Sc., St. Francis Xavier University, Nova Scotia, 1964
B.Ed., St. Thomas University, New Brunswick, 1966
M.Sc., The University of Manitoba, 1971

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The University of British Columbia
2075 Wesbrook Place
Vancouver, Canada
V6T 1W5

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ABSTRACT

A study was designed to investigate the attitudes, knowledge, and practice regarding diet and cardiovascular disease (CVD) among adult members attending selected community centres. The relationships among attitudes, knowledge, and practice and the influence of specific biodemographic variables on these three dependent variables were determined. The independent variables, non-manipulative in nature, were age, gender, living arrangement, family history of CVD, personal history of CVD, physical exercise pattern, smoking habit, education level, and obesity risk. Data were collected by a self-administered questionnaire that had been validated and pretested in a pilot study.

In May 1979, questionnaires were distributed by random day to adult members of 11 community centres in the city of Vancouver. Each centre was represented by a random sample or by volunteers in attendance at each class on the chosen day. The final sample size was 281, yielding an overall response rate of 74.7%.

Data were analyzed by computer and all analyses were conducted at the .05 level of significance. Expressed as percentages of possible scores, the mean scores for the two attitude subtests and total test were quite high (83%) with standard deviations of 8 to 9%. The mean scores for the three knowledge subtests and total test revealed tests of medium difficulty (48 to 53%) with standard deviations of 12 to 17%. Practice scores,

expressed as ratios of recommended values, were equal to or exceeded the Canadian Dietary Standard and the Nutrition Recommendations for Canadians for nine of the 11 nutrients examined; all were greater than 67% of the recommended values.

Reliabilities determined by internal consistency, test-retest, and congruency check procedures for attitudes and knowledge, biodemographic, and practice instruments, respectively, were considered adequate for the purpose of the study.

Correlation analysis revealed that attitudes and knowledge were moderately correlated (range .38 to .56) but practice and both attitudes and knowledge were weakly correlated (range .00 to .24). One-way multivariate analyses of variance revealed that living arrangement, degree of obesity, and positive family history of CVD did not appear to have an effect on any of the dependent variables. Smoking habit was not found to influence either attitudes or knowledge.

Multivariate analyses of variance revealed that respondents with a positive personal history of CVD had significantly different attitudes toward the use of diet in prevention of CVD and performed significantly better on the subtest about the affect of foods than those without a positive history. Adults under 50 years of age had significantly more positive attitudes toward the role of diet in heart disease and scored significantly higher on subtest of facts versus fallacy than adults over 50 years of age. Females had significantly more positive attitudes and performed significantly better on all knowledge subtests than males. The education group with less than grade 12 had

significantly less positive attitudes toward the role of diet in heart disease and significantly lower knowledge related to food composition than all other education groups; and significantly lower scores on facts versus fallacy than the one to three years university group. No significant differences in knowledge or practice were observed between groups who varied in exercise pattern, however, the sedentary group had significantly less positive attitudes toward the role of diet in heart disease than those who were classified as high moderate or vigorous. While significant differences in practice were observed for a number of biodemographic variables, no particular group was characterized by a deficient or excess intake of any of the 11 nutrients examined.

Several implications for nutrition education were inferred from interpretation of results.

Research Supervisor

TABLE OF CONTENTS

APPENDIX | Page

LIST OF TABLES

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CHAPTER I

INTRODUCTION

Background to the Problem

Few areas of research in clinical nutrition have received as much attention in recent years as the relationship of diet to cardiovascular disease (CVD). However, little conclusive evidence has resulted. In Canada, CVD is the major cause of mortality and morbidity as well as a major source of economic drain from loss of productivity (Canada, 1974a; Canadian Heart Foundation, 1977). These facts, combined with the increased incidence of premature heart attacks among adults under 40, have been responsible for an intensification of research on etiology and prevention of CVD, including the role of diet.

The first evidence of a link between habitual diet and CVD was provided by Ancel Keys (Keys et al., 1955) who introduced the dietary fat hypothesis based initially on a correlation between CVD and available food fat in seven countries (Keys, 1970). Subsequently, numerous researchers (McGandy et al., 1972; Kummerow et al., 1977; Truswell, 1976; Vergroesen, 1977; Eaton, 1978) contributed information on the effect of fat and other nutrients on the development of CVD which supported the relationship of diet to CVD. However, several years of research have failed to provide consistent results or sufficient evidence to establish a causal relationship between any specific dietary factor and CVD.

Despite inconsistent and often controversial research findings, a number of countries have adopted national dietary guidelines for prevention of heart disease. These recommendations for dietary modification are based upon the concept of risk factors and knowledge of the influence of diet on these factors. Risk factors are "factors (habits, traits or abnormalities) that are associated with an increased likelihood of heart attack" (Kuller, 1976, p.425). Although risk factors may be genetic or environmental, strategies for prevention of CVD have focused on those factors that may be controlled. Dietary guidelines for prevention of CVD, such as the Nutrition Recommendations for Canadians (NRC) (Canada, 1977), are aimed at reducing two major risk factors, hyperlipidemia and hypertension, as well as obesity.

Release of NRC was accompanied by additional recommendations to Government, Agriculture, and Industry stressing the importance of establishing vigorous campaigns to promote the recommended dietary changes. This required that research be directed at the development of the most effective methods for making useful knowledge available to Canadians. Accomplishment of this goal may be greatly facilitated by prior assessment of the population's current nutrition attitudes, knowledge, and practice. Based on results of such an assessment, appropriate nutrition education programs may be developed.

A search of the literature revealed a number of studies that have assessed attitudes, knowledge, and practice related to general nutrition but a paucity of research related to the assessment of cardiovascular nutrition attitudes, knowledge, and practice. In addition, few of the data collection instruments developed to measure these three variables have been empirically and critically assessed for validity and reliability. This finding indicated a need to develop sound instruments for measuring nutrition attitudes, knowledge, and practice so that nutrition education programs could be planned, based upon accurate baseline information.

Once the data are available, investigation of relationships among nutrition attitudes, knowledge, and practice is required, since the development of an effective nutrition education strategy assumes a particular sequence of events prior to the adoption of a behavioural change such as dietary practice. The traditionally accepted model, the KAP or consistency model, predicted that knowledge would be followed by change in attitude which would lead to change in behaviour (Swanson, 1972). This alleged sequence of change has been seriously contradicted by research findings. As a result, several alternate models have been proposed to explain the interrelationships among attitudes, knowledge, and practice which, according to McGuire (1967), are complimentary to, rather than mutually exclusive of, one another.

Researchers have attempted to resolve these cognitive inconsistencies and to predict how inconsistency reduction might occur. One outcome (Fishbein, 1967) indicated that behaviour is a function of many variables including: situational variables, norms, and motivation as well as attitude; and that any factor which influenced one or more of these direct determinants was also an important, albeit indirect determinant.

The practical applicability of these findings to the comprehension of how healthy behaviour might be promoted is obscure. Clearly, knowledge is a necessary factor in the total process but it may not be the determining factor in behavioural change. Indeed, a considerable amount of variation might be expected in the relationship between different factors (attitudes, knowledge, or biodemographic characteristics) and behaviour.

While it is important to delineate the model that best represents the observed results, identification of the specific factors responsible for the dietary practice is paramount. Recognition of misconceptions and inadequacies in knowledge related to diet and CVD, negative attitudes that might interfere with a desirable change, and biodemographic subgroups of the population that require special attention, would provide the foundation on which to build appropriate cardiovascular nutrition education programs.

Statement of the Problem

An analytical survey was conducted to determine interrelationships among cardiovascular nutrition attitudes, knowledge, practice, and biodemographic characteristics. Data were collected among adult members of community centres to address the following questions:

1. What are current attitudes, knowledge, and practice related to diet and CVD?

2. What is the nature of the relationships among attitudes, knowledge, and practice?

3. Is there a significant difference in nutrition attitudes, knowledge, and practice among groups defined in terms of the following biodemographic variables:

   (a) age
   (b) gender
   (c) living arrangement
   (d) family history of CVD
   (e) personal history of CVD
   (f) physical exercise pattern
   (g) smoking habit
   (h) education level, and
   (i) obesity risk?

Hypotheses

Based on review of the literature, it was postulated that there would be a significant relationship among attitude, knowledge, and practice scores of adults. Consequently, the following three null hypotheses were tested among adults attending community centres: There is no significant correlation

1. between attitude and knowledge scores,
2. between attitude and practice scores, and
3. between knowledge and practice scores.

Given significant relationships were found among the three variables, it was hypothesized that one of the following two plausible causal models would account for the observed relations:

1. Knowledge "causes" attitudes which lead to practice.
2. Attitudes "cause" knowledge which leads to practice.

A third set of hypotheses was examined in which attitudes, knowledge, and practice of various subgroups were compared:

1. There are no significant differences in mean attitude, knowledge, and practice scores among young, mid-, or old-aged adults.

2. There are no significant differences in mean attitude, knowledge, and practice scores between male and female adults.

3. There are no significant differences in mean attitude, knowledge, and practice scores between adults who live with family and those who do not.

4. There are no significant differences in mean attitude, knowledge, and practice scores between adults who have a positive family history of CVD and those who do not.

5. There are no significant differences in mean attitude, knowledge, and practice scores between adults who have a positive personal history of CVD and those who do not.

6. There are no significant differences in mean attitude, knowledge, and practice scores between adults who follow sedentary, low moderate, high moderate, or vigorous physical exercise patterns.

7. There are no significant differences in mean attitude, knowledge, and practice scores among adults who are non-smokers, past smokers, light smokers, moderate smokers, heavy smokers, or very heavy smokers.

8. There are no significant differences in mean attitude, knowledge, and practice scores among adults who have less than grade 12, grade 12, one to three years university, or four or more years university education.

9. There are no significant differences in mean attitude, knowledge, and practice scores among adults who are at low, moderate, or high risk for obesity.

Definition of Terms

The following terms were operationally defined for the purpose of this study:

Adults: members of community centres who were 19 years of age or older.

Participants: adult members of community centres who were registered for programs offered during the Spring 1979 session and who agreed to participate in the study.

Community centre: the 11 community centres in the city of Vancouver that agreed to participate and that fulfilled the criteria for inclusion in the study (see p.104). A community centre is a multi-purpose neighbourhood facility operated by the Vancouver Park Board to provide space for cultural, sports, educational, physical fitness, and social activities (Vancouver, 1977).

Nutrition attitudes: participant's opinions of the importance of diet in CVD as measured by scores reflecting responses to the attitude instrument (scale) developed for this study.

Nutrition knowledge: participant's comprehension of basic concepts of diet and CVD as measured by scores obtained on the knowledge test (scale) developed for this study.

Nutrition practice: participant's usual dietary intake as measured by scores obtained in three steps: estimation of usual intake of specific foods using amounts or serving sizes reported in the practice instrument developed for this study, change to nutrient values based on computer food composition data bank, and conversion to nutrient ratio scores based on the Canadian Dietary Standard (Canada, 1975a) for age and gender, and the Nutrition Recommendation for Canadians (Canada, 1977).

Cardiovascular disease (CVD): atherosclerosis and hypertension.

Living arranagement: one of the following modes of living: with family, roommate(s), communal, alone, other.

Family history of CVD: prior history of hypertension, hyperlipidemia and/or heart attack by any member of the immediate family (parent, sibling, spouse, child).

Personal history of CVD: prior treatment for one or more of the following conditions: hypertension, hyperlipidemia, heart attack, angina, diabetes.

Physical exercise pattern: one of the four categories defined by the Health Hazard Appraisal Manual (Canada, 1974b): sedentary (work and leisure, under five flights of stairs or half a mile of walking per day); low moderate (some activity work and leisure; between five and 15 flights of stairs or 0.5 to 1.5 miles walking or comparable daily exercise); high moderate (programmed exercise four times per week or 1.5 to two miles of walking or 15 to 20 flights of stairs or comparable daily exercise); vigorous (greater than that of high moderate).

Smoking habit: one of six categories of risk ranging from low to high: nonsmoker (never smoked or not smoked for five years); former smoker (not smoked for less than five years); light smoker (cigars or pipes only: less than five per day not inhaled); moderate smoker (cigars or pipes only: five or more per day or any amount inhaled; and cigarettes: less than 10 per day); heavy smoker (cigarettes: 10 to 19 per day); very heavy smoker (cigarettes: 20 or more per day). These categories were modified from the Health Hazard Appraisal Manual (Canada, 1974b) and the health risk index (Family Health Medical Datamation, 1978).

Level of education: one of four classical groupings for years of education completed: less than grade 12, grade 12, one to three years university, four or more years of university.

Obesity risk: low, moderate, or high risk according to Thomas' nomograph method for diagnosing obesity (Thomas et al., 1976) and based on body mass index.

Body mass index (BMI): ratio of weight in kilograms to height in meters squared (Keys et al., 1972).

Assumptions

Assumptions underlying this study are:

1. Participants in the study are representative of the adult membership of community centres in the city of Vancouver.

2. Each questionnaire received from participants in the study was completed in good faith, by the individual to whom it was distributed, without assistance from reference sources or other individuals.

Organization of the Study

This study begins with background information relating to cardiovascular nutrition and the need for research to determine current attitudes, knowledge, and practice among the general public. A review of pertinent literature is presented in Chapter II. The pilot study, conducted to establish reliability and validity of data collection instruments developed for this research, is summarized in Chapter III.

Chapter IV includes a description of the methodology employed for this research. The results and a discussion of the major findings are presented in Chapter V. The sixth and final chapter contains a summary of the study, limitations, and implications based on interpretation of the findings.

Appendices contain material pertinent to the investigation and are appropriately identified in the sections of the report to which they apply.

CHAPTER II
REVIEW OF THE LITERATURE

In the first section of this chapter the current position regarding nutrition's role in cardiovascular disease (CVD) including the concept of risk factors, strategies for prevention, and recommendations for Canadians, is discussed. The second section examines both the traditional and alternate models for the interrelationships among attitudes, knowledge, and practice as well as contributions of research on general and cardiovascular nutrition attitudes, knowledge, and practice. The final section is a critique of methods for assessing attitudes, knowledge, and practice including instruments, procedures for data collection, and techniques for determining validity and reliability.

Nutrition and Cardiovascular Disease (CVD)

Risk Factors

Current knowledge of the role of nutrition in CVD has evolved from epidemiological, experimental, and clinical investigations that have established a number of "risk factors" associated with susceptibility to CVD (Keys et al., 1955; Sherwin, 1974; Oliver, 1976). These risk factors, defined as factors associated with an increased likelihood of heart attack (Kuller, 1976), may be genetic in origin or acquired from one's environment. They have been classified as primary, including hypercholesterolemia, hypertension, and cigarette smoking or secondary, including age, gender, heredity, hypertriglyceridemia, diabetes mellitus, physical inactivity, stress, and personality type (Gotto et al., 1976; Kuller, 1976; Blackburn, 1976). Because genetic manipulation is not possible at present, research has been focused on environmentally produced risk factors thought to be amenable to preventive action such as lifestyle and dietary modification.

Strategies for Prevention of CVD

Fundamental to the concept of prevention of CVD is the belief that CVD is not an inevitable consequence of aging or affluence and that its development may be retarded or reversed. One approach to the prevention or reversal of CVD is to intervene on risk factors. Two types of intervention trials for CVD have been conducted: primary prevention trials designed to prevent CVD among subjects at high risk but free of clinical CVD; and secondary prevention trials designed to prevent death or recurring heart attack in patients with CVD.

Although valuable information has resulted from both types of trials, secondary prevention trials, by their very definition, provided limited information regarding the feasibility of lifestyle modification for the general public as a means of preventing CVD. The main thrust of these trials has been therapeutic use of diet which might be so severely modified that it would not be tolerated by or advisable for the general population.

A classic example of a primary prevention trial was the New York Anti-Coronary Club Study designed to lower blood cholesterol levels among a group of adult men (Christakis et al., 1966). A control group maintained normal eating habits but an experimental group followed a study diet with 30-33% of the total calories as fat and a polyunsaturated fatty acid (PUFA) to saturated fatty acid (SFA) ratio of 1.25-1.50 to 1.0. If the subjects were overweight, total fat intake was reduced to 19% and energy, to 1900 kilocalories. When normal weight was reached, the study diet was begun. At the end of seven years, the experimental group had significantly lower serum levels and a significantly lower incidence of CVD, thus supporting the role of diet for primary prevention of CVD. Shaper (1976) advised caution in interpreting this data since the control group was selected two years after the onset of the study, from a population other than that of the experimental group. Also, information on characteristics of lifestyle such as physical activity were not reported. Similar findings have been reported by other primary prevention trials that involved veterans, mental patients (Miettinens et al., 1972), or international groups (Multination collaboration studies). Yet, study limitations including lack of control over subjects, inability to determine all pertinent information because of time considerations, or the necessity of using patients without CVD have resulted in minimal knowledge gains.

The above examples focused on a single risk factor. Recognizing man's environment is multifaceted, interest in multifactor risk reduction led to the establishment of a community intervention approach. In the early 1970's, three trials directed their attention to the major risk factors: cigarette smoking, high serum cholesterol level, and hypertension. The Stanford project and the Finland project in North Karelia focused on entire communities while the multiple risk factor intervention trial (MRFIT) concentrated intensive efforts on high risk individuals only, cigarette smokers with hypertension and high serum cholesterol levels. The Stanford Three Community Study used mass media to teach specific behavioural skills and was reported to lead to favourable dietary changes in the general population (Stern et al., 1976). In contrast, the North Karelia project of Eastern Finland integrated the project objective into the existing service structure and social organization of the country. This required implementation of a strategy whereby widespread participation of the Finnish people, their organizations, and their institutions would be insured. Five years later, results indicated success (Breslow, 1978).

The MRFIT project differed from the Stanford and Finnish projects in that it first selected high risk individuals who were willing to participate in a six year program. Half of the group were followed-up by their usual sources of medical care and the remainder introduced to a specific intervention program with intensive group sessions. The group sessions emphasized factual education, principles of behaviour modification, and the use of group process to facilitate change (Breslow, 1978). Once the risk factor goals were achieved, a maintenance program was introduced. To date, preliminary results for the MRFIT project are encouraging but conclusive findings pertinent to the study objectives await completion of the project.

The common component in these three projects is the change in lifestyle with particular emphasis on diet. Any dietary recommendation to the public aimed at reducing the risk of CVD must be specific, clear, and brief (Shaper and Marr, 1977). The nutrition education program should try to provide some leadership and answer the questions of how much sugar, salt, cholesterol, fat, or kind of fat is desirable in the diet (Hegsted, 1978). The high incidence of overweight in the United States has been attributed to failure of the public to understand and apply energy concepts (McNutt, 1978). A similar reason may exist in Canada. McNutt suggested the fault lies with programs that move too quickly over basic concepts because nutrition educators are misled by the ability of people to deal with rather sophisticated nutrition terminology and have thus incorrectly assumed that people were equally able to implement simple nutritional concepts.

Dietary Recommendations for Prevention of CVD

The actual role of diet in reducing the risk of CVD has been extensively debated. Some investigators (Mann, 1977; Reiser, 1978; Harper, 1978) favoured abandonment of the concept that dietary modification would prevent or delay atherosclerosis and the resulting CVD.

A second group of investigators argued that research, while not proving a direct relationship between plasma cholesterol concentration in an individual and a particular nutrient or food in the current diet, had demonstrated the ability to alter plasma cholesterol concentrations in a predictable way by specific changes in dietary composition (National Diet-Heart Study, 1968). Although suggestive but not unequivocal proof existed that dietary modification would ameliorate or prevent CVD in man, these investigators (Shaper and Marr, 1977; Truswell, 1978; Glueck and Connor, 1978; Hegsted, 1978) recommended changes in diet as a preventive measure to reduce CVD incidence.

Encouraging results have been presented in a recent review of research in atherosclerosis and risk factors (Gotto, 1979). Regression of CVD had been reported in pigeons, chickens, dogs, and non-human primates and, in the case of man, preliminary study results supported the hypothesis that atherosclerosis in man is reversible.

A recent poll of international experts in atherosclerosis and lipids revealed a consensus among these experts that sufficient information did exist upon which to base dietary recommendations for the public (Norum, 1978). The poll also pointed out differences among the experts in terms of priority for the recommendations.

Despite the controversy and the many unanswered questions about the role of diet as a risk factor in CVD, many Western countries including Canada, United States, West Germany, the Netherlands, Sweden, Finland, Australia, Norway, United Kingdom, and New Zealand have recommended dietary guidelines for the general public (Truswell, 1976; U.S. Senate, 1977; U.S. Senate 2nd ed., 1977; Canada, 1977).

Nutrition recommendations for Canadians

In Canada, a comprehensive review of literature on the relationship of diet to CVD was undertaken by a special expert committee appointed by Health and Welfare Canada in 1973. The committee concluded that there was adequate basis for recommending some changes in the dietary habits and lifestyle of Canadians and submitted a report to the Minister of Health and Welfare in December 1976. Following further clarification, the ammended recommendations of this committee were adopted by the Department of National Health and Welfare in June 1977 (Canada, 1977). It was stressed that the recommendations were for the general public and not for patients on therapeutic diets prescribed by physicians, nor children under two years of age.

In summary, the dietary recommendations were:

1. Consume a nutritionally adequate diet, as outlined in Canada's Food Guide.

2. Reduce calories from fat to a maximum of 35% of total calories. Include a source of polyunsaturated fatty acids (linoleic acid) in the diet.

3. Consume a diet which emphasizes whole grain products and fruits and vegetables, and minimizes alcohol, salt, and refined sugar.

4. Prevent and control obesity by reducing excess consumption of calories and increasing physical activity. Precautions should be taken that no deficiency of vitamins and minerals occurs when total calories are reduced (Canada, 1978).

The release of the recommendations stimulated discussion regarding the most appropriate methods for implementation at both public and professional levels. The outcome was the realization that the recommendations provide the foundation for general health promotion and disease prevention other than just prevention of CVD. Subsequently, the recommendations were renamed Nutrition Recommendations for Canadians (Canada, 1979b).

Nutrition Attitudes, Knowledge, and Practice

It is generally accepted that an effective nutrition education program must acknowledge currently held concepts, building upon those that are accurate and correcting those that are in error. How this might be achieved most effectively remains unclear. One approach has been to examine nutrition attitudes, knowledge, and practice including their interrelationships. Such an examination of the relationships among the three variables is essential since development of a nutrition education strategy assumes a particular sequence of events prior to the adoption of a behavioural change such as dietary practice.

Models for the Interaction of Attitudes, Knowledge, and Practice

The traditionally accepted model, termed the KAP or consistency model, predicted that the accumulation or introduction of knowledge would be followed by changes in attitudes which would lead to changes in behaviour (Swanson, 1972; Steuart, 1975). Past health education programs have confirmed this model with the end point adoption of a particular health practice. However, most research findings have failed to support this alleged sequence of change. Reported inconsistencies with the KAP model have resulted in several alternatives being proposed to explain the effects of knowledge upon attitudes and practice.

Craft (1978) questioned whether improvements in knowledge or attitudes toward dental health always lead to desirable changes in preventive dental practices, or whether change in dental behaviour could precede improvement in attitudes and knowledge. Using a sample of general dental practitioners and their patients, Craft compared attitudes and reported behaviour to desirable preventive dental practice. He had hypothesized that the parental behaviour of dentists acted as a motivation model which was responsible for better oral health of their children, compared to that of their patients' children. Results showed that the dentists made no cognitive distinction in the importance of dental health for patients and family but, in practice, behaved in different ways. The dentists, by practicing standards of oral health in keeping with their profession, served as "an example" for their children thus providing an adjunct to the routine check up period for giving information and knowledge. Craft proposed that this model supports the possibility that behaviour can precede attitudes and knowledge as had been suggested by Steuart (1975) and Rayner (1970).

The KAP model was further challenged by a committee of the World Health Organization (WHO, 1978). They suggested that the model might be workable for certain situations but, in a socially and culturally diverse world characterized by an immense variety of circumstances, it would be doomed to failure unless due consideration was given to all intervening forces.

The WHO report further emphasized that the ultimate change in any attitude was not due to knowledge per se but to the related values which would ultimately determine the practice. Young's review (1967) of health education research supported the necessity of considering existing value systems by suggesting that effective information; that is, knowledge, would only lead to desired practice if the recommended practice did not conflict with one's motives, beliefs, values, or existing social group norms.

Lack of precise direction as to how one's health behaviour can be altered has led to numerous studies exploring the attitude-to-practice relationship. Fishbein (1963) attempted to refine the KAP model by dealing with ways in which evaluative, mediating responses combined to produce the overall attitude.

He postulated that beliefs led to attitudes which led to practice. This extension of the model offered no contradiction to the consistency theory since he defined belief as "the information a person has about the object" (Fishbein and Ajzen, 1975, p.12). The source of information does not necessarily imply an education situation but encompasses all external information. Later Fishbein and Ajzen (1975) presented conceptual distinction between attitude, belief, and behavioural intention. These distinctions appear to be more important for theoretical discussion of attitudes since the existing methods of measurement generally combine all three in a single attitude score (Gross and Niman, 1975).

The inconsistencies of reported relationships between attitudes and practice have been explained as the result of failure to appreciate attitudes as but one of several variables which influence behaviour (Gross and Niman, 1975). Previously Wicker (1971) concluded that measured attitudes by themselves were relatively poor predictors of overt behaviour. However, if "other variables" were taken into account along with attitudes, he suggested that behaviour might be predicted in some cases. In 1969, Wicker proposed that several factors could influence the attitude-practice relationship; namely, personal factors, situational factors, social norms, and role requirements as well as expected consequences. He stressed that most of these factors had not been systematically studied.

Fishbein and Ajzen (1975) endeavoured to unify the attitude theories by de-emphasizing the distinction between behaviour and consistency theories of the day. Each theory was examined in terms of the relations among beliefs, attitudes, intentions, and behaviour. They concluded that the consistency theories using the cognitive approach focused on information processing, leading to attitude formation and resulting change. In other words, knowledge may lead to the formation of an attitude or a change in an existing attitude. Festinger's 1957 cognitive dissonance theory followed this school of thought since it dealt with the effects of inconsistent beliefs, and attempts at reducing the dissonance which led to changes in attitude or practice. This interpretation could be used to explain reported inconsistencies in the KAP model which suggested that practice preceded attitudes or knowledge. If a particular practice is enforced and leads to "cognitive dissonance" because the practice is not consistent with the information known or attitude held, the person's mind may shift the existing attitude to bring it more in line with the behaviour expressed. In this case, it could be stated that the practice preceded the attitude.

The second school of thought is based on behaviour theory which utilizes the stimulus-response approach most characteristic of various learning theories concerning attitude. It differs from the consistency theory in that it postulates a dynamic, rather than a formative process. That is, it focuses on change with little concern for formation of attitudes or beliefs. Osgood and Tannenbaum's 1955 congruity theory exemplifies this viewpoint since it is concerned with changes in attitude or belief produced by incongruity or lack of agreement between existing attitudes or attitude and practice. The state of incongruity leads to evaluation with resulting change in attitude to achieve congruity.

From the previous discussion, it is evident that practical applicability of these theories to the comprehension of how healthy behaviour might be promoted is obscure. Clearly knowledge is a necessary factor in the total process but it may not be the determining factor in behavioural change. If knowledge is not sufficient in itself, it would seem logical that attitudes must mediate the process of behavioural change. However, evidence suggests that special circumstances such as social norms which determine one's behaviour, can produce changes in attitude as a result of the modeling of the behaviour. This viewpoint has been suggested by numerous researchers (Rayner, 1970; Swanson, 1972; Salancik, 1976; Craft, 1978) and may be considered as support for the WHO health education concept that education should be considered as a process which enlarges one's capacities (perhaps by broadening attitudes, beliefs, intentions, and/or behaviour) as well as one's knowledge (WHO, 1978).

This discussion has provided background for the succeeding section which will examine the contributions and limitations of specific research in nutrition attitudes, knowledge, and practice. The "other variable" effect will be considered with reference to biodemographic factors.

Research on Nutrition Attitudes, Knowledge, and Practice

Attitudes and knowledge

Because of the continual expansion of nutrition, a young science, by research findings, the necessity of providing nutrition knowledge for the public is not in dispute. Indeed, it necessitates the integration of these findings with the existing concepts and their dissemination to the public. A major concern among nutrition educators is the apparent lack of application of nutrition knowledge gained from various sources (Poolton, 1972). In order to establish the rationale for non-application of nutrition knowledge, a number of studies were conducted which investigated attitudes toward nutrition as well as knowledge of nutrition.

In 1976, Sims reported results of a survey on knowledge and attitudes of mothers of preschool children. The design utilized a combination of mail questionnaire and personal interview. It was found that the highest knowledge scores were achieved by mothers who felt proper nutrition was important for the child. The author suggested that her results confirmed previous research which indicated that attitudes exerted a consistent influence on nutrition knowledge scores.

Schwartz's (1976) mail survey of public health nurses determined that a significant relationship ($P<.05$) existed between scores for nutrition knowledge and attitudes. Similar findings ($P<.001$ and $P<.05$, respectively) were reported for female athletes (Werblow et al., 1978) and eighth grade students (Thompson and Schwartz, 1977). However, Grotkowski and Sims (1978) reported that nutrition knowledge of the elderly was significantly related to three of four attitudes assessed ($P \leq .05$, 0.01 and 0.001, respectively). The correlation between knowledge and the fourth attitude (vitamin/mineral supplements are necessary) was reported to be inverse (Pearson "r", -.30), although not statistically significant.

Knowledge and practice

On considering the relationship of knowledge and practice, varying results were found. A Beirut study (Al-lsi et al., 1975) that assessed knowledge and practice among mothers of preschoolers reported that although the mothers as a whole were very deficient in knowledge and poor in practice related to infant feedings, the relationship between the variables was significant ($P<.001$). The correlation between knowledge and practice was found to be very low and nonsignificant for eighth grade students (Thompson and Schwartz, 1977), significant ($P<.05$) for public health nurses (Schwartz, 1976), lactating women (r values of .25 to .41) (Sims, 1978b), and a combination i.e., significant or nonsignificant depending on the specific food pattern, for female athletes (Werblow et al., 1978). Werblow's group (1978) reported a significant relationship ($P<.05$) between knowledge and food patterns associated with training-weight control diets and pre-event-weight control diets (r values of .24 and .25) but no significant correlation between knowledge and the remaining food patterns assessed: general-weight control, general-pre-event, general-training, and training-pre-event diets. In a survey of the elderly, the association between knowledge and nutrient intake was reported positive but not statistically significant (Grotkowski and Sims, 1978). In this latter study, it should be noted that a total diet score was not determined. Instead, quantities for ten major nutrients plus energy were computed.

Attitudes and practice

The relationship between attitudes and practice proved to be more diverse. Sanjur (1974) reviewed three studies which examined the effect of attitudes on practice. Her definition of attitudes was culture-dependent and included beliefs, customs, and taboos. The samples were composed of mothers of Latin American descent who lived in three environments: a very small village in Southwest Mexico, a large urban centre in South America, and in the low-socioeconomic area of East Harlem, New York. The author noted that in all three cases, a number of food beliefs existed which might suggest negative nutritional implications. She stressed that any modification in food behaviour must involve changes that are compatible with existing beliefs and attitudes.

This approach had been suggested by Frankle and Heussenstamm (1974) for dealing with various counterculture groups in Western society. The importance of asking the opinions of the person before attempting to recommend a change in their eating practice was stressed with the admonition that "Sensitivity to and recognition of the emotional significance of food on the part of professionals.... It is crucial to understand the social psychology involved in the use of these foods" (Frankle and Heussenstamm, 1974, p.16).

A significant correlation (P<.05) between scores for attitudes and practice was reported (Schwartz, 1976; Thompson and Schwartz, 1977) among Canadian public health nurses and eighth grade students, but no significant association was found between attitudes and practice of female athletes (Werblow et al., 1978); lactating women (r values .03 to .25) (Sims, 1978b), or the elderly (Grotkowski and Sims, 1978) except (P<.05) between certain nutrients and two of the four attitudes assessed (r values ranging from .00 to .38).

Other variable effect on attitudes, knowledge, and practice

The relationship between nutrition attitudes, knowledge, and practice and specific variables was also reviewed. Age, gender, and education level have been shown to influence attitudes, knowledge, and practice. Research results suggested that mothers' educational level appeared to affect their children's nutritional status (Al-lsi et al., 1975), at least within a low socioeconomic class in Lebanon. A significant difference in knowledge and practice scores between women with five or less years of schooling compared with seven-to-nine years was reported. However, no significant difference was found among women of no, one-to-three, and five years of schooling. In contrast, Shekelle and Liu (1978) reported poor nutrition knowledge related to CVD among both males and females, 20 to 59 years of age, and with varying education background (from not a high school graduate, to a high school graduate, to a college graduate).

Sims (1976) reported mothers of preschoolers who scored highest in nutrition knowledge were from a higher socioeconomic level (SES) than those who scored low. No age information was reported but older families were observed to be less knowledgeable about nutrition. The same high scorers in knowledge were observed to rank high in the attitude "nutrition is important". To determine whether age is an influence on one's attitudes and practice, several studies with the elderly have been reported. Grotkowski and Sims (1978) found a positive correlation between SES and knowledge and with attitudes and knowledge in this group. SES was also positively related to the adequacy of nutrient intake. The group was composed of 77% females and comprised 64 subjects in total so the effect of gender was not determined. Jalso et al. (1965) had previously reported that education was directly related to valid nutrition opinions and that practice observed reflected the influence of age, not education. Cho and Fryer (1974) studied nutrition knowledge of physical education majors at Kansas State University. Women were found to score higher than men and graduate students attained higher scores than undergraduates. This suggested a difference in knowledge due to gender and to education level.

Sources of nutrition information have also been reported to influence attitudes, knowledge, and practice, however, the particular source of information differs widely. Cho and Fryer (1974) reported a progressive decrease in nutrition knowledge as the primary source of nutrition information moved from college courses, to high school courses, to other sources (such as doctor), to parents, and coaches. A significant difference was found between the scores of those who ranked college as the primary source of information and those who ranked parents and coaches as primary sources. This suggested the caliber of the information received led to higher scores. Women athletes were also studied by Werblow et al. (1978), and a general positive influence of nutrition education from high school or college on knowledge and attitudes was reported. Jalso et al. (1965) determined magazines, newspapers, and books ranked highest as sources of nutrition information among homemakers in their study. Labels (Brown and Sloan, 1978), magazines, newspapers, radio, and television talk shows, and diet books (McNutt, 1978), have been earmarked as sources of nutrition information for the public. Indeed, medical students and physicians, like the general public, were reported to rely on nonprofessional literature for their nutrition information (Podell et al., 1975a).

Because surveys of different populations have reported that physicians are a major source of nutrition information (Cosper and Wakefield, 1975; Sims, 1978a), the necessity of assessing physicians' attitudes and practice is clear. This effect of physicians' attitudes and practice had been demonstrated in a

British Columbia study of mothers' attitudes and practice toward infant nutrition (Schwartz and Barr, 1977). Information obtained from a self-administered questionnaire and an interview indicated that the attitudes of these mothers paralleled the attitudes and counselling practice of the physicians (Johnston and Schwartz, 1978), and that physicians were an important source of information on both prenatal and infant nutrition.

The necessity of formal nutrition training for specific population subgroups such as physicians becomes more apparent with the increasing involvement of health professionals in counselling patients on nutrition. Podell et al. (1975a) assessed the clinical nutrition knowledge of four groups of medical volunteers composed of practicing physicians, internists and pediatricians, two third-year medical student groups, and one fourth-year medical student group. The representativeness of the participants was not determined so data were not statistically analyzed. Findings of the survey indicated that knowledge of clinical nutrition was poor for all four groups and remarkable variations within areas of nutrition were observed. Very high knowledge scores were attained on topics of current popularity in the press and nonprofessional journals suggesting to the authors that learning of nutrition was very haphazard and dependent on nonprofessional literature.

Recently Krause and Fox (1977) studied the nutrition knowledge and attitudes of Nebraska physicians by a mail survey. No significant relationship was found between nutrition knowledge and attitudes. However, with a 22% response rate (292 out of 1350 physicians), the representativeness of the data is questionable. In addition, precise information on the development of instruments, reliability, and validity procedures were not reported other than to note that the basis of the questionnaire was the recommendations of 20 nutritionists and dietitians, and a statistician who had reviewed their draft questionnaire.

Physicians in British Columbia were surveyed by mail regarding their opinions and counselling practice in maternal and infant nutrition (Johnston and Schwartz, 1978). Content validity of the test instruments was determined by a panel of 16 nutrition experts in Canada and the United States (Johnston, 1975). The overall response rate was 43% of all practicing general practitioners, pediatricians, and obstetricians registered with the British Columbia Medical Association. Significantly higher opinion and practice test scores were obtained by general practitioners who were female, had additional training, attended continuing education programs, and had received nutrition instruction during medical school. Those physicians with more than 10 years in practice were found to score significantly lower ($P<.001$). None of the variables mentioned had a consistent, significant effect on the nutrition opinion and practice scores of obstetricians or pediatricians. Comparison with the two previously cited studies (Podell et al., 1975a; Krause and Fox, 1977) is not possible as different instruments, sample characteristics, and procedures were used to assess the nutrition attitudes and knowledge.

Interrelationships of attitudes, knowledge, and practice

Schwartz (1975) surveyed a random sample of 1000 Ohio high school graduates to ascertain their nutrition attitudes, knowledge, and practice, and to determine the nature of the relationship of nutrition knowledge to attitudes and practice and the interrelationship of knowledge and attitudes with practice. A mail questionnaire was employed and a 31.3% response rate obtained. The attitude and knowledge instruments were adapted from a previously developed and validated questionnaire (Eppright et al., 1970) but the practice instrument was developed especially for this study. A separate phase of the study determined and confirmed content validity and reliability of the data collection instrument and method for quantitative evaluation of nutritional practice (Rudge, 1973).

