

THE UNIVERSITY OF MANITOBA

AN ASSESSMENT OF THE FOOD INTAKES OF CHILDREN WHO  
PARTICIPATED IN A SCHOOL MILK PROGRAM IN THE  
FRONTIER SCHOOL DIVISION OF MANITOBA

by

MARGARET IRENE O'NEILL

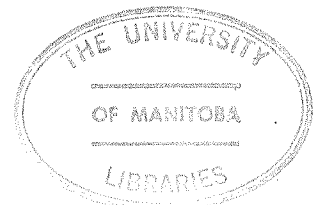
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A dissertation submitted to the Faculty of Graduate Studies of  
the University of Manitoba in partial fulfillment of the requirements  
of the degree of

MASTER OF SCIENCE

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## ABSTRACT

In the spring of 1974 the Government of Manitoba gave approval for a School Milk Program, for students attending Kindergarten through Grade Four in the Frontier School Division of the Province, with the objective of providing a milk supplement to school children and nutrition education for the program participants and their families. Three-day food records of 145 children were assessed qualitatively by food-groups in relation to Canada's Food Guide recommendations. The investigation included two surveys, the first being conducted in the summer of 1974 before the initiation of the program, and the second being conducted in the winter of 1975 after the children had been receiving the milk supplement for approximately six months and nutrition education for approximately eight months. The data obtained were divided into three studies: Study One included data from 103 children who participated in the summer survey, Study Two included data from eighty-one participants in the winter survey, and Study Three included data from thirty-nine children who participated in both the summer and winter surveys. On the basis of the food records it was shown that the mean milk intake of the children was 1.98 cups in Study One, 2.42 cups in Study Two, and 2.28 cups and 2.59 in the summer and winter surveys, respectively, of Study Three. The mean intakes of fruit was 1.27 servings in Study One, 1.17 servings in Study Two, and 1.32 and 1.31 servings in the summer and winter surveys, respectively, of Study Three. In Study One the mean potato intake was 0.96 servings, in Study Two it was 0.79 servings, and in the summer and winter surveys of Study Three it was 1.19 and 0.89 servings, respectively. The mean vegetable intake of the children was 0.45 servings in Study One, 0.48 servings in Study Two, and 0.47 and 0.56 servings in the summer and winter surveys, respectively, of Study Three. The mean intake of bread-cereal was 3.58 servings in Study One, 4.58 servings in Study Two, and 3.30 and 4.11 servings in the summer and winter surveys, respectively, of Study Three. The mean meat intake was 1.85 servings in Study One, 1.60 servings in Study Two, and 1.47 and 1.71 in Study Three's summer and winter surveys respectively. It was found that there was a significant change in the milk intake and bread-cereal intake from the summer survey to the winter survey of Study Three. In general, however, the children's intakes of the vegetable, fruit, milk, and potato food-groups were below the recommendations of Canada's Food Guide, while intakes of the meat and bread-cereal food-groups were in closer agreement with Food Guide recommendations. A household profile and supplementary information questionnaire were also completed for participating households.

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## INTRODUCTION

The nutritional welfare of the school child is of interest and concern to parents, educators, and governments, alike.

E. N. Todhunter (44), a noted nutrition educator, has written the following commentary:

"The child comes to school at age five and, hopefully remains in school until eighteen years of age. In these school years he has to accomplish a major physiological job ... the job of growth and development .... This physiological growth and development is accomplished through the nutritive processes associated with an adequate intake of quantity and quality of food .... The major reason the child goes to school is to learn, to gain the education which will help him to be a fully functioning adult. The school is expected to guide him in the development of his intellectual capacity to his full potential ... in addition to so called 'book-learning', the child surely has a right to learn how to care for his own health. This includes learning desirable food choices and the basis of food habits that will serve him nutritionally throughout life."

How can the school play this important role of promoting and maintaining the nutritional welfare of the child?

School feeding programs are increasingly viewed as important contributors to the health and well-being of the school child. The provision of supplementary food and/or meals can contribute to the nutritional status of the child and nutrition education can provide the child with knowledge of proper food selection and information on how food affects health. Hence, together, nutritional supplementation and educational stimulation can help children develop wholesome attitudes toward food, desirable eating habits, and understanding that will enable them to carry their good eating habits into adulthood (20).



However, it must be noted that the existence alone of feeding programs in schools does not necessarily assure improvement of the nutritional status and food habits of children (12, 21, 37). Factors such as level of participation in programs, knowledge of the nutritional deficits of the children being served, control over the nutritional composition of the childrens' diet, and parental interest and cooperation, have been found to affect the success or failure of school programs (12, 20, 37).

In the spring of 1974 the Government of Manitoba initiated a School Milk Program for students attending Kindergarten through Grade Four in the Frontier School Division of the Province. The program provided a daily diet supplement of eight ounces of milk or dairy products of equivalent nutritional value to approximately 3,000 school children and a nutrition education program to the inhabitants of the communities served by the Program.

Good results have been obtained from some nutrition programs, yet often we do not know which factors contributed to these results. Conversely, we do not know why other seemingly well-planned programs have been unsuccessful. Thus, nutrition programs must be so planned that they will include adequate controls, methods for evaluating each step and procedure, and methods for evaluating both the immediate and long term effects of a program (43).

The ideal evaluation would be to set up a study in which the deviation from a standard of normal nutriture would be determined on two comparable samples of a population. As the only variable, one sample would be exposed to a nutrition program. Re-examination of both groups for nutritional status at the end of the program should reveal

whether a change had occurred. This ideal technique of objective evaluation is not feasible in most nutrition programs, however, even though such a study may never be done in a particular program, the same underlying principles may be applied to some extent in the evaluation of certain aspects or of specific components of nutrition programs (4). The following investigation is involved with one aspect of program evaluation, namely, assessment of food intake.

In this investigation an attempt is made to assess the food intakes of children who participated in the Northern Manitoba School Milk Program. The investigation included two surveys, one being conducted in the summer of 1974 before the initiation of the Program, and the second being conducted in the winter of 1975 after the children had been receiving the milk supplement for approximately six months and nutrition education for approximately eight months. In each survey three-day food intake records, household profiles, and supplementary information data were collected and assessed with the following objectives in mind:

- 1) to study the adequacy of the food-group intakes of the children attending Kindergarten through Grade Four in the Frontier School Division of Manitoba in relation to the recommendations of Canada's Food Guide; and
- 2) to examine the changes that occurred in the food-group intakes of these children.

## REVIEW OF LITERATURE

The ultimate objective of the majority of supplementary feeding programs is the establishment and maintenance of the best possible nutritional state among members of the population served. In new programs, and programs already in progress, some criteria of effectiveness and procedures for evaluation are necessary to measure the success of a program in achieving its purpose.

There are two main classifications used to evaluate the effectiveness of supplementary feeding programs. The first is measurement of nutritional status of the participants, which usually consists of data on dietary, anthropometric, clinical, and biochemical measures. The second classification is measurement of behavior and attitude which includes assessment of sociability, mental development, and school achievement.

In the past fifty years, a number of studies have been made of the effects of supplementing the diets of children, but most of these were made before the incorporation of the field of statistics and advances in measurement of nutritional status. However, in recent years more refined methods and procedures have been developed which can be used to measure the effects of supplementary feeding programs. A selection of studies which employed varied criteria for measurement will be presented here in chronological sequence.

In a series of three studies (8, 32, 33) conducted in California in the 1920's, weight gain was used to compare the influence of various types of supplementary lunches. School children were given either oranges, milk, figs, or no supplementary lunch. In all studies

oranges seemed to be most effective in producing a gain in weight, while milk and figs produced a favorable but less marked gain. It was not possible to draw definite conclusions from these results as the number of cases was small and the period of feeding was short. However, it was thought by the researchers that oranges supplemented the home diet of these children "by their antiscorbic vitamin content" and, at the same time, did not detract from the appetite of the children.

Gain in weight was also the criterion for measurement used in a study by Lininger (26) in Philadelphia from 1930 to 1932 to assess the relationship between the use of milk and the physical progress of undernourished school children. The children were divided into two groups - milk users and non-users. It was found that those who did not consume milk had lower weight gains than the children who used milk. The milk users were further divided into four groups and these children were found to have weight gains in the following order: those who purchased milk at school and received it at home; those who received milk at home; those who received free school milk and milk at home; and those who received free school milk. It was concluded that the use of milk in the home was more closely related to gain in weight than was the use of milk in school.

Growth and food intake were used to study the effect of nonfat dry milk solids on children in an investigation carried out by Moore and co-workers (31) in Louisiana from 1946 to 1947. One hundred and forty-four children were followed for one and one-half school years. During this time, half the children were given nonfat dry milk solids, equivalent to nine ounces of fluid milk, in the school lunch, and half the children, who served as controls, continued to

receive the school lunch but without the additional milk solids. Food intake, recorded by the children for one week at the end of the study, was tabulated and evaluated qualitatively by food groups by a dietitian. Examination of the seven-day dietary records showed that foods eaten at home were essentially the same for both groups of children. The children who received the milk solids showed slightly greater physical growth in weight, height, pelvic width, and calf circumference than those who had not, but the differences were not significant.

A Canadian study (42) was conducted from 1947 to 1949 to observe the effects of a well-balanced school meal on the growth, physical and dental condition, mental development, school achievement and absenteeism on school children from low-income families. For over two years a well planned and prepared school lunch was served to a large group of children, aged five to ten years. A well-matched group of children ate at home and served as controls. The children were examined before and after the study. The experimental group showed slight improvement in growth and blood biochemical parameters, no improvement in dental condition, and although absences were less, no improvement was shown in school progress as compared with the controls. It was found, however, that the buying habits of the families whose children received the school lunch improved during the course of the study, whereas those of the control families became worse. In general then, the effect of the school lunch was very small, but it was noted that the physical condition of both groups of children was good throughout the entire study.

Eppright and co-workers (13) conducted an investigation in 1955 using dietary records, physical and biochemical measurements, and dental examinations to ascertain the effect on girls of a supplement of foods designed to bring their intake of milk and fruit and vegetables, all high in ascorbic acid and vitamin A value, up to the standards of the Recommended Dietary Allowances. One hundred and eighty-five girls, aged eight to fourteen years, were studied for one and one-half school years. The girls were divided into two well-matched groups, an experimental group which received the nutritive-rich supplement of fruit and vegetables rich in ascorbic acid and carotenoids plus one-half pint of frozen milk concentrate, and a control group given a supplement of fruit and vegetables low in ascorbic acid and carotenoids plus a capsule of cornstarch. During the course of the study dietary information was collected by a dietitian by means of four two-day records kept by the girls assisted by their mothers. It was found that the nutritive-rich supplement brought the diets of almost all the experimental girls within the limits of 66 to 100% of the Recommended Daily Dietary Allowances for calcium, vitamins A and D, and ascorbic acid. It also resulted in approximately 200 more calories in their daily diet. Biochemical measurements of ascorbic acid and carotenoids in serum were found to be increased significantly during the supplementation. However, there were no significant effects on physical measurements of height, weight, and skinfolds that could be attributed to the supplements. Evidence was also presented indicating that the nutritive-rich supplement tended to retard development of dental caries in a group such as the experimental group included in this study.

