

THE UNIVERSITY OF MANITOBA

AN ASSESSMENT OF THE KNOWLEDGE AND APPLICATION OF
NUTRITION PRINCIPLES AND THEIR RELATIONSHIP TO
AVAILABILITY AND USE OF NUTRITION INFORMATION
BY HOMEMAKERS IN AN ISOLATED COMMUNITY

by

DONNA MYLES WOOLCOTT

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF SCIENCE

DEPARTMENT OF FOODS AND NUTRITION

WINNIPEG, MANITOBA

MAY, 1971



ABSTRACT

An Assessment of the Knowledge and Application of Nutrition Principles and Their Relationship to Availability and Use of Nutrition Information by Homemakers in an Isolated Community

by

Donna Woolcott

One hundred and twenty-nine homemakers from Lynn Lake, Manitoba, located five hundred and fifty miles northwest of Winnipeg were interviewed during September, 1970. The interview schedule consisted of a test of knowledge of nutrition, two practice indices, that is, a twenty-four hour dietary recall, and a hypothetical meal plan; a measure of the availability and use of various nutrition information sources; a description of the personal characteristics of respondents.

Respondents scored average or high in just over eighty-five percent of cases on the nutrition knowledge test. High knowledge was related to higher educational attainment, previous exposure to nutrition education, higher socio-economic status, and a positive degree of concern.

Respondents generally scored lower on practice of nutrition than in their knowledge of nutrition. There was

a relationship between higher nutrition knowledge and better practice of nutrition. Scores on the hypothetical meal plan tended to be higher than scores on the dietary recall which may be a further indication of the gap between knowledge and practice. Fruit and milk were the two least well used food groups while meats and vegetables were consumed in adequate amounts by most respondents.

Better practice was indicated by homemakers with higher educational attainment, higher socio-economic status, and a positive degree of concern.

The availability of nutrition information sources in this isolated community was limited. Most respondents named friends, relatives, neighbors, and doctor as their most important sources of information for questions about nutrition and family feeding. Professional sources of information were for the most part unavailable in the community while mass media sources including radio and television were available but only in limited amounts. These were not considered good sources of nutrition information. It was therefore difficult to draw any conclusions about the relationship of use of nutrition information sources and the knowledge and practice of nutrition. Better educated, older respondents tended to be more aware of and to use more nutrition information sources.

In summary, knowledge and practice of nutrition were

related to certain personal characteristics but not significantly to use of nutrition information sources.

ACKNOWLEDGEMENTS

The author would like to express special thanks to her advisor, Dr. S. M. Weber, Head of Foods and Nutrition Department of the Faculty of Home Economics for her continued assistance, direction, and encouragement throughout the duration of this study.

Appreciation is also expressed to:

Mrs. G. Armstrong, Department of Foods and Nutrition, for her assistance in interviewing and in computer programing;

Dr. A. Kristjanson, Department of Sociology, for his assistance in the questionnaire development;

Dr. B. Johnstone, Department of Statistics, for his assistance in statistical analysis of the data;

Faculty members in the Department of Foods and Nutrition for their advice in the formulation of the nutrition knowledge test;

Residents of Lynn Lake who participated in the study.

Appreciation is extended to the Centre for Settlement Studies and to the University of Manitoba Graduate Scholarship Fund for the financial support which made this study possible.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERATURE	7
Knowledge and Its Relation to Practice	7
Relationship of Personal Characteristics of Homemakers to Knowledge and Practice of Nutri- tion	13
Use and Factors Relating to Use of Nutrition Information Sources	17
RESEARCH DESIGN	26
Hypotheses	26
Subjects	27
Interview Schedule	27
Definitions	28
Analysis of Data	31
RESULTS AND DISCUSSION	32
Description of Respondents	32
Knowledge of Nutrition	37
Nutrition Practices	49
Availability and Use of Nutrition Information Sources	53
Relationships Between Personal Characteristics and Use of Nutrition Information Sources	63
Relationships Between Knowledge of Nutrition and Personal Characteristics	70

	Page
Relationships Between Nutrition Practices and Personal Characteristics	73
Relationships Between Knowledge and Practice Indices	77
Relationships Between Knowledge and Awareness and Use of Nutrition Information Sources	78
CONCLUSIONS	83
BIBLIOGRAPHY	91
APPENDIX:	
A. Interview Schedule	95
B. Department of National Health and Welfare Score Sheet	96

LIST OF TABLES

Table		Page
I.	DISTRIBUTION OF RESPONDENTS BY AGE	32
II.	DISTRIBUTION OF RESPONDENTS BY LENGTH OF RESIDENCY IN LYNN LAKE	33
III.	DISTRIBUTION OF RESPONDENTS BY EDUCATIONAL ATTAINMENT	33
IV.	DISTRIBUTION OF RESPONDENTS BY NUMBER OF YEARS OF MARRIAGE	34
V.	DISTRIBUTION OF RESPONDENTS BY NUMBER OF CHILDREN	35
VI.	DISTRIBUTION OF RESPONDENTS BY EMPLOYMENT .	35
VII.	DISTRIBUTION OF RESPONDENTS BY HUSBANDS' OCCUPATIONAL CLASS	36
VIII.	DISTRIBUTION OF RESPONDENTS BY INCOME	36
IX.	RESPONDENTS' PERFORMANCE ON NUTRITION KNOWLEDGE TEST	37
X.	DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE QUESTIONS RELATING TO ROLE AND SOURCES OF PROTEIN	39
XI.	DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE QUESTIONS RELATING TO ROLE AND SOURCES OF VITAMINS AND MINERALS	41
XII.	DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE QUESTIONS RELATING TO OBESITY, AND CHOLESTEROL	44
XIII.	DISTRIBUTION OF RESPONSES TO GENERAL NUTRITION KNOWLEDGE QUESTIONS	46
XIV.	DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE QUESTIONS RELATING TO FOOD MYTHS	48

Table		Page
XV.	SCORES ON TWENTY-FOUR HOUR DIETARY RECALL	50
XVI.	TWENTY-FOUR HOUR RECALL OF FOOD INTAKE	51
XVII.	SCORES ON MEAL PLAN	52
XVIII.	FOOD GROUP INTAKE AS INDICATED IN HYPO- THETICAL MEAL PLAN	54
XIX.	AVAILABILITY AND USE OF SOME NUTRITION INFORMATION SOURCES	55
XX.	USE OF NEWSPAPER ARTICLES AND ADVERTISE- MENTS AS SOURCES OF NUTRITION INFORMA- TION	57
XXI.	NUMBER OF MAGAZINES READ REGULARLY BY RESPONDENTS	58
XXII.	USE OF MAGAZINE ARTICLES AND ADVERTISEMENTS AS SOURCES OF NUTRITION INFORMATION	59
XXIII.	USE OF TELEVISION AS A SOURCE OF NUTRITION INFORMATION	59
XXIV.	USE OF RADIO AS A SOURCE OF NUTRITION INFORMATION	60
XXV.	RESPONDENTS' USE OF INFORMATION SOURCES TO SOLVE HOMEMAKING PROBLEMS	62
XXVI.	HOMEMAKERS' FIRST AND SECOND CHOICE OF MOST HELPFUL INFORMATION SOURCES FOR QUESTIONS ABOUT FAMILY FEEDING AND NUTRITION	64
XXVII.	RELATIONSHIP BETWEEN EDUCATION ATTAINMENT AND USE OF NUTRITION INFORMATION SOURCES	66
XXVIII.	RELATIONSHIP BETWEEN EDUCATIONAL ATTAINMENT AND HOMEMAKERS' KNOWLEDGE OF NUTRITION ..	70
XXIX.	RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND HOMEMAKERS' KNOWLEDGE OF NUTRITION ..	71

Table		Page
XXX.	RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORES AND PREVIOUS EXPOSURE TO NUTRITION INFORMATION	72
XXXI.	RELATIONSHIP BETWEEN AGE AND SCORES ON HYPOTHETICAL MEAL PLAN	74
XXXII.	RELATIONSHIP BETWEEN EDUCATIONAL ATTAINMENT AND SCORES ON TWENTY-FOUR HOUR DIETARY RECALL	75
XXXIII.	RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND SCORES ON TWENTY-FOUR HOUR DIETARY RECALL	76
XXXIV.	RELATIONSHIP OF MEAL PLAN SCORES AND SCORES ON TWENTY-FOUR HOUR RECALL	77
XXXV.	RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORES AND SCORES ON TWENTY-FOUR HOUR DIETARY RECALL	78
XXXVI.	RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORE AND USE OF NUTRITION INFORMATION SOURCES	80

INTRODUCTION

The decade of the sixties has been one of great advances not only in communications technology but also in the field of nutrition. At the same time, nutrition education programs have developed and expanded in an attempt to make information available to families. As a result, a greater proportion of the population has available to them more sources of information about foods and nutrition than ever before. In spite of these factors, there appears to be a gap between what the general population knows about nutrition at a scientific level, and what is actually being exhibited by the food habits of these people.

Historically, poor food habits and malnutrition have been attributed to lack of availability of food and general social and economic underdevelopment. Similarly, within the developed nations, the malnourished have been found mainly in the poorly educated, lower socio-economic status portion of society.

However, malnutrition and poor food habits do exist in many segments of Canadian society in spite of economic and social prosperity and widespread availability of food. In 1963 Trenholme and Milne (34) reported that in a sample of nearly 2500 grade nine children in Ontario, forty percent had "poor" diets while seventy percent had "very poor" diets on the basis of seven-day food records. Two years later

Broadfoot (2) examined the Vitamin D intake of 1000 Ontario children and found that twenty percent of these children received less than the recommended daily allowance of 400 International Units. Furthermore, the Canada Council on Nutrition (6) reported that in one year between 1967 and 1968, there were 400 cases of rickets treated in Toronto and Montreal. A Food and Drug Directorate Study (13) in 1969 indicated that there was an appreciable Vitamin A deficiency in the diets of many Canadians.

Poor food habits can lead ultimately to: (1) a nutrient deficiency due to underconsumption; (2) a nutrient excess due to overconsumption. In addition to the examples of undernutrition in this country given above, there is widespread evidence of overnutrition in the form of obesity which has been named Canada's most prominent public health problem.

These conditions are a contradiction to the economic and social progress which has occurred in many segments of society. They point out the need to re-examine the reasons why people may not use adequate foodstuffs even though they are readily available.

In lieu of explaining the existing poor food habits and resultant malnutrition by lack of food, poverty, or ignorance, alternative explanations may be sought in the fields of anthropology, sociology, and psychology. It has

been established that many factors are more influential in determining a family's food habits than actual knowledge of what foods make up a nutritionally adequate diet. Bruch (4), a psychiatrist, recently commented in an article on nutrition quackery that,

... eating is a function of high and complex emotional significance. What we eat, how we eat, and with whom we eat are determined in innumerable ways by social and national tradition, moral commands, and restrictions, and individual psychologic experiences, and only incidentally by nutritional needs. Emotional aspects of eating pervade our lives to such an extent that they are taken for granted as the normal and natural ways of eating.

Psychologists have suggested that people do not necessarily change behavior in light of information which is available to them or knowledge which they may have. According to one educator (14), a person must go through three steps for a behavior change to occur. He must have the knowledge, he must believe this knowledge to be correct, and he must feel that it applies to and is significant to him. Widespread information about the nutritional value of food does not guarantee that a population is consuming a well-balanced diet. Evidence suggests that people are more interested in how food tastes rather than in its nutritional value, that in fact, people buy and eat food to fulfil psychological needs rather than physical needs.

These and other breakdowns in the communication process may also partially explain the existing gap between

the nutrition information that is available and what is being used by the homemaker. Because the communication process is complex, the breakdown could be at one or more of many phases. Problems may occur at the information source, in the channel through which the information flows, in the nature of the information itself, or at the receiver end of the process, that is, with the homemaker who may not be motivated to acquire new information. In addition, she may not be motivated to use any prior information which she has obtained.

Katz and Lazarsfeld (20) have suggested that there are five variables which may intervene in the flow of communication between the media and the masses. These variables include exposure, the differential character of the media, message content, attitudes and psychological predispositions of the audience, and interpersonal relations.

Some of these variables appear to be involved in the flow of nutrition information. Although much of the nutrition information available to the public is channeled through reliable sources, perhaps even more information and misinformation is reaching people through mass media, advertising, and "popular" writings where the purpose is more often to sell a product on the consumer market than to educate the consumer as to the nutritional benefits of the product.

Widespread food faddism is a further indication that misinformation about foods and nutrition exists. The psychological and social implications of food and eating are evidenced by this existing food faddism. In an attempt to understand these beliefs and to direct people to make sound nutritional practices, Jenner (19), a public health educator, states that, "We ... proceed within the framework of peoples' ideas, attitudes, and beliefs, actively supporting beneficial practices, and trying to dissuade from those considered on mature judgement to be harmful."

Because very little research has been related to the isolated community, it may be a unique setting for the study of communication of information. However, it can be assumed that many characteristics of communication in the urban non-isolated community are also present in the isolated community. Physical barriers to communication may be a greater problem than in the non-isolated urban setting, however social-psychological barriers to communication may be less evident in the isolated community.

The following investigation attempts to define the availability and use of nutrition information sources and their relationship to knowledge and practice of nutrition in an effort to delineate where the communication breakdown occurs. One hundred and twenty-nine homemakers from a northern isolated mining community (Lynn Lake, Manitoba)

were interviewed with the following objectives:

- (1) to study the availability and use of various nutrition information sources in the isolated community.
- (2) to study the knowledge of nutrition of a randomly selected group of homemakers.
- (3) to study the application of this knowledge by a dietary recall and meal plan,
- (4) to relate certain personal factors including age, education, socio-economic status and degree of concern of the homemaker to the use of nutrition information sources and knowledge and practice of nutrition.