The KAP model described previously (see p.20) was employed by Schwartz (1975) and four possible variations of the multivariate interrelationship were considered:

KAP model 1. $K \longleftrightarrow A \longleftrightarrow P$

KAP model 2. $\left.\begin{matrix}K\\A\end{matrix}\right\} \longleftrightarrow P$

KAP model 3.

$$\begin{tikzcd} K \arrow[dr, leftrightarrow] & \\ & P \\ A \arrow[ur, leftrightarrow] & \end{tikzcd}$$

KAP model 4.

$$\begin{tikzcd} K \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & A \\ & P \arrow[ur, leftrightarrow] & \end{tikzcd}$$

Significant correlation coefficients were reported between nutrition knowledge and attitudes and between nutrition attitudes and practice but the correlation between nutrition knowledge and practice was nonsignificant. The author interpreted this result as support for the KAP model 1. (K$\leftrightarrow$ A $\leftrightarrow$P) to describe the interrelationship of nutrition knowledge, attitudes, and practice of these high school graduates.

In contrast to Schwartz's (1975) conclusion, Sims (1978b) proposed knowledge as the mediator between attitudes and practice thus questioning the traditional sequence of the KAP model. Her study population consisted of 61 lactating women in Indiana and Pennsylvania who had been solicited through contact with the local La Leche League, by person or by follow-up of birth announcements in local papers. Questionnaires and three one-day food records were distributed by mail or in person, with telephone follow-up and clarification of response as necessary. The coefficients of reliability (alpha) were .77 for the nutrition knowledge instrument and .71 to .83 for the four attitudes measured. Nutrient data from the food records were expressed as percentages of the American recommended dietary allowance (RDA). Values for energy and ten major nutrients were then formulated into four group indices: protein group index, energy group index, dairy group index, and ascorbic acid index. The latter represented a single nutrient. Reliability analyses of the three group indices resulted in scores ranging from .83 to .87.

Unlike the previous study, Sims (1978b) explored the underlying causal nature of the relationships between nutrition knowledge, attitudes, and nutrient intake using the path analysis technique. Two models were examined: (1) K $\longrightarrow$ A $\longrightarrow$ P and (2) A $\longrightarrow$ K $\longrightarrow$ P. The one way arrow represents the causal relationship between each determining variable and each variable dependent on it. Values, that is, path coefficients were calculated for each causal arrow and a nonsignificant path coefficient resulted in deletion of the causal arrow from the path analysis diagram. Sims reported a significant correlation between knowledge and attitudes, knowledge and education, and knowledge and each dietary factor. Only one of the four attitude measures was found to be significantly related to one of the four nutrient indices. These reported correlations among knowledge, attitudes, and practice (defined as nutrient intake) differ from her previous observation of a lack of statistical correlation between nutritional knowledge and nutrient intakes of the elderly (Grotkowski and Sims, 1978).

The results of the path analysis test procedure were reported (Sims, 1978b) to support the sequence of A $\longrightarrow$ K $\longrightarrow$ P ($P<.05$). Only one attitude out of four was found to exert a significant effect for inclusion in the path analysis diagram. The second model, K $\longrightarrow$ A $\longrightarrow$ P was not supported by the data.

Comparison of the results of these two major investigations (Schwartz, 1975; Sims, 1978b) must be made with caution. The use of specific overall attitude measurements, randomly selected versus judgemental samples, a food frequency check list of 17 food subgroups expressed as a single cumulative score versus food record data expressed as four nutrient indices, as well as differing procedures for administration of the instruments and analysis of data, limits the likelihood of meaningful comparisons. Further empirical testing of the KAP model and its variations would appear warranted.

Cardiovascular nutrition attitudes, knowledge, and practice

Podell et al. (1975b, 1978) conducted a two-year investigation to evaluate the effectiveness of a cardiovascular nutrition education program. The study population was tenth grade biology students from two similar schools, designated test and control. The test group completed a questionnaire to assess their cardiovascular nutrition attitudes, knowledge, and practice prior to the program and seven months after completion. The control group was not surveyed for their cardiovascular attitudes, knowledge, and practice.

All students were screened for fasting cholesterol and triglyceride (TG) levels. Interpretation of the results was sent to all parents of these students. One year later, both groups were retested for serum cholesterol and TG levels (64 and 83% of the test and control groups, respectively). Results of pretest-posttest change indicated a significant ($P<.001$) improvement in knowledge and five of the six attitude parameters measured ($P<.001$ except for one, $P<.01$). Students who were female ($P<.01$) and had high initial cholesterol levels ($P<.05$) were reported to have significantly greater change in eating practice. Students with a positive family history of elevated cholesterol also showed a significant ($P<.01$) positive change in attitudes toward a cholesterol-lowering diet compared to those with no family history. Despite these changes in attitude, knowledge, and practice, no significant change in serum cholesterol and TG levels were reported.

A community-based study of 35 to 59 year old male and female adults assessed their cardiovascular nutrition knowledge and practice (Stern et al., 1976; Farquhar et al., 1977) as part of the Stanford Three Community Study discussed earlier in this chapter (Breslow, 1978). Residents of the two communities, where a two year mass-media health education campaign was conducted, were compared to residents of a control community. A dietary questionnaire which estimated participants' consumption of cholesterol, saturated fat, and polyunsaturated fat was used to assess practice both before and after the campaign (Stern et al., 1976). Knowledge was measured by a 25-item test of factors associated with CVD (Farquhar et al., 1977). Results of subjects who participated in the initial survey and in two subsequent follow-up surveys indicated a significant reduction in cholesterol and saturated fat consumption among both men and women (Stern et al., 1976), as well as an increase in knowledge related to CVD (Farquhar et al., 1977).

A similar adult population, aged 20 to 59 years, was surveyed on their knowledge, beliefs, and attitudes related to CVD, especially causes and prevention of heart attack. Telephone interviews were conducted with a random sample of 617 residents of Cook, Du Page, and Lake counties, Illinois (Shekelle and

Liu, 1978). Over half (58%) of the respondents were high school graduates. While 76% of all participants indicated belief in the possibility of heart attack prevention in people under 60 years of age, a substantial difference in response according to education level was apparent (college group, 88%; not high school graduate, 62%). When asked to name the major causative agent of heart attack, "cigarette smoking", "high blood pressure", and "cholesterol or fat in the diet or blood" were indicated by 28, 21, and 13% of the respondents, respectively. If formal education of the respondents were considered, these percentages increased with an increase in education; however, even among college graduates only 1% were able to name three major risk factors and 41% of them did not name any.

The authors concluded that there was a common, extensive lack of information among the general adult population concerning possible causes of CVD even though a positive attitude toward prevention of heart attack was indicated by 75% of the respondents. No specific dietary practices were recorded in this survey but responses concerning overweight, high fat meals, proper diet, cholesterol, and fat content of the diet were reported indicating, perhaps, an association of diet with heart attack incidence. Despite the study limitations, namely, brevity of the interview (15 to 20 minutes), lack of face-to-face contact, nonresponse rate (27.6%), and restricted locale, the results seem to support the need for large-scale programs in cardiovascular nutrition education for the public.

A recent Canadian study (Canada, 1979b), was designed to investigate among a sample from the general public: perception of and attitude toward basic nutrition concepts including interpretation of "sensible", "balanced", or "adequate" diet; perception of Canadians' willingness to follow the Nutrition Recommendations (Canada, 1977); and sources of nutrition information. Results were intended to provide government and nongovernment services with direction for the development of future cardiovascular nutrition education and health promotion programs for Canadians. The study using a multi-stage random sample of 6761 adults from British Columbia, the Prairies, Ontario, and the Atlantic regions, collected data by questionnaire during an interview. All four areas responded similarly. Over 80% felt a sensible diet was important and that better health, general well-being, and weight control were the three major benefits of such an eating pattern. This was interpreted to indicate possible topics of importance for future programs. Use of a wide variety of nutrition sources was considered to emphasize the need for extended use of the media. Of the concepts examined, polyunsaturated fatty acids (PUFA) was considered to be misunderstood by 40 to 45% of the sample despite the fact that the majority had a minimum of 12 years of education. The study group was found to perceive Canadians as more likely to include than limit or avoid certain foods, suggesting that a positive approach might be more successful in nutrition education programs. The representativeness of the findings may be questioned since people in Quebec, the Territories, and all cities of less than 5000 people were not sampled. In addition, a low response rate (ranging from 22 to 36%) for the four areas suggested a nonresponse bias that was not examined.

Results of the previously cited studies must be compared and generalized cautiously, as each study involved widely differing research designs, sampling techniques, populations, data collection instruments, and procedures. An examination of the measurement instruments in particular revealed the need for nutrition education researchers to employ sound techniques of measurement. Carruth and Anderson (1977) suggested that more research be devoted to the development of instruments for measuring nutrition knowledge and attitudes.

Future research on the complex relationships among attitudes, knowledge, and practice necessitates scrutiny of the methodology available for assessing these variables. The following section will review advantages and limitations of methods relevant to the present study.

Survey Research

In contrast to laboratory research, surveys are generally conducted on a fairly large scale employing one of several methods for data collection: personal interview, questionnaire, variations including panel and telephone, and observational techniques (Mouly, 1970; Kerlinger, 1973). The interview and questionnaire were used in the present study to assess the cardiovascular nutrition attitudes, knowledge, and practice of community centre adult members. Consequently, the following discussion will focus on these two methods.

Questionnaire versus Interview

Because the term questionnaire is often used to designate any kind of instrument that has items or questions to which individuals respond, the succeeding discussion will use the term "schedule" to refer to the data collection instrument used in the personal interview, and "questionnaire" to refer to the self-administered data collection instrument used to measure attitudes, knowledge, and dietary practice.

Both the schedule and the questionnaire are classified as direct instruments with their advantage being that a great deal of information can be received from respondents by direct questioning. The main disadvantage is that respondents may be unwilling, reluctant, or unable to answer some questions readily and directly. All methods for data collection have strengths and weaknesses that must be weighed so that the most appropriate method is chosen based on the purpose of the study. According to Bennett and Ritchie, "the self-administered questionnaire is completed by the respondent without the assistance or interference of an interviewer" (1975, p.52). It is generally the method of choice for knowledge and attitude assessment. The items of the questionnaire may be "open questions" which require the respondent to reply in his own words or "closed questions" which provide the respondent with ready-made alternatives. Greater uniformity and reliability can be achieved by use of closed questions (Kerlinger, 1973). Mouly (1970) suggested that the use of closed questions had the added advantage of keeping the length reasonable, thus encouraging response and therefore validity, in terms of representativeness of the returns. Bennett and Ritchie (1975) suggested that the closed-type question served to refine the questionnaire method with the chief advantage being that it insured standardization of measurement because all subjects are asked precisely the same question. The ability to provide anonymity, to increase the sample size, and to use the postal system, if desired, were additional advantages of the questionnaire to consider (Kerlinger, 1973; Henerson et al., 1978) along with the removal of the interviewer bias, lower cost, and ability to respond at one's convenience.

Disadvantages of the self-administered questionnaire were lack of flexibility and the problem of those people who have less ability to express views in writing compared to orally (Henerson et al., 1978). Bennett and Ritchie (1975) considered this method to be appropriate only when simple and straight forward questions were possible and understandable with the aid of written instructions. This restriction would eliminate its use for persons of low intelligence or poor reading ability, perhaps due to failing eyesight. The physically handicapped may also be eliminated as respondents to the self-administered questionnaire. Kerlinger (1973) stated that the main disadvantage was lack of opportunity to probe for uncertain responses, as the responses are final. He also cited low percentage of returns (especially if mailed) and unexpected lack of uniformity as disadvantages that could be avoided in the structured interview. Some of these disadvantages can be overcome. Mouly (1970) suggested follow-up as the major way to promote high return rates. This might involve a series of follow-up mailings.

Finally, perhaps a shortened version of the questionnaire or an interview with a random sample of the nonrespondents might be necessary before returns reach an acceptable level.

In contrast to the questionnaire, the interview is a "face-to-face interpersonal role situation in which one person, the interviewer, asks a person being interviewed, the respondent, questions designed to obtain answers pertinent to the research problem" (Kerlinger, 1973, p.481). The interview schedule is "read out by an interviewer, to which the respondent replies orally and the response is noted down by the interviewer" (Bennett and Ritchie, 1975, p.38). The schedule may be standardized so that the questions, their order, and their wording are fixed. Relatively little liberty in asking questions is permitted and this must be specified in advance. The unstandardized interview differs in that it is flexible, open, unordered, and ordinarily lacking a schedule.

Similarities between the structured schedule and the self-administered closed-type questionnaire are obvious, however, some differences are evident. The main advantage of the schedule over the questionnaire is its greater flexibility which permits pursuit of leads, elaboration of points, or clarification of questions apparently misunderstood, thus, enabling the investigator to remain in command of the situation throughout the investigation. Mouly (1970) considered advantages of the schedule to be establishment of greater rapport which would lead to more complete and valid responses; inclusion of respondents otherwise eliminated such as the illerate; and promotion of higher returns. The interviewer may be able to appraise the situation, perhaps reduce reluctance or resistance, and thus improve the quality of the results.

The major weakness of the schedule is interviewer bias which may be expressed by the respondents giving the socially accepted answer, rather than the truth in an attempt to please, or evading the question due to annoyance with the interviewer. The interview method is also more expensive, in time, effort, and money. A large sample will require more than one interviewer. Differences in results among interviewers may be due to individual personal characteristics or deviations from the standardized procedure. Both of these problems can be minimized if not overcome, by care in the selection of interviewers and in their training (Bennett and Ritchie, 1975).

Response Bias

A second type of bias, response bias, is concerned with possible differences in study results due to the fact that all subjects did not return the questionnaire. Two methods of controlling response bias, prevention and correction, have been suggested (Bennett and Ritchie, 1975).

Prevention as a means of controlling response bias concerns construction of the questionnaire in a manner that will induce response. Bennett and Ritchie (1975) suggested that colour of paper, questionnaire length, typed versus handwritten envelopes, tone of the cover letter, layout, method of recording, and timing were all factors that influenced response. In addition to a follow-up letter, Mouly (1970) suggested the inclusion of a second copy of the questionnaire with the reminder, in case the respondent had discarded the first.

Correction of response bias involves hypothesizing why nonresponse occurred. To study this, return dates for each questionnaire are recorded so that early and late respondents can be identified. Accepting that late respondents perform similarly to nonrespondents (Oppenheim, 1966), a comparison of the answers given in early and late returns can be used to judge the response bias.

Response Format

Construction of the questionnaire may involve closed- or open-type item formats. Closed questionnaires are structured so that the risk of misinterpretation of the concept under study is minimized, and tabulation and interpretation of results are easier. While the open-type possesses greater flexibility, the format produces more detailed responses, a lengthened response time requirement, and problems with statistical analysis. If interpretative, judgemental procedures are used, the prior classification of responses may result in error (Bennett and Ritchie, 1975). The closed questionnaire is not without problems. It must allow for all possible answers (Mouly, 1970). There is loss of spontaneity and expressiveness and, possibly, an introduction of bias by forcing respondents to choose between given alternatives which might not have occurred to them

(Oppenheim, 1966). Henerson et al. (1978) suggested that a closed-response format be used if the sample size was greater than 20 to 30. However, the advantages of permitting expression of feeling, providing for unanticipated outcomes, or obtaining unprompted responses may suggest the use of both open- and closed-response formats.

If the closed-response format is used, several options are available, namely: (1) checklist, (2) two-way questions, (3) multiple-choice questions, and (4) ranking scales. A bio-demographic data collection questionnaire will often use any or all of the first three options, depending on the type of answer required. A checklist may verify the presence or absence of some situation, the main criterion being that the checklist contain all relevant options (Henerson et al., 1978). The two-way question presents dichotomous alternatives that must present a realistic choice. The limitation of this type of response format is that a single misinterpretation of the question or error in recording the response, results in a complete reversal of the answer (Bennett and Ritchie, 1975). A third option, the multiple-choice question, is favoured by most questionnaire developers. It attempts to overcome the limitations of the dichotomous type of response format by permitting a greater variety of responses. It is particularly useful for situations where it is necessary to ensure awareness of all possible responses to a question (Henerson et al., 1978).

A special form of the multiple-choice question is the rating scale which allows for quantification of the responses.

Attitude rating scales may be considered as a special kind of questionnaire (Henerson et al., 1978) developed according to strict procedures which ensure that several responses can be summed to yield a single score representing one attitude.

Attitude and Knowledge Measurement

The construction of an attitude scale involves evaluating each item to determine the extent to which it can differentiate those respondents with a positive attitude from those with a negative attitude. The single score obtained indicates the direction and intensity of the respondent's attitude toward the object.

There are three major types of attitude scales (Kerlinger, 1973): (1) Likert's summated rating scales, (2) Thurstones's equal-appearing interval scale, and (3) Guttman's cumulative scales. Kerlinger describes a Likert-type summated rating scale as "a set of attitude items, all of which are considered of approximately equal 'attitude value', and to each of which subjects respond with degrees of agreement or disagreement (intensity). The scores of the items of such a scale are summed, or summed and averaged, to yield an individual's attitude score" (p.496). The Thurstone equal-appearing interval scale also assigns attitude scores to individuals but differs in that it "accomplishes the important purpose of scaling the attitude items. Each item is assigned a scale value and the scale value indicates the strength of attitude of an agreement response to the item" (Kerlinger, 1973, p.497). The final type of scale, the Guttman scale, is defined by Kerlinger as "a relatively small set of homogeneous items that are unidimensional" (p.497). The resulting cumulative relation between items and the total scores of individuals makes it possible to predict an individual's pattern of response from information on the total score. While the purpose of any attitude scale is to place an individual somewhere on an agreement continuum of the attitude under examination, each scale is very different. The Likert-type scale focuses on the subjects and their placement whereas the Thurstone scale concentrates on the items and their place on the scale. Guttman's cumulative scale differs in that it focuses on scalability of sets of items and on scale positions of individuals. According to Kerlinger (1973), the Likert-type scale is easier to develop, yields results comparable to the more laboriously constructed Thurstone scale, and can be adapted to many needs of behavioural research. Because the Likert scale does not include items that represent gradations of the attitude but ones that embody extremes, the respondents are asked to indicate their agreement with each statement commonly using a five-point scale. The scale response alternatives range from strongly agree to strongly disagree. This response format is used in a variety of measures (Henerson et al., 1978) including knowledge tests. Construction of Likert-type scales to measure attitudes and knowledge follow parallel procedures described in detail by several investigators (Edwards, 1957; Likert, 1967; Thorndike and Hagen, 1977; Henerson et al., 1978). The main distinction between the two scales is the type of item used. Attitude items must be expressions of desired behaviour (Likert, 1967) and not be statements of fact, as are knowledge items. Both may use the five point continuum ranging from 1= strongly disagree or definitely false to 5=strongly agree or definitely true.

Besides the use of similar procedures for construction, attitudes and knowledge instruments may also be examined by similar techniques for validity and reliability.

Validity and reliability of attitude and knowledge instruments

The importance of determining validity and reliability of test instruments has been consistently emphasized in the literature. This need for establishing quality standards for test construction led to the 1966 publication of "Standards for educational and psychological tests" by the American Psychological Association (APA, 1974). The recommendations of this revised document form the basis of quality test construction today.

Traditionally, validity of an instrument has been defined as "the extent to which a test measures what it is supposed to measure" (Stanley and Hopkins, 1972, p.459) but Stanley and Hopkins suggest that a more appropriate definition is "the extent to which a test does the job for which it is used" (1972, p.458). This latter definition regards validity as a multi-faceted concept which is implied by the APA's classification of validity into three types: (1) content, (2) construct, and (3) criterion-related validities (APA, 1974).

Content validity is defined as the "representativeness or sampling adequacy of the content--the substance, the matter, the topics--of a measuring instrument" (Kerlinger, 1973, p.458). Validation of content involves judgement of the representativeness of the items as determined by experts in the field of study (APA, 1974). Because this method of validating is primarily a process of logical analysis (Stanley and Hopkins, 1972), it is necessary that the experts be carefully selected in terms of relevant professional experience and qualifications (APA, 1974). By itself, content validity utilizing logical analysis cannot disprove a validity claim but requires empirical verification (Cronbach, 1971). Thus, there is a need to determine construct validity of the test instrument.

In contrast to content validity, construct validity is an analysis of the property being measured, not the test itself (Kerlinger, 1973). Cronbach (1971) suggests that construct validation is a three part process beginning with the claim that a given test measures a certain construct, developing an hypothesis about the construct and, finally, systematically testing the theory. This empirical analysis procedure is exemplified by the known groups method (Kerlinger, 1973) wherein groups of people with known characteristics are administered the instrument. The results are then empirically studied and, if the test has construct validity, the hypothesized direction of differences will be confirmed.

The third type of validity, criterion-related validity, is studied by comparing tests or scale scores with one or more external criteria and is applied when one wishes to infer from a test score one's probable standing on some other variable or criterion (APA, 1974). The quality of the criterion, as well as the test, is involved in this procedure since the criterion used must be reliable (Stanley and Hopkins, 1972). According to Kerlinger (1973), the single greatest difficulty of criterion-related validation is the criterion since a reliable criterion is frequently not available. Because this was the situation for the present study, there will be no further discussion of criterion-related validation.

While validity is always a major consideration in test construction, reliability is also a crucial prerequisite. According to the APA, "reliability refers to the degree to which the results of testing are attributable to systematic sources of variance" (1974, p.48), that is, "the accuracy and precision of the measurement taken by the test procedure" (Thorndike and Hagen, 1977, p.56). Indices of reliability indicate the extent to which a particular measurement is consistent and reproducible and may be determined by three procedures: (1) test-retest, (2) parallel-forms, and (3) split-half or internal consistency methods.

The test-retest method requires retesting with the identical test thus introducing a practice effect that may cause a spuriously high correlation of the two sets of scores. To overcome this problem, parallel sets of items, that is, the parallel-forms method, can be used. This may be impractical in situations where only one testing period is required or limited funds are available.

To avoid two test administrations of unspeeded tests, methods which estimate the internal consistency of the test are employed. According to the APA (1974), estimates of internal consistency should be determined by the split-half method or by analysis of variance procedures. The former method may assemble the test into half-tests by matching, that is, using expert judgement to balance the content and difficulty level or by alternating items, that is, putting all odd-numbered items in one half-test and all the even-numbered items in the other (Thorndike and Hagen, 1977). The obtained scores for each half-test can then be correlated to secure a split-half coefficient of reliability (Stanley and Hopkins, 1972). The analysis of variance procedure for estimating internal consistency is the Hoyt reliability procedure that defines a variable error in a slightly different way than the other procedures. Because any test is a sample from a population of items, most procedures consider an obtained score to be a combination of the "true" score plus a random error of measurement. The Hoyt procedure differs in that variation in the performance of an individual from item to item is not considered to be an error but a real (nonerror) difference. Thus, the total variation observed is divided into three, not two parts: true interindividual differences, intraindividual differences, and error interindividual differences. This concept is expressed in terms of a mathematically derived Hoyt reliability formula which can be estimated by an analysis of variance procedure (Helmstadter, 1970).

Another procedure that does not require splitting the test into two halves was suggested by Thorndike and Hagen (1977). It depends upon the consistency of the individual's performance from item to item and is based on the standard deviation of the test and the standard deviation of the separate items. The estimate of reliability formed, termed Cronbach's coefficient "alpha", estimates the degree to which all of the items measure a common characteristic (Thorndike and Hagen, 1977). That is, it "tells how well scores obtained by testing under just one condition -...- represent universe scores" (Cronbach, 1970, p.160).

Practice Measurement

The literature contains several reviews of dietary data collection methods for individual dietary intakes (Pekkarinen, 1970; Marr, 1971, Christakis, 1973; Bazzarre and Myers, 1979). All agree that there is no single method presently available which is free from error and limitations. However, each method provides certain advantages which might make it more suited to the purpose of a particular study. Any decision regarding the most appropriate method for assessing individual diet consumption involves a consideration of the prospective methods based on food records, namely, food inventory and weighed food intake; and the more recent retrospective methods based on dietary recall. The latter focus on actual intake, usual intake, or food frequency and utilize the interview schedule and/or self-administered questionnaire.

Prospective methods

Although the prospective methods, especially food records by direct weighing, provide the most accurate food intake data (Bazzarre and Myers, 1979), their many disadvantages resulted in their replacement with the recall method for large scale nutrition surveys. The main limitations of the prospective methods are the necessity for a high degree of cooperation by the participants over a sufficient time interval, the inability to determine if the record-keeping of food consumed caused a change in the normal eating habits, and the inability to assess large numbers, particularly if direct weighing is utilized because of prohibitive time, personnel, and monetary requirements.

The alternative to prospective methods, retrospective methods, attempts to quantify actual intake, usual intake, or frequency of use of specific foods. Chapter IV, Method, will discuss details of the method chosen. The present discussion will summarize the advantages and limitations of the three variants of dietary recall as background for the study decision detailed in Chapter IV.

Retrospective methods

Pekkarinen (1970) stated that the major advantages of retrospective methods in general were representativeness and large size of the sample, two factors not always possible with prospective methods. She also included less cost relative to the prospective methods, no interference with the normal diet, and shorter time requirement as advantages.

The 24-hour recall. The most widely used recall method that determines the actual amounts and types of food consumed is the 24-hour recall. For large groups, it is considered to provide estimates of group average intakes comparable to those obtained with more cumbersome techniques (Beaton et al., 1979). The major disadvantage of this method is that the data do not provide a reliable estimate of the usual intake since the day represented may be atypical.

Dietary history method. The second type of recall is the dietary history method which determines the individual's usual intake. Beal (1967) suggested that usual intake is preferable to actual intake for correlation with allied data on the individual. Most dietary history methods follow or are modifications of the Burke method (Burke, 1947) and consist of data on the overall eating pattern including a 24-hour recall, a cross-check, and sometimes a 3-day menu. The complete dietary history procedure requires from one to one and one-half hours (Bazzarre and Myers, 1979) so the 3-day menu is frequently omitted in the interest of time. A range of time requirements from an average of 30 minutes (Abramson et al., 1963), 30 to 45 minutes (Young, 1959) to approximately 60 minutes (Burke, 1947) have been reported. All agreed that the time could vary depending on the type of history used.

Use of graduated food models in the interview is a decided advantage as it is reported to lessen the interview time requirement, greatly reduce the frustration of respondents, and perhaps contribute to the quantitative accuracy of the reported intakes (Moore et al., 1967). The information obtained is translated into usual intake by a nutritionist who determines the average intake on the basis of the usual pattern and crosscheck. Because the values are nutrient intake estimates, Burke (1947) proposed the use of a rating scale to analyze and interpret the values. In Canada, the most widely used standard for rating nutrient values is the Canadian Dietary Standard (CDS) (Canada, 1975a). The disadvantages of the dietary history are the dependency on the interviewer's skill and the participant's memory and degree of cooperation. Pekkarinen (1970) viewed the dependency on personal characteristics of the interviewer as the main disadvantage of the interview technique used in any recall method. She stated that "the attitude of the interviewer towards the respondents may be decisive for the success of the survey in some cases" (p.162). Differences between interviewers were not considered to alter appreciably the results of the survey provided that the interviewers had similar backgrounds and training (Church et al., 1954).

In addition to the concern about the interview, the dietary history generally involves more time, cost, and professional personnel than the other variations of recall. The advantages may compensate for the additional cost. Linusson et al. (1974) advocated the use of the dietary history over the 24-hour recall as a method of providing quantitative information as opposed to more qualitative estimates, especially if the survey population consumed a varied diet. In fact, a one-week recall survey may not be sufficient to provide reliable data on normal food consumption if the sample follows a varied diet (Pekkarinen, 1970).

<u>Food frequency</u>. The third type of recall, food frequency, collects semi-quantitative data on frequency of consumption of food items subdivided into specific food groups (Bazzarre and Myers, 1979). The list of food items can be short or very long requiring as much as two hours for completion. Data, expressed as the number of times a specific food type is consumed per unit of time (day or week), may be analyzed directly or be converted to a food score, a more quantitative estimate of the food consumed. The advantages of the food frequency method are that it focuses on specific foods, not nutrients, and therefore eliminates the errors inherent in food composition tables. Disadvantages are the lack of quantitative data as well as reliance on participant's ability to recall food, the amount consumed, and the frequency of its consumption. Bazzarre and Myers (1979) suggested that the frequency method might reduce the chance of showing true differences among groups due to failure of the subject to remember different foods, especially if the foods were "low esteem" foods necessary for the purpose of the study. Balogh et al. (1968), on the other hand, reported success with a frequency questionnaire developed as part of a cardiovascular disease survey.

Regardless of the type of instrument that is chosen, it must be evaluated by validation and reliability procedures prior to its administration in the field.

Validity and reliability of dietary practice instruments

The actual validation of a dietary intake instrument utilizes the same principles and procedures as validation of any instrument of testing and measurement. The present state of limited knowledge regarding diet behaviour in the general population presents unique problems. The most desirable method for valid measurement of food intake is considered to be the precise weighing technique (Balogh et al., 1968; Pekkarinen, 1970; Marr, 1971). Due to its high cost and time requirement, it is impractical for surveys of the general population (Burke, 1947). Researchers have attempted to validate the retrospective methods against the food record or one-week weighed record techniques but have achieved little success (Young et al., 1952; Pekkarinen, 1970; Marr, 1971). Part of the difficulty may be attributed to the lack of controlled conditions for weighing or measuring, and to the disadvantage of creating an artificial situation which may alter the normal eating pattern of the individual (Burke, 1947). Young et al. (1952) concluded that it was impossible to predict an individual's food intake as estimated by one method (dietary history) by projecting values for another method (seven-day record) with any practical degree of accuracy. Dawber et al. (1962) stated the important consideration is that the "measurement of the variable (dietary intake) be sufficiently accurate to place a subject in a subgroup with reasonable certainty and that the subgroups differ significantly, one from the other" (p.227). They concluded that a suitable method for establishing validity of dietary evaluation did not exist. Marr (1971) emphasized the need to ascertain to what extent validity is influenced by the practical necessity of replacing the precise weighing technique with a descriptive measurement such as the modified dietary history using the interview technique. Any loss of validity must be balanced against the usefulness of the data from samples of a free-living population. To improve validity lost by data recorded in descriptive estimates, Marr (1971) suggested the inclusion of both a 24-hour recall and a current record in the history method. Despite the shortcomings of the dietary history method, many researchers consider "the dietary data to be a reasonable approximation of the truth" (Paul et al., 1963, p.28).

Progress in this area of validation of dietary intake measurements has been minimal in the last several decades. As a result, criterion-related validation is not feasible nor is construct validation; the former, because of lack of a valid criterion and the latter, because of lack of information concerning the construct (dietary intake). Since the requirement, development of an hypothesis about the construct (Cronbach, 1971), is not credible as a result of the present state of knowledge regarding diet behaviour of the general population, a systematic testing of the hypothesis by procedures such as the known groups method is not feasible at present. Content validation is possible, however, and can be determined by an expert panel of judges using logical analysis. Each question of the structured interview must be related to the topic of the survey, must adequately cover the overall topic, and must be clear and unambiguous (Mouly, 1970). Since the validity of the interview method has been reported to be directly proportional to the competence of the interviewer (Mouly, 1970), rigorous selection and intensive training of the interviewers will assure quality control of the dietary assessment procedure and improve validity (Balogh et al., 1968). Content validation of the practice questionnaire would follow the same procedures as the interview schedule.

Reliability of the interview method may be determined in various ways. The modified dietary history asks questions on the general food patterns and habits of the individual over a relatively long period of time. The obtained data may be cross-checked (Burke, 1947) by weighing difficult items or recording daily and weekly food purchases. This type of cross-check is restricted to those interviews held at home. If the interview is held away from home, cross-checking can consist of asking additional questions concerning general food habits (Pekkarinen, 1970) or concerning the usual intake of foods from a check list of food groups (Young et al., 1952). The use of food models and quality control of the procedure itself have also been suggested as an aide in promoting reliable data (Young et al., 1952; Balogh et al., 1968). Burke (1947) suggested that careful questioning as to each food group listed in relation to the amount given as usual intake, was essential to improve the accuracy of the history. In this way, it is possible to clarify and verify the data. Because some inaccuracies of dietary history are inevitable, Burke suggested the use of rating scales rather than precise quantities for expressing dietary intake so that the range would absorb the inaccuracies and promote reliability.

Reliability of the modified dietary history questionnaire data can be determined by a congruency check method. A comparison of the responses by personal interview using a schedule developed as a parallel form of a modified dietary history self-administered questionnaire can support the reliability of the usual intake data provided that no significant differences are found between the two responses by a paired t test.

Recent studies investigated the effect of intraindividual sources of variation i.e., day by day variation in intake, on the reliability of the estimates of mean consumption (Liu et al., 1978; Beaton et al., 1979) and the authors suggested possible procedures for diminishing the effect of this intraindividual variation to improve the validity of the group mean estimates. Liu et al. (1978) concluded a single 24-hour recall was a very limited tool to represent an individual's true intake due to the influence of the intraindividual variation. They further stated the presence of a high degree of intraindividual variation in food intake data based on a single day's intake might be the explanation for the reported lack or weak relationship between nutrients and various risk factors (Frank et al., 1978). In contrast, Beaton et al. (1979) concluded that good estimates of group average intakes could be obtained with one day data for a reasonable-sized group provided that the groups were formed by using a variable known to have a small intraindividual variation. Thus, the choice of approach to data analysis may reduce the impact of a large intraindividual variation in dietary data permitting the continued use of the 24-hour recall. Beaton et al. (1979) further suggested that the data be analyzed using nutrient concentrations (in proportion to energy) rather than absolute nutrient intake. In the Bogalusa Heart Study, Frank et al. (1978) reported a similar approach to analysis in which children were grouped according to risk factor level. A previous grouping by intake level of selected nutrients had failed to result in observable differences in any risk factor level stressing the importance of choosing the most appropriate grouping variable.

Modifications of the dietary history method have been used in diet-CVD studies (Paul et al., 1963; Kahn et al., 1969; Nichols et al., 1976). The use of this method assumes the intraindividual variation has been accounted for by the individual reporting his usual habit over a specified time period (Liu et al., 1978). Dawber et al. (1962) expressed concern about the ability of a person to directly estimate his own true mean for dietary intake. Beal (1967), based on results from a 12-year longitudinal study, concluded individuals were not able to give adequate data using twice-yearly histories but were able to give adequate data for monthly histories. She also stressed that after one year, the interval period could be extended to three months without affecting the quality of the data. Liu et al. (1978) suggested any correlation study testing the relationship between diet patterns and some other variable e.g., serum cholesterol, should use diet recall or consecutive daily food record methods, provided the effect of intraindividual variation was considered, but that the dietary history method was clearly inappropriate. While no reason for rejecting the dietary history method was offered, the fact that it is a single measurement (a series of histories are assumed to measure change in pattern) which does not permit the identification of intraindividual variation, may be the cause. Since both repeated recall and daily food record methods allow the identification of intraindividual variation, Liu et al. (1978) considered them more suitable.

Conclusion

This review of the literature illustrates the scope of our present understanding of cardiovascular nutrition as well as the consensus among international experts in atherosclerosis and lipids that there is an adequate basis for recommending dietary changes. The recommendations are intended as a preventive measure designed to reduce the risk of CVD among the general population (Truswell, 1976; Canada, 1977; U.S. Senate, 1977; Shaper and Marr, 1977; Turner, 1978). As a prerequisite to the development of effective education strategies to assist adults in implementing the recommendations, baseline data are required. Current research on the relationships among nutrition attitudes, knowledge, and practice is reviewed to expose areas requiring further investigation. An overview of the available methods for assessing these three variables (attitudes, knowledge, and practice) provides background for decision-making of the present study. The following chapter presents the preliminary and pilot testing of instruments which validated the attitude, knowledge, and practice instruments and pretested the total questionnaire developed for use in the main study.

CHAPTER III

PRELIMINARY AND PILOT TESTING OF INSTRUMENTS

Purpose

Preliminary and pilot testing was conducted to: (1) validate the attitude and knowledge instruments specifically developed for the present study, and (2) pretest the data collection procedure. The testing involved several stages: preparation of a draft questionnaire, validation of the instrumentation, pretesting, revising the questionnaire for pilot testing, analyzing the results of the study, and refinement of the questionnaire for later use in the main study.

Preliminary Testing

Prior to construction of the questionnaire, rating scales were chosen to measure attitudes and knowledge. The use of similar scoring procedures and formats was desired for ease in responding and familiarity of the categories used.

The attitude, knowledge, and practice data were collected by means of a self-administered questionnaire. This questionnaire consisted of four sections related, respectively, to nutrition attitudes, nutrition knowledge, biodemographic information, and nutrition practice. All parts of the questionnaire were completed by all participants.

Nutrition Attitude Instrument

Since the purpose of the attitude instrument was to ascertain the attitudes or feelings regarding diet as a means of promoting heart health and intervening against heart disease, three subscales were chosen to represent this domain. Following procedures outlined by Edwards (1957), three subtests of five items each were formed. The first subdomain focused on attitudes toward the general role of diet in heart disease (A: GEN ROLE). Because the Canadian guidelines (Canada, 1977) recommended some changes in dietary habits, attitudes regarding changing or manipulating the diet were included as the second subdomain (A: MANAGE) of the attitude instrument. Finally, because the recommendations were designed to help the public take some personal responsibility for health (Rae and Murray, 1978), the third section of the instrument was developed to determine the attitudes toward self-responsibility (A: RESPON) for heart health. Items that expressed agreement with the Canadian recommendations or the intentions of the recommendations (Rae and Murray, 1978) were considered favourable or positive and those that disagreed, unfavourable or negative.