A study by Edwards and co-workers (15), reported in 1956, investigated the influence of a fortified soybean grits product on the height, weight and scholastic achievement of school children in Alabama. One hundred and twenty children, in grades one through eight, were studied for six months. The children were divided into groups which ate the regular school lunch, the school lunch plus the supplement, soup plus the supplement, or lunches brought from home. The researchers found significant responses in height and weight when the supplement was added to the school lunch of the children. The children receiving the dietary supplement appeared to be more cooperative, more energetic, more responsive in class, and school attendance improved, although differences between the supplemented and unsupplemented groups were not significant.

The effects of a balanced lunch program on school children in India were measured by weight gain, nutritional status, sociability, and school performance. In the study (38), boys and girls, aged five to seven years, were given a free mid-day meal designed to supply one-third to all the total daily requirements for nutrients as established by the Indian Council of Medical Research. A control group, selected from the same school, ate lunches brought from home. The study was carried out for five months. Some evaluation of food intake at home was carried out through surveys of a non-random sample of the childrens' families. There was an indication that the control group had an intake of major nutrients somewhat greater than that of the experimental group, however, it was noted that many of the control children were from homes of better socio-economic status than the experimental children.

The experimental group had a weight increase of almost four pounds, which was significantly greater than that of the control group, although estimation indicated a similar daily caloric intake. There was an apparent increase in sociability and school performance of the experimental group, but the increases were not significant.

A statewide nutrition survey (6, 7) was conducted among 80,000 Massachusetts public school children in 1969. By means of comprehensive survey forms, data was obtained on 24-hour dietary intake, school lunch, breakfast, the Basic Four, and miscellaneous data to help answer questions raised about the value of school feeding programs. General instructions on the survey forms were discussed at meetings with school personnel prior to the survey and were also included with the survey forms. Children in grades one through three completed an abbreviated, simplified picture form questionnaire with the help of teacher aides, and children in grades four through twelve completed a detailed questionnaire on all aspects of the survey. It was found that those children who participated in school lunches fared best, as approximately three-quarters of them ate an adequate lunch on the day of the survey, while three-quarters of those children who ate at home had an inadequate lunch. It was also learned that only 5% of the children ate a good breakfast that morning. Criteria for lunch and breakfast adequacy were established on the basis of selection of foods from the Basic Four. Data from the 80,000 children who participated in the survey indicated that Basic Four recommended servings of meat were consumed by 63% of the children, milk recommendations by 72%, and vegetable and/or fruit recommendations by 45% of the children on the day of the survey.



Other studies have been made to learn about food habits and to determine the need for supplementary feeding programs. These studies employed the same methods of assessment of nutritional status as the previous investigations cited.

A series of two Canadian studies (45, 48) was carried out in 1952 and 1956 to determine the eating habits of Toronto school children with the purpose of arousing the interest of parents, teachers, and others in the welfare of children by use of the results of the studies. One-day food records of 4,734 grade six students in the first investigation, and 4,425 grade eight students in the second study, were assessed in terms of essential food-groups based on the recommendations of Canada's Food Guide. The children were instructed on recording their food intake by their teachers, who had been previously instructed by nutritionists. When the 1952 study records were assessed it was found that intakes of citrus fruits, vegetables, and whole grain cereals were particularly low when Canada's Food Guide recommendations were used as a criterion. The 1956 study concluded that only meat appeared to be used to a satisfactory extent by the group as a whole and it was also noted that lack of vitamin D was particularly marked.

Myers and co-workers (35, 36) in a study reported in 1968, used dietary, physical, biochemical, and dental parameters to determine whether there were any indications of nutritional problems of sufficient magnitude to justify nutrition education and feeding programs. The investigation included 332, nine through thirteen-year old students from two elementary schools in a depressed district of Boston. Four-day dietary records, kept by the children assisted by their parents, teachers, and nutritionists, were assessed for meal pattern and food-groups on the basis of "satisfactory" and "unsatisfactory"

scores developed by the researchers. Meal pattern scores were unsatisfactory in 33% of the subjects for lunch, 17% for breakfast, and 14% for the evening meal. The group as a whole had unsatisfactory ratings in all the food-groups scored. Those groups especially low were milk, citrus fruit, and green and yellow vegetables. Generally, the children presented a "good-to-excellent" clinical picture, however, 50% of the boys and 43% of the girls were in the twenty-five and under percentiles for height and weight using Stuart-Boston standards. On the basis of biochemical determinations of hemoglobin, hematocrit, cholesterol, thiamin, riboflavin, urea, total nitrogen, and creatinine, these children exhibited values which could be related to poor nutrition. The overall dental picture was also poor as each child had an average of six decayed, missing, or filled teeth. An obvious need was thus shown for a school feeding program in conjunction with parent-teacher orientation to nutrition.

In summary, it can be seen that various methods and procedures can be used to measure the effects of supplementary feeding programs. Early studies used weight gain, anthropometric measurements, and school achievement in their assessment of feeding programs. Work done in the 1950's and 1960's included dietary evaluation and biochemical analysis to widen the scope of nutritional evaluation, and observation of behavior and academic achievement in assessing behavioral and mental development. Nevertheless, it should be noted that selection of criteria for evaluation of feeding programs is influenced by many factors including the purpose of the study, the size of the sample, the characteristics of the population to be tested, and the availability

of funds, personnel, time, and equipment. One or a combination of these factors can determine the criterion of measurement which will be used to assess the effect of a supplementary feeding program.

## THE NORTHERN SCHOOL MILK PROGRAM

In the spring of 1974 the Government of Manitoba gave approval for a School Milk Program for students attending Kindergarten through Grade Four in the Frontier School Division of the Province. The program was initiated to provide a diet supplement to school children and nutrition education for the program participants and their families in communities "where poor nutritional habits are noted because of low socio-economic status and inaccessibility to a reasonably priced food supply"\*.

The School Milk Program was developed by the Planning and Research Branch of the Provincial Department of Education and consisted of two parts:

- 1) the provision of a daily milk supplement or dairy product of equivalent nutritional value to approximately 3,000 school children; and
- 2) the provision of nutrition education to the inhabitants of approximately forty-four communities in which the schools were located.

Distribution of the milk to the schools began with the opening of the school term in the fall of 1974 and continued on a daily basis, with the exception of weekends and holidays, until the close of the school term in June 1975. The children were given eight ounces of fluid milk daily or dairy products such as cheese, yoghurt, or ice cream, in an amount equivalent to the nutritional value of the milk

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\* School Milk Program. 1974. Submission To The Health, Education And Social Policy Committee of Cabinet. Province of Manitoba.

supplement. The supplement was given to the children by their teachers before morning classes, during the morning recess, or during the lunch break - the time being decided at the discretion of individual school principals. The milk and dairy products were supplied on a contract basis by a Winnipeg dairy and were delivered weekly or monthly by truck, rail, or air transport, depending on the location of the schools.

The nutrition education segment of the School Milk Program was implemented in the summer of 1974. In order to carry out this part of the program it was arranged that eleven non-professionals would be employed as Nutrition Advisors. The Nutrition Advisors were engaged under New Careers, an on-the-job training and education program for disadvantaged adults sponsored by the Manitoba Government. Nine women and two men, all of Native origin and ranging in age from twenty to fifty-five years, were recruited on the basis of their interest in the program, their potential to relate to community members, and their knowledge of the people, problems, resources, life style, and language of the communities to be served by the School Milk Program.

The Nutrition Advisors had a minimum of four years to a maximum of thirteen years of formal education and none had previous training in foods and nutrition. Consequently, it was necessary to provide the Nutrition Advisors with a training program to enable them to help families improve the nutritive quality and adequacy of their diets and make the best use of their resources.

Under the direction of a home economist, and other support professionals, the Nutrition Advisors received training in basic foods and nutrition, teaching techniques, and other areas of information

helpful when working in the community. The training program was carried out during the ten-day sessions held every two months, beginning in July 1974 and continuing for the duration of the program. The courses given covered the following topics:

- 1) orientation, data gathering, and basic nutrition;
- 2) helping relationships;
- 3) basic food preparation and food buymanship;
- 4) gardening in the north; and
- 5) teaching techniques and Native foods.

The Nutrition Advisors were responsible for nutrition education in their home community and one to three other communities close to their home community. Nutrition education was carried out by means of puppet shows, school classes, and day camps with children, and home visits, cooking classes, and school committee meetings with adults. Some or all of these forms of nutrition education were used by the Nutrition Advisors depending on the needs and interests of specific communities. The Nutrition Advisors were also responsible for collecting data for the present investigation and received instruction on this subject from the author.

The School Milk Program was to be carried out for a two-year period, beginning in July 1974 and ending with the close of the school term in June 1976. The information presented in this report is based on the data collected during the first eight months of the program.

## METHODOLOGY

The purpose of this investigation was to assess the food intakes of children attending kindergarten through Grade Four in the Frontier School Division of Manitoba who participated in the Northern School Milk Program. It was postulated that these children would have dietary intakes that were inadequate in relation to the recommendations of Canada's Food Guide. Therefore, this investigation was conducted to learn if the food intakes of those children who participated in the School Milk Program would change following the diet supplementation and nutrition education provided by the program.

The investigation included two surveys, the first was conducted in the summer of 1974 during the months of July and August, and the second survey was carried out in the winter of 1975 during February and March. Twenty-two communities in the Frontier School Division were selected to be surveyed (Figure 1). The communities selected included the eleven home communities of the Nutrition Advisors and another eleven communities chosen in order that communities from a range of population sizes could be surveyed.