REVIEW OF LITERATURE

A review of the literature indicates that homemakers, in general, have a low level of knowledge of nutrition. Homemakers who demonstrate a high knowledge of nutrition reflect their knowledge in more adequate food practice. Research investigations indicate that nutrition knowledge and its application in food practice, is related to many personal characteristics in homemakers. For example, higher education is associated with higher knowledge and more adequate practices. Furthermore, it has become apparent that nutrition information, although available, may not be effectively reaching most homemakers, who for the most part prefer to use their own common sense or to consult friends, neighbors, or relatives for information about feeding their families. The following review attempts to elaborate some of the relevant studies.

Knowledge of Nutrition and its Relation to Practice

The best known work relating knowledge and practice of nutrition was recorded by Young and co-workers (37,38,39) in 1956. Homemakers' knowledge of nutrition was evaluated in terms of familiarity with the "Basic Seven" food guide, understanding of the term "balanced diet," knowledge of what foods should be included in the daily diet and why, ability to make sound nutritional substitutions for basic

foods in the diet, and use of "good for you," "child," or "husband" foods. A general assessment of nutritional knowledge of the homemakers was based on the number of foods for which she could give a nutritionally correct reason for including in the diet. Between one-third and one-half of the homemakers showed no evidence of any nutrition knowledge as the basis for planning meals, while only one-fourth of the homemakers could correctly define the term "balanced diet." Between ten and twenty percent of the group had heard of and could name food groups in the "Basic Seven" guide. When asked to name nutritionally adequate substitutions, about one-third named possible substitutes for citrus fruits; slightly more knew partial substitutes for milk; while about two-thirds were aware of meat, fish or poultry substitutes. Results indicated that homemakers knew more about the nutritional values of meat, fish, poultry, of potatoes, of other fruits and vegetables than about other items in the diet. Young's study showed that homemakers lack greatest knowledge of ascorbic-acid-rich fruits and vegetables, adult need for milk, nutritional value of bread-stuffs and cereals, and of butter and fortified margarine. These findings led Young to conclude that these homemakers had a low general knowledge of nutrition.

Young compared the practices of homemakers with little or no nutritional knowledge with those who indicated

a fair knowledge of nutrition. Based on a twenty-four hour recall of foods eaten, it was found that the performance of the homemaker in feeding her family, at least on a qualitative basis, was considerably better than her knowledge. Those food groups which were least well known in terms of knowledge were also least well used. These groups included green, leafy, or yellow vegetables, citrus fruits, tomato or cabbage groups, and milk.

Food practice was measured on a quantitative basis by a recall of the foods purchased and used over the previous week. Less than fifty percent used adequate amounts of milk or citrus fruits or substitutes. These studies indicated that the adequacy of food used was related to nutritional knowledge. A higher percentage of homemakers with "minimal" knowledge of nutrition had more adequate feeding practices than homemakers with "some" or "no" knowledge.

Cameron (5) investigated the knowledge of nutrition of rural Virginian homemakers by testing their knowledge of which foods should be eaten daily, the nutritional value of these foods, and their purpose in the body. In addition, Cameron investigated the extent to which foods listed in the "Basic Seven" guide were used. Results of a twenty-four hour dietary recall indicated that three of the "Basic Seven" guide foods were seriously lacking in respondents'

diets. Green and yellow vegetables, tomatoes, citrus fruits, milk, and milk products were included in less than fifty percent of the diets, yet sixty-one percent of the homemakers stated that they thought their families were eating the kinds of food they need. Cameron reported that only seven percent of her sample had a working knowledge of nutrition, twenty-four percent had "some" knowledge, while sixty-nine percent had "little" or "no" nutritional knowledge.

In a study of homemaking practices of nearly fifteen hundred women in upstate New York, Abell (1) reported the results of a twenty-four hour recall of foods eaten. It was found that over one-third of the women did serve balanced meals, however, citrus fruits, salad greens, tomatoes, and green and yellow vegetables were found to be lacking in a high proportion of diets. Although no measure of nutrition knowledge was reported in this study, Abell suggested that the low incidence of these particular food groups was due to lack of knowledge concerning the nutritional value of the foods in addition to lack of availability of the foods themselves or insufficient income to provide these foods.

More recently, in 1967 Waye (35) conducted a study with low income homemakers to determine how knowledge and practice of nutrition were related to socio-economic factors and to use of sources of information. Nutritional knowledge

was evaluated in terms of respondents' ability to (1) list the essential foods for the body, (2) make adequate substitutions for basic foods in the diet, (3) define what was meant by the term "balanced diet," (4) name food groups in the "Basic Four" guide, and (5) identify food fallacies as being incorrect.

Results of this study indicated that these homemakers had low knowledge of the need for certain food groups in the diet, for example, bread and cereals, fruits, and vegetables. Low knowledge of nutritionally adequate substitutions, the term "balanced diet," and constituent food groups in the "Basic Four" chart was also demonstrated by homemakers in this investigation.

Results of a twenty-four hour dietary recall indicated that nearly all homemakers served at least one food from each food group during the day, however it was found that only 7.5 percent used all four groups in adequate amounts. The food group which was least well used was the fruit and vegetable group.

Waye (35) did find a positive association between adequate practice and the listing of foods to be included daily, the ability to choose a balanced meal from a list, the ability to make adequate substitutions and the knowledge of how much milk is needed by different age groups. As in Young's studies (37,38,39), the relationship between

knowledge and practice was not strong. While ninety percent of the homemakers recognized the importance of inclusion of the fruits and vegetables in the daily diet, only twenty-five percent used the group adequately.

In a study to evaluate homemaking classes as a means of providing nutrition education for welfare recipients, Wolczuk (36) confirmed the findings of other researchers that homemakers do have a low general knowledge of nutrition. Prior to the course, homemakers in this study attained a mean score of 5.26 of a possible thirteen points on a general knowledge of nutrition test. Only one out of the twenty-seven subjects was familiar with more than fifty percent of Canada's Food Guide. Results of a twenty-four hour recall indicated that only one-third of the homemakers had included over fifty percent of the daily dietary items.

From a study of the nutritional knowledge of housewives in Britain, Brown (3) concluded that their nutritional knowledge was not very extensive, in fact some of it was quite wrong. This knowledge whether right or wrong, frequently did not determine the actual choice of foods bought and eaten. Jenkins (17,18) confirmed these conclusions in a follow-up study designed to compare rural homemakers' knowledge of nutrition with that of the suburban housewives in Brown's study.

Upon examination of all of these studies, it appears

that knowledge of what foods constitute a nutritionally adequate diet does bear some relationship to nutrition practices. There appears to be some gap however, between knowledge and practice of nutrition. The following review attempts to uncover some factors which may explain the gap between knowledge and application of this knowledge in the practice of nutritionally sound food habits.

Relationship of Personal Characteristics of Homemakers to Knowledge and Practice of Nutrition

In order that education programs can be directed towards the needs of homemakers, it is important to know the personal characteristics of women who really lack knowledge of nutrition. Several studies have been reported which attempt to relate knowledge and practice of nutrition to socio-economic factors in women.

Results of Young's studies (37,38,39) showed that formal educational attainment was the single most important factor relating to higher knowledge of nutrition. In addition knowledge was higher among younger, higher income homemakers. Homemakers who reported that they had studied nutrition scored higher in their knowledge of nutrition with schools being reported most often as the place where "they studied about what to eat." The younger homemaker appeared to do a more adequate job in feeding her family than the older homemaker and this may have been due to the

higher educational attainment of the younger homemaker. Higher education again was the most important factor related to practice of adequate nutrition in family feeding, while income was not an important related factor.

Abell (1) also reported that age was an important factor related to practice of good food habits. Younger women tended to serve foods from all groups in the "Basic Seven" food guide more than older women. Higher income and contact with home economics training were also positively related to good food practices.

Cameron's Virginia study (5) substantiates these same findings. Most of the homemakers in this study who served adequate meals were under forty-four years of age, in the middle and upper income groups, and were high school or college graduates. About one-third of this group of homemakers had studied nutrition or cooking in school and tended to be concentrated in the younger, better educated groups.

Waye's data (35) showed a strong positive correlation between nutritional knowledge and formal education, while the relationship between education and practice was less clearly delineated. In contrast to other studies, older women were found to have more adequate practice while greater knowledge was related to earlier stages in the family life cycle.

The studies mentioned above, have indicated that good nutrition practices reflect sound nutrition knowledge. In addition, evidence exists that faddist beliefs and myths are the basis for the food habits of many other people. Jalso et al. (16) studied the association between food faddism and age, socio-economic level, educational level, and personality rigidity in over three hundred New York State residents. Faddists were concentrated in the older age, lower income categories but were distributed throughout the educational range. Non-faddists, on the other hand, were younger, higher income, better educated, and had received more nutrition education.

Schulte (29) investigated the relationship between food faddism, age, and educational achievement among upper class homemakers in New York city. Her results also indicated a trend for older women to believe in more food fallacies. She found no significant correlation between general education, nutrition education levels, and the belief in food fallacies.

In contrast to these studies, Lamb and Wilson's results (21) showed that higher education was significantly related to acceptance of false beliefs about food. Their sample was comprised of women with professional and civic interest with forty-four percent of the sample having graduated with a university degree. Increased age was also

directly related to belief in food fallacies. Participants who had been exposed to home economics and nutrition education did not accept the fallacies believed by their peers.

Cornely (7) investigated nutritional beliefs among a low income urban population. His data suggested that age, education and lack of sufficient correct information influences the acceptance of false food beliefs. Younger, more educated respondents held more sound nutritional beliefs than older, less educated respondents.

In general, it can be concluded from all of these studies, that socio-economic factors are important in determining knowledge and practice of nutrition. As has been indicated by several workers, education is perhaps the most significant of these factors, with age, income, and social class additional but less important variables. Knowing that these relationships exist leads on to a discussion of the role and effectiveness of communication of information about foods and nutrition to these various groups of homemakers.

Use and Factors Relating to Use of Nutrition Information Sources

In writing about communication of home economics information, Fewster (12) has commented that,

... as Communicators, our chief aim is to share and interpret ideas, information, knowledge, and

research, so as to make it relevant and meaningful ... We communicate to educate and motivate. Sometimes our purpose is simply to inform; but more frequently our intent is to create an awareness of new ideas and an appreciation for newer, better ways to satisfy needs and improve levels of family living.

Recent research in communication of homemaking information will be examined to see to what extent these aims are being fulfilled.

Research in the field of general communication has generally taken one of two directions. The earliest and most extensive of these has been that represented by the work of Lazarsfeld (20) known as the "two-step flow of communication." Another general research direction has been the "diffusion" studies of Dodd, De Fleur, and Larsen (8, 10), who have sought to describe the direction, speed, accuracy, and degree of penetration of socially diffused information, started by mass media, and transmitted by word-of-mouth through complex networks of communications in communities. The diffusion studies have concentrated on the mechanics of message transmission and have not dealt extensively with the transmission of personal influence.

Larsen (23) found that news diffused at different rates depending on the socio-economic status of the population. In addition, his study pointed out that different segments of the population pick up news from different sources. While radio and television played a dominant role

in the lower socio-economic class, interpersonal communications were a more important mode of communication in the higher socio-economic levels.

Information use is also dependent on the attitudes and psychological predispositions of individuals. Hyman (15) emphasized that, in addition to physical barriers to information diffusion, the psychological barriers are also important. Interested people acquire most information because of their desire to achieve and to learn. Hyman's data (15) suggests that people seek information which is congenial to prior attitudes, that they are biased in their selection of information. Moreover, people interpret the same information differently.

De Fleur (9) concluded from his study of message diffusion in four communities, that to maximize the probability that every person in a community will be communicated to, it is necessary to use an intense stimulus and to repeat this stimulus. His study involved the distribution of leaflets to a population and the subsequent response of that population to the information on the leaflets.

Katz and Lazarsfeld (20) whose research has been concentrated in the area of personal influence point out that exposure to information is a product of technological, political, economic, and voluntary factors. In our society where modern technology and free speech prevail these

factors have lesser importance than economic factors. Exposure to information is partially dependent on one's ability to purchase a television, radio, magazines, and newspapers.

While certain information sources are physically available to all, they may not be "socially" available to all. For example, some low income homemakers may not feel comfortable making contact with a professional home economist.

Closely related to interpersonal relations is the phenomenon of opinion leadership as first described by Lazarsfeld, Berelson, and Gaudet (24). The central proposition of the two-step flow hypothesis maintains that mass media information is received by individuals who are "more exposed" to a particular subject matter. These individuals then transmit this information to members of their primary groups in such a way that they influence the decisions of the members regarding that subject matter. Such individuals, who through personal influence help shape the behavior of others, are called opinion leaders.

This area of communication research is relevant particularly in the isolated community where physical barriers to communication may be present. Personal influence may well play a more important role because of fewer formal and mass media sources of information.

Relatively few studies relating the communication of nutrition information have been recorded. The following studies attempt to illustrate some of the communication principles mentioned above, in the area of flow of nutrition information.

In 1965, Spindler (33) interviewed several young homemakers with the aim of discovering how to reach this group with nutrition education programs. When asked where they would expect to get authentic information on nutrition most women responded with doctor, home economist (teacher), home agent, dietitian. Cookbooks, library, women's magazines, and bulletins were also listed as possible information sources. Most women felt that television and radio were ineffective means of transmitting information while meetings and newspaper articles were considered more useful channels for flow of information.

Lyle (26), on the other hand, investigated where homemakers actually got their homemaking information. She studied over four hundred rural homemakers from three socio-economic groups and found that there were class differences in use of information. Higher socio-economic class respondents subscribed to more magazines and newspapers and more often reported adult homemaking classes, home economics extension classes, and other organized women's groups as helpful sources of information. Personal contacts with

relatives, friends, and neighbors were the most frequently listed sources of information followed by store clerks, professional home economists and home economics teachers.