The scoring system, validated in previous research (Thompson and Schwartz, 1977) provided for two responses to each statement; the first, a designation of agreement or disagreement and the second, a designation of one of four degrees of certainty for the response ranging from very doubtful to very certain. Each statement was then scored from one to eight, with a score of one representing a negative attitude with the highest degree of certainty and a score of eight representing a positive attitude with the highest degree of certainty.

A panel of seven nutrition experts familiar with the subject matter and actively involved in community nutrition services in British Columbia independently validated the instrument. In addition, prior to preliminary testing, seven graduate students in human nutrition and five adults with little or no previous exposure to formal nutrition pretested the instrument.

From the validation and pretest results, minor changes were made to the wording of several items. The attitude questionnaire was then prepared for preliminary testing during the Summer 1978 with 41 people of the same nature as those who would receive the final draft, namely, male and female adult members of community centres.

Item analysis was performed on each subtest using LERTAP (Nelson, 1974), a computer program, to determine if the item-subtest correlations were positive. Positive correlations for five, three, and three items, respectively, were found. Results of analysis for internal consistency of the three subtests indicated that the attitude instrument, in its preliminary form, had low reliability (r= .60, .10, and .00, respectively).

The revised attitude instrument

Based upon these observations, several changes were introduced:

(1) The items were re-examined and refined for improvement in clarity. The construction of the items was such that, as far as possible, each subtest contained equal numbers of items that reflected positive and negative attitudes. The items were then randomly ordered within the scale.

(2) Because the reliability coefficient increases with length of the test and spread or variance of scores (Thorndike and Hagen, 1977), the total number of items was increased to 26 by including more items to reflect each subtest area related to diet and heart disease. The number of items added to each subtest was four, four, and three, respectively.

(3) To avoid the possibility that the response format had been too complicated for the group tested, the scoring system was changed to a Likert-type summated scale with a five category continuum ranging from 1= strongly disagree to 5= strongly agree. Respondents were requested to circle the number that best indicated how closely they agreed or disagreed with each item. To score the instrument, each statement was rated from one to five with a score of one representing a negative attitude with the highest degree of certainty and a score of five signifying a positive attitude with the highest degree of certainty. Thus

the possible attitude score range for the instrument could range between 26 and 130. The scoring system for the attitude instrument is illustrated in Table 1.

TABLE 1

Scoring System for the Attitude Instrument

Wording of Item	Strongly Disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly Agree 5
Positive	1	2	3	4	5
Negative	5	4	3	2	1

Validation of the attitude instrument

After careful construction and editing of the 26 statements, the attitude instrument was submitted to a panel of five independent judges who were members of the Canadian Dietetic Association, British Columbia Dietetic Association, and British Columbia Nutrition Council, and were employed in community nutrition service in B.C. either with government services, community agencies and organizations, or in hospital clinical services. In addition, each member of the panel was an active participant in nutrition continuing education programs and had experience in counselling adults on diet and heart disease.

The judges were instructed to independently follow the judging procedures as outlined, since a follow-up interview would be conducted if clarification of comments was necessary. The attitude domain was defined and the three subdomains used to describe the domain listed. The procedure dealt with each subdomain separately and asked questions, all open-ended about: (1) whether the subdomain was representative, (2) whether each item belonged to the subdomain, and (3) whether all concepts were present regarding the subdomain. In addition, the validators were asked to rate, on a nine point scale, relevancy of each item to the attitude domain (9, extremely relevant; 1, extremely irrelevant). A final question asked whether, as a set, the items provided an adequate amount of information for validly estimating the attitudes of adults toward diet and cardiovascular disease (CVD). Table 2 reports the agreement of the panel regarding the relevance of the items to the domain to which each was referenced. Defining consensus as a rating of seven or greater by at least four validators, consensus was achieved for 19 of the 26 attitude statements.

Table 3 presents validation results regarding representativeness of the individual subdomains, appropriateness of each statement to its subdomain, and presence of all concepts regarding the subdomain. In addition, judgement of the overall representativeness of the instrument to diet and heart disease, and adequacy of information are included.

Consensus (at least four out of five) was achieved among the validators for representativeness of each statement to its subdomain, appropriateness of each statement to its subdomain (with the exception of items 15 and 16 which received agreement

TABLE 2

Attitude Instrument: Distribution of Judges' Rating for Item Relevance to Content Domain

Item No.	Distribution of ratings [a]									Mean Rating
	9	8	7	6	5	4	3	2	1	
1	3	2								8.6
2	3	2								8.6
3	2		1	1	1					7.2
4	1	2	1	1						7.6
5	2		1	1	1					7.2
6		4			1					7.4
7		3	1	1						7.4
8	2	2	1							8.2
9	3	2								8.6
10	4		1							8.5
11	3		2							8.2
12	2	2	1							8.2
13	1	2	1	1						7.6
14	3			1		1				7.4
15	1	2				1		1		6.2
16	1	1	1		1			1		6.2
17	4		1							8.4
18	2	2	1							8.2
19	4	1								8.8
20	2		1	1	1					7.2
21	2	2		1						8.0
22	2		1	1			1			6.8
23	3	1		1						8.2
24	2		2	1						7.6
25	3	1		1						8.2
26	2	2		1						7.8

Note. Number of Judges = 5.

[a] 9 = extremely relevant; 1 = extremely irrelevant.

TABLE 3

Agreement of Validators on Questions Concerning Content Validation of the Attitude Instrument

Content Domain: Attitudes or feelings toward diet as a means of promoting heart health and intervening against heart disease.

	Agreement of Judges
1. General role of diet in heart disease	
a) representative of Content Domain	5
b) each statement belongs (1-9)	4
c) all concepts present	5
2. Changing/manipulating the diet to promote a healthy heart	
a) representative of Content Domain	5
b) each statement belongs (10-18)	5[a]
c) all concepts present	4
3. Self-responsibility for one's heart health	
a) representative of Content Domain	5
b) each statement belongs (19-26)	5
c) all concepts present	5
Statements overall represent adequate variety of topics on diet and heart disease	5
Statements cover adequate amount of information to obtain a valid estimate of attitudes of adults as relate to diet and heart disease	5

Note. Number of validators = 5.

[a] Except items 15 and 16 (agreement 3/5).

by three out of five judges), and presence of all concepts regarding each subdomain. In addition, there was complete agreement among the validators that the statements overall represented an adequate variety of topics on diet and heart disease, and that they would provide an adequate amount of information to obtain a valid estimate of adults' attitudes related to diet and heart disease.

Nutrition Knowledge Instrument

Nutrition knowledge related to diet and CVD was measured by a questionnaire developed for this study and based on the 1977 recommendations of Health and Welfare Canada (Canada, 1977) and current knowledge regarding diet and CVD. A thorough review of the Canadian recommendations and associated literature pointed out three general areas of significance. Using criteria suggested by Oppenheim (1966) and Mouly (1970), 23 items were developed to test three subdomains: (1) how food affects the heart (K: AFFECTS), (2) the importance of food composition (K: COMP), and (3) facts versus fallacy (K: FACTS). The first subdomain, how food affects the heart, tested respondents' knowledge regarding food and its association with the heart. The second subdomain tested respondents' knowledge of food composition considered essential for making substitutions or modifications in dietary practice. The third subdomain, facts versus fallacy, tested respondents' knowledge involving the differentiation between facts and fiction or myths related to diet and CVD. Common topics of faddism or misinformation that are promoted by the popular press but not supported by scientific evidence were included. For brevity, the parenthesized abbreviations for both attitude and knowledge subtests will be used in all subsequent discussion and tables.

A two response scoring system was used with the first response specifying true or false and the second, the degree of certainty ranging from very doubtful to very certain. Again, each item was scored from one to eight with one signifying an incorrect response made with the highest degree of certainty and eight signifying a correct response with the highest degree of certainty.

In their preliminary form, the knowledge items were validated and pretested at the same time as the attitude items (see p.67). Responses from this preliminary testing were analyzed using LERTAP (Nelson, 1974), to determine if the items were behaving in the correct direction, that is, if there was a positive point biserial correlation for each correct option. Results showed that several items were negatively correlated. As well, the top scorers did not consistently have more correct responses, as would be expected. Estimates of internal consistency revealed that the instrument in its preliminary form, had low reliability (r= .00, .04, and .72, respectively).

The revised knowledge instrument

Based upon these observations, the items were revised. Two items each were transferred from the subtest K:AFFECTS to K:COMP and K:FACTS, respectively. The total number of knowledge items was increased to 32 by adding three, six, and three items, respectively to the three knowledge subtests. The items were constructed so that a balance was maintained, as far as possible, between true and false items for each of the subtests. Once completed, the items were randomly ordered in the test. Also, the response format was replaced. Again, the change to a five category continuum ranging from 1= definitely false to 5= definitely true was made and the respondents requested to circle the number that best indicated their knowledge of each item. To score the test, each statement was rated from one to five as shown in Table 4.

TABLE 4

Scoring System for the Knowledge Instrument

	Definitely False	Probably False	Do Not Know	Probably True	Definitely True
KEY	1	2	3	4	5
True	1	2	3	4	5
False	5	4	3	2	1

<u>Content validation of the knowledge instrument</u>

Judgement packets containing the 32 items were prepared for validation by the same panel of five judges used to validate the attitude instrument. The logical analysis method (Kerlinger, 1973) and similar instruction format were followed. An additional question asked about the correctness of the item key. Results for relevance rating are presented in Table 5. Again, defining consensus as a rating of seven or greater by at least four validators, consensus was achieved for all but two of the knowledge statements.

Table 6 presents validation results regarding representativeness of the individual subdomains to the content domain, appropriateness of each statement to its subdomain, presence of all concepts regarding the subdomain, and agreement of the panel with the key for each item. In addition, judgement of the overall representativeness of the instrument to diet and CVD, and adequacy of information are also included.

With the exception of one item (number 2), consensus (at least four out of five) was achieved among the validators for representativeness of the individual subdomain to content domain, appropriateness of each statement to its subdomain, and agreement of the panel with the key. Four out of five judges agreed that all concepts were present regarding the subdomains "how food affects the heart" and "facts versus fallacy". The subdomain "importance of food composition" was judged to contain all concepts by one validator only. However, the method of agreement was a yes-no response with the request that the missing concept(s) be recorded.

One validator suggested further clarification of the difference between polyunsaturated fatty acid and saturated fatty acid. This was considered to contradict the purpose of the test and was not implemented. Two of the five validators suggested inclusion of items that tested knowledge of the

TABLE 5

Knowledge Instrument: Distribution of Judges' Rating for Item Relevance to Content Domain

Item No.	Distribution of ratings[a] 9	8	7	6	5	4	3	2	1	Mean Rating
1	3	1	1							8.4
2	3						1	1		6.4
3	4				1					8.2
4	2	2			1					8.0
5	2	2				1				7.6
6	3		1	1						8.0
7	3		2							8.2
8	3	1		1						8.2
9	3	1	1							8.4
10	3		1	1						8.0
11	3	1	1							8.4
12	3	1				1				7.8
13	3	2								8.6
14	3	1		1						8.2
15	3	1	1							8.4
16	2	2		1						8.0
17	4	1								8.8
18	3	1	1							8.4
19	2	1	2							8.0
20	3	2								8.6
21	2		2		1					7.4
22	2	1	2							8.0
23	4		1							8.4
24	3	1	1							8.4
25	3	1		1						8.2
26	2			1		1				6.4
27	2	2	1							8.2
28	3		1	1						8.0
29	2	1	1	1						7.8
30	3	1	1							8.4
31	3	1	1							8.4
32	3	1	1							8.4

Note. Number of Judges = 5.

[a] 9 = extremely relevant; 1 = extremely irrelevant.

TABLE 6

Agreement of Validators on Questions Concerning Content Validation of the Knowledge Instrument and the Key to the Statements

Content Domain: Nutrition knowledge related to the heart.

	Agreement of Judges
1. How food affects the heart	
a) representative of Content Domain	5
b) each statement belongs (1-9)	4[a]
c) all concepts present, if no, suggest what is missing	4
d) agree with the key for 1-9	5[b]
2. Importance of food composition	
a) representative of Content Domain	5
b) each statement belongs (10-21)	5[c]
c) all concepts present, if no, suggest what is missing	1[d]
d) agree with the key for 10-21	5
3. Facts versus fallacy	
a) representative of Content Domain	5
b) each statement belongs (22-32)	5
c) all concepts present, if no, suggest what is missing	4
d) agree with the key for 22-32	5
Statements overall represent an adequate variety of topics on diet and heart disease	5
Statements give an adequate amount of information to obtain a valid estimate of nutrition knowledge as relates to diet and heart disease	5

Note. Number of Validators = 5.

[a] Except item 2 (agreement 2/5).
[b] Except item 9 (agreement 4/5).
[c] Except item 12 (agreement 4/5).
[d] 1/5 suggested the difference between polyunsaturated and saturated fat be clarified (contradicts purpose of the instrument). 2/5 suggested sodium content of foods and snacks be included (too specialized a question in light of the recommendation regarding salt). 1/5 suggested more items related to sugar content of foods (the recommendation suggested moderation in the use of sugar to avoid overweight and displacement of essential vitamins and/or minerals).

sodium content of foods and snacks. Again, this suggestion was not implemented because of its specialized nature and the fact that the Canadian recommendations do not advise a quantitative limit on the sodium intake of the general population. The recommendation was to reduce the intake of salty foods and exert moderation in the use of salt in cooking and at table (Rae and Murray, 1978) --both concerned with the reduction of added salt (sodium chloride), not the sodium content of foods per se. The final suggestion by the fourth validator was to include items to test knowledge of the sugar content of foods. This suggestion was not carried out either since the Canadian guidelines did not advise a quantitative limit on sugar intake of the general population but recommended moderation in its use so as to avoid overweight and/or displacement of essential vitamins and minerals.

All members of the panel agreed that the statements overall represented an adequate variety of topics on diet and heart disease and would give an adequate amount of information to obtain a valid estimate of cardiovascular nutrition knowledge.

Before further action based on these validation results was taken, it was decided to try out all attitude and knowledge items with the pilot sample.

Biodemographic Section

In the third section of the questionnaire, respondents were asked to provide the following biodemographic information:

age, gender, occupation, physical exercise pattern, smoking habit, height and weight, living arrangement, education level, place of birth, family history of CVD, personal history of CVD, and sources from which information on diet and heart disease were obtained. The format was a check list or short answer. Check list questions were designed so that, if necessary, short answers could be given to allow for respondents who did not find any of the alternatives suitable.

Nutrition Practice Instrument

Practice was measured in the fourth and final section of the questionnaire. Items were developed for this study by modifying a number of previously validated dietary history and dietary recall questionnaires (Diet Manual Committee of the B.C.D.A., 1976; Ohlson, 1972; Frankle and Owen, 1978; Canada, 1973), as well as a food frequency practice instrument (Schwartz, 1973). The practice instrument was constructed as a parallel instrument to the modified dietary history which utilizes an interview situation for a more comprehensive coverage of dietary information. Due to logistical constraints, the sole use of the interview was not feasible for the main study.

The practice questionnaire was further subdivided into three sections corresponding to the following three general questions: "What did you eat yesterday?" "What is your general eating pattern?", and "How frequently do you eat each of the following common foods?" Question one involved recall of all foods and beverages consumed over the previous 24-hour period. Respondents were asked to report the kind of food, type and/or preparation, and amount consumed for six time periods: morning, late morning, mid day, afternoon, evening meal, and after evening meal. Also, next to their report, they were asked to indicate how it varied from usual for the corresponding period. A series of questions (open- and close-ended) followed to determine the answer to the second question concerning general eating pattern. Comments on variations of the previous recall from the usual pattern, use of food or nutrient supplements, current alcohol consumption, use of salt, food dislikes, weekend food practice, meal skipping practice, and length of present eating pattern were also included.

The final subsection of the practice questionnaire contained a comprehensive food frequency check list which, together with the data from previous questions, served as a cross-check on the usual food intake and contributed to the final estimate of the participants' usual dietary practice.

Because the components of the practice instrument had been previously validated, the validity of the practice instrument was not determined before pilot testing. However, the total questionnaire, including attitude, knowledge, biodemographic, and practice sections, was pretested by nine graduate students in human nutrition, three of whom had previous professional experience in public health nutrition and dietetics in Canada. Two human nutrition faculty members with experience in nutrition survey research also examined the instrument. Based on the results of this pretest and the validation procedure, the questionnaire was prepared for pilot testing.

Pilot study form. The four sections described above were assembled to form one questionnaire. Each section was colour-coded to facilitate the transition between sections for the respondents. Green was chosen for the attitudes instrument, blue for the knowledge instrument, and yellow for the biodemographic and practice sections. The sections were introduced by a brief statement of content and direction for responding. The first section, attitudes, also included an example of the response procedure using a general item unrelated to diet and heart disease. Finally, to reduce the bulk of the questionnaire, both sides of the page were utilized resulting in a total of six pages (one, one, and four, respectively) for the pilot questionnaire.

Questions for a short interview were also constructed to deal with specific points not possible to cover in the pretest questionnaire, such as, (1) how specific items were interpreted; (2) if any statements gave difficulty; (3) whether it was difficult to switch from attitudes to knowledge; (4) if there were any difficulties, problems, questions, or frustrations regarding the practice instrument; and (5) overall impression of the questionnaire. A copy of both the preliminary questionnaire and the pilot study questionnaire are presented in Appendix A.

Pilot Study

Purpose

The purpose of the pilot study was twofold: (1) to determine if the total questionnaire was appropriate for the intended target population; and (2) to further utilize the data to determine the psychometric characteristics of the attitude and knowledge instruments developed for this study.

The Sample

The pilot sample consisted of five groups "known" to differ in nutrition knowledge. Two of the groups were university students: one, a fourth year class of nutrition and dietetics majors (NUTR); the other, a fourth year secondary education class (EDUC). To avoid a possible university effect on score results, two non-university groups were included as well: a group of nutrition and dietetics professionals employed in the community (DIET), and a group of adults who were members of a Vancouver community centre (CC). Members of the education class and the community centre group who reported prior courses in nutrition in the debriefing questionnaire that accompanied the pilot packet, formed a fifth group (MIX).

Hypotheses

It was hypothesized that there would be a significant difference in mean knowledge scores among the five groups.

It was assumed that, because the members of NUTR group were currently electing nutrition as their choice of a future profession, they would have the most knowledge regarding diet and CVD. Because the EDUC group were presumed to have less association with information on diet and CVD, they were predicted to have less knowledge than any of the groups with prior nutrition exposure but equal to or more knowledge than the CC group. Likewise, it was predicted that the CC group would have lower mean knowledge scores than the DIET group in the community, the MIX group, and the NUTR group.

It was further hypothesized that there would be no difference in mean attitude scores between the two nutrition groups (NUTR and DIET); no difference in mean attitude scores between the two non-nutrition groups (EDUC and CC) but a significant difference in mean attitude scores between the nutrition groups and the non-nutrition groups.

Data Collection Procedure

In March 1979, a questionnaire packet consisting of a cover letter, the self-administered questionnaire, and a short debriefing questionnaire was distributed to each person in the pilot test sample. The university groups and the professional community group were briefly addressed by the investigator, the purpose of the pilot study was stated, and the packet distributed. The questionnaires were immediately completed and collected. The community centre group was also addressed by the investigator, the purpose stated, and the packet including a self-addressed envelope, distributed to those who agreed to participate. The questionnaire was taken home, completed, and returned by mail or to the community centre within one week of distribution. Data collection for all groups was completed within a two week period.

Data Analysis

In preparation for analysis by computer, the investigator coded the responses. Each questionnaire was given an identification number that identified the person and the group to which she or he belonged. The coded questionnaires were key-punched directly and verified by the Key-punching Services of the Computer Centre at the University of British Columbia. The data were then placed on file and hand-checked for punching errors by the investigator. Any errors were double-checked and corrected. All analyses were performed by an AMDAHL 470 V/6 Model II computer under the Michigan Terminal System.

Item analysis was performed using the LERTAP (Nelson, 1974) computer program in order to determine the internal consistency (Hoyt, 1941) of the knowledge and attitude instruments and to examine the performance of the items. One-way analysis of variance (ANOV11: University of Alberta, 1969) was also performed to test the tenability of the hypotheses followed by Scheffé's S method (Kirk, 1968) to determine the source of any significant effect.

Results and Discussion

Attitude instrument

Item analysis. An examination of the item-subtest correlations revealed that all item-test values for both A:GEN ROLE and A:MANAGE were positive; however, in the case of A:RESPONS, five of the eight items were found to be negatively correlated with the subtest. An examination of the subtest :RESPON for each of the five groups showed that only two of the items were positively correlated with three or more groups; the remaining six items had negative or no correlation for three or more groups. This indicated that the items were ambiguous for the majority of the groups.

The internal consistency coefficients for the subtest and Cronbach's alpha for the total test are reported in Table 7 together with the corresponding mean, standard deviation, and standard error.

The mean scores indicated an apparent positive attitude toward the role of diet in promotion of heart health and intervention against CVD for A:GEN ROLE and A:MANAGE (both means greater than 85% of total possible score). The mean score for A:RESPON was somewhat lower.

The reliabilities for A:GEN ROLE and A:MANAGE were acceptable (.72 and .79, respectively) but Hoyt's r for A:RESPON indicated that subtest was not reliable, in agreement with the item level analysis. The internal consistency of the total

TABLE 7

Summary Test Statistics for the Attitude Instrument

	A:GEN ROLE	A:MANAGE	A:RESPON	A:TOTAL
No. of items	9	9	8	26
Mean (%)	38.95(86.56)	38.54(85.64)	29.38(73.45)	106.87(82.21)
S.D. (%)	3.46(7.69)	3.93(8.73)	2.58(6.45)	7.97(6.13)
Hoyt's r	.72	.79	.00	.70[a]
S.E.	1.72	1.68	2.49	3.66

[a] Cronbach's composite alpha (Cronbach, 1951).

scale was acceptable (.70). Given the lack of reliability of A:RESPON, no further analysis was performed with this subtest, the items of which are discussed under revision of the attitude instrument.

Test of hypotheses. To test the hypotheses that there was no difference in mean attitude scores between the two nutrition groups (NUTR and DIET) or between the two non-nutrition groups (EDUC and CC) but that there was a significant difference between the nutrition groups and the non-nutrition groups, a one-way analysis of variance was performed for A:GEN ROLE and A:MANAGE. Table 8 presents the mean attitude scores for the five groups and Table 9 summarizes the analysis of variance results.

In each case, the null hypothesis was rejected. To determine the source of the effects, all pairwise comparisons among mean scores were tested using Scheffé's S method (Kirk, 1968) at the .05 level of significance. Table 10 summarizes the results.

As shown in Table 10, for A:GEN ROLE, the mean attitude scores of the NUTR group were significantly higher ($P<.05$) than those of the CC group. All other pairwise comparisons were not found to be significantly different.

For the second subtest (A:MANAGE), the NUTR group scored significantly ($P<.05$) higher than both non-nutrition groups. In addition, the DIET group scored significantly ($P<.05$) higher than the EDUC group. These results lend support to the conclusion that there was evidence for construct validity.

TABLE 8

Mean Scores for Attitude Subtests by Group

Group	N	A:GEN ROLE	A:MANAGE[a]
CC	11	36.64	36.36
EDUC	25	37.96	36.24
MIX	10	39.50	40.00
DIET	14	39.86	39.86
NUTR	16	40.94	41.56

[a] Ordered according to performance in A:GEN ROLE.

TABLE 9

One-Way Analysis of Variance for Attitude Subtests and Total Test

Source of Variability	df		F: A:GEN ROLE	F: A:MANAGE	F: A:TOTAL
Between	4		3.89*	8.55*	6.18*
Within	71	MSw	10.35	11.00	49.75

* $P < .05$.

TABLE 10

Differences among Group Mean Scores for Attitude Subtests

Group		A:GEN ROLE				A:MANAGE[a]			
		2	3	4	5	2	3	4	5
1	CC	1.32	2.86	3.22	4.30*	.12	3.64	3.50	5.20*
2	EDUC		1.54	1.90	2.98		3.76	3.62*	5.32*
3	MIX			.36	1.44			.14	1.56
4	DIET				1.08				1.70
5	NUTR								

[a] Order based on performance in A:GEN ROLE.

* $P<.05$.

Knowledge instrument

Item analysis. Items which behave in the correct direction will have a positive point biserial correlation for the key response option; as well, the more knowledgeable groups should have more correct responses than incorrect. Items on the individual subtests were examined for the five groups, separately and combined, in order to identify those items that behaved correctly. A comparison of the proportion from each group that responded correctly to an item indicated whether the item discriminated between the nutrition (NUTR and DIET) and non-nutrition (EDUC and CC) groups. Examination of the proportion correctly responding for the combined group suggested the difficulty level of the individual item.

In subtest K:AFFECTS, one item was found to have a correlation of .15 as well as not discriminate between the nutrition and non-nutrition groups. Four other items suggested that there was considerable guessing. However, the point biserial correlations were greater than .23 and the highest scorers correctly answered the four items. The remaining items appeared to behave correctly.

Item analysis results for K:COMP revealed three of the 12 items were misbehaving in that major guessing was suggested for all five groups indicating lack of discrimination between the nutrition and non-nutrition groups. For K:FACTS, two of 10 items while having positive point biserial correlations greater than .39, did not discriminate between the nutrition and the non-nutrition groups.

With data from all five groups, internal consistency of subtests and total test was computed using analysis of variance (see Hoyt, 1941) for subtests and Cronbach's composite alpha for the total test. Mean, standard deviation, Hoyt's reliability coefficient, and standard error are summarized for the knowledge instrument in Table 11.

The low reliability for K:AFFECTS (.36) may be partially due to the nature of the subtest content, a more general topic than either food composition or facts versus fallacy; or to the misbehaviour of five of the nine items. The reliability of the remaining knowledge subtests and the total test all exceeded .71, with that for the total test (Cronbach's alpha) approaching the more desired value of .80.

Test of hypotheses. To test the hypothesis that there was a significant difference in mean knowledge scores among the five groups, one-way analysis of variance was performed. Table 12 presents the mean knowledge scores for each group. Table 13 summarizes the results of the analysis.

In each case, the null hypothesis was rejected at the .05 level of significance. To determine the source of the effects, all pairwise comparisons among mean scores were tested using Scheffé's S method (Kirk, 1968). The results are summarized in Table 14.

TABLE 11

Summary Test Statistics for the Knowledge Instrument

	K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
No. of items	9	12	10	31
Mean (%)	34.26(76.13)	46.91(78.18)	39.61(79.22)	120.78(77.92)
S.D. (%)	3.19(7.09)	6.21(10.35)	5.13(10.26)	12.59(8.12)
Hoyt's r	.36	.71	.74	.79[a]
S.E.	2.40	3.23	2.46	4.91

[a] Cronbach's composite alpha (Cronbach, 1951).

TABLE 12

Mean Scores for Knowledge Subtests by Group

Group	N	K:AFFECTS	K:COMP	K:FACTS
CC	11	32.27	40.36	34.00
EDUC	25	32.48	43.52	37.12
MIX	10	34.00	47.30	40.50
DIET	14	36.57	50.57	42.64
NUTR	16	36.56	53.25	44.13

TABLE 13

One-Way Analysis of Variance for Knowledge Subtests and Total Test

Source of Variability	df		F K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
Between	4		10.47*	21.70*	16.94*	31.29*
Within	71	MSw	6.76	18.33	14.23	60.58

* $P<.05$.

TABLE 14

Differences among Group Mean Scores for Knowledge Subtests

Group	K:AFFECTS				K:COMP				K:FACTS			
	2	3	4	5	2	3	4	5	2	3	4	5
1 CC	.21	1.73	4.29*	4.30*	3.16	6.94*	10.21*	12.89*	3.12	6.50*	8.64*	10.13*
2 EDUC		1.52	4.08*	4.09*		3.78	7.05*	9.73*		3.38	5.52*	7.01*
3 MIX			2.56	2.57			3.27	5.95*			2.14	3.63
4 DIET				.01				2.68				1.49
5 NUTR												

* P<.05.

As shown in Table 14, the mean scores for NUTR and DIET groups were significantly ($P<.05$) greater than the EDUC and CC groups in all three knowledge subtests. Similarly, the CC group did not differ significantly ($P<.05$) from the EDUC group, nor the NUTR group from the DIET group for all three subtests.

Since these results indicated that the mean scores of the nutrition groups were significantly ($P<.05$) greater than those of the non-nutrition groups, but that the mean scores of the CC group did not differ significantly from the EDUC group, this confirmed the requirement that the test discriminate between those with and without specific knowledge, thus providing further evidence of the content validity of these tests.

Debriefing questionnaire and interview

A short debriefing questionnaire accompanied the pretest questionnaire. It used a check format with provision for additional comments. Nine questions dealt with: (1) clarity of the cover letter, (2) directions, (3) use of colour, (4) time requirement for completion, (5) length of the questionnaire, (6) prior attendance at formal nutrition courses, (7) whether any statements were regarded as ambiguous, repetitious, biased, (8) whether the questionnaire was interesting, and (9) their overall impression of the questionnaire.

To determine answers to questions that could not be covered in the debriefing questionnaire, a short interview (15 minutes) was arranged with randomly chosen representatives of three

(NUTR, CC, EDUC) groups. In the case of the professional nutrition group in the community (DIET), the 14 dietitians with experience in dietary history procedures participated in a round table discussion. At that time, the questions previously described were asked as well as questions regarding the practice instrument itself. Each section of the practice instrument was examined for relevance to the topic (usual dietary practice), adequacy of coverage of the topic, clarity, and lack of ambiguity (Mouly, 1970). Results are described below in the discussion of the revisions of the instruments.

Revisions of the Instruments

Attitude Instrument

Comments obtained from the interview and the debriefing questionnaire confirmed the ambiguity of the six items in the A:RESPON subtest which correlated negatively with the total subtest score. Consequently, these six items were deleted. The remaining two items of the subtest appeared to perform correctly and were transferred to subtest A:GEN ROLE. A seventh item was also deleted from subtest A:GEN ROLE as its correlation, while positive and very low (.09) for the total group, was negatively correlated for two of the five groups, and was considered ambiguous in the debriefing results. The final revised attitude instrument consisted of two subtests: (1) A:GEN ROLE and (2) A:MANAGE with 10 and nine items, respectively.

Knowledge Instrument

The two criteria used for deleting or revising knowledge items were as follows: (1) a point biserial correlation less than .2; and (2) the inability of an item to discriminate between the nutrition and non-nutrition groups as determined by the proportion of each group that responded correctly.

For K:AFFECTS, of the five misbehaving items identified on the basis of the item analysis results, four were retained. On each, the top scorers for the total K:AFFECTS responded correctly. One of these items was altered to increase the clarity of the statement based on pretest comments. The fifth item was deleted since both nutrition groups had negative correlations and the correlation for the total group, while positive, was only .15.

The three items that misbehaved in K:COMP were re-examined. One was retained despite its difficulty level (30% of test takers picked the correct response). While most items should be in the 50 to 80% difficulty range (Stanley and Hopkins, 1972, pp.188-189), the item was retained because of its importance to the study as a whole. The remaining two items were deleted due to confirmed ambiguity from the pretest comments.

Two items from the final subtest (K:FACTS) were also reexamined. One was retained even though all groups appeared to be guessing, because of its importance regarding CVD. The second item was deleted since it was judged to reflect current popular literature and failed to discriminate between groups (overall proportion who answered correctly was 19.7%).

The final knowledge instrument consisted of three subtests: K:AFFECTS, K:COMP, and K:FACTS with eight, 10, and nine items, respectively.

Biodemographic Section

Two revisions were made in the biodemographic section: the age categories were altered to coincide with the Canadian Dietary Standard categories, and the sequence of the questions concerning histories of CVD was reversed, that is, the personal history of CVD now preceeded the family history of CVD.

Practice Instrument

The dietitians agreed that the questions were clear, relevant to usual dietary practice, and provided adequate coverage of the topic except for some minor additions. More description was added to the "yesterday's intake" format and several foods were added to the food frequency check list.

The debriefing questionnaire established the time requirement for completion of the questionnaire to be about 30 minutes, and confirmed the use of the coloured sections to separate the attitude, knowledge, and the remaining sections (biodemographic and practice).

The revisions mentioned were implemented; the final questionnaire typed, printed, and collated in preparation for the main survey, the methodology of which is described in the next chapter. A copy of the final questionnaire is presented in Appendix A.

CHAPTER IV

METHOD

An analytical survey was conducted to determine interrelationships among cardiovascular nutrition attitudes, knowledge, and practice and biodemographic characteristics of adult members of community centres.

Instruments

Cardiovascular nutrition attitudes, knowledge, and practice data were collected by a self-administered questionnaire that consisted of four sections corresponding, respectively, to nutrition attitudes, nutrition knowledge, biodemographic information, and dietary practice.

Nutrition Attitudes

The attitude instrument, validated and pretested in the pilot study described in the previous chapter, consisted of two subtests: (1) A:GEN ROLE and (2) A:MANAGE with 10 and nine items, respectively. A:GEN ROLE measured attitudes toward the general role of nutrition in heart disease. The second subtest, A:MANAGE, measured attitudes regarding the changing or manipulating of the diet as a preventive measure against CVD. The overall purpose of the instrument was to measure attitudes toward diet as a means of promoting heart health and intervening against heart disease.

Nutrition Knowledge

The knowledge instrument, also validated and pretested in the pilot study, contained three subtests: K:AFFECTS; K:COMP; and K:FACTS, with eight, 10, and nine items, respectively. The first subtest, K:AFFECTS, measured knowledge of how food affects the heart. Knowledge of food composition was measured by the subtest K:COMP, and knowledge involving the differentiation between facts and fallacies related to diet and CVD was assessed by K:FACTS.

Biodemographic Section

The biodemographic section of the self-administered questionnaire collected data on the independent variables which were non-manipulative in nature and included: (1) gender, (2) age, (3) living arrangement, (4) education level, (5) physical exercise pattern, (6) height, (7) body weight, (8) smoking habit, (9) personal history of CVD, and (10) family history of CVD. In addition, information that related to occupation, place of birth, history of previous weight change, and sources from which information on diet and heart disease was obtained, was collected. All responses required short answers or checking.

Dietary Practice

The practice instrument, validated by 14 dietitians with experience in dietary history procedures (see Chapter III, p.97), measured the usual dietary practice of the participants. It consisted of three sections that provided information on yesterday's intake, general eating pattern, and frequency of consumption of a number of common foods. The combined information from the three sections gave an estimate of the usual intake of the individual.

To ascertain the reliability of the practice data, dietary data was also obtained from personal interviews with a random subsample of those returning the questionnaires. The interview schedule was a parallel form to the questionnaire and was predominantly a close-ended instrument based on the method described by Burke (1947) and Young (1959). It used a 24-hour recall with probing techniques for determining variations from the usual intake recorded, questions regarding the general eating pattern, and a food frequency check list to cross-check the usual food intake. The interview schedule also collected data on the participant's exercise pattern, smoking habits, age, gender, and use of supplements. All interviews were conducted by two qualified nutritionists with experience in obtaining dietary histories. Probing questions and food models were used to assist the participant in recalling portion sizes and amounts. Once the recorded intake had been carefully cross-checked, the final estimate of the participant's dietary practice was determined according to the same procedure used for the self-administered practice instrument.

Because the validity of the interview data is affected by the competence of the interviewer, the two nutritionists received two or more hours of training in the interview specific to this study. Instructions included the use of food models, probing, and recording of data as well as procedures for height and weight measurement, so that the interview protocol was standardized, between-interviewer differences minimized, quality control assured, and validity improved. Written instructions for standardizing the interview and measuring weight and height were provided (see Appendix B). To pretest the schedule, the interviewers conducted a taped practice interview with the same adult, not a member of the survey sample. The tapes were later reviewed by both interviewers and any problems, questions, or improvements collectively resolved. As a result of the pretest, several minor changes in the schedule were made. A copy of the final form of the schedule is presented in Appendix B.

The four sections of the questionnaire were assembled in the same order used in the pilot questionnaire: attitudes, knowledge, biodemographic, and practice sections. Colour-coded sections were used and the pages printed on both sides.

Population

The present study was an analytical field survey designed to investigate the cardiovascular nutrition of adult members of community centres with respect to the dependent variables attitudes, knowledge, and practice, and the relationships of these three variables to the biodemographic characteristics of the sample.

It was thought that adults who attended community centre programs would likely form an audience appropriate for the type of cardiovascular nutrition program that might be planned based on the findings. Therefore, the target population for this survey was adults, 19 years of age and over, who participated in programs offered by community centres operated in the city of Vancouver, B.C. Since 1976, the city had been divided into four recreation areas (Vancouver, 1977) containing a total of 21 community centres (Vancouver, 1978). Information received from the head offices of each recreation area suggested that differences existed from centre to centre as well as between recreation areas, indicating the inadvisability of using any one community centre to represent a particular area.

Consequently, it was decided that each community centre would be sampled in order to represent the total population of Vancouver community centre adults. The requirements for inclusion in the survey were that the community centre cater to the whole community and that the members fluently speak and read English. Of the 21 centres, four were eliminated from the study: one centre used a language that was not English, two centres catered to specific subgroups of the community, and a fourth centre participated in both preliminary and pilot testing of the instruments.

Sample

In April 1979, letters that described the purpose of the study, asked for their cooperation, and requested completion and return of an enclosed authorization form were sent to the recreation coordinators of the 17 community centres (see Appendix C). Of the 17 centres approached, three chose not to participate in the study and two were unacceptable because they differed in orientation from remaining community centres i.e., not centralized or schools rather than activity centres. One final centre allowed entry of the investigator but declined permission for conduction of the research procedure devised for the study. To avoid introducing possible bias with a different approach, this centre was also eliminated from the study. The six non-participating centres represented all four recreation areas of the city of Vancouver; two each from the South and North areas; one each from the West and East areas. The remaining centres, 11 in total, participated in the study.

