AN ABSTRACT OF THE THESIS OF

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Title: Consumer Interest by Oregon State University Students in Nutrition Information on Food Labels

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This exploratory study examined the degree of involvement of Oregon State University students in nutrition information. Specific objectives were to: (1) determine the relationship between, a) use of nutrition information, b) interest in nutrient information, c) satisfaction with the amount of information required by law, d) kinds of foods to be labeled, and e) advocacy of nutrition information (overall involvement), with each of 18 independent variables (students' characteristics); (2) determine the comparative importance of specific nutrition information items on food labels; (3) calculate an importance rank order for all nutrients; and (4) determine sources of nutrition information which students use and prefer.

Four-hundred-forty Oregon State University students completed a 27 question survey, conducted during February 1986. The statistical

techniques used varied depending upon the type of variables being analyzed. Six null hyoptheses with sub-parts were tested at the $p < .05$ level of significance.

Age, gender, class rank, college major, major classified as hard or social science, participation in nutrition classes, health problems, special diets and intake of vitamins and minerals are significantly related to student involvement in nutrition information. The majority of students reported using nutrition label information. They rated some of the nutrients which are not mandated in the current labeling law (sugar, cholesterol, saturated fats, sodium, fiber and starch) higher in importance than other nutrients which are required. Almost 60 percent of the students wanted more information than is currently given on the labels and approximately 88 percent of the students wanted more foods labeled than are presently required by law. Price and health (i.e. care labeling, open date, nutrition information, and ingredient list) were rated more important than other information provided on food labels. Preferred sources of nutrition information were different in importance compared to current information sources.

Nutrition educators, policy makers, food producers and retailers need to understand the nutrition information needs and desires of students as future consumers. These findings could contribute to the development of effective nutrition information labels for food products. Replication of the research with additional audiences would contribute to a broader understanding of consumer demands for nutrition and food label information and lead to better nutrition education programs.

Consumer Interest by Oregon State University Students in Nutrition Information on Food Labels

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CONSUMER INTEREST BY OREGON STATE UNIVERSITY STUDENTS IN NUTRITION INFORMATION ON FOOD LABELS

I. INTRODUCTION

Recent Developments in Nutrition Labeling

In December 1969 the participants of the White House Conference on Food, Nutrition and Health recommended making information about nutrients available to consumers (White House Conference, 1970). As a consequence, the Food and Drug Administration (FDA) initiated and conducted investigations with the cooperation of the food industry, nutritionists and consumer groups about what kinds of nutrition information should be made available to consumers and which format would be most suitable (Call & Hayes, 1970; Lenahan et al., 1972; Stokes 1972). The results of those efforts led to the publication of a preliminary proposal for nutrition labeling in 1972 (Federal Register) and a final regulation in 1973 (Federal Register) with an effective compliance date of July 1975.

At the end of the seventies, the FDA decided to assess the adequacy of food labeling. During fall and winter 1978 five public hearings, conducted by the FDA and co-sponsered by the U. S. Department of Agriculture and the Federal Trade Commission's Bureau of Consumer Protection, were held to obtain consumers' opinions on the food label issue with particular emphasis on ingredient and nutrition information (Food and Drug Administration, 1978; 1979). Of particular

interest was whether or not consumers used food label information and if it met their needs (Heimbach & Stokes, 1979). Findings regarding nutrition labeling indicated that consumers were not satisfied with the current label. One of the problems with the current nutrition labeling was its complexity. Many people seemed not to understand the technical terminology. Secondly, many consumers wanted different or more detailed information about the nutritional value of their food, due to the growing public concern about the relationship of diet to health problems. Specifically, they felt uneasy about their consumption of calories, sodium, cholesterol, sugars and fatty acids (Heimbach and Stokes, 1979). The public seemed to be most concerned about the overconsumption of these nutrients (e.g. sugar, fat), rather than in possible deficiencies of nutrients as measured by the U. S. Recommended Daily Allowance (e.g. vitamin C, calcium, iron). However, current labels emphasize deficiencies rather than overconsumption (Heimbach and Stokes, 1979; Schrayer, 1978).

Overall findings relative to the adequacy of nutrition labeling indicate that the time has come to reevaluate current labeling regulations and practices and adapt them to the changing consumers' needs (Food and Drug Administration, 1979; Heimbach and Stokes, 1979; Schrayer, 1978).

Statement of Problem

Based on extensive research between 1970 and 1982 it can be concluded that consumers use information on food labels but are not completely satisfied with the current food label regulation established in 1973. Today consumers are interested in specific nutrients that are considered detrimental to their health, some of which are not currently required to be listed on the nutrition information label.

There are various perceived barriers to expanding the nutrition label, such as the information processing capacity of consumers, the size of the label on food packages, costs, etc. If consumers' needs and wants are known, then the lawmakers and food manufacturers can be more responsive within the constraints relating to clarity, simplicity and costs.

If consumers had access to their high priority nutrition information, they would have a more sound basis for their purchase decisions. Manufacturers may receive a more accurate message as to what kinds of food products consumers want.

Recently, new label formats have been developed, based on the results of former studies concerning information content, amount and format (U. S. Department of Agriculture & U. S. Department of Health and Human Services, 1982). However, consumer response to new nutrition information label systems has not been assessed (personal correspondence, 1985).

Objectives of the Study

One of the objectives of this study was to assess college student interest in nutrition information on food labels. Students have been chosen as a sample which could potentially serve to represent future consumer interests. This study was focused on several research questions. Are students interested in information about nutrition? How well informed do they feel about nutrition? How important is nutrition information compared to other food product label information? Do students look for nutrition information on food labels? Do students use labels at the store or at home? Are students satisfied with the kinds of food products labeled? Are students satisfied with the amount of nutrition information on the food label required by law? Which types of nutrients do students consider important? What type of information sources do students use? Few studies have addressed these questions. Therefore, the overall purpose of this study was to determine the level of college student involvement in nutrition information.

Degree of involvement in nutrition information was measured on an eight-factor scale that included: interest in having access to nutrition information, reported assessment of being informed about day-to-day needs, interest in nutrition information, degree of looking for nutrition information, use of nutrition information in the store for purchase decisions or at home for meal planning, preferred kinds of foods required to be labeled, and satisfaction with the amount of nutrition information required on the label.

More specific objectives were (1) to determine the relationships between a) advocacy of nutrition information (involvement), b) use of nutrition information, c) interest in nutrient information, d) satisfaction with the amount of information required by law, and e) kinds of foods labeled, with each of the independent variables (student characteristics); (2) to determine the importance of nutrition information items on food products and compare it to other items of product information on food labels; (3) to calculate an importance rank order for nutrients; and (4) to determine the sources of nutrition information which students use and would like to use.

Results from this study might be useful to consumer information advocates to suggest what "future" consumers, especially the well-educated, would like to find on nutrition labels, compared to the present label regulation. The results might also be used as an indication of constituent support for future nutrition label legislation. Changes in the regulations according to consumers' needs and wants could be useful to food manufacturers and consumers if it limits the quantity of costly nutrient analysis to those specific nutrients that interest the majority of consumers. Another benefit to manufacturers might be to have a uniform law which does the best job possible to please consumers. On one hand a uniform law increases accountability in the food industry and on the other hand it encourages competition among brands. Such uniformity of labeling would allow the consumers to accurately compare brands.

Consumers try to maximize their utility. If the information they need to optimize their decisions is not provided, they end up making suboptimal decisions. If the information consumers need is provided on the food labels, consumers have more opportunities to make decisions which bring greater satisfaction. They also have a better chance of communicating their preferences to producers through their purchases. This study will indicate if prior course work in nutrition education and/or consumer economics has an influence on involvement in nutrition information.

A review of the literature indicates that well-educated consumers are more likely to seek information. Since the trend is towards higher education levels of the U. S. citizen, an increase in demand for nutrition information might be expected in future. Thus, the student population might be assumed to represent the future well-educated consumer group, a group which has a high likelihood of exerting influence on policy making and market place interaction out of proportion to their numbers. Assessing their interest could give a clue to future interests in, and demands for, legislation or regulation to increase the availability of nutrition information on food labels.

Limitation of the Study

A limitation of this study is the fact that reported answers by the respondents have been analysed. No actual behavior has been observed.

II. LITERATURE REVIEW

The focus of this chapter is centered on nutrition information, its development, use and benefits to the consumer. Therefore, the literature reviewed in this chapter relates to:

(1) general attitudes towards health and nutrition labeling,

(2) benefits, use and costs of nutrition information labeling, and

(3) types and amount of nutrition information on food labels.

General Attitudes towards Health and Nutrition Labeling

Concern about Health and Nutrition

Concern about Nutrition-Related Health Problems

A number of nutrition surveys have been conducted to determine the magnitude and location of malnutrition and nutrition-related health problems. Previous studies, such as the 1968-70 Ten State Nutrition Survey (Center for Disease Control, 1972) and the 1971-72 Health and Nutrition Examination Survey (National Center for Health Statistics, 1974) indicated that vitamins A and C, riboflavin, calcium and iron are the nutrients most likely to be consumed in inadequate amounts by low income people. Later studies found that although Americans typically consume adequate amounts of most vitamins and minerals, their consumption of calcium and iron may often be low.

Furthermore, surveys indicated that there are several nutrition-related health problems. The most common problems were obesity and coronary heart diseases (Heimbach & Stokes, 1981; Stewart, 1981). A study conducted by the National Center for Health Statistics indicated that one third of the population was overweight (Lecos, 1984a).

Three thousand viewers of the special program "FDA Hearings: You Can Change Government Policy" participated in a computer based, two-way TV service system in Columbus, Ohio. The viewers were asked if they had a health problem that required knowledge about nutrients. Fifty-five percent of the respondents reported to be interested in calories, 43 percent indicated interest in fat and cholesterol information, 39 percent needed information on sugar and 41 percent were concerned with the consumption of salt/sodium (Murray, 1978).

Members of the American Institute of Nutrition, a consumer panel ("interested consumers": a non-representative group of consumers on the Food and Drug Administration mailing list who expressed interest in receiving information about FDA issues and activities; e.g. health professors, teachers, and representatives of community consumer groups), and members of food industry trade associations rated obesity or excess caloric consumption as the most serious diet-related health problem. They ranked heart and cardiovascular diseases second to obesity and diabetes third. Concern was also expressed about the overconsumption of alcohol, sodium, sugar and fats. Micro-nutrient deficiencies were ranked quite low, however, iron was most frequently mentioned followed by calcium (Heimbach and Stokes, 1981).

Concern about Nutrition

American eating habits have been changing in the last decades (Schoenfeld, 1970), with more and more women working outside the home and therefore, less time spent on preparing food. This trend has increased the need for easy to prepare food (Lenahan et al., 1972), such as TV dinners and instant breakfasts (Schoenfeld, 1970). With the trend towards greater consumption of processed and formulated food, there was an imbalance between the percentage of nutrients present in the average American diet (Hopkins, 1972). In 1965 relatively fewer households had nutritionally good diets than in 1955 (Bymers, 1972). In the late 1960's, most consumers showed little knowledge about what constitutes a well-balanced diet and had inadequate conceptions about common food sources of important nutrients. In fact only about 50 percent were able to describe a nutritionally balanced meal (Bauman, 1973).

With a more general involvement in physical fitness, people are becoming increasingly more interested in the nutritional composition of their food (Heimbach, 1981). The public has become more and more aware of nutrition-related health problems in the last decade. The number of people who want to eat in a healthier way has increased and they want to know more about what they eat. They are interested in ingredients, nutritional value, additives (flavors and colors) and preservatives in the food they eat. People have started to comprehend the importance of the balance of calories, proteins, fats, carbohydrates, vitamins and minerals as a basic requirement for an adequate and wholesome diet (Hopkin,

1972). Inflation and continued concern about nutrition-related health problems have contributed to increased interest in food labeling (Consumers desire, 1981).

Nutrition Labeling

Development of Nutrition Labeling

In 1938 the new federal Food, Drug and Cosmetic Act was passed. One of the accomplishments of that law concerned food label requirements. According to this law, food labels must state: "... the common name of the product; the name and address of the manufacturer, packer or distributer; and its net content expressed in terms of weight, measure, numerical count or a combination of those, depending on the nature of the product ..."; ingredients must be listed on the label in descending order of predominance for foods for which standards of identity have not been established (Ross, 1974, p. 262). However there is additional information about food products that consumers are interested in besides the mandatory label information.

The public demand for information is based on one of the consumer's rights, the right to be informed (Kennedy, 1962; cited in Aaker & Day, 1978, pp. 32-33). Consumers have the right to know what is in the food they eat (Food and Drug Administration, 1978). Consumers seemed to be concerned about additives in food products like preserves, colors and flavors (Food and Drug Administration, 1979). They expressed interest in the quantity of certain nutrients (e.g. sodium, cholesterol,

sugar, etc.) in food (Food and Drug Administration, 1979; Heimbach and Stokes, 1979; Murray, 1978). They want to know the nutrient content of certain products in addition to the ingredients. Additionally, there is an interest in open dates on packages, especially for perishable products, for quality assurance. There are different types of open dates used today, pack-date, sell-by or pull-date, expiration date and freshness date (Morrision, 1977). Care labeling of food products in regard to storage and handling to prevent consumers from food-born illness is another aspect of food products consumers want to know about (Woodburn & VanDeRiet, 1985).

In the sixties and seventies both, federal and state government agencies and the food industry became aware that more information should be included on labels for the use and benefit of the consumers (Ross, 1974). As a result of this growing awareness Congress passed the Fair Packing and Labeling Act in 1966.

In December 1969 members of the White House Conference on Food, Nutrition and Health proposed that:

> "Information about nutrition properties which are significant to consumers in relation to the use of a given food in the daily diet should be required to be made available to consumers. Insufficient data are available to show what nutrition information is significant for the various foods, or what type of nutrition information is meaningful and useful to consumers" (White House Conference, 1970, p. 121).

One of the results of those recommendations were changes in food labeling and the development of nutrition labeling (Ross, 1974). Prior to the White House Conference little had been done to evaluate nutition

labeling as a tool for informing and educating consumers about nutrition. No data were available concerning preferred format or details of nutrition labels. In response to the White House Conference, the Food and Drug Administration initiated and conducted studies with the cooperation of the food industry, nutritionists and consumer groups, to investigate which kinds of nutrition information should be made available and which format would be most suitable (Asam & Bucklin, 1973; Call & Hayes, 1970; Klinger, 1974; Lenahan et al., 1972; Stokes, 1972). Findings indicated that consumers would use nutrition information on food labels (Asam & Bucklin, 1973; Call and Hayes, 1970; Lenahan et al., 1972; Stokes, 1972).

Regulation

Results of the early research led to the publication of a preliminary proposal for nutrition labeling in 1972 (Federal Register) and a final proposal in 1973 (Federal Register) published on March 14, with an effective compliance day of July, 1975 (Moore and Wendt, 1973). Schultz (1981) summarized the essential features briefly:

"Nutrition Labeling
(1) Nutrition Labeling is voluntary for most foods.
(2) Nutrition Labeling is mandatory if the food
  (a) contains any added vitamin, mineral or protein, or
  (b) is labeled or advertised with any nutritional claim or information, other than sodium content.
  Certain foods such as infant foods, dietary supplements consisting solely of vitamins and/or minerals, fresh fruits and vegetables, and food including an enriched food, e.g. enriched flour, as an ingredient, are exempt but some have special labeling requirements.
(3) When nutrition labeling is used on a food it must conform to a standardized format titled "Nutrition Information", which must include all of the following items in the order:
  (a) Serving size
  (b) Servings per container
  (c) Calorie content per serving
  (d) Protein content per serving (in grams)
  (e) Carbohydrate content per serving (in grams)
  (f) Fat content per serving (in grams)
  (g) Percentage of U. S. Recommended Daily Allowance (U.S.RDA) of all of the following in the order:
    (i) Protein
    (ii) Vitamin A
    (iii) Vitamin C
    (iv) Thiamin
    (v) Riboflavin
    (vi) Niacin
    (vii) Calcium
    (viii) Iron

(4) The following nutrients must be added to the list of eight given: vitamin D, vitamin E, vitamin B_6, folic acid, vitamin B_{12}, phosphorus, iodine, magnesium, zinc, copper, biotin, pantothenic acid.

(5) The U.S.RDA and the approved nomenclatur for each vitamin and mineral which shall or may appear on the label are given in the regulation.

(6) Nutrients present in amount less than 2% of the U.S.RDA may be indicated by a zero, or by an asterik referring to another asterik placed at the bottom of the table followed by the statement "contains less than 2 percent of the U.S.RDA of this (these) nutrient (nutrients)."

(7) When a product contains less than 2% of the U.S.RDA of each of five or more of the eight specified nutrients, no more than three of the eight specified nutrients need be listed. A statement "contains less than 2 percent of the U.S.RDA of ...", listing whichever of the eight nutrients are present at less than 2% and have not been declared, shall directly follow declared nutrients in the same type size.

(8) No claim may be made that a food is a significant source of a nutrient unless that nutrient is present in the food at a level equal to or in excess of 10% of the U.S.RDA in one serving.

(9) No claim may be made that a food is superior to another food unless it contains at least 10% or more of the U.S.RDA of the claimed nutrient per serving.

(10) The fatty acid composition or the cholesterol content may be designated following the fat declaration but the label must bear a standard disclaimer of any implied benefits of the fat or cholesterol content of the product.

(11) Additional details in the regulation pertain to but are not limited to prescribing how calorie content and percentage of U.S.RDAs shall be expressed less than 1% of protein, carbohydrate and fat, and how to use the protein efficiency ratio in determining the percentage U.S.RDA for protein. Also, policies and rules have been established to prohibit certain statements which may be misleading by suggesting a food may cure a disease, is superior to processed foods, is superior because it contains "natural" vitamins, etc." (p. 535).

According to this label regulation standardized nutrition information labels have been developed (see figure 1).

Figure 1: Example of a Current Label

Nutrition Information Per Serving	
Serving Size	¼ Pizza
Servings per Container	4
Calories	240
Protein	9g
Carbohydrate	35g
Fat	7g
Percentage of U.S. Recommended Daily Allowances (U.S. RDA)	
Protein	20%
Vitamin A	15%
Vitamin C	8%
Riboflavin	10%
Thiamine	8%
Niacin	10%
Calcium	10%
Iron	6%

(U. S. Department of Agriculture and U. S. Department of Health and Human Services, 1982, p. 3)

The following additional information is optional unless a vitamin or mineral is added to food or claims are made in the label or advertising about cholesterol, fatty acids, or sodium content of a food (Kinder and Green, 1978).