An investigation by Abell (1) in rural New York State revealed that a significantly higher proportion of women in the early stages of the family life cycle indicated that magazines or neighbors, friends or relatives provided their most helpful sources of information about homemaking problems. On the other hand, women in the later stages of the family life cycle received their most helpful information from radio, Home Bureau contacts and newspapers. Magazines were named as the most important source for all areas of information and for all stages of the family life cycle continuum.

Pontzer and Dodds (28), in an investigation of the use of federally donated foods and sources of information in a rural community in Pennsylvania, found that newspapers, magazines, and television played no significant role in influencing methods of food preparation. Common sense, relatives, and neighbors were mentioned most often as sources of information.

In a study of low income farm families in Missouri, Lionberger (25) investigated the use of personal and impersonal contacts as sources of information. Women

from higher income and educational levels used personal contact sources of information. These women also participated more in extension programs. Lower income, less educated women in contrast, used mass media sources including newspaper and radio. Women in this socio-economic group were thought to feel social class barriers to the use of personal contacts as sources of information.

Waye (35) examined the use of nutrition information sources in relation to knowledge and practice of nutrition among low income homemakers. Her results were very similar to those reported by Lionberger. The largest proportion of these women had contact with mass media such as radio, television, newspapers and magazines. Sources of information involving direct personal contact such as extension meetings did not reach most of these homemakers. As with other studies (31,32), the most preferred information sources were a relative or a friend. Waye concluded that, "Although high use of information sources is associated with both more adequate practice and greater nutrition knowledge, low income homemakers do not find available sources useful and have very little contact with personal sources of information, which they perceive to be most useful."

Several other studies relating to low income homemakers have been conducted in urban areas. In a study

done by Shank (30), ninety-four homemakers who participated in a federal food stamp program were asked where they obtained information about food. Exposure to food information was through newspapers, relatives, friends, and television for over fifty percent, magazines for twenty percent, radio for four percent, and organized groups for two percent. Friends, neighbors and relatives were used extensively as sources of information.

In a similar investigation involving a federally donated foods program, Kornbluh (21) surveyed the use of written recipes and found that educational background was the most influential factor in determining the use of written recipes. In general, she concluded, these homemakers preferred to follow familiar routines of food preparation learned from relatives and from their own experience.

Young and co-workers (37,38,39) studied the use of information sources by urban homemakers in New York and Syracuse. They reported that mothers and other relatives preceded all other sources of nutrition information named. Women with higher education received information more often from newspapers, magazines, and group meetings. Higher income homemakers were more interested in information on nutrition and named teachers, magazines, and television as their main sources of information.

Shipman (32), investigating the use of information sources by urban homemakers in Wisconsin, found that the number of information sources used by homemakers was significantly related to two socio-economic factors, age and education, and to two mass media availability factors, radio and women's magazines. Women under thirty-five years of age used information from a greater number of information sources than older women. More educated women were more aware of extension services. Some women used five to nine sources for answers to homemaking problems while others used none.

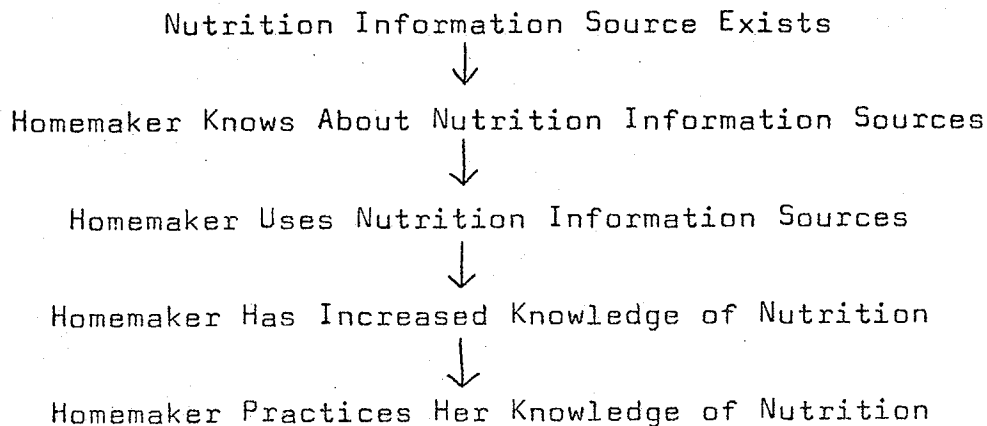
Schulte (29) reported interesting results in her study of the relationship between belief in food fallacies and educational attainment of upper class homemakers in New York City. The twenty highest and twenty lowest scores named the same information sources in the same order: parents and relatives, family doctor and pediatrician.

In accordance with classical communication theory, research studies relating to the use of nutrition information sources have illustrated the importance of social, psychological, and physical factors in the transmission of information. The role of these factors is of great interest to the nutritionist who seeks to reach homemakers with increased knowledge aimed at improving family food

habits.

RESEARCH DESIGN

The flow chart presented below represents the conceptual framework within which this investigation was undertaken.



Based on this flow chart, the following hypotheses were formulated and tested.

- I. Awareness and use of nutrition information sources, knowledge, and practice of nutrition will be inversely related to age, and directly related to educational attainment, socio-economic status, and homemakers' degree of concern.
- II. Knowledge of nutrition will be positively related to awareness and use of nutrition information sources.
- III. Practice of nutrition will be positively related to knowledge of nutrition.

Subjects

The sample consisted of one hundred and twenty-nine homemakers from an isolated mining community (Lynn Lake) located five hundred and fifty miles northwest of Winnipeg. Respondents were systematically sampled from a one stage area sample using a sampling interval of four. Women who were eligible to be interviewed were designated as being part of a family unit at the time of the survey. Divorced and separated women without children were not included in the sample.

Interview Schedule

An interview schedule was devised and administered by the author and an assistant over a ten-day period in September, 1970. The interview schedule was pretested, revised, and re-tested, using secretarial and technical staff in the Faculty of Home Economics. The schedule (Appendix A) was comprized of four main parts:

- (1) Description of Personal Characteristics included in Questions 1 - 7; 26 - 29; 38 - 42 inclusive.
- (2) Nutrition Knowledge Test: Questions 9 - 25 inclusive.
- (3) Measure of Practice of Nutrition: Questions 8 and 30.
- (4) Measure of Availability and use of nutrition information sources: Questions 31 - 37 inclusive.

Interviews were conducted in the respondents' homes and lasted from forty-five minutes to one hour in length. A system of callbacks was devised for respondents who were not at home at the time of first contact. Evenings and week-end days were used to make these callbacks. After three unsuccessful callbacks, respondents were solicited from the next household.

Definitions

Knowledge of Nutrition

The test of nutrition knowledge consisted of two main parts, that is sixteen multiple choice questions and nine "agree-disagree" statements, giving a maximum score out of twenty-five for each respondent. Respondents who scored between eighteen and twenty-five were rated as high in knowledge, while those who scored between twelve and seventeen were rated as medium, and those scoring under twelve had a low knowledge of nutrition.

A panel of faculty members from the Department of Foods and Nutrition adjudicated the nutrition knowledge questions until a consensus was reached that the twenty-five questions which finally appeared in the schedule would give a measure of a homemaker's knowledge of nutrition.

Knowledge was based on the respondents' ability to identify sources of the main nutrients in the body, including protein, iron, calcium, carbohydrate; knowledge of the

Vitamin D requirement and what foods constitute a balanced meal; identification of empty-calorie foods; and cause and treatment for overweight. The questions relating to energy, protein, minerals, and vitamins were designed to measure scientifically based knowledge. These questions were based on Canada's Food Guide since this is a basic educational tool to which most persons who have been educated in Canada have been exposed. The remaining "general" questions, found mainly in the "agree-disagree" statements gave an indication of knowledge based on social custom, food myths, and other "non-scientific" knowledge.

Practice of Nutrition

Homemakers' application of her knowledge of nutrition was measured in two ways: first by a twenty-four hour recall of foods eaten on the previous day and secondly, by a plan of a day's menu that the homemaker "might feed her family tomorrow." Respondents' practice of nutrition was scored using the criteria of the Department of National Health and Welfare (Appendix B). A score of eighty-five or over in practice was rated "very good"; a score of seventy to eighty-four was "good," and a score of under seventy was rated "fair."

Availability and Use of Nutrition Information Sources

An objective measure of the availability of nutrition

information sources in Lynn Lake was carried out by the author. A list of professional, mass-media, and written sources of nutrition information that were available to homemakers in Lynn Lake was compiled.

Respondents were asked if various sources of information were available and if they had ever contacted any of the following sources for information about nutrition or feeding their family: Canada Department of Agriculture, Extension Home Economist, University of Manitoba, Public Health Nurse, Department of Health and Social Services, High School Home Economics Teacher, Hydro Company, Gas Company, Department of National Health and Welfare, Manitoba Department of Agriculture.

In addition, respondents were given a list of specific homemaking problems and asked to name her source(s) of information for each problem from a list of nutrition information sources. Because some of the problems were not applicable to all of the respondents, a ratio of the number of sources of information per problem was calculated. A ratio of at least three sources per problem was arbitrarily considered "high" use of nutrition information sources, two sources per problem "medium" and one or less sources per problem "low."

From a list of professional, written, promotional, and personal contact sources of information, respondents

were asked to name her two "most helpful" sources.

Personal Characteristics

Degree of Concern

The degree of homemaker's concern for meal planning and her family's food habits was measured by four separate indices including knowledge of her family's food intake, degree of meal planning, interest in trying new recipes and menus and control over her family's food habits. Homemakers were given a score of either positive or negative degree of concern on each one of these indices.

In addition age, education attainment, marital status, number of children, income, employment, husbands' occupation (measure of socio-economic status based on Dominion Bureau of Statistics Occupational Scale), exposure to nutrition education, and proximity to close relatives were studied.

Analysis of Data

Questionnaires were coded and data transferred to computer cards. Frequency distributions were carried out on one hundred and twenty-seven variables. Variables under study were cross-tabulated and chi square tests of independence of variables were carried out. All analysis was programed in Fortran IV.

RESULTS AND DISCUSSION

Description of Respondents

Table I illustrates that about sixty percent of the sample were under thirty-six years of age. About twenty percent were between thirty-six and forty-five years while just under twenty percent were over forty-six years of age.

The majority of homemakers had lived in Lynn Lake for less than ten years even though the community has been in existence for just over twenty years.

TABLE I
DISTRIBUTION OF RESPONDENTS BY AGE

Age of Respondent Years	No.	%
25 and under	34	26.35
26 - 35	44	34.11
36 - 45	27	20.93
46 and over	24	18.60
Total	129	100.00

Table II illustrates the distribution of respondents by length of residency in the community.

Table III illustrates the distribution of respondents by educational attainment. About sixty percent of the sample had attempted high school, technical or secretarial

TABLE II
 DISTRIBUTION OF RESPONDENTS BY LENGTH OF
 RESIDENCE IN LYNN LAKE

Length of Residence in Lynn Lake	No.	%
less than 6 months	12	9.30
6 - 12 months	15	11.63
13 months - 5 years	42	42.56
6 - 10 years	20	15.50
11 - 15 years	18	13.95
16 - 20 years	18	13.95
more than 20 years	4	3.10
Total	129	100.00

school. Just over twenty percent had attempted grade school while fourteen percent had attempted university, teaching or nursing training.

TABLE III
 DISTRIBUTION OF RESPONDENTS BY EDUCATIONAL
 ATTAINMENT

	No.	%
attempted grade school	29	22.49
attempted high school/tech- nical or secretarial school	82	63.57
attempted university/teaching or nursing training	18	13.95
Total	129	100.00

All of the respondents were married, none was separated or divorced, one was widowed. Table IV illustrates the length of time respondents had been married.

TABLE IV
DISTRIBUTION OF RESPONDENTS BY NUMBER OF YEARS
OF MARRIAGE

Length of Time of Marriage	No.	%
less than 6 months	1	0.78
6 - 11 months	3	2.33
12 - 23 months	8	6.20
2 - 4 years	19	14.73
5 - 9 years	26	20.16
10 - 14 years	24	18.61
more than 15 years	47	36.43
widowed	1	0.78
Total	129	100.00

Table V illustrates the distribution of respondents by number of children.

Most of the respondents were full-time homemakers. Table VI indicates that of those who were employed outside their homes, ten percent worked full-time while twelve percent worked part-time.

Respondents were characterized into three socio-economic classes on the basis of husbands' occupations as shown in Table VII.

TABLE V
DISTRIBUTION OF RESPONDENTS BY NUMBER OF CHILDREN

Number of Children*	No.	%
none	7	5.43
one	16	12.40
two	35	27.13
three	29	22.48
four	19	14.73
five	11	8.13
six	5	3.88
more than six	6	4.65
* no response	1	0.78
Total	129	100.00

TABLE VI
DISTRIBUTION OF RESPONDENTS BY EMPLOYMENT

Employment	No.	%
full-time	13	10.08
part-time	16	12.40
none	100	77.52
Total	129	100.00

TABLE VII
DISTRIBUTION OF RESPONDENTS BY HUSBANDS'
OCCUPATIONAL CLASS

Occupational Class*	No.	%
executive/professional	32	24.81
salaried white collar	25	19.38
hourly rated blue collar	69	53.49
* no response	3	2.33
Total	129	100.00

¹Classes determined by D.B.S.

Total income for most respondents was over \$7500 per annum. Table VIII shows the income distribution of the sample.