The following sampling procedure was used for each of the community centres surveyed. As the majority of the community centre classes operated on a Monday to Thursday basis, one day from among these four was randomly selected. Then, from the office's registration list, a list of members for the programs of the chosen day was generated and 40 names were randomly selected. Because of different centre administrative policies, five of the 11 centres were not able to supply a membership list and/or a class list for the chosen day. In these five instances, the investigator with the cooperation of officials of the centres concerned, met each class operating on that particular day. After introducing herself, the investigator stated: (1) the purpose of the survey, (2) that the day had been selected at random to represent their centre, (3) that all classes operating on that particular day would be approached, (4) that volunteers were requested for participation in the study, (5) that the questionnaire required about 30 minutes to complete, (6) that they could take it home and mail it back in the stamped envelope provided, and (7) that complete anonymity would be maintained and all answers treated confidentially. The remaining six centres provided lists from which names were randomly selected.

Data Collection Procedures

Questionnaire Distribution

Once the distribution day had been assigned to each participating community centre, a time table for administration of the questionnaire packets during May and June 1979 was arranged. This necessitated several distribution periods per centre. Each time, the investigator briefly addressed the selected group, stated the purpose of the survey, and requested their participation. Before receiving the survey packet which contained a cover letter, the questionnaire, an identification card, and an addressed, stamped, return envelope, the participants signed a consent form. They were assured that complete anonymity would be maintained and that all results would be treated confidentially. Mail return of the completed questionnaire in the envelope provided was requested within one week from the date of distribution. At the time of distribution, three of the six centres in which random sampling had been contemplated were found to have problems. Due to class cancellation or replacement, only half of the initial classes were present. Consequently, the investigator met with the substituted classes and requested participation from all present. Using the signed consent forms, lists of participants from each centre were made and reminders, once the deadline elapsed, communicated by means of telephone follow-up.

Interview Sample

With the same list of participants who signed the consent forms, a second sampling procedure was followed to select a subsample for the interview segment of the study. From the list, stratified by gender, a random subsample of four people per centre was selected with gender represented in proportion to the original centre participation. Contact by telephone determined whether they had returned the questionnaire and, if so, whether they were willing to participate in the interview. In this way, a subsample of 44 people, representative of the 11 community centres, was interviewed.

Interview data collection procedure

The final stage of the data collection, the interviewing of the subsample, was scheduled two weeks after the administration of the questionnaire. Appointments were arranged for interviewing according to the convenience of the members of the subsample. The procedure was as follows: the interviewers were assigned to subjects according to a time table established by mutual convenience.

The interviewers telephoned the prospective participant and stated "Mr. X, I am . . . . calling about the diet and heart disease survey in which you participated at . . . . community centre." He was informed that he had been randomly chosen for the interview about his food habits, that all answers were confidential, and that no names would be used in the analysis. He was then asked if he had completed and returned the questionnaire. If he responded negatively, he was asked whether he intended to complete it or wished a second copy to replace the one lost. If he responded in the affirmative, the interviewer stated that she wished to come and talk with him about his food habits on (date), and that it would take about 30 minutes. He was reminded that he would be asked at that time to submit the identification card that accompanied the questionnaire. The conversation closed with two questions: What time is most convenient for you, and shall I call at your home? or . . . (address to be taken). If the person hesitated, the . . . . community centre was suggested. Before ending the telephone conversation, the interviewer reviewed the time and place for the interview.

On the day of the interview, the interviewer identified herself, showed the authorization form, repeated the survey name and University of British Columbia affiliation, and emphasized that all answers were confidential. Then, she proceeded with the interview according to the established protocol. At the end, the participants were reminded to submit their identification card so comparison with the parallel self-administered practice instrument could be made.

Data Analysis

Preparation of Data

As questionnaires were received, the identification numbers were recorded and the date of the return noted. Each questionnaire was reviewed for completeness and those with incomplete sections deleted. All biodemographic data were converted to numerical codes, recorded on the questionnaire, and double-checked for accuracy.

Practice information was transferred by the investigator to food record booklets using the scoring procedure described below.

Data were key-punched directly from the questionnaire and practice coding booklets (the latter from both the questionnaire and interview) by the staff at the University of British Columbia Computer Centre. The biodemographic information from the interview schedules was key-punched by the investigator. Because of the large volume of data, all raw data input were placed on files and hand-checked for key-punching errors by the investigator. Any errors were double-checked and corrected. The items of the attitude and knowledge scales were also re-checked for correct coding and scoring key.

Scoring

The same scoring procedures for the attitude and knowledge scales used in the previously described pilot study (see Chapter III, pp. 68 and 75 and Tables 1 and 4) were used in the main study. Responses to the attitude and knowledge subtests were item analyzed and the resulting scores stored on file.

Scoring of the practice data involved three steps: (1) estimation of the usual intake, (2) transfer to coding booklets for translation by computer to nutrient values, and (3) conversion to nutrient ratio scores.

Estimation of usual intake

To score the usual eating practice of the respondents, guidelines were developed to standardize the scoring procedure for the practice instrument (see Appendix D). The usual intake was estimated in terms of specific foods, using amounts or serving sizes consumed.

Translation to nutrient values

The usual intake information was transferred to dietary analysis coding booklets devised by the Division of Human

Nutrition, School of Home Economics, University of British Columbia. Each food item was identified by a specific code number and recorded according to the serving quantity consumed for later nutrient composition determination by computer. All coding booklets were identified by the respondent's unique identification number and practice data were confined to one booklet per respondent.

A number of additions to the existing nutrient food composition data bank were necessary. The food composition tables used to supplement the GNA: General Nutrient Analysis program (see p.112) were based on the revised publications NUTRIENT VALUES OF SOME COMMON FOODS (Canada, 1979a) and FOOD VALUES OF PORTIONS COMMONLY USED (Church and Church, 1975). The nutrient composition for one specified serving of the new food item was entered into the nutrient analysis food composition data bank and stored for later use. For each addition, an identifying nine digit code was devised following the program's original procedure for coding food items. That is, the first three digits were unique for each food item, the fourth to sixth digits represented the food groups e.g., 130 referred to cheese, and the remaining three digits determined one serving portion, coded in grams.

The new food items were added to the dietary analysis coding booklets with the first six identifying code numbers only. Then the three digits to designate the serving portion were based on the fraction of serving portion specified (one serving portion was coded 010). Thus, the nutrient composition of a food item was determined by the fraction of serving portion entered in the food booklet.

Following the above procedure, the usual intake was entered, according to the list of foods and the serving quantities of each, by the appropriate food codes. The conversion from food code to nutrient value was done by computer. The GNA: General Nutrient Analysis program, developed by R.D. Meldrum, revised by Louis James, 1979, and part of the Nutritional Status Investigation Computer Programs of the School of Home Economics, U.B.C. was used. Values for the nutrients (protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, vitamin C, fat, carbohydrate) and energy (kilocalories) were determined.

<u>Conversion to nutrient ratio scores</u>

Since nutrient intake in terms of the Canadian Dietary Standard (CDS) (Canada, 1975a) for adults by age and gender and the dietary guidelines released by Health and Welfare regarding diet and CVD (Canada, 1977) were of major interest, nutrient ratio scores, termed practice scores, were computed for each intake value, including energy. This avoided the confusion of different units for nutrient and energy measurement and controlled for variation in requirement due to age and gender. The practice score for a given nutrient was the ratio of the respondent's intake to the CDS for that respondent's gender and age category, or to the recommendation regarding diet and CVD. For kilocalories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and vitamin C, the following formula was used:

$$\text{nutrient ratio score} = \frac{\text{actual intake}}{\text{CDS based on age and gender}}$$

For the nutrients fat and carbohydrate, the formula used was as follows:

$$\text{nutrient ratio score} = \frac{\text{intake in gx9 or 4/kilocalorie intake}}{\text{Canadian recommendation}}$$

The numerator in the second formula computed the proportion of energy derived from fat and carbohydrate, respectively.

The gross nutrient values and the nutrient ratio scores were placed on file. Data for the remaining items were unaltered.

Statistical Analysis

Formation of variables

Biodemographic variables. Univariate frequency distributions were computed for each biodemographic variable using the Statistical Package for the Social Sciences (SPSS) subprogram FREQUENCIES (Nie et al., 1975). Based on these results, the number of categories for several of the variables were altered as follows:

(1) The 10 age groups were collapsed into three categories: young (19-35 years), mid- (36-50 years), and older-age (51 + years) group, the same grouping system employed by the CDS.

(2) Living arrangement was collapsed into two categories: those who lived with family and other.

(3) For education level, four classical groups were formed: less than grade 12, grade 12, 1-3 years university, and 4 or more years of university.

(4) Place of birth was expressed by two categories: Canada and other.

(5) Height and weight were expressed as body mass index (BMI) defined as the ratio of weight in kilograms to height in meters squared (Keys et al., 1972). After computing the BMI for each respondent (Wt/Ht^2), Thomas' et al., (1976) nomograph method was used to establish three obesity risk categories: low, moderate, and high. The basis of the nomograph method is the use of life insurance tables' desirable weights for men and women. Ranges were suggested to correspond to degree of risk for obesity. Men and women whose BMI fell within ranges that were equal to or less than their desirable weight or greater than 20% of the outside limit for desirable weight according to gender were designated at low or high risk, respectively.

Those who fell within + 20% of their desirable weight were designated at moderate risk for obesity.

(6) Family history of CVD was expressed as two categories, positive and other.

(7) The 24 information sources were grouped into three categories: human professional, human non-professional, and material source.

Originally, socioeconomic status (SES), a combination of occupation and education level data, and lifestyle, a combination of exercise pattern, obesity risk, and smoking habit, were considered as possible independent variables. Information on education attainment and occupation were to be used to form SES indices according to Green's (1970) method developed for research specifically related to health behaviour. This was considered somewhat redundant in light of analysis following the classical grouping for education level. Since most indices are based on education and, as Green's method had no set standard for categorizing the SES levels, it was decided to drop SES index and to use education level only as the independent variable. The usual Canadian index (Blishen et al., 1971) is applied to the male and not females, and was, therefore, considered inappropriate for the present study. Likewise, the variable lifestyle risk was dropped because of concern regarding the scoring procedure and possible failure to represent each risk component equally. Instead, the component variables, physical exercise pattern, smoking habit, and obesity risk, were used in the biodemographic section of the analysis.

Practice score categories. Practice nutrient ratio scores, for interpretative purposes, were grouped into three categories: deficient, acceptable, and excess. The cut-off points were less than 67, 67 to 133, or more than 133% of the values recommended by CDS, with the exception of vitamin C (Canada, 1975a), or Canadian recommendations (Canada, 1977). The upper limit for vitamin C was set at 200% since a value of 1.33 fell within the American Recommended Dietary Allowance (RDA, 1980) for that nutrient. Traditionally, the literature reported intakes less than 2/3 i.e., 67% of the CDS, as deficient and of concern. Consumption in excess of 100% of the recommended values received little, if any, attention. Since excess kilocalories and fat are both of nutritional concern in CVD, the third category (excess) was defined as intake that was 133% of the recommended values (200% for vitamin C). Using rationale similar to that employed for defining the deficient category, it was judged to be sufficiently strict to assure an area of nutritional concern yet flexible enough to provide an allowance for individual differences in requirement.

Preliminary analysis of centre differences

Descriptive statistics (mean, standard deviation, minimum and maximum scores, range, skewness and kurtosis) were computed for the attitude, knowledge, and practice scores for each centre using the SPSS subprogram CONDESCRIPTIVE (Nie et al., 1975).

Means and standard deviations are reported in Appendix E.

A preliminary analysis was performed to test for possible differences among centres for attitudes, knowledge, and practice. OWMAR, a computer program (maintained by the Psychology Department, U.B.C.) was used to perform multivariate test of differences in central tendency among the centres and to test the tenability of the assumption of homogeneity of variance-covariance. As described in the next chapter, preliminary analysis revealed that data could be pooled across community centres. (see pp.123-129).

Reliability

Item analysis and reliability analysis were performed on the responses of the attitude and knowledge instruments using the program LERTAP (Nelson, 1974). Reliability analysis of the practice instrument was determined by a congruency check of the mean intake for the questionnaire data against the interview data. A paired t test was used to test the null hypothesis that the mean difference between the two data collection instruments was equal to zero. A comparison of selected biodemographic data for respondents who completed both instruments was performed using the test-retest procedure.

Correlational analysis

To determine the relationship among attitude, knowledge, and practice scores, a matrix of correlations was formed using

SPSS subprogram PEARSON CORR and SCATTERGRAM. The first program computed Pearson product-moment correlations for all pairs of the three variables, while the latter provided scatterplots which were examined for systematic departures from linearity.

Assuming a strong relationship among the three variables, two hypothesized models of causal relationship among attitude, knowledge, and practice scores were to be tested by path analysis. The two models were: $K \longrightarrow A \longrightarrow P$ and $A \longrightarrow K \longrightarrow P$ with the one-way arrow representing the causal relationship between each determining variable and each variable dependent on it. For each model, the strength of the relationship was defined by path coefficients (beta weights) determined by multiple regression analysis using SPSS subprogram REGRESSION. If the beta weights were significant at the .05 level, the model being considered would be supported. Models inconsistent with the data would be rejected.

Biodemographic analysis

In the present study, three one-way multivariate analysis of variance, OWMAR analyses, corresponding to attitudes, knowledge, and practice, were performed for each of the biodemographic variables. Because of the unequal sample sizes, homogeneity of variance-covariance was checked using the Bartlett-Box procedure described by Winer (1971, p.595). Follow-up univariate F-statistics, as suggested by Hummel and Sligo (1971) and Finn (1974), were computed following significant multivariate F ratios (Fox and Guire, 1976). All analyses were tested at the .05 level of significance. The source of any significant effect was then determined using Scheffé's S method (Kirk, 1968).

CHAPTER V
RESULTS AND DISCUSSION

Introduction

In this chapter, the results and interpretation of analyses conducted to test the hypotheses are presented. Response rate and preliminary analyses to ascertain differences among community centres are given first, followed by a description of the sample. The properties of the measuring devices are then reported. Next, the relationships among attitude, knowledge, and practice scores are examined. The chapter concludes with results describing the effect of biodemographic variables on attitudes, knowledge, and dietary practice variables.

For reasons of brevity, the attitude and knowledge subtests, total tests, and the nutrients will be designated by the following parenthesized abbreviations throughout the discussion and in the tables: attitude subtest 1, general role of diet in cardiovascular disease (CVD) (A:GEN ROLE); attitude subtest 2, changing or manipulating the diet to promote a healthy heart (A:MANAGE); total attitude test, attitude toward diet as a means of promoting heart health and intervening against heart disease (A:TOTAL); knowledge subtest 1, how food affects the heart (K:AFFECTS); knowledge subtest 2, importance of food composition (K:COMP); knowledge subtest 3, facts versus fallacy (K:FACTS); total knowledge test, nutrition knowledge related to the heart (K:TOTAL); kilocalorie (KCAL); protein (PROT); calcium (CA); iron (FE); vitamin A (VA); riboflavin (RIBO); niacin (NIA); thiamin (THI); vitamin C (VC); carbohydrate (CHO).

Rate of Response

Table 15 summarizes the distribution of responses by community centre. In total, 391 questionnaires were distributed. Of the 292 returned, only 11 were considered to be nonusable (see footnote, Table 15). The overall rate of response (74.68%) and overall percent usable returns (71.87%) compare favourably with other reported survey responses (where a 40 to 50% completion rate is considered good (Warwick and Lininger, 1975)).

Comparison of Early and Late Respondents

Because the mail questionnaire as a research instrument does not provide for control over who responds, the problem arises of a possible nonresponse bias. If the nonrespondents differed significantly from those who responded to the questionnaire, the interpretation of the study might be invalid. Researchers (Larson and Catton, 1959; Roeher, 1963; Oppenheim, 1966) have shown that differences between early and late returns were indicative of differences between returns and nonreturns. Accepting these findings, lack of a significant difference between early and late respondents in the present study may suggest that the survey results are representative of all adult

TABLE 15

Distribution of Response by Community Centre, Separately and Combined

Centre	No. of Questionnaires Distributed	Questionnaire Returns							
		Early[a]	(%)	Late[a]	(%)	Total	(%)	Usable[b]	(%)
1	32	21	(65.62)	10	(31.25)	31	(96.88)	30	(93.75)
2	34	21	(61.76)	9	(26.47)	30	(88.24)	28	(82.35)
3	34	19	(55.88)	8	(23.53)	27	(79.41)	27	(79.41)
4	25	11	(44.00)	6	(24.00)	17	(68.00)	16	(64.00)
5	43	20	(46.51)	9	(20.93)	29	(67.44)	29	(67.44)
6	44	20	(45.45)	16	(36.36)	36	(81.82)	35	(79.55)
7	32	13	(40.62)	7	(21.88)	20	(62.50)	18	(56.25)
8	38	22	(57.89)	5	(13.16)	27	(71.05)	27	(71.05)
9	24	16	(66.67)	2	(8.33)	18	(75.00)	17	(70.83)
10	43	19	(44.19)	8	(18.60)	27	(62.79)	25	(58.14)
11	42	19	(45.24)	11	(26.19)	30	(71.43)	29	(69.05)
Combined	391	201	(51.54)	91	(23.27)	292	(74.68)	281	(71.87)

[a] Early: returned by first deadline; late: returned after the first deadline and up to cut-off date.

[b] Eleven questionnaires were considered unacceptable: five were substantially incomplete, three were unmarked, two were returned after the cut-off date, and one was completed by an under-age individual. Five of the 11 unacceptable questionnaires were early; six were late.

members of the 11 community centres surveyed.

Of the 281 who returned usable questionnaires, 196 did so by the first deadline and were designated as early respondents. The remaining 85 who returned the questionnaire before the final cut-off date were considered to be late respondents. Results of t test and F test analysis for testing differences between means and homogeneity of variance, respectively, are reported in Table 16 for each of the variables considered in the study. Two-tailed tests of the hypotheses that there is homogeneity of variance between early and late respondents' attitude, knowledge, and practice scores and that there is no significant difference between early and late respondents' mean attitude, knowledge, and practice scores were not significant at the .05 level. Thus it was concluded that the data could be pooled for subsequent analyses.

Preliminary Analyses

Initial observations suggested that no significant differences existed among centres for mean attitude, knowledge, and practice scores. Further, since analysis of variance procedures were to be used subsequently, the assumption of homogeneity of variance-covariance among centres was examined as the centres differed appreciably in size. Both the test of homogeneity of variance-covariance and the test of differences among centre mean scores for attitude, knowledge, and practice were completed using the computer program OWMAR (maintained by

TABLE 16

Tests of Homogeneity of Variance and Difference between Means on Attitude, Knowledge, and Practice Scores of Early and Late Respondents

	Early (n=196)		Late (n=85)		Difference		Homogeneity of Variance	
	$\bar{X}$	S^2	$\bar{X}$	S^2	t(df 279)	P	F^a(df 84,195)	P
Attitudes[b]								
A:GEN ROLE	41.44	19.36	42.18	22.00	-1.257	.210	1.137	.470
A:MANAGE	37.26	15.86	37.83	16.52	-1.105	.270	1.041	.808
A:TOTAL	78.70	58.52	80.01	67.77	-1.286	.200	1.158	.408
Knowledge[b]								
K:AFFECTS	8.33	3.95	8.67	4.25	-1.318	.189	1.074	.680
K:COMP	9.69	10.08	9.68	10.96	.028	.978	1.087	.632
K:FACTS	8.54	10.17	9.20	10.42	-1.586	.114	1.025	.874
K:TOTAL	26.56	47.46	27.55	47.06	-1.110	.268	1.008	.984
Practice[b]								
KCAL	.71	.03	.67	.03	1.394	.164	1.119	.561
PROT	.96	.01	.97	.01	- .421	.674	1.025	.914
CA	.75	.05	.77	.05	- .585	.559	1.070	.734
FE	.71	.05	.71	.05	.076	.940	1.042	.804
VA	.83	.05	.82	.06	.125	.901	1.072	.689
THI	.74	.05	.75	.04	- .414	.680	1.050	.812
RIBO	.85	.03	.86	.04	- .394	.694	1.060	.731
NIA	.86	.03	.88	.03	-1.201	.231	1.051	.769
VC	.95	.02	.95	.02	.558	.577	1.088	.629
FAT	.83	.02	.82	.02	.743	.458	1.224	.291
CHO	.64	.02	.63	.01	.274	.784	1.428	.063

[a] The F represents the ratio of the larger of the two sample variances to the smaller. The computed attained significance level is one-sided. For the usual two-sided test, the MIDAS output value must be doubled (Statistics Research Laboratory, University of Michigan, p.217, 1976).

[b] Attitude and knowledge scores analyzed in the raw form; practice scores analyzed using arc sine transformation of a practice ratio score with a range of 0 to 1.

(see pp.126,127).

* P<.05.

Department of Psychology, U.B.C.). The results of these analyses are presented in Tables 17 and 18.

TABLE 17

MANOVA Likelihood Ratio Test of Differences among Mean Attitude, Knowledge, and Practice Scores of Community Centres

Variables		DF1	DF2	F-RATIO	PROB
Centres	Attitude Scores	20	538	1.1702	.275
	Knowledge Scores	30	787	1.1363	.282
	Practice Scores	110	1959	1.4479*	.002

* $P<.05$.

TABLE 18

Bartlett-Box Homogeneity of Dispersion Test among Attitude, Knowledge, and Practice Scores of Community Centre

Variables		DF1	DF2	F-RATIO	PROB
Centres	Attitude Scores	30	100039	1.2385	.173
	Knowledge Scores	60	56662.3	1.0258	.420
	Practice Scores	660	41441.7	2.0280*	.000

* $P<.05$.

The results indicated that the null hypotheses of no significant differences among centres for mean attitude and knowledge scores and the null hypotheses of homogeneity of variance-covariance among centres for attitudes and knowledge scores were tenable at .05 level of significance. Significant differences among centre means and among centre variance-covariance were observed for the practice scores ($P<.05$).

Standardization within centre to mean 50 and standard deviation 10 eliminated the variance differences but not the covariance differences. The suspected cause of the covariance problem was the presence of outliers i.e., disparate cases. Subsequently, 47 outliers were identified by UBC BMD10M program (Halm, 1976) which screened the 11 practice scores by computing the Mahalanobis distance of each case from the centre of the distribution of the remaining cases. If the probability of the F-statistic corresponding to the greatest distance was less than the stipulated probability cut-off ($P<.05$), the case involved was removed and the process repeated until all cases met the requirement. The remaining cases (234) were analyzed, by centre, using OWMAR. Although a lower F ratio resulted, the statistical decision remained unchanged i.e., homogeneity was not tenable. Therefore, the outliers were returned and the total sample used for subsequent analyses.

The Bartlett-Box test for homogeneity of variance-covariance is sensitive to failure to meet the normality assumption. To avoid possible contamination due to non-normality, when the data are proportions, an arc sine transformation can be utilized to normalize the data and stablize the variance (Natrella, 1963). This particular transformation requires the range of variables to be zero to one. Consequently, the original nutrient ratio scores were transformed into proportions by establishing an upper boundary for the nutrient values. Defining an upper limit was judged to be appropriate for this study since the practice scores would be interpreted on the basis of their being within deficient, acceptable, or excessive limits. Excess was defined as any amount that exceeded 133% of the Canadian Dietary Standard (Canada, 1975a) for all nutrients but vitamin C. The latter's upper limit was set at 200% since a value of 1.33 fell within the American Recommended Dietary Allowance (RDA, 1980) for that nutrient. The values were then divided by the upper limit for that nutrient to give ratio scores with a range of zero to one. Means and standard deviations of the practice ratio scores are presented in Appendix E.

As all ratios were greater than .001, these ratios were then transformed using the arc sine transformation (Kirk, 1968; Winer, 1971):

(i) $X' = 2 \arcsin \sqrt{X}$ for values of X between .001 and .999

(ii) $X' = 2 \arcsin \sqrt{X - 1/2n}$ for values of $X \geq .999$ and where n is the number of observations on which X is based. According to Natrella (1963), one important characteristic of this transformation is that it is order preserving i.e., the relative rank order (with respect to magnitude) of the original values is strictly preserved in their transformed state. This transformation of practice scores was not considered to distort the interpretation of the results, nor to jeopardize the purpose of the study.

The transformed practice scores were then analyzed, by centre, to test homogeneity of variance-covariance using OWMAR.

The resulting Bartlett-Box F-statistic was reduced (from 2.028 to 1.205) but still significant at the .05 level. Since moderate departures from the assumption of homogeneity of variance do not seriously affect the sampling distribution of the F-statistic (Winer, 1971, p.205), and in light of the small value for F (1.205), it was concluded that the departures were such that subsequent tests of mean differences would not be adversely affected.

The null hypothesis that there were no significant differences among centre mean practice scores was also rejected (Table 19). Therefore, although the subjects were part of intact groups, it was assumed that an individual's practice scores were not influenced by the centre to which he belonged.

TABLE 19

Summary of Centre Analyses for Homogeneity of Variance-Covariance and Differences among Mean Practice Scores[a]

Test	DF1	DF2	F-RATIO	PROB
Bartlett-Box Homogeneity of Dispersion Test	660	41441.7	1.205*	.0002
MANOVA Likelihood Ratio Test for Differences among Means	110	1959	1.484*	.001

[a] Practice scores expressed as arc sine transformed values.
* $P<.05$.

Therefore, attitude, knowledge, and transformed practice scores were pooled across centres and centre was not considered in further analyses. In all subsequent analyses, "practice scores" were analyzed using the practice ratio scores converted to an arc sine according to the formula previously described.

Description of the Sample

The Biodemographic characteristics of the sample are summarized in Table 20.

Age

The majority (57.7%) of participants were young (between 19 and 35 years of age). The rest of the sample was about equally distributed between mid- (36-50 years) and older- (greater than 50 years) age (22.3 and 20%, respectively).

Gender

The gender composition of the sample was 79% female and 21% male.

Place of Birth

When described by place of birth, 62.7% of the participants were born in Canada, 14.9% in the British Isles, while the remainder were dispersed among 30 other countries.

TABLE 20

Biodemographic Characteristics, Percent in Sample

Age		Physical Exercise Pattern	
19-35 years	57.7	Sedentary	11.4
36-50 years	22.3	Low moderate	44.8
greater than 50 years	20.0	High moderate	32.0
		Vigorous	10.0
Gender			
Male	21.0	Obesity Risk	
Female	79.0	Low	74.7
		Moderate	19.6
Place of Birth		High	4.6
Canada	62.7		
British Isles	14.9	Level of Education	
Other	22.4	Less than grade 12	20.3
		Grade 12	29.9
Living Arrangement		1-3 years university	30.6
With family	74.0	4 or more years university	19.2
Alone	16.4		
Other	9.6		
		Smoking Habit	
Family History of CVD[a]		Nonsmoker	66.2
Positive	54.8	Former smoker	12.8
Other[b]	44.1	Light smoker[c]	7.1
		Heavy smoker	8.2
Personal History of CVD[a]		Very heavy smoker	5.3
Positive	19.2		
Other[b]	76.9		

Note. Number in sample = 281.

[a] CVD: cardiovascular disease.

[b] Other for Family History included those reporting they did not know; other for Personal History referred to those who had never received treatment for cardiovascular-related conditions.

[c] Light smoker category included the moderate category because only one participant reported they did not inhale.

Living Arrangement

The majority of the sample (74.0%) reported living with family. The remainder (26.0%) either lived alone or not with family members.

Family and Personal History of Cardiovascular Disease (CVD)

Family history of CVD was reported positive for 54.8% of the sample and negative or unknown for 44.1%. When asked about their personal history of CVD, 76.9% of the sample reported that they received no previous treatment for any cardiovascular-related condition (i.e., high blood pressure, high blood fat levels, high blood cholesterol levels, heart attack, angina, diabetes) while 19.2% reported receiving treatment for one or more of the related conditions. The high percentage reporting no previous treatment for cardiovascular-related conditions may be explained in part by the predominance of participants less than 35 years of age (57.7%) and the fact that CVD is an insidious condition that may not be manifested until late in life.

Physical Exercise Pattern

The regular exercise pattern reported by respondents described about 10% of the sample as walking less than ½ mile per day (SEDENTARY). The majority (44.8%) reported some activity during work and leisure comparable to walking between ½ to 1½ miles per day (LOW MODERATE) and 32% reported programmed exercise four times a week or daily walking from 1½ to 2 miles (HIGH MODERATE). Walking in excess of two miles per day (VIGOROUS) was reported by 10% of the sample. Thus, over 50% of the participants who responded to this question (n=276) described their activity pattern as being on the low end of the activity scale. Since the participants were members of community centres that offer a wide range of physical activities for members of all ages, the reported low activity is a matter for concern. It supports the need to stress physical activity and fitness programs proposed by Nutrition Canada (1973), as part of nutrition education since the availability of sport and exercise facilities in itself does not appear to be sufficient.

Obesity Risk

Obesity risk, calculated on the basis of participant's body mass index (BMI: Wt/Ht^2) and controlled for gender (Thomas et al., 1976), was found to be low for 74.7%, moderate for 19.6%, and high for 4.6% of the sample. Using ponderal index (PI), the ratio of height to cube root weight (Canada, 1973), obesity risk was found to be low for 67.3% and high for 32.7% of the sample. Further examination of the high risk group, as defined in subsequent Nutrition Canada reports (Canada, 1975b), resulted in classifying 27.0% at moderate risk and 5.7% at high risk. A comparison of the two indices revealed that a lower percentage of the sample was classified at high risk by BMI than by PI. Both indices indicated that the present sample was at lower risk of obesity than the Canadian population where half or more were reported to be at high risk (Canada, 1973).

Subsequent analyses used BMI as the index of choice because BMI met the two requirements for an appropriate index of relative weight: (1) highly correlated with weight, and (2) relatively independent of height (Keys et al., 1972). In contrast, PI had been reported to overestimate the amount of obesity among the short as compared with the tall women (Khosla and Lowe, 1967). This bias in relation to height made PI a less suitable choice and may explain the different percentages observed between indices in the present study.

Level of Education

For the variable education, 20.3% of the participants had not completed high school, 29.9% completed grade 12, 30.6% completed 1-3 years of university, and the remainder (19.2%) completed four or more years of university training. On the whole, the study population represented a more highly educated population than that of the city of Vancouver (Canada, 1976b) where about 40% are reported to have less than grade 12 education.

Smoking Habit

Smoking habits classified the sample according to degree of risk for CVD from smoking. In order of increasing risk, 66.2% reported they never smoked or not for five years (NON-SMOKER); 12.8%, not smoked for less than five years (FORMER

SMOKER); 7.1%, cigars, pipes, or less than 10 cigarettes a day (LIGHT SMOKER); 8.2%, 10 to 19 cigarettes a day (HEAVY SMOKER); and 5.3%, 20 or more cigarettes a day (VERY HEAVY SMOKER). The high percentage of nonsmokers (79%) supports literature reports of a decline in smoking among Canadian adults (Game and Devenyi, 1971; Morrison, 1978) although a substantial number (20.6%) still retain the habit.

Supplements

Respondents were asked to indicate what type of food or nutrient supplement they were taking. As shown in Table 21, 51.6% of the sample were taking some type of supplement while 47.7% were not taking any kind of supplement. The most popular supplement appeared to be vitamins.

TABLE 21

Types and Frequency of Supplement

Supplement	Percent in Sample
Vitamin	21.0
Mineral	1.1
Vitamin and mineral	17.8
Vitamin, mineral, and food	5.3
Vitamin and food	5.0
Food	1.4
None	47.7

Sources of Nutrition Information

The participants reported 24 sources of nutrition information on diet and heart disease (see Table 22). When grouped

TABLE 22

Sources of Cardiovascular Nutrition Information Reported by Sample

Source	Percent of Sample		Source	Percent of Sample	
Professional	59.1		Material	88.3	
Doctor		44.8	Exhibits/Displays		28.1
Action B.C.		5.7	Newspapers		52.3
Nutritionist/Dietitian		22.1	Magazines		71.5
Home Economist/Teacher		13.5	Books		61.6
Nurse		11.7	Cookbooks		32.0
			Television		49.5
Nonprofessional	77.9		Food Labels		29.2
Weight Control Group		16.7	Radio		29.9
Family		33.8			
Health Food Store		23.5	No Source	4.3	
Grocery Store		7.1			
Friends		45.9	Unreported	.4	
YM/YWCA		5.0			
Fitness Instructor		22.1			
Teacher		15.3			
Drug Store		8.2			
Service Club		1.8			

according to whether the source was human (professional or nonprofessional) or material, 59.1% of the sample received information from professionals; 77.9% from nonprofessionals; and 88.3% from material sources. Only 4.3% reported receiving no previous information on diet and heart disease. Of the material sources cited, magazines, books, newspapers, and television were most frequently mentioned. Similar sources of information on nutrition were reported by New York State adults (Jalso et al., 1965), medical students and physicians (Podell et al., 1975a), and Canadians 18 years and older (Canada, 1979b). Of the nonprofessional sources cited, ranked second in importance, friends and family were the chief sources. This is in contrast to Sims' (1976) study of mothers of preschool children in which television and friends ranked last. Consistent with findings of the Canadian study (Canada, 1979b), other major sources reported were family and doctor. Results of the present study strongly support the Canadian recommendation (Canada, 1979b) that the media is most important as a channel for nutrition education. Further, nutrition educators should recognize the important role that doctors, family, and friends may play as sources of information on diet and heart disease.

In summary, the study population tended to be young, female, Canadian-born, living with family, characterized by no previous treatment for cardiovascular-related diseases, in the low risk category for obesity, and nonsmokers. Education level and physical exercise pattern were about equally represented between higher education (one or more years of university) and lower education (grade 12 or less) and between higher activity patterns and lower activity patterns. Slightly more than half of the participants reported having family histories of cardiovascular-related conditions.

About 52% of the sample reported taking some type of supplement and over 95% had received some prior exposure to cardiovascular nutrition information. The main information sources mentioned were magazines, books, newspapers, television, friends, doctor, and family.

Before proceeding to a discussion of the measuring devices used in the study, a brief description of the sample in terms of their reported dietary practices is presented. Chapter IV (see pp.112,116) reviewed the method for computing the nutrient values and for interpreting them according to recommended standards. Table 23 presents the mean and standard deviation of each nutrient score, expressed as a ratio of the recommended value, and the distribution of the sample by practice category. For the sample, the mean nutrient scores for PROT, VA, RIBO, and NIA exceeded 133%, and VC, 200% of the recommended values (Canada, 1975a). None of the mean nutrient scores were less than 67% of the standard.

The mean scores for FAT and CHO, which represent proportions of total energy intake (39.2 and 42.5%, respectively) are very similar to the values for FAT (39 to 40%) reported by Nutrition Canada (Canada, 1976a, p.240) for the Canadian adult population but somewhat lower for CHO values (46 to 47%). In the Nutrition Canada survey, alcohol was included with CHO

TABLE 23

Practice Characteristics of the Sample

	Nutrient Scores[a]		Percent of Sample[a]		
	$\overline{X}$	S.D.	Deficient[b]	Acceptable[b]	Excess[b]
KCAL	.94	.26	14.6	79.7	5.7
PROT	1.76	.52	1.1	17.8	81.1
CA	1.14	.54	16.4	55.5	28.1
FE	1.04	.49	23.1	55.5	21.4
VA	2.39	2.78	14.2	29.2	56.5
THI	1.12	.61	16.4	58.4	25.3
RIBO	1.61	1.46	5.3	50.5	44.1
NIA	1.39[c]	.61[c]	6.0	48.4	45.6
VC	4.19	2.55	1.1	5.0	94.0
FAT	1.12	.22	2.1	82.6	15.3
CHO	.85	.18	13.9	85.4	.7

Note. Sample size = 281.

[a] Expressed as ratio of recommended values (Canada, 1975a; 1977).

[b] Deficient, <67%; acceptable, 67-133%; excess, >133% (except VC, >200%) of recommended values.

[c] Expressed as mg NIA intake/CDS based on age and gender.

which may account for the difference.

When the sample is separated into three practice categories, the percentage with nutrient scores less than 67% (deficient) of the recommended values indicates possible deficiencies for a small segment of the sample. The percentage deficient in FE (23%) is not surprising as the majority of the sample were female and it had been reported that 75% of 20 to 64 year old females have less than desirable FE intakes (Nutrition Canada, 1973). Those reporting deficient KCAL intake (14.6%) might possibly represent a portion of the sample concerned with weight control rather than one characterized by chronic KCAL deficit. The percentage (14.2%) deficient in VA intake is of concern if the deficient intake had occurred for an extended period of time and depleted liver reserves; otherwise, VA requires no immediate attention. The 6% deficient in NIA is of little concern since PROT levels are sufficiently high to provide tryptophan for NIA synthesis. The percentage deficient in THI and RIBO may reflect the high female representation since Nutrition Canada reported that more females consumed inadequate amounts of THI and RIBO than males. The relatively high percentages (16.4%) deficient in THI and CA may suggest that THI and CA should receive special attention. Nutrition Canada reported that CA intakes were inadequate for one out of five women in the general population and the present study confirms this finding for 16% of the sample.

In the excess category (greater than 133% or for VC, 200%, of recommended), percentages for the nutrients PROT and VC were extremely high. Many authorities consider nutrient intakes that are higher than required for health, but not imcompatible with it, to be of little concern. With the exception of KCAL and FAT, intakes that exceeded recommended values for the remaining nutrients examined would not be considered unacceptable. Consequently, the majority of the sample can be described as having acceptable practices. A small percentage of the sample (5.7%) reported unacceptably high KCAL intakes. Of greater concern are those (15.3%) who reported excess FAT intake which indicates that they are consuming over 46% of their energy as FAT, a value far in excess of the recommended 35% maximum.