> "(1) Percentages of the U.S.RDA for twelve additional vitamins and minerals (vitamin D, vitamin E, folic acid, vitamin B_6, vitamin B_{12}, biotin, and pantothenic acid; also copper, iodine, magnesium, phosphorus, and zinc).
> (2) The amount of cholesterol and saturated and polyunsaturated fatty acids per serving.
> (3) The amount of sodium per serving" (p. 59).

Stokes and Heimbach (1979) proposed a label in this format (see figure 2).

Mandatory Versus Voluntary Labeling

During a series of public hearings in 1978 (Food and Drug Administration, 1979) the FDA tried to acquire information about the adequacy of the current food labeling situation. The nutrition label and ingredient list was of particular interest. Eighty percent of the oral and written comments (Food and Drug Administration, 1979) favored mandatory nutrition labeling. This indicates that there is a public interest for expanding the mandatory food labeling which would force the producers to nutrition label products according to the requirements.

Figure 2: Example of a Current Label with Optional Information

NUTRITION INFORMATION

Per Serving
Serving size = 8 oz.
Servings per container = 2

Calories	560
Protein	23 g
Carbohydrate	43 g
Fat	33 g
(Percent of Calories from fat = 53%)	
Polyunsaturated*	22 g
Saturated	9 g
Cholesterol* (20 mg/100 g)	40 mg
Sodium (365 mg/100 g)	810 mg

Percentage of U.S. Recommended Daily Allowances (U.S. RDA)

Protein	35	**Niacin**	25
Vitamin A	35	**Calcium**	2
Vitamin C	10	**Iron**	25
Thiamin	15	**Vitamin B_6**	20
Riboflavin	15	**Vitamin B_{12}**	15

*Information on fat and cholesterol content is provided for individuals who, on the advice of a physician, are modifying their total dietary intake of fat and cholesterol.

(Heimbach & Stokes, 1979, p. II-55)

On the other hand, Day (1976) proposed that the best way to avoid a loss in flexibility inherent in any mandatory disclosure requirement is to allow for voluntary provision of the information. Over the last decade the public interest in certain nutrients has changed (Heimbach, 1981). It is easier to adjust labels to changing public needs if its not legally regulated, but voluntary provided.

The food industry tends to prefer voluntary guidelines over mandatory regulations (Semling, 1981). One of the sources of dissatisfaction stems from the detail to which each item is spelled out in strict, inflexible terms, even though that makes it easier for consumers to compare different brands. Problem areas for manufacturers include the requirement that test batches of foods must contain 80 percent of their declared nutritive value. Fluctuations in nutritive content can be caused by variations in growing seasons, growing areas and climate, as well as the temperature of the food storage. Smaller processors may have relatively higher costs induced by the nutrition measurement requirements (French & Barksdale, 1974).

Thus a compromise has to be found between the consumers' and manufacturers' perspectives. The usefulness of the present regulation has to be evaluated in order to determine if the information requirements are what the consumers want and need to know.

Review of Previous Studies

Benefits of Nutrition Information Labeling

Direct Benefits

Nutrition information on the label can be viewed as an aid for consumers to shop for nutritious food and to plan balanced meals. It can be used as a tool for diet planning (Lenahan et al., 1973; McNutt, 1979). For example, elderly people have poorer diets than most adult groups (Pao & Hill, 1974). Nutrition information would be helpful for them to use to plan nutritious meals. People with certain dietary and medical problems have to know the nutrient content in order to select the food they need, or to avoid what is detrimental to their well being (Lambert, 1977).

Wilkie (1976) pointed out that one of the fundamental purposes of providing information for consumers from a public policy perspective is to enable consumers to evaluate the quality of products in brand choice decisions. People are often unfamiliar with the nutritional content of processed foods (Lambert, 1977). A benefit of nutrition labeling is point of purchase comparisions of different brands relative to their contents (Schrayer, 1978). Seventy-five percent of the consumers reported they would use nutrition labeling in deciding whether to buy a new brand (Division of Consumer Studies, 1976a; Stevan, 1974). Nutrition information seems to enhance buyers' confidence by assuring them of the correctness of their choices (Day, 1976; Division of Consumer Studies, 1976a). Another potential benefit is that nutritional labeling is an aid for

consumers in obtaining the U. S. Recommended Daily Allowance of important nutrients while lowering their food costs, if lowering costs is their goal (Lambert, 1977). Fifty-seven percent of the shoppers believed that they could cut food costs and still serve the family nutritious meals (Division of Consumer Studies, 1976a; Stevan, 1974). A further benefit is to nutrition teachers who can have a standardized format from which to teach what to look for in order to achieve a balanced diet.

Indirect Benefits

According to Freiden (1981) there are non-use benefits to labeling. One of these indirect benefits is that nutrition information labels strengthen consumers' confidence in the food industry (Lenahan et al., 1973). They make faceless food products more accountable. Advertising nutrition information might possibly contribute to consumers' education with regard to nutrition (Lenahan et al., 1973).

One of the reasons the Food and Drug Administration (FDA) set guidelines and printed booklets and brochures concerning nutrition label information was to create a consumer demand for more nutritious food that, in turn, will encourage the food industry to regard better nutrition as profitable (Schoenfeld, 1970). A non-use benefit may be that food labels create a whole new basis for product competition. According to Lambert (1977) a disclosure of nutrition information will bring competitive pressure on food manufacturers and improve the nutrient level of their product. Producers of competing brands would try to make their food products nutritionally more valuable than their competitors

(Lenahan et al., 1973). In 1984 over half of the packaged processed food sales (54%) consisted of products bearing nutrition information. There was an increase of 12 percent from 1978 (42%) to 1984 (54%) (Center for Food Safety and Applied Nutrition, 1984a). For one half of the packaged processed food sales which was nutrition labeled in 1975 the full label was mandatory. The other half had labeling which was voluntary on the part of the manufacturers (Lecos, 1982b). Seventy-eight percent of the potato chip manufacturers indicated that they nutrition labeled their products, and 76 percent provided sodium content on their products (Package Labeling, 1983). No direct relationship between brand share and presence of labeling could be found; also larger manufacturers did not begin nutrition labeling before smaller companies (Stewart, 1981).

The most common non-use benefits stated by consumers interviewed in 1972 were: the public would learn more about nutrition, food manufactures would tend to make more nutritious food products, and the consumers would get better nutritious value for their money (Lenahan et al., 1972).

Nutrition information on food labels and in advertisements, accompanied by nutrition education programs, can contribute to the consumers education about nutrition.

Use of Nutrition Information Labels

Research has been conducted to determine how much consumers are interested in using nutrition information on food labels (Asam & Bucklin, 1973; Division of Consumer Studies, 1976a; 1976b; Heimbach & Stokes, 1979; 1982; Lenahan et al., 1972; Schrayer, 1978; Smith et al., 1979; Stokes, 1972).

General Use of Nutrition Labels

The Consumer Research Institute assessed the use of the nutrient information on the labels through the use of a controlled experiment (Stokes, 1972). Families recorded their purchases over a four-week period during which no nutrition information was available, and then over an eight-week test period during which nutrition information was available. Changes in the market share of brands for certain product categories were observed before and after they were nutrition labeled. With nutrition information available, the market share of the more nutritious brand increased for the test period. This experiment successed in indicating that some consumers tend to use the nutrition information label.

Asam and Bucklin (1973) confirmed these findings by providing a variation in information on labels of canned peas. Results suggested that nutrition labeling may improve consumers perception of the quality of a product and the rank ordering of the preferred nutrients. Their findings support the idea that some consumers would be better served with the

provision of the labeling program.

In the 1975 FDA Consumer Nutrition Knowledge Survey the primary use of the nutrition label information was evaluated. Forty-two percent of all food shoppers reported that nutrition information "helped to get best buys", 28 percent stated that they "helped planning better home diets", 22 percent indicated that they would not use the labels too much, and 8 percent would use this information in another way (Division of Consumer Studies, 1976a; Murray, 1977).

Awareness and Actual Use

Several studies conducted during the last decade indicated that awareness and actual use of nutrition information labels increased. Before the 1973 nutrition label regulation few people were aware of the labels, and even fewer consumers used them. After the nutrition label regulation went into effect, awareness and actual use of nutrition information increased.

In the beginning of the seventies, Lenahan and associates (1972) conducted studies in four different stores (Giant, Jewel, First National, and Kroger Food Stores). Two months after the labeling program had been introduced in those selected stores, 26 percent of all respondent (averaged over the four tests) stated that they had actually seen the labels. Sixteen percent indicated they understood them, and 9 percent reported that they had used the labels at least once during the test period. After the labels were explained to the respondents, 97 percent were in favor of the idea of having nutrition labels on food products,

and 51 percent indicated that they would use the labels at least occasionally if the labels would be made available on food products.

Soon after the first packages displaying nutrient information appeared, personal in-home interviews in the Chicago metropolitan area were conducted, in early 1974. Twenty-nine percent of the homemakers interviewed were aware, on an unaided basis, of the nutrient information. Awareness of nutrient labeling increased to 88 percent after the labels were shown to the homemakers (Klinger, 1974).

In a nationwide survey conducted by the Division of Consumer Studies in 1975, 58 percent of the 1,664 chief food shoppers surveyed recalled that they had noticed the nutrition information label, with 33 percent stating that they used the nutrition label information (Division of Consumer Studies, 1976b; Schrayer, 1978).

During spring 1976 and 1977 a two-phase national survey was conducted to examine the usefulness of shopping aids to consumers (Smith, Brown & Weimer, 1979). Usefulness was measured on a five-point scale, "extremely useful, very useful, somewhat useful, not too useful, and not at all useful". In 1976, 55 percent of the consumers considered nutrition information extremely useful or very useful, whereas in 1977, 63 percent indicated it was extremely useful or very useful to them. However, the findings of this study suggested that the actual use of nutrition information by consumers appeared to be less than the reported usefulness. Actual use of nutrition information was measured by using a five-point Likert scale; if the respondent read nutrition information provided on food packages before purchasing a product for the first

time, they were asked to respond with: "always, almost always, sometimes, seldom or never". In 1977, 44 percent of the consumers reported reading the nutrition labels always or almost always before they purchased a product for the first time, compared to 29 percent in 1976 (Smith et al., 1979). Nutrition information seemed to be more important in 1977 than in 1976, and there is still the potential for future increases (Smith et al., 1979). The percentages for actual use would be higher if the category "sometimes" would be included in actual use (68 percent in 1977 and 60 percent in 1976). According to Jacoby and collegues (1977) 82 percent of the respondents reported after having been shown the label of a cereal box that they were aware of the labels. Fifty-seven percent of the respondents claimed that they used the nutrition labels in making their purchase decisions.

In the FDA 1978 Consumer Food Label Survey, 38 percent of the respondents recalled without aid, nutrition information as a piece of information on the food label. The aided recall question (mentioning of nutrition information) produced an affirmative response from 67 percent of the surveyed consumers. After the nutrition information sample label had been shown, 88 percent indicated awareness of the nutrition label. Sixty-four percent of all respondents reported that they use the nutrition labels (Heimbach & Stokes, 1979). Thus consumers actually appear to use the information on the label as they claim to do (Vandenberg, 1981).

Demographic Analysis of the Users

Lenahan and associates' findings (1972) about nutrient label use indicated that consumers in younger age groups, more educated, in higher income groups and of the white race would most likely be the primary users of the labels for nutrition information. In addition the respondents of the Consumer Research Institute Survey were parts of the affluent segment of society, living in suburban metropolitan areas (Stokes, 1972). Nicholls and Morrisons' results (1974) confirmed previous findings (Lenahan et al., 1972; Stokes, 1972) that better educated consumers look for more information on the label and are more sensitive to economic information and description of the content. A demographic analysis of the users in the 1976 and 1977 national surveys (Smith et al., 1979) indicated that interest in food labeling increased with household size, as well as when children under eighteen were part of the household. Female shoppers were also found to be more interested in nutrition than were males (Smith et al., 1979). Jacoby and associates' study (1974a) indicated that young people (college students) were more interested in reading labels than the older population. In the 1978 Consumer Food Labeling Survey, 64 percent claimed to pay attention to the nutrition information on the label (Heimbach & Stokes, 1979). Those who paid attention to the nutrition information were more likely to be well-nourished, white, between the ages 39 to 59 years, college educated, with above average incomes (Baumgardner, Heimbach & Stokes, 1980).

Non-Use of the Labels

Forty percent of the participants in an exploratory study conducted by Klopp and MacDonald (1981) were classified as non-users since they selected the response category to use food labels "never" or "seldom". Reasons for non-use of nutrient labels were absence of need, "I trust my ability to select nutritious foods without using the label information" (79%); having no time to read the nutrition label information when shopping (43%); and buying of certain brand-name products, regardless of the nutrition information (39%). For 30 percent the price of the food item was more important, and 18 percent reported not to know enough about nutrition to be able to use the label information (Klopp & McDonald, 1981, p. 310). Almost 43 percent of the users felt they understood all of the label information, compared to only 17 percent of the non-users (Klopp & McDonald, 1981). According to Jacoby and his associates (1977) a non-use reason is that consumers do not comprehend the labels due to lack of nutrition education. Other reasons for not reading the labels were given: print too small and/or knowing what they were going to buy before going shopping (Wyatt, 1980).

Costs of Nutrition Labels

According to Friedman (1977) costs for foods would increase because of the food label regulation. Everybody has to pay for something only a few consumers are going to use. He singles out nutrient information but ignores that advertising for products and recipes on the label and other information also increase the costs of a product. In addition, to the extent that nutrition information sells the product, the label information should result in higher sale returns to initial costs as do other advertising efforts. Seventy-nine percent said that they would prefer nutrition labeling over recipes on the packages (Division of Consumer Studies, 1976a; Stevan, 1974). Consumers are not asked how much they are willing to pay for this non-nutrient product information. According to Friedman (1977) the majority of consumers make no use of the labels. However, he ignores the indirect benefits (Freiden, 1981; Lenahan, 1973).

Consumers' attitudes towards nutrition labeling appeared to be highly positive (Daly, 1976). Research results of consumer desire for nutrition information are fairly consistent as this statement suggests: "Consumers say that they want nutrition information, say they would (or do) use it, and say they are willing to pay something extra to get it" (Jacoby et al., 1977, p. 121). In 1972, 36 percent of the surveyed consumers indicated a willingness to pay something for the labels (Lenahan et al., 1972). Willingness to pay was defined as a measure of perceived benefits (Lenahan et al., 1973). Findings of the 1973 FDA study indicated that 75 percent of the respondents would actually pay an

extra dime or more on their overall weekly food bill for nutrition information on food labels (Division of Consumer Studies, 1976a; Stevan, 1974). The 1975 FDA Consumer Nutrition Knowledge Survey showed a decrease to 65 percent in the share willing to pay a dime or more. In 1976, 58 percent of the respondents reported to be willing to pay a few pennies extra on their weekly grocery bill to have nutrition labels available (Daly, 1976). Daly (1976) considered the consumers' willingness (58%) to pay for the nutritional information during a period of rapid inflation as further evidence of their support for the nutrition labeling program. Furthermore 70 percent disagreed with the statement that nutrition labeling should be dropped if it ends up costing the consumer more money (Daly, 1976). Muller's findings (1982) confirmed previous findings that consumers are willing to pay a small premium.

Nutrition Education to Increase Use of Nutrition Labels

The FDA study in 1973 (Nicholls and Morrison, 1974) found that two thirds of the consumers understood that there is a difference between ingredient and nutrient labeling. The rest thought the two meant the same (Nicholls and Morrison, 1974). Various authors have indicated that nutrition information on the label is of little use unless it is accompanied by an educational campaign concerning the value of good nutrition (Bymers, 1970; Call & Hayes, 1970; Jacoby et al., 1977; Lenahan et al., 1972). Since the regulation the FDA has launched an extensive public education campaign to inform consumers about nutrition labeling. The government and federal agencies (USDA, FDA, FTC)

produced materials about how to read the labels, understanding labels, etc. They tried to educate people in terms of nutrition information.

People were approached by all different kinds of media to learn about the importance of nutrition. Magazines inform about that topic, as well as government agencies; and finally consumers are confronted with the labels on the products. Increased knowledge may be necessary to select good diets in America today.

Nutrition education should be emphasizied since it was found that over 70 percent of TV advertising time is devoted to promoting foods generally high in fat, saturated fats, cholesterol, sugar and salt (Henderson, 1982). Poolton (1972) stated that students gain nutrition knowledge in the classroom but don't apply the knowledge outside of the classroom. She proposes that nutrition education has to be made more interesting and more applicable for practical problems.

Baumgardner and associates (1980) proposed different education programs for different consumer groups. Their findings indicated that different consumer groups have specific information needs and process information in various ways.

Similarity between Unit-Pricing and Nutrition Labeling

A similarity may be drawn between unit-pricing and food labeling. Several studies (Friedman, 1966, 1971; Gatewood & Perloff, 1973; McCullough & Padberg, 1971; Russo, Krieser & Miyashita, 1975) have been conducted in regard to unit-pricing. Since unit prices have been available, people have been more inclined to use them instead of making

mathematical jumps with price comparisons. People have become used to use unit prices, and actually saved money when they did use them. McElroy and Aaker (1979) reevaluated the unit-pricing program and their findings indicated that a higher percentage than expected used the unit prices. In the beginning of the seventies about 65 percent of the consumers were aware of unit-pricing and about 55 percent used the unit prices. In 1979, 73 percent were aware and 61 percent reported to be users (McElroy & Aaker, 1979). The 6 percent increase in users indicated that people had learned to use unit prices (McElroy & Aaker, 1979).

Similar to unit-pricing, the level of awareness and actual use of the nutrition labels increased and will increase, because of the fact that the labels are there, as well as additional education programs designed to make consumers aware of nutrition information labels.

Nutrition Information on Food Labels

Information on labels can be characterized by:

(1) type of information,

(2) amount of information provided, and

(3) format in which the information is presented.

These factors are considered important in consumers' information processing research because they are thought to affect the ability to process information and therefore the potential usefulness of information to consumers (Muller, 1982). According to Day (1976) objective product information should be easily accessible at the point of purchase, understood by the consumers, and physically displayed in a form which allows direct comparision of alternative brands.

Type of Nutrition Information

According to the 1973 nutrition label regulation, a defined set of components has to be displayed on the nutrition information label (see figure 1). Within the last decade several surveys have been conducted to determine importance ranking of nutrients available on nutrition label information with several different samples, to determine if the highly important ranked nutrients are the ones currently required to be on the nutrition information label. Results are reported below.

Calories

Consumers want to know about calories, especially when they are following a reduced calorie diet. Fifty-five percent of the participants in the "FDA Hearings: You Can Change Government Policy" stated that they had a health problem which required specific knowledge about calories (Murray, 1978).