In each community households were chosen on the basis that they had one or more children attending Kindergarten to Grade Four, inclusive, in the Frontier School Division. The households were chosen from lists made available by the Assistant Field Superintendents of the Frontier School Division. As the time allotted for conducting the first survey was one week per community, it was decided that six households in each community would be selected to be surveyed. In the second survey two weeks were allowed for data collecting in each

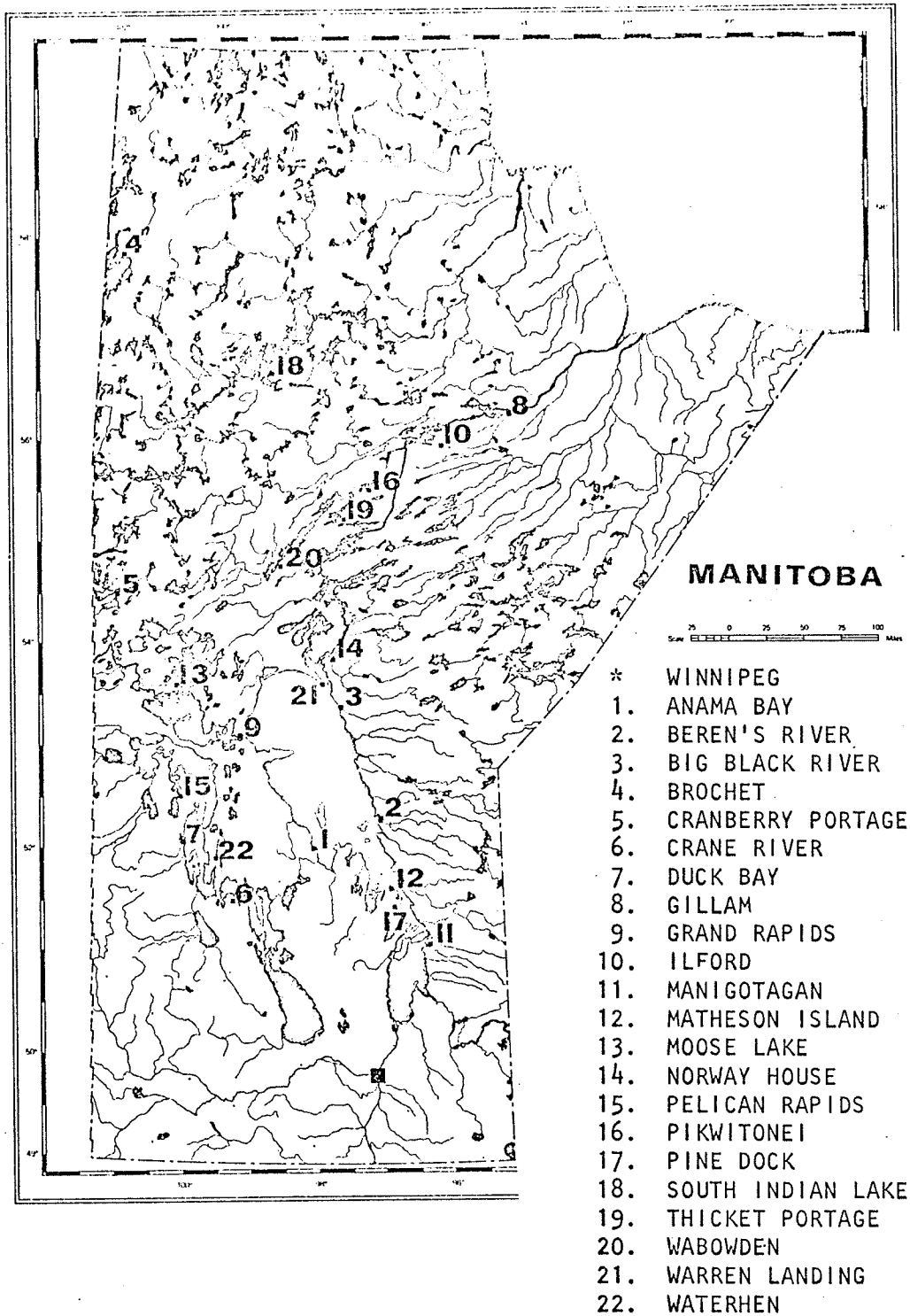


FIGURE 1

MAP OF COMMUNITIES TO BE SURVEYED



community and thus the original six households plus an additional six households were to be surveyed.

In order to assess the food intakes of the children a research instrument (refer to Appendix A) was devised by the author. This research instrument consisted of three parts: a three-day food intake record form; a household profile; and a supplementary information questionnaire. The Nutrition Advisors administered the research instrument in designated communities following instructions given to them by the author during two-day training sessions prior to both the summer and winter survey.

The three-day food intake record form consisted of an instruction sheet with directions for completing the forms and sheets for recording three-days' food intake. The Nutrition Advisors were instructed to deliver the food intake record form to the selected households and at this initial visit the instruction sheet was to be explained to the person in the household who would be responsible for recording the child's food intake. The households were to be visited on two subsequent days by the Nutrition Advisors to answer questions and to assist in completing the food intake record if required. At the fourth and final visit the food intake record was to be collected. The three-day food intake record was to be completed on days Monday to Friday, inclusive.

The household profile asked for information on family composition, which included the names, relationship, age, and employment status of the members of a participating household. The supplementary information questionnaire inquired about the means of cooking, storage,

purchase and preparation of food, infant feeding, use of indigenous foods, and the consumption frequency of milk and dairy products. The Nutrition Advisors were instructed to complete the household profile and supplementary information questionnaire at the initial visit to the households. All records and information collected by the Nutrition Advisors were forwarded to the Planning and Research Branch of the Manitoba Department of Education in Winnipeg.

It had been intended to analyze the three-day food intake records quantitatively by nutrient analysis. However, the data obtained from many records was not explicit enough as to specific amounts of food consumed to allow nutrient calculation. For example, if bread or bannock was taken it was usually recorded as one piece rather than the number of slices or specific amount consumed. Nevertheless, sufficient information was available to analyze the food intake records qualitatively by food-groups. This method of evaluating the nutritional quality of diets has been employed by many investigators (21, 22, 24). It has proven to be a practical technique and can provide a simple and quick way to assess the overall nutritional value of diets.

The food-groups selected for assessment in this investigation were seven and included: milk; fruit; potato; vegetable; bread-cereal; meat; and sweets. Potato and vegetable intakes were assessed separately to learn about their individual consumption. The first six groups were calculated on the basis of Canada's Food Guide food-group portion amounts and food-group substitute portion amounts (refer to Appendix B). The seventh food-group, sweets, included foods such as soft drinks, candy, potato chips, cake, and pie, and their incidence was recorded.

The three-day food intake records of the subjects were broken down into seven food-groups and the average quantity of each food-group consumed was calculated. The subjects' food-group intakes were recorded and assessed. Guttman analysis (41) and chi-square tests (11) were applied to these data. Data from the household profiles and supplementary information questionnaires were also recorded.

## RESULTS AND DISCUSSION

This investigation consisted of two surveys, a summer survey and a winter survey. The surveys included a total of 145 children who attended Kindergarten through Grade Four in the Frontier School Division of Manitoba. All these children participated in the Northern School Milk Program and were from eighty-five households in eighteen northern Manitoba communities. For the purpose of this discussion the data are divided into three studies: Study One refers to the data from the summer survey which included 103 subjects; Study Two refers to the data from the winter survey which included eighty-one subjects; and Study Three refers to data obtained from the thirty-nine subjects who participated in both the summer and winter surveys. These thirty-nine subjects are also included in Study One and Study Two.

### Description of Subjects

The number of subjects in the investigation was less than that planned. It was anticipated that twenty-two communities would be surveyed and that six households from each community would be surveyed in the summer survey and in the winter survey the original six households plus an additional six households would be surveyed. Thus, it was anticipated that a minimum of 132 children would take part in Study One, 264 children would take part in Study Two, and 132 children would be included in Study Three. However, as has been noted previously, Study One included 103 subjects, Study Two eighty-one subjects, and Study Three included thirty-nine subjects.

It had been planned that twenty-two communities would be surveyed, but, in actuality, only eighteen were included in the investigation. Four communities were not surveyed because Nutrition Advisors refused to carry out the survey in two of the designated communities and the inhabitants of another two communities refused to participate in the investigation. However, this loss of subjects did not alone account for the reduced numbers.

It was anticipated that some of the households selected to be surveyed would not be able or wish to participate in the investigation. Therefore, the research instrument provided a section for the Nutrition Advisors to record the reason for no response by a selected household. This section of the research instrument was seldom completed. Reasons for no response that were recorded included: not interested in participating; inability, because of work commitments or illness, to complete the food intake record; fear that participation might consequently interfere with Government Welfare benefits; and lack of trust in the confidentiality of the Nutrition Advisors.

It must also be remembered that the Nutrition Advisors who administered the research instrument were neither professionally trained nor experienced in interviewing techniques. Morgan and co-workers (34), in a study of factors for refusal to participate in a nutrition survey, concluded that professionally trained interviewers can elicit more information and acceptance in homes than less skilled interviewers.

On the other hand, participation in several communities was satisfactory. This was thought to be attributable to the fact that

the Nutrition Advisors were persons of influence in their communities and also spoke the language of the people and thus they were able to establish a rapport and secure the cooperation of participants. These factors have been noted by several investigators (2, 34, 50) as being influential in participation. The Nutrition Advisors were instructed to impress upon the households selected to be surveyed the fact that they were one of a study group and their cooperation would be a valuable contribution to the investigation. This may also have been helpful in obtaining the participation of households.

The distribution of subjects by community is presented in Table I. All of the communities included in the two surveys were inhabited largely by people of Native origin and, therefore, it can be assumed that a greater number of Native and Metis than white children were included as subjects in the investigation.

The distribution of subjects by age in Studies One, Two, and Three is shown in Table II. The children ranged in age from four to twelve years, the largest number being five to nine years of age. The age distribution of the subjects was biased due to the fact that the sampling procedure led to a non-representative sample of households with a large number of children of younger ages.

The distribution of subjects by school-grade in Studies One, Two, and Three is presented in Table III. The children were distributed among nine categories from Kindergarten to Grade Four, inclusive.

It can also be seen that a larger number of girls than boys were included in the studies. Approximately the same number of girls and boys were selected to be surveyed, however, there were more records kept for the girls. The ratio of girls to boys was 1.6:1 in Study One, 1.5:1 in Study Two, and 2:1 in Study Three.