Overall, nutrient intakes were satisfactory except for FE where nearly one quarter of the sample were classified as having a deficient intake of that nutrient and FAT where over 15% of the sample reported consuming over 133% of the recommended maximum amount.

Characteristics of the Measuring Instruments

Attitude Scale

Summary statistics for the attitude scale are presented in Table 24. The mean scores for each of the subtests (A:GEN ROLE, A:MANAGE) and total test (A:TOTAL) were quite high representing 83% of the possible score. This suggested the sample as a whole reported a positive attitude toward diet as a means of promoting heart health and intervening against heart disease. Item analysis data for the attitude scale are reported in

Appendix F.

TABLE 24

Summary Test Statistics for the Attitude Instrument

	Attitude Subtest		
	A:GEN ROLE	A:MANAGE	A:TOTAL
No. items	10	9	19
Mean (%)	41.67 (83.34)	37.43 (83.18)	79.10 (83.26)
S.D. (%)	4.49 (8.98)	4.01 (8.91)	7.84 (8.25)
Kurtosis	- .025	- .177	- .264
Skewness	- .324	- .249	- .225
Hoyt's r	.73	.67	.82 [a]
S.E.	2.22	2.17	3.20

[a] Cronbach's composite alpha (Cronbach, 1951).

The positive attitude toward the role of diet in heart disease (A:GEN ROLE) is similar to that reported for another Canadian group (Canada, 1979b) where over 80% felt that the benefits of a sensible diet included better health and fewer health problems.

Standard deviations for each subtest and total test were quite acceptable representing eight to nine percent of the possible score. This supports the positive attitude of the group since approximately 70% of the attitude scores would be greater than 75% of the possible score, if their distribution approximated the normal. Kurtosis and skewness values support no marked deviation of the subtests or total test scores from a normal distribution.

The reliability coefficients are .73 and .67 (Hoyt's ANOVA internal consistency estimates) for the subtests and .82 for the total test (Cronbach's composite alpha). These are considered adequate for the purpose of this study.

Knowledge Scale

Summary statistics for the knowledge scale revealed that reliabilities for the three subtests (K:AFFECTS, K:COMP, K:FACTS) were quite low (.06, .43, .47, respectively, see Appendix G). This raised a question regarding the scoring procedure. Since all the items had been based on current knowledge regarding the relationship of diet and CVD and the key to the items had been accepted by a panel of experts, an attempt was made to improve the reliability of the instrument by changing from the 1 to 5 scoring system initially adopted (see Table 4, Chapter III) to a system reflecting a more conventional right-wrong scoring.

Three alternative systems were explored:

(1) Two points for "definitely correct", one for "probably correct", and zero for the remaining responses (2,1,0 system);

(2) One point for "definitely correct", one for "probably correct", and zero for the remaining responses (1,1,0 system);

(3) One point for "definitely correct" response and zero for the remainder (1,0 system).

Inspection of the test statistics for each system revealed that the 1,1,0 system resulted in reliabilities for the three subtests as low as that of the 1 to 5 system (.04, .45, and .47). A comparison of results using scoring systems 1,0 with that of 2,1,0 showed that the reliabilities of K:COMP and K:FACTS were very similar for the two systems but that the reliability for K:AFFECTS was somewhat lower with the 2,1,0 system (.45 compared to .59). As expected, Cronbach's composite alpha was lower for the 2,1,0 system also. Although the scoring system should reflect as closely as possible the purpose of the test, which in this case was identification of statements as true or false, the 1,0 system was deemed inappropriate for the present study. Instead the 2,1,0 system was chosen since this option was judged to more clearly reflect the response format which implied more than one appropriate response. In this way, those respondents who knew the correct response but because of traits of character circled "probably" rather than "definitely" would be included. A summary of the test statistics for the knowledge scale using the 2,1,0 system is presented in Table 25. Appendix G reports summary statistics for the other scoring systems (1 to 5; 1,0; 1,1,0). Item analysis data for the 2,1,0 system are also reported in Appendix G.

The mean percentage for each subtest and total test indicate the tests were of medium difficulty. Kurtosis and skewness values for the knowledge subtests and total test indicate that the scores approximated the normal distribution. Standard

TABLE 25

Summary Test Statistics for the Knowledge Instrument[a]

	Knowledge Subtests			
	K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
No. items	8	10	9	27
Mean (%)	8.43 (52.69)	9.69 (48.45)	8.74 (48.56)	26.86 (49.74)
S.D. (%)	2.01 (12.56)	3.21 (16.05)	3.21 (17.83)	6.88 (12.74)
Kurtosis	- .372	.439	- .333	- .358
Skewness	- .320	.372	.211	- .033
Hoyt's r	.45	.64	.62	.72[b]
S.E.	1.40	1.84	1.86	3.12

[a] 2,1,0 scoring system.
[b] Cronbach's composite alpha (Cronbach, 1951).

deviations for the subtests reveal greater variability of knowledge for the specific tests (K:COMP, and K:FACTS) than the more general test (K:AFFECTS).

The reliability coefficients (Table 25) are .45, .64, and .62 for K:AFFECTS, K:COMP, and K:FACTS, respectively. Although the r value for K:AFFECTS is relatively low suggesting a less homogeneous subtest, the misbehaviour of three of the eight items may partially explain the result. These items were the same three of four items found to misbehave in the pilot study but were retained for their contribution to the purpose of the test (see Chapter III, p. 98). In the present study, the three items were answered correctly by the highest scorers and, in two of three cases, had point biserial correlations greater than .22. The third item, related to cholesterol in the diet, was incorrectly answered by the majority (85%) of the sample and had a low point biserial correlation. The coefficient for the composite (.72) supported the reliability of the test, thus, it was concluded that the knowledge scale was reliable for measuring knowledge in the present study.

Examination of the item test statistics (Appendix G) revealed the proportions of the sample that responded to the various options for each item. For the subtest K:AFFECTS, items related to overweight, obesity, and overeating i.e., weight control, were answered correctly by more than 80% of the sample. However, over 65% showed lack of knowledge for items concerning cholesterol and fat, both items of particular interest in CVD. Overall, subtest K:COMP had a slightly lower mean percentage than any of the other subtests yet, more than 70% of the sample were able to answer five of the 10 items correctly. Items dealing with nutrient composition of meat, fish, fruit, eggs, and alcohol were answered correctly more frequently than items that related to the composition of food substitutes or oils and which required a knowledge of the terms saturated and unsaturated. For the latter group of items, 30 to 50% of the respondents reported they did not know the correct response. The poorest response (over 75% reporting they did not know) occurred for the item defining polyunsaturated fatty acids (PUFA). This finding agrees with the Canadian Opinion study (Canada, 1979b) report that 40 to 45% of their respondents could not define what was meant by "make sure that sources of PUFA are included in your diet" (p.25).

The final subtest K:FACTS again pointed to the lack of knowledge about PUFA in the diet as over 50% of the sample reported the more PUFA in the diet the better and about 30% said they did not know. Items of nutrition fallacies concerning thinness, family history, weight reduction methods, and exercise were correctly answered by over 70% of the sample. Four items that were related to special functions of garlic, lecithin, hard water, and vitamin C were less well answered as 20 to 40% of the sample responded "do not know" and 30 to 47%, incorrectly. These percentages indicate a predominance of insufficient knowledge regarding diet and CVD which may be further complicated by the presence of inaccurate or conflicting information accepted as true by the respondents. This latter claim is based on the apparent acceptance of statements regarding the special functions of food components e.g., the lecithin item considered a true statement by 47% of the sample.

Practice Instrument

Reliability analysis of the practice scale was performed using a subsample of respondents who reported returning questionnaires. As described in Chapter IV, a random sample of four respondents per centre was interviewed (15.7% of total sample). Five interviews were rejected due to inadequate age of one interviewee, incomplete practice responses, failure to return the questionnaire, failure to retain the identification interview card, or unreliable interview as judged by the interviewer. In total, 39 interviews (13.9% of study population) were used in the analysis.

Because the interview schedule was developed as a parallel form to the self-administered questionnaire, a congruency check of the mean performance was used to verify the consistency of the practice data. A paired t test was used to test the null hypothesis that the mean of the difference between the two variables (questionnaire and interview) was zero. Results are presented in Table 26.

The results show that, at the .05 level of significance, there was no significant difference in practice scores between questionnaire and interview methods for all nutrients except calcium. Since inspection of the mean scores for calcium

TABLE 26

Paired t Test of Practice Scores from Questionnaire and Interview

Variable	Questionnaire $\bar{X}_1$ Ratio	Interview $\bar{X}_2$ Ratio	$\bar{X}_1-\bar{X}_2$	S.D.	t-Stat[a]	Significance[a]
KCAL	.724	.720	.003	.194	.204	.840
PROT	.987	.972	.015	.055	1.552	.129
CA	.763	.888	-.125	.189	-3.681*	.001
FE	.783	.774	.009	.190	.286	.777
VA	.839	.865	-.026	.298	- .574	.569
THI	.814	.800	.014	.208	.443	.660
RIBO	.872	.918	-.046	.200	-1.351	.185
NIA	.937	.901	.036	.158	1.396	.171
VC	.952	.986	-.033	.152	-1.277	.209
FAT	.802	.789	.013	.177	.496	.622
CHO	.639	.671	-.033	.127	-1.617	.114

Note. Size of sample = 39.

[a] computed using arc sine transformed data.

* $P<.05$.

revealed both groups were well within the mid to upper levels of the acceptable range (discussed in Chapter IV, p.116) for calcium intake, the practice instrument was judged to provide information on dietary practices as reliable as that of the interview.

Self-report of the biodemographic information was also checked for consistency using the test-retest procedure. The correlation of the responses between questionnaire and interview were found to vary between 1.00 and .58 (Table 27) comparing quite favourably with the literature suggestion that a correlation of .5 to .8 indicates an acceptable degree of reproducability between data collection instruments (Dawber et al., 1962; Reshef and Epstein, 1972; Stern et al., 1976). Only two variables (height and weight) were objectively measured at the time of the interview, the remainder were reported. The high correlations (.83 and .99, respectively) of these two variables offer additional support for the accuracy of the questionnaire data.

TABLE 27

Pearson Product-Moment Correlations between Questionnaire and Interview Responses to Biodemographic Questions

Variable	Coefficient
Gender	1.00
Age	.997
Smoking Habit	.926
Exercise Pattern	.580
Height	.829
Weight	.986
Amount of Alcohol	.885

Note. Size of sample = 39.

Hypotheses Testing

Relationships among Attitudes, Knowledge, and Practice

The first hypotheses to be tested were correlational in nature focusing on the relationships among attitudes, knowledge, and practice. To ascertain the type of relationships among attitudes, knowledge, and practice, scatterplots for all combinations of attitude, knowledge, and practice scores were formed. On examining these scatterplots, no nonlinear relationships were found. Thus, Pearson product-moment correlations were computed to reflect the magnitudes of linear relationship among these variables. Table 28 presents the correlations for attitude and knowledge scores.

TABLE 28

Pearson Product-Moment Correlations between Attitude and Knowledge Scores

		2	3	4	5	6	7
1	A:GEN ROLE	.70*	.93*	.48*	.40*	.49*	.56*
2	A:MANAGE		.91*	.44*	.38*	.38*	.48*
3	A:TOTAL			.50*	.42*	.47*	.56*
4	K:AFFECTS				.49*	.50*	.76*
5	K:COMP					.48*	.83*
6	K:FACTS						.84*
7	K:TOTAL						

* P<.05.

Results confirmed a moderate correlation between attitude and knowledge scores (range .38 to .56) and rejected the null hypothesis that the correlation between attitude and knowledge scores is equal to zero. The high correlation observed between subtests and total test for both attitude and knowledge scores must be recognized as spuriously high since it is based partly on the perfect correspondence of identical errors of measurement in the subtest and in the total test (APA, 1974, p.53). The degree of relationship between practice and both attitude and knowledge scores is presented in Table 29.

The results revealed a zero to weak relationship between practice and both attitudes and knowledge (range .00 to .24). Although several of the correlations were statistically significant, the maximum shared variance between any practice score and attitude or knowledge score was only 5.8% (for, RIBO and A:GEN ROLE, only 5.8% of the variance of RIBO could be determined by A:GEN ROLE scores).

In summary, while comparable correlation coefficients have been reported for the relationships among attitudes, knowledge, and practice (see Chapter II, pp. 26,28), stronger correlations than those found in the present study have been reported for the relationship between practice and both attitudes and knowledge. A reason for the different findings may be due in part to the assessment of cardiovascular, not general, nutrition attitudes and knowledge or to the use of adult members of community centres, not specific segments of the population i.e., lactating females and women athletes who might be expected to

TABLE 29

Pearson Product-Moment Correlations between Practice and Attitude and Knowledge Scores

	A:GEN ROLE	A:MANAGE	A:TOTAL	K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
KCAL	.04	.05	.04	.13*	.11	.07	.12*
PROT	.08	.04	.07	.03	.09	.06	.08
CA	.20*	.13*	.18*	.10	.15*	.08	.14*
FE	-.02	.05	.01	.00	.05	-.05	-.00
VA	.05	.09	.07	.01	.01	.08	.05
THI	.15*	.11	.14*	.16*	.14*	.10	.16*
RIBO	.24*	.16*	.22*	.12*	.15*	.10	.16*
NIA	.11	.12*	.13*	.11	.11	.09	.13*
VC	.05	.07	.06	.13*	.10	.10	.13*
FAT	.00	-.07	-.03	.03	.06	-.04	.02
CHO	-.04	-.01	-.02	-.04	-.06	.03	-.03

* $P<.05$.

be more involved with respect to the specific practice investigated.

Because of the weak relationship observed between practice scores and both attitude and knowledge scores, path analysis procedures to test the models:

(1) $$\begin{tikzcd} P & & A \arrow[ll] \\ & K \arrow[ul] \arrow[ur] & \end{tikzcd}$$ and (2) $$\begin{tikzcd} P & & A \arrow[ll] \arrow[dl] \\ & K \arrow[ul] & \end{tikzcd}$$

that knowledge causes attitudes which cause practice or attitudes cause knowledge which causes practice were judged inappropriate and not attempted.

An attempt was made to see if within the sample, practice groups defined in terms of the extent of deficiency and excess could be formed and membership subsequently predicted from attitude and knowledge scores. The formation of practice groups is described in Appendix H. Use of multiple discriminant analysis confirmed the weak relationship and revealed only about 7% of the total variability of the two discriminant functions formed was attributable to group differences (see Appendix H). The total discriminatory power of the predictor battery as a whole was very weak.

The Relationship of Biodemographic Variables to Attitudes, Knowledge, and Practice

Before examining the mean attitude, knowledge, and practice in terms of the biodemographic variables listed in Table 20 (with the exception of place of birth), it was necessary first to test the tenability of the assumption of homogeneity of variance-covariance for each biodemographic variable considered. Summary tables and accompanying discussion are presented in Appendix I. Briefly, the Bartlett-Box homogeneity test revealed that this assumption was tenable for six of the nine biodemographic variables. For the remaining three, departures were such that, given the robustness of the MANOVA (Olson, 1974) and the levels of significance associated with the tests, analyses proceeded with the assumption that results of tests of mean differences would not be adversely influenced.

Means and standard deviations of attitude, knowledge, and practice scores for each biodemographic group are presented in Appendix J. Tables that summarize the results of multivariate and univariate analysis of variance for each biodemographic variable considered are presented in Appendix K.

Age

Results of the multivariate analysis of variance for age showed that significant differences were found for attitudes ($F(4,554)=7.62$; $P<.05$), knowledge ($F(6,552)=3.03$; $P<.05$), and practice ($F(22,536)=3.61$; $P<.05$). The follow-up univariate tests revealed that, for attitudes, the young and mid-age groups possessed a significantly ($P<.05$) more positive attitude toward the general role of diet in CVD (A:GEN ROLE) as compared to the oldest group (>50 years) and that the same two groups scored significantly ($P<.05$) higher on the test of facts versus fallacy

(K:FACTS) than the oldest group. In the case of practice, the oldest group was found to consume significantly ($P<.05$) higher amounts of FE (.87) than the young or mid-aged groups (.68 and .65, respectively). However, all three groups were within the acceptable range for this nutrient.

Gender

The multivariate F results for gender were also significant for the three variables: attitudes ($F(2,278)=8.81$; $P<.05$), knowledge ($F(3,277)=4.29$; $P<.05$), and practice ($F(11,269)=17.97$; $P<.05$). Univariate analyses revealed that females possessed a significantly ($P<.05$) more positive attitude toward both the general role of diet in CVD and the manipulation of diet to promote heart health (A:GEN ROLE, A:MANAGE) than males. In addition, females were significantly ($P<.05$) more knowledgeable on all three knowledge subtests than males. Inspection of the practice results of univariate analyses showed the consumption of a number of nutrients (KCAL, PROT, FE, RIBO, NIA, VC) differed significantly ($P<.05$) between males and females. In all cases except FE, females scored higher than males. Again, however, all mean scores for these six nutrients were within the acceptable range.

Living Arrangement

For living arrangement, the multivariate analysis of variance results indicated no significant ($P<.05$) differences between attitudes, knowledge, and practice of those who live with family and those who do not. The type of living arrangement appeared not to influence peoples' attitude toward diet as a means of promoting heart health and intervening against heart disease, knowledge of nutrition related to the heart, nor food practice in which they engaged. Inspection of the mean practice scores disclosed that all nutrient intakes were within the acceptable range.

Family History of CVD

There were no significant ($P<.05$) differences between attitudes, knowledge, and practice of respondents with a positive family history of CVD and those with no family history of CVD. This suggests that the presence of family problems with CVD does not act as a deterrent for the rest of the family leading to more positive attitudes, greater knowledge, or better practice related to CVD prevention.

Personal History of CVD

Although multivariate F ratios for personal history of CVD were significant for attitudes ($F(2,267)=4.56$; $P<.05$), knowledge ($F(3,266)=4.05$; $P<.05$), and practice ($F(11,258)=2.12$; $P<.05$), follow-up analysis with inspection of means did not clarify the effect for attitudes. Since more confidence can be placed in the multivariate test, the hypothesis, that there is no significant difference in attitudes of people with a positive personal history of CVD and others, was rejected at .05 level of significance.

Univariate tests indicated that those with a positive personal history scored significantly ($P<.05$) higher on general knowledge of how food affects the heart but were not significantly more knowledgeable about food composition or nutrition facts versus fallacy than the rest of the sample. For practice, this group (positive personal history of CVD) was found to consume significantly ($P<.05$) higher amounts of VC than the others, yet, both groups' mean intake for VC was within the acceptable range.

Physical Exercise Pattern

Results of the multivariate analysis of variance for physical exercise pattern revealed significant differences only for attitudes ($F(6,542)=2.86$; $P<.05$). The follow-up univariate tests indicated that the sedentary group had a significantly ($P<.05$) less positive attitude toward the general role of diet in heart disease than those who followed high moderate and vigorous activity patterns. The remaining group (low moderate) did not differ significantly from any of the groups.

Obesity Risk

Multivariate F ratios for obesity risk indicated that there were no significant ($P<.05$) differences for attitudes, knowledge, and practice. The degree of risk for obesity appeared not to influence peoples' attitude toward, knowledge of, or practice regarding diet and CVD.

Level of Education

Examination of the multivariate results for the independent variable level of education showed that significant differences existed among the groups for attitudes ($F(6,552)=4.12$; $P<.05$), knowledge ($F(9,669)=2.08$; $P<.05$), and practice ($F(33,787)=1.92$; $P<.05$). Further exploration revealed that those with less than grade 12 had significantly ($P<.05$) less positive attitudes toward the general role of diet in heart disease (A:GEN ROLE) than all other groups; and were significantly ($P<.05$) less informed about food composition (K:COMP) than all other groups, as well as significantly ($P<.05$) less informed about nutrition facts versus fallacy (K:FACTS) than the one to three year university group. In terms of practice, those with less than grade 12 reported significantly ($P<.05$) less CA intake than those with four or more years of university; less THI intake than both university groups; less VC intake than those with grade 12 and one to three years of university; and less RIBO intake than all groups. It must be emphasized that all mean intakes for the four education groups were within the acceptable range.

Smoking Habit

For the variable smoking habit, multivariate results indicated that there were no significant ($P<.05$) differences for attitudes and knowledge but a significant difference was found for practice ($F(33,725)=1.58$; $P<.05$). Univariate tests revealed that the nutrient CHO was the source of the effect, however, no pairwise comparison was significant for CHO using Scheffé's S method at the .05 level of significance. This suggested a complex comparison was responsible for the significant effect.

A summary of the biodemographic effect on attitudes, knowledge, and practice is reported in Table 30.

TABLE 30

Summary of the Biodemographic Variables' Effect on Attitude, Knowledge, and Practice Scores

	Attitude	Knowledge	Practice
Age	S[a]	S	S
Gender	S	S	S
Living Arrangement	NS[b]	NS	NS
Family History of CVD	NS	NS	NS
Personal History of CVD	S	S	S
Physical Exercise Pattern	S	NS	NS
Obesity Risk	NS	NS	NS
Education Level	S	S	S
Smoking Habit	NS	NS	S

[a] S: significant at $P<.05$.

[b] NS: not significant at $P<.05$.

Evaluation of the relationships between biodemographic variables and mean attitude, knowledge, and practice scores revealed that the type of living arrangement, the presence of a family history of CVD, and one's degree of obesity risk had no apparent influence on peoples' attitudes toward, knowledge of, or practice related to diet and CVD. Smoking habit also appeared to have no significant effect on peoples' cardiovascular attitude and knowledge but a significant ($P<.05$) effect on practice which was traced to a complex comparison of groups for the nutrient CHO.

For physical activity pattern, sedentary people had a significantly ($P<.05$) less positive attitude toward the general role of diet in heart disease compared with both active groups yet, the attitude for all groups ranged from 79 to 86% indicating that the overall attitude was positive regardless of activity pattern followed.

The remaining, age, gender, personal history of CVD, education level, were all found to significantly ($P<.05$) influence attitudes, knowledge, and practice. The oldest group (>50 years) had a significantly ($P<.05$) less positive attitude toward the general role of diet in CVD and were significantly ($P<.05$) less able to separate nutrition facts from fallacy than the rest of the sample. While the oldest group did have a satisfactory attitude (78.9% of possible score), the mean percentage for the knowledge test was much more deficient for this group (41.1 compared to 49.5 and 52.7%), suggesting a general inability to separate nutrition facts that are true from statements that are inaccurate. This latter finding is of particular interest to nutrition educators since nutrition sources of questionable validity are so prevalent in the popular press.

Females were found to consistently possess more positive attitudes toward and be more knowledgeable about diet and CVD than males. While the attitudes for both were quite positive, in the case of knowledge scores, the mean percentages for males ranged from 43 to 48% compared with 50 to 54% for females, with the lower percentages for males and females in the more specific knowledge areas i.e., related to food composition and the ability to identify nutrition facts.

For personal history of CVD, both those who responded in the affirmative and others were found to have positive attitudes (attaining 82 to 84.4% of the possible score) although the multivariate test indicated a significant ($P<.05$) difference existed between the two groups when the overall attitude was considered.

Finally, those with less than grade 12 education consistently reported less positive attitudes toward diet as a means of promoting heart health and intervening against heart disease than the remaining groups, yet, their mean score was 78% of the possible score, a quite positive value. Only knowledge related to facts versus fallacy was found to differ significantly ($P<.05$) between those with less than grade 12 and those with one to three years of university. Mean scores for the four groups ranged from 41.5 to 51.4% of the possible score indicating a deficiency in cardiovascular nutrition knowledge is not confined just to the less educated.

In addition, a number of significant ($P<.05$) practice scores were reported for age, gender, education level, personal history of CVD, and smoking habit. It should be stressed once more that, while differences between groups were statistically significant, inspection showed that all group mean scores were within the acceptable range for the nutrients concerned. This suggests that no particular biodemographic grouping is characterized by either a deficient or excessive intake of any of the 11 nutrients examined.

CHAPTER VI
SUMMARY AND IMPLICATIONS

A brief review of the study, its objectives and major findings are presented in this chapter. Limitations of the study and implications inferred from interpretation of the findings, as well as suggestions for future research, are also discussed.

Summary

Purpose

This analytical study was designed to investigate the nutrition attitudes, knowledge, and practice of adult members of community centres regarding diet and cardiovascular disease (CVD). The relationships among nutrition attitudes, knowledge, and practice were determined as well as the influence of specific biodemographic variables on the three dependent variables (attitudes, knowledge, practice). The independent variables, non-manipulative in nature, were: (1) age, (2) gender, (3) living arrangement, (4) family history of CVD, (5) personal history of CVD, (6) physical exercise pattern, (7) smoking habit, (8) education level, and (9) obesity risk. The investigation was exploratory in nature since limited research data were available on cardiovascular nutrition attitudes, knowledge, and practice relationships of free-living adults, particularly in terms of the influence of biodemographic variables.

Procedure

Data collection instruments were developed for this study and included: (1) an attitude instrument composed of two subtests (A:GEN ROLE, A:MANAGE), (2) a knowledge instrument incorporating three subtests (K:AFFECTS, K:COMP, K:FACTS), (3) a biodemographic section, and (4) a practice instrument. The attitude instrument measured attitudes toward diet as a means of promoting heart health and intervening against heart disease. Comprehension of basic concepts of diet and heart disease was measured by the knowledge instrument. The biodemographic section collected data on the independent variables. Finally, the usual intake of eleven specific nutrients was estimated by the practice instrument and defined as practice scores. All four sections of the data collection instrument were completed by all participants.

During May and June 1979, the investigator distributed the validated questionnaire, by random day, to adult members of 11 community centres in the city of Vancouver. Each centre was represented by a random sample or by volunteers in attendance at each class on the chosen day. Completed questionnaires were returned by mail in addressed, stamped envelopes provided. The final sample size was 281, yielding an overall response rate of 74.7%

Analysis

The attitude, knowledge, and practice instruments were validated and pretested in the pilot study (see Chapter III). Reliability of the attitude and knowledge instruments was determined using LERTAP (Nelson, 1974). A congruency check employing a paired t test was used to determine the reliability of the practice data and a test-retest procedure, to determine the reliability of selected biodemographic data.

All analyses were tested at the .05 level of significance. Correlation analysis was used to test the hypotheses regarding the relationships among attitudes, knowledge, and practice. Pearson product-moment correlations were computed for all pairs of the three variables. Further analysis to test two causal models by path analysis was judged inappropriate. The remaining null hypotheses regarding the influence of biodemographic variables on attitudes, knowledge, and practice were tested by one-way multivariate analysis of variance. Any significant effect was followed by univariate analysis of variance, and the source of the effect was then determined by Scheffé's S method (Kirk, 1968).

Psychometric Properties of the Instruments

The mean scores for the attitude subtests and total test (A:GEN ROLE, A:MANAGE, A:TOTAL) were quite high (83% of the possible score) with standard deviations representing 8-9% of the possible score. The mean scores for the knowledge subtests and total test (K:AFFECTS, K:COMP, K:FACTS, K:TOTAL) revealed tests of medium difficulty with mean percents ranging from 48 to 53% and standard deviations ranging from 12 to 17% of the possible score. Kurtosis and skewness values for both attitude and knowledge subtests and total tests supported no marked departure from a normal distribution.

Reliability of the attitude and knowledge instruments was considered adequate for the purpose of this study with internal consistency reliability coefficients (Hoyt, 1941) for the subtests of .73, .67, .45, .64, and .62, respectively. The reliability of the practice instrument was determined by a congruency check of the data collected by questionnaire and by interview on a subsample of the survey respondents. As a result of a paired t test, the null hypothesis that the mean difference was zero between the practice scores collected by questionnaire and by interview was not rejected. A test-retest procedure determined the reliability of selected biodemographic data and resulted in correlations ranging from .58 to 1.0.

Results

No significant difference was found between early and late respondents' mean attitude, knowledge, and practice scores, so the data were pooled and the analysis conducted with the total sample from each centre. Preliminary analysis revealed that data could be collapsed across community centres.

The major findings of this study were:

Attitudes

The respondents' attitudes were consistently positive towards diet as a means of promoting heart health and intervening against heart disease.

Knowledge

Respondents' comprehension of basic concepts of diet and CVD was found to be more diverse. Over 80% of the sample could correctly answer items related to body weight and nutrient composition of meat, fish, poultry, fruits, eggs, and alcohol. Areas of inadequate comprehension were related to fat, cholesterol, and nutrient composition of specific products such as food substitutes and oils. Overall, the most difficult item concerned polyunsaturated fatty acids (PUFA). Again, over 80% of the respondents chose the incorrect option for the item related to the application of the concept "is more better?" to the use of PUFA.

Ability to differentiate nutrition facts from fallacies was very poor as exemplified by responses to items attributing special benefits from garlic, lecithin, hard water, or vitamin C. In contrast, responses to items relating family history, body weight, or exercise to CVD indicated good knowledge in these areas.

Practice

Mean values for nine of the 11 nutrients examined were equal to or exceeded the recommended values of the Canadian Dietary Standard (CDS) or Nutrition Recommendations for Canadians (NRC). Kilocalories and carbohydrate intakes, while less than recommended values, were within acceptable limits. The latter, carbohydrate, represented 42.5% of the energy consumed compared to the suggested 50%, and was somewhat lower than the national average reported by Nutrition Canada (Canada, 1976a).

Although no more than 35% of total calories as fat is recommended, fat intake in excess of 46% of the total energy was reported by 15.3% of the sample. The mean for the sample (39%) was similar to that of the national average as reported by Nutrition Canada. Only 5.7% of the sample reported energy intake in excess (133% of the CDS) while nearly 25% of the sample reported deficient (less than 67% of CDS) iron intake and about 16%, deficient intake of thiamin and calcium.

Relationships among attitudes, knowledge, and practice

While the correlation between attitudes and knowledge related to diet and CVD was moderate (range .38 to .56), the correlation between practice and both attitudes and knowledge was weak (range from .00 to .24).

Biodemographic variables

No effect. Type of living arrangement, degree of obesity risk, and positive family history of CVD did not appear to influence attitudes, knowledge, or practice. In addition, those with varying smoking habits did not differ significantly in attitudes or knowledge.

Attitude and knowledge effect. A positive personal history of CVD appeared to influence attitudes toward diet as a means of promoting heart health and intervening against heart disease. Those with a positive personal history also performed significantly better on the knowledge subtest about the affect of food (K:AFFECTS). No significant differences were noted between the performance of those with and without a positive personal history on subtests related to more specific knowledge, namely, food composition and facts versus fallacy.

Those who were young or mid-aged had a significantly more positive attitude toward the role of diet in heart disease, and were significantly better informed about facts versus fallacy than those who were old-aged. Females were also found consistently to have significantly more positive attitudes and to be significantly more informed about diet and CVD than were males.

In terms of education level, those with less than 12 years of education had significantly less positive attitudes toward the role of diet in heart disease, and were significantly less knowledgeable about food composition than all other education groups. Those with one to three years of university scored significantly higher on the subtest facts versus fallacy than those with less than grade 12; however, there was no significant difference between any other pairwise combination of education groups for this subtest.

Attitude effect. Those with varying physical exercise patterns did not differ in knowledge or practice but the sedentary group was found to have a significantly less positive attitude toward the role of diet in heart disease than those who regularly followed a high moderate or vigorous activity pattern.

Practice effect. While a number of differences were found to be significant when the practice scores of the different biodemographic groups (age, gender, personal history of CVD, education level, and smoking habit) were examined, no particular group was characterized by a deficient or excess intake of any of the 11 nutrients examined. That is, all biodemographic groups consumed intakes within the range considered acceptable for this study.

Limitations

The study was conducted with adults only, aged 19 years or over, in Metropolitan Vancouver and was restricted to members of 11 community centres. No attempt was made to assess residents of rural or smaller urban areas, or adults who were not community centre members. This restricted sample may account for the lack of variability among biodemographic subgroups, in particular regarding practice scores.

Due to circumstances beyond the control of the investigator, random sampling was not feasible for all centres, resulting in the majority of the participants being volunteers.

Although the response rate was high (74.7%), the nonrespondents were not checked for possible nonresponse bias.

Implications

Several implications can be inferred from interpretation of the results. The findings that attitude and knowledge were moderately correlated but that the correlation between practice and both attitudes and knowledge was weak provide support for the relationship of attitudes and knowledge but does not support a direct relationship between practice and either attitudes or knowledge. The latter finding may be explained by two reasons: (1) deficiencies in the measurement instruments, or (2) there is no direct relationship between cardiovascular nutrition practice and either attitudes or knowledge. With respect to the measurement instruments, an operational definition of nutritional practice limited to dietary risk factors for CVD may have been more suitable. Similarly, a response format for the knowledge instrument other than that employed in the study may have improved the results.

Since the sample as a whole reported positive attitudes toward the role of diet in CVD prevention yet these attitudes were only weakly correlated with cardiovascular nutrition practice, this would suggest there is no direct relationship between cardiovascular nutrition attitudes and practice. In the case of knowledge, the mean scores for each subtest were about 50% of the possible score. Thus, failure to support a direct relationship between cardiovascular practice and knowledge may be the result of insufficient knowledge on the part of the respondents and therefore inability to apply knowledge to their practice. If indeed this is the case, an improvement in cardiovascular nutrition knowledge should be reflected in an improvement in practice, with an accompanying improvement in the correlation between the two.

Despite failure of these findings to support the consistency model (KAP model), results of item analysis suggested a need to develop cardiovascular nutrition education programs for the general public which would promote dietary modification. The findings emphasize need for specific topics of information including:

1. The meaning of terms such as PUFA and linoleic acid. Over 75% of the respondents indicated that they did not know what PUFA was. This would have to be clarified before types of fats could be discussed or modification of diet implemented.

2. Basic nutrition information on the role of fat, cholesterol, and salt in heart disease. This should include the concept of risk factors, the rationale for the recommendations regarding fat and cholesterol, as well as information concerning the use of fat.

3. Composition of foods, especially those related to fat, cholesterol, protein, and carbohydrate. The reported high protein intake (1.76 of CDS), fat intake (40% of total energy), and less than CDS and NRC recommended energy and carbohydrate intakes, respectively, suggest the need to emphasize possible hidden fat in food,

particularly "protein foods", and to introduce appropriate changes in the diet so that reduction of fat is accompanied by increases in complex carbohydrates to meet the energy requirements. Information on the composition of newer food products such as food substitutes and the various oils was emphasized by the inability of many respondents to identify constituents of non-dairy cream substitutes or differentiate between oils.

4. Misconceptions regarding special attributes of foods and nutrients. The need for inclusion of this area of information is exemplified by the acceptance of garlic, lecithin, and vitamin C as protectors against heart disease and of hard water as a cause of heart disease.

5. Finally, application of the above topics of information in terms of food selection. The ability to recite facts related to CVD is of no benefit unless information is also provided for the practical application of the information to daily living. In terms of CVD prevention, this involves information on how to modify the present diet so that the guidelines are implemented yet the personal preferences of the individual are recognized and utilized in the most acceptable manner.

The findings further suggest that the target of the programs should be the male audience, since males are at greater risk than females and were found to consistently score significantly lower than females on all three knowledge subtests.

However, the fact that the average percentage for both groups was 45 and 52%, respectively, indicates need to reach the female audience as well. One method may be the education system in its entirety, including: primary, grade school, high school, college, trade, or university, and continuation school, since poor performance was observed across all education levels and all age groups, without exception.

Three major channels for dissemination of cardiovascular nutrition information were suggested by the study: (1) mass media, (2) doctors, and (3) family and friends. The principle source of information on diet and heart disease reported in the study was mass media with the main focus on magazines, books, newspapers, and television. While these four sources have been used for nutrition education in the past, utilization of their full potential may suggest a need for a multi-disciplinary approach to the development of future cardiovascular nutrition education programs. Nutrition educators working with communication experts may be able to devise a more effective message for the general public. A combination of sources would allow the reinforcement of the central theme in more economical terms as well as reach those who do not come in contact with a variety of sources but rather restrict themselves to specific forms of the mass media.

If the doctor, family, and friends are to be effective, information services that provide the latest information must be established, if they do not exist; or be promoted, if they do exist but are not efficiently utilized. This latter point indicates a need to assess the present information services for the general public so that recommendations for their operation at full potential may be formulated and implemented.

Future Research

Results and implications of the study suggest several areas for future research:

1. Research should be undertaken to investigate the effect of a cardiovascular nutrition education program on attitudes, knowledge, and practice of a large group of adults. Random assignment to experimental and control groups who are exposed or not exposed to the program, respectively, and the use of a pretest-posttest design should determine if change has occurred and how much can be attributed to the pretesting or to the program. Such a study should provide valuable insight into the relationships among cardiovascular nutrition attitudes, knowledge, and practice, in particular, if an improvement in knowledge is associated with an improvement in practice.
2. Since the present study was restricted to adult members of community centres, further investigation of the public appears warranted. A study in which the questionnaire is distributed to a large, random sample of adults who are not members of community centres is desirable. The results would establish the reliability of the instruments for assessing cardiovascular nutrition attitudes, knowledge, and practice of the general public.
3. Differences between groups based on their cardiovascular dietary practice should be investigated. A study using large groups of adults who are characterized as low fat

or high fat consumers should be conducted to determine possible attitudes and knowledge differences between these practice groups. Prior screening to establish group membership is necessary before the questionnaire is distributed. Results should reveal the discriminatory power of the attitude and knowledge instruments. If the power is adequate, future use of the attitude and knowledge instruments alone would permit a more economical and less time consuming assessment of different groups in the general population.

4. A study to assess the food practice of a large number of adults with specific emphasis on fat intake, its composition, and any associated practice that might be modified to reduce CVD risk should be undertaken. The results could then be integrated into a nutrition education program that would attempt to bring fat intake more in line with the recommended 35% yet acceptable to the people concerned. Concurrently, biochemical and anthropometric measurements should be collected for correlation with the dietary information and confirmation of those who are most at risk.