TABLE VIII
DISTRIBUTION OF RESPONDENTS BY INCOME¹

Income Per Annum*	No.	%
under \$3000	0	0.00
3000 - 4999	2	1.55
5000 - 7499	16	12.40
7500 - 9999	46	35.66
10,000 - 15,000	15	11.63
* no response	13	10.08
Total	129	100.00

¹Included wife's income where applicable

The sample was comprized mainly of young home-makers who for the most part were born in Canada. Only fourteen in the sample were from other countries. Two of the respondents were Canadian Indians who had been born on local Reservations. The majority of the respondents' husbands were employed at the local mine and earned, for the most part, annual incomes over \$7500. Many of the respondents were recent newcomers to the community however, four women had been there since the community was established over twenty years ago.

Knowledge of Nutrition

Results of the nutrition knowledge test indicated that just over one-third of the respondents have "high" knowledge of nutrition (score 18-25), about one-half have "medium" knowledge (score 12-17), while the remaining respondents have "low" knowledge (score under 12). These results are summarized in Table IX.

TABLE IX
RESPONDENTS' PERFORMANCE ON NUTRITION KNOWLEDGE TEST

Knowledge	No.	%
high	47	36.43
medium	66	51.16
low	16	12.41
Total	129	100.00

It is difficult to make direct comparisons with results from other studies since each researcher has used different criteria to measure knowledge. However, it would appear that homemakers in this study performed better in nutrition knowledge than respondents from other studies. Results of other investigations have indicated that homemakers in general, have a limited knowledge of nutrition. Young and associates (37,38,39) reported that between one-third and one-half of their sample showed no knowledge or erroneous knowledge relating to nutrition. Cameron (5) reported that sixty-nine percent of rural homemakers and fifty percent of urban Virginian homemakers had little or no knowledge of nutrition. Wolczuk (36) found that only one respondent in her sample obtained a score greater than fifty percent while the remaining respondents were scored "low" in nutrition knowledge. Waye (35) did not assign knowledge scores to respondents in her sample, however she concluded that they had low knowledge of nutrition.

Responses to individual questions (Table X) indicate that protein was the least well understood nutrient in terms of this test. Only one-quarter of the sample thought that all market forms of milk contained both protein and calcium, while over fifty percent named whole milk as the best source of these nutrients. Furthermore, about fifty percent of the respondents thought that baked beans were not a source of

TABLE X
 DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE
 QUESTIONS RELATING TO ROLE AND SOURCES
 OF PROTEIN

	Respondents	
	No.	%
Which <u>one</u> of the following is the best source of protein and calcium?		
(a) skimmed milk	7	5.43
(b) buttermilk	6	4.65
(c) 2% milk	6	4.65
(d) whole milk	73	56.59
* (e) all of the above	32	24.81
don't know	<u>5</u>	<u>3.88</u>
Total	129	100.00
Which <u>one</u> of the following is <u>not</u> a good protein food?		
(a) beef	6	4.65
(b) baked beans	70	54.26
(c) eggs	2	1.55
* (d) spinach	38	29.46
(e) fish	8	6.20
don't know	<u>5</u>	<u>3.88</u>
Total	129	100.00
Which <u>one</u> of the following is the best source of protein?		
(a) potatoes	13	10.08
(b) green beans	27	20.93
(c) white bread	15	11.63
* (d) hamburger	50	38.76
(e) oatmeal porridge	20	15.50
don't know	<u>4</u>	<u>3.10</u>
Total	129	100.00
Protein is used for body building		
* agree	124	96.12
disagree	<u>5</u>	<u>3.88</u>
Total	129	100.00

* denotes correct response

protein while only about thirty percent of the respondents answered correctly that spinach was not a good source of protein. About forty percent of the sample were able to choose hamburger as the best protein food from a list of low protein foods. On the other hand, while homemakers generally had poor knowledge of sources of high and low protein foods, almost all respondents knew the function of protein as a body builder.

Knowledge of the function of vitamins and minerals was demonstrated by most of the respondents who recognized the role of iron in the prevention of anemia and calcium as a nutrient important for the bones. Most respondents were unaware of the Vitamin D requirement for children in spite of the fact that about ninety percent of the women who were interviewed had children of their own. Furthermore, only forty percent of the subjects knew that vitamin supplements are not necessary for healthy adults who consume a well-balanced diet. Slightly more than forty percent felt that vitamin pills should be taken in the winter. Many respondents added that this was necessary due to the long, harsh winter. Food sources for iron and calcium were better known than sources for ascorbic acid. Table XI summarizes the responses to these questions.

Obesity and arteriosclerosis are two health problems given widespread exposure in "popular" nutrition articles.

TABLE XI
DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE
QUESTIONS RELATING TO ROLE AND SOURCES
OF VITAMINS AND MINERALS

	Respondents	
	No.	%
Which <u>one</u> of the following fruits contains the <u>smallest</u> amount of Vitamin C?		
(a) oranges	2	1.55
* (b) peaches	55	42.64
(c) vitaminized apple juice	17	13.18
(d) grapefruit	10	7.75
(e) tomatoes	41	31.78
don't know	<u>4</u>	<u>3.10</u>
Total	129	100.00
Vegetables provide which <u>one</u> of the following?		
(a) protein and vitamins	33	25.58
* (b) vitamins and minerals	74	57.36
(c) water and fat	2	1.55
(d) minerals and fat	1	0.78
(e) carbohydrate and protein	11	8.53
don't know	<u>8</u>	<u>6.20</u>
Total	129	100.00
For which <u>one</u> of the following reasons is iron important in the body?		
(a) prevent scurvy	0	0.00
(b) give healthy skin	2	1.55
* (c) build up the blood	119	92.25
(d) prevent rickets	2	1.55
(e) give strong teeth	3	2.33
don't know	<u>3</u>	<u>2.33</u>
Total	129	100.00
Which <u>one</u> of the following foods contains the <u>most</u> iron?		
* (a) eggs	79	61.24
(b) milk	16	12.40
(c) potatoes	6	4.65
(d) fortified margarine	6	4.65
(e) oranges	6	4.65
don't know	<u>16</u>	<u>12.40</u>
Total	129	100.00

TABLE XI--Continued

	Respondents	
	No.	%
How many units of Vitamin D do you think a growing child should have each day?		
(a) 10,000 units	8	6.20
(b) 600 units	14	10.85
* (c) 400 units	14	10.85
(d) 1,000 units	20	15.50
(e) 800 units	15	11.63
don't know	58	44.96
Total	129	100.00
A healthy adult eating a good selection of foods should take vitamin pills:		
(a) daily	18	13.95
* (b) never	49	37.98
(c) in the winter	54	41.86
(d) in the summer	0	0.00
(e) once a week	8	6.20
Total	129	100.00
Which <u>one</u> of the following foods is the best source of calcium?		
(a) liver	30	23.26
(b) white bread	6	4.65
(c) tomatoes	5	3.88
* (d) cheese	83	64.34
(e) beets	0	0.00
don't know	5	3.88
Total	129	100.00
Iron prevents anemia		
* agree	118	91.47
disagree	11	8.53
Total	129	100.00
Calcium is used by the bones		
* agree	125	96.90
disagree	4	3.10
Total	129	100.00

* denotes correct response

Responses to questions in these areas indicated that homemakers are either not reading these articles or receiving false information. While about seventy percent of the subjects could identify "eating more than you need" as the main cause of obesity, only about forty percent knew that the solution for overweight is to decrease total intake of all foods. Over thirty percent of the respondents felt that the best way to lose weight is to decrease intake of starchy foods. This response may be explained by the predominance of fad diets which recommend the exclusion of breads, cereals, potatoes, and desserts.

Because cholesterol is the subject of so much public controversy, it was interesting to note that almost twenty percent of the sample said that they had never heard of it. On the other hand, about fifty percent of the subjects were able to identify butter as a food containing high levels of cholesterol. Table XII summarizes the results of these questions.

Respondents scored well on most of the general questions about nutrition. Almost the entire sample correctly identified a balanced meal. This question was taken directly from a United States Education Commission Survey of general knowledge which was reported in Time Magazine (11). Thirteen year olds and seventeen year olds responded correctly in eighty-nine and ninety-five percent of cases

TABLE XII

DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE
QUESTIONS RELATING TO OBESITY, AND CHOLESTEROL

	No.	Respondents %
What is the most important reason for some people having a large amount of fat on their bodies?		
(a) they eat sweet foods	6	4.65
(b) they eat fat foods	13	10.08
(c) they eat between meals	18	13.95
(d) they eat before going to bed	1	0.78
* (e) they eat more than they need	<u>91</u>	<u>70.54</u>
Total	129	100.00
Which <u>one</u> of the following would be the best advice to give to a friend who wants to lose weight? Tell her to decrease her total intake of:		
(a) starches	45	34.88
(b) sweets	20	15.50
* (c) all foods	48	37.21
(d) fat	14	10.85
(e) protein	<u>2</u>	<u>1.55</u>
Total	129	100.00
Which <u>one</u> of the following contains the greatest amount of cholesterol?		
* (a) butter	65	50.39
(b) saturated margarine	11	8.53
(c) polyunsaturated margarine	4	3.10
(d) eggs	20	15.50
(e) whole milk	4	3.10
don't know	<u>25</u>	<u>19.38</u>
Total	129	100.00

* denotes correct response

respectively. Results of this study concur with these findings.

Waye (35) reported that homemakers in her sample were able to choose a well-balanced meal from a list of foods but generally were unable to define what was meant by "well-balanced."

In response to a question relating to whole grain cereals, three-quarters of the sample were able to identify cornflakes as a refined cereal, that is not a whole grain, from a list of whole grain cereals.

Most respondents were able to identify apples as the most nutritious snack food from a list of common empty-calorie snack foods.

Results of other general questions of nutrition knowledge indicated that over eighty percent knew that eating sweets causes tooth decay. Almost all respondents disagreed that inexpensive cuts of meat are less nutritious than expensive cuts of meat. Only thirty percent of the respondents knew that canned foods are about as nutritious as fresh foods. Table XIII indicates the results of these general questions.

Results of the knowledge test indicated that myths about food still exist in the minds of many people. Table XIV indicates these findings.

TABLE XIII
DISTRIBUTION OF RESPONSES TO GENERAL NUTRITION
KNOWLEDGE QUESTIONS

	Respondents	
	No.	%
Which <u>one</u> of the following would most closely represent a balanced meal?		
* (a) steak, bread, carrots, milk	125	96.90
(b) ice cream soda and cake	0	0.00
(c) potatoes, oatmeal, bread, and bananas	1	0.78
(d) poultry, steak, and fish	2	1.55
(e) hamburger and coke	0	0.00
don't know	<u>1</u>	<u>0.78</u>
Total	129	100.00
Which <u>one</u> of the following is not considered to be a whole grain food?		
(a) buckwheat pancakes	9	6.98
* (b) corn flakes	98	75.97
(c) oatmeal porridge	4	3.10
(d) cornmeal muffins	6	4.65
(e) oatmeal cookies	6	4.65
don't know	<u>6</u>	<u>4.65</u>
Total	129	100.00
Which <u>one</u> of the following is the most nutritious snack food?		
(a) potato chips	5	3.88
* (b) apple	107	82.95
(c) popcorn	1	0.78
(d) coke	0	0.00
(e) chocolate cookies	<u>16</u>	<u>12.40</u>
Total	129	100.00

TABLE XIII--Continued

	Respondents	
	No.	%
Eating sweets helps to cause tooth decay		
*agree	114	88.37
disagree	<u>15</u>	<u>11.63</u>
Total	129	100.00
Canned foods are about as nutritious as fresh foods		
*agree	39	30.23
disagree	<u>90</u>	<u>69.77</u>
Total	129	100.00
Inexpensive cuts of meat are less nutritious than expensive meat		
agree	11	8.53
*disagree	<u>118</u>	<u>91.47</u>
Total	129	100.00

* denotes correct response

TABLE XIV
DISTRIBUTION OF RESPONSES TO NUTRITION KNOWLEDGE
QUESTIONS RELATING TO FOOD MYTHS

	Respondents	
	No.	%
An apple a day keeps the doctor away		
agree	58	44.96
*disagree	71	55.04
Total	129	100.00
Fish makes you brainy		
agree	23	17.83
*disagree	106	82.17
Total	129	100.00
Lemon juice makes you slim		
agree	28	21.71
*disagree	101	78.29
Total	129	100.00

* denotes correct response

Jenkins (17,18) found that twenty-six percent of subjects in his study believed that "fish makes you brainy," while sixty-two percent thought that "lemon juice makes you slim." Belief in food myths was also substantiated by other investigators (3,7,29).

Results of these studies and the present study indicate that belief in food myths exists in spite of scientific proof that they are in fact, myths.

In general most other researchers (35,37,38,39) have indicated that homemakers show least knowledge in relation to: fruits and vegetables containing ascorbic acid and Vitamin A; requirements for milk, nutritional value of breads and cereals, butter and margarine. Waye (35) found in addition that more than half of her respondents were unable to suggest nutritionally adequate substitutions for milk and orange juice.

This study indicated that in general, homemakers are more aware of the role of nutrients in the body than they are of good sources of many nutrients.

Nutrition Practices

I. Twenty-four Hour Dietary Recall

Based on the criteria of the Department of National Health and Welfare (Appendix B), sixty-six percent of the respondents scored "fair" on food intake on the basis of a twenty-four hour dietary recall. About thirty percent scored "good" and four percent scored "very good" on food intake. Table XV indicates the distribution of scores.

Almost three-quarters of the respondents reported that their recall was typical of what they usually eat. Reasons given for the dietary recall being atypical included: usually eat more (17.05 percent); on diet (1.55 percent); sickness (3.88 percent); other (2.33 percent).