TABLE I  
DISTRIBUTION OF SUBJECTS BY COMMUNITY

COMMUNITY	CHILDREN IN KINDERGARTEN THROUGH GRADE FOUR		STUDY ONE		STUDY TWO		STUDY THREE	
	No.	%	No.	%	No.	%	No.	%
ANAMA BAY	11	0.61	3	2.91	0	0.00	0	0.00
BEREN'S RIVER	172	9.47	18	17.48	25	30.87	13	33.00
BROCHET	111	6.11	10	9.71	4	4.94	3	7.69
CRANBERRY PORTAGE	68	3.74	3	2.91	2	2.47	2	5.13
DUCK BAY	87	4.79	5	4.85	0	0.00	0	0.00
GILLAM	231	12.72	7	6.80	0	0.00	0	0.90
GRAND RAPIDS	134	7.38	2	1.94	0	0.00	0	0.00
MANIGOTAGAN	75	4.13	10	9.71	22	27.16	7	17.95
MATHESON ISLAND	12	0.66	9	8.74	6	7.41	6	15.38
MOOSE LAKE	128	7.05	0	0.00	1	1.23	0	0.00
NORWAY HOUSE	201	11.07	9	8.74	0	0.00	0	0.00
PELICAN RAPIDS	121	6.66	1	0.97	0	0.00	0	0.00
PIKWITONEI	34	1.87	5	4.85	0	0.00	0	0.00
PINE DOCK	8	0.44	8	7.77	5	6.17	4	10.26
SOUTH INDIAN LAKE	126	6.94	7	6.80	12	14.81	4	10.26
THICKET PORTAGE	53	2.92	2	1.94	0	0.00	0	0.00
WABOWDEN	166	9.14	0	0.00	4	4.94	0	0.00
WATERHEN	78	4.30	4	3.88	0	0.00	0	0.00
TOTAL	1816	100.00	103	100.00	81	100.00	39	100.00

TABLE II

DISTRIBUTION OF SUBJECTS BY AGE IN STUDIES ONE, TWO, AND THREE

AGE	STUDY ONE			STUDY TWO			STUDY THREE		
	F*	M	T	F	M	T	F	M	T
4	5	1	6	3	1	4	3	0	3
5	9	7	16	6	3	9	4	2	6
6	16	7	23	10	6	16	6	2	8
7	12	8	20	7	6	13	4	3	7
8	11	7	18	9	8	17	5	4	9
9	11	7	18	8	4	12	4	1	5
10	0	1	1	3	3	6	0	1	1
11	0	0	0	2	1	3	0	0	0
12	0	1	1	0	1	1	0	0	0
TOTAL	64	39	103	48	33	81	26	13	39

\* F - Female; M - Male; T - Total



TABLE III  
 DISTRIBUTION OF SUBJECTS BY SCHOOL-GRADE IN  
 STUDIES ONE, TWO, AND THREE

SCHOOL-GRADE	STUDY ONE			STUDY TWO			STUDY THREE		
	F*	M	T	F	M	T	F	M	T
Kindergarten	14	5	19	9	2	11	7	1	8
Kindergarten - 1	2	0	2	0	1	1	0	0	0
1	14	12	26	8	7	15	6	4	10
1 - 2	1	2	3	2	4	6	1	2	3
2	11	9	20	6	6	12	3	3	6
2 - 3	0	1	1	1	0	1	0	0	0
3	11	6	17	9	7	16	5	2	7
4	11	4	15	11	5	16	4	1	5
Special	0	0	0	2	1	3	0	0	0
TOTAL	64	39	103	48	33	81	26	13	39

\*F- Female; M - Male; T - Total

### Household Profile Data

Household profile information was obtained from the eighty-five families of the 145 children whose food intakes are reported. The average participant-household number was 7.6 members, with a range of three to seventeen members.

The distribution of languages spoken in the participant-households is presented in Table IV. It can be seen from these data that traditional Native languages -- Cree, Saulteaux, and Chipewyan -- were spoken in two-thirds (67.06%) of the households and thus it could be assumed that these families were of Native origin. However, English was spoken in the majority (87.05%) of households and hence the interpretation of data was not found to be a problem.

The distribution of employment status of heads of the participant-households is shown in Table V. From these data it can be seen that approximately 44% of the heads of participating households were not employed in full-time occupations and consequently it might be assumed that the economic status of many families was low.

### Supplementary Information Data

Supplementary information was also obtained from the families of subjects whose food intakes are reported. The first portion of the supplementary information questionnaire dealt with questions on the means of cooking, storage, purchase, and preparation of food. All eighty-five participant-households provided answers to these questions and the distribution of their responses are summarized in Appendix C, Part 1.

TABLE IV  
DISTRIBUTION OF LANGUAGES SPOKEN IN PARTICIPANT-HOUSEHOLDS

LANGUAGE	NUMBER	PERCENT
ENGLISH	27	31.76
ENGLISH AND CREE	27	31.76
ENGLISH AND SAULTEAUX	16	18.82
CREE	7	8.24
ENGLISH, CREE, AND SAULTEAUX	4	4.71
CHIPEWYAN	2	2.35
SAULTEAUX	1	1.18
UKRANIAN	1	1.18
TOTAL	85	100.00

TABLE V  
DISTRIBUTION OF EMPLOYMENT STATUS OF HEADS OF  
PARTICIPANT-HOUSEHOLDS

EMPLOYMENT STATUS	NUMBER	PERCENT
FULL-TIME	48	56.46
SEASONAL	15	17.65
UNEMPLOYED	12	14.12
RETIRED	4	4.71
OTHER (Not Specified)	4	4.71
PART-TIME	2	2.35
TOTAL	85	100.00

Households were also questioned about infant feeding practices. The distribution of responses of seventy-five mothers and guardians of the children to questions on infant feeding are presented in Appendix C, Part II.

A summary of the responses of the eighty-five families to questions on the use of indigenous foods is shown in Table VI. From these data it was noted that a large percentage (92.94%) of the families used local fish and animals, while only 39% of the families used local plant sources of food in their diets.

The last part of the supplementary information questionnaire inquired about the consumption frequency of milk and dairy products. Seventy-five households provided information on this query (Table VII). It can be seen from these data that evaporated milk and fluid milk were consumed on the average approximately twice a day by the households. All other items were consumed on the average less than once a day.

Supplementary information was collected to provide additional information on the food practices of the families of the subjects in this investigation. Although these data have not been discussed at length here, the information obtained has been summarized and presented to extend the readers' knowledge of the food habits of the population investigated. (Refer to Appendix C, Table VI, and Table VII)

#### Food-Group Intake Data

The subjects' food-group intakes as reported for Studies One, Two, and Three are presented in Appendices D, E, and F, respectively.

TABLE VI

DISTRIBUTION OF RESPONSES TO SUPPLEMENTARY INFORMATION  
QUESTIONS ON THE USE OF INDIGENOUS FOODS

	Respondents	
	No.	%
Do you eat fish or animals trapped by people in your community?		
Yes	79	92.94
No	4	4.71
No Response	4	4.71
TOTAL	85	100.00
Do you eat herbs, plants, or vegetables gathered by people in your community?		
Yes	33	38.82
No	40	47.06
No Response	12	14.12
TOTAL	85	100.00

TABLE VII  
MEAN CONSUMPTION FREQUENCY OF MILK AND DAIRY PRODUCTS  
OF 75 PARTICIPANT-HOUSEHOLDS

FOOD	NUMBER OF TIMES EATEN PER DAY	
	MEAN	RANGE
MILK, FLUID	1.96	0-7
MILK, POWDERED	0.21	0-3
MILK, EVAPORATED	2.43	0-8
CHEESE	0.57	0-3
COTTAGE CHEESE	0.08	0-2
CREAM	0.28	0-5
ICE CREAM	0.99	0-6
CHOCOLATE MILK	0.35	0-5
BUTTERMILK	0.03	0-2

## 1. Study One

The number and percentage of subjects in Study One whose food-group intakes met or exceeded the recommendations of Canada's Food Guide are presented in Table VIII and Figure 2. From these data it can be seen that many of the children were not consuming foods in amounts recommended by the Food Guide and, in particular, approximately 64% of the children surveyed were not meeting the recommended intake for milk.

The means of the food-group intakes of subjects in the same study are given in Table IX and Figure 3. The mean milk consumption of 1.98 cups was below the 2.5 cups suggested by the Food Guide. However, two subjects consumed nine cups of milk per day which would consequently affect the mean intake of the group and result in a mean intake of 1.84 cups when the two subjects mentioned were excluded. It was also noted from Study One data that six children did not consume any milk and one-third (33.96%) had milk intakes of less than one cup of milk per day.

Study One indicated extremely low intakes of the vegetable food-group. Only one child met the recommended two servings of vegetables, other than potatoes, suggested by Canada's Food Guide. The diet records of the children indicated that the vegetable food-group intake consisted mainly of canned soup and canned vegetables and that few fresh vegetables were included in the childrens' diets.

Intakes of the fruit food-group were also low in Study One. It was found that approximately 76% of the children in this study did not consume the two servings of fruit recommended by the Food Guide.



TABLE VIII  
SUBJECTS IN STUDY ONE WHO MET THE RECOMMENDATIONS  
OF CANADA'S FOOD GUIDE

FOOD-GROUP	NUMBER	PERCENT
MILK	37	35.92
FRUIT	25	24.27
POTATO	50	48.45
VEGETABLE	1	0.97
BREAD-CEREAL	62	60.19
MEAT	68	66.02
N = 103		