5. Based on results of item analysis, a study should be undertaken to assess the suitability of employing a multiple choice answer format with a right/wrong scoring system for the knowledge instrument.

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APPENDIX A

DATA COLLECTION INSTRUMENTS AND COVER LETTERS

A.1. Preliminary Questionnaire

A.2. Pilot Study Questionnaire

A.3. Main Research Instrument

A.1. Preliminary Questionnaire

- 1 -

No. ______________

NUTRITION OPINIONS

Card ______________

Some statements concerning nutrition, diet and heart disease are made below. We are interested in your judgment of each statement, in terms of how well it reflects your personal opinion or feelings. If the statement describes how you feel, circle "A" for agree; if the statement does not describe how you feel, circle "D" for disagree. After you have made your decision, indicate how certain you are about the decision.

Circle: 1 if you are VERY DOUBTFUL about your decision (A or D)
2 if you are MODERATELY DOUBTFUL about your decision
3 if you are MODERATELY CERTAIN about your decision
4 if you are VERY CERTAIN about your decision

Please be sure to respond twice to each statement.

> Sample: Nutrition is important to good health. A D 1 2 3 4
>
> This person is MODERATELY CERTAIN that he/she agrees with the statement above.

	Agree or Disagree	VERY DOUBTFUL	MODERATELY DOUBTFUL	MODERATELY CERTAIN	VERY CERTAIN
1. As long as I have no symptoms of heart disease I guess I must be eating right.	A D	1	2	3	4
2. Eating for heart health is necessary only for overweight adults.	A D	1	2	3	4
3. Children should be taught proper food habits that will help prevent heart disease in later life.	A D	1	2	3	4
4. I think the government should remove products from the market that are hazardous to the heart.	A D	1	2	3	4
5. Since heredity, age and stress have so much to do with heart disease, it doesn't really matter what I eat.	A D	1	2	3	4
6. As long as I trim away the fat, I can eat as much meat as I want.	A D	1	2	3	4
7. As long as the doctor does not say that I should cut down the amount I eat, I do not need to be concerned.	A D	1	2	3	4
8. Everyone should replace eggs with low-cholesterol egg substitutes (eg. Egg-Beaters).	A D	1	2	3	4
9. I feel everyone should use polyunsaturated margarine in place of butter.	A D	1	2	3	4

CONTINUE ON BACK OF PAGE

No. ___________

Card __________

	Statement	Agree or Disagree	VERY DOUBTFUL	MODERATELY DOUBTFUL	MODERATELY CERTAIN	VERY CERTAIN
10.	As long as I eat properly, I don't have to worry about exercising.	A D	1	2	3	4
11.	I believe industry should develop more foods that are good for our hearts.	A D	1	2	3	4
12.	Labels should carry warnings if the products are harmful to the heart.	A D	1	2	3	4
13.	If I eat baked, broiled, or steamed foods, I can help reduce the amount of fat in my diet.	A D	1	2	3	4
14.	I believe fats and oils should be clearly labelled as to their contribution to heart health.	A D	1	2	3	4
15.	Females do not have to worry about eating for a healthy heart.	A D	1	2	3	4

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

NUTRITION KNOWLEDGE

Some statements concerning nutrition, diet and heart disease are made below. Indicate whether or not you think each statement is true or false. Circle "T" for true and "F" for false. After you have reached this decision, indicate how certain you are about your answer.

Circle: 1 if you are VERY DOUBTFUL about your decision (T or F)
2 if you are MODERATELY DOUBTFUL about your decision
3 if you are MODERATELY CERTAIN about your decision
4 if you are VERY CERTAIN about your decision

Please be sure to respond twice to each statement.

	Statement	True or False	VERY DOUBTFUL	MODERATELY DOUBTFUL	MODERATELY CERTAIN	VERY CERTAIN
1.	The food we eat affects the development of heart disease.	T F	1	2	3	4
2.	Atherosclerosis (hardening of the arteries) is caused by fat in the diet.	T F	1	2	3	4
3.	The more polyunsaturated fat in the diet the better protected one is against heart disease.	T F	1	2	3	4

No. ____________

Card ___________

		True or False	1 VERY DOUBTFUL	2 MODERATELY DOUBTFUL	3 MODERATELY CERTAIN	4 VERY VERTAIN
4.	Heart disease affects only people who eat too much and exercise too little.	T F	1	2	3	4
5.	White fish is lower in fat content than beef.	T F	1	2	3	4
6.	Hardening of the arteries can be slowed down by proper food habits.	T F	1	2	3	4
7.	Non-dairy cream substitutes do not contain any saturated fat.	T F	1	2	3	4
8.	Garlic purifies the blood thus protecting against heart disease.	T F	1	2	3	4
9.	Processed meats like sausage and salami are high in saturated fat.	T F	1	2	3	4
10.	Lecithin prevents heart disease by softening the arteries.	T F	1	2	3	4
11.	Vitamin C cures heart disease by clearing fat from the blood stream.	T F	1	2	3	4
12.	It is unnecessary for healthy people to limit their intake of cholesterol.	T F	1	2	3	4
13.	Corn oil contains more polyunsaturated fat than does coconut oil.	T F	1	2	3	4
14.	Polyunsaturated fats are made up of polyunsaturated fatty acids, the most important of which is linoleic acid.	T F	1	2	3	4
15.	Vitamin E supplements protect against heart disease.	T F	1	2	3	4
16.	What one eats affects the amount of fat in the blood.	T F	1	2	3	4
17.	Overweight people are more likely to die of a heart attack.	T F	1	2	3	4
18.	Due to their high cholesterol content, eggs should be eliminated from the diet of all adults.	T F	1	2	3	4
19.	Drinking hard water causes heart disease.	T F	1	2	3	4
20.	Use of margarine in place of butter protects against heart disease.	T F	1	2	3	4

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

CONTINUED ON BACK OF PAGE

No. ______________

NUTRITIONAL PRACTICES

Card ______________

We are interested in the types of food that you eat during a period of three days. Indicate, by checking, HOW FREQUENTLY YOU ATE each of the foods listed below during the PAST THREE DAYS. This is only an estimate but please try to be as accurate as possible. You may wish to recall your activities of the past three days which may help you to remember the foods you ate. Average serving sizes or portions are noted beside each food, to serve as a guide. Check (✓) in the appropriate blank:

(1) the number of 'average' portions' of each food listed that you ate during the past three days
(2) check under '0' if you did not eat the food in the past three days
(3) check under 'never' if you never consume the food

	Average Portion	Times eaten in the past three days							
		10+	8-9	6-7	4-5	2-3	1	0	Never
1. Milk as a beverage including flavoured milk drinks, cocoa made with milk	1 cup (8 oz)								
2. Milk used on cereal, pudding, fruit	½ cup (4 oz)								
3. Milk used in cream soup, custard, pudding	½ cup								
4. Ice cream, yoghurt, ice milk	½ cup								
5. Cottage cheese, Swiss, American &/or other types (except cream cheese)	1 oz 2 T								
6. Eggs (except those used in cooking and baking	1								
7. Dried beans and/or peas	½ cup								
8. Nuts and/or peanut butter	2 T								
9. Meat, fish, poultry (all varieties including weiners and luncheon meat)	3 oz								
10. Orange (1), grapefruit (½), orange juice and/or grapefruit juice	½ cup								
11. Tomato and/or tomato juice	½ cup								
12. Other fruit: one piece fresh fruit and/or cooked, canned or frozen juice	½ cup								
13. Dark green, yellow and/or orange vegetables	½ cup								
14. Other vegetables including potatoes	½ cup								

No. ___________

Card ___________

	Average Portion	Times eaten in the past three days							
		10+	8-9	6-7	4-5	2-3	1	0	Never
15. Bread, roll, muffin, biscuit	1/one slice								
16. Breakfast cereal (all varieties)	½-3/4 cup								
17. Spaghetti, rice, macaroni, noodles	½-3/4 cup								

Please underline the days which you chose to record in the above table (three days):

MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, SUNDAY

1. Check (✓) the types of milk used regularly for each of the following (check as many as apply):

	Whole Milk	2% Milk	Skim Fat-free Milk	Canned Evaporated Milk	Butter Milk	Sweetened Condensed Milk	Half and Half	Whole Cream	DISREGARD THIS COLUMN
As beverage									
Cooking and baking									
On cereals and puddings									

2. Check (✓) the types of fat used regularly for each of the following (check as many as apply):

	Bacon Fat	Lard	Butter	Shortening	Margarine	Soft Margarine	Veg. Oil
Baking							
Cooking and frying							
As a spread on bread etc.							

CONTINUE ON BACK OF PAGE

No. ________

Card ________

INFORMATION ABOUT YOU

DISREGARD THIS COLUMN

Please check (✓) or fill in the appropriate blanks below:

1. Your sex: Male ( ) Female ( )
2. Your age: 19-24 ( ) 40-44 ( ) 60-64 ( )
   25-29 ( ) 45-49 ( ) 64+ ( )
   30-34 ( ) 50-54 ( )
   35-39 ( ) 55-59 ( )
3. Do you live: alone ( ) communal ( )
   with family ( ) other ( )
   with roommate(s) ( ) please specify ________
   ____
4. Highest education received:

College or University		High School		Elementary	
4+	( )	4	( )	8	( )
4	( )	3	( )	7	( )
3	( )	2	( )	6 & 5	( )
2	( )	1	( )	4 & 3	( )
1	( )			2 & 1	( )
1 Voc	( )				

5. Your present occupation (if you are a student, write your intended occupation; if retired, your past one; if unemployed, your usual one; if a homemaker, write that of your spouse): ________

Check the one choice that best represents your personal habits:

6. Regular active exercise pattern:
   frequent (4-6X/week) ( ) infrequent (< 1X/week) ( )
   occasional (1-3X/week) ( ) none ( )
7. Cigarette smoking: heavy (20+ per day) ( )
   moderate (10-20 per day) ( )
   light (1-9 per day) ( )
   ex-smoker ( )
   non-cigarette smoker ( )
8. Your body weight: normal or less ( )
   up to 10lbs. above normal ( )
   10+ lbs. above normal ( )

No. ___________

Card ___________

DISREGARD THIS COLUMN

9. Has anyone in your immediate family (husband, wife, children or brother, sister, parent) ever had high blood pressure, stroke, high blood fat levels and/or heart attack? Yes ____ No ____

10. Have you ever been treated for any of the following (check as many as apply):

high blood pressure	( )	angina	( )
high blood fat levels	( )	diabetes	( )
high blood cholesterol levels	( )	none of the above	( )
heart attack	( )		

11. There are many sources from which one can obtain information about diet and heart disease. Check (✓) the source(s) from which you have obtained information on diet and heart disease (check as many as apply):

doctor	( )	labels on foods	( )
weight control group	( )	nutritionist, dietitian	( )
Action B.C.	( )	home economist/home ec teacher	( )
exhibits or displays	( )	nurse	( )
health food store	( )	YM/YWCA	( )
family	( )	radio	( )
newspapers	( )	fitness instructor	( )
magazines	( )	teacher	( )
grocery store	( )	drug store	( )
books	( )	service club	( )
cookbooks	( )	other, please specify	( )
friends	( )	______________________________	

THANK YOU FOR YOUR TIME AND COOPERATION

A.2. Pilot Study Questionnaire

NUTRITION OPINIONS

Some statements concerning nutrition, diet, and heart disease are made below. We are interested in your opinions of these statements. Please circle the number which best indicates how closely you agree or disagree with the FEELING expressed in each statement AS IT CONCERNS YOU. Circle:

1 if you STRONGLY DISAGREE with the statement
2 if you DISAGREE with the statement
3 if you are UNDECIDED, neither agree nor disagree
4 if you AGREE with the statement
5 if you STRONGLY AGREE with the statement

SAMPLE: The premier of British Columbia should call an election at this time. 1 2 3 4 5
This person STRONGLY DISAGREES with the statement.

	STRONGLY DISAGREE	DISAGREE	UNDECIDED	AGREE	STRONGLY AGREE
1. I am concerned about the amount of salt in the foods that I buy.	1	2	3	4	5
2. With no signs of heart disease, I guess one is eating right.	1	2	3	4	5
3. It is the doctor's job to make me eat for heart health.	1	2	3	4	5
4. There is nothing I can do to prevent heart disease.	1	2	3	4	5
5. To help fight heart disease, I feel only nutritious foods should be sold in food stores.	1	2	3	4	5
6. Once an adult, it is too late to protect your heart by changing your food habits.	1	2	3	4	5
7. There is too much emphasis on eating for the heart.	1	2	3	4	5
8. As long as the doctor does not say that I should cut down the amount I eat, I do not need to be concerned.	1	2	3	4	5
9. I think I am the one who should decide what I eat.	1	2	3	4	5
10. What I eat will affect my heart.	1	2	3	4	5
11. Labels should carry warnings if the products are harmful to a healthy heart.	1	2	3	4	5

CONTINUED ON BACK OF PAGE

		STRONGLY DISAGREE	DISAGREE	UNDECIDED	AGREE	STRONGLY AGREE
12.	Children should be taught proper food habits that will help prevent heart disease in later life.	1	2	3	4	5
13.	If I am careful I can cut down the amount of fat I eat.	1	2	3	4	5
14.	As long as I eat properly, I can forget about exercising for my heart.	1	2	3	4	5
15.	I am trying to eat for a healthy heart.	1	2	3	4	5
16.	I feel it is impossible to change what I eat regardless of my heart health.	1	2	3	4	5
17.	Since I can't control the amount of salt in packaged foods, I can't cut down on the amount of salt I eat.	1	2	3	4	5
18.	I think people should be advised to change the type of fat they eat.	1	2	3	4	5
19.	I think government can help us decide what is best for a healthy heart.	1	2	3	4	5
20.	I feel fats and oils should be clearly labelled as to their contribution to heart health.	1	2	3	4	5
21.	My eating habits influence my heart health.	1	2	3	4	5
22.	If I pay attention to how my food is cooked, I can reduce the amount of fat I eat.	1	2	3	4	5
23.	As long as I trim away the fat, I can eat all the meat I want.	1	2	3	4	5
24.	People of all ages should be concerned about eating for a healthy heart.	1	2	3	4	5
25.	I think it is the job of industry to develop foods that are healthy for the heart.	1	2	3	4	5
26.	I feel I should be concerned about the total amount of fat I eat.	1	2	3	4	5

<u>PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED</u>

NUTRITION KNOWLEDGE

Some true and false statements concerning nutrition, diet and heart disease are below. Please circle the number which best indicates your knowledge of each statement. Circle:

1 if the statement is DEFINITELY FALSE
2 if the statement is PROBABLY FALSE
3 if you DO NOT KNOW
4 if the statement is PROBABLY TRUE
5 if the statement is DEFINITELY TRUE

	DEFINITELY FALSE	PROBABLY FALSE	DON'T KNOW	PROBABLY TRUE	DEFINITELY TRUE
27. Alcoholic beverages add extra calories to the diet.	1	2	3	4	5
28. Garlic purifies the blood thus protecting against heart disease.	1	2	3	4	5
29. Hardening of the arteries can be slowed down by eating wisely.	1	2	3	4	5
30. It is unnecessary for healthy people to limit their intake of cholesterol, a fatty substance found in animal foods.	1	2	3	4	5
31. Non-dairy cream substitutes such as Coffee-Mate contain no fat.	1	2	3	4	5
32. Low-cholesterol egg products such as Egg-Beaters are healthier than eggs.	1	2	3	4	5
33. What one eats affects the amount of fat in the blood.	1	2	3	4	5
34. Being thin is no guarantee against heart disease.	1	2	3	4	5
35. Hardening of the arteries (athero-sclerosis) is caused by fat in the diet.	1	2	3	4	5
36. The more polyunsaturated fat in the diet, the better protected one is against heart disease.	1	2	3	4	5
37. Vitamin E supplements offer no protection against heart disease.	1	2	3	4	5
38. High blood pressure is the result of high salt intake.	1	2	3	4	5
39. Normal weight people need not exercise to protect their heart.	1	2	3	4	5
40. Polyunsaturated fats are made up of polyunsaturated fatty acids, the most important of which is linoleic acid.	1	2	3	4	5

CONTINUED ON BACK OF PAGE

		DEFINITELY FALSE	PROBABLY FALSE	DON'T KNOW	PROBABLY TRUE	DEFINITELY TRUE
41.	Use of margarine in place of butter protects against heart disease.	1	2	3	4	5
42.	Just because no one in your family has had heart problems does not mean you are protected against heart disease.	1	2	3	4	5
43.	A good way to lose weight is to eat a high meat diet.	1	2	3	4	5
44.	Weight for weight, hamburger has the same energy value as white chicken breast meat.	1	2	3	4	5
45.	Of all the vegetable oils, corn oil contains the most polyunsaturated fat.	1	2	3	4	5
46.	Olive oil contains less polyunsaturated fat than safflower oil.	1	2	3	4	5
47.	Heart disease affects only people who over eat.	1	2	3	4	5
48.	Lecithin, a fatty substance in animal tissue and eggs, prevents heart disease by clearing cholesterol from the arteries.	1	2	3	4	5
49.	Drinking hard water causes heart disease.	1	2	3	4	5
50.	Obese people have a greater chance of a fatal heart attack than people of normal weight.	1	2	3	4	5
51.	Vitamin C cures heart disease by removing fat from the blood stream.	1	2	3	4	5
52.	Processed meats like sausage and salami are high in saturated fat.	1	2	3	4	5
53.	People do not out grow the need for regular exercise.	1	2	3	4	5
54.	Due to their high cholesterol content, eggs should be eliminated from the diet.	1	2	3	4	5
55.	White fish such as cod and haddock is lower in fat content than beef.	1	2	3	4	5
56.	The food we eat affects the development of heart disease.	1	2	3	4	5
57.	Fruit drinks such as Tang are a nutritious substitute for fresh fruits.	1	2	3	4	5

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

INFORMATION ABOUT YOU

Please check ☑ or fill in the appropriate blanks below:

1. Your sex: ☐ Male ☐ Female

2. Your age: ☐ 19-24 ☐ 25-29 ☐ 30-34 ☐ 35-39 ☐ 40-44 ☐ 45-49 ☐ 50-54 ☐ 55-59 ☐ 60-64 ☐ 64+

3. Do you live: ☐ alone ☐ communal ☐ with roommate(s) ☐ with family ☐ other, please specify ______________ ______________________________

4. Highest level of education completed:

College or University	High School	Elementary
☐ 4+	☐ 4	☐ 8
☐ 4	☐ 3	☐ 7
☐ 3	☐ 2	☐ 6 & 5
☐ 2	☐ 1	☐ 4 & 3
☐ 1		☐ 2 & 1
☐ 1 Voc		☐ None

5. Your present occupation (if you are a student, write your intended occupation; if retired, your past one; if unemployed, your usual one; if a homemaker, write that of your spouse), please describe as carefully as possible: ______________________________

6. Were you born in Canada?
☐ Yes - go to number 7 ☐ No
Where were you born? ______________________________
How long have you lived in Canada? ______________________________

CONTINUE ON BACK OF PAGE

7. What is your regular exercise pattern? Check one.

☐ Sedentary: work and leisure. Under 5 flights of stairs or half a mile walking per day.

☐ Low moderate: some activity work and leisure; between 5 and 15 flights of stairs or 0.5 to 1.5 miles walking or comparable daily exercise.

☐ High moderate: programmed exercise 4 times per week or 1.5 to 2 miles of walking or 15 to 20 flights of stairs or comparable daily exercise.

☐ Vigorous: greater than that of high moderate.

8. What is your height: ______ft. ______in. (or ______cm.)
What is your present weight? ______lbs. (or ______kg.)

9. Do you have a history of previous weight gain?

☐ Yes ☐ No - go to number 10

How has your weight changed? ☐ increased ☐ decreased

Why? Please specify ________________________________

10. What is your smoking habit? Check one.

☐ Nonsmoker: never smoked or not smoked for 5 years
☐ Past smoker: not smoked for less than 5 years
☐ Cigarettes: 20 or more per day
☐ Cigarettes: 10-19 per day
☐ Cigarettes: less than 10 per day
☐ Cigars or pipes ONLY: 5 or more per day or any amount inhaled
☐ Cigars or pipes ONLY: less than 5 per day not inhaled

11. Has anyone in your immediate family (husband, wife, children or brother, sister, parent) ever had high blood pressure, stroke, high blood fat levels and/or heart attack?

☐ Yes ☐ No ☐ Do not know

12. Have you ever been treated for any of the following (check as many as apply):

☐ High blood pressure
☐ High blood fat levels
☐ High blood cholesterol levels
☐ Heart attack
☐ Angina
☐ Diabetes
☐ None of the above

13. There are many sources from which one can obtain information about diet and heart disease. Check ☐ the source(s) from which you have obtained information on diet and heart disease (check as many as apply):

- ☐ Doctor
- ☐ Weight control group
- ☐ Action B.C.
- ☐ Exhibits or displays
- ☐ Health food store
- ☐ Family
- ☐ Newspapers
- ☐ Magazines
- ☐ Grocery store
- ☐ Books
- ☐ Cookbooks
- ☐ Friends
- ☐ Television
- ☐ Labels on foods
- ☐ Nutritionist, dietitian
- ☐ Home economist, home ec teacher
- ☐ Nurse
- ☐ YM/YWCA
- ☐ Radio
- ☐ Fitness instructor
- ☐ Teacher
- ☐ Drug store
- ☐ Service club
- ☐ None
- ☐ Other, please specify below ____________________

PLEASE CHECK TO BE SURE ALL THE QUESTIONS HAVE BEEN ANSWERED

YOUR DIETARY PRACTICES

We are interested in determining your "usual" eating habits. To help you remember, three questions will be asked. Question 1: What did you eat yesterday? Think of yesterday, hour by hour, and record on the back of this page EVERYTHING you ate and drank from the time you got up in the morning until you went to bed at night and what you ate during the night. Mention meals, snacks, and drinks of all kinds taken at home, at work, and away from home. BE AS ACCURATE AS POSSIBLE. Record the KIND of food and AMOUNT that you ate. Use average household servings, sizes or portions and describe the food as completely as possible. Say if it differed from your "usual".

SAMPLE:

	Food type/preparation	Amount	Variation from "Usual"
MID DAY:	Fish, cod, fried in one tablespoon butter	4 oz. cooked	Usually have cheese sandwich and tea
	Pie, apple (2 crust)	1/6 of 9" pie	
	Beer, Highlite	2 - 12oz. bottles	

CONTINUE ON BACK OF PAGE

FOOD	TYPE/PREPARATION	AMOUNT	VARIATION FROM "USUAL"
MORNING?	☐ Yes ☐ No	If yes, what?	
LATE MORNING?	☐ Yes ☐ No	If yes, what?	
MID DAY?	☐ Yes ☐ No	If yes, what?	
AFTERNOON?	☐ Yes ☐ No	If yes, what?	
EVENING MEAL?	☐ Yes ☐ No	If yes, what?	
AFTER EVENING MEAL?	☐ Yes ☐ No	If yes, what?	

Question 2: What is your GENERAL EATING PATTERN, including supplements?
Please check ☑ or fill in the appropriate blanks below.

A. Was your intake yesterday unusual in any way?

☐ Yes ☐ No - go to B

Why was your intake yesterday unusual? Please specify ____________________

____

In what way was your intake yesterday unusual? Please specify ____________

____

B. Are you taking any food or nutrient supplement?

☐ Yes ☐ No - go to C

When did you last take a food or nutrient supplement?

☐ within the past three months
☐ not within the past three months

What kind? Check and write the name and amount below:

☐ Vitamin ____
☐ Mineral ____
☐ Both ____
☐ Don't know the name/kind but the amount is ____________

On whose advice?

☐ Doctor/nurse
☐ Self
☐ Other, please specify ______________________________

C. Do you currently (within the past year) drink alcoholic beverages?

☐ Yes ☐ No - go to D

What type of alcoholic beverage(s) do you drink?

☐ wine, 4 oz.
☐ light beer (3.5 or less % alcohol), 12 oz.
☐ ale/beer, 12 oz.
☐ spirits/hard liquor, 1-1½ oz.

How much? (The amount beside each type of drink above equals one drink)

☐ less than 2 drinks per week
☐ 2 to 10 drinks per week
☐ 10 to 25 drinks per week
☐ over 25 drinks per week

CONTINUE ON BACK OF PAGE

D. Do you use salt? (Check twice if yes)

			ALWAYS	FREQUENTLY	SOMETIMES	NEVER
1) at the table	☐ Yes	☐ No				
2) in cooking	☐ Yes	☐ No				
3) before tasting	☐ Yes	☐ No				
4) after tasting	☐ Yes	☐ No				

E. Do you have any food dislikes?

☐ Yes ☐ No - go to F

What food dislike(s) do you have? Please specify ______________________

____

F. Do you eat the same on weekends as you do during the week?

☐ Yes - go to G ☐ No

What is the difference between your weekday and weekend eating practices?

Please specify ____

____

G. Do you usually skip or omit a meal?

☐ Yes ☐ No - go to H

Which meal(s)?

☐ Breakfast

☐ Lunch: noon meal

☐ Dinner: evening meal

H. How long have you followed your present pattern of eating?

☐ Less than one month

☐ A few months

☐ Over one year

Question 3: HOW FREQUENTLY do you eat each of the following common foods? Please indicate by checking $\boxed{\surd}$. This is only an estimate, but try to be as accurate as possible. Average serving sizes or portions are noted beside each food, to serve as a guide. (C. = cup; oz. = ounce; Tbsp. = tablespoon; Tsp. = teaspoon)

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily; more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month
Cream, whole	2 Tbsp.				
Half & Half	1 Tbsp.				
Milk (all forms)	1 C.(8oz.)				
Cheese (all types)	1 oz.				
Cottage cheese	2 Tbsp.				
Meat/fish/poultry	3 oz.				
Ham	1 oz.				
Bacon, side	1 strip				
Bacon, back	1 strip				
Organ meat (liver)	3 oz.				
Weiners (hot dogs)	2				
Dried beans/peas	1/2 C.				
Eggs, medium	1				
Grapefruit (½) orange	1				
as juice	1/2 C.				
Tomato and/or juice	1/2 C.				
Dried fruit	1/2 C.				
Other fruit	1 or 1 C.				
Dk. green leafy vegetables/deep yellow	1/2 C.				
Potatoes, mashed	1/2 C.				
baked/boiled	1				
French fried	1 C.				
Bread/roll/muffin/biscuit	1				
Bkfst. cereal, dry	1 C.				
cooked	3/4 C.				
Spaghetti/macaroni/rice/noodles	3/4 C.				
Salty crackers	2 ritz 4 melba				

CONTINUE ON BACK OF PAGE

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily; more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month
Butter	2 pats 1 Tbsp.				
Margarine, soft	1 Tbsp.				
Margarine, regular	1 Tbsp.				
Vegetable oils	1 Tbsp.				
Lard	1 Tbsp.				
Puddings	1 C.				
Pie/pastry	1/7 of 9"				
Cake/doughnut	1				
Candy, chocolate	3/4 oz. ½ 25¢bar				
Candy, other (examples)	4 hard 7caramels				
Jam/jelly	2 Tbsp.				
Syrup/molasses	2 Tbsp.				
Ice cream	1/2 C.				
Soft drinks	8 oz.				
Potato chips/corn chips	10 about 2"in size				
Popcorn, plain	1 C.				
Popcorn, buttered	1 C.				
Pizza, all kinds	1/8 of 14"				
Coffee, regular	1 C.				
Coffee, decaffeinated	1 C.				
Tea	1 C.				

If any food items that you usually eat have been omitted from the above table, please add and check the frequency.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION

A.3. Main Research Instrument

- 1 - 1

NUTRITION OPINIONS

Some statements concerning nutrition, diet, and heart disease are made below. We are interested in your immediate reaction to these statements. Please circle the number which best indicates how closely you agree or disagree with the FEELING expressed in each statement AS IT CONCERNS YOU. Circle:

1 if you STRONGLY DISAGREE with the statement
2 if you DISAGREE with the statement
3 if you are UNDECIDED, neither agree nor disagree
4 if you AGREE with the statement
5 if you STRONGLY AGREE with the statement

SAMPLE: The premier of British Columbia should call an election at this time. 1 2 3 4 5

This person STRONGLY DISAGREES with the statement.

	STRONGLY DISAGREE	DISAGREE	UNDECIDED	AGREE	STRONGLY AGREE	
1. I am concerned about the amount of salt in the foods that I buy.	1	2	3	4	5	(8)
2. With no signs of heart disease, I guess one is eating right.	1	2	3	4	5	(9)
3. It is the doctor's job to make me eat for heart health.	1	2	3	4	5	(10)
4. Once an adult, it is too late to protect your heart by changing your food habits.	1	2	3	4	5	(11)
5. There is too much emphasis on eating for the heart	1	2	3	4	5	(12)
6. As long as the doctor does not say that I should cut down the amount I eat, I do not need to be concerned.	1	2	3	4	5	(13)
7. What I eat will affect my heart.	1	2	3	4	5	(14)
8. Children should be taught proper food habits that will help prevent heart disease in later life.	1	2	3	4	5	(15)

CONTINUE ON BACK OF PAGE

		STRONGLY DISAGREE	DISAGREE	UNDECIDED	AGREE	STRONGLY AGREE	
9.	If I am careful I can cut down the amount of fat I eat.	1	2	3	4	5	(16)
10.	As long as I eat properly, I can forget about exercising for my heart.	1	2	3	4	5	(17)
11.	I am trying to eat for a healthy heart.	1	2	3	4	5	(18)
12.	I feel it is impossible to change what I eat regardless of my heart health.	1	2	3	4	5	(19)
13.	Since I can't control the amount of salt in packaged foods, I can't cut down on the amount of salt I eat.	1	2	3	4	5	(20)
14.	I think people should be advised to change the type of fat they eat.	1	2	3	4	5	(21)
15.	My eating habits influence my heart health.	1	2	3	4	5	(22)
16.	If I pay attention to how my food is cooked, I can reduce the amount of fat I eat.	1	2	3	4	5	(23)
17.	As long as I trim away the fat, I can eat all the meat I want.	1	2	3	4	5	(24)
18.	People of all ages should be concerned about eating for a healthy heart.	1	2	3	4	5	(25)
19.	I feel I should be concerned about the total amount of fat I eat.	1	2	3	4	5	(26)

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

NUTRITION KNOWLEDGE

Some true and false statements concerning nutrition, diet and heart disease are below. Please circle the number which best indicates your knowledge of each statement. Circle:

1 if the statement is DEFINITELY FALSE
2 if the statement is PROBABLY FALSE
3 if you DO NOT KNOW
4 if the statement is PROBABLY TRUE
5 if the statement is DEFINITELY TRUE

	DEFINITELY FALSE	PROBABLY FALSE	DON'T KNOW	PROBABLY TRUE	DEFINITELY TRUE	
20. Alcoholic beverages add extra calories to the diet.	1	2	3	4	5	(27)
21. Garlic purifies the blood thus protecting against heart disease.	1	2	3	4	5	(28)
22. It is unnecessary for healthy people to limit their intake of cholesterol, a fatty substance found in animal foods.	1	2	3	4	5	(29)
23. Non-dairy cream substitutes such as Coffee-Mate contain fat.	1	2	3	4	5	(30)
24. What one eats affects the amount of fat in the blood.	1	2	3	4	5	(31)
25. Being thin is no guarantee against heart disease.	1	2	3	4	5	(32)
26. Hardening of the arteries (atherosclerosis) is caused by fat in the diet.	1	2	3	4	5	(33)
27. The more polyunsaturated fat in the diet, the better protected one is against heart disease.	1	2	3	4	5	(34)
28. High blood pressure is caused by high salt intake.	1	2	3	4	5	(35)
29. Normal weight people need not exercise to protect their heart.	1	2	3	4	5	(36)
30. Polyunsaturated fats are made up of polyunsaturated fatty acids, the most important of which is linoleic acid.	1	2	3	4	5	(37)

CONTINUE ON BACK OF PAGE

		DEFINITELY FALSE	PROBABLY FALSE	DON'T KNOW	PROBABLY TRUE	DEFINITELY TRUE	
31.	Just because no one in your family has had heart problems does not mean you are protected against heart disease.	1	2	3	4	5	(38)
32.	A good way to lose weight is to eat a high meat diet.	1	2	3	4	5	(39)
33.	Weight for weight, hamburger has the same energy value as white chicken breast meat.	1	2	3	4	5	(40)
34.	Of all the vegetable oils, corn oil contains the most polyunsaturated fat.	1	2	3	4	5	(41)
35.	Olive oil contains less polyunsaturated fat than safflower oil.	1	2	3	4	5	(42)
36.	Heart disease affects only people who over eat.	1	2	3	4	5	(43)
37.	Lecithin, a fatty substance in animal tissue and eggs, prevents heart disease by clearing cholesterol from the arteries.	1	2	3	4	5	(44)
38.	Drinking hard water causes heart disease.	1	2	3	4	5	(45)
39.	Obese (very fat) people have a greater chance of a fatal heart attack than people of normal weight.	1	2	3	4	5	(46)
40.	Vitamin C cures heart disease by removing fat from the blood stream.	1	2	3	4	5	(47)
41.	Processed meats like sausage and salami are high in saturated fat.	1	2	3	4	5	(48)
42.	People do not outgrow the need for regular exercise.	1	2	3	4	5	(49)
43.	Due to their high cholesterol content, eggs should be eliminated from the diet.	1	2	3	4	5	(50)
44.	White fish such as cod and haddock is lower in fat content than beef.	1	2	3	4	5	(51)
45.	The food we eat affects the development of heart disease.	1	2	3	4	5	(52)
46.	Fruit drinks such as Tang are a nutritious substitute for fresh fruits.	1	2	3	4	5	(53)

PLEASE CHECK TO BE SURE ALL STATEMENTS HAVE BEEN ANSWERED

2

INFORMATION ABOUT YOU

Please check ☑ of fill in the appropriate blanks below:

1. Your sex: ☐ Male ☐ Female ______(8)

2. Your age: ☐ 19-24 ☐ 25-29 ☐ 30-35 ☐ 36-39 ☐ 40-44 ☐ 45-50 ☐ 51-54 ☐ 55-59 ☐ 60-66 ☐ 66+ ___(9,10)

3. You live: ☐ alone ☐ communal ☐ with roommate(s) ☐ with family ☐ other, please specify ____________ ______(11)

4. Highest level of education completed: ___(12,13)

College or University	High School	Elementary
☐ 4+	☐ 4	☐ 8
☐ 4	☐ 3	☐ 7
☐ 3	☐ 2	☐ 6 & 5
☐ 2	☐ 1	☐ 4 & 3
☐ 1		☐ 2 & 1
☐ 1 Voc		☐ None

___(14,15)

5. Your present occupation (if you are a student, write your intended occupation; if retired, your past one; if unemployed, your usual one; if a homemaker, write that of your spouse), please describe as carefully as possible: ____________________ ___(16,17)

6. Were you born in Canada? ___(18,19)

☐ Yes - go to number 7

☐ No

Where were you born? ____________________

How long have you lived in Canada? ____________________

CONTINUE ON BACK OF PAGE

7, What is your regular exercise pattern? Check <u>one</u>.

☐ Sedentary: work and leisure. Under 5 flights of stairs or half a mile walking per day. ______(20)

☐ Low moderate: some activity work and leisure; between 5 and 15 flights of stairs or 0.5 to 1.5 miles walking or comparable daily exercise.

☐ High moderate: programmed exercise 4 times per week or 1.5 to 2 miles of walking or 15 to 20 flights of stairs or comparable daily exercise.

☐ Vigorous: greater than that of high moderate.

8. What is your height? ______ft. ______in. (or ______cm.) ________

What is your present weight? ______lbs. (or ______kg.) (21,22,23)

9. Do you have a history of previous weight change? ________

☐ Yes ☐ No - go to number 10 (24,25,26)

How has your weight changed? ☐ increased ☐ decreased

Why? Please specify ____________________________________ ______(27)

10. What is your smoking habit? Check <u>one</u>.

☐ Nonsmoker: never smoked or not smoked for 5 years

☐ Past smoker: not smoked for less than 5 years

☐ Cigarettes: 20 or more per day

☐ Cigarettes: 10-19 per day ______(28)

☐ Cigarettes: less than 10 per day

☐ Cigars or pipes ONLY: 5 or more per day or any amount inhaled

☐ Cigars or pipes ONLY: less than 5 per day <u>not inhaled</u>

11. Have <u>you</u> ever been treated for any of the following (check as many as apply): ______(29)

☐ High blood pressure ☐ Angina ______(30)

☐ High blood fat levels ☐ Diabetes ______(31)

☐ High blood cholesterol levels ☐ None of the above ______(32)

☐ Heart attack ______(33)

12. Has anyone in <u>your immediate family</u> (husband, wife, children or brother, sister, parent) ever had high blood pressure, stroke, high blood fat levels and/or heart attack? ______(34) ______(35)

☐ Yes ☐ No ☐ Do not know ______(36)

13. There are many sources from which one can obtain information about diet and heart disease. Check ☑ the source(s) from which you have obtained information on diet and heart disease (check as many as apply):

- 37 ☐ Doctor
- 38 ☐ Weight control group
- 39 ☐ Action B.C.
- 40 ☐ Exhibits or displays
- 41 ☐ Health food store
- 42 ☐ Family
- 43 ☐ Newspapers
- 44 ☐ Magazines
- 45 ☐ Grocery store
- 46 ☐ Books
- 47 ☐ Cookbooks
- 48 ☐ Friends
- 49 ☐ Television
- 50 ☐ Labels on foods
- 51 ☐ Nutritionist, dietitian
- 52 ☐ Home economist, home ec teacher
- 53 ☐ Nurse
- 54 ☐ YM/YWCA
- 55 ☐ Radio
- 56 ☐ Fitness instructor
- 57 ☐ Teacher
- 58 ☐ Drug store
- 59 ☐ Service club
- 60 ☐ None
- 61 ☐ Other, please specify below ______________________

PLEASE CHECK TO BE SURE ALL THE QUESTIONS HAVE BEEN ANSWERED

YOUR DIETARY PRACTICES

We are interested in determining your "usual" eating habits. To help you remember, three questions will be asked. Question 1: What did you eat yesterday? Think of yesterday, hour by hour, and record on the back of this page EVERYTHING you ate and drank from the time you got up in the morning until you went to bed at night and what you ate during the night. Mention meals, snacks, and drinks of all kinds taken at home, at work, and away from home. BE AS ACCURATE AS POSSIBLE. Record the KIND of food and AMOUNT that you ate. Use average household servings, sizes or portions and describe the food as completely as possible. Say if it differed from your "usual".