AIN members (75%), the food industry (66%) and the consumer panel (61%) ranked obesity, overweight and excess calorie intake as the most important diet-related health problem (Heimbach and Stokes, 1981). In 1981, 94 percent of the AIN members, 92 percent of the food industry, 95 percent of the consumer panel, in 1978, 87 percent of the consumers and in 1970, 74 percent of the AIN members rated calories information as useful to consumers (see table 1).

Protein

About 80 percent of all the groups surveyed by Heimbach and Stokes (1981) rated protein as very useful information on the label (see table 1). However, consumers are not really concerned with protein deficiencies (Food and Drug Administration, 1978).

Table 1: Ratings of Utility to Consumers of Nutrition Information*

Type of information	AIN members in 1981	Food industry in 1981	Consumer panel in 1981	Consumers in 1978+	AIN members in 1970#
Calories	94	92	95	87	74
Sodium (salt)	81	70	95	73	55
Fat	80	73	88	77	69
Protein	78	76	87	81	81
Iron	70	54	75	74	70
Calcium	67	52	72	64	68
Carbohydrates	62	70	80	72	48
Polyunsaturated fat, %	56	37	76	64	51
Saturated fat, %	53	40	77	63	
Cholesterol	55	44	80	74	35
Potassium	55	41	67	47	
Amount of CHO that is fiber	55	35	64	58	
Amount of CHO that is sugars	53	39	70	75	
Vitamin C	53	44	67	78	70
Vitamin A	52	40	61	63	71
Vitamin D	46	37	57	62	62
Thiamine	46	39	53	40	58
Riboflavin	45	39	55	30	54
Niacin	43	38	53	36	49
Amount of CHO that is starches	43	27	54	65	
Vitamin B_6	41	30	56	50	37

Table 1: continued

Vitamin B_{12}	37	30	57	58	38
Iodine	35	21	46	47	47
Phosphorus	34	16	29	28	35
Folacin	34	9	25	12	34
Zinc	30	10	31	25	
Vitamin E	29	24	48	52	27
Magnesium	28	11	35	23	24
Pantothenic acid	22	11	28	14	
Vitamin K	20	13	37	36	
Copper	19	9	24	17	
Manganese	17	7	28	16	
Biotin	17	7	22	10	
Selenium	15	5	22	9	
Chromium	13	4	20	10	
Choline/lecithin	12	7	24	25	
Molybdenum	12	6	20	10	
Inositol	11	6	19	9	
Mean rating score	42.5	31.9	52.6	45.6	NA§
n	531	177	107	884	824

* Rating scores based on the following weighting: "very useful" = 100, "of some use" = 50, "of little use or no use" or "don't know enough" = 0.

+From Heimbach and Stokes (1979.

++ From Call and Hayes (1970). Ratting scores for the 22 types of information (including "fatty acids" rather than separate percent saturated and polyunsaturated fats) based on the following weighting: "high priority" = 100, "medium priority" = 50, "low priority" = 0.

§ Not applicable.

From Heimbach and Stokes, 1981, pp. 39-40.

Carbohydrates and Sugars

All sugars are carbohydrates, but not all carbohydrates are sugars. Carbohydrates can be broken down into sugars, fibers and starches. There are all kinds of sugars: sucrose (cane and beet sugar), corn sweetner and syrup, invert sugar and honey, fructose, glucose, lactose, and many others. The body breaks carbohydrates into simpler sugars (e.g. sucrose into glucose and fructose). These components enter the blood stream and are carried to tissues and the liver. There they are converted into glycogen and fat and stored until the body needs the sugars as an energy source.

Today, Americans consume 24 percent of their daily caloric intake from all types of sugar. The per capita consumption for all sugars increased from 122 pounds in 1970 to 128 pounds in 1978 (Lecos, 1980).

Sugar is one type of ingredient in foods that people most often try to avoid, because experts believe that it is healthier if Americans would eat less sugar (Heimbach & Stokes, 1981). Furthermore, sugar has become the leading ingredient added to foods in the United States. Most people do not know how much sugar they consume, even though many want to know. The concern about sugar is consistent with the public concern of being overweight as is, the relationship between sugar and tooth decay and other health related problems. Sugar has been shown to be a main contributor to tooth decay. Americans spend $10 billion a year on dental care (Lecos, 1980). In written and oral statements 27 percent of the respondents discussed sugar, making this the most frequently mentioned food component (Food and Drug Administration, 1979). Thirty-nine

percent of the participants in the TV program "FDA Hearings: You Can Change Government Policy" indicated that they were concerned about sugar consumption (Murray, 1978).

The public would like to see sugar listed on food labels (Food and Drug Administration, 1979). Is seems that 80 percent of the consumer panel in 1981 rated carbohydrates as useful to consumers; the consumers in 1978 (72%) and the food industy in 1981 (70%) rated carbohydrate information as more useful to consumers than the AIN members in 1981 (62%) and in 1970 (48%). Consumers indicated a high interest in the amount of carbohydrates which are sugars and less interest in the amount of starches and fibers (see table 1). Consumers desire to have information about the carbohydrates broken down into its components, sugar, fiber and starch, not just the total carbohydrates, as the current label displays (Schucker, 1981). Current labeling combines both complex and simple carbohydrates, yet only the latter are sugars. It has been discussed that the total amount of sugars should be shown on the label, excluding cases below a minimum level of five percent of sugar per serving (Lecos, 1980). In addition it should be decided whether or not information is needed on the total sugar content of a food product or only on the added sugars (Lecos, 1980).

Fat and Cholesterol

The United States has one of the highest fat content diets in the world. During this century, the total fat intake had risen from 32 to 42 percent of the total calories consumed. As a guideline the Food and Nutrition Board of the National Academy of Sciences suggested that the fat intake should not exceed 35 percent of the total calories (Lecos, 1983).

Fats are the most concentrated sources for food energy, providing nine calories per gram. They also supply essential fatty acids, and are carriers of vitamins. (Miller, 1981).

Most fats are derived from either animal or vegetable food sources. Fatty acids are generally described as either saturated or unsaturated, referring to the number of hydrogen atoms attached to the carbon atom in the fat molecule. If all the carbon atoms within the chain are linked to hydrogen atoms, the fatty acid is considered to be saturated. If two carbon atoms are double bonded and have one less hydrogen atom, the fat is called monounsaturated. Polyunsaturated fatty acids have more than one double bond between carbon atoms (Lecos, 1983).

Concern about the quality and composition of fats stems from a greater understanding of the possible relationship between those substances and heart diseases (Food and Drug Administration, 1979). Medical experts believe that there is a link between consumption of saturated fat and cholesterol, and the incidence of heart disease.

Cholesterol is not a fat, but a steroid which is a fat-like substance found in animal tissues. In addition it is an important part of nerve tissue and cell membrane (Lecos, 1983).

High blood cholesterol levels are considered a risk factor for heart attacks. People with diets high in saturated fats and cholesterol tend to have high blood cholesterol levels, and usually are at greater risk of a heart attack than people eating low-fat and/or low-cholesterol diets (Lecos, 1983). Hypertension, cholesterol levels and heart diseases might be linked by the following sequence of events: cholesterol, in the blood carried by lipoprotein (fat and protein complexes), may be deposited in fatty streaks along the inner linings of arteries, builing up fibrous plaque. This causes the artery wall to thicken, resulting in reduced blood flow due to narrowed arteries and increased blood pressure. Eventually the artery may be completely stopped up, resulting in a stroke, if it is an artery feeding the brain, and a heart attack, if the artery is connected to the heart. Thus high blood cholesterol level is one of the factors that increases the risk of having a heart attack (Miller, 1981). Consumption of polyunsaturated fats can result in lowering of the blood cholesterol level (Miller, 1981).

Overconsumption of fats and saturated fats was given high priority as a health problem. In the TV program "FDA Hearings: You Can Change Government Policy", 43 percent of the participants indicated a need for information on cholesterol and fats (Murray, 1978). The utility of fat information to consumers was rated between 69 percent (by AIN members in 1970) and 88 percent (by the consumer panel in 1981). The consumer

panel indicated special interest in saturated (77%) and polyunsaturated fats (76%), whereas only about 40 percent of the food industry thought it would be useful. There was a wide difference in the rating of cholesterol, with 80 percent of the consumer panel and 74 percent of the consumers in 1978 rating cholesterol as useful information for consumers, while in 1981 only 55 percent of the AIN members found it useful. In 1970, 44 percent of the food industry and 35 percent of the AIN members rated cholesterol as useful information for consumers (see table 1).

On the voluntary nutrition label cholesterol is printed as grams per serving and in parentheses per 100 grams of the food. Information about fat is provided first by the percentage of the total number of calories and second by the grams of fat, divided into polyunsaturated and saturated fats (see figure 2). The remainder not listed are monounsaturated fats (Food and Drug Administration, 1977). This information, if available on all foods, would help consumers to select adequate food products when living on cholesterol or fat modified diets (Stephenson, 1975).

Minerals and Vitamins

Consumers expressed relatively low interest in specific vitamin or mineral values during five public hearings held in 1978 (Food and Drug Administration, 1978; 1979). The utility of nutrition information for consumers was rated very useful for sodium, iron, calcium and potassium. The vitamins were rated lower, followed by the other minerals (see table 1).

Sodium

Sodium plays a major role in maintaining blood volume and blood pressure by holding water in the blood vessels and controlling the passage of the water in and out of the cells. Sodium is also necessary for nerve transmissions, and affects the sensitivity of arterioles by aiding blood circulation and oxygen exchange. It is contained in all body fluids and is central to proper body functioning (Andres, 1982). It also helps regulating the balance of water and dissolved molecules moving in and out of cells (Seligsohn, 1981).

As valuable as sodium is, the body needs only small amounts (Food and Drug Administration, 1983). The minimum daily adult requirement for sodium is 200 milligrams, while a daily dose of 1,100 to 3,300 milligrams for an adult is still considered "safe and adequate" by the National Research Council. However, the estimated average daily dose in the United States varies between 2,300 to 6,900 milligrams (U. S. Department of Agriculture & U. S. Department of Health and Human Services, 1982;

Jones Putnam & Reidy, 1981).

Certain health problems, such as hypertension, have been associated with excessive sodium intake. Hypertension is a major public health concern in the United States today (Wolf, Raper & Rosental, 1983). About 60 million Americans are affected by hypertension; 35 million are definitive hypertensives (= 160/95 mmHg) and the other 25 million are at the borderline (= 140/90 mmHg), according to the National Heart Lung and Blood Institute (Heimbach, 1983; Jones-Putnam & Reidy, 1981). Hypertensives who do not keep their blood pressure under control are at considerable risk of developing serious heart, circulatory (stroke) and kidney problems. (Food and Drug Administration, 1984; Jones-Putnam & Reidy, 1981).

Although many epidemiological studies indicated a relationship exists between sodium intake and the prevalence of hypertension, the evidence that sodium consumption is a major factor in causing hypertension is not conclusive (Lecos, 1982a). Rather, the predominant medical/scientific view is that there is an association or link between sodium consumption and hypertension, particularly for salt-sensitive persons (Miller, 1983). However, excessive salt intake in the diet has been linked with hypertension. Several studies have shown that people throughout the world who take little sodium in their food do not develop hypertension (Jones-Putnam & Reidy, 1981; Stein, 1981). The incident of high blood pressure occurs more often among people who eat more sodium than they need (National Urban League & Food and Drug Administration, 1984).

About half of the consumers interviewed in a telephone survey conducted by the FDA's Division of Consumer Studies connected high blood pressure with salt consumption (Heimbach, 1983). Fifty-seven percent thought that the terms salt and sodium have the same meaning even though chemically, salt is sodium chloride (Heimbach 1983). Salt is about 39 percent sodium, and the largest single contributor of sodium to the human diet (Stein, 1981).

In the 1976 USDA survey 22 percent of the households reported that at least one person in their household had hypertension. Fifty-five percent stated that they had changed their diet to reduce salt, and 26 percent indicated that they read labels when doing their shopping to see if sodium was present (Jones-Putnam & Reidy 1981). In 1977, 13 percent of those surveyed expressed concern about salt content in their food and there was an increase to 25 percent in 1980 (Andres, 1982). Eighty-six percent of the respondents in a 1980 survey agreed the more salt you consume the greater the risk is of high blood pressure. However only 46 percent saw any potential health benefits from a reduction in their own salt intake (Jones-Putnam & Reidy, 1981). A FDA survey conducted in fall 1982 found that 85 percent of the consumers were concerned enough about the salt content of processed food products to look at least at the label (Demkovich, 1983). Twenty-five percent of the people who were concerned with salt consumption recalled seeing sodium on some of the nutrition information label but often it was not available when they looked for sodium information. In a 1983 telephone survey about sodium labeling 26 percent were concerned about their sodium consumption

(Heimbach, 1983). Nearly three out of four adults have read or heard about health problems related to sodium or salt and four out of ten adults are trying to avoid or cut down on salt intake (Miller, 1983). In 1978 salt was number two on the avoidance list after sugar and number one in 1982; 40 percent of those surveyed tried to avoid salt while 30 percent tried to avoid sugar (Miller, 1983). The respondents claiming to avoid sodium have increased dramatically from 14 percent in 1978 to over 40 percent in 1982.

Twenty-five percent of the sodium intake occurs naturally in food, another 25 percent is added while preparing it or at the table, with the remaining 50 percent added at the processing plant (Stein, 1981). Salt is the second leading food additive after sugar in the amount added to food each year (Seligsohn, 1981; U. S. Department of Agriculture & U. S. Department of Health and Human Services, 1982). Every one can use a salt shaker to add more salt, but salt removers have not yet been invented (Semling, 1981).

The only mandatory requirement for listing sodium content has been when a particular food is recommended for controlling one's sodium intake. Interested consumers must usually write to the manufacturer for sodium information in order to make product comparisons (Jones-Putnam & Reidy, 1981). Foods with quantitative sodium information appearing on the labels accounted for 30 percent of grocery sales in 1978 and increased to 40 percent in 1984 (Center for Food Safety and Applied Nutrition, 1984b). Consumers with various health problems (hypertension, kidney disease, diabetes, etc.) indicated increased purchases of low-salt

products; 8 percent in 1977 versus 14 percent in 1980 (Andres, 1982). Forty-one percent of the participants in the TV program "FDA Hearings: You Can Change Government Policy" indicated that they watched their salt intake (Murray, 1978).

Until all manufacturers of processed food make known the amount of sodium per serving, neither patient nor physicians will be able to make proper decisions about appropriate sodium deductions (Seligsohn, 1981). For people with hypertension, the problem is not how to get a balanced diet, but how to know which foods are high or low in sodium (Stein 1981). Medical experts and policy makers have expressed the view that sodium reductions for everyone cannot hurt and may actually help prevent high blood pressure in some people (Miller, 1983).

The industry has indicated that labeling of sodium would increase costs because of the analytical problems required to determine the sodium content (Schmidt, 1984). Soil salinity, as well as the sodium content of water, varies from region to region and influences the sodium content of raw products (Stein 1981). However, the American College of Preventive Medicine stated that mandatory sodium labeling would only generate small expenses to either the government or industry, in comparison to the potential reduction of medical costs for treating hypertension related illness, including heart and kidney disease and stroke, which currently total about $8 billion a year. The savings would be even greater if reduction in human sufferings would be taken into account (Demkovich, 1983; Jones-Putman & Reidy, 1981; Schmidt, 1984). Benefits of sodium labeling are very difficult to assess; it could be an

improvement in public health, a decline in mortality associated with stroke and heart diseases and perhaps a reduction in the severe occurence of hypertension (Jones-Putnam & Reidy, 1981).

Sodium is not required to be on most labels, but it is voluntary provided by some manufacturers in milligrams per 100 grams of the product (Food and Drug Administration, 1977). In five hearings held in 1978 there was general agreement that sodium content should be labeled in grams or milligrams per serving, with sodium per 100 grams of the food product added in parentheses. One of the problems that consumers saw with sodium labeling in milligrams is that only a few have any idea of what their goals should be in terms of milligrams of sodium per day. A study conducted by Wyatt (1980) indicated food labeling does not adequately inform consumers of the sodium content in processed foods. There is a need for more information on sodium content and education to use and understand the information (Wyatt, 1980).

Sodium information was rated useful by almost all group members; by 95 percent of the consumer panel, 81 percent of the AIN members in 1981, 70 percent of the consumers in 1978, 70 percent of the food industry and 55 percent of the AIN members in 1970 (see table 1). These ratings demonstrate that consumers wish to have information about sodium. The rising public interest in sodium labeling is not surprising, because of the concern about the relation between sodium, hypertention and other physiological disorders.

One question being discussed is if the amount of sodium should be included in the nutrition information, or only displayed in standardized

expressions, like "low sodium" or "reduced sodium", on the label (Food and Drug Administration, 1979).

General Rating of Nutrients

In 1972 nutrient information was rated highest for vitamins and minerals, calories, proteins, fats and carbohydrates (Stokes, 1972). However, in the 1978 hearings, written comments and survey findings indicated a change in consumers' interest, placing more importance on the macro-nutrients and calories than on the micro-nutrients (Food and Drug Administration, 1979; Heimbach, 1981). In five public hearings held in 1978 consumers were most concerned about sugar, salt and/or fat (Food and Drug Administration, 1978). Consumers expressed a need for additional nutrient data, specifically about calories; fat, with a break down into saturated and polyunsaturated fats; carbohydrates, with a break down into simple and complex carbohydrates; cholesterol and protein (Food and Drug Administration, 1978). A possible reason for the change in the importance ranking could have been that the public is concerned about "possible averse health effects of the foods they consume" (Heimbach & Stokes, 1982, p. 701). The most important diet related health problems were obesity, followed by heart and cardiovasuclar diseases. High blood pressure was mentioned as a health problem along with most types of overconsumption, especially overconsumption of fats, saturated fats and sugar (Heimbach and Stokes, 1982).

Amount of Information (Information Load)

Information Load Paradigma

In recent years several studies dealing with various issues regarding consumer information processing have been reported in the literature (Bettman, 1975; 1979; Jacoby, Speller & Kohn, 1974a; Jacoby, Speller & Berning-Kohn, 1974b; Jacoby, Chestnut & Silberman, 1977; Scammon, 1977; Wilkie, 1974). A review of the literature showed that a controversy exists about consumer information processing, particularly in regard to the information load paradigma (Malhotra et al., 1982). Although the findings of some researchers indicated the occurrence of information overload in point of purchase decisions (Jacoby et al., 1974a; 1974b) these findings and conclusions have been questioned by others (Malhotra, 1982; Muller, 1982; Russo, 1974; Summers, 1974; Wilkie, 1974).