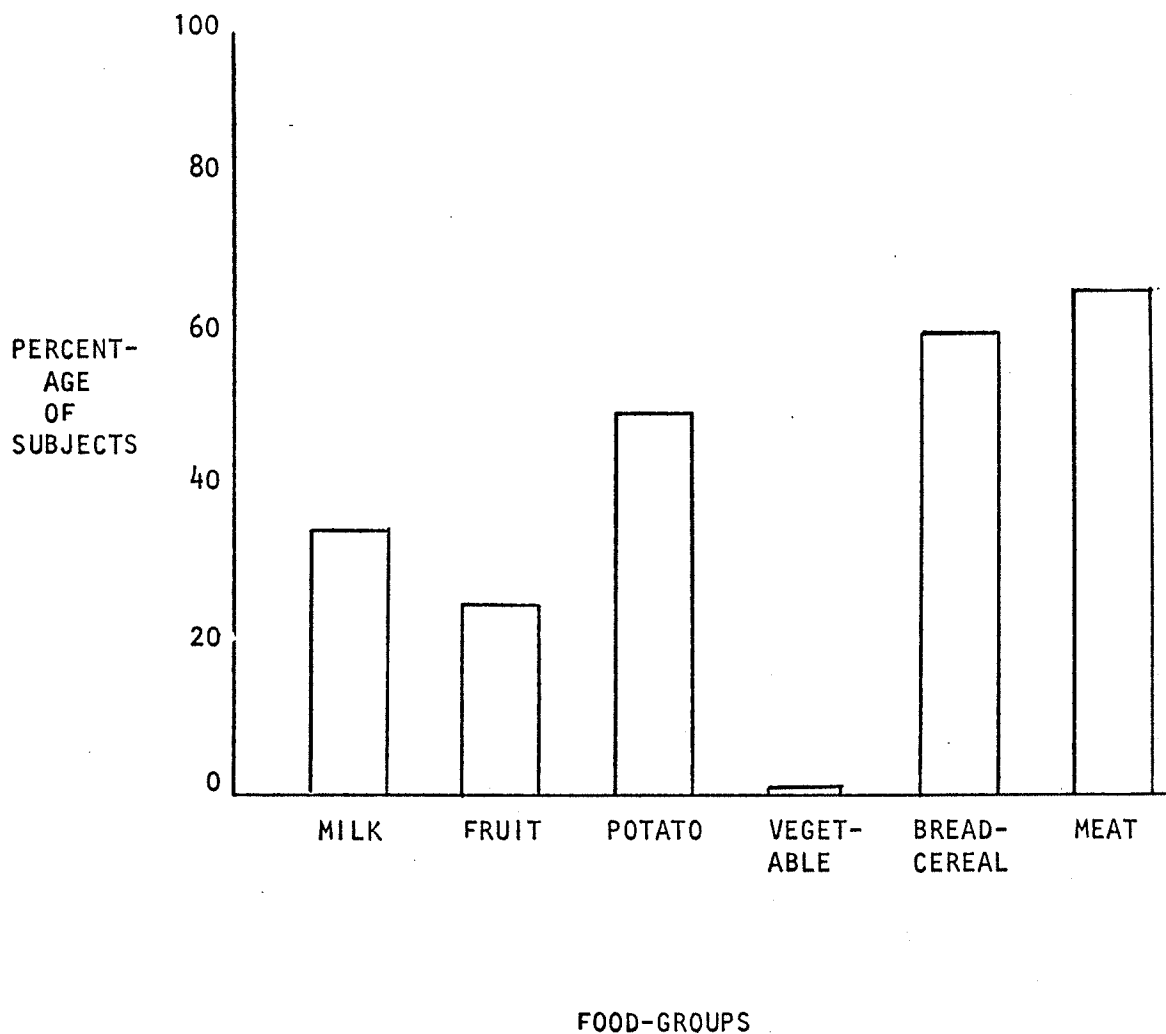


FIGURE 2                    PERCENTAGE OF SUBJECTS IN STUDY ONE  
WHO MET THE RECOMMENDATIONS OF CANADA'S FOOD GUIDE

TABLE IX  
FOOD-GROUP INTAKES OF SUBJECTS IN STUDY ONE

FOOD-GROUP	MEAN	RANGE	CANADA'S FOOD GUIDE RECOMMENDATIONS
MILK (cups)	1.98	0.00-9.00	2.50
FRUIT (servings)	1.27	0.00-7.00	2.00
POTATO (servings)	0.96	0.00-4.33	1.00
VEGETABLE (servings)	0.45	0.00-2.00	2.00
BREAD-CEREAL (servings)	3.58	0.50-9.83	3.00
MEAT (servings)	1.85	0.00-4.00	1.50

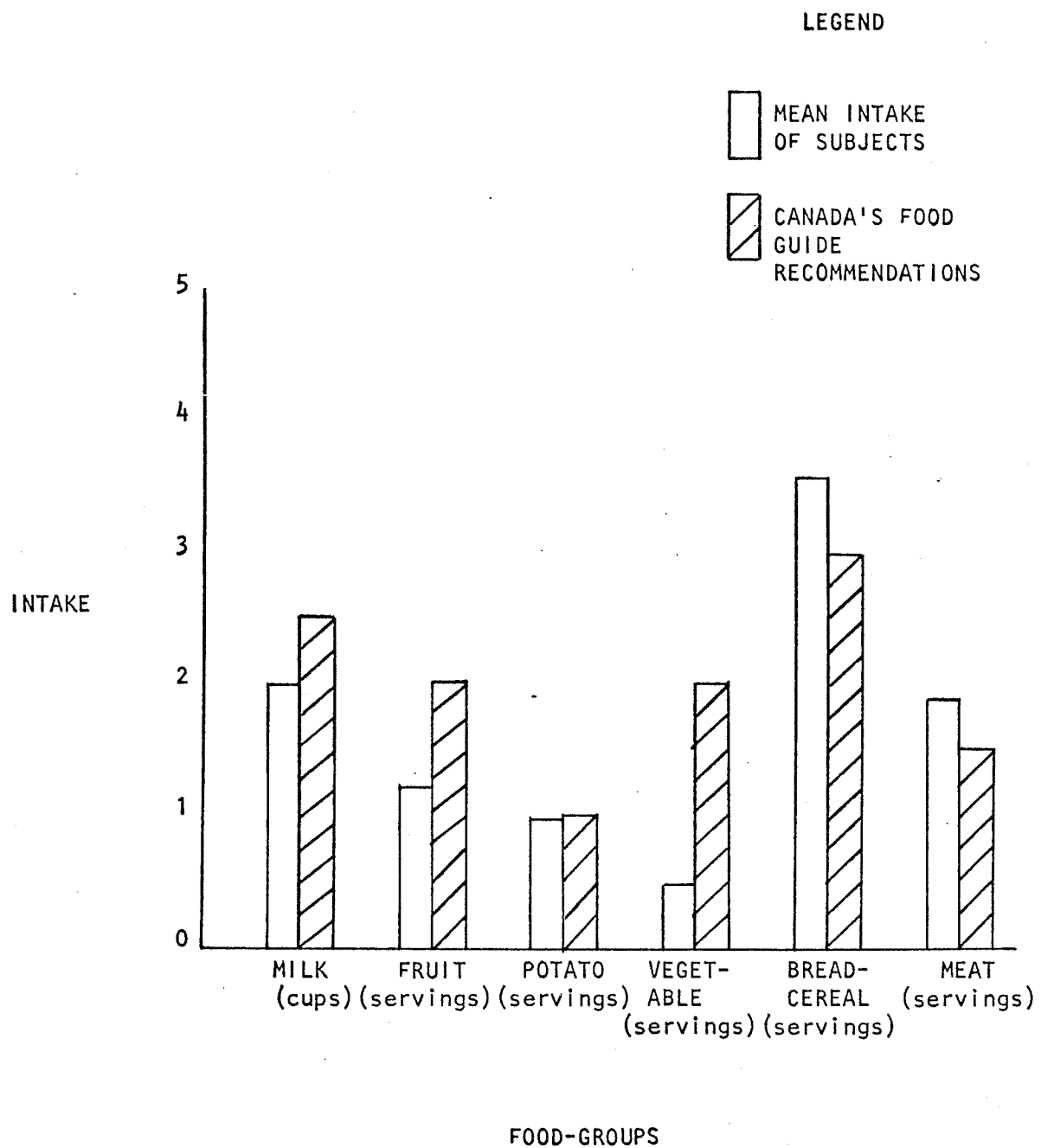


FIGURE 3

MEAN FOOD-GROUP INTAKES  
OF 103 SUBJECTS IN STUDY ONE

It was observed from the childrens' diet records that the fruit-group intake consisted largely of canned and powdered fruit juices. Little fresh fruit was included in the childrens' intake.

Food-group intakes of potato, bread-cereal, and meat were in closer agreement with Canada's Food Guide recommendations. Approximately one-half (48.54%) of the subjects consumed the suggested one serving of potato recommended by the Food Guide. The recommended three servings of bread and cereal was met or exceeded by 60% of the children and 66% of the children consumed the Food Guide's suggested intake of one and one half servings of meat, fish or poultry.

The diet records of the children in Study One indicated that approximately 42% of the subjects did not include foods from the sweets food-group in their diets during the survey period, while 48% of the children had one sweet food, and approximately 10% included two or more foods from this food-group in their diets (refer to Appendix D).

## II. Study Two

The data for Study Two were collected after the children had been receiving the milk supplement at school for approximately six months and the nutrition education segment of the School Milk Program had been in progress for approximately eight months.

Table X and Figure 4 illustrate the number and percentage of subjects in Study Two whose food-group intakes met or exceeded the recommendations of Canada's Food Guide. From these data it can be seen that many of the children were not consuming foods in amounts

TABLE X  
SUBJECTS IN STUDY TWO WHO MET THE RECOMMENDATIONS  
OF CANADA'S FOOD GUIDE

FOOD-GROUP	NUMBER	PERCENT
MILK	43	53.09
FRUIT	17	20.99
POTATO	29	35.80
VEGETABLE	2	2.47
BREAD-CEREAL	75	92.59
MEAT	49	60.49
N = 81		

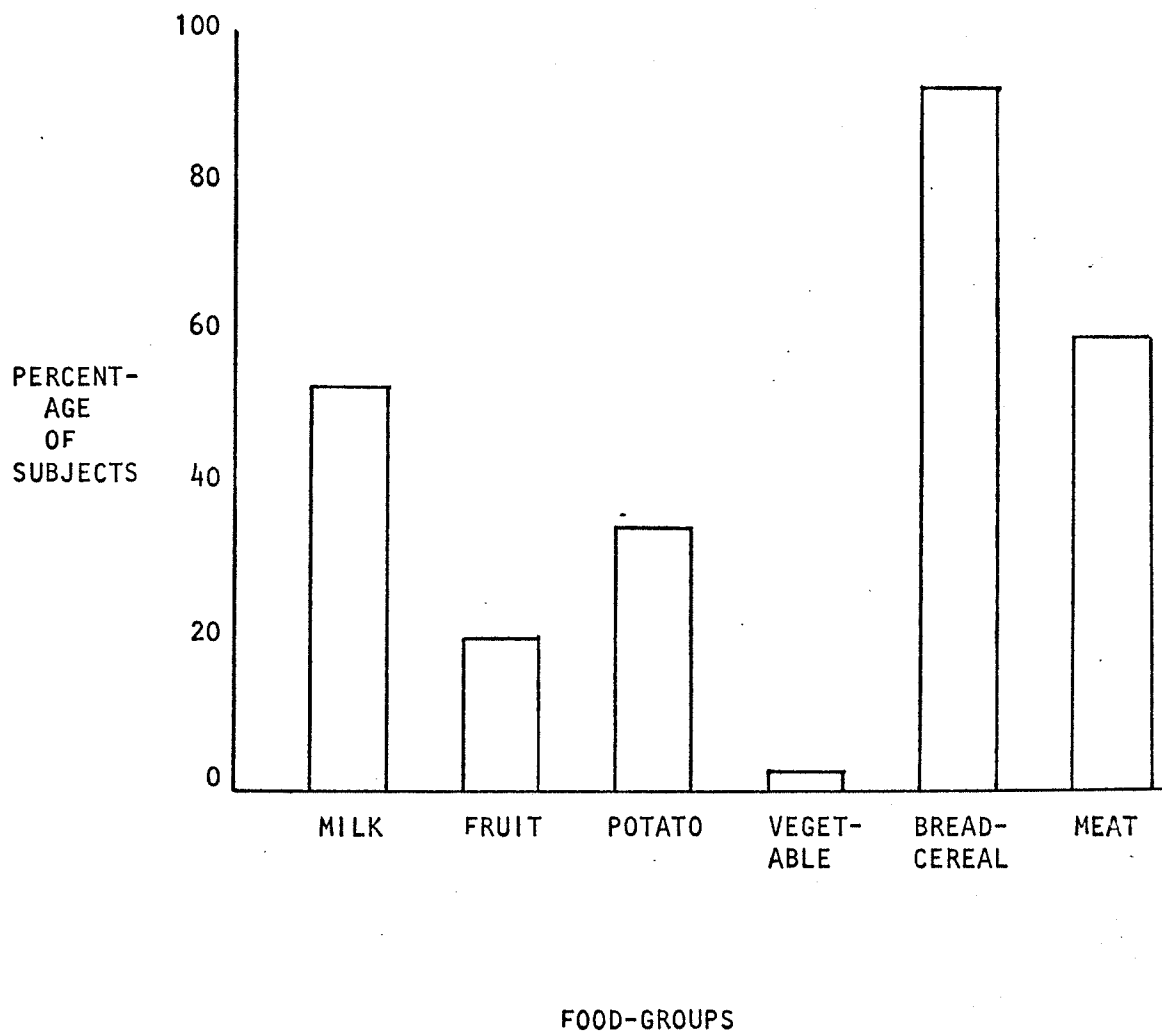


FIGURE 4 PERCENTAGE OF SUBJECTS IN STUDY TWO WHO MET THE RECOMMENDATIONS OF CANADA'S FOOD GUIDE

recommended by the Food Guide and, in particular, approximately 45% of the children did not meet the recommended milk intake.