SAMPLE:

	Food type/preparation	Amount	Variation from "Usual"
MID DAY:	Fish, cod, fried in one tablespoon butter	4 oz. cooked	Usually have cheese sandwich and tea
	Pie, apple (2 crust)	1/6 of 9" pie	
	Beer, Highlite	2 - 12oz. bottles	

CONTINUE ON BACK OF PAGE

3

FOOD TYPE/PREPARATION	AMOUNT	VARIATION FROM "USUAL"
____(8) Did you eat in the MORNING? ☐ No	If yes, what?	
____(9) Did you eat in the LATE MORNING? ☐ No	If yes, what?	
____(10) Did you eat MID DAY? ☐ No	If yes, what?	
____(11) Did you eat in the AFTERNOON? ☐ No	If yes, what?	
____(12) Did you eat an EVENING MEAL? ☐ No	If yes, what?	
____(13) Did you eat after the EVENING MEAL? ☐ No	If yes, what?	

Question 2: What is your GENERAL EATING PATTERN, including supplements?
Please check [√] or fill in the appropriate blanks below.

A. Was your intake yesterday unusual in any way? ______(14)

[ ] Yes [ ] No - go to B

Why was your intake yesterday unusual? Please specify ____________________
____

In what way was your intake yesterday unusual? Please specify ____________
____

B. Are you taking any food or nutrient supplement? ______(15)

[ ] Yes [ ] No - go to C

When did you last take a food or nutrient supplement?

[ ] within the past three months ______(16,17)
[ ] not within the past three months

What kind? Check and write the name below: ______(18)

[ ] Vitamin ____________________
[ ] Mineral ____________________
[ ] Both ____________________
[ ] Food ____________________

On whose advice?

[ ] Doctor/nurse
[ ] Self
[ ] Other, please specify ____________________

C. Do you currently (within the past year) drink alcoholic beverages?

[ ] Yes [ ] No - go to D

What type of alcoholic beverage(s) do you drink? ______(19,20)

[ ] wine, 4 oz.
[ ] light beer (3.5 or less % alcohol), 12 oz.
[ ] ale/beer (5% or more alcohol), 12 oz.
[ ] spirits/hard liquor, 1-1½ oz.

How much? (The amount beside each type of drink above equals one drink) ______(21)

[ ] less than 2 drinks per week
[ ] 2 to 10 drinks per week
[ ] 10 to 25 drinks per week
[ ] over 25 drinks per week

CONTINUE ON BACK OF PAGE

D. Do you use salt?

			ALWAYS	FREQUENTLY	SOMETIMES	SELDOM	
1) at the table	☐ No	If yes, check:					______(22)
2) in cooking	☐ No	If yes, check:					______(23)
3) before tasting	☐ No	If yes, check:					______(24)
4) after tasting	☐ No	If yes, check:					______(25)

E. Do you have any food dislikes? ______(26)

☐ Yes ☐ No - go to F

What food dislike(s) do you have? Please specify ______________________

____

F. Do you eat the same on weekends as you do during the week? ______(27)

☐ Yes - go to G ☐ No

What is the difference between your weekday and weekend eating practices?

Please specify ______________________

____

G. Do you usually skip or omit a meal? ______(28)

☐ Yes ☐ No - go to H

Which meal(s)?

☐ Breakfast

☐ Lunch: Noon meal

☐ Dinner: evening meal

H. How long have you followed your present pattern of eating? ______(29)

☐ Less than one month

☐ A few months

☐ Over one year

Question 3: HOW FREQUENTLY do you eat each of the following common foods? Please indicate by checking ☑. This is only an estimate, but try to be as accurate as possible. Average serving sizes or portions are noted beside each food, to serve as a guide. (C. = cup; oz. = ounce; Tbsp. = tablespoon; Tsp. = teaspoon)

4

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily;more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month	
Cream, whole	2 Tbsp.					___(8)
Half & Half	1 Tbsp.					___(9)
Milk (all forms)	1C.(8oz.)					___(10)
Yoghurt, all types	6 oz.					___(11)
Cheese (all types)	1 oz.					___(12)
Cottage cheese	2 Tbsp.					___(13)
Meat/fish/poultry	3 oz.					___(14)
Ham	1 oz.					___(15)
Bacon, side/back	1 strip					___(16)
Organ meat (liver)	3 oz.					___(17)
Weiners (hot dogs)	2					___(18)
Dried beans/peas	1/2 C.					___(19)
Eggs, medium	1					___(20)
Grapefruit (½) orange	1					___(21)
as juice	1/2 C.					___(22)
Tomato and/or juice	1/2 C.					___(23)
Dried fruit	1/2 C.					___(24)
Other fruit/canned/ frozen/cooked/raw	1 or 1 C.					___(25)
Dk. green, yellow and/or orange vegetables	1/2 C.					___(26)
Other vegetables	1/2 C.					___(27)
Potatoes, mashed	1/2 C.					___(28)
baked/boiled	1					___(29)
French fried	1 C.					___(30)
Bread/roll/muffin/ biscuit	1					___(31)
Bkfst. cereal, dry	1 C.					___(32)
cooked	3/4 C.					___(33)
Spaghetti/macaroni/ rice/noodles	3/4 C.					___(34)

CONTINUE ON BACK OF PAGE

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily;more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month	
Salty crackers	2					____(35)
Plain crackers	2					____(36)
Butter	1 Tbsp.					____(37)
Peanut butter	1 Tbsp.					____(38)
Margarine, soft	1 Tbsp.					____(39)
Margarine, regular	1 Tbsp.					____(40)
Vegetable oils	1 Tbsp.					____(41)
Mayonnaise or Salad Dressing	1 Tbsp.					____(42)
Lard and/or shortening	1 Tbsp.					____(43)
Puddings	1 C.					____(44)
Pie/pastry	1/6of 9"					____(45)
Cookies, all types	1-2"size					____(46)
Cake/doughnut	1					____(47)
Candy, chocolate	3/4 oz.					____(48)
Candy, other	1 oz.					____(49)
Jam/jelly	2 Tbsp.					____(50)
Syrup/molasses	2 Tbsp.					____(51)
Ice cream	1/2 C.					____(52)
Soft drinks	8 oz.					____(53)
Potato chips/corn chips	10 about 2" in size					____(54)
Pizza, all kinds	1/8 of 14"					____(55)
Nuts/peanuts	1/2 C.					____(56)
Coffee, regular	1 C.					____(57)
Coffee, decaffeinated	1 C.					____(58)
Tea	1 C.					____(59)
Other						

If any food items that you usually eat have been omitted from the above table, please add and check the frequency.

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

APPENDIX B

PROCEDURES FOR NUTRITION PRACTICE INTERVIEWS

B.1. Preliminary Instructions

Interview scheduling:

Mr. X, I am ________________, calling about the diet and heart disease survey in which you participated at _____________ community centre.

You have been selected at random for an interview about your food habits. All answers will be treated confidentially and no names will be used in the analysis.

Have you completed and mailed the questionnaire? _____yes; _____no. (If no, ... do you intend to complete it? Would you like a second copy to replace the one lost, etc.)? If so, take the address. (If yes, ... I would like to come and talk with you about your food habits on (date). It should take about 30 minutes. Please give me the white file card that came with the questionnaire, at that time.

TIME: What time is most convenient?

PLACE: Shall I call at your home? Address? ___________________ or ______________? If he hesitates, at __________________________ community centre.)

Before saying good-bye, repeat "I shall see you at"

(i) time

(ii) place

(iii) day and date.

MEETING:

(i) Identify self (may show identification form).

(ii) Repeat the survey name and UBC.

(iii) Emphasize answers are confidential.

Then, proceed with the interview.

B.2. Anthropometric Measurements

For both height and weight measurement, the person should be in street clothing (light) and without shoes. Ask him to remove outer jacket, sweater, etc., if necessary.

Height measurement: taken with the individual in the position as follows:

1. Place board on floor at right angles to a wall without a baseboard, or a door.
2. Direct the person to stand on the board, as tall as possible, with head, shoulders, buttocks, and heels touching the wall. Arms should be straight at their sides.
3. Place the wooden plaque so that it makes a right angle with the wall and the crown of the person's head.
4. Hold the plaque against the wall and ask the person to come away from the wall, and to hold the plaque in position so you can measure the height.
5. With the tab of the metal tape, connect over the wooden plaque and lower the tape until the case rests flat on the board. Be sure the direction is straight down with no bend or ripple in the tape. Lock the tape in position.
6. Record the reading to the nearest 1/32" (adjustment will be made later, so note the side of the plaque used i.e., 3" or ¼").

Weight measurement:

1. Ask the person to stand straight; look ahead, not down at his feet; avoid moving and face the front of the scales.
2. Record the weight to the nearest pound or ½ kilogram.

B.3. Interview Schedule

Interview Schedule

Code No. ________

Date ______________

Sex ___________

Height ________________ Present weight _____________
no shoes

Your age:			
	19-24 ____	40-44 ____	60-66 ____
	25-29 ____	45-50 ____	60+ ____
	30-35 ____	51-54 ____	
	36-39 ____	55-59 ____	

Your present occupation: (Give as complete a description as possible. If a student: intended; retired: past; unemployed: usual one; homemaker: spouse's) _________________________

1. Your regular exercise pattern:
   (a) How would you describe your activity pattern at work and leisure?
   (b) Do you follow any regular program of exercise?
   (c) What about your walking habits - how many miles might you walk per day? Do you climb stairs regularly? How many flights?

   Sedentary: work and leisure. Under 5 flights of stairs or half milk walking per day. ____

   Low moderate: some activity work and leisure. Between 5 and 15 flights of stairs or 0.5 to 1.5 miles walking or comparable daily activity. ____

   High moderate: programmed exercise 4 times per week or 1.5 to 2 miles of walking or 15 to 20 flights of stairs or comparable daily activity. ____

   Vigorous: greater than high moderate ____

2. Your smoking habit: Check one. (Show card to help the participant remember the quantities).

   Nonsmoker; not smoked for 5 years or never smoked ____

   Past smoker; not smoked for less than 5 years ____

   Cigarettes; 20 or more per day ____

   Cigarettes; 10-19 per day ____

   Cigarettes; less than 10 per day ____

   Cigars/pipes ONLY; 5 or more per day or any amount inhaled ____

   Cigars/pipes ONLY; less than 5 per day not inhaled ____

3. Are you taking any food or nutrient supplement?

   ____ yes ____ no. Skip to question 4

   Within past 3 months ____

   Not within the past 3 months ____

What kind of food/nutrient supplement?

Vitamin ____________________

Mineral ____________________

Both ____________________

Food ____________________

Other (e.g. yeast/tonic), please specify: ____________________

Whose advice?

Doctor/nurse ________

Self ________

Other, specify: ________

4. Do you have a history of previous weight change?

No ____

Yes ____ increased? ____ decreased: ____

Why? Please specify: ____________________

5. Do you have any food dislikes?

No ____

Yes ____ What? ____________________

6. Do you have any food allergies?

No ____

Yes ____, please specify: ____________________

7. Do you avoid eating any particular food(s)?

No ____

Yes ____, please specify: ____________________

We are interested in determining your "usual" eating habits. Let us begin by looking at what you ate yesterday. Think of yesterday, hour by hour, from the time you got up in the morning until you went to bed at night and if you ate during the night. Then we will compare that day with your "usual" day.

Food Kind/Preparation	Amount	Variation from "usual"
Morning?		
Late Morning?		
Mid Day?		
Afternoon?		
Evening Meal?		
After Evening Meal?		

Comments: (including variations on weekends, eating out etc.):

1. a) Do you eat the same on weekends as you do during the week?

   ____ yes ____ no

   Difference? ______________________________

   b) Do you usually skip or omit a meal? ____ yes ____ no

   If yes, which one(s)? Breakfast ____
   Lunch (noon) ____
   Dinner (evening) ____

   c) How long have you followed your present pattern of eating?

   Less than one week ____ Over one year ____
   A few months ____

   d) Do you currently (within the past year) drink alcoholic beverages?

   ____ yes (show card) ____ no - go to (e).

   What type of alcoholic beverage(s) do you drink?

   ____ wine, 4 oz.
   ____ light beer (3.5 or less % alcohol), 12 oz.
   ____ ale/beer, 12 oz.
   ____ spirits/hard liquor, 1-1½ oz.

   How much? (The amount beside each type of drink above equals one drink)

   ____ less than 2 drinks per week
   ____ 2 to 10 drinks per week
   ____ 10 to 25 drinks per week
   ____ over 25 drinks per week

   e) Do you use salt?

			ALWAYS	FREQUENTLY	SOMETIMES	SELDOM
1) at the table	No ____	If yes, how often?				
2) in cooking	No ____	If yes, how often?				
3) before tasting	No ____	If yes, how often?				
4) after tasting	No ____	If yes, how often?				

I would now like to find out how frequently you eat each of the following foods. (Show card)

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily;more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month
Cream, whole	2 Tbsp.				
Half & Half	1 Tbsp.				
Milk (all forms)	1C.(8oz.)				
Yogurt, all types	6 oz.				
Cheese (all types)	1 oz.				
Cottage cheese	2 Tbsp.				
Meat/fish/poultry	3 oz.				
Ham	1 oz.				
Bacon, side/back	1 strip				
Organ meat (liver)	3 oz.				
Weiners (hot dogs)	2				
Dried beans/peas	½ C.				
Eggs, medium	1				
Grapefruit (½) orange	1				
as juice	½ C.				
Tomato and/or juice	½ C.				
Dried fruit	½ C.				
Other fruit/canned/ frozen/cooked/raw	1 or 1C.				
Dk. green, yellow and/or orange vegetables	½ C.				
Other vegetables	½ C.				
Potatoes, mashed	½ C.				
baked/boiled	1				
French fried	1 C.				
Bread/roll/muffin/ biscuit	1				
Bkfst.cereal, dry	1 C.				
cooked	3/4 C.				
Spaghetti/macaroni/ rice/noodles	3/4 C.				

	AVERAGE PORTION	ALWAYS at least one/day	FREQUENTLY not daily;more than one/week	SOMETIMES less than once/week	SELDOM/NEVER less than once/month
Salty crackers	2				
Plain crackers	2				
Butter	1 Tbsp.				
Peanut butter	1 Tbsp.				
Margarine, soft	1 Tbsp.				
Margarine, regular	1 Tbsp.				
Vegetable oils	1 Tbsp.				
Mayonnaise or Salad Dressing	1 Tbsp.				
Lard and/or shortening	1 Tbsp.				
Puddings	1 C.				
Pie/pastry	1/6of 9"				
Cookies, all types	1-2"size				
Cake/doughnut	1				
Candy, chocolate	3/4 oz.				
Candy, other	1 oz.				
Jam/jelly	2 Tbsp.				
Syrup/molasses	2 Tbsp.				
Ice Cream	½ C.				
Soft drinks	8 oz.				
Potato chips/corn chips	10 about 2"in size				
Pizza, all kinds	1/8of14"				
Nuts/peanuts	1/2 C.				
Coffee, regular	1 C.				
Coffee, decaffeinated	1 C.				
Tea	1 C.				
*Other					

*Are there any foods that I have missed but which you eat regularly?

As the interviewer, what is your impression of this interview?

Acceptable ____

Not acceptable ____

Reason? ____

How long did this interview take?

30-45 minutes _____

45-60 minutes _____

Longer, please specify: ________________________________

Thank you very much for your time. Your cooperation is most appreciated.
(or similar thank you).

APPENDIX C

COMMUNITY CENTRE CORRESPONDENCE

C.1. Cover Letter to Recreation Coordinator

C.2. Authorization Form for Community Centre Participation

C.3. Consent Form for the Participants

THE UNIVERSITY OF BRITISH COLUMBIA
2075 WESBROOK MALL
VANCOUVER, B.C., CANADA
V6T 1W5

DIVISION OF HUMAN NUTRITION
SCHOOL OF HOME ECONOMICS

April 19, 1979

Dear

As recreation coordinator of Community Centre, we are enlisting your cooperation in a survey which we plan to conduct during May among adult members of Vancouver Community Centres. The survey is endorsed by the B.C. Heart Foundation andiis designed to investigate knowledge, attitudes, and practices of adults with respect to diet and heart disease. This information will provide a valuable basis for health educators planning programs for such agencies as the B.C. Heart Foundation and the Ministry of Health.

This past year, a questionnaire was developed and pretested through the cooperation of the Marpole-Oakridge Community Centre. We are now asking for your permission to approach members of your community centre registered for specific programs this Spring. If you are able to help us, please sign the enclosed authorization form and return to me at your earliest convenience in the envelope provided. Should you be unable to comply, we would appreciate your immediate return of the form indicating your inability to participate.

I hope this explanation is sufficient to give you an appreciation of the research we wish to conduct. Should you have questions concerning this request, I shall be pleased to answer them when I telephone you on April 25. A copy of the cover letter used for the Marpole-Oakridge Community Centre Survey and a sample consent form are enclosed for your information. A similar letter and consent form would accompany the questionnaire to be distributed to your community centre members.

Yours truly,

Doctoral Candidate
Division of Human Nutrition
School of Home Economics

Enclosures

THE UNIVERSITY OF BRITISH COLUMBIA
2075 WESBROOK MALL
VANCOUVER, B.C., CANADA
V6T 1W5

DIVISION OF HUMAN NUTRITION
SCHOOL OF HOME ECONOMICS

TO COMMUNITY CENTRE COORDINATOR:

IF YOU AGREE TO PARTICIPATE IN THE MAY SURVEY:

1. YOU WILL BE ASKED TO HELP COMPILE A LIST OF NAMES OF ADULT MEMBERS WHO PARTICIPATE IN CLASSES ON ONE SPECIFIC DAY OF THE WEEK. FORTY NAMES WILL BE SELECTED AT RANDOM FROM THE LIST.

2. YOU WILL BE ASKED TO ASSIST THE RESEARCHER IN SOLICITING VOLUNTEERS FROM THE FORTY SELECTED MEMBERS.

****

I agree to assist Ann Sullivan in selecting forty subjects from our Community Centre Membership to participate in the Diet and Heart Disease Survey and further authorize her to contact those members in the programs for which they are registered. I understand that all information will be held in confidence and names will not be included in the data analysis.

Signature: ____________________

Date: ________________________

****

Are you unable to authorize this May survey request? ____ YES

Signature: ____________________

Date: ________________________

Do you wish to meet the survey organizer for further information:

___ YES ___ NO. If yes, you will be contacted as soon as possible for an appointment.

THE PURPOSE OF THIS SURVEY IS TO GAIN A BETTER UNDERSTANDING OF FACTORS RELATED TO DIET AND HEART DISEASE AMONG ADULTS IN THE GREATER VANCOUVER AREA. IF YOU AGREE TO PARTICIPATE IN THIS SURVEY:

1. YOU WILL BE ASKED TO COMPLETE A QUESTIONNAIRE INCLUDING INFORMATION RELATED TO YOUR DIET, YOUR BELIEFS ABOUT THE ROLE THAT DIET PLAYS IN HEART DISEASE, AND SOME INFORMATION ABOUT YOU AND YOUR FAMILY. THE QUESTIONNAIRE WILL THEN BE RETURNED BY MAIL IN THE STAMPED, ADDRESSED ENVELOPE PROVIDED.

2. YOU MAY BE ASKED TO TAKE PART IN ONE INTERVIEW CONCERNING YOUR DIETARY PRACTICES AND RELATED INFORMATION.

3. ALL INFORMATION WILL BE HELD IN CONFIDENCE AND NAMES WILL NOT BE USED IN THE DATA ANALYSIS.

4. THE RESULTS OF THE STUDY WILL BE ANALYZED AND THE KNOWLEDGE OBTAINED USED TO DESIGN EFFECTIVE PUBLIC EDUCATION PROGRAMS ON DIET AND HEART DISEASE.

****

I, ______________________ .have had the survey explained to me
(PLEASE PRINT)
and agree to participate. I understand that I may decline to answer or I may withdraw from the study at any time.

Signature: ______________________

Date: ______________________

This survey has been approved and authorized by the participating Community Centres. Your participation or lack thereof in the survey will in no way influence your membership in the Community Centre.

APPENDIX D

SCORING PROCEDURE FOR THE PRACTICE INSTRUMENT

D.1. Procedure

D.2. Coding Instructions for Alcohol

D.3. Coding Instructions for Unspecified Items and/or Quantities

D.1. Procedure

A. Compare the recorded intake (yesterday's 24-hour recall) with the 'variation from usual' comments (question 1 of the instrument). Make adjustments as necessary.

B. Check the responses to question 2: general eating pattern. If intake for yesterday was unusual, check the comments against the 'variation from usual' and make adjustments as necessary.

C. Check the alcohol consumption pattern for type and amount. Add the quantities stipulated by the pre-established chart (see Appendix D.2.).

D. Compare the foods from the 24-hour recall against the frequency checklist. For those items consumed at least once per day, but not included in the 24-hour recall, add one portion unless otherwise indicated; if an item is checked 'frequently', add $\frac{1}{2}$ portion.

E. Together, items A to D provide a list of specific foods with the amount usually consumed. This gives an estimate of the usual intake for the individual.

F. The specific foods are then coded (see coding instructions for unspecified amounts, Appendix D.3.), according to type and serving size, into the food record booklets for later conversion by computer to nutrient values formed on the basis of composition tables.

D.2. Coding Instructions for Alcohol

Drinks per week	Types	Additions to the 'usual intake'
less than 2	all 4	2 oz beer, ½ oz wine
	wine	1.3 oz wine
	beer	4 oz beer
	spirits	½ oz liquor
2 to 10	all 4	1 oz wine, 6 oz beer, .4 oz spirits
	wine	4 oz wine
	beer	12 oz beer
	spirits	1 oz liquor
10 to 25	all 4	2.5 oz wine, 14 oz beer, .9 oz spirits
	wine	10 oz wine
	beer	30 oz beer
	spirits	3 oz liquor
more than 25	all 4	3.5 oz wine, 20 oz beer, 1 oz liquor
	wine	14 oz wine
	beer	42 oz beer
	spirits	4.5 oz liquor

D.3. Coding Instructions for Unspecified Items and/or Quantities

A. Cereal, ready to eat: code as corn flakes, Kelloggs.

B. Cereal, amount of milk unspecified: code as $\frac{1}{4}$ C per 1 C cereal.

C. Amount of butter or margarine added to pancakes, waffle, French toast: 1 tsp.

D. Amount of butter or margarine added (or cooked in) to vegetables, unknown: code 1 tsp per 1 C vegetables.

E. Amount of dressings on salad, unknown: code 1 tbsp per C of salad.

F. Amount of butter or margarine spread on bread or saltine: code 1 tsp and $\frac{1}{2}$ tsp, respectively.

G. Grilled sandwiches: code as regular sandwich with 1 tsp margarine per slice of bread.

H. Raw fruit, unknown size: code as medium.

I. Breaded meat/fish/poultry: code 1 tbsp bread crumbs per 4 oz portion.

J. Egg size unknown: code large.

K. Peanut butter, amount unspecified: code 1 tbsp per sandwich (2 slices).

L. Cheese omelet, cheese amount unspecified: code $1\frac{1}{2}$ tbsp cheese per egg used.

M. Ice cream sundae, amount unknown: code $\frac{1}{2}$ C ice cream, 2 tbsp chocolate syrup, if chocolate; 2 tbsp preserves, etc.

N. Milk, amount not specified: code 1 C and whole.

O. Cocoa made with evaporated milk: $\frac{1}{4}$ C evaporated milk per cup.

P. Olives: code as green olives.

Q. Vegetables eaten away from home: assume 1 tsp fat per C is added.

R. Sugar on cereal, unknown: code 1 tsp per C, dry or 1 tsp per $1\frac{1}{2}$ C, cooked.

S. Syrup amount unknown: code 1 tbsp per pancake, waffle, or piece of French toast.

T. Whipped topping on dessert: code as 1 tbsp topping per ½ C dessert.

U. Cheese, unspecified: code cheddar.

V. Cookies, unspecified: code sandwich-type.

W. Cream, unknown amount: code 1 tsp per 6 oz coffee; 1 and 1/3 tsp per 8 oz C.

APPENDIX E

MEAN AND STANDARD DEVIATION FOR EACH ATTITUDE AND KNOWLEDGE SUBTEST AND PRACTICE SCORE BY CENTRE, SEPARATELY AND COMBINED

E.1. Attitude and Knowledge Subtest Scores

E.2. Practice Ratio Scores

E.1. Mean and Standard Deviation of Attitude and Knowledge Subtests and Total Tests by Community Centre, Separately and Combined

Centre		A:GEN ROLE	A:MANAGE	A:TOTAL	K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
1 (30)	$\bar{X}$	42.73	38.30	81.03	9.20	10.90	9.37	29.47
	S.D.	3.57	3.60	6.74	1.56	2.63	3.22	5.72
2 (28)	$\bar{X}$	41.14	37.57	78.71	8.75	9.79	9.46	28.00
	S.D.	4.15	3.44	6.92	1.60	3.25	2.73	5.31
3 (27)	$\bar{X}$	42.63	37.74	80.37	8.44	9.37	8.78	26.59
	S.D.	5.29	3.10	7.86	1.91	2.65	2.98	6.23
4 (16)	$\bar{X}$	40.12	36.94	77.06	8.06	8.25	7.75	24.06
	S.D.	3.81	3.94	6.98	1.95	2.35	3.38	6.57
5 (29)	$\bar{X}$	40.72	36.83	77.55	7.52	9.52	8.69	25.72
	S.D.	4.56	3.32	7.20	2.05	3.55	3.64	7.68
6 (35)	$\bar{X}$	40.57	36.54	77.11	7.97	9.26	7.71	24.94
	S.D.	5.40	5.12	9.94	2.32	2.78	3.52	7.21
7 (18)	$\bar{X}$	40.67	37.44	78.11	8.72	9.22	7.89	25.83
	S.D.	5.28	3.87	8.66	2.22	2.98	3.38	6.62
8 (27)	$\bar{X}$	41.33	37.52	78.85	8.26	9.52	8.07	25.85
	S.D.	3.68	3.97	7.16	1.83	3.67	2.67	7.12
9 (17)	$\bar{X}$	41.82	36.06	77.88	8.59	9.59	9.12	27.29
	S.D.	3.81	3.88	6.80	1.73	4.43	3.37	8.27

E.1. Mean and Standard Deviation of Attitude and Knowledge Subtests and Total Tests by Community Centre, Separately and Combined (continued)

Centre		A:GEN ROLE	A:MANAGE	A:TOTAL	K:AFFECTS	K:COMP	K:FACTS	K:TOTAL
10 (25)	$\bar{X}$	42.16	37.68	79.84	8.32	10.24	9.40	27.96
	S.D.	4.28	4.68	7.96	2.46	3.94	3.71	8.47
11 (29)	$\bar{X}$	43.69	38.59	82.28	8.97	10.17	9.55	28.69
	S.D.	4.16	4.44	8.01	2.01	2.83	2.40	5.63
Combined (281)	$\bar{X}$	41.67	37.43	79.10	8.43	9.69	8.74	26.86
	S.D.	4.49	4.01	7.84	2.01	3.21	3.21	6.88

E.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Community Centre, Separately and Combined

Centre	(n)		KCAL	PROT	CA	FE	VA	THI
1	(30)	$\bar{X}$	.73	.95	.84	.72	.89	.83
		S.D.	.19	.11	.20	.22	.18	.21
2	(28)	$\bar{X}$	.79	.97	.78	.70	.82	.79
		S.D.	.16	.08	.22	.20	.24	.21
3	(27)	$\bar{X}$	.71	.98	.78	.71	.85	.80
		S.D.	.18	.06	.22	.19	.20	.21
4	(16)	$\bar{X}$	.67	.97	.62	.67	.86	.74
		S.D.	.17	.07	.20	.20	.26	.23
5	(29)	$\bar{X}$	.68	.95	.76	.73	.89	.72
		S.D.	.15	.14	.22	.19	.21	.20
6	(35)	$\bar{X}$	.74	.99	.74	.75	.81	.75
		S.D.	.17	.03	.23	.24	.25	.19
7	(18)	$\bar{X}$	.71	.96	.74	.75	.70	.68
		S.D.	.20	.10	.25	.23	.28	.25
8	(27)	$\bar{X}$	.66	.95	.71	.80	.82	.73
		S.D.	.19	.12	.25	.25	.23	.21
9	(17)	$\bar{X}$	.64	.96	.72	.64	.85	.69
		S.D.	.16	.09	.23	.22	.24	.18
10	(25)	$\bar{X}$	.71	.98	.83	.69	.84	.77
		S.D.	.18	.05	.20	.20	.22	.19
11	(29)	$\bar{X}$	.59	.93	.73	.64	.76	.64
		S.D.	.18	.14	.26	.24	.28	.22
Combined	(281)	$\bar{X}$	.70	.96	.76	.71	.83	.74
		S.D.	.18	.10	.23	.22	.24	.21

E.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Community Centre, Separately and Combined

Centre	(n)		RIBO	NIA	VC	FAT	CHO
1	(30)	$\overline{X}$	.94	.90	.96	.85	.59
		S.D.	.14	.15	.14	.14	.11
2	(28)	$\overline{X}$	.91	.88	.93	.87	.65
		S.D.	.16	.16	.16	.12	.11
3	(27)	$\overline{X}$	.88	.92	.99	.78	.64
		S.D.	.15	.14	.03	.14	.14
4	(16)	$\overline{X}$	.76	.84	.97	.82	.63
		S.D.	.18	.19	.12	.13	.11
5	(29)	$\overline{X}$	.83	.80	.94	.80	.69
		S.D.	.19	.20	.14	.16	.13
6	(35)	$\overline{X}$	.80	.91	.98	.82	.66
		S.D.	.19	.14	.06	.16	.17
7	(18)	$\overline{X}$	.82	.86	.89	.86	.61
		S.D.	.21	.22	.20	.09	.10
8	(27)	$\overline{X}$	.85	.85	.94	.86	.60
		S.D.	.20	.18	.18	.14	.17
9	(17)	$\overline{X}$	.81	.81	.96	.80	.66
		S.D.	.19	.19	.16	.14	.10
10	(25)	$\overline{X}$	.88	.90	.98	.84	.65
		S.D.	.14	.14	.07	.14	.16
11	(29)	$\overline{X}$	.82	.80	.91	.81	.62
		S.D.	.22	.22	.20	.14	.11
Combined	(281)	$\overline{X}$	.85	.86	.95	.83	.64
		S.D.	.18	.18	.14	.14	.14

APPENDIX F

ITEM ANALYSIS DATA FOR ATTITUDE SCALE

Summary Item Statistics for Attitude Subtests (n=281)

Subtest	Item	Option	Wt	P	Mean	S.D.	Correlation ST	Correlation TT
A:GEN ROLE[a]	1	1	5	31.7	3.99	.97	.38	.50
		2	4	48.8				
		3	3	7.1				
		4	2	11.4				
		5	1	1.1				
	2	1	5	49.8	4.21	1.03	.27	.35
		2	4	35.6				
		3	3	3.2				
		4	2	8.9				
		5	1	2.5				
	3	1	5	30.6	4.02	.89	.51	.60
		2	4	49.5				
		3	3	12.1				
		4	2	6.8				
		5	1	1.1				
	4	1	5	40.6	4.21	.88	.43	.51
		2	4	48.0				
		3	3	5.0				
		4	2	5.0				
		5	1	1.1				
	5	1	1	2.1	4.15	.85	.48	.59
		2	2	3.2				
		3	3	7.5				
		4	4	51.6				
		5	5	35.6				
	6	1	5	48.8	4.42	.66	.46	.53
		2	4	46.6				
		3	3	3.2				
		4	2	.7				
		5	1	.7				
	7	1	1	1.4	3.72	.89	.16	.38
		2	2	10.7				
		3	3	16.7				
		4	4	56.9				
		5	5	14.2				
	8	1	5	47.0	4.37	.74	.42	.50
		2	4	48.0				
		3	3	1.1				
		4	2	2.8				
		5	1	1.1				

Summary Item Statistics for Attitude Subtests (continued)

Subtest	Item	Option	Wt	P	Mean	S.D.	Correlation ST	Correlation TT
A:GEN ROLE[a]	9	1	1	.4	4.16	.70	.48	.61
		2	2	1.8				
		3	3	7.1				
		4	4	61.6				
		5	5	28.8				
	10	1	1	.0	4.42	.62	.41	.58
		2	2	1.8				
		3	3	1.4				
		4	4	49.8				
		5	5	47.0				
A:MANAGE[b]	1	1	1	3.6	3.64	1.12	.35	.45
		2	2	15.7				
		3	3	19.2				
		4	4	36.7				
		5	5	24.9				
	2	1	5	60.1	4.41	.97	.16	.45
		2	4	31.7				
		3	3	1.8				
		4	2	2.8				
		5	1	2.8				
	3	1	1	1.8	4.55	.72	.29	.38
		2	2	.7				
		3	3	.7				
		4	4	34.5				
		5	5	62.3				
	4	1	1	1.1	4.35	.62	.38	.51
		2	2	.0				
		3	3	1.4				
		4	4	58.0				
		5	5	39.5				
	5	1	5	43.4	4.26	.86	.37	.52
		2	4	47.3				
		3	3	3.2				
		4	2	4.3				
		5	1	1.8				
	6	1	1	.7	3.89	.83	.37	.44
		2	2	3.2				
		3	3	22.8				
		4	4	50.9				
		5	5	22.1				

Summary Item Statistics for Attitude Subtests (continued)

Subtest	Item	Option	Wt	P	Mean	S.D.	Correlation ST	Correlation TT
A:MANAGE[b]	7	1	1	.4	4.31	.63	.48	.56
		2	2	1.4				
		3	3	2.5				
		4	4	58.4				
		5	5	37.4				
	8	1	5	22.1	3.79	.99	.34	.50
		2	4	50.5				
		3	3	14.2				
		4	2	10.7				
		5	1	2.5				
	9	1	1	.4	4.23	.77	.51	.60
		2	2	3.2				
		3	3	5.3				
		4	4	53.4				
		5	5	37.4				

[a] Items 1 to 10 are numbered in the questionnaire as 2,3,5,6,7, 10,11,12,15 and 18, respectively.

[b] Items 1 to 9 are numbered in the questionnaire as 1,4,8,9,13, 14, 16, 17, and 19, respectively.

APPENDIX G

KNOWLEDGE SCORING SYSTEM

G.1. Summary Test Statistics for Knowledge Scale using 5 to 1; 1,0; and 1,1,0 Scoring Systems

No. items	K:AFFECTS 8	K:COMP 10	K:FACTS 9	K:TOTAL 27
5 to 1 System				
Mean (%)	29.11 (72.78)	38.03 (76.10)	33.53 (74.51)	100.67 (74.57)
S.D. (%)	2.57 (6.42)	3.70 (7.40)	4.20 (9.33)	7.62 (5.64)
Hoyt's r	.06	.43	.47	.52[a]
S.E.	2.33	2.66	2.87	4.77
1,0 System				
Mean (%)	3.32 (41.50)	3.67 (36.70)	3.36 (37.33)	10.35 (38.33)
S.D. (%)	1.59 (19.88)	1.95 (19.50)	1.91 (21.22)	4.62 (17.11)
Hoyt's r	.59	.65	.66	.80[a]
S.E.	.95	1.09	1.06	1.88
1,1,0 System				
Mean (%)	5.11 (63.88)	6.02 (60.20)	5.38 (59.78)	16.51 (61.15)
S.D. (%)	.82 (10.25)	1.58 (15.80)	1.62 (18.00)	2.89 (10.70)
Hoyt's r	.04	.45	.47	.46[a]
S.E.	.75	1.11	1.11	1.83

[a] Cronbach's composite alpha (Cronbach, 1951).