The information paradigma is based on the proposition that there are finite limits to the amount of information human beings can assimilate and process during a given unit of time (Jacoby et al., 1974a). The term information load is the load or the burden being placed on the processing capacity of the short term memory (Bettman, 1979). Overload occurs when these limits are exceeded, and consumers become confused and dysfunctional as a result. Dysfunctional performance is a result of too much information (Jacoby et al.; 1974a, 1974b). This concept is theoretically supported by research in human information processing (Miller, 1956). According to Miller (1956), humans are able to cluster information pieces to chunks, and can process about seven of those

information chunks. The information paradigma seems reasonable, but the question is whether or not the phenomenon of information overload in the consumer setting has been demonstrated.

Previous Studies on Information Load

Jacoby and associates (1974a; 1974b) were among the first consumer behavior researchers to study this phenomen. In their studies, they tried to evaluate the effects of experimentally controlled information on consumer product decisions by studying the effects of various amounts of information on brand selection. In one study they used a 3 x 3 (number of brands of laundry detergent by items of information per brand) design. The subjects (students) were randomly assigned to one of the nine treatment conditions. The subjects received 8 to 72 items of information according to their specific treatment cell. They had to provide importance ratings for the product attributes of laundry detergent, to rate their ideal brand and to identify their most preferred brand from among alternatives in the choice setting. The effects of information load were evaluated by examining several questions related to the subjective evaluation of the proccess by the consumers (subjective psychological states) regardless of their abilities to select the best brand. Best brand was defined as that brand which most closely approximated the subject's ideal brand as measured prior to the experiment. Jacoby and associates' conclusions were that increasing package information load beyond some maximum point tended to produce dysfunctional consequences. The subjects felt better with more

information, but actually made poorer purchase decisions in terms of consumers' ability to select the brand which was best for them (Jacoby et al., 1974a). The general conclusion was that after some threshold the more information displayed in the study the poorer were the purchase decisions.

In a follow-up study, Jacoby and collegues (1974b) varied the number of brands and product attributes at four levels, to further highlight the occurence of information overload. Their subjects were housewives, and the products they used were rice and prepared dinners. The results obtained with the subjective state variable confirmed previous findings of Jacoby and associates (1974a). Subjects felt more satisfied, more certain, less confused, and desired less additional information as the total amount of information they were provided with increased, even though they made poorer purchase decisions.

Earlier studies (Jacoby, Szybillo & Busto-Schach, 1977; Olson & Jacoby, 1972) indicated that purchase decisions are based on the three to five most important product dimensions rather than on all available information. Consumers tend to organize and integrate the information bits into larger information chunks (Miller, 1956; Jacoby et al., 1974b). Therefore Jacoby and associates (1974b) concluded that consumer's ability to process information is limited.

Wilkie (1974) has argued that the two sources of variance in Jacoby and associates' studies (1974a; 1974b), the number of brands and the number of items per brand, are conceptually comparable or equally controllable. He does not dispute the overload premise, but to evaluate

the impact of information load on consumers the number of dimensions of information should be varied rather than the number of products. Within a number of brand conditions, results showed that more items of information per brand generally improve decisions. In Wilkie's opinion (1974) Jacoby and associates' data (1974a; 1974b) do not support the conclusion that consumers make poorer decisions with more information. As a response to Wilkie's critisism (1974), Jacoby cited Woodruff (1972, p. 259) "A consumer's prior information can be segregated by brands and attributes" (Jacoby, 1977, p. 570), to indicate that consumer information can be considered a function of both brands and items of information about brands. According to Summers (1974) Jacoby and associates' findings (1974a; 1974b) indicated that more information about an individual brand indeed led to a greater number of correct decisions. Therefore, Summers' findings tend to support the opposite of the conclusion that more information leads to poorer purchase decisions. Russo's reanalysis (1974) of Jacoby and associates' experimental situation confirmed that consumers wanted and benefited from more information. His findings conflict with Jacoby, Speller and Kohn's conclusions (1974a) in that "the source of the subject's confusion was not too much, but too little information" (Russo, 1974, p. 71). This explains why the consumers did not suffer from information overload. In addition, in Jacoby and associates' study (1974a), the different numbers of alternatives for different subjects were randomly selected. Therefore the measures of choice were not accurately comparable because equally difficult test choices were not provided across different numbers of alternatives

(Russo, 1974). Furthermore the fact of the information load within Jacoby and associates' study should be questioned because the subjects were dealing with only one choice and in the test-like situation the subjects' motivation was high to work at reaching a decision until they were satisfied (Russo, 1974). Summers (1974) questioned the external validity of the experiment by asking how much can be generalized from studies making simulated choices about laundry detergent in a laboratory experiment?

Malhotra, Jain and Lagokos (1982) reviewed the information overload controversy by reanalyzing Jacoby and collegues's studies (1974a; 1974b) with the LOGIT approach. The general conclusion of their reanalysis was that the probability for making better decisions increased when the number of attributes was increased. The reanalysis of the instant rice data (Jacoby et al., 1974b) revealed that when the number of brands increased the probability of making a correct choice decreased (Malhotra et al., 1982). According to Jacoby (1984) Malhotra and collegues' findings (1982) indicate that there is no overload due to the number of attributes, but there is a tendency towards information overload for number of brands and number of items (attributes x brands) (Jacoby, 1984). At the same time, the results of Malhotra's own study (1982) supported the evidence for an overload effect (Jacoby, 1984). "The empirical investigation revealed dysfunctional effects of information overload if the respondents were provided with 10 or more alternatives in the choice set or with information on 15 or more attributes" (Malhotra, 1982, p. 427). According to Jacoby (1984) there is

enough evidence to suggest that consumers can be overloaded. But more important is will the consumers be overloaded? There is a widely accepted belief that information proccessing and decision making are selective. "Consumers have a variety of information processing strategies to limit the amount of information that they permit to enter into their decision making" (Jacoby, 1984, p. 434). Since consumers are selective, policy makers and advertisers should pay more attention to what kind of information they want to provide instead of how much is provided (Jacoby, 1984). Jacoby, Syzbillo and Busato-Schach (1977) found that consumers typically acquire small proportions of the available information.

Scammon (1977) extended the information load paradigma by varying the number of attributes and the formats. She used a 2 x 2 (amount: 4 or 8 nutrients per brand by format: percentage of recommended daily allowances on specific nutrients or adjectival descriptions of the nutrient contents) design. Subjects were presented with information about two brands of peanut butter, and were requested to identify the brand that was more nutritious, and thus the preferred choice. In Scammon's study (1977), the dimension of information was defined as an objective, testable fact (nutrient content of an individual nutrient), with information load defined as the number of dimensions (number of nutrients) per brand. One of her results was that the more nutritious brand was identified independently of the amount of nutrition information the subjects received. The subject's brand preference or intention to buy was affected by neither the amount nor the format

(adjective/numerical) of the information, but it appeared that satisfaction and certainty of their decision were significantly less for respondents receiving more information. However, some information was found to be better than none. The subjects were more satisfied with the given information when the information was given in percentage format. Subjects felt less satisfied with the information provided as adjectives. The overall conclusion was that processing time available appeared to explain the results better than the phenomenon of information overload (Scammon, 1977).

Malhotra, Jain and Lagokos (1982) reviewed Scammon's study (1977) with the LOGIT approach. Reanalysis of Scammon's data (1977) indicated that subjects had a tendency to make better decisions when they were provided with the information on eight nutrients in adjective format than when they had no information about nutrients. Malhotra and collegues' reevaluation (1982) of Scammon's data (1977) suggested that the adjective format facilitates the processing of information as compared to a percentage or numerical format. If that result can be generalized, it is important for policy makers to know to communicate to the consumers in a verbal format (Malhotra et al., 1982).

Neither Jacoby's conclusion (1974a) that consumers actually make poorer purchase decisions with more information, nor Scammon's conclusion (1977) that "neither the amount nor the format of the information presented to the subjects affected their brand preference/intention to buy" (p. 152) could be confirmed (Malhotra et al., 1982). Malhotra and associates (1982) stated that providing consumers

with more information is a step in the right direction, because consumers are capable of processing "fairly" large amounts of information. But they admitted that the capacity to absorb and process information is not unlimited (Jacoby, 1984). Consumers in general have more favorable attitudes towards more product information than towards brands with less product information (Freiden, 1981).

Information Processing: Consumer Characteristics

Lambert (1977) questioned the ability of consumers to make optimal choices among many alternatives with much nutrient information per alternative. He suggests that "the complexities and difficulties of the information manipulation and choice tasks necessitated by nutrition labeling would appear to preclude the most needy consumers from using this information to minimize their food costs" (Lambert, 1977, p. 131). In his opinion the current nutrition information label might serve some consumers extremely well. However, he doubted that the poorly educated and/or elderly can deal effectively with all the information provided by the present form of nutrition information.

An extensive study about information load and information type showed that different consumer groups preferred different types of labels (McCullough & Best, 1980). Information load was defined as 4, 8, or 12 items of information; and type of information was defined as ingredients only, ingredients and nutrition, nutrition only, percent ingredients and nutrition, percent ingredients only. Using these different types of information fifteen different labels for bread were developed.

Consumers with similar preference patterns towards information amount and format of labels were clustered together. Consumer groups were examined on attitudes, demographics and consumption characteristics. Mainly blue collar families showed a decreasing utility for more information and preferred a simple label with ingredients listed only. In particular white collar workers indicated a desire for an increasing amount of information. They preferred more complex types of information, e.g. listing of ingredients in percentage and listing of nutrition information. This study indicated that there are different preferences for type and amount of information among different consumer segments. Consumers can be differentiated, because different consumer groups prefer different labels. Jacoby, Chestnut, Weigl and Fisher (1976) found that different consumer types use also different information acquisition and processing strategies.

McCullough and Best (1980) found that consumers can be segregated into groups. There are consumers who want to have more information and others who favored less information. Heimbach (1981) confirmed this occurrence. Those who reported the need of more information were the ones with specific health problems. Therefore, an ideal label has to be developed to provide necessary information in suffcient detail for those who need it, while avoiding overloading others.

Jacoby and associates (1974a; 1974b) indicated that the information load consumers can handle depends upon their age and education. Jacoby and associates (1977) found in their study with breakfast cereal that college students were better able to process

information and were more interested in labels than older, less educated population groups. McCullough and Best (1980) found also that knowledge regarding nutrition depends on education. The more people are educated, the more information they seek (Thorelli & Thorelli, 1977). McCullough and Best (1980) concluded that less educated, lower income consumers are more likely to prefer smaller amounts of information. Additional information might actually confuse them, or they would find it of no value. In summary the consumer's capacity to absorb and process information is not unlimited and varies among consumer types.

Information Processing: Motivation

Another aspect concerning nutrition information is the motivation to use the information (Muller, 1982). According to Bettman (1979) the motivation of the consumers to acquire and process information is rather low. If people are not motivated, they are not able to process as much information, but if people are interested in a certain topic, they can process larger amounts of information. For example, if consumers have to live on a certain diet they are more able to process the information given on the label. Thus it appears that motivation affects the amount of information consumers can process.

Information Processing: Time

According to Jacoby and collegues (1973) providing information involves costs for the manufacturer as well as for the consumer. "It takes time for the consumer (a) to identify relevant sources of information, (b) to physically locate or obtain these sources, (c) to simply read (input) the information into one's information processing system and finally (d) to evaluate this information prior to making a decision and/or engaging in some behavior" (Jacoby, Kohn & Speller, 1973, p. 813). They used a 4 x 4 (number of brands by number of bits of information per brand) information matrix, where the subjects were assigned to either 4, 8, 12 or 16 bits of information for either 4, 8, 12 or 16 different bands. The findings of their labatory-like experiment indicate that consumers will continue to spend time acquiring package information as the number of brands increases, (at least up to 16 brands); however, they will tend to stop spending time to acquire package information as the number of bits (amount) of information per brand begins to exceed 12, regardless of how this information may be organized (Jacoby et al., 1973).

Scammons' findings (1977) indicated that time available for product examination played an important factor in information processing and recall. The analysis suggested that the major constraint on consumers to process and recall information was the exposure time and a finite amount of time to process the information, with more items were added, the less time per item was available (Scammon, 1977). Chesnut and Jacoby (1976) conducted a study and showed that as more items were bought, the less time was spent per item. In their opinion the acquisitation of nutrition

information decreases as more items are bought. People are under time pressure and cannot spend much time reading and decision making to obtain the best purchases. In today's world people have "no time" (Linder, 1976). Therefore everybody hurries through the supermarkets and does not want to spend time dealing with prices or nutritional information that are not easy to understand. But if the format is easy to read and understand they are more willing to use it as a shopping aid in spite of time constraints.

Information Processing: Effectiveness

The information has to be accessible, comprehenable and relevant to be processed (Day, 1976). Information is more effective, the closer the information display is to the point of decision, in a form that permits easy comparison to alternatives (i.e. a standardized nutrition information label on the product, or the matrix form label (brand by nutrient) on the shelf). Even if the information is available, it does not necessarily mean it is comprehendable. The seriousness of this problem depends on the effectiveness of an accompanying nutrition education program. The relevance of the information is also important. Seemingly unimportant information has little effect (Day, 1976). The more relevant the information is the more likely it will be acquired and processed. Therefore more relevant information for consumers should be given higher priority on the nutrition labels.

"Useful Information Load"

Some studies indicated that there is information overload while others studies do not suggest overload. The question still remains whether or not the human information processing limitation documented in the behavioral sciences will prevent consumers from effectively using large amounts of product information in a real life setting or under what conditions might be likely to do so. A balance must be found between information "overload" and "useful" information which consumers may understand (Symons, 1981).

Format of Information Display

Bettman's point of view (1975) is that it is crucial for consumers to have access to nutritional information. The issue is not whether to present nutrition information, but rather how to present the information most effectively so that consumers can process and use it, if they desire to do so. Information format is the manner in which product information data are presented and physically organized (Day, 1976).

In the past, policy makers concentrated efforts to make information available. However, it is not sufficient to make information available, because it cannot be used by consumers if it is not processable (Bettman & Kakkar, 1977; Russo, Krieser & Miyashita, 1975). The format in which the information is presented affects the acquisitation and perhaps even the usage of the information (Bettman, 1979; Bettman & Kakkar, 1977; Bettman & Zins, 1979; Biehal & Chakravarti, 1982; van Raaij, 1977). That means that the ability to process information depends upon presentation and format of the information.

According to the present regulation the calories are measured in calories; the macro-nutrient (protein, carbohydrate and fat) are measured in grams; and the micro-nutrients are measured in U. S. Recommended Daily Allowances (U.S.RDA), based on one serving. The U.S.RDA allowances are guides to the amounts of vitamins and minerals a person needs each day to stay healthy. The U.S.RDA's were developed by the Food and Drug Administration for use in nutrition labeling and for labeling of dietary supplements and special dietary foods, and are based on the Recommended Dietary Allowances established by the Food and

Nutrition Board of the National Research Council. (Kinder & Green, 1978). Basically, with the 1973 regulation a new system for labeling of vitamins and minerals present in a food product has been established. The U.S.RDA's replaced the previously used Minimum Daily Requirements, which were based on how much is needed to avoid dietary deficiencies The new system, the U.S.RDA, indicates how much is needed to maintain good health (FDA Consumer, 1981).

According to Kemm (1980) it is difficult to establish nutrient requirements, because standards differ within countries and change over the years. The minimum requirements are also influenced by individual variables (sex, age, activity, etc.), environmental variables (temperature, altitude, etc.), food variables (interaction of nutrients, etc.) and pathalogical variables (diseases, etc.).

The nutrients on the information label can be presented in a numerical, verbal or graphical mode. The current label is expressed in the numerical mode (see figure 1). The U.S.RDA's are used for the micro-nutrients on a percentage basis.

Summary

There is no argument about the consumer's right to be informed. The question is; who decides what it is that the consumer has the right to know? There is a controversy about the amount of information that should appear on the label and the extent of use. Previous studies indicated that there was an increase in awareness and usage of the nutrition information labels within the past decade. Most often the labels are used for comparision shopping between different brands rather than for meal planning.

However, consumers find the current label confusing and are dissatisfied with the current content of the nutrition information label. Possible reasons for this dissatisfaction were that consumers did not see a need for some of the mandatory micro-nutrient measures (e.g. riboflavin, niacin, thiamin) and others included by the manufactures (e.g. zinc, magnesium, etc.). They rather preferred to have information included about nutrients considered detrimental to their health like sodium; sugar, separated from the total carbohydrates; fatty acids broken down into saturated and polyunsaturated fats; and cholesterol.

Findings indicate that some of the expressions on the current label are too complex and unfamiliar for consumers. It was suggested that labels be improved to become useful for a broader spectrum of consumers. The current nutrition information is most useful to the younger, more affluent and well-nourished group. Those who really need it, the older and/or, poorer group, probably don't understand it if they had not had the education to use the nutrition information.

For the development of a new nutrition information label content, amount and format play an important role. It is important to provide consumers with the relevant information they are interested in and to find the amount that would not overload consumers. It has been proposed to emphasize information of high public health concern on food labels. Consumers are more interested in the avoidance of certain nutrients than in receiving the recommended amount of other nutrients.

There are potential health benefits to consumers and society to design labels consistent with current public health concerns according to dietary guidelines relating to diet-related diseases.

III. METHODOLOGY

This study was exploratory in nature, examining the relationship between student interest in, use of and preference for nutrition information on food labels. Demographic characteristics of the sample were also examined in relation to consumer's use of nutrition labels. Data used in this study were collected by administering a questionnaire to students.

This chapter describes:

(1) hypotheses,

(2) operational definitions and terms,

(3) development of the instrument,

(4) sample collection and collection of data, and

(5) treatment of data.

Hypotheses

Following are the null hypotheses developed for this study.

$H_0 1$: There will be no difference in student nutritional information involvement scores by student characteristics.

$H_0 2$: Student characteristics do not influence the reported use of nutrition information labels.

$H_0 3$: Student characteristics do not influence the degree of interest in nutrient labeling.

$H_0 4$: Student characteristics do not influence the amount of nutrition information students would like to find on the labels.

$H_0 5$: Student characteristics do not influence the preference for different types of food to be labeled with nutrition information.

$H_0 6$: There will be no difference between the student group mean importance scores for nutrition information as compared to all other food product information items.

Operational Definitions of Terms

Food means (a) articles used for food or drink for man or other animals, (b) chewing gum, and (c) articles used as components of any such articles.

Food label is a label that contains information about a certain food product and is attached to the product package or directly to the food.

Information format is the manner in which information data are presented and physically organized.

Information load is the amount, load or burden of information being placed on the processing capacity of an individual's short term memory.

Label means any display of written, printed, or graphic matter on the immediate container of any article, and also on the outside container or wrapper (if there is one), or a display that is easily legible through the outside container or wrapper.