The means of food-group intakes of Study Two subjects are presented in Table XI and Figure 5. The mean milk intake in this study was 2.42 cups, which was still below the Food Guide recommended intake. This mean intake was approximately one-half cup more than the 1.98 cups of milk consumed by the subjects in Study One. It was estimated that the mean milk intake could be approximately three cups, taking into account the mean intake of the children before supplementation and the one cup of milk provided by the supplement.

Study Two data showed that all the children consumed some milk as compared with six children in Study One who did not consume any milk. Furthermore, in Study Two approximately 11% of the subjects consumed less than one cup of milk per day whereas in Study One it was found that 34% of the subjects consumed less than one cup of milk per day.

Thus, although milk supplementation did increase the milk-group intake of the children, it was not increased to the extent anticipated. A basic problem in using supplementation in school feeding programs is the ability to control total food intake. It has been found that food intake outside school may decrease with supplementation and, consequently, total daily intake remains the same (38). It has also been noted by several investigators (10, 12, 27, 38) that persons responsible for the home diet of the child may pay less attention to the diet because of confidence in adequacy of school feeding. These factors may have influenced the milk food-group intakes of the children studied.



TABLE XI  
FOOD-GROUP INTAKES OF SUBJECTS IN STUDY TWO

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FOOD GROUP	MEAN	RANGE	CANADA'S FOOD GUIDE RECOMMENDATIONS
MILK (cups)	2.42	0.13-5.00	2.50
FRUIT (servings)	1.17	0.00-5.00	2.00
POTATO (servings)	0.79	0.00-2.75	1.00
VEGETABLE (servings)	0.48	0.00-2.00	2.00
BREAD-CEREAL (servings)	4.58	1.20-11.00	3.00
MEAT (servings)	1.60	0.50-3.17	1.50

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N = 81

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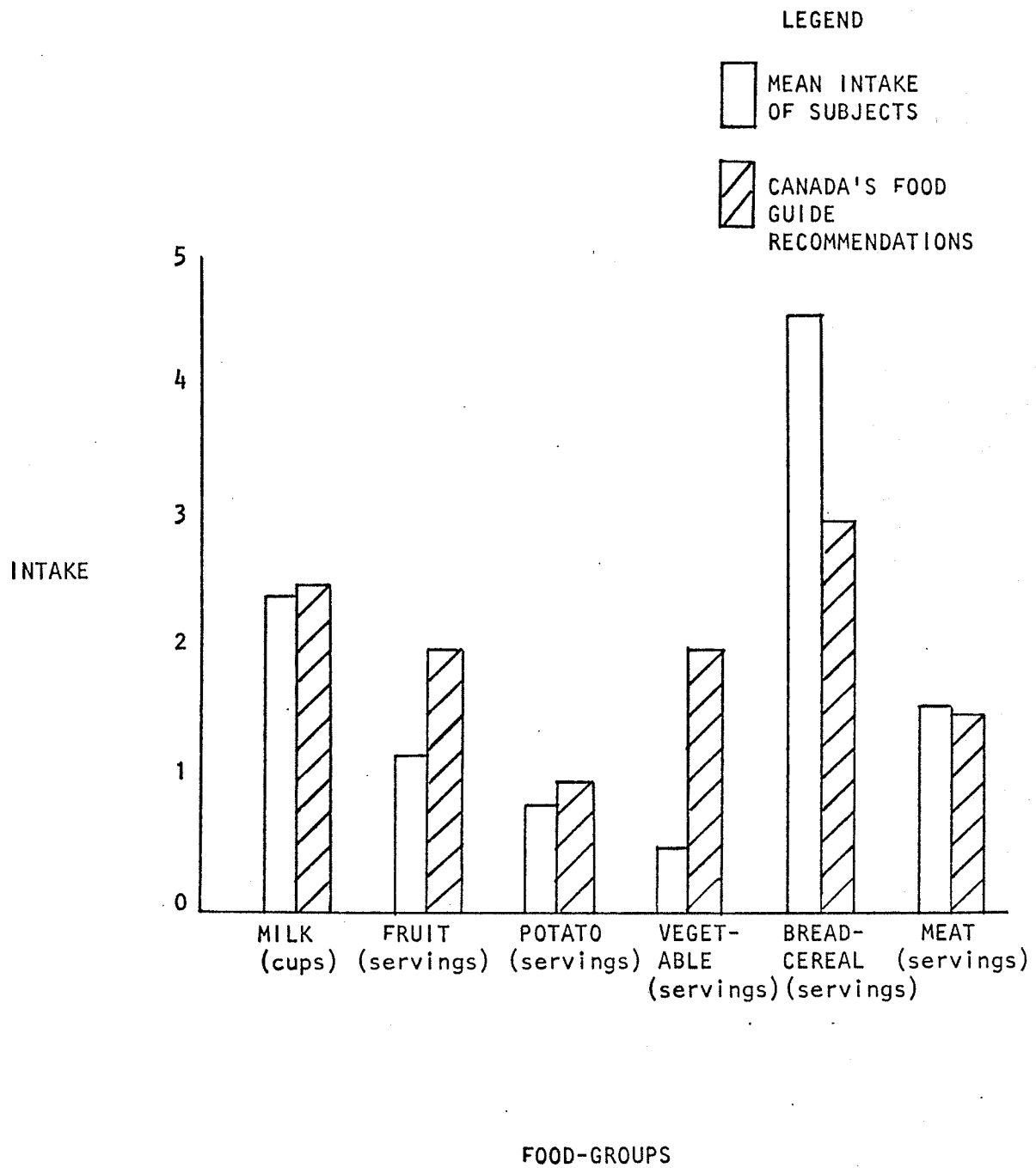


FIGURE 5

MEAN FOOD-GROUP INTAKES  
OF 81 SUBJECTS IN STUDY TWO

As in Study One, Study Two data also indicated particularly low intakes of the vegetable food-group. Only two children met the recommended two servings of vegetables, other than potatoes, suggested by Canada's Food Guide. The vegetable-group intakes determined from the childrens' food intake records came chiefly from canned soups and canned vegetables. The poor vegetable-group intakes found in both Study One and Study Two might be attributed in part to the unavailability of vegetables, however, it was observed that the majority of local stores, in the communities surveyed, did stock a variety of canned vegetables.

It was found that approximately 79% of the children in Study Two did not consume the two servings of fruit suggested by Canada's Food Guide. This was a further 3% decrease in the fruit-group intake from Study One. It was also noted that the mean intakes of the fruit-group decreased from Study One and Study Two. It was observed that the fruit-group intake determined from the childrens' intake records consisted largely of canned and powdered fruit juices. The decrease in the subjects' intake of fruit from Study One to Study Two might be attributed to the fact that any fresh fruit that was being consumed during the period of the first survey might be unavailable during the winter months of the second survey.

Approximately 36% of the subjects in Study Two consumed the suggested one serving of potatoes recommended by Canada's Food Guide. This was an approximate 13% decrease from Study One. The decrease in consumption apparent in the survey conducted during the winter months may be an indication that potatoes were unavailable in the communities surveyed during this time of the year.

It was observed from the childrens' food intake records that the bread-cereal-group intakes consisted largely of bread, bannock, and pasta products. There was little use of cereals in the childrens' diets. Ninety-two percent of the children in Study Two met or exceeded the Food Guide's recommended three servings of bread and cereal. This was an increase of 32% from Study One. The increase in the bread-cereal-group intake between the first and second surveys may have helped to compensate for the decrease in the potato-group intake, as both these groups contributed a large proportion of calories to the childrens' diets. Several investigators (22, 25, 29, 30) have suggested that when the intake of one food-group is less than proposed the intake may be satisfactory because of a tendency to compensate in other groups.

Canada's Food Guide suggested intake of one and one-half servings of meat, fish, or poultry was met or exceeded by approximately 60% of the subjects. This was 6% less than those subjects in Study One who met or exceeded the recommended intake. It was noted from the food intake records of the children that the meat food-group intake consisted mainly of fish during the summer survey and meat during the winter survey. The use of indigenous meat and fish by approximately 93% of the households (refer to Table VI) who were surveyed may have contributed significantly to the meat food-group intakes of the subjects studied.

The diet records indicated that approximately 39% of the subjects in Study Two, as compared with 42% of the subjects in Study One, did not include foods from the sweets food-group in their diets during the survey period. It was also observed that 51% of Study Two

subjects had one sweet food compared with 48% of the subjects in Study One. And as in Study One, approximately 10% of the children included two or more foods from this food-group in their diets (refer to Appendix E).

### III. Study Three

A comparison of the food-group intakes of the subjects who participated in both the summer and winter surveys, referred to as Study Three, is presented in Table XII and Figure 6. From these data it can be seen that many of the children were not consuming foods in amounts recommended by Canada's Food Guide and, in particular, approximately 56% of the summer-survey subjects and 38% of the winter-survey subjects were not meeting the recommended intake for milk.

The means of the food-group intakes of subjects in Study Three are shown in Table XIII and Figure 7. Figures 8 through 13 provide illustration of data from this study. The mean milk consumption of subjects who participated in both surveys was 2.28 cups in the summer survey and 2.59 cups during the winter survey. The mean milk-group intake in the summer was therefore below the 2.5 cups suggested by the Food Guide, however, the mean milk-group intake in the winter, following supplementation, was above the recommended intake. The mean milk-group intake in the winter survey was approximately one-quarter cup more than the mean intakes of the subjects before supplementation. It had been estimated that the mean milk intake could be over three cups, taking into consideration the intake before supplementation and the one cup of milk provided by the supplement.