G.2. Item Analysis Data for 2,1,0 Scoring System

Summary Item Statistics for Knowledge Subtests (n=281)

Subtest	Item	Option	Wt	P	Coefficients of correlation PB-ST	B-ST	Means ST	TT
K:AFFECTS[a]	1	1	0	59.8	.27	.34	8.87	28.46
		2	0	25.6	-.27	-.36	7.51	24.50
		3	0	3.6	-.12	-.28	7.20	20.90
		4	1	8.2	-.04	-.07	8.17	25.43
		5	2	2.8	.11	.29	9.75	26.00
	2	1	0	.7	-.02	-.08	8.00	32.00
		2	0	3.2	-.16	-.39	6.67	22.11
		3	0	6.8	-.28	-.54	6.32	22.11
		4	1	39.1	-.43	-.55	7.35	23.93
		5	2	50.2	.62	.78	9.67	30.02
	3	1	2	1.1	.22	.80	12.67	37.33
		2	1	6.4	.07	.13	8.94	28.06
		3	0	22.4	-.14	-.19	7.92	24.48
		4	0	44.8	-.10	-.13	8.21	26.84
		5	0	25.3	.16	.21	8.97	28.27
	4	1	2	9.3	.38	.66	10.81	32.65
		2	1	14.6	.15	.23	9.17	27.83
		3	0	24.9	-.37	-.50	7.14	22.66
		4	0	35.6	-.04	-.05	8.33	27.22
		5	0	15.3	.05	.08	8.67	28.40
	5	1	2	79.7	.51	.72	8.95	28.41
		2	1	15.7	-.39	-.60	6.59	20.89
		3	0	1.4	-.16	-.52	5.75	22.50
		4	0	1.4	-.16	-.52	5.75	16.00
		5	0	1.8	-.18	-.53	5.80	22.40
	6	1	2	70.1	.48	.63	9.06	29.16
		2	1	24.6	-.36	-.49	7.17	21.87
		3	0	1.1	-.18	-.65	5.00	16.00
		4	0	3.6	-.25	-.60	5.80	19.80
		5	0	.7	.00	.01	8.50	24.00
	7	1	0	2.1	-.17	-.47	6.17	24.83
		2	0	1.8	-.04	-.13	7.80	27.80
		3	0	.4	-.01	-.07	8.00	38.00
		4	1	32.4	-.55	-.71	6.85	21.82
		5	2	63.3	.59	.76	9.34	29.42

Summary Item Statistics for Knowledge Subtests (continued)

					Coefficients of correlation		Means	
Subtest	Item	Option	Wt	P	PB-ST	B-ST	ST	TT
K:AFFECTS[a]	8	1	0	.7	-.06	-.26	7.00	24.50
		2	0	1.8	-.19	-.57	5.60	21.40
		3	0	4.3	-.21	-.47	6.42	21.42
		4	1	37.4	-.47	-.60	7.21	23.59
		5	2	55.9	.60	.76	9.51	29.67
K:COMP[b]	1	1	0	.7	-.01	-.02	9.50	28.50
		2	0	.7	-.10	-.41	6.00	23.00
		3	0	1.4	-.19	-.61	4.75	18.00
		4	1	6.8	-.25	-.48	6.74	20.42
		5	2	90.0	.33	.53	10.04	27.56
	2	1	0	3.6	-.09	-.21	8.20	25.20
		2	0	12.1	-.12	-.19	8.68	24.68
		3	0	32.7	-.36	-.46	8.05	24.20
		4	1	29.2	.01	.01	9.73	26.62
		5	2	22.1	.53	.74	12.87	32.74
	3	1	0	.0	.00	.00	.00	.00
		2	0	1.4	.02	.07	10.25	35.00
		3	0	75.8	-.44	-.60	8.89	25.64
		4	1	16.7	.26	.38	11.53	28.83
		5	2	6.0	.38	.75	14.47	34.82
	4	1	2	19.6	.48	.70	12.84	32.84
		2	1	29.2	.04	.06	9.91	26.73
		3	0	30.2	-.45	-.59	7.49	22.71
		4	0	19.2	-.04	-.06	9.43	27.06
		5	0	1.8	.08	.24	11.60	31.80
	5	1	2	6.4	.38	.75	14.39	34.56
		2	1	10.0	.07	.12	10.36	27.36
		3	0	42.7	-.23	-.29	8.85	25.37
		4	0	34.5	-.03	-.04	9.57	26.64
		5	0	6.4	.04	.08	10.22	29.56
	6	1	0	9.3	.16	.28	11.27	29.50
		2	0	15.3	-.01	-.01	9.63	27.79
		3	0	54.4	-.40	-.51	8.50	24.73
		4	1	14.9	.19	.29	11.14	29.07
		5	2	5.7	.40	.81	14.88	34.69
	7	1	0	.7	-.03	-.13	8.50	25.00
		2	0	2.1	-.09	-.24	7.83	22.83
		3	0	6.4	-.33	-.65	5.61	19.28
		4	1	43.1	-.36	-.46	8.35	23.88
		5	2	47.3	.56	.71	11.59	30.89

Summary Item Statistics for Knowledge Subtests (continued)

Subtest	Item	Option	Wt	P	Coefficients of correlation PB-ST	B-ST	Means ST	TT
K:COMP[b]	8	1	2	47.7	.45	.57	11.21	29.89
		2	1	34.2	-.22	-.28	8.73	24.64
		3	0	5.3	-.23	-.47	6.60	20.20
		4	0	9.6	-.26	-.45	7.15	23.26
		5	0	3.2	.02	.06	10.11	27.44
	9	1	0	1.8	-.05	-.16	8.40	25.40
		2	0	3.6	-.08	-.18	8.40	25.40
		3	0	8.9	-.36	-.64	6.00	20.44
		4	1	27.8	-.37	-.49	7.78	22.95
		5	2	57.7	.60	.75	11.33	29.96
	10	1	2	64.8	.46	.59	10.78	28.97
		2	1	22.8	-.26	-.36	8.17	23.75
		3	0	5.7	-.25	-.52	6.38	20.69
		4	0	6.0	-.20	-.40	7.18	22.82
		5	0	.7	-.07	-.30	7.00	18.50
K:FACTS[c]	1	1	2	15.7	.49	.74	12.36	32.75
		2	1	18.1	.23	.34	10.33	28.90
		3	0	39.9	-.38	-.48	7.26	24.40
		4	0	21.0	-.15	-.21	7.83	25.42
		5	0	5.3	-.10	-.22	7.33	26.67
	2	1	0	5.0	-.12	-.26	7.00	26.14
		2	0	3.6	-.12	-.29	6.70	22.20
		3	0	2.8	-.23	-.60	4.38	17.00
		4	1	25.3	-.29	-.39	7.15	23.38
		5	2	63.3	.44	.57	9.82	29.01
	3	1	2	5.0	.30	.64	13.00	35.93
		2	1	12.8	.14	.22	9.89	28.25
		3	0	29.2	-.25	-.34	7.48	23.15
		4	0	36.7	-.05	-.06	8.54	26.87
		5	0	16.4	.07	.10	9.24	29.61
	4	1	0	10.7	-.16	-.27	7.23	25.53
		2	0	5.0	-.21	-.44	5.86	20.43
		3	0	1.1	-.01	-.05	8.33	24.33
		4	1	21.4	-.33	-.47	6.68	21.72
		5	2	61.6	.49	.62	9.98	29.45
	5	1	2	42.3	.53	.66	10.71	30.77
		2	1	30.6	-.17	-.22	7.94	24.45
		3	0	10.7	-.35	-.58	5.53	20.00
		4	0	13.9	-.21	-.33	7.08	25.31
		5	0	2.5	-.03	-.08	8.14	28.00

Summary Item Statistics for Knowledge Subtests (continued)

Subtest	Item	Option	Wt	P	Coefficients of correlation PB-ST	B-ST	Means ST	TT
K:FACTS[c]	6	1	2	9.6	.33	.57	12.00	32.26
		2	1	16.4	.11	.17	9.57	27.15
		3	0	47.0	-.18	-.22	8.14	25.37
		4	0	20.3	-.09	-.13	8.14	26.61
		5	0	6.8	-.05	-.10	8.11	29.58
	7	1	2	30.2	.60	.79	11.65	32.09
		2	1	35.6	-.13	-.16	8.20	25.70
		3	0	30.2	-.42	-.55	6.71	23.16
		4	0	3.2	-.14	-.34	6.33	23.67
		5	0	.4	.02	.13	10.00	36.00
	8	1	2	25.3	.61	.83	12.11	32.92
		2	1	31.0	.04	.05	8.91	27.20
		3	0	33.5	-.51	-.66	6.43	22.48
		4	0	8.5	-.09	-.17	7.75	25.67
		5	0	1.1	-.09	-.32	6.00	23.33
	9	1	0	1.8	-.10	-.30	6.40	26.20
		2	0	2.8	-.19	-.48	5.25	17.38
		3	0	.4	-.05	-.29	6.00	13.00
		4	1	11.7	-.36	-.59	5.58	19.76
		5	2	82.6	.45	.65	9.40	28.34

[a] Items 1 to 8 are numbered in the questionnaire as 22,24,26,28, 29,36,39,45.

[b] Items 1 to 10 are numbered in the questionnaire as 20,23,30,33, 34,35,41,43,44,46.

[c] Items 1 to 9 are numbered in the questionnaire as 21,25,27,31, 32,37,38,40,42.

APPENDIX H

SUMMARY OF DISCRIMINANT ANALYSIS

H.1. Formation of Practice Groups

Identification of groups based on individual's nutrient profile was carried out using logical analysis. Because all nutrient excesses were not of nutritional concern in the present study, a ratio of 1.0 for the nutrients protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, vitamin C, and carbohydrate was judged to be within acceptable limits. For the variable fat and kilocalorie, a ratio score of 1.0 was considered to be of nutritional concern and unacceptable. Using these two restrictions, the groups were formed by examining each nutrient profile and determining specific nutrient deficiencies and excesses of fat and kilocalories. Four unique groups resulted characterized by distinctive unacceptable practice and one group with acceptable practice. The practice groups were defined as:

1. Deficient intake: one or more nutrients less than 67% of recommended values (n=115).

2. Excess fat intake: cases with fat intake greater than 133% of CVD guidelines but all other nutrients within acceptable limits (n=8).

3. Excess kilocalorie intake: cases with kilocalorie intake greater than 133% of CVD guidelines but all other nutrients within acceptable limits (n=9).

4. Adequate intake: cases whose intake for all 11 nutrients was within acceptable limits (n=113).

5. Multipractice problem: cases characterized by overlapping of 1 or 2 or 3 (n=36).

To substantiate this logical partitioning, analytical analysis using multidimensional scalogram analysis (Lingoes, 1966) program computed and plotted Gutmann-Lingoes outer-point scalogram analysis coordinates for two dimensions. The resulting plot suggested little difference among the majority of profiles but did assign the same cases to groups previously established by logical analysis.

To test the predictive ability of the attitude and knowledge subtest scores, the fifth group (multipractice problem) was eliminated since the groups must be formed so that any individual who belongs simultaneously to more than one group is removed (Tatsuoka, 1970). Both logical and analytical analysis identified the multipractice problem group which was eliminated from the subsequent discriminant analysis.

H.2. Results and Discussion

To test whether attitude and knowledge test scores could predict the four practice categories, multiple discriminant analysis was performed with practice, the grouping variable, as dependent or criterion variable and attitude and knowledge scores as the independent or predictor variables.

Discriminant analysis was performed using the five subtests (A:GEN ROLE, A:MANAGE, K:AFFECTS, K:COMP, K:FACTS) as independent variables and the four levels of practice as dependent variables. For the analysis, values of 1.0 for maximum F to enter and maximum F to remove were used. The results (Table 31) suggested that, for the combined discriminant functions, there was a significant difference ($P<.05$) among the four group centroids of the set of five variables. Once the first function was removed, the second function was not significant at the .05 level.

While the results illustrated that the first discriminant function was statistically significant ($P<.05$) and accounted for 84.84% of the total discriminatory power of the five scales, the sample size was large ($n=245$). Therefore, to determine the degree of differentiation the predictor battery exhibited among the four practice levels, the total discriminatory power was calculated by the formula, a multivariate extension of the univariate "estimated ω^2" (see Tatsuoka, 1970, p.48):

TABLE 31

Summary for Discriminant Analysis of Attitude and Knowledge Scores with Practice

Function	Eigen-Value	% of Variance	Canonical Correlation	: After Function	Wilks' Lambda	Chi-Squared	df	Significance
				: 0	.9228	19.36*	6	.0036
1	.07022	84.84	.25616	: 1	.9876	3.01	2	.2224
2	.01255	15.16	.11134					

* P<.05.

$$\hat{\omega}^2_{multi} = 1 - \frac{N}{(N-k)\ (1+\lambda_1)\ (1+\lambda_2)\ldots(1+\lambda_r)+1}$$

where $\lambda_1, \lambda_2, \ldots, \lambda_r$ are the eigen values; N, the total sample size; and k, the number of groups. The result, .0655, suggested only about 7% of the total variability of the two discriminatory functions was attributable to group differences i.e., the total discriminatory power of the predictor battery as a whole was very weak. This may be partically explained by the low overall knowledge level exhibited by each group. Mean scores and percentages for the five predictor scales are reported in Table 32.

The table shows that the adequate group alone scored consistently higher than the total sample mean score for each of the five scales, however, no one group scored more than 57% on any of the knowledge tests.

TABLE 32

Mean Scores and Percentages for Predictor Battery among Practice Levels

Dependent Variable (n=245)	Predictor Variables				
	A:GEN ROLE	A:MANAGE	K:AFFECTS	K:COMP	K:FACTS
Adequate	42.15(84.30)	37.64(83.64)	8.68(54.25)	10.14(50.71)	9.03(50.15)
Excess fat	39.50(79.00)	34.12(75.83)	9.00(56.25)	9.50(47.50)	7.38(40.97)
Deficient	41.16(82.33)	37.10(82.45)	8.23(51.41)	9.14(45.70)	8.61(47.83)
Excess kilocalorie	41.67(83.33)	39.89(88.64)	8.00(50.00)	9.67(48.33)	9.22(51.23)
Total sample (n=281)	41.67(83.34)	37.43(83.18)	8.43(52.69)	9.69(48.45)	8.74(48.56)

APPENDIX I

SUMMARY TABLES AND DISCUSSION OF HOMOGENEITY OF VARIANCE-COVARIANCE FOR EACH BIODEMOGRAPHIC VARIABLE

Summary Tables and Discussion of Homogeneity of Variance-Covariance for each Biodemographic Variable

OWMAR, a multivariate analysis of variance program was used to test the homogeneity of variance-covariance. The program employs the Bartlett-Box test (see Winer, 1971, p.595) for this purpose. The results revealed that for the biodemographic variables age, living arrangement, family history of cardiovascular disease (CVD), and smoking habit, the assumption of homogeneity of variance-covariance was tenable for each of the three sets of dependent variables (attitudes, knowledge, and practice).

For the groups defined in terms of obesity, the assumption of homogeneity of variance-covariance was tenable for knowledge and practice scores, but not for mean attitude. A univariate F-statistic, suggested by Box, was computed to test the hypothesis that the stratum variances were equal for each of the attitude subtests. Results of the univariate F-statistic pinpointed subtest A:MANAGE as being responsible for lack of homogeneity. Table 33 presents the results for the obesity risk variable and attitude scores.

Inspection of means and standard deviations for A:MANAGE (see Appendix J) revealed that the high risk group had the highest mean score but also the greatest variability and lowest number of cases. According to Glass and Stanley (1970, p.372), the effect of heterogenous variances when the sample sizes and variances are unequal, and fewer cases are sampled from the population with the largest variance, is to shift the F ratio to the left i.e., increase the probability of a Type I error.

TABLE 33

Bartlett-Box Homogeneity Test for Attitude Scores with Obesity Risk

Independent Variable	Multivariate Test		Dependent Variable	Univariate Test	
	F	(df)		F	(df)
			A:GEN ROLE	1.49	(2, 13573)
Obesity Risk	2.22*	(6, 7626.88)	A:MANAGE	4.11*	(2, 13573)

* P<.05.

Thus, it was concluded that departures from homogeneity of variance-covariance would be such that it would not adversely influence the attitude results obtained.

For the remaining variables: exercise pattern, education level, gender, and personal history of CVD, and all three dependent variables, homogeneity of variance-covariance was tenable for attitudes and knowledge scores but not tenable for practice scores. Inspection of the variables, shown in Table 34, revealed F-ratios that varied from 1.241 to 1.971.

If sample sizes are equal, there is no reason for concern about violation of the assumption of homogeneous variances (Glass and Stanley, 1970, p.306). In an attempt to assess the extent of this violation of homogeneity, statistical analysis was performed in which groups were made equal by random elimination of cases from each group until all were equal. Results, presented in Table 34 for the variable education level, showed that there was no change in the statistical decision made. Thus, it did not appear useful to randomly delete subjects to achieve equal size groups.

Summary

Indeed, the significance shown is likely an attribute to the large number of degrees of freedom associated with the F-value. In light of this last estimation, the small F-ratios, and the robustness of the multivariate test (Olson, 1974), it was decided that the departures from homogeneity of variance-covariance were such that they would not adversely influence the results obtained.

TABLE 34

Bartlett-Box Homogeneity of Dispersion Test for Attitude, Knowledge, and Practice Scores with the Biodemographic Variables Exercise Pattern, Level of Education, Gender, and Personal History of CVD

Variable		DF1	DF2	F-Ratio
Exercise Pattern	Attitudes	9	69600.5	1.264
	Knowledge	18	40044.9	.460
	Practice	198	28119.7	1.241*
Education	Attitudes	9	493976.0	1.662
	Knowledge	18	194881.0	1.145
	Practice	198	123985.0	1.282*
Gender	Attitudes	3	162199.0	1.670
	Knowledge	6	66569.5	1.510
	Practice	66	37396.0	1.746*
Personal History of CVD	Attitudes	3	130768.0	1.783
	Knowledge	6	54551.8	.812
	Practice	66	30772.5	1.971*
<u>EQUAL GROUPS</u>				
Education	Practice	198	96711.0	1.25 *

* P<.05.

APPENDIX J

MEAN AND STANDARD DEVIATION FOR EACH ATTITUDE AND KNOWLEDGE SUBTEST AND PRACTICE SCORE BY BIODEMOGRAPHIC GROUP

J.1. Mean and Standard Deviation of Attitude and Knowledge Scores by Biodemographic Group

Biodemographic Group	(n)		A:GEN ROLE	A:MANAGE	K:AFFECTS	K:COMP	K:FACTS
Gender							
Male	(59)	$\bar{X}$	39.54	36.07	7.66	8.80	7.78
		S.D.	3.96	4.16	2.16	3.64	2.80
Female	(222)	$\bar{X}$	42.23	37.80	8.64	9.93	9.00
		S.D.	4.47	3.90	1.93	3.05	3.27
Age							
Young	(162)	$\bar{X}$	42.07	37.26	8.46	9.76	8.91
		S.D.	4.27	3.96	2.09	3.12	3.00
Mid	(63)	$\bar{X}$	42.60	38.24	8.48	9.67	9.49
		S.D.	4.16	3.73	1.87	3.37	3.49
Old	(56)	$\bar{X}$	39.43	37.04	8.29	9.52	7.39
		S.D.	4.83	4.38	1.98	3.33	3.13
Living Arrangement							
Family	(208)	$\bar{X}$	41.98	37.62	8.51	9.80	8.85
		S.D.	4.42	4.12	2.05	3.04	3.28
Other	(73)	$\bar{X}$	40.78	36.89	8.21	9.38	8.42
		S.D.	4.61	3.65	1.91	3.66	2.99
Education Level							
$<$ grade 12	(57)	$\bar{X}$	39.33	36.32	7.79	8.65	7.47
		S.D.	4.76	4.67	1.96	3.06	3.15
Grade 12	(84)	$\bar{X}$	41.92	37.86	8.52	9.48	8.93
		S.D.	4.69	3.65	2.02	3.27	2.86
1-3 yr Univ	(86)	$\bar{X}$	42.69	37.80	8.67	10.09	9.26
		S.D.	4.11	3.79	2.00	2.88	3.39
$\geq$ 4 yr Univ	(54)	$\bar{X}$	42.11	37.37	8.57	10.48	8.96
		S.D.	3.64	4.01	1.99	3.52	3.24

J.1. Mean and Standard Deviation of Attitude and Knowledge Scores by Biodemographic Group (continued)

Biodemographic Group (n)			A:GEN ROLE	A:MANAGE	K:AFFECTS	K:COMP	K:FACTS
Personal History of CVD							
Positive	(54)	$\overline{X}$	41.75	37.25	8.29	9.78	8.80
		S.D.	4.34	4.06	1.98	3.19	3.18
Negative	(216)	$\overline{X}$	41.02	38.00	8.91	9.28	8.35
		S.D.	5.08	3.82	2.08	3.18	3.31
Family History of CVD							
Positive	(154)	$\overline{X}$	41.58	37.51	8.45	9.54	8.76
		S.D.	4.54	4.08	1.95	2.99	3.30
Negative	(124)	$\overline{X}$	41.84	37.42	8.43	9.80	8.69
		S.D.	4.39	3.92	2.09	3.45	3.13
Physical Exercise Pattern							
Sedentary	(32)	$\overline{X}$	39.50	36.84	7.69	8.62	8.41
		S.D.	5.59	4.62	2.12	3.71	3.70
Low Moderate	(126)	$\overline{X}$	41.58	37.40	8.44	9.66	8.81
		S.D.	4.16	3.77	1.94	3.06	3.22
High Moderate	(90)	$\overline{X}$	42.39	37.70	8.60	10.08	8.74
		S.D.	4.25	3.86	2.08	3.16	3.11
Vigorous	(28)	$\overline{X}$	43.00	37.64	8.71	9.93	9.25
		S.D.	3.93	4.86	2.09	3.25	3.04
Smoking Habit							
Very Heavy	(15)	$\overline{X}$	41.60	37.20	8.13	9.73	9.00
		S.D.	3.64	3.88	1.60	2.66	3.16
Heavy	(23)	$\overline{X}$	43.09	37.74	8.78	9.39	8.48
		S.D.	3.46	3.14	1.73	2.71	3.69
Light	(20)	$\overline{X}$	40.35	36.45	7.45	8.60	8.00
		S.D.	4.17	3.76	1.88	1.85	2.27

J.1. Mean and Standard Deviation of Attitude and Knowledge Scores by Biodemographic Group (continued)

Biodemographic Group	(n)		A:GEN ROLE	A:MANAGE	K:AFFECTS	K:COMP	K:FACTS
Smoking Habit							
Former	(36)	$\overline{X}$	41.03	36.89	8.36	9.44	8.11
		S.D.	4.25	4.00	1.99	3.10	3.00
Nonsmoker	(186)	$\overline{X}$	41.75	37.63	8.53	9.88	8.96
		S.D.	4.73	4.16	2.08	3.44	3.28
Obesity Risk							
High	(13)	$\overline{X}$	42.54	38.54	9.08	9.08	9.08
		S.D.	5.92	5.61	2.40	3.30	3.75
Moderate	(55)	$\overline{X}$	41.29	37.33	8.47	10.24	8.35
		S.D.	4.11	4.63	2.19	3.37	3.22
Low	(210)	$\overline{X}$	41.76	37.45	8.41	9.58	8.84
		S.D.	4.48	3.71	1.93	3.18	3.19

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group

Biodemographic Group	(n)		KCAL	PROT	CA	FE	VA	THI
Gender								
Male	(59)	$\bar{X}$	.64	.92	.74	.87	.80	.71
		S.D.	.19	.16	.24	.18	.25	.22
Female	(222)	$\bar{X}$	.71	.98	.76	.67	.83	.75
		S.D.	.18	.07	.22	.21	.23	.21
Age								
Young	(162)	$\bar{X}$	.68	.97	.78	.68	.82	.74
		S.D.	.19	.09	.23	.22	.24	.22
Mid	(63)	$\bar{X}$	.68	.95	.71	.65	.82	.74
		S.D.	.17	.10	.22	.19	.22	.22
Old	(56)	$\bar{X}$	.76	.96	.75	.87	.84	.75
		S.D.	.16	.12	.23	.16	.25	.19
Living Arrangement								
Family	(208)	$\bar{X}$	.69	.97	.76	.70	.82	.75
		S.D.	.18	.09	.22	.22	.24	.21
Other	(73)	$\bar{X}$	.71	.96	.75	.76	.86	.74
		S.D.	.18	.13	.25	.23	.22	.21
Education Level								
< grade 12	(57)	$\bar{X}$	.69	.95	.70	.71	.80	.65
		S.D.	.19	.12	.22	.25	.26	.21
Grade 12	(84)	$\bar{X}$	.68	.97	.76	.70	.82	.74
		S.D.	.18	.10	.23	.22	.24	.20
1-3 yr Univ	(86)	$\bar{X}$	.69	.96	.76	.70	.83	.77
		S.D.	.18	.10	.24	.20	.24	.23
$\geq$ 4 yr Univ	(54)	$\bar{X}$	.74	.98	.81	.75	.86	.80
		S.D.	.18	.07	.21	.22	.21	.18

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group (continued)

Biodemographic Group (n)			KCAL	PROT	CA	FE	VA	THI
Personal History of CVD								
Positive	(54)	$\overline{X}$	.72	.95	.74	.77	.86	.73
		S.D.	.19	.14	.25	.20	.23	.20
Negative	(216)	$\overline{X}$	.70	.97	.76	.70	.82	.75
		S.D.	.18	.09	.23	.22	.24	.22
Family History of CVD								
Positive	(154)	$\overline{X}$	.69	.97	.75	.71	.83	.73
		S.D.	.18	.09	.23	.22	.24	.22
Negative	(124)	$\overline{X}$	.71	.96	.76	.72	.82	.76
		S.D.	.18	.11	.23	.22	.23	.20
Physical Exercise Pattern								
Sedentary	(32)	$\overline{X}$	.70	.99	.69	.74	.88	.73
		S.D.	.16	.05	.22	.22	.20	.20
Low Moderate	(126)	$\overline{X}$	.72	.97	.78	.72	.84	.74
		S.D.	.17	.09	.22	.21	.23	.21
High Moderate	(90)	$\overline{X}$	.67	.96	.74	.68	.79	.75
		S.D.	.18	.10	.23	.23	.25	.22
Vigorous	(28)	$\overline{X}$	.68	.93	.79	.76	.80	.76
		S.D.	.22	.16	.24	.22	.26	.21
Smoking Habit								
Very Heavy	(15)	$\overline{X}$	.62	.96	.70	.68	.68	.64
		S.D.	.17	.09	.26	.26	.31	.25
Heavy	(23)	$\overline{X}$	.66	.96	.72	.66	.80	.74
		S.D.	.16	.09	.21	.24	.23	.23
Light	(20)	$\overline{X}$	.76	1.00	.73	.76	.83	.78
		S.D.	.18	.00	.22	.21	.24	.20

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group (continued)

Biodemographic Group (n)			KCAL	PROT	CA	FE	VA	THI
<u>Smoking Habit</u>								
Former	(36)	$\overline{X}$	.70	.95	.76	.75	.86	.74
		S.D.	.19	.12	.27	.22	.23	.21
Nonsmoker	(186)	$\overline{X}$	.70	.96	.77	.71	.83	.75
		S.D.	.18	.10	.22	.21	.23	.21
<u>Obesity Risk</u>								
High	(13)	$\overline{X}$	.58	.98	.72	.60	.65	.65
		S.D.	.13	.05	.21	.22	.25	.20
Moderate	(55)	$\overline{X}$	.72	.97	.77	.75	.82	.73
		S.D.	.18	.08	.22	.22	.24	.21
Low	(210)	$\overline{X}$	.70	.96	.96	.71	.84	.75
		S.D.	.18	.11	.23	.22	.23	.21

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group

Biodemographic Group (n)			RIBO	NIA	VC	FAT	CHO
Gender							
Male	(59)	$\bar{X}$	.78	.80	.92	.84	.64
		S.D.	.22	.22	.18	.13	.12
Female	(222)	$\bar{X}$	.87	.88	.96	.82	.64
		S.D.	.17	.16	.13	.14	.14
Age							
Young	(162)	$\bar{X}$	.86	.87	.96	.84	.63
		S.D.	.18	.17	.13	.14	.13
Mid	(63)	$\bar{X}$	.84	.86	.93	.83	.62
		S.D.	.19	.18	.18	.12	.14
Old	(56)	$\bar{X}$	.84	.86	.95	.80	.68
		S.D.	.19	.19	.13	.15	.14
Living Arrangement							
Family	(208)	$\bar{X}$	.85	.87	.95	.83	.64
		S.D.	.18	.17	.14	.14	.13
Other	(73)	$\bar{X}$	.86	.85	.96	.83	.63
		S.D.	.20	.19	.14	.14	.14
Education Level							
< grade 12	(57)	$\bar{X}$	.76	.81	.90	.81	.67
		S.D.	.20	.21	.18	.15	.15
Grade 12	(84)	$\bar{X}$	.86	.88	.97	.82	.63
		S.D.	.18	.17	.11	.14	.13
1-3 yr Univ	(86)	$\bar{X}$	.87	.87	.94	.83	.62
		S.D.	.18	.18	.16	.14	.13
≥ 4 yr Univ	(54)	$\bar{X}$	.90	.89	.98	.86	.63
		S.D.	.14	.15	.07	.13	.12

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group (continued)

Biodemographic Group (n)			RIBO	NIA	VC	FAT	CHO
Personal History of CVD							
Positive	(54)	$\bar{X}$	.83	.87	.99	.81	.64
		S.D.	.21	.19	.07	.16	.15
Negative	(216)	$\bar{X}$	.86	.86	.94	.83	.64
		S.D.	.18	.18	.15	.14	.13
Family History of CVD							
Positive	(154)	$\bar{X}$	.84	.87	.95	.81	.64
		S.D.	.18	.17	.14	.14	.13
Negative	(124)	$\bar{X}$	.86	.85	.95	.85	.62
		S.D.	.18	.19	.14	.14	.13
Physical Exercise Pattern							
Sedentary	(32)	$\bar{X}$	.80	.85	.95	.79	.67
		S.D.	.17	.15	.13	.17	.14
Low Moderate	(126)	$\bar{X}$	.86	.88	.94	.83	.64
		S.D.	.18	.18	.16	.14	.14
High Moderate	(90)	$\bar{X}$	.85	.86	.96	.83	.62
		S.D.	.19	.17	.12	.14	.13
Vigorous	(28)	$\bar{X}$	.86	.84	.98	.87	.62
		S.D.	.22	.21	.09	.13	.15
Smoking Habit							
Very Heavy	(15)	$\bar{X}$	.74	.87	.87	.85	.59
		S.D.	.21	.15	.26	.08	.15
Heavy	(23)	$\bar{X}$	.90	.85	.93	.82	.56
		S.D.	.14	.19	.14	.15	.16
Light	(20)	$\bar{X}$	.86	.91	.98	.78	.66
		S.D.	.18	.15	.09	.16	.12

J.2. Mean and Standard Deviation of Practice Ratio Scores (Range 0 to 1) by Biodemographic Group (continued)

Biodemographic Group (n)			RIBO	NIA	VC	FAT	CHO
Smoking Habit							
Former	(36)	$\bar{X}$	.85	.89	.94	.84	.62
		S.D.	.22	.17	.16	.14	.13
Nonsmoker	(186)	$\bar{X}$	.85	.86	.96	.83	.65
		S.D.	.18	.18	.13	.14	.13
Obesity Risk							
High	(13)	$\bar{X}$	.84	.81	.94	.82	.59
		S.D.	.20	.23	.15	.16	.17
Moderate	(55)	$\bar{X}$	.86	.85	.96	.84	.64
		S.D.	.16	.20	.13	.13	.11
Low	(210)	$\bar{X}$	.85	.87	.95	.82	.64
		S.D.	.19	.17	.14	.14	.14

APPENDIX K

SUMMARY TABLES OF MULTIVARIATE AND UNIVARIATE ANALYSES OF VARIANCE FOR EACH BIODEMOGRAPHIC VARIABLE

Summary Tables of Multivariate and Univariate Analyses of Variance for each Biodemographic Variable

In the following one-way analysis of variance statistics tables (Tables 35 to 43) for attitude, knowledge, and practice scores with biodemographic variables, the univariate F, numbered 1 to 11 refers to:

(i) Attitudes: 1 (A:GEN ROLE), 2 (A:MANAGE);

(ii) Knowledge: 1 (K:AFFECTS), 2 (K:COMP), 3 (K:FACTS);

(iii) Practice: 1 (KCAL), 2 (PROT), 3 (CA), 4 (FE), 5 (VA), 6 (THI), 7 (RIBO), 8 (NIA), 9 (VC), 10 (FAT), 11 (CHO).

TABLE 35

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Age

Source of Vari-ability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df	F 1	2	3	4	5	6	7	8	9	10	11
<u>Attitudes</u>														
Between	4	7.62*	2	9.53*	1.71									
Within	554		278 MSw	19.04	15.99									
<u>Knowledge</u>														
Between	6	3.03*	2	.18	.12	7.21*								
Within	552		278 MSw	4.08	10.37	9.86								
<u>Practice</u>														
Between	22	3.61*	2	3.41	1.03	2.53	22.18*	.34	.04	.39	.11	.59	1.24	3.25*
Within	536		278 MSw	.22	.12	.41	.32	.48	.37	.32	.31	.18	.19	.09

*P<.05

TABLE 36

One-Way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Gender

Source of Vari-ability	Multi-Variate Test		Univariate Test												
					F										
	df	F	df		1	2	3	4	5	6	7	8	9	10	11
Attitudes															
Between	2	8.81*	1		17.66*	8.92*									
Within	278		279	MSw	19.06	15.63									
Knowledge															
Between	3	4.29*	1		11.31*	5.89*	6.83*								
Within	277		279	MSw	3.91	10.13	10.09								
Practice															
Between	11	17.97*	1		5.83*	16.98*	.09	47.37*	.52	1.96	10.60*	10.20*	4.16*	.06	.01
Within	269		279	MSw	.22	.11	.42	.32	.48	.37	.31	.30	.18	.19	.10

* $P<.05$.

TABLE 37

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Living Arrangement

Source of Vari-ability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df	F 1	2	3	4	5	6	7	8	9	10	11
Attitudes														
Between	2	1.92	1	3.86	1.82									
Within	278		279 MSw	19.99	16.03									
Knowledge														
Between	3	0.52	1	1.23	.90	.95								
Within	277		279 MSw	4.05	10.31	10.30								
Practice														
Between	11	1.63	1	.38	.54	.01	4.62	2.00	.26	.73	.32	.45	.12	.07
Within	269		279 MSw	.22	.12	.42	.36	.47	.37	.32	.31	.18	.19	.10

* P<.05.

TABLE 38

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Family History of CVD[a]

Source of Vari-ability	Multi-Variate Test		Univariate Test												
				F											
	df	F	df	1	2	3	4	5	6	7	8	9	10	11
<u>Attitudes</u>														
Between	2	.36	1	.22	.03									
Within	275		276 MSw	20.04	16.10									
<u>Knowledge</u>														
Between	3	.28	1	.01	.45	.04								
Within	274		276 MSw	4.06	10.27	10.40								
<u>Practice</u>														
Between	11	.72	1	1.01	.02	.44	.10	.31	.96	.42	.30	.14	4.60	1.87
Within	266		276 MSw	.23	.12	.42	.37	.48	.37	.32	.31	.19	.18	.09

[a] CVD: cardiovascular disease.

* $P<.05$.

TABLE 39

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Personal History of CVD[a]

Source of Variability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df		F 1	2	3	4	5	6	7	8	9	10	11
Attitudes															
Between	2	4.56*	1		1.16	1.49									
Within	267		268	MSw	20.19	16.12									
Knowledge															
Between	3	4.05*	1		4.08*	1.06	.83								
Within	266		268	MSw	4.01	10.16	10.30								
Practice															
Between	11	2.12*	1		.59	.83	.08	3.68	1.18	.57	.76	.01	5.77*	2.02	.20
Within	258		268	MSw	.23	.12	.42	.36	.48	.38	.32	.31	.18	.19	.10

[a] CVD: cardiovascular disease.

P<.05.

TABLE 40

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Physical Exercise Pattern

Source of Variability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df		F 1	2	3	4	5	6	7	8	9	10	11
Attitudes															
Between	6	2.86*	3		4.33*	.38									
Within	542		272	MSw	18.96	16.21									
Knowledge															
Between	9	1.00	3		1.84	1.68	.35								
Within	657		272	MSw	4.08	10.20	10.41								
Practice															
Between	33	1.32	3		.96	2.17	2.08	1.02	1.47	.19	1.27	.73	.59	1.29	1.15
Within	773		272	MSw	.22	.12	.41	.36	.48	.37	.32	.31	.19	.19	.10

* $P<.05$.

TABLE 41

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Obesity Risk

Source of Vari-ability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df		F 1	F 2	F 3	F 4	F 5	F 6	F 7	F 8	F 9	F 10	F 11
Attitudes															
Between	4	.39	2		.48	.50									
Within	548		275	MSw	20.14	16.03									
Knowledge															
Between	6	1.50	2		.68	1.16	.59								
Within	546		275	MSw	4.03	10.39	10.39								
Practice															
Between	22	1.12	2		3.01	.19	.29	2.08	4.15	1.61	.05	.70	.15	.45	.57
Within	530		275	MSw	.22	.12	.42	.37	.47	.37	.32	.31	.19	.19	.09

* P<.05.

TABLE 42

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Level of Education

Source of Variability	Multi-Variate Test df	Multi-Variate Test F	Univariate Test df		F 1	2	3	4	5	6	7	8	9	10	11
<u>Attitudes</u>															
Between	6	4.12*	3		7.32*	2.06									
Within	552		277	MSw	18.91	15.90									
<u>Knowledge</u>															
Between	9	2.08*	3		2.54	3.78*	4.01*								
Within	669		277	MSw	3.99	10.01	9.98								
<u>Practice</u>															
Between	33	1.92*	3		1.44	1.05	2.98*	.74	.36	5.64*	6.79*	2.07	4.64*	1.19	2.59
Within	787		277	MSw	.22	.12	.41	.37	.48	.35	.31	.31	.18	.19	.09

* P<.05.

TABLE 43

One-way Analysis of Variance Statistics for Attitude, Knowledge, and Practice Scores with Smoking Habit

Source of Vari-ability	Multi-Variate Test		Univariate Test												
					F										
	df	F	df		1	2	3	4	5	6	7	8	9	10	11
Attitudes															
Between	8	.80	4		1.20	.62									
Within	548		275	MSw	20.19	16.22									
Knowledge															
Between	12	.88	4		1.58	.83	.88								
Within	723		275	MSw	4.03	10.35	10.35								
Practice															
Between	33	1.58*[a]	3		1.32	.04	.82	.89	2.30	.88	2.42	.40	1.50	.08	3.60*
Within	725		256	MSw	.22	.13	.42	.37	.47	.37	.32	.32	.19	.19	.09

[a] Light smokers (n=20) group omitted from analysis for Practice because the variance of the group for VC was zero. Univariate analyses using full sample (all 5 groups) provided the same statistical decisions as the above.

* $P<.05$.