Labeling includes all written, printed, or graphic matter (a) upon any article or any of its containers or wrappers, or (b) accompanying such article.

Nutrition Information is information about the nutritional value of a product. Nutrition information on food labels provides the following information in this standard format: serving size; servings per container; calorie content; protein content; carbohydrate content; fat content; and percentage of U. S. Recommended Daily Allowance (U.S.RDA) of protein, certain vitamins and minerals.

Student characteristics are characteristics of students referring to age, gender, hours per week watching television, hours per week participating in physical activities, living situation, political classification, voting history, class rank, college major, major classified as hard or social science, participation in nutrition or consumer economics classes, mother's and father's level of education, existence of any nutrition related health problems, living on a special diet, and intake of vitamins and/or minerals and food supplements.

Student Involvement is the label given to represent the degree to which a student interacts with nutrition information on food labels. Each student involvement score is the sum of responses to eight questions which address different aspects of involvement. Potential response for each question ranges from 0 to 4 (i.e. from low to high). The eight factors included in the involvement score are:

1) interest in access to information about nutrition,
2) reported assessment of being informed about nutritional needs,
3) interest in nutrient information on food label products,
4) degree to which students look for nutrition information on food labels,
5) read and use of nutrition information in store to make purchase decisions,
6) read and use of nutrition information at home for meal planning,
7) preferred application of the nutrition labeling law, from no foods to all foods being included, and
8) satisfaction with the amount of nutrition information currently required by law.

U. S. Recommended Daily Allowance (U.S.RDA) are national standards for the amount of selected major vitamins and minerals a person needs each day to stay healthy, as developed by the Food and Drug Administration in 1972. U.S.RDA's were derived from the Recommended Daily Allowances of the Food and Nutrition Board of the National Research Council.

Development of the Instrument

Questionnaire

A seven page questionnaire was developed which was composed of two sections and included, part I: ten questions on the degree of student involvement with nutrition information on food labels, from awareness to use; and part II: seventeen questions on demographic data (Appendix).

The questions were asked in order to obtain data regarding student interest in nutrition information labels. An open-ended question was also included to allow students to report what they like and do not like about nutrition information labels. The demographic section included questions that were thought to have a direct or indirect influence on awareness, use, or demand for nutrition information.

The survey questionnaire was pilot tested with students in classes, the results of which were not included in the survey sample. Following the pilot test, final revisions were made to clarify meanings or correct any misleading questions.

Responses to selected questions in part I (questions 1, 2, 3 part 6, 4, 5a, 5b, 6 and 8) were added up to compute a nutritional information involvement scale, which was defined to represent the degree of advocacy for nutrition information. The scale included interest in having access to nutrition information; reported assessment of being informed about day-to-day nutrition needs; interest in nutrition information; looking for nutrition information; use of information in the store or at home for meal planning; kinds of foods required to be labeled, and amount of information required to be on the nutrition information label.

Pilot test - Validity and Reliability

Content validity was achieved by asking experts such as Food and Nutrition Department faculty members at Oregon State University to review the questionnaire. Most items used have been developed by others and, therefore, this study could contribute to an understanding of reliability for these items as relationships with personal characteristics are assessed.

The questionnaire was pretested with 30 Oregon State University student who responded to the questionnaire in regard to words or phrases which needed clarification. Suggested changes were considered and made as appropriate. The involvement scale for the pilot test was tested with a Cronbach alpha reliability test, with a resulting value of alpha = .78.

Sample Selection and Data Collection

Students from within the population of Oregon State University at Corvallis, Oregon were chosen for this study. The enrollment at Oregon State University for undergraduate students totaled 11,934 according to the registration report of January 31, 1986. This nutrition survey was conducted during the last week of February 1986. Different classes were chosen from the entire student population according to the mix of class ranks and college majors in order to obtain a representative sample.

The investigator administered the questionnaire to the students before the beginning of selected classes, and collected it appproximately ten minutes later. Verbal instructions were given which included; purpose of the study, assurance of confidentiality and anonymity, and an assurance that completing the questionnaire or any parts of it was voluntary and in no way affected the student's class work.

Even though the class attendence was not 100 percent in any class, the classes were only sampled once. No repetitions were conducted because it was assumed that those students who were absent did not differ from those in class on the given day.

Treatment of Data

Data from the questionnaires were coded by the researcher for analysis. The coded data were marked onto general purpose data collection sheets by student helpers, verified by the researcher and read into a computer data file by the Oregon State University off-scanner.

Prior to inferential statistical analysis, descriptive statistics were determined for all of the variables. All hypotheses were tested in the null form using statistical procedures appropriate to the form of the data and the research questions. A confidence level of $p < .05$ was chosen by the researcher as the criterion for rejection of the null hypotheses.

Statistical Analyses

The researcher received financial support for this study through the unfunded research program by the Milne Computer Center, Oregon State University. Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) installed on the campus Cyber 170/720 system. Statistical techniques used in this study were; descriptive statistics, Wilcoxon signed rank tests, Pearman's product moment correlation coefficients, one-way analysis of variance with the Scheffée post-hoc procedure, Spearman's rank order correlation coefficients, *t*-tests, Kruskal-Wallis one-way analysis of variance, and chi square tests of independence. The specific descriptive statistics used for the student characteristics were frequency distributions, percentages, means, and ranges.

Dependent Variables

Student Involvement in Nutrition Information

The possible range for the student nutritional information involvement score was 0 to 32. This was computed by adding the individual scores of the following factors: question 1) interest in having access to nutrition information (not at all to extremely); question 2) self-reported assessment of being informed about day-to-day nutrition needs (not at all to extremely); question 3) part 6 only, interest in nutrition information (not at all to extremely); question 4) look for nutrition information (never to always); question 5a) use of information in the store (never to always); question 5b) use of information at home for meal planning (never to always); question 6) kinds of food to be labeled (none to all); and question 8) amount of information required to be on the nutrition information label (none to much more) (Appendix).

Total Use

The possible score ranged from 0 to 9. This was computed by adding the scores for question 5a) use of information in the store and question 5b) use of information at home for meal planning (never to always for each) (Appendix).

Interest in Nutrients

Possible scores for interest in nutrient labeling ranged from 0 to 88. They were computed by adding the individual five-point scale (not at all to extremely) for the 22 nutrients listed in question 7 (Appendix).

Amount of Nutrition Information to be required on Labels

The possible range for this category was from 0 to 4 (none to much more) and was determined by using question 8 (Appendix).

Kinds of Foods to be Labeled

Scores ranged from 0 to 4 (none to all) based on question 6 (Appendix).

Eleven Types of Food Product Information

The possible scores for each of the eleven type of product information ranged from 0 to 4 (not at all interested to extremely interested in having ready access to each type of food product information). These eleven items are listed in question 3 (Appendix).

Student Characteristics

Student characteristics are classified into different types of variables: continuous variables (interval and ordinal) and categorical variables (nominal variables with two categories and nominal variables with more than two categories). All the questions concerning the student characteristics can be found in part II in the questionnaire (Appendix).

Interval Variables

Age, hours per week watching television, and hours per week participating in physical activities were classified as interval variables.

Ordinal Variables

Political classification, class rank, level of participation in nutrition classes, level of participation in consumer economics classes, mother's education and father's education were considered as ordinal

variables. Political classification is a variable with five categories ranging from very liberal to very conservative. Class rank is a variable ranging from freshmen to senior. Level of participation in nutrition classes and consumer economics classes has three categories ranging from no classes in the subject, over classes at high school level, to classes at college level. Highest level of mother's and father's education are variables with eight categories ranging from grammar school or less to graduate degree.

Nominal Variables with two categories

Gender, living situation, voting history, major classified as hard or social science, existence of specific health problems, living on a special diet, intake of vitamins and/or minerals and intake of food supplements are nominal variables with two categories. Gender had two categories, male and female. Living situation was divided into two groups: a) living in a house or apartment shared with others or living alone and b) living in a dormatory, cooperative, sorority, fraternity, or living with parents or relatives. For the variable "major classified as hard or social science", the colleges were divided into two categories: a) social sciences: Liberal Art, Business, Home Economics and Education and b) hard sciences: Science, Agricultural Science, Engineering or Pre-engineering, Forestry, Health and Physical Education, Oceanography, Pharmacy and Veterinary Medicine, respectively. All other variables were responded to in one of two-ways categories, yes or no.

Nominal Variables with more than two categories

College major is a nominal variable with 7 categories corresponding to the colleges within Oregon State University. Only those seven colleges with a sample size $n > 20$ have been included (i.e. Liberal Arts, Science, Agricultural Science, Business, Education, Engineering and Home Economics)

Appropriate Statistical Tests for the Hypotheses

In the null hypotheses $H_0 1$ through $H_0 5$ the dependent variable was tested in correlation with the 18 student characteristics. For the nominal variables with two categories *t*-tests were used. For nominal variables with more than two categories and dependent variables with less than twenty categories ($H_0 2$, $H_0 4$ and $H_0 5$) Kruskal-Wallis one-way analysis of variance was used; for dependent variables with more than twenty categories ($H_0 1$ and $H_0 3$) one-way analysis of variance with the Scheffée post-hoc procedure was applied. Ordinal variables were tested with Spearman's rank correlation coefficients. Pearson's product moment correlation coefficients were used for the interval variables.

For hypothesis 6 the student group mean importance scores for the eleven types of product information obtained by the frequency tables were ranked. After ranking the scores, Wilcoxon signed rank tests were applied, comparing "nutrition information" with each of the other ten product information items, in order to determine the importance of each of the ten types of product information relative to nutrition information.

IV. RESULTS AND DISCUSSION

This researcher investigated the consumer interest of Oregon State University (OSU) students regarding the nutrition information on food labels. The findings will be discussed under the following topics:

(1) student characteristics,

(2) descriptive data for nutrition information,

(3) testing of hypotheses,

(4) summary of findings, and

(5) discussion of findings.

Student Characteristics

The sample consisted of 440 students from Oregon State University in Corvallis, Oregon. Of the 463 questionnaires administered, 440 were returned, providing a rate of return of 95.0 percent. All of the questionnaires have been used in the analysis, however not all questions were answered, thus unanswered questions have been coded as missing data.

The sample was composed of 55.8 percent males and 44.2 percent females compared to 59.3 percent males and 40.7 percent females in the OSU student population. The sample mean age was 20.7 years. Almost one third (30.9%) of the students were freshmen, 25.7 percent were sophomores, 21.3 percent were juniors and 21.0 percent were seniors. The colleges of students' majors are listed in table 2 and are compared to the general lower division enrollment of the 12 colleges. The

population has been oversampled for freshmen, and undersampled for seniors in comparision to the OSU registration report from January 31, 1986 (see table 2). There is some variation between the majors represented in the sample and their actual distribution in the population. Business was overrepresented by 9.7 percent and Education by 4.5 percent, whereas Engineering was undersampled by 7.1 percent in comparision to the OSU college student population.

Twenty-nine percent (29.0%) of the respondents never had any nutrition classes, 41.7 percent reported having attended nutrition classes in high school and 29.3 percent reported participation in nutrition classes at least at the college level. About one third (32.5%) of the students had not had any consumer economics classes prior to college, another third (34.9%) attended consumer economics classes at the high school level and the last third (32.6%) took classes in consumer economics at least at the college level. Students who had nutrition and/or consumer economics classes at high school level were more likely to take nutrition or consumer economics classes at the college level. Those who took nutrition courses at one level were significantly more likely to take consumer economics classes at the same level, $\chi^2(4, \underline{N} = 424) = 64.01$, $\underline{p} = .000$.

Table 2: College of Major by Class Rank for the Student Sample and the OSU Student Population

College of Major		Fr %	So %	Jr %	Sr %	Total %	size rank	n-N
Liberal Arts	(n)[1]	4.9	3.0	3.3	2.3	13.5	2	-0.9
	(N)[2]	2.8	3.2	3.8	4.6	14.4	3	
Science		3.3	1.4	3.3	2.3	10.3	5	-2.5
		3.9	0.1	3.5	5.3	12.8	4	
Agricultural Science		1.2	0.9	0.9	1.6	4.6	8	-1.4
		1.3	1.2	1.5	2.0	6.0	5	
Business		8.0	9.4	7.7	5.9	31.0	1	+9.7
		4.4	4.6	5.7	6.6	21.3	1	
Education		5.2	2.6	1.9	0.7	10.4	4	+4.5
		1.2	1.1	1.7	1.9	5.9	6	
Engineering		3.5	4.9	1.2	3.0	12.6	3	-7.1
		5.9	4.2	3.9	5.7	19.7	2	
Forestry		0.2	0.0	0.0	0.7	0.9	10	-1.4
		0.4	0.3	0.5	1.1	2.3	11	
Health and Physical Education		0.5	0.0	0.2	0.2	0.9	10	-3.3
		0.6	0.9	1.0	1.7	4.2	9	
Home Economics		0.2	1.2	0.9	2.6	4.9	7	+0.3
		0.9	0.9	1.1	1.7	4.6	7	
Oceanography		0.2	0.0	0.0	0.0	0.2	13	+0.2
		0.0	0.0	0.0	0.0	0.0	12	
Pharmacy		0.0	0.5	0.5	1.2	2.2	9	-0.3
		0.4	0.3	0.6	1.2	2.5	10	
Veterninary Medicine		0.2	0.2	0.2	0.0	0.6	12	+0.6
		0.0	0.0	0.0	0.0	0.0	12	
Undeclared/Other		3.5	1.6	1.2	0.5	6.8	6	+2.4
		2.2	1.7	0.4	0.1	4.4	8	
Total %	(n)	30.9	25.7	21.3	21.0	98.9[3]		
	(N)	24.0	18.5	23.7	31.9	98.1[3]		

1) student sample (n)
2) OSU student population (N) (registration report, January 31, 1986)
3) Totals may not add to 100 percent due to rounding.

On the average the students watched 6.7 hours television per week and exercised 6.6 hours per week. Sixty percent (60.3%) lived in a dormatory, cooperative, sorority or fraternity, while 31.6 percent shared a house or an apartment with others, 5.8 percent lived alone and 2.3 percent lived with their parents. Three percent (2.7%) classified themselves as very liberal, 20.5 percent as liberal, 43.6 percent considered themselves politically in the middle of the road, 29.1 percent stated they were conservative, and 4.1 percent very conservative. Sixty-nine percent (68.9%) of the students reported that they had voted in community, federal and/or state elections. Father's education was significantly higher than mother's education, $\chi^2(49, \underline{N} = 411) = 359.75$, $\underline{p} = .000$ (see table 3).

Twelve percent (12.1%) of the students reported having health problems, and 5.2 percent were living on a special diet. Forty-six percent (46.4%) take vitamins and/or minerals and 6.2 percent take food supplements on the average once or more often per week. It appeared that most students who lived on a special diet had more nutrition-related health problems, and were more likely to take vitamins and/or minerals and food supplements. With chi square tests significant relationships could be found for special diet by health problems, $\chi^2(4, \underline{N} = 423) = 155.17$, $\underline{p} = .000$; special diet by intake of vitamins, $\chi^2(4, \underline{N} = 425) = 109.58$, $\underline{p} = .000$; and special diet by intake of food supplements, $\chi^2(4, \underline{N} = 418) = 13.10$, $\underline{p} = .012$.

Table 3: Mother's and Father's Level of Education

Level of Education	Mother %	Father %
Grammar school or less	1.7	2.3
Some high school	3.6	4.1
High school diploma	26.7	14.6
Post secondary other than college	7.0	6.3
Some college	24.3	13.8
College degree	23.6	30.8
Some graduate school	3.4	3.4
Graduate degree	9.1	24.5
Total	99.4[1]	99.8[1]

1) Totals may not add to 100 percent due to rounding.

Descriptive Data of Nutrition Information

Forty-two percent (42.2%) of the students surveyed were extremely or very interested in having access to nutrition information, and 42.4 percent were somewhat interested. Forty percent (40.0%) of the students said they were either extremely or very informed about their day-to-day nutrition needs, and 54.2 percent felt somewhat informed. The more interested students were in nutrition, the better informed they reported themselves as being, $\chi^2(16, \underline{N} = 439) = 33.02$, $\underline{p} = .007$.

Fifty-four percent (54.3%) of the students often or always looked for nutrition information on food labels. Thirty-two percent (32.0%) responded that they sometimes looked at the labels. It appears that people who look for nutrition information also use the label information; looking for information by use of labels in the store, $\chi^2(16, \underline{N} = 439) = 352.84$, $\underline{p} = .000$ and by use of labels at home, $\chi^2(16, \underline{N} = 439) = 155.94$, $\underline{p} = .000$. Forty-one percent (41.0%) of the students reported that they often or always use nutrition information in the store, and 46.7 percent often or always used the information at home for meal planning. Thirty-nine percent (39.0%) sometimes used labels in the store and 33.9 percent sometimes used them at home. About eighty percent of the students reported using the labels at least sometimes in the store and/or at home. The label was not used by 3.4 percent in the store setting and by 5.5 percent at home. The more the students used the labels in the store, the more they were likely to use them at home, $\chi^2(16, \underline{N} = 439) = 223.58$, $\underline{p} = .000$.

Thirty-nine percent (39.0%) of the students wanted nutrition information on all kinds of foods, whereas 49.1 percent wanted all processed foods labeled. That means 88.1 percent of the students wanted to have more foods labeled than currently required to be labeled by law. Only fewer than ten percent (9.5%) were satisfied with the types of foods currently required to be labeled by law. Sixty percent (59.8%) preferred to have more nutrition information on the labels, whereas 39.3 percent were satisfied with the current amount of information required to be displayed by law. Fewer than one percent (0.9%) indicated the desire to have less nutrition information on food products.

Student group mean ranking scores were computed by calculating the mean of all scores for each nutrient. Using the group mean scores for the 22 nutrients, a ranking was developed in table 4. Some of the nutrients that students thought were important are not listed on nutrition information labels (see table 5).

Additional information about the current source of information and the preferred sources of information was compiled (see table 6).

Table 4: Student Ranking of Nutrients as Preferred Items to Appear on the Food Label.