TABLE XV
 SCORES ON TWENTY-FOUR HOUR DIETARY RECALL

Score	Respondents	
	No.	%
Very good (85 and over)	5	3.88
Good (70 - 84)	38	29.46
Fair (under 70)	86	66.67
Total	129	100.00

Milk, fruit, and whole grain cereals appeared to be the least well used food groups. Protein intake was well above the recommended levels as shown in Table XVI. Meats and vegetables were consumed in required amounts by most respondents. Lower scores on the cereal and bread category are thought to be due to the lack of whole grain cereals and not to a lack of other cereals or enriched breads which were mentioned in a high proportion of dietary recalls.

Since all foods including fresh, frozen, and canned were available in the stores at the time of the survey, it is felt that the isolation of the community cannot account for the low intake of milk and fruit.

Similar results of twenty-four hour recalls have been reported by Young (37,38,39) and Cameron (5) whose respondents' intake of green, leafy, and yellow vegetables, citrus fruits, and milk were low. Abell (1) and Waye (35) reported low intakes of citrus fruits, and vegetables,

TABLE XVI
 TWENTY-FOUR HOUR RECALL OF FOOD INTAKE

Food Group	Required* Amount		Less Than Requirement		No Intake	
	No.	%	No.	%	No.	%
Milk	45	35.88	42	32.56	42	32.56
Fruit	40	31.01	58	44.96	31	24.04
Vegetables	87	67.44	35	27.14	7	5.43
Cereals and Breads	11	8.53	108	83.72	10	7.75
Meat, Fish, Poultry	125	96.90	0	0.00	4	3.10

* Requirement based on Canada's Food Guide

however, these investigators studied groups whose low incomes may have accounted in part for the low intake of these particular food groups. In Lynn Lake, this explanation for poor food intake does not seem relevant due to the high income levels of the greatest proportion of people in that community.

II. Hypothetical Meal Plan

Meal plans were scored using the same criteria as for the dietary recall. Plan scores were generally higher than scores on the twenty-four hour recall. Table XVII indicates the distribution of scores.

TABLE XVII
SCORES ON MEAL PLAN

Score	Respondents	
	No.	%
Very good (85 and over)	30	23.26
Good (70 - 84)	52	40.31
Fair (under 70)	47	36.43
Total	129	100.00

"Very good" scores were attained by thirty respondents on the hypothetical menu plan as compared to five respondents who received this score on the dietary recall. Fifty-two respondents planned while thirty-eight respondents

recalled a day's menu that scored "good." Eighty-six homemakers actually consumed "poor" diets as compared to forty-seven homemakers who, in fact planned menus that were considered "poor" by the criteria of the National Department of Health and Welfare.

Table XVIII indicates the intake of each food group according to the hypothetical menu plan.

Intake of all food groups was higher in the hypothetical plan than was indicated by a recall of actual foods eaten. It is significant to note however, that in just over ten percent (10.08) of the respondents' plans, milk and fruit were not included. Since availability appeared not to be a problem, it would seem that lack of knowledge that these foods make up an important part of the diet accounts for their absence in the plan as well as the recall of intake.

Availability and Use of Nutrition Information Sources

Within the community of Lynn Lake, the only professional sources of nutrition information are the public health nurses, and the doctors. There were no dietitians, nutritionists, extension home economists, home economics teachers, or other home economists in the community.

Respondents were asked if they had ever contacted any sources outside the community for information. Table XIX indicates that very little contact is made with formal

TABLE XVIII

FOOD GROUP INTAKE AS INDICATED IN HYPOTHETICAL MENU PLAN

Food Group	Required*		Less Than Requirement		No Intake	
	No.	%	No.	%	No.	%
Milk	98	75.97	18	13.95	13	10.08
Fruit	65	50.39	51	39.53	13	10.08
Vegetables	102	79.07	26	20.16	1	0.78
Cereals and Breads	28	21.71	100	77.52	1	0.78
Meat, Fish, Poultry	128	99.22	0	0.00	1	0.78

* Requirement based on Canada's Food Guide

TABLE XIX

AVAILABILITY AND USE OF SOME NUTRITION INFORMATION SOURCES¹

Source of Information	Respondent Has Contacted		Respondent Knows About But Not Contacted		Respondent Does Not Know About	
	No.	%	No.	%	No.	%
Canada Department of Agriculture	12	9.30	67	51.94	50	38.76
Extension Home Economist	14	10.85	66	51.16	49	37.98
University of Manitoba	4	3.10	72	55.81	53	41.09
Public Health Nurse/ Doctor	56	43.41	54	41.86	19	14.73
Department of Health and Social Services	2	1.55	73	56.59	54	41.86
High School Home Economics Teacher	1	0.78	77	59.69	51	39.53
Hydro Company*	31	24.03	58	44.96	39	30.23
Department of National Health and Welfare	5	3.88	72	55.81	52	40.31
Manitoba Department of Agriculture	8	6.20	68	52.71	53	41.09

* one "no response"

¹ Gas Company was omitted in analysis because electricity is the sole power source used in Lynn Lake.

nutrition information sources. In many cases the respondent might be aware that the source exists but has never used it herself or, she may be unaware of the existence of such an information source.

Most respondents appeared to use very few formal sources even though a good proportion of them were aware that many of the information sources do supply nutrition information. Even in the case where the source was located directly in the community, namely, doctor/public health nurse, fifteen percent of the respondents were unaware that this was a source of nutrition information, while only about forty percent actually had contacted this source. Contact with the hydro company was reported by about twenty-five percent of the sample, most of whom reported that they received recipes rather than any other kind of information. It is significant to note the large proportion of respondents who are unaware that government and university departments (which are thought to be the most reliable) are sources of nutrition information.

Mass media sources of information available in Lynn Lake included newspapers, magazines, radio, and television. In addition to a local newspaper which is published bi-monthly, two Winnipeg daily papers were available in Lynn Lake. Eighty-nine homemakers said that they read a daily newspaper while fourteen respondents indicated that they did

not receive any newspaper. The local community paper was read by twenty-six respondents. This paper often contained nutrition information in a regularly featured column written by a home economist from another community. The following table indicates the use of newspapers as sources of nutrition information.

TABLE XX
USE OF NEWSPAPER ARTICLES AND ADVERTISEMENTS
AS SOURCES OF NUTRITION INFORMATION

Frequency of Use	Newspaper Articles		Newspaper Advertisements	
	No.	%	No.	%
Frequently	54	41.86	42	32.56
Occasionally	45	34.88	43	33.33
Never	18	13.95	31	24.03
Not Applicable	12	9.30	13	10.08
Total	129	100.00	129	100.00

Magazines are a common source of information for many homemakers. The respondents were asked to list magazines which they read regularly and to state whether or not they received nutrition information from any of these magazines. Table XXI indicates that most homemakers do read from one to more than five magazines quite regularly. Respondents were asked how frequently they read articles or advertisements in these magazines which contained food or

TABLE XXI
NUMBER OF MAGAZINES READ REGULARLY BY RESPONDENTS

Number of Magazines	Respondents	
	No.	%
none	36	27.91
one	28	21.71
two	19	14.73
three	19	14.73
four	11	8.53
five or more	16	12.40
Total	129	100.00

nutrition information. Magazine articles were used slightly more frequently than newspaper articles for nutrition information. Advertisements from both sources were used as sources of nutrition information by the same proportion of respondents. Table XXII indicates the use of magazines as nutrition information sources.

Although there was no local television station in Lynn Lake, there were four hours of CBC programs relayed daily from Winnipeg to this community. Only nine respondents did not have a television in their homes. Respondents were asked how often they watched television programs which related to foods or nutrition. Table XXIII summarizes these results.

All respondents stated that the source of information was the "Gallopig Gourmet" program which, although it

TABLE XXII
 USE OF MAGAZINE ARTICLES AND ADVERTISEMENTS
 AS SOURCES OF NUTRITION INFORMATION

Frequency of Use	Magazine Articles		Magazine Advertisements	
	No.	%	No.	%
Frequently	61	47.29	42	32.56
Occasionally	23	17.83	33	25.58
Never	15	11.63	22	17.05
Not Applicable	30	23.26	32	24.81
Total	129	100.00	129	100.00

TABLE XXIII
 USE OF TELEVISION AS A SOURCE OF NUTRITION
 INFORMATION

Frequency of Use	Respondents	
	No.	%
Frequently	66	51.16
Occasionally	21	16.28
Never	32	24.81
Not Applicable/No Response	10	7.75
Total	129	100.00

may be rated high on its value as entertainment must be evaluated low as a legitimate source of nutrition information. A few respondents commented that a cooking program done by Mme. Benoit had previously been shown in Lynn Lake but was no longer televised. In this instance, isolation appears to be a limiting factor on the amount of information which is reaching the community by television.

Radio programming was provided to the community by a CBC satellite station. Only two respondents said that they did not have radios in their homes. Respondents were asked how often they listened to radio programs which related to foods or nutrition. Table XXIV summarizes these results.

TABLE XXIV
USE OF RADIO AS A SOURCE OF NUTRITION
INFORMATION

Frequency of Use	Respondents	
	No.	%
Frequently	58	44.96
Occasionally	29	22.48
Never	39	30.23
Not Applicable/No Response	3	2.33
Total	129	100.00

Programs which were mentioned as nutrition information sources included a consumer report presented by a home

economist and phone-in or discussion programs. Since there was no local station, respondents could not participate directly in the open line programs.

In order to obtain more detailed information about where homemakers actually do go for answers to "homemaking problems," a list of specific problems was presented to each respondent who then replied where she went when she had that problem. The ratio of number of sources used for each problem was calculated. Only two respondents used less than one source per problem while one hundred and twenty-four respondents used between one and two sources per problem. The remaining three respondents used between three and four information sources per problem.

The information sources were classified into four groups: professional, written, promotional, and personal influence. Table XXV indicates the number of respondents who used each information source for one or more of the "homemaking problems." No attempt has been made to weight the number of times one particular source was mentioned for different problems.

Doctor, and public health nurse, cookbooks, friends and neighbors were mentioned by most homemakers as sources of information for "homemaking problems." Personal influence sources were listed more often than any other group followed by written sources, promotional sources, and finally by

TABLE XXV
 RESPONDENTS' USE OF INFORMATION SOURCES TO SOLVE
 HOMEMAKING PROBLEMS

Information Source	No.	%
I. Professional		
Dietitian	3	2.33
Hydro Home Economist	10	7.75
Extension Home Economist	9	6.98
Home Economics Teacher	4	3.10
Doctor/Public Health Nurse	101	78.29
II. Written		
Cookbooks	109	84.50
Food Articles	75	58.14
Library	3	2.33
Home Economics/Extension Bulletins	7	5.43
Wrote Away	26	20.16
III. Promotional		
Food Advertisements	48	37.21
Store	41	31.78
Radio	29	22.48
Television	25	19.38
IV. Personal Influence		
Friends/Neighbors	110	85.27
Relatives	57	44.19
Demonstration	4	3.10
Other	60	46.51

professional sources.

These findings are in agreement with those reported by other workers (31,32) who found that printed media, commercial sources, friends, neighbors, relatives ranked ahead of professional or expert persons, or television.

Respondents were asked what their two most helpful sources of information were. Friends, neighbors, relatives, cookbooks, doctor and public health nurse were mentioned by almost all respondents. This is interesting since ninety respondents indicated that they had no parents living in Lynn Lake. Friends then must be the important sources of information. Use of cookbooks as a source of information probably related more to family feeding problems than to nutrition problems. Table XXVI summarizes the responses to this question.

Other investigations (28,38,39) revealed similar results that relatives, friends, and neighbors are mentioned most often as preferred sources of information. Schulte's (29) respondents also mentioned family doctor and pediatrician in addition to parents and relatives.

Relationships Between Personal Characteristics and Use of Nutrition Information Sources

According to the first hypothesis, awareness and use of nutrition information sources will be inversely related to age, and directly related to educational attainment,

TABLE XXVI

HOMEMAKERS' FIRST AND SECOND CHOICE OF MOST HELPFUL
INFORMATION SOURCES FOR QUESTIONS ABOUT
FAMILY FEEDING AND NUTRITION

Information Source	First Choice		Second Choice	
	No.	%	No.	%
Friends/Neighbors	41	31.78	27	20.93
Relatives	6	4.65	12	9.30
Dietitian	1	0.78	0	0.00
Hydro Home Economist	1	0.78	0	0.00
Extension Department	1	0.78	1	0.78
Home Economics Teacher	1	0.78	0	0.00
Cookbooks	41	31.78	31	24.03
Food Ads	1	0.78	0	0.00
Food Articles	4	3.10	10	7.75
Library	1	0.78	1	0.78
Wrote Away	2	1.55	3	2.33
Labels	2	1.55	1	0.78
Store	1	0.78	1	0.78
Doctor/Public Health Nurse	17	13.18	16	12.40
Radio	1	0.78	3	2.33
Television	2	1.55	2	1.55
Home Economics or Extension Bulletins	1	0.78	0	0.00
Other	3	2.33	4	3.10
No Response	2	1.55	17	13.18
Total	129	100.00	129	100.00

socio-economic status, and homemakers' degree of concern.

Age, education, income, socio-economic status, and degree of concern were cross tabulated with several nutrition information sources including Canada Department of Agriculture, Extension Home Economist, University of Manitoba, Public Health Nurse, Department of Health and Social Services, High School Home Economics Teacher, Hydro Company, Gas Company, Department of National Health and Welfare, and Manitoba Department of Agriculture.

Chi square measures of independence between variables yielded significant association between educational attainment and awareness and use of the Canada Department of Agriculture, Extension Home Economist, University of Manitoba, Department of Health and Social Services, High School Home Economics Teacher, Department of National Health and Welfare, and Manitoba Department of Agriculture. These results are presented in Table XXVII. Because so few respondents actually use these nutrition information sources but at the same time are aware that these sources exist, the association measure shows greater strength between educational attainment and awareness of nutrition information sources.

As in this study, other investigations (21,31,38,39) found that better educated women used more nutrition information sources including professional and written sources.