TABLE X:1  
COMPARISON OF THE FOOD-GROUP INTAKES OF SUBJECTS IN STUDY THREE

FOOD-GROUP	SUBJECTS WHO MET CANADA'S FOOD GUIDE RECOMMENDATIONS				CHANGES FROM SUMMER SURVEY TO WINTER SURVEY		
	SUMMER SURVEY		WINTER SURVEY		$\chi^2*$	df	p**
No.	%	No.	%				
MILK	17	43.59	24	61.54	3.77	1	0.0522
FRUIT	9	23.08	10	25.64	0.09	1	0.7642
POTATO	23	58.97	16	41.03	2.58	1	0.1082
VEGETABLE	0	0.00	1	2.56	1.00	1	0.3173
BREAD-CEREAL	20	51.28	35	89.74	15.00	1	0.0002
MEAT	25	64.10	27	69.23	0.29	1	0.5902

N = 39  
\* Refer to Bibliography: Cochran, W. G., 1937.  
\*\*  $p = P(\chi^2 < \chi^2)$

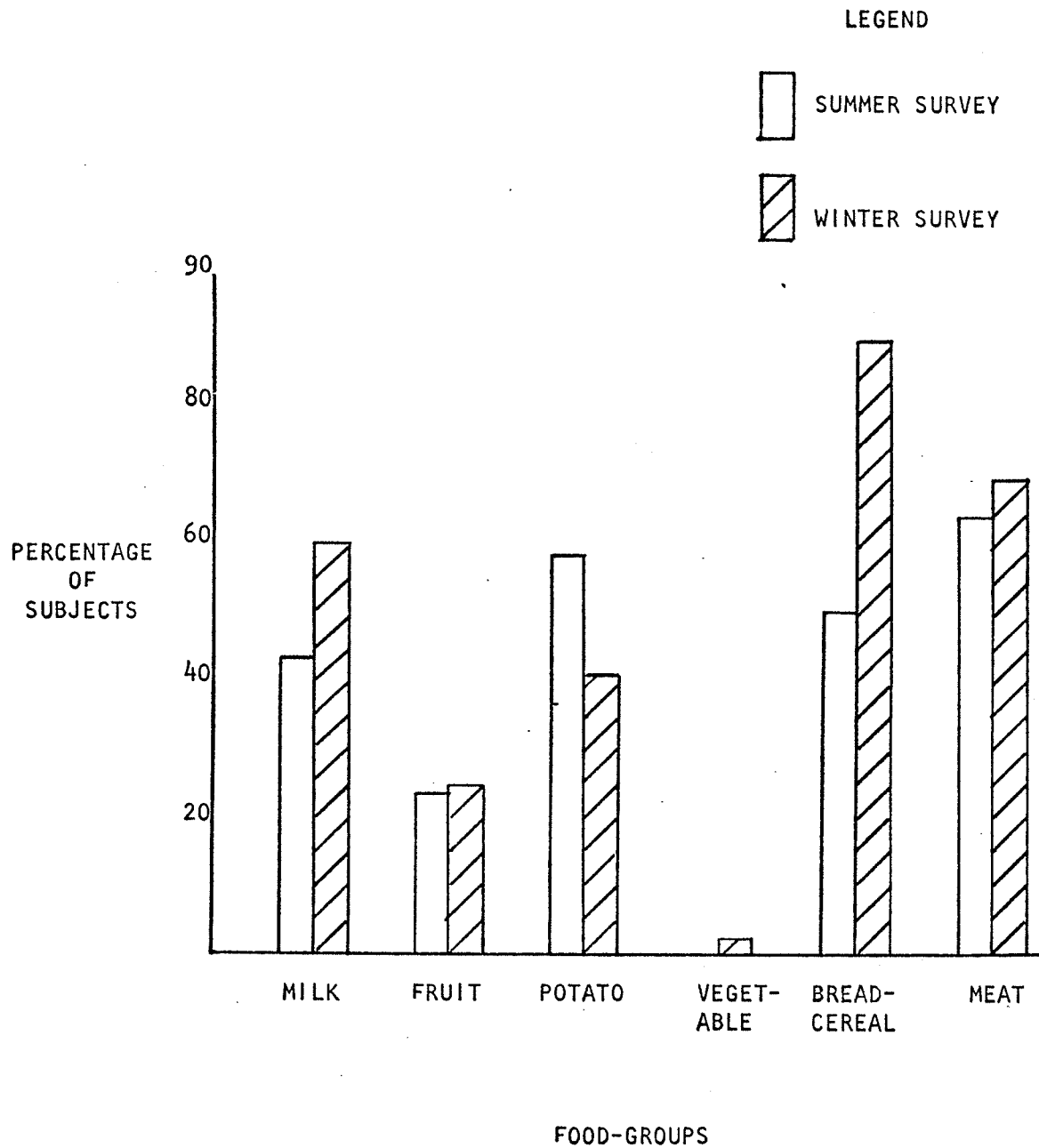


FIGURE 6 PERCENTAGE OF SUBJECTS IN STUDY THREE WHO MET THE RECOMMENDATIONS OF CANADA'S FOOD GUIDE

TABLE XIII

## FOOD-GROUP INTAKES OF SUBJECTS IN STUDY THREE

FOOD-GROUP	SUMMER SURVEY		WINTER SURVEY		CANADA'S FOOD GUIDE RECOMMENDATIONS
	MEAN	RANGE	MEAN	RANGE	
MILK	2.28	0.00-9.00	2.59	0.50-5.00	2.50
FRUIT (servings)	1.32	0.00-7.00	1.31	0.00-5.00	2.00
POTATO (servings)	1.19	0.00-4.33	0.89	0.00-2.75	1.00
VEGETABLE (servings)	0.47	0.00-1.83	0.56	0.00-2.00	2.00
BREAD-CEREAL (servings)	3.30	0.50-9.00	4.11	0.00-7.67	3.00
MEAT (servings)	1.47	0.00-3.50	1.71	0.00-3.17	1.50
N = 39					