Rank	Nutrients	Group Mean Scores
1	Calories	3.195
2	Sugar	3.060
3	Protein	2.982
4	Fat	2.915
5	Carbohydrates	2.864
6	Cholesterol	2.843
7	Iron	2.748
8	Calcium	2.746
9	Vitamin C	2.724
10	Saturated Fats	2.707
11	Sodium	2.701
12	Fiber	2.698
13	Starch	2.609
14	Vitamin A	2.578
15	Potassium	2.430
16	Riboflavin	2.297
17	Polyunsaturated Fats	2.278
	Niacin	2.278
19	Thiamin	2.276
20	Monounsaturated Fats	2.262
21	Magnesium	2.257
22	Zinc	2.241

Table 5: Importance Rank Order of Nutrition Information by OSU Students

Currently Required on the Nutrition Information Label	Currently not Required on the Nutrition Information Label
Calories	
	Sugar
Protein	
Fat	
Carbohydrates	
	Cholesterol
Iron	
Calcium	
Vitamin C	
	Saturated Fats
	Sodium
	Fiber
	Starch
Vitamin A	
	Potassium
Riboflavin	
	Polyunsaturated Fats
Niacin	
Thiamin	
	Monosaturated fats
	Magnesium
	Zinc

Table 6: Current and Preferred Information Sources about Nutrients

Information Source	Ranking			
	current		preferred	
	rank	%	rank	%
Nutrition Information	1	77.9	1	51.1
Family Member and Relatives	2	65.6	6	20.2
Magazines	3	62.6	4	38.5
Television	4	57.1	6	36.3
Friends	5	53.2	15	14.5
School and Lectures	6	52.3	5	37.8
Newspapers	7	44.8	7	33.8
Books	8	42.2	8	30.2
Sellers and Retailers	9	35.3	3	46.6
Radio	10	32.5	12	21.8
Doctors	11	28.3	2	48.0
Government Publications	12	10.8	8	30.2
Industry Publications	13	6.0	11	22.2
Pharmacists	14	5.8	10	24.6
Exhibitions and Meetings	15	5.3	16	12.9
County and/or State Extension Services	16	5.0	14	17.2
Insurance Company Publications	17	2.6	17	10.8
Nowhere	18	2.4	18	3.7

Multiple responses were possible.

Testing of Hypotheses

Null hypothesis $H_0 1$; there will be no difference in student nutritional information involvement score by student characteristics.

An involvement scale was developed from the responses to eight separate questions. The mean scale score was 20.38 with a range from 4 to 31.

A Cronbach alpha reliability test showed a value of alpha = .77 with 429 cases. It was assumed that the higher the score on the scale, the greater the advocacy for nutrition information. This scale was tested for significance against all eighteen of the student characteristics (see table 7).

The following variables turned out to be significant in a positive direction at the $p < .05$ level of confidence. Female students, older students (age and class rank), students with classes in nutrition at college level, students living alone or in a house or an apartment shared with others were more involved in nutrition information. Those students were all more likely to be advocates of nutrition information.

Table 7: Summary of the Findings of Hypothesis $H_0 1$

Student Characteristics	Statistical Procedure	Results
age	Pearson's	$r = +.14$, $p = .002$
gender	t-test	$t(430) = 7.25$, $p = .000$
hours TV	Pearson's	N.S.
hours phys. act.	Pearson's	N.S.
living situation	t-test	$t(382) = -2.44$, $p = .015$
polit. class.	Spearman's	N.S.
voting history	t-test	N.S.
class rank	Spearman's	$r_s = +.14$, $p = .002$
college major	Anova	$F(6, 371) = 7.00$, $p = .000$
	Scheffée	$p < .05$
hard/social sciences	t-test	$t(237) = -3.30$, $p = .001$
nutrition classes	Spearman's	$r_s = +.18$, $p = .001$
consumer economics	Spearman's	N.S.
mother's education	Spearman's	N.S.
father's education	Spearman's	N.S.
health problems	t-test	$t(381) = 3.32$, $p = .001$
special diet	t-test	$t(26) = 4.72$, $p = .000$
vitamins/minerals	t-test	$t(436) = 4.38$, $p = .000$
food supplement	t-test	N.S.

Students in Home Economics (mean = 24.20) were more involved in nutrition information than students in Engineering (mean = 18.30), Science (mean = 19.50) and Business (mean = 20.20). Students in Liberal Arts (mean = 21.20) and Education (mean = 21.90) were more involved than students in Engineering (mean = 18.30). In general students in social sciences (mean = 21.07) were more involved in nutrition information than students in hard sciences (mean = 19.45). Students with specific health problems, those on a special kind of diet, and those who take vitamins and/or minerals were more likely to be advocates for nutrition information.

Null hypothesis $H_0 1$ can be rejected for ten of the eighteen student characteritics: age, gender, class rank, living situation, college major, major classified as hard or social sciene, level of participation in nutrition classes, existence of specific health problems, living on a special diet and intake of vitamins and/or minerals.

Null hypothesis $H_0 2$: student characteristics do not influence the reported use of nutrition information labels.

The reported use was measured with a total use score, computed by adding the scores for use at the point of purchase and use at home for meal planning. The total use score had a mean of 4.54 and ranged from 0 to 8. This total use score was tested against all eighteen student characteristics (see table 8).

Table 8: Summary of the Findings of Hypothesis $H_0 2$

Student Characteristics	Statistical Procedure	Results
age	Pearson's	$r = +.12$, $p = .007$
gender	t-test	$t(430) = 6.11$, $p = .000$
hours TV	Pearson's	N.S.
hours phys. act.	Pearson's	N.S.
living situation	t-test	$p = .015$
polit. class.	Spearman's	N.S.
voting history	t-test	$t(246) = 2.73$, $p = .007$
class rank	Spearman's	$r_s = +.12$, $p = .007$
college major	K-W test	$\chi^2 = 27.69$, $p = .006$
hard/social sciences	t-test	$t(397) = -3.06$, $p = .002$
nutrition classes	Spearman's	$r_s = +.09$, $p = .023$
consumer economics	Spearman's	$r_s = +.10$, $p = .017$
mother's education	Spearman's	N.S.
father's education	Spearman's	N.S.
health problems	t-test	$t(78) = 3.03$, $p = .003$
special diet	t-test	$t(421) = 2.48$, $p = .014$
vitamins/minerals	t-test	$t(434) = 2.74$, $p = .006$
food supplement	t-test	N.S.

The likelihood of using information was greater for female students, older students (age and class rank), and students who had voted in federal, state and/or community elections. The use of nutrition information labels was higher with participation in nutrition and/or consumer economics classes at college level. A difference in use of nutrition information was found between colleges. Social science students (mean = 4.76) were more likely to use nutrition information than hard science students (mean = 4.23). Students with health problems, those on a special diet and those who take vitamins and/or minerals were more likely to use nutrition information.

Null hypothesis $H_0 2$ can be rejected for eleven out of eighteen student characteristics: age, gender, class rank, voting history, college major, major classified as hard or social science, level of participation in nutrition and/or consumer economics classes, existence of specific health problems, living on a special diet, and intake of vitamins and/or minerals.

Null hypothesis $H_0 3$: student characteristics do not influence the degree of interest in nutrient labeling.

Interest in nutrient labeling was computed from individual mean interest scores by adding responses from all of the 22 ranked nutrients. The mean score was 56.36 and ranged from 0 to 88. Statistical procedures and results are shown in table 9.

Table 9: Summary of the Findings of Hypothesis $H_0 3$

Student Characteristics	Statistical Procedure	Results
age	Pearson's	N.S.
gender	*t*-test	$t(430) = 6.04$, $p = .000$
hours TV	Pearson's	N.S.
hours phys. act.	Pearson's	N.S.
living situation	*t*-test	N.S.
polit. class.	Spearman's	N.S.
voting history	*t*-test	N.S.
class rank	Spearman's	N.S.
college major	Anova	$F(6, 371) = 5.02$, $p = .000$
	Scheffée	$p < .05$
hard/social sciences	*t*-test	$t(397) = -.3.30$, $p = .001$
nutrition classes	Spearman's	$r_s = +.13$, $p = .005$
consumer economics	Spearman's	$r_s = + .09$ $p = .031$
mother's education	Spearman's	N.S.
father's education	Spearman's	N.S.
health problems	*t*-test	$t(80) = 2.71$, $p = .008$
special diet	*t*-test	$t(421) = 2.92$, $p = .004$
vitamins/minerals	*t*-test	$t(428) = 4.19$, $p = .000$
food supplement	*t*-test	N.S.

Female students appeared to show a greater interest in nutrient information than male students. Students in Education (mean = 65.50) were more interested in nutrients than students in Engineering (mean = 50.10) and Science (mean = 50.0) were. In general students in a social science (mean = 59.14) were more interested in nutrients than students in a hard science (mean = 52.14) were. Students who participated in nutrition and/or consumer economics classes at college level were more likely to be interested in nutrients. Students who have health problems, who live on a special diet and who take vitamins and/or minerals also showed more interest in nutrients.

Null hypothesis $H_0 3$ was rejected for eight out of eighteen student characteristics: gender, college major, major classified as hard or social science, level of participation in nutrition and/or consumer economics classes, existence of specific health problems, living on a special diet and intake of vitamins and/or minerals.

Null hypothesis $H_0 4$: student characteristics do not influence the amount of nutrition information students would like to find on the labels.

Question 8 on the questionnaire (Appendix) asked if students prefer to have more or less nutrition information on food product labels than currently required by law. The variable had a mean of 2.68 and a range from 0 to 4. Sixty percent (59.8%) preferred to have more information on the labels than required under the current label regulation, while less than one percent (0.9%) preferred to have less information. Forty percent (39.3%) were satisfied with the current label

regulation. Statistical procedures and results are listed in table 10.

Female students, students who classified themselves as more liberal, students who attended nutrition classes at college level, those who had specific health problems, and those who lived on a special diet preferred to have more nutrition information on their food labels than currently required by law.

Null hypothesis $H_0 4$ can be rejected for five out of the eighteen variables. Gender, political classification, level of participation in nutrition classes, existence of specific health problems, and living on a special diet influenced the amount of nutrition information students would like to find on the nutrition label.

Null hypothesis $H_0 5$: student characteristics do not influence the preference for different types of food to be labeled with nutrition information.

The mean score for various kinds of food that should be labeled was 3.24, and ranged from 0 to 4. About half of the students (49.1%) wished to have all processed food products labeled, while 39.3 percent of the students want to have all foods labeled. Statistical procedures and findings are listed in table 11.

Table 10: Summary of the Findings of Hypothesis $H_0 4$

Student Characteristics	Statistical Procedure	Results
age	Pearson's	N.S.
gender	*t*-test	$t(424) = 2.44$, $p = .015$
hours TV	Pearson's	N.S.
hours phys. act.	Pearson's	N.S.
living situation	*t*-test	N.S.
polit. class.	Spearman's	$r_s = -.10$, $p = .019$
voting history	*t*-test	N.S.
class rank	Spearman's	N.S.
college major	K-W test	N.S.
hard/social sciences	*t*-test	N.S.
nutrition classes	Spearman's	$r_s = +.12$, $p = +.009$
consumer economics	Spearman's	N.S.
mother's education	Spearman's	N.S.
father's education	Spearman's	N.S.
health problems	*t*-test	$t(376) = 3.39$, $p = .001$
special diet	*t*-test	$t(416) = 3.03$, $p = .003$
vitamins/minerals	*t*-test	N.S.
food supplement	*t*-test	N.S.

Table 11: Summary of the Findings of Hypothesis $H_0 5$

Student Characteristics	Statistical Procedure	Results
age	Pearson's	N.S.
gender	*t*-test	$t(420) = 4.57$, $p = .000$
hours TV	Pearson's	N.S.
hours phys. act.	Pearson's	N.S.
living situation	*t*-test	N.S.
polit. class.	Spearman's	N.S.
voting history	*t*-test	N.S.
class rank	Spearman's	N.S.
college major	K-W test	$\chi^2 = 28.38$, $p = .005$
hard/social sciences	*t*-test	$t(234) = -3.04$, $p = .003$
nutrition classes	Spearman's	N.S.
consumer economics	Spearman's	N.S.
mother's education	Spearman's	$r_s = .12$, $p = .008$
father's education	Spearman's	N.S.
health problems	*t*-test	N.S.
special diet	*t*-test	N.S.
vitamins/minerals	*t*-test	N.S.
food supplement	*t*-test	N.S.

Females students seemed to prefer more kinds of food to be labeled than currently required by law than male students did. A difference was found between the students from different majors. Social science students (mean = 3.34) had a significantly higher mean score than the hard science students (mean = 3.08) had. Students whose mothers had a higher level of education tended to be more interested in having more kinds of foods nutrition labeled. Students with health problems, students who live on a special diet, and students who take vitamins and/or minerals were also more likely to prefer more kinds of foods labeled.

Null hypothesis $H_0 5$ can be rejected for four of the eighteen student characteristics. The following student characteristics influenced kinds of foods required to be labeled: gender, college major, major classified as hard or social science, and level of mother's education.

A summary of the significant results of hypotheses 1 through 5 may be found in table 12. The level of significance for each test has been listed.

Table 12: Summary of Hypotheses Findings

Student Char.	Involvement H1	Use H2	Nutrient interest H3	Info. Amount H4	Food Type H5
gender	p=.000	p=.000	p=.000	p=.015	p=.000
nutrition classes	p=.001	p=.023	p=.005	p=.009	-
health problems	p=.001	p=.003	p=.008	p=.001	-
special diet	p=.000	p=.014	p=.004	p=.003	-
college major	p=.000	p=.006	p=.000	-	p=.005
hard/social	p=.001	p=.002	p=.001	-	p=.003
vitamins/minerals	p=.000	p=.006	p=.000	-	-
age	p=.002	p=.007	-	-	-
class rank	p=.002	p=.007	-	-	-
consumer econ.	-	p=.017	p=.031	-	-
living situation	p=.015	-	-	-	-
voting history	-	p=.007	-	-	-
polit. class.	-	-	-	p=.019	-
mother's education	-	-	-	-	p=.008
father's education food supplements hours TV hours phys. act.	These independent variables had no influence on the dependent variables.				

Null hypothesis $H_0$6: there will be no difference between the group mean importance scores for nutrition information compared to all other food product information items.

The eleven information items found on food product labels are listed in table 13 along with the group mean importance scores and the results of the Wilcoxon signed rank tests which compared the score of each item with the nutrition information importance score.

The group mean importance scores for product name; weight; drained weight; name and address of the producer, distributer or retailer; and number of servings and serving size were significantly lower than the group mean score for nutrition information. There was no significant difference in the group mean score for nutrition information when compared to the mean scores for ingredient list, care instruction and unit price. The group mean scores for price and open date were significantly higher than the group mean scores for nutrition information.

Null hypothesis $H_0$6 could be rejected for seven of the ten product information items when group mean importance scores were compared with the importance score.

Table 13: Group Mean Importance Scores of Product Information Items

Rank	Product Information	Group Mean Score	Wilcoxon signed rank test with nutrition information
1	Price	3.414	$z = -6.27$, $p = .000$ *
2	Open Date	3.394	$z = -7.02$, $p = .000$ *
3	Care Instructions	3.106	$z = -0.90$, $p = .369$
4	Ingredient List	3.060	$z = -0.33$, $p = .743$
5	**Nutrition Information**	3.048	
6	Unit Price	3.046	$z = -0.26$, $p = .792$
7	Product Name	2.766	$z = -5.26$, $p = .000$ *
8	Number of Servings and Serving Size	2.507	$z = -8.94$, $p = .000$ *
9	Weight	2.179	$z = -11.96$, $p = .000$ *
10	Name and Address of the Producer, Distributer, Retailer	2.081	$z = -12.79$, $p = .000$ *
11	Drained Weight	1.893	$z = -13.87$, $p = .000$ *

* $p < .05$

Discussion of Findings

The availability of empirical research on student interest in and use of nutrition information is somewhat limited. This study attempted to determine the nutrition information interest and advocacy of students as future consumers. A comparision with former studies can be found in table 14. Some of the differences between the studies, maybe due to (1) time (five and fifteen year comparions) and (2) the different population groups being compared. Therefore, only general trends can be highlighted.

Calories have always been one of the most important pieces of label information for consumers. Sugar also seems to have been important for consumers, whereas it seems less important to professionals. For consumers, sugar is number one on the avoidance list (Heimbach and Stokes, 1981). Protein, fats and carbohydrates seem to be of general interest. Cholesterol seems to be somewhat more important to consumers than to professionals, whereas professionals tend to find sodium to be more important than consumers do, especially the student group. The minerals, iron and calcium, were rated about the same by every group. Saturated fats were rated more important than polyunsaturated fats by students and general consumer groups. Vitamins were generally ranked lower than other nutrients, except for vitamin C, which consumers rated more important than did professionals.

Table 14: Ratings of Nutrients
by Various Sample Populations in Different Years

Type of information	OSU Students 1986	Members of the American Institute of Nutrition (AIN) 1) 1981	Members of the Food Industry Trade Associations 1) 1981	Consumer Panel (FDA Mailing List) 1) 1981	Consumers 2) 1978	Members of the American Institute of Nutrition (AIN) 3) 1971
Calories	1	1	1	1	1	2
Sugar	2	13	13	11	5	
Protein	3	4	2	4	2	1
Fat	4	3	3	3	4	6
Carbohydrates	5	7	4	5	9	12
Cholesterol	6	10	8	5	6	13
Iron	7	5	6	9	6	4
Calcium	8	6	7	10	11	7
Vitamin C	9	14	8	12	3	4
Saturated Fats	10	9	11	7	13	
Sodium	11	2	4	1	8	9
Fiber	12	12	18	14	15	
Starch	13	19	19	16	10	
Vitamin A	14	15	11	15	13	3
Potassium	15	11	10	12	16	
Riboflavin	16	17	13	19	19	10
Polyunsaturated Fats	17	8	17	8	11	
Niacin	17	18	16	17	18	11
Thiamin	19	16	13	17	17	8
Monounsaturated	20					
Magnesium	21	21	20	20	20	14
Zinc	22	20	21	21	21	15

1) data from Heimbach and Stokes, 1981
2) data from Heimbach and Stokes, 1979
3) data from Call and Hayes, 1971

The rating scores from these studies (1, 2, 3) were substituted by rank scores.
Only the nutrients surveyed in the student study have been considered.

Some of the nutrients which ranked fairly high in importance are not currently required on the nutrition information label, especially those which may seem to be detrimental to health, if consumed in excess of recommended amounts. The importance ranking of the nutrients shows that students are interested in the basic macro-nutrients, nutrients considered detrimental to their health, and some selected minerals and vitamins. The results of this study confirmed previous findings by Heimbach and Stokes in their 1979 study.

Students preferred to find more nutrition information on the labels than the current amount of nutrition information required by law. This could reflect the desire to have some of the highly important ranked nutrients present on the label which are currently not required to be listed. In addition they prefer to have more food products labeled than the ones currently required by law, which is consistent with the consumers need for additional information, expressed during hearings in 1978 by the Food and Drug Administration. Students (60%) prefer more information than currently required by law when compared to consumers (25%) surveyed in 1978 (Heimbach and Stokes, 1979). This could be explained by the hypothesis that higher educated consumers are more likely to be information seekers (Thorelli & Thorelli, 1977). With a trend towards more education and health consciousness, consumers tend to be more interested in nutrition information. This would suggest that consumers feel better when nutrition and other types of information are available, even if not used. However, the information overload theory was not tested in this study, i.e. it is not known to what extent students

would or could use the information desired.