TABLE XXVII
RELATIONSHIP BETWEEN EDUCATION ATTAINMENT AND
USE OF NUTRITION INFORMATION SOURCES

Information Source	Educational Attainment			Total No.
	Grade School No.	High School No.	University No.	
Canada Department of Agriculture				
Knows about and uses	1	6	5	12
Knows about and doesn't use	10	48	9	67
Doesn't know it is source of nutrition information	18	28	4	50
Total	29	82	18	129
	$\chi^2 = 16.21$	df = 4	P < .01	
Extension Home Economist				
Knows about and uses	1	9	4	14
Knows about and doesn't use	11	44	11	66
Doesn't know it is source of nutrition information	17	29	3	49
Total	29	82	18	129
	$\chi^2 = 10.60$	df = 4	P < .05	

TABLE XXVII--Continued

Information Source	Educational Attainment			Total No.
	Grade School No.	High School No.	University No.	
University of Manitoba				
Knows about and uses	0	3	1	4
Knows about and doesn't use	11	47	14	72
Doesn't know it is source of nutrition information	18	32	3	53
Total	29	82	18	129
	$\chi^2 = 10.39$	df = 4	P < .05	
Department of Health and Social Services				
Knows about and uses	1	1	0	2
Knows about and doesn't use	11	47	15	73
Doesn't know it is source of nutrition information	17	34	3	54
Total	29	82	18	129
	$\chi^2 = 9.79$	df = 4	P < .05	
High School Home Economics Teacher				
Knows about and uses	0	1	0	1
Knows about and doesn't use	10	52	15	77
Doesn't know it is source of nutrition information	19	29	3	51
Total	29	82	18	129
	$\chi^2 = 13.23$	df = 4	P < .05	

TABLE XXVII--Continued

Information Source	Educational Attainment			Total No.
	Grade School No.	High School No.	University No.	
Department of National Health and Welfare				
Knows about and uses	1	2	2	5
Knows about and doesn't use	11	48	13	72
Doesn't know it is source of nutrition information	17	32	3	52
Total	29	82	18	129
	$\chi^2 = 10.46$	df = 4	P<.05	
Manitoba Department of Agriculture				
Knows about and uses	0	5	3	8
Knows about and doesn't use	11	45	12	68
Doesn't know it is source of nutrition information	18	32	3	53
Total	29	82	18	129
	$\chi^2 = 12.72$	df = 4	P<.05	

There was a trend, although not statistically significant, for older homemakers to be more aware of these nutrition information sources. This may be due to their longer experience as homemakers. On the other hand, Shipman (31,32) found that younger women used information from more nutrition information sources than older women.

In this study, income and socio-economic status were not significantly related to use of nutrition information sources. Lyle (26), on the contrary, found that lower socio-economic status homemakers had fewer magazines, newspapers, and bulletins, in addition to less contact with professional home economists. Young (38,39) found that higher income homemakers contacted more professional sources than lower income homemakers.

Almost the entire sample of homemakers scored a positive degree of concern which was related, but not statistically, to the use of nutrition information sources.

From this study, it can be concluded that awareness and use of nutrition information sources are directly related to educational attainment. No observable associations between socio-economic status, income, and degree of concern and awareness and use of nutrition information sources were evident. There was a trend for use of nutrition information sources to be directly rather than inversely related to age.

Relationships Between Knowledge of Nutrition and Personal Characteristics

It was hypothesized that knowledge of nutrition would be inversely related to age, and directly related to educational attainment, socio-economic status, income, and homemakers' degree of concern. These characteristics were cross tabulated with nutrition knowledge scores. Chi square tests of independence between variables indicated that educational attainment, previous exposure to nutrition education, and socio-economic status were significantly related to knowledge of nutrition.

Higher educational attainment was associated with higher knowledge of nutrition at the .001 level of probability. These results are presented in Table XXVIII.

TABLE XXVIII

RELATIONSHIP BETWEEN EDUCATIONAL ATTAINMENT AND
HOMEMAKERS' KNOWLEDGE OF NUTRITION

Educational Attainment	Knowledge of Nutrition			Total No.
	High No.	Medium No.	Low No.	
attempted grade school	4	17	8	29
attempted high school/ technical/secretarial	27	48	7	82
attempted university/ nursing/teaching	16	1	1	18
Total	47	66	16	129
	$\chi^2 = 33.51$	df = 4	P < .001	

There was a direct relationship between socio-economic status on the basis of husbands' occupation and nutrition knowledge scores as shown in Table XXIX.

TABLE XXIX

RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND
HOMEMAKERS' KNOWLEDGE OF NUTRITION

Socio-Economic Status ¹	Knowledge of Nutrition			Total No.
	High No.	Medium No.	Low No.	
executive/professional	20	11	1	32
salaried white collar	11	12	2	25
hourly-rated blue collar	15	41	13	69
Total	46	64	16	126*
	$\chi^2 = 17.97$	df = 4	P < .01	

* Three "no response"

¹Occupational Classification Manual, Dominion Bureau of Statistics, 1961.

In this community, there is little relationship between occupation and income. All of the respondents were concentrated in the middle and upper income levels (\$7500 to over \$15,000 per year). In many cases the hourly-rated blue collar worker was earning an income as high as or higher than an executive/professional person. Occupation, rather than income, then was a better measure of socio-economic status.

Previous exposure to nutrition education has been associated with higher nutrition knowledge by other workers

(16,36). Results of this study also indicated a significant relationship between previous exposure to nutrition information and nutrition knowledge. Previous exposure to nutrition information was reported through attendance at cooking school, 4-H Homemaking Clubs, school home economics classes, nurses training, and college home economics training. Table XXX indicates the distribution of respondents who had previously been exposed to nutrition information and their knowledge of nutrition.

TABLE XXX

RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORES AND
PREVIOUS EXPOSURE TO NUTRITION INFORMATION

Previous Exposure to Nutrition Information	Knowledge of Nutrition			Total No.
	High No.	Medium No.	Low No.	
Some	38	32	8	78
None	9	34	8	51
Total	47	66	16	129
	$X^2 = 12.87$		df = 2	P < .01

In this study, four indices which measured the respondents' degree of concern were cross tabulated with nutrition knowledge scores. Almost all homemakers had a positive degree of concern which was related, although not significantly to a higher knowledge of nutrition.

There was a general trend for women in the twenty-

five to thirty-five age group to have higher knowledge of nutrition than either the younger or older women.

Results of other studies (35,36,38,39) agree with this study that increased knowledge is associated with greater educational attainment. Young (38) reported that knowledge was higher among younger, higher income homemakers. Wolczuk (36), on the other hand, found that nutrition knowledge was higher among older women in her study of a low income group. She also found positive association between knowledge of nutrition and positive degree of concern.

From this study it can be concluded that knowledge of nutrition is inversely related to age, and directly related to educational attainment, socio-economic status, previous exposure to nutrition education, and homemakers' degree of concern.

Relationship Between Nutrition Practices and Personal Characteristics

It was hypothesized that practice of nutrition would be inversely related to age, and directly related to educational attainment, socio-economic status, and homemakers' degree of concern. These characteristics were cross-tabulated with scores on a twenty-four hour dietary recall, and scores on a hypothetical menu plan.

Chi square tests of independence of variables

indicated that age was significantly related to scores on the meal plan, while educational attainment and socioeconomic status were significantly related to scores on the twenty-four hour dietary recall.

Respondents in the middle age groups (26 - 45 years) tended to score higher than either the younger or older respondents as shown in Table XXXI. Age was not significantly related to scores on the dietary recall.

TABLE XXXI
RELATIONSHIP BETWEEN AGE AND SCORES ON
HYPOTHETICAL MEAL PLAN

Age in Years	Meal Plan Scores			Total No.
	High No.	Medium No.	Low No.	
25 and under	6	9	19	34
26 - 35	15	19	10	44
36 - 45	6	16	5	27
46 and over	3	8	13	24
Total	30	52	47	129
	$\chi^2 = 18.54$	df = 6	P < .01	

Education, on the other hand, was significantly related to dietary recall scores but not to meal plan scores. Table XXXII indicates that higher educational attainment was related to higher dietary recall scores. Other workers (1,5, 35,39) have substantiated this finding in studies which

consistently found higher education associated with better feeding and nutrition practices.

TABLE XXXII
RELATIONSHIP BETWEEN EDUCATIONAL ATTAINMENT AND
SCORES ON TWENTY-FOUR HOUR DIETARY RECALL

Educational Attainment	Twenty-Four Hour Recall Scores			Total No.
	High No.	Medium No.	Low No.	
attempted grade school	0	5	24	29
attempted high school/ technical school	1	29	52	82
attempted university/ nursing	4	4	10	18
Total	5	38	86	129
$\chi^2 = 22.60$	df = 4		P < .001	

Socio-economic status was significantly related to scores on the twenty-four hour dietary recall. Respondents in the higher socio-economic level scored higher in practice. This finding is presented in Table XXXIII. Income was not significantly related to food practices. Young (38,39) substantiated this finding, however Abell (1) reported that higher income was related to better practices in a study of low income homemakers.

A trend between higher scores on practice indices and positive degree of concern was evident however, not statistically significant. Wolczuk's data (36) supports

TABLE XXXIII

RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND
SCORES ON TWENTY-FOUR HOUR DIETARY RECALL

Socio-Economic Status	Twenty-Four Hour Recall			Scores Total No.
	High No.	Medium No.	Low No.	
executive/professional	2	13	17	32
salaried white collar	3	4	18	25
hourly-rated blue collar	0	21	48	69
Total	5	38	83	126*
	$\chi^2 = 11.12$	df = 4	P < .05	

* Three no response

this finding.

From this study it may be concluded that age is related to practice (measured by hypothetical meal plan) while educational attainment, socio-economic status, and degree of concern are directly related to practice (measured by twenty-four hour dietary recall).

A cross tabulation between scores on the twenty-four hour dietary recall and scores on the meal plan yielded significant chi square values as shown in Table XXXIV. High scores on the recall could be associated at the .05 level of probability with high meal plan scores. There are some differences in these indices of practice. While the dietary recall measures only practice, the meal plan in addition is a reflection of knowledge. This may account for generally

higher "plan" scores and substantiates the feeling that knowledge is there but not being carried through in practice. In addition, the respondent may have given "plans" for family menus rather than for their personal intake which was reported in the dietary recall.

TABLE XXXIV
RELATIONSHIP OF MEAL PLAN SCORES AND SCORES ON
TWENTY-FOUR HOUR RECALL

Meal Plan Scores	Twenty-Four Hour Recall			Scores Total No.
	High No.	Medium No.	Low No.	
High	0	12	18	30
Medium	5	15	32	52
Low	0	11	36	47
Total	5	38	86	129
	$\chi^2 = 10.23$	df = 4	P < .05	

Relationship Between Knowledge and Practice Indices

It was hypothesized that practice of nutrition would be positively related to knowledge of nutrition.

Cross tabulation of knowledge and practice indices and chi square tests of independence indicated that there was some association between knowledge and practice as measured by the dietary recall. This finding is presented in Table XXXV. There was a trend, though not significant, for respondents who had high nutrition knowledge to score higher

on the meal plan.

Young (38,39) and Waye (35) found no strong relationship between knowledge and practice. Young (38,39) reported that homemakers' practice was considerably better than their knowledge. In contrast, findings of this study indicate that respondents' knowledge of nutrition is better than their practice. Furthermore, as evidenced in the twenty-four hour dietary recall, practice is positively related to nutrition knowledge.

TABLE XXXV

RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORES
AND SCORES ON TWENTY-FOUR HOUR DIETARY RECALL

Twenty-Four Hour Recall Scores	Nutrition Knowledge Scores			Total No.
	High No.	Medium No.	Low No.	
High	5	0	0	5
Medium	13	22	3	38
Low	29	44	13	86
Total	47	66	16	129
$\chi^2 = 10.42$	df = 4		P < .05	

Relationship Between Knowledge and Awareness and Use of
Nutrition Information Sources

It was hypothesized that knowledge of nutrition would be positively related to awareness and use of nutrition information sources. These variables were cross

tabulated and chi square tests of independence of variables were carried out.

High nutrition knowledge was significantly related to awareness and use of the following nutrition information sources: Canada Department of Agriculture, Extension Home Economist, University of Manitoba, Public Health Nurse/Doctor, Department of Health and Social Services, High School Home Economics Teacher, Hydro Company, Department of National Health and Welfare, and Manitoba Department of Agriculture.

With the exception of the doctors and public health nurses, none of these information sources was available in Lynn Lake. Respondents who were aware that these sources existed and were, in fact, sources of nutrition information tended to have higher knowledge of nutrition. There was very little contact with any of these sources by any of the respondents as seen in Table XXXVI.

Knowledge scores were related to use of mass media sources of information including newspapers, magazines, radio and television. No significant associations were observed with the exception of use of newspaper articles and higher nutrition knowledge scores.

Other workers have not done association of knowledge with use of nutrition information sources, thus comparisons cannot be made.