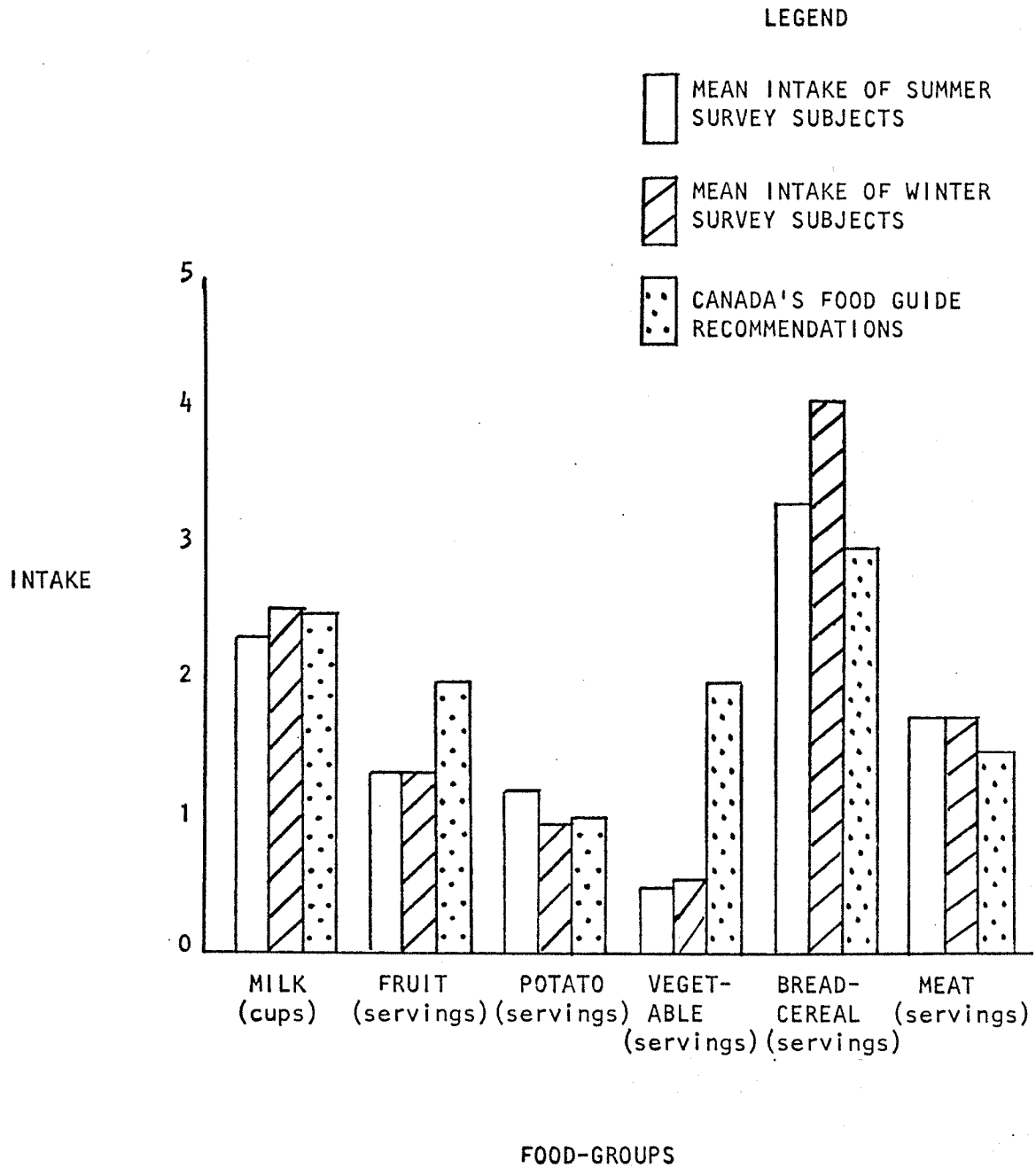


FIGURE 7

MEAN FOOD-GROUP INTAKES  
OF 39 SUBJECTS IN STUDY THREE

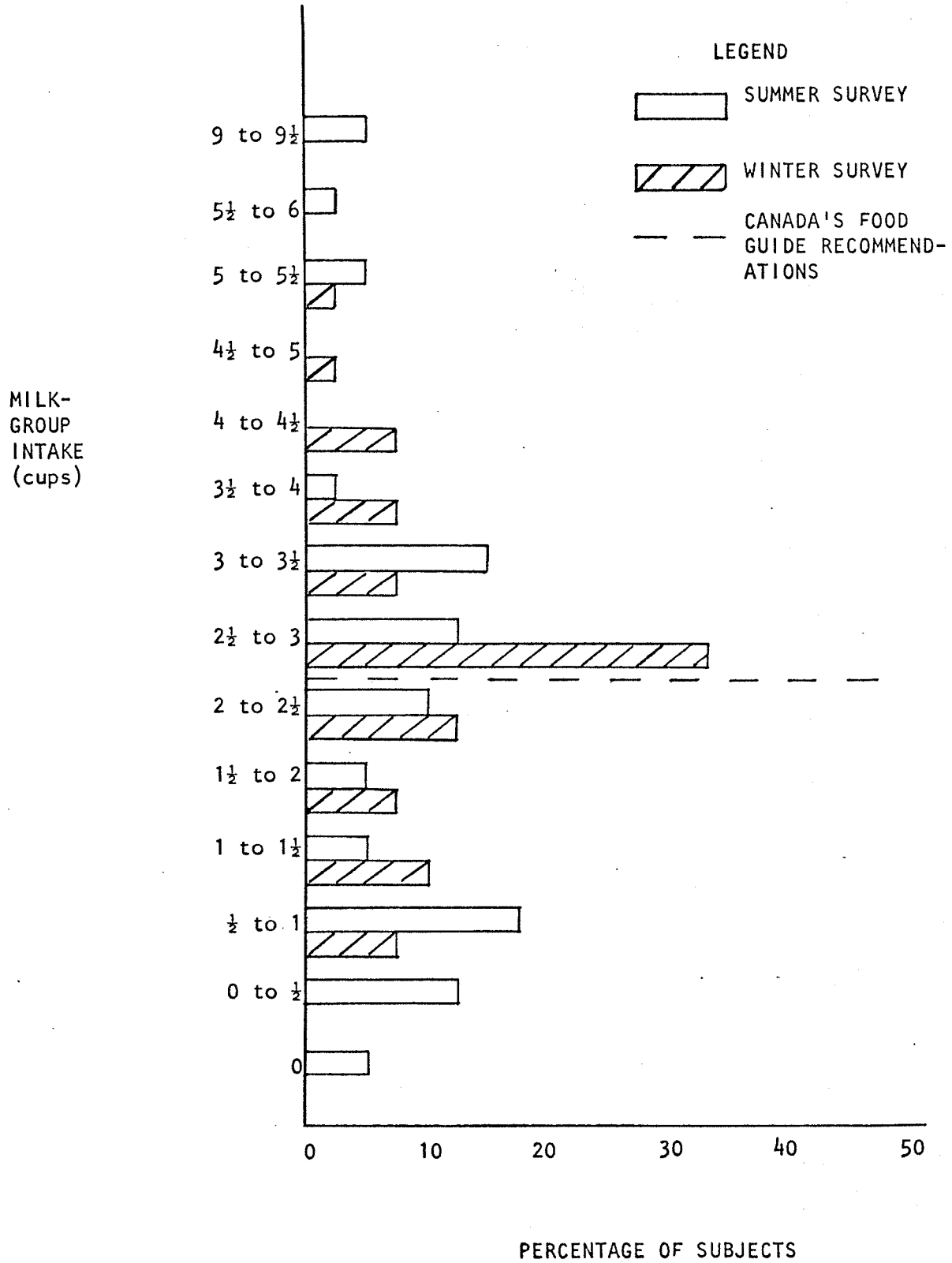


FIGURE 8

MILK-GROUP INTAKES OF 39 SUBJECTS IN STUDY THREE

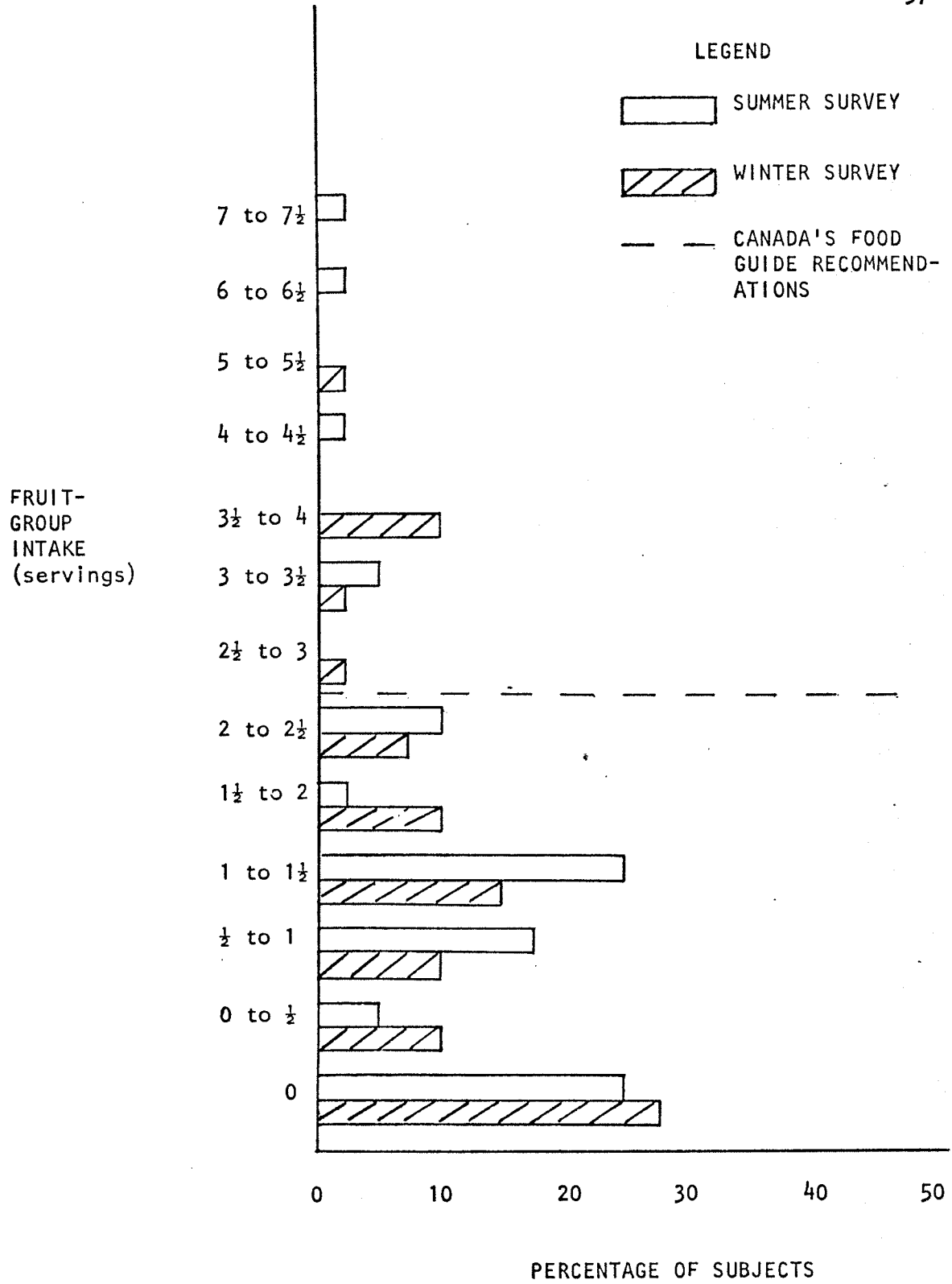


FIGURE 9

FRUIT-GROUP INTAKES OF 39 SUBJECTS IN STUDY THREE

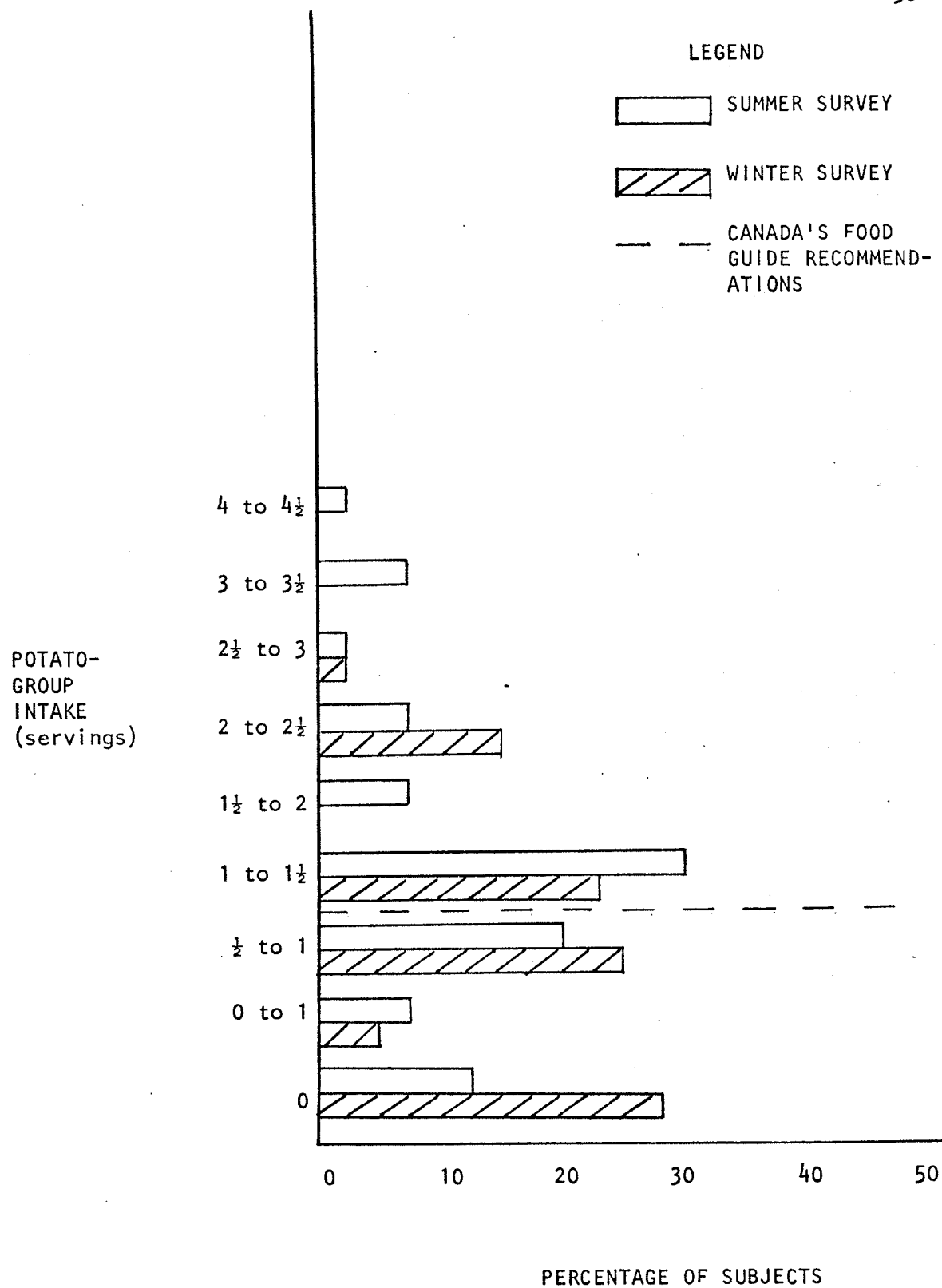


FIGURE 10

POTATO-GROUP INTAKES OF 39  
SUBJECTS IN STUDY THREE