Confirming previous studies (Smith et al., 1979), female students seem to be more involved in nutrition information. They are more likely to use nutrition information than males. Older students who majored in a social science, who attended nutrition classes and/or consumer economics classes, those who lived in an apartment or house alone or shared with others, those who had health problems, who lived on a special diet and took vitamins and/or minerals were more likely to be interested in nutrition information. They might be more aware about nutrition information, thus they want to find it on the label. This suggests that better educated consumers and those with special dietary needs look for more information on the labels. Students who have had nutrition classes are interested in and have a knowledge of nutrition information, thus they look for and use the information more than others. Students who are interested in nutrition are more motivated to use the labels. The more motivated people are, the more likely they are to be able to process larger amounts of information (Bettman, 1979).

Price is still the primary information item students would like to know about products, because they want to know what they have to pay. Because of health consciousness, students maybe more interested in open dates, care instructions, ingredient lists and nutrition information than product name, etc. (see table 5). These findings are consistent with results from previous studies.

The recognition of possible relationships between health and nutrition might be one of the reasons why "doctors" is one of the preferred information sources. Dietitians and nutritionists were not included in the list of information sources and thus no information was gained about them as a source of professionally based information. The preference for the "nutrition information label", and "sellers and retailers" as preferred information sources might indicate that students would like to use the information in the store at the point of purchase. Consumers feel that it is the supermarket's responsibility to provide nutrition and health information (Borra, 1985).

Students who were informed about nutrition, because of classes or health problems, showed a higher involvement score for nutrition advocacy. This means that students who have the knowledge are applying it for their own health benefits. These are the students who use nutrition information labels and would like to have more information. A high number of students do use food labels; this result confirms previous studies about use of label information and extends the findings to a younger and relatively well educated population (Division of Consumer Studies, 1978; Heimbach & Stokes, 1979; Jacoby et al., 1977; Schrayer, 1978). Reported main benefits were using the label at home for meal planning and in the store for purchase decisions (Division of Consumer Studies, 1976a; Murray, 1977; Stevan, 1974).

V. SUMMARY AND IMPLICATIONS

Summary

The purpose of this study was to assess student interest in nutrition information on food labels. There were four specific objectives. The first objective was to compare the advocacy of nutrition information (involvement score), use of nutrition information, interest in nutrient information, interest in amount of nutrient information on food labels, and preferred kinds of foods to be labeled, with student characteristics (independent variables). The second objective was to determine the importance of nutrition information items on food products. The third objective was to obtain an importance rank order for various nutrients. The fourth objective was to determine the type of sources for nutrition information students use and would like to use.

Few studies have addressed these questions for the college student group. Therefore the purpose of this study was to determine student interest in nutrition information, determine their wants and needs concerning nutrition information and determine wether they get the information they consider highly important.

Consumers try to maximize their utility. They have needs and goals they attempt to satisfy. If the information they need to optimize their decisions is not provided, they end up making suboptimal purchases. If the producers provide all the information consumers need to make a decision for one brand over another, their needs can be more readily satisfied. They also have a better chance of communicating their

preferences through their purchases.

Although there may be some realistic limits to the amount of information that can be utilized and understood, it is generally consistent with current consumer theory to provide as much unbiased information as possible for consumers to use in decision-making, rather then having industry or government dictate what is desirable. The burden for society is then placed on the educational process, so that consumers make their demands known through informed marketplace decisions.

Therefore students, as future consumers, were surveyed to determine their nutrition interest and use since they may ultimately be related to better purchase decisions. Consumers do not only use label information at the store for purchase decisions over competing brands, but they also consider it as an information source about nutrition, and they use it to about the same extent at home for meal planning. The student characteristics studied also give some important clues to what educators and others can do to heighten awareness and use of nutrition information.

Summary of Procedures

The subjects for this study were a sample from the population of Oregon State University undergraduate students. Large classes with a wide variety of majors and class ranks were selected on a non-random basis.

The researcher administered questionnaires on the 25th and 27th of February, 1986 to Oregon State University students in Corvallis, Oregon and obtained a sample of 440 students. The questionnaire consisted of part I: a series of questions concerning nutrition information, and part II: questions regarding demographic data. Analyses from this study were based on the responses of the 440 students surveyed. Frequency distributions were used to analyse the demographic characteristics of the students.

Summary of Hypotheses Findings

Six hypotheses in the null form were developed for the purpose of this study with the level of significance set at $p < .05$. One-way analysis of variance, Pearson's product moment correlation coefficient, Wilcoxon signed rank tests, *t*-tests, Spearman's rank correlation coefficients, chi square tests of independence and Kruskal-Wallis one-way analysis of variance were the statistical tests used to evaluate the hypotheses. A summary of the significant hypotheses findings is presented in table 15.

On the basis of this study, significant differences were found between advocates and non-advocates of nutrition information. Nutrition information advocacy, measured by an information involvement scale, was influenced by age, gender, living situation, class rank, college major, major classified as hard or social science, level of participation in nutrition classes, existence of specific health problems, living on a special diet and intake of vitamins and/or minerals. Female students, older students, students with higher class ranks, students in a social science, students who participated in nutrition classes, those who share a house or an apartment with others or live alone, those with health problems, those who live on a special diet, and students who take vitamins and/or minerals seem more likely to be involved in using nutrition information, and thus are judged to be stronger advocates for nutrition information.

Table 15: Results of Hypotheses Testing

Hypothesis	Independent Variable	Statistical Procedure	Results
$H_0$1: There will be no difference in student nutritional information involvement score by student characteristics.			
	age	Pearson's	$p = .002$
	gender	t-test	$p = .000$
	living situation	t-test	$p = .015$
	class rank	Spearman's	$p = .002$
	college major	Anova	$p = .000$
		Scheffée	$p < .050$
	hard/social	t-test	$p = .001$
	nutrition classes	Spearman's	$p = .001$
	health problems	t-test	$p = .001$
	special diet	t-test	$p = .000$
	vitamins/minerals	t-test	$p = .000$
$H_0$2: Student characteristics do not influence the reported use of nutrition information labels.			
	age	Pearson's	$p = .007$
	gender	t-test	$p = .000$
	voting history	t-test	$p = .007$
	class rank	Spearman's	$p = .007$
	college major	K-W test	$p = .006$
	hard/social	t-test	$p = .002$
	nutrition classes	Spearman's	$p = .023$
	consumer economics	Spearman's	$p = .017$
	health problems	t-test	$p = .003$
	special diet	t-test	$p = .014$
	vitamins/minerals	t-test	$p = .006$
$H_0$3: Student characteristics do not influence the degree of interest in nutrient labeling.			
	gender	t-test	$p = .000$
	college major	Anova	$p = .000$
		Scheffée	$p < .050$
	hard/social	t-test	$p = .001$
	nutrition classes	Spearman's	$p = .005$
	consumer economics	Spearman's	$p = .031$
	health problems	t-test	$p = .008$
	special diet	t-test	$p = .004$
	vitamins/minerals	t-test	$p = .000$

Table 15: continued

Hypothesis	Independent Variable	Statistical Procedure	Results
$H_0$4: Student characteristics do not influence the amount of nutrition information students would like to find on the labels.			
	gender	t-test	$p = .015$
	polit. class.	Spearman's	$p = .019$
	nutrition classes	Spearman's	$p = .009$
	health problems	t-test	$p = .001$
	special diet	t-test	$p = .003$
$H_0$5: Student characteristics do not influence the preference for different types of food to be labeled with nutrition information.			
	gender	t-test	$p = .000$
	college major	K-W test	$p = .005$
	hard/social	t-test	$p = .003$
	mother's education	Spearman's	$p = .008$
$H_0$6: There will be no difference between student group mean importance scores for nutrition information as compared to all other food product information items. For detailed results see table 6.			

level of significance $p < .050$

Furthermore, female students, older students, those sharing a house or an apartment with others or live alone, those who voted in elections before, students in a social science, students with a higher class rank, those who have had nutrition and/or consumer economics classes, students who have health problems, and those who take vitamins and/or minerals were more likely to use nutrition information at home or in the store.

Most interest in nutrient information was expressed by female students, students in a social science, those who have attended nutrition and/or consumer economics classes, those who have health problems, and those who take vitamins and/or minerals.

More than the currently required amount of nutrition information was preferred by students who were female, those who classified themselves as politically more liberal, those who have had nutrition classes, those who have health problems and those who live on a special diet.

In addition female students, students in a social science and those whose mothers had a higher level of education were more likely to prefer all types of foods to be labeled.

Price information and open dates were significantly more important than nutrition information to the students surveyed. No significant difference could be found between the importance of nutrition information and ingredient list, unit price, and care labeling, whereas all other kinds of product information was found to be significantly less important than nutrition information.

Overall, the ten most important nutrients for the students were ranked in the following order: calories, sugar, protein, fat, carbohydrates, cholesterol, iron, calcium, vitamin C and saturated fats.

Implications

In the market place rationally motivated consumers try to maximize their expected utility from any product they buy. Through an information feedback system consumers tell producers, with a purchase, that their product has been chosen over competing products. To maintain competition among the producers all important information has to be available or known, so that consumers can decide according to their needs.

There are different utilities tied to food. One of them might be to maintain health by eating the food product which contains the least amount of nutrients considered detrimental to one's health. If the information is not available, consumers can't decide according to their needs.

If other consumer groups in addition to students indicate they would rather have more information on the labels, more products labeled, and have a different rank-order for the nutrients than currently required by law, producers and lawmakers should consider redesigning the current legislation according to consumer needs. The consumers are at risk of making suboptimal decisions if important information is missing. In addition, consumer response to properly labeled and more nutritious products could have the effect of encouraging competition between

manufacturers to produce more nutritious food, thus enabling the consumers to accomplish their health goals more readily.

It needs to be recognized that consumers may need more education and/or information then is on the label to be able to make optimal decisions and that not all consumers derive utility from making nutritional choices. However, for most processed foods, the label information is critical for anyone who has nutrition-related health problems and for those who desire to use the nutrition labels for their decisions concerning food.

Students showed an interest not only in nutrition information, but also in open dates, care instructions and ingredient list. This interest may indicate that the students are interested in nutrition and food as they relate to consumer behavior, and their health. Satisfying their interest can only be achieved if producers, educators and/or lawmakers help provide the information necessary to make the decision process easier.

The variable political classification turned out to be non significant in all cases except for amount of nutrition information shown on the label. Students seem to be interested in having and using nutrition information regardless to their political orientation. Students and all consumers need to know mechanisms for policy changes so that both producers and government can become more responsive to changing consumer needs.

Students clearly indicated that they would like to have more information and more products labeled. The nutrients presently listed on the nutrition label are not necessarily the nutrients considered by students to be important.

Recommendations for Further Research

The following recommendations are made for further research:

(1) Replication of the study with the same questionnaire with Home Economic nutrition majors. Compare the nutrition majors to the general students in order to determine if majoring in food and nutrition makes a difference in being a nutrition information advocate.

(2) Study parents' interest in nutrition information and compare it with the students' interest to see if parental attitudes have an influence on their children's attitude, since mother's education was positively related to the amount of information preferred. It would be interesting to see if the younger generation is beaming more interested and involved, relative to their parents.

(3) Use the questionnaire to validate or modify findings for the general public. There could be target group differences for various products. Replicate this study with other consumer groups, e.g. representative consumers in one area, with a comparision of these findings with different professional groups, e.g. nutritionists, employees in the food industry, etc. to see if consumers and professionals continue to differ regarding the importance of some of the nutrients.

(4) Labels should be developed based on this and other future studies, and tested for consumers nutrition information processing ability and their nutrition information preference.

(5) Replication of the study to compare college student responses to others of the same age group.

(6) Studies might be designed to assess the costs and benefits of providing better nutrition label information.

BIBLIOGRAPHY

Aaker, D. A. & Day, G. S. (1978). Consumerism: Search for the consumers' interest (3rd ed.). New York: MacMillen.

Andres, C. (1982). Sodium. (FDA estimates 40% of food will carry sodium content label by spring). Food Processing, 43(2), 75-78.

Asam, E. H. & Bucklin, L. P. (1973). Nutrition labeling for canned goods: A study of consumer response. Journal of Marketing, 37(April), 32-37.

Baumgardner, M. H., Heimbach, J. T. & Stokes, R. C. (1980). FDA 1978 Consumer Food Labeling Survey: Demographic analysis of surey responses. Washington, DC: U. S. Department of Health and Human Services, Food and Drug Administration, Division of Consumer Studies.

Bauman, H. E. (1973). What does the consumer know about nutrition? Journal of the American Medical Association, 225(July), 61-72.

Bettman, J. R. (1975). Issues in designing consumer information environments. Journal of Consumer Research, 2(December), 169-177.

Bettman, J. R. (1979). An information processing theory of consumer choice. Reading, MA: Addision Wesley.

Bettman, J. R. & Jacoby, J. (1976). Patterns of processing in consumer information acquisition. In B. B. Anderson (Ed.), Advances in Consumer Research, 3, 315-20.

Bettman, J. R. & Kakkar, P. (1977). Effects of information presentation format on consumer information acquisition strategies. Journal of Consumer Research, 3, 233-240.

Bettman, J. R. & Zins, M. A. (1979). Information format and choice task effect in decision making. Journal of Consumer Research, 4(September), 141-153.

Biehal, G. & Chakravarti, D. (1982). Information presentation format and learning goals as determinants of consumer's memory retrieval and choice processes. Journal of Consumer Research, 8, 431-441.

Borra, S. T. (1985). Food marketing strategies. Annual Agricultural Outlook Conference. Washington D.C.: USDA, 80-82.

Bymers, G. (1972). Seller - buyer communication: Point of view of a family economist. Journal of Home Economics, 62(2), 59-63.

Call D. L. & Hayes M. G. (1970). Reactions of nutritionists to nutrient labeling of foods. Americal Journal of Clinical Nutrition, 23, 1347-1352.

Center for Disease Control (1972). The Ten State Nutrition Survey 1968-1970 (DHEW Publication No. (HMS) 72-8130 to 72-8134). Atlanta, GA: U. S. Department of Health, Education and Welfare, Health Services and Mental Health Administration.

Center for Food Safety and Applied Nutrition (1984a). Nutrition labeling in the retail processed food supply: 1984. Washington, DC: Division of Consumer Studies.

Center for Food Safety and Applied Nutrition (1984b). Status of sodium labeling of retail processed foods. Washington, DC: Division of Consumer Studies.

Consumers desire for detailed food labels assuring ingredient safety. (1981). Food Product Development, (Februar), 17.

Daly, P. A. (1976). The response of consumers to nutrition labeling. Journal of Consumer Affairs, 10, 170-17852.

Demkovich, L. E. (1983). Skeptics taking voluntary industry food labeling without a grain of salt. National Journal, 15, 1501-1502.

Division of Consumer Studies (1976a). FDA Consumer Nutrition Knowledge Survey. Report I 1973-1974 (DEHW Publication No. (FDA) 76-2058). Washington, DC: U. S. Government Printing Office.

Division of Consumer Studies (1976b). FDA Consumer Nutrition Knowledge Survey. Report II 1975 (DEHW Publication No. (FDA) 76-2059). Washington, DC: U. S. Government Printing Office.

Federal Register (1972), 37 FR 6493.

Federal Register (1973), 38 FR 6950.

Food and Drug Administration (1977). Understanding Nutrition Labels (HEW Publication No. (FDA) 77-2082). Rockville, MD: U. S. Department of Health, Education and Welfare, Public Health Service.

Food and Drug Administration (1978). Food Labeling Hearings, Summary Report. Rockville, MD: Department of Health, Education and Welfare, Public Health Service.

Food and Drug Administration (1979). Summary of food labeling notices. Rockville, MD: Department of Health, Education and Welfare, Public Health Service.

Food and Drug Administration (1981). Nutrition labels and U.S.RDA (HHS Publication No. (FDA) 81-2146). Washington, DC: U. S. Government Printing Office.

Food and Drug Administration (1983). Sodium, facts for older citizen (HHS Publication No. (FDA) 83-2169). Rockville, MD: U. S. Department of Health and Human Services, Public Health Service.

Food and Drug Administration (1984). A word about low sodium diets (HHS Publication No. (FDA) 84-2179). Rockville, MD: U. S. Department of Health and Human Services, Public Health Service.

Freiden, J. B. (1981). The effects of nutrition information on brand rating: test for a non-use benefit. Journal of Consumer Affairs, 15(1), 106-114.

French, W. A. & Barksdale, H. C. (1974). Food labeling regulation: efforts towards full disclosure. Journal of Marketing, 38(3), 14-19.

Friedman, M. P. (1966). Consumer confusion in the selection of supermarket products. Journal of Applied Psychology, 50, 529-534.

Friedman, M. P. (1971). Dual price labels: Usage patterns and potential benefits for shoppers in inner-city and suburban supermarkets. Congressial Record, (April 15), 10555-10571.

Friedman, M. P. (1977). Consumer use of informational aids in supermarkets. Journal of Consumer Affairs, 11(1), 78-89.

Gatewood, R. D. & Perloff, R. (1973). An experimental investigation of the three methods of providing weight and price information to consumers. Journal of Applied Psychology, 57(February), 81-85.

Heimbach, J. T. (1981). Defining the problem: The scope of consumer concern with food labeling. In K. B. Monroe (Ed.) Advances in Consumer Research, 8, 474-478.

Heimbach, J. T. (1983). The public response to labeling of the sodium content of foods. Washington, DC: U. S. Department of Health and Human Services, Food and Drug Administration, Division of Consumer Studies.

Heimbach, J. T. & Stokes, R. C. (1979). FDA 1978 Consumer Food Labeling Survey. Washington, DC: U. S. Department of Health and Human Services, Food and Drug Administration, Division of Consumer Studies.

Heimbach, J. T. & Stokes, R. C. (1981). Nutrition labeling for today's needs: Opinions of nutritionists, the food industry and consumers. Washington, DC: Food and Drug Administration, Division of Consumer Studies.

Heimbach, J. T. & Stokes, R. C. (1982). Nutrition labeling and public health: Survey of American Institut of Nutrition members, food industry and consumers. The American Journal of Clinical Nutrition, 36, 700-708.

Henderson, D. (1982). Using the store shelf as a food label. FDA Consumer, 16(7), 22-23.

Hopkins, H. C. (1972). Nutrient labeling. FDA Papers, 6(May), 4-7.