TABLE XXXVI

RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE SCORE
AND USE OF NUTRITION INFORMATION SOURCES

Information Source	Nutrition Knowledge Scores			Total No.
	High No.	Medium No.	Low No.	
Canada Department of Agriculture				
Knows about and uses	11	1	0	12
Knows about and doesn't use	25	36	6	67
Doesn't know it is source of nutrition information	11	29	10	50
Total	47	66	16	129
	$\chi^2 = 22.22$	df = 4	P < .001	
Extension Home Economist				
Knows about and uses	9	4	1	14
Knows about and doesn't use	29	32	5	66
Doesn't know it is source of nutrition information	9	30	10	49
Total	47	66	16	129
	$\chi^2 = 14.93$	df = 4	P < .01	
University of Manitoba				
Knows about and uses	1	3	0	4
Knows about and doesn't use	36	31	5	72
Doesn't know it is source of nutrition information	10	32	11	53
Total	47	66	16	129
	$\chi^2 = 15.72$	df = 4	P < .01	
Public Health Nurse/Doctor				
Knows about and uses	19	30	7	56
Knows about and doesn't use	26	24	4	54
Doesn't know it is source of nutrition information	2	12	5	19
Total	47	66	16	129
	$\chi^2 = 10.76$	df = 4	P < .05	

TABLE XXXVI--Continued

Information Source	Nutrition Knowledge Scores			Total No.
	High No.	Medium No.	Low No.	
Department of Health and Social Services				
Knows about and uses	1	0	1	2
Knows about and doesn't use	35	33	5	73
Doesn't know it is source of nutrition information	11	33	10	54
Total	47	66	16	129
	$\chi^2 = 14.88$	df = 4	P < .01	
High School Home Economics Teacher				
Knows about and uses	0	1	0	1
Knows about and doesn't use	38	34	5	77
Doesn't know it is source of nutrition information	9	31	11	51
Total	47	66	16	129
	$\chi^2 = 16.71$	df = 4	P < .01	
Hydro Company				
Knows about and uses	15	13	3	31
Knows about and doesn't use	24	29	5	58
Doesn't know it is source of nutrition information	7	24	8	39
Total	46	66	16	128
	$\chi^2 = 9.56$	df = 4	P < .05	
Department of National Health and Welfare				
Knows about and uses	3	1	1	5
Knows about and doesn't use	34	33	5	72
Doesn't know it is source of nutrition information	10	32	10	52
Total	47	66	16	129
	$\chi^2 = 13.65$	df = 4	P < .01	
Manitoba Dept. of Agriculture				
Knows about and uses	5	2	1	8
Knows about and doesn't use	32	32	4	68
Doesn't know it is source of nutrition information	10	32	11	53
Total	47	66	16	129
	$\chi^2 = 15.57$	df = 4	P < .01	

It can be concluded from this study however that knowledge is significantly related to awareness and use of certain nutrition information sources.

CONCLUSIONS

In making concluding remarks about this study, the objectives as given in the introduction (p. 6) will be used as an outline.

Objective 1: To study the availability and use of nutrition information sources in an isolated community.

Findings of this study demonstrated that there were limited nutrition information sources in this community. Doctors and public health nurses were the only professional resource persons in the community and as such acted as "primary" sources of nutrition information. In most urban communities they act as "secondary" resource persons, that is, they receive their information from nutritionists, dietitians or other professional home economists in the community and/or refer questions to these "primary" nutrition information sources. In this community, however there were no home economists associated with the hospital, schools, business, or government agencies. Mass media sources including newspapers (both local and out-of-town dailies), and magazines were in abundant supply. Television programming, on the other hand, was available on one channel and only for four hours each day. Television, at least at the present time, cannot be considered a legitimate source of sound nutrition information. Programs, such as the Galloping

Gourmet which was shown in Lynn Lake, have more value as entertainment than as sources of information about nutrition. Radio is a valid medium for information flow about nutrition and family feeding. Open-line discussion programs and consumer reports are a successful means of transmitting this information. There was one radio station (CBC satellite) which did broadcast both of the programs mentioned above.

There was very limited use of nutrition information sources by respondents in this study. Although a number of women were aware of government and university sources of information, most respondents had never contacted those sources. Perhaps even more disturbing was the large number of respondents who were unaware that such sources as Departments of Agriculture, University of Manitoba, and even the local doctor or public health nurses were sources of nutrition information.

The first conclusion of this study is that respondents in this community consulted friends, neighbors and their doctor as their main sources of information. Relatives were less important sources because many respondents had no close relatives living in the community. Mass media, promotional, and professional sources of nutrition information were less well used.

Objective 2: To study the knowledge of nutrition of a

randomly selected group of homemakers.

From the results of this study it would appear that women sampled in this investigation do have a fairly adequate knowledge of nutrition. Thirty-six percent of the respondents scored "high"; fifty-one percent scored "medium"; while only twelve percent scored "low" in knowledge of nutrition. Other workers have reported that homemakers, in general, have a low knowledge of nutrition.

It is difficult to explain why homemakers in this study performed better. It may be due to differences in the criteria used to judge nutrition knowledge or it may be due to the higher educational attainment of the general population in 1970, as compared to educational levels at the time of Young's studies (37,38,39) for example. Income may also be a partial explanation for differences. Waye (35) and Wolczuk (36), for example, conducted their studies with low income homemakers. Lynn Lake is unique in that only fourteen percent of the respondents had annual incomes of less than \$7500. Wolczuk (36) compared the knowledge scores of her low income respondents with scores of middle and upper income homemakers. The latter two groups scored higher not only in knowledge but also in their food choice.

It appeared that respondents in this study knew more about the functions of nutrients in the body than about actual food sources of these nutrients. This may explain,

in part, why their knowledge of nutrition appeared to be more adequate than their practice of nutrition.

This conclusion has some implication for nutrition education programs. Perhaps enough emphasis is not placed on sources as well as on functions of nutrients. The stress in Canada's Food Guide is on requirements rather than on food sources. Since this is the basic tool used in nutrition education, perhaps more emphasis should be placed on food selection and the kinds of foods which supply the required nutrients.

The existence of faddist beliefs and myths as the basis of some respondents' food habits indicate the strength of food faddists as communicators who appear to be able to appeal to the psychological needs of some people.

The second conclusion of this study is that most respondents have a fairly adequate knowledge of nutrition as indicated by scores on a nutrition knowledge test.

Objective 3: To study the application of nutrition knowledge by a dietary recall and a meal plan.

It was hypothesized that there would be a relationship between higher knowledge of nutrition and more adequate nutrition practices.

Results of a twenty-four hour dietary recall and a plan for a hypothetical day's menu indicated that respondents in this study had a greater knowledge of what they

should eat than what they, in fact, eat or plan to eat. Respondents tended to score higher on the menu plan than on the dietary recall. This may also be an indication of the gap between nutrition knowledge and practice. This gap between knowledge and practice is difficult to explain. In this community, it cannot be explained by lack of availability of food because, in spite of isolation, there was a wide variety of fresh, frozen, and canned foods in the stores. Lack of sufficient income to purchase the food does not appear to be an explanation as only eighteen respondents in the sample had incomes of less than \$7500 per year.

The third conclusion of this study is that respondents exhibit greater theoretical knowledge of nutrition than application of this knowledge as measured by a twenty-four hour dietary recall or a hypothetical meal plan. However, respondents who have higher knowledge of nutrition also tend to have higher scores on their practice of nutrition.

Objective 4: To relate certain personal characteristics including age, education, socio-economic status, and degree of concern of the homemaker to the use of nutrition information sources and knowledge and practice of nutrition.

It was hypothesized that awareness and use of nutrition information sources and knowledge and practice of

nutrition would be inversely related to age, and directly related to educational attainment, socio-economic status, and homemakers' degree of concern.

Educational attainment was the single personal characteristic which was significantly and directly related to each of these variables: awareness and use of nutrition information sources, knowledge and practice of nutrition.

In addition, prior exposure to nutrition education was related to nutrition knowledge. Respondents who had received some nutrition information through 4-H homemaking courses, cooking schools, or courses in home economics in school tended to score higher in nutrition knowledge than respondents who had had no exposure to nutrition education.

There was a relationship, although not statistically significant, between practice of nutrition and previous exposure to nutrition information. Higher scores on nutrition practice were associated with previous exposure to nutrition information.

The relationship of age to awareness and use of nutrition information sources, knowledge and practice of nutrition was less obvious. There was a trend for older homemakers to use more nutrition information sources than younger respondents. This may be due to their longer experience as homemakers and perhaps to longer residency in the community.

On the other hand, women between the ages of twenty-six and forty-five attained highest scores on knowledge and practice of nutrition. People in this age group are likely to have more formal education than older people which might account for greater knowledge of nutrition.

Knowledge and practice of nutrition were significantly and directly related to socio-economic status. This finding is common in the literature and may be due to the higher educational achievement which usually accompanies higher socio-economic status. Socio-economic status showed no significant relationship with awareness and use of nutrition information sources.

Almost all respondents in this study showed a positive degree of concern for their family's food habits. This, in turn, was related to higher knowledge and practice, and use of nutrition information sources.

The fourth conclusion of this study is that there is a direct relationship between age and use of nutrition information sources. There is no relationship in either direction between age and knowledge and practice of nutrition. There is a trend for higher socio-economic status respondents to score higher in knowledge and practice of nutrition with no observable relationship with use of nutrition information sources. Finally, most respondents exhibit a positive degree of concern which can be related

to higher knowledge and practice of nutrition and use of nutrition information sources.

In light of findings of this study, it would seem evident that nutrition education programs should emphasize the practical aspects of nutrition. Respondents appeared to have a fairly adequate theoretical knowledge of nutrition however, most were unable to apply their knowledge as evidenced by lower scores on a twenty-four hour recall and a hypothetical meal plan.

In addition, the role of nutritionists as communicators should be emphasized in order that information can be transferred to homemakers with the aim of improving their family food habits. Further investigation of the social, psychological and physical factors which affect the transmission of information is indicated. This is of particular interest in an isolated community such as Lynn Lake, where the role of these factors has not been studied.

BIBLIOGRAPHY

1. Abell, H. C. "The Differential Adoption of Homemaking Practices in Four Rural Areas of New York State." Ph.D. Thesis, Cornell Univ. Library, Ithaca, New York, September, 1951.
2. Broadfoot, B. V., Trenholme, M. L., McClinton, E. P., Thompson, S. H., Cowan, E. J. "Vitamin D Intakes of Ontario Children." Canad. Med. Assoc. J. 94: 332-340, 1966.
3. Brown, A. N., McKenzie, J. C., Yudkin, J. "Knowledge of Nutrition amongst Housewives in a London Suburb." Nutrition 17: 16-20, 1963.
4. Bruch, H. "The Allure of Food Cults and Nutrition Quackery." J. Am. Diet. Assoc. 57: 316-320, 1970.
5. Cameron, J. L. Study of Nutrition Information and Food Production and Conservation Practices of Rural Homemakers in Appomattox County, Virginia, July, 1951. V.P.I. Extension Service, Blackburg, Virginia, April, 1952.
6. Canada Council on Nutrition Report, Canad. Nutr. Notes 24: 85-92, 1968.
7. Corneley, P. B., Bigman, S. K., Watts, D. D. "Nutritional Beliefs Among a Low-Income Urban Population." J. Am. Diet. Assoc. 42: 131-135, 1963.
8. De Fleur, M., Larsen, D. The Flow of Information. New York: Harper and Row, 1958.
9. De Fleur, M., Rainboth, E. "Testing Message Diffusion in Four Communities: Some Factors in the Use of Airborne Leaflets as a Communication Medium." Am. Soc. Rev. 17: 734-737, 1952.
10. Dodd, S. C., Winthrop, H. "A Dimensional Theory of Social Diffusion: An Analysis, Modelling, and Partial Testing of One Way Interacting." Sociometry 16: 180-202, 1953.

11. Education "Report Card for Americans," Time, July 20, 1970, p. 40.
12. Fewster, J. W. "Communicating Home Economics Information: Reaching and Teaching Women by Radio." Nutrition Newsletter 8: 23-34, 1970.
13. Happner, K., Phillips, W. E., Endody, P., Murray, T.K., Perrin, D. C. "Vitamin A Reserves of Canadians." Canad. Med. Assoc. J. 101: 736-740, 1969.
14. Hochbaum, G. cited in Palko, M. E. "Mass Media's Role In Public Health Education." Canad. Nutr. Notes 20:37-40, 1964.
15. Hyman, H., Sheatsley, P. "Some Reasons Why Information Campaigns Fail." Pub. Opin. Quart. 11: 412-423, 1947.
16. Jalso, S. B., Burns, M. M., Rivers, J. M. "Nutritional Beliefs and Practices. Relation to Demographic and Personal Characteristics." J. Am. Diet. Assoc. 47: 263-268, 1965.
17. Jenkins, N. K. "Knowledge of Nutrition and Consumer Preferences of Housewives in Rural Communities. Part I." Nutrition p. 115-120, Autumn, 1964.
18. Jenkins, N. K. "Knowledge of Nutrition and Consumer Preferences of Housewives in Rural Communities. Part II." Nutrition p. 155-159, Winter, 1964.
19. Jenner, A. "Social, Emotional and Cultural Influences as Related to Eating Patterns and Malnutrition." Canad. Nutr. Notes 24: 37-43, 1968.
20. Katz, E., Lazarsfeld, P. Personal Influence, New York: Free Press, 1955.
21. Kornblueh, M., Park, H. C. "Survey of Use of Written Recipes." J. Am. Diet. Assoc. 47: 113-115, 1965.
22. Lamb, M. W., Wilson, M. M. "Food Beliefs as Related to Ecological Factors in Women." J. H. Ec. 60: 115-118, 1968.

23. Larsen, O., Hill, R. "Mass Media and Interpersonal Communication in the Diffusion of a News Event." Am. Soc. Rev. 19: 426-433, 1954.
24. Lazarsfeld, P., Berelson, B., Gaudet, H. The People's Choice. New York: Duell, Sloan, and Pearce, 1944.
25. Lionberger, H. F. Low Income Farmers in Missouri. Their Contacts with Potential Sources of Farm and Home Information. Univ. Mo. Res. Bull. 441, 1949.
26. Lyle, M. S. Educational Needs of Three Socio-Economic Groups of Rural Homemakers in Iowa. Iowa Agric. Exp. Sta. Res. Bull. 470, 1959.
27. Occupational Classification Manual, D.B.S. Catalogue No. 12-506, Census of Canada 1961.
28. Pontzer, M. E., Dodds, M. L. "Use of Government Donated Foods in a Rural Community." J. Am. Diet. Assoc. 42: 128-130, 1963.
29. Schulte, V. R. "Relationship between Belief in Food Fallacies and the Educational Attainment Levels of Upper Class Homemakers in New York City." Ph.D. Thesis, N.Y. University, 1962.
30. Shank, J. A. "The Nutritive Intake of and Information Media Used by a Group of Food Stamp Recipients." Master's Thesis, Penn. State Univ. Library, University Park, Pennsylvania, 1964.
31. Shipman, J. A. "Homemaking Information Sources of Women in Urban-Trended Communities." Master's Thesis, University of Wisconsin, Madison, Wisconsin, 1963.
32. Shipman, J. A., McCannon, N. R. "Urbanites Must Be Approached Through Recognized Information Sources." J. H. Ec. 56: 744-746, 1964.
33. Spindler, E. B. "Group Interviews As An Approach To Planning Nutrition Education Programs For Young Homemakers." J. H. Ec. 57: 342-346, 1965.
34. Trenholme, M., Milne, H. "Studies of Teenage Eating in Ontario." C. J. Pub. Health 59: 455-462, 1963.

35. Waye, B. L. "An Assessment of Nutritional Knowledge and Practices among a Selected Sample of Low Income Homemakers in Ithaca, New York." Master's Thesis, N.Y. State College of Home Economics, Cornell Univ., 1967.
36. Wolczuk, P. "An Evaluation of a Series of Homemaking Classes in Providing Nutrition Education for Women on Public Assistance." Master's Thesis, Faculty of Home Economics, University of Manitoba, 1970.
37. Young, C. M., Berresford, K., Waldner, B. C. "What the Homemaker Knows about Nutrition. I. Description of Studies in Rochester and Syracuse, New York." J. Am. Diet. Assoc. 32: 214-217, 1956.
38. Young, C. M., Waldner, B. G., Berresford, K. "What the Homemaker Knows about Nutrition. II. Nutrition Knowledge." J. Am. Diet. Assoc. 32: 214-217, 1956.
39. Young, C. M., Berresford, K., Waldner, B. G. "What the Homemaker Knows about Nutrition. III. Relation of Knowledge to Practice." J. Am. Diet. Assoc. 32: 321-326, 1956.

APPENDIX

APPENDIX A
INTERVIEW SCHEDULE

Address:

Code No.

Interviewer:

Date:

We are interested in finding out where women in Lynn Lake go for information about preparing and cooking meals. We would like to ask you a few questions about feeding your family and some general questions about you and your family. Your answers will be kept strictly confidential so please do not hesitate to be completely frank in your answers.

First we would like to know a little bit about you and your family:

1. How long have you lived in this community? Years _____ Months _____
2. Were you born in Canada? Yes _____ No _____
If no, (a) Where were you born? _____
(b) How long have you been in Canada? _____
3. What is your birth date? Day _____ Month _____ Year _____
4. What is the last grade you completed in school or the last year completed in college? _____
5. How long have you and your husband been married? Years _____ Months _____
6. (a) How many children do you have? _____
(b) What are their ages? _____
7. Do your parents _____ live in Lynn Lake?
Your husband's parents _____
other close relatives _____

Now we would like to ask you a few questions about the foods that you eat.

8. Would you tell me what you ate yesterday starting with the morning:

FOOD	INGREDIENTS	AMOUNT
------	-------------	--------

Breakfast:

Mid-Morning:

Lunch:

Mid-Afternoon:

FOOD

INGREDIENT

AMOUNT

Dinner:

After Dinner:

Is this a typical day's menu? Yes _____ No _____

If no, Explain:

9. Which one of the following is the best source of protein and calcium?

- (a) skimmed milk
- (b) buttermilk
- (c) 2% milk
- (d) whole milk
- (e) all of the above

10. Which one of the following foods is not a good protein food?

- (a) beef
- (b) baked beans
- (c) eggs
- (d) spinach
- (e) fish

11. Which one of the following fruits supplies the smallest amount of vitamin C?

- (a) oranges
- (b) peaches
- (c) vitaminized apple juice
- (d) grapefruit
- (e) tomatoes

12. Which one of the following is the most nutritious snack food?

- (a) potato chips
- (b) apple
- (c) popcorn
- (d) coke
- (e) chocolate cookies

13. Vegetables provide which one of the following?
- (a) protein and vitamins
 - (b) vitamins and minerals
 - (c) water and fat
 - (d) minerals and fat
 - (e) carbohydrate and protein
14. For which one of the following reasons is iron important in the body?
- (a) prevent scurvy
 - (b) give healthy skin
 - (c) build up the blood
 - (d) prevent rickets
 - (e) give strong teeth
15. Which one of the following is not considered to be a whole grain food?
- (a) buckwheat pancakes
 - (b) cornflakes
 - (c) oatmeal porridge
 - (d) cornmeal muffins
 - (e) oatmeal cookies
16. Which one of the following foods contains the most iron?
- (a) eggs
 - (b) milk
 - (c) potatoes
 - (d) fortified margarine
 - (e) oranges
17. Which one of the following foods is the best source of protein?
- (a) potatoes
 - (b) green beans
 - (c) white bread
 - (d) hamburger
 - (e) oatmeal porridge

18. How many units of Vitamin D do you think a growing child should have each day?
- (a) 10,000 units
 - (b) 600 units
 - (c) 400 units
 - (d) 1000 units
 - (e) 800 units
19. A healthy adult eating a good selection of foods should take vitamin pills:
- (a) daily
 - (b) never
 - (c) in the winter
 - (d) in the summer
 - (e) once a week
20. Which one of the following would be the best advice to give to a friend who wants to lose weight? Tell her to decrease her total intake of:
- (a) starches
 - (b) sweets
 - (c) all foods
 - (d) fat
 - (e) protein
21. Which one of the following foods is the best source of calcium?
- (a) liver
 - (b) white bread
 - (c) tomatoes
 - (d) cheese
 - (e) beets
22. What is the most important reason for some people having a large amount of fat on their bodies?
- (a) they eat sweet foods
 - (b) they eat fat foods
 - (c) they eat between meals
 - (d) they eat before going to bed
 - (e) they eat more than they need

23. Which one of the following contains the greatest amount of cholesterol?
- (a) butter
 - (b) saturated margarine
 - (c) polyunsaturated margarine
 - (d) eggs
 - (e) whole milk
24. Which one of the following would most closely represent a balanced meal?
- (a) Steak, bread, carrots, milk
 - (b) ice cream soda and cake
 - (c) potatoes, oatmeal, bread, and bananas
 - (d) poultry, steak, and fish
 - (e) hamburger and coke
25. Do you agree or disagree with the following statements?
- A D (a) An apple a day keeps the doctor away
- A D (b) Eating sweets helps to cause tooth decay
- A D (c) Canned foods are about as nutritious as fresh foods
- A D (d) Fish makes you brainy
- A D (e) Iron prevents anemia
- A D (f) Inexpensive cuts of meat are less nutritious than expensive meat
- A D (g) Protein is used for body building
- A D (h) Lemon juice makes you slim
- A D (i) Calcium is used by the bones
26. (a) Do you serve your family any foods which they don't like Yes
No Explain:
- (b) In general, who has the most influence on what foods you serve your family?
- husband
- Children
- Yourself

Explain:

27. (a) How many meals does your family usually eat together during the week? _____

Breakfast: Yes ___ No ___ Explain:

Lunch: Yes ___ No ___ Explain:

Dinner: Yes ___ No ___ Explain:

(b) Is this true on weekends as well? Yes _____ No _____
If no, Please explain:

28. How often do you try new recipes or new menu ideas?

Frequently _____ Ocassionally _____ Never _____

29. When do you usually decide what you will have to eat for meal?

As you prepare a meal _____

one day ahead _____

one week ahead _____

more than one week ahead _____

(b) Why do you plan that way?

30. Would you plan for me a menu that you might feed your family tomorrow?

31. (a) What kind of information about nutrition or feeding your family could each of the following give you?
- (b) Have you ever contacted any of the following? (Check which ones?)
- (c) If no, why not?

	Information	Contact		Why
		Yes	No	
Canada Department of Agriculture				
Extension Home Economist				
University of Manitoba				
Public Health Nurse				
Department of Health & Social Services				
High School Home Economics Teacher				
Hydro Company				
Gas Company				
Department of National Health & Welfare				
Manitoba Department of Agriculture				

32. (a) What newspapers come into your home regularly?

Name	Daily,	Weekly,	etc.
Lynn Lake Lyre			
Winnipeg Free Press			
Winnipeg Tribune			
None			
Other, Specify			

- (b) Do you ever read newspaper articles on nutrition or feeding your family?

Frequently _____ Occasionally _____ Never _____

- (c) Do you read food advertisements in the newspaper?

Frequently _____ Occasionally _____ Never _____

35. (a) Do you have a radio? yes _____ no _____
 (b) If yes, do you ever listen to any programs about nutrition or feeding your family?

Frequently _____ Occasionally _____ Never _____

- (c) Which one(s)?

36. You may have had questions since coming to this community about things that come up around the house. Would you tell me where you went for answers to these questions?
 (Show list of information sources)

ITEM	Source(s) of Information
new recipes	
feeding children	
dieting to lose weight	
foods that are good for your family	
what to feed a baby	
use of leftover foods	
new food products	
buying food or budgeting	
meal planning	
food preparation	
food spoilage	
foods to eat when your family is sick	
how to store food	
canning, freezing, etc.	
nutritional needs of your family	
fortification of foods	
other (specify)	

37. In general, what would you say are your two most helpful sources of information for questions about feeding your family and nutrition? Check list.

- Friends or neighbours
- Relatives
- Dietitian
- Gas Company Home Economist
- Hydro Home Economist
- Extension Department
- High School Home Economics Teacher
- Cookbook(s)
- Food Advertisement(s)
- Food Articles
- Library
- Wrote Away for Information (where?)
- Demonstration - explain
- Labels on Packages or containers
- Store or Business
- Doctor or Public Health Nurse
- Radio
- Television
- Home Economics or Extension Bulletins
- Other (specify)

We have a few more background questions which we hope you will answer.

38. (a) Do you work outside the home? Yes No

(b) If yes, what kind of work do you do? _____

(c) How many hours a week do you work?

39. (a) What kind of work does your husband do? _____

(b) How is he paid? straight salary _____ fee _____ by the hour _____
other _____

40. Here is a card listing income groups. Into which group would your family fit?

_____ Under \$3,000

_____ \$3,000 - 4,900

_____ \$5,000 - 7,499

_____ \$7,500 - 9,999

_____ \$10,000 - 15,000

_____ Over \$15,000

41. Have you ever attended: _____ a cooking school

_____ 4-H Homemaking courses

_____ high school home economics classes

_____ college home economics courses

42. If there were a course offered in your community in foods and nutrition, would you attend?

Yes _____ No _____

INTERVIEWERS NOTES:

APPENDIX B
DEPARTMENT OF NATIONAL HEALTH AND WELFARE
SCORE SHEET

SCORE SHEET FOR EACH DAY'S MEALS

FOOD AND CREDITS (The maximum score for each group is 20)		Your Score					Food Group Average
MILK - fluid milk (see 1), cheese (see 2), milk dishes (see 3)							
Children up to about 11 years)	Adolescents	Adults					
2 cups.....20	4 cups.....20	1½ cups.....20					
1 cup.....15	3 cups.....15	1 cup.....15					
½ cup.....10	2 cups.....10	½ cup.....10					
¼ cup.....5	1 cup.....5						
FRUIT (see 4) 20							
1 serving of citrus fruit or tomatoes or their juices (see 5).....15.....							
1 or more servings of other fruit - fresh, canned, dried or frozen.....5.....							
VEGETABLES (see 4) 20							
3 or more servings (one should be potatoes).....15.....							
2 servings.....10							
1 serving.....5							
If one or more servings are green, leafy, yellow or raw, extra.....5.....							
Include fresh, canned, dried and frozen vegetables.							
CEREALS, BREAD (see 4) 20							
1 or more servings of whole grain cereal.....8.....							
Bread (not more than 4 slices may be scored).....8.....							
Enriched white, 1 point per slice.....4							
Nutritionally improved (see 6), 2 points per slice.....8							
Butter.....4.....							
MEAT, FISH, POULTRY OR MEAT ALTERNATES (see 7) 20							
1 or more servings of meat, fish, poultry or meat alternates such as eggs and cheese.....15.....							
Extra for liver, heart or kidney.....5.....							
Eggs (if not scored as meat alternate).....5.....							
Cheese (if not scored as meat alternate or in milk group).....5.....							
VITAMIN D PREPARATIONS - liquid, capsules, tablets or drops							
For Children and Adolescents.....10.....							
MAXIMUM SCORE - Adults.....100							
Children and Adolescents.....110							

AVERAGE SCORE FOR WEEK _____

Children and Adolescents

For Adults

A score of 95 or over is very good.

A score of 80-94 is good.

A score below 80 is only fair, try to improve.

A score of 85 or over is very good.

A score of 70-84 is good.

A score of 70 is only fair, try to improve.

NOTES

1. A cup is an 8 fluid ounce measuring cup. A pint is 20 fluid ounces or 2½ cups.
2. Cheese, two one-inch cubes can be scored as ½ cup milk.
3. Milk dishes (cream soup, milk puddings) can be scored as ½ cup milk.
4. An average serving of vegetable, fruit or cereal is ½ cup. Servings will be smaller for children.
5. VITAMINIZED apple juice can be used in place of citrus fruit or tomatoes or their juices.
6. A nutritionally improved bread contains such foods as whole wheat, wheat germ, rye, dried milk, oatmeal, raisins.
7. Meat alternates - 2 eggs, 1 cup baked beans, three one-inch cubes of cheese.