Jacoby, J. (1984). Perspectives on information overload. Journal of Consumer Research, 10, 432-435.

Jacoby, J., Chestnut, R. W. & Silberman, W. (1977). Consumer use and comprehension of nutrition information. Journal of Consumer Research, 4(September), 119-128.

Jacoby, J., Chestnut, R. W., Weigl, K. C. & Fisher, W. (1976). Prepurchase information acquisition: Description of a process methodology, research paradigm, and pilot investigation. In B. B. Anderson (Ed.) Advances in Consumer Research, 3, 306-314.

Jacoby, J., Kohn, C. A. & Speller, D. E. (1973). Time spent acquiring product information as a function of information load and organization. In Proceedings of the 81st Annual Convention of the American Psychological Association, 813-814.

Jacoby, J., Speller, D. E. & Kohn, C. A. (1974a). Brand choice behavior as a function of information overload. Journal of Marketing Research, 11, 63-69.

Jacoby, J., Speller, D. E. & Kohn-Berning, C. A. (1974b). Brand choice as a function of information load: Replication and extension. Journal of Consumer Research, 1, 33-42.

Jacoby, J., Syzbill, G. J. & Busto-Schach, J. (1977). Information acquisation behavior in brand choice situations. Journal of Consumer Reseach, 3,(4), 209-216.

Jones-Putnam, J. & Reidy, K. (1981). Sodium: Why the concern? National Food Review, 15(Summer), 27-30.

Kemm, J. R. (1980). Nutrient requirement and recommended daily intake. Nutrition and Food Science, 63, 2-5.

Kinder, F. & Green, N. R. (1978). Meal Management (5th ed.). New York: MacMillan.

Klinger, L. E. (1974). Update on nutrient labeling: Consumer awareness, use and attitudes. Food Product Development, 8(June), 30-40.

Klopp, P. & MacDonald, M. (1981). Nutrition labels: An explanatory study of consumer reasons for non-use. Journal of Consumer Affairs, 15(2), 301-316.

Lambert, Z. V. (1977). Nutrition information: A look at some processing and decision making difficulties. In W. D. Perrault, Jr. (Ed.). Advances in Consumer Research, 4, 126-132.

Lecos, C. (1980). Sugar: How sweet it is - and isn't (HEW Publication No. (FDA) 80-2127). Washington, DC: Government Printing Office.

Lecos, C. (1982a). For food labels better read = better feed. FDA Consumer, 16(October), 8-11.

Lecos, C. (1983). A compendium on fats (HHS Publication No. (FDA) 83-2171). Washington, DC: U. S. Government Printing Office.

Lecos, C. (1984). On making food labels truthful (HHS Publication No. (FDA) 84-2181). Washington, DC: U. S. Government Printing Office.

Lenahan, R. J., Thomas, J. A., Taylor, D. A., Call, D. L. & Padberg, D. L. (1972). Consumer reaction to nutrition information labels on food products. Search Agriculture, 2(September), 1-27.

Lenahan, R. J., Thomas, J. A., Taylor, D. A., Call, D. L. & Padberg, D. L. (1973). Consumer reaction to nutrition labels on food products. Journal of Consumer Affairs, 5, 1-12.

Linder, S. (1970). The hurried leisure class. New York: Columbia Universal Press.

Malhotra, N. K. (1982). Information load and consumer decision making. Journal of Consumer Research, 8, 419-430.

Malhotra, N. K., Jain, A. & Lagakos, S. W. (1982). The information overload controversy: An alternative viewpoint. Journal of Marketing, 46, 27-37.

McCullough, J. & Best, R. (1980). Consumer Preferences for Food Label Information: A basis for segmentation. Journal of Consumer Affairs, 14(1), 180-192.

McCullough, T. D. & Padberg, D. I. (1971). Unit-pricing in supermarkets: Alternatives, costs and consumer reaction. Search Agriculture, 1(6), 1-25.

McElroy, B. F. & Aaker, D. A. (1979). Unit-pricing, six years after introduction. Journal of Retailing, 55(Fall), 44-57.

McNutt, K. W. (1979). Nutrition labeling - a tool for dietplanning. In R. Levy et al. (Ed.), Nutrition, lipids, and coronary heart disease (pp. 425-440). New York: Raven Press.

Miller, G. A. (1965). The magical number seven plus or minus two: Some limits on our capacity for processing information. Psychological Review, 63(2), 81-92.

Miller, R. W. (1981). On being too rich, too thin, too cholesterol laden (HHS Publication No. (FDA) 81-1087). Washington, DC: U. S. Government Printing Office.

Miller, R. W. (1983). The public knows and cares about sodium (HHS Publication No. (FDA) 83-2173). Washington, DC: U. S. Government Printing Office.

Mohr, K. G., Wyse, B. W. & Hansen, R. G. (1980). Aiding consumer nutrition decisions. Comparision of a graphical nutrient density labeling format with the current food labeling system. Home Economics Research Journal, 8(3), 162-172.

Moore, J. L. & Wendt, P. F. (1973). Nutriton labeling - a summary and evaluation. Journal of Nutrition Education, 5, 121-125.

Morrison, M. (1977). A consumer's guide to food labels (HHS Publication no. (FDA) 77-2083). Washington, DC: U. S. Government Printing Office.

Muller, T. E. (1982). The impact of consumer information brand sales: A field experiment with point of purchase nutritional information load. Unpublished doctoral dissertation, University of British Columbia, Vancouver.

Murray, B. K. (1977). Testing consumers' knowledge of food and nutrition. Food Product Development, 11(July/August), 15-17.

Murray, B. K. (1978). Commissioner Kennedy measures consumers attitudes as "Qubesumers" talk back to their TVs. Food Product Development, 12,(December), 12+14.

National Center for Health Statistics (1974). First Health and Nutrition Examination Survey, United States, 1971-1972. (DHEW Publication No. (HRA) 74-1219-1). Washington, DC: U. S. Government Printing Office.

National Urban League and Food and Drug Administration (1984). Why and how to reduce sodium (DHHS Publication No. (FDA) 84-2185). Rockville, MD: U. S. Department of Health and Human Services.

Nicholls, C. A. & Morrision, M. (1974). Consumer talk about labeling. FDA Consumer, 8(2), 4-7.

Olson, J. C. & Jacoby, J. (1972). Cue utilization in the quality perception process. In M. Venkatesan (Ed.), Proceedings, Third Annual Conference of Association for Consumer Research (pp. 167-179). Chicago: Association for Consumer Research.

Package labeling on the increase: Study. (1983). Chipper/Snacker, 40(8), 23.

Pao, E. M. & Hill, M. M. (1974). Diets of the elderly, nutrition labeling and nutrition education. Nutrition Education, 6, 96-99.

Personal Correspondence (November, 1985) with the FDA.

Poolton, M. A. (1972). Predicting application of nutrition education. Journal of Nutrition Education, 4, 110-113.

Raaij, W. F. van (1977). Consumer information processing for different information structures and formats. In W. D. Perrault, Jr. Advances in Consumer Research, 4, 1976-184.

Registration Report. (January 31, 1986). Oregon State University.

Ross, M. (1974). What's happening to food labeling? Journal of the American Dietetic Assoication, 64, 262-267.

Russo, E. J. (1974). More information is better. A reevaluation of Jacoby, Speller and Kohn. Journal of Consumer Research, 1(3), 68-72.

Russo, E. J., Krieser, G. & Miyashita, S. (1975). An effective display of unit price information. Journal of Marketing, 39(April), 11-19.

Scammon, D. L. (1977). Information load and consumers. Journal of Consumer Research, 4, 148-155.

Schmidt, F. (1984). Food industry shakes off sodium labeling. Business and Society Review, 49(Spring), 57-59.

Schoenfeld, A. F. (1970). Nutrition Report/FDA's proposal for guideline signals. New approach to the U. S. diet. National Journal, 2, 2399-2407.

Schrayer, D. W. (1978). Consumer response to nutrition labeling. Food Technology, 32(12), 42-45.

Schucker, R. E. (1981). Implementation of a revised food labeling policy: Evaluation and tracking. In K. B. Monroe (Ed.) Advances in Consumer Research, 8, 493-496.

Schultz, H. W. (1981). Food Law Handbook. Westport, CT: AVI.

Seligsohn, M. (1981). Sodium content labeling: An issue that won't go away. Food Engineering, 53(8), 42-44.

Semling, H. V. Jr. (1981). Industry suggests ways to make label rules more workable, practicable, affordable. Food Processing, 42(May), 16-18.

Smith, R. B., Brown, J. A. & Weimer J. P. (1979). Consumer attitudes towards food labeling and other shopping aids (Agricultural Economics Report No. 439). Washington, DC: U. S. Government Printing Office.

Stein, J. (1981). Warning about salt - will voluntary labeling do the job without a new law? National Journal, 13, 1863-1865.

Stephenson, M. (1975). Making food labels more informative. FDA Consumer, 9(October), 13-17.

Stevan, M. A. (1974). What shoppers are concerned about. FDA Consumer, 8(September), 13-17.

Stewart, M. L. (1981). Commercial market tracking systems. Application to policy formation regarding nutrition labeling. In K. B. Monroe (Ed.) Advances in Consumer Research, 8, 488-492.

Stokes, R. C. (1972). Consumers want nutrition labeling - and can use it. The National Provisioner, 66(April 29), 35-42.

Stokes, R. C. (1972). The Consumer Research Institute's nutrient labeling research program. Food and Drug Cosmetic Law Journal, 27, 249-262.

Summers, J. C. (1974). Less information is better? Journal of Marketing Research, 11, 467-468.

Symons, H. W. (1981). The frozen food label and consumer needs. Food Technology, (Februar), 65-66.

Thorelli, H. B. & Thorelli, S. V. (1977). The information systems and consumer policy. Cambridge, MA: Ballinger.

U. S. Department of Agriculture and U. S. Department of Health and Human Services. (1982). Design and Evaluation of nutrition label formats. Information kit. Washington, DC.

U. S. Department of Agriculture and U. S. Department of Health and Human Services. (1980). Sodium, think about it (Home and Garden Bulletin No. 237). Washington, DC: U. S. Government Printing Office.

Vandenberg, R. L. (1981). Food label information: What consumers say they use and what they actually use. In K. B. Monroe (Ed.) Advances in Consumer Research, 8, 484-487.

White House Conference on Food, Nutrition and Health (1970). (Final Report). Washington, DC: U. S. Government Printing Office.

Wilkie, W. L. (1974). Analysis of effects of information load. Journal of Marketing Research, 7, 462-466.

Wilkie, W. L. (1976). Consumer Information Acquisition: Public policy perspectives. In B. B. Andersen (Ed.) Advances in Consumer Research, 3, 334-340.

Wolf, I. D., Raper, N. R. & Rosenthal, J. C. (1983). USDA activities in relation to the sodium issue 1981-83. Food Technology, 37(9),59-63.

Woodburn, M. & VanDeRiet, S. (1985). Safe food: Care labeling for perishable foods. Home Economics Research Journal, 14 (September), 3-10.

Woodruff, R. B. (1972). Measurement of consumer's prior brand information. Journal of Marketing Research, 9, 258-263.

Wyatt, C. J. (1980). Adequacy of food labeling for consumers limited sodium diet. Journal of Food Science, 45(2), 259-261.

APPENDIX

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SURVEY

OF

STUDENTS' INTEREST

IN

NUTRITION INFORMATION

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QUESTIONNAIRE 1

Part I

1. How interested are you in having ready access to information about nutrition? (circle one)

4	3	2	1	0
extremely interested	very interested	somewhat interested	not too interested	not at all interested

2. How informed do you feel about your own day to day nutrition needs? (circle one)

4	3	2	1	0
extremely informed	very informed	somewhat informed	not too informed	not at all informed

3. How interested are you in having ready access to the following types of food product information?
(Circle the appropriate number for each information type)

	extremely	very	somewhat	little	not at all
1 Product Name	4	3	2	1	0
2 Weight	4	3	2	1	0
3 Drained Weight	4	3	2	1	0
4 Name and Adress of the Producer, Distributor or Retailer	4	3	2	1	0
5 Ingredient List	4	3	2	1	0
6 Nutrition Information	4	3	2	1	0
7 Open Date (sell-by date)	4	3	2	1	0
8 Care Instructions (for storing the product safely)	4	3	2	1	0
9 Number of Servings and Servings Size	4	3	2	1	0
10 Price	4	3	2	1	0
11 Unit Price (price per oz.)	4	3	2	1	0

4. Do you look for nutrition information on food labels? (circle one)

4	3	2	1	0
always	often	sometimes	seldom	never

5. Do you take the time to read and use the food label instructions,
a. in the store for purchasing a certain brand? (circle one)

4	3	2	1	0
always	often	sometimes	seldom	never

b. at home for meal planning? (circle one)

4	3	2	1	0
always	often	sometimes	seldom	never

6. According to the present nutrition label regulation nutrition labeling is voluntary for most foods. Any packaged (processed) food product that
(a) contains any added vitamin, mineral or protein, or
(b) is labeled or advertised with any nutritional claim or information, other than sodium content, must be labeled by law.

If you had authority to write the law, for which foods would you require nutrition label information? (circle one)

4 all foods (fresh and processed foods)
3 all processed foods, but not fresh produce
2 only those foods currently required by law
1 special, dietary food only (not regular food, sold for the average consumer)
0 no foods

7. How interested are you to find the following nutrients on the nutrition information labels of food products you buy?
(circle one number for each nutrient)

	extremely	very	somewhat	little	not at all
1 Calories	4	3	2	1	0
2 Protein	4	3	2	1	0
3 Carbohydrate	4	3	2	1	0
4 Fat	4	3	2	1	0
5 Saturated Fat	4	3	2	1	0
6 Monounsaturated Fat	4	3	2	1	0
7 Polyunsaturated Fat	4	3	2	1	0
8 Cholesterol	4	3	2	1	0
9 Sugar	4	3	2	1	0
10 Starch	4	3	2	1	0
11 Fiber	4	3	2	1	0
12 Sodium	4	3	2	1	0
13 Potassium	4	3	2	1	0
14 Vitamin A	4	3	2	1	0
15 Vitamin C	4	3	2	1	0
16 Riboflavin	4	3	2	1	0
17 Thiamin	4	3	2	1	0
18 Niacin	4	3	2	1	0
19 Calcium	4	3	2	1	0
20 Iron	4	3	2	1	0
21 Magnesium	4	3	2	1	0
22 Zinc	4	3	2	1	0
23-Others (please specify)	4	3	2	1	0

8. Are you satisfied with the amount of information required by law, or would you prefer to have more or less information on the label? (circle one)

4 much more
3 somewhat more
2 amount required by law
1 less
0 no nutrient information

current label

Nutrition Information Per Serving	
Serving Size	8 oz
Servings per Container	2
Calories	560
Protein	23 g
Carbohydrate	43 g
Fat	33 g
Percentage of U.S. Recommended Daily Allowance (U.S.R.D.A.)	
Protein	35%
Vitamin A	35%
Vitamin C	10%
Thiamin	15%
Riboflavin	15%
Niacin	25%
Calcium	2%
Iron	25%

9a. Where do you get your information about nutrients present in the food you eat? (Circle all appropriate numbers on the left side)
b. Where would you like to get your information abouts nutrients present in the food you eat? (Circle all appropriate numbers on the right side)

I currently get information about nutrition from:

1 ..... Family Members and Relatives 1
2 ..... Friends 2
3 ..... Doctors 3
4 ..... Pharmacists 4
5 ..... Sellers and Retailers 5

6 ..... School and Lectures 6
7 ..... County and/or State Extension Service 7
8 ..... Exhibitions and Meetings 8
9 ..... Newspaper 9
10 ..... Magazines 10

11 ..... Books 11
12 ..... Government Publications 12
13 ..... Industry Publications 13
14 ..... Insurance Company Publications 14
15 ..... Radio 15

16 ..... Television 16
17 ..... Nutrition Labels on Food Products .. 17
18 ..... No where 18
19 ..... Others 19

(please specify)_____

I would like to get information about nutrition from:

10. Do you have any comments for possible changes with nutrition information labels, or the nutrition information label regulation?

PART II

Would you please give some additional information about your situation?

1. What is your age? _____ years

2. What is your sex? (circle one) 0-Female 1-Male

3. How many hours per week do you watch TV? _____ hours per week

4. How many hours per week do you participate in physical activities? (Aerobics, biking, swimming, jogging, etc.) _____ hours per week

5. What is your living situation? (circle one)

   1 living in a dormatory/coop/sorority/fraternity
   2 living in a house/appartment shared with others
   3 living in a house/appartment alone
   4 living with parents or relatives

6. How would you classify yourself politically?

   1 Very liberal
   2 Liberal
   3 Middle of the road
   4 Conservative
   5 Very conservative

7. Have you ever voted in a community, state or federal election?

   1 yes
   2 no

8. Which of the following statements best describes your present student status? (circle one)

   1 Freshman
   2 Sophomore
   3 Junior
   4 Senior
   5 Postbaccalaureate
   6 Graduate

9. What college is your major in?

   1 Liberal Arts
   2 Science
   3 Agricultural Science
   4 Business
   5 Education
   6 Engineering or Preengineering
   7 Forestry
   8 Health and Physical Education
   9 Home Economics
   10 Oceanography
   11 Pharmacy
   12 Veterinary Medicine
   13 Undeclared or Other _____

10. Have you ever taken classes in which nutrition was one of the topics studied? (circle the number for all that apply)

    no: 0

    yes: 1 High school
         2 College/University

11. Have you ever taken classes in which consumer economics was one of the topics studied? (circle the number for all that apply)

    no: 0

    yes: 1 High school
         2 College/University

12. What is your mother's/father's highest level of education attained? (Please circle the appropriate number for your mother and your father)

Mother		Father
1	Grammar school or less	1
2	Some high school diploma	2
3	High school diploma	3
4	Post secondary other than college	4
5	Some college	5
6	College degree	6
7	Some graduate school	7
8	Graduate degree	8

13. What is your mother's/father's occupation?

a. Mother: _____

b. Father: _____

14. Do you have any specific health problems that might be affected by the food you eat? (circle one)

1 yes 2 no 3 don't know

If yes: What kind of health problems? (please specify)_____

_____

15. Are you on any kind of special diet as a result of your specific health problems? (circle one)

1 yes 2 no 3 don't know

If yes: What kind of diet? (please specify) _____

_____

16. Do you take vitamins or minerals once a week or more often on the average? (circle one)

1 yes 2 no 3 don't know

If yes: What kinds of vitamins/minerals? (please specify) _____

_____

17. Do you take food supplements once a week or more often on the average? (circle one)

1 yes 2 no 3 don't know

If yes: What kinds of supplements? (please specify) _____

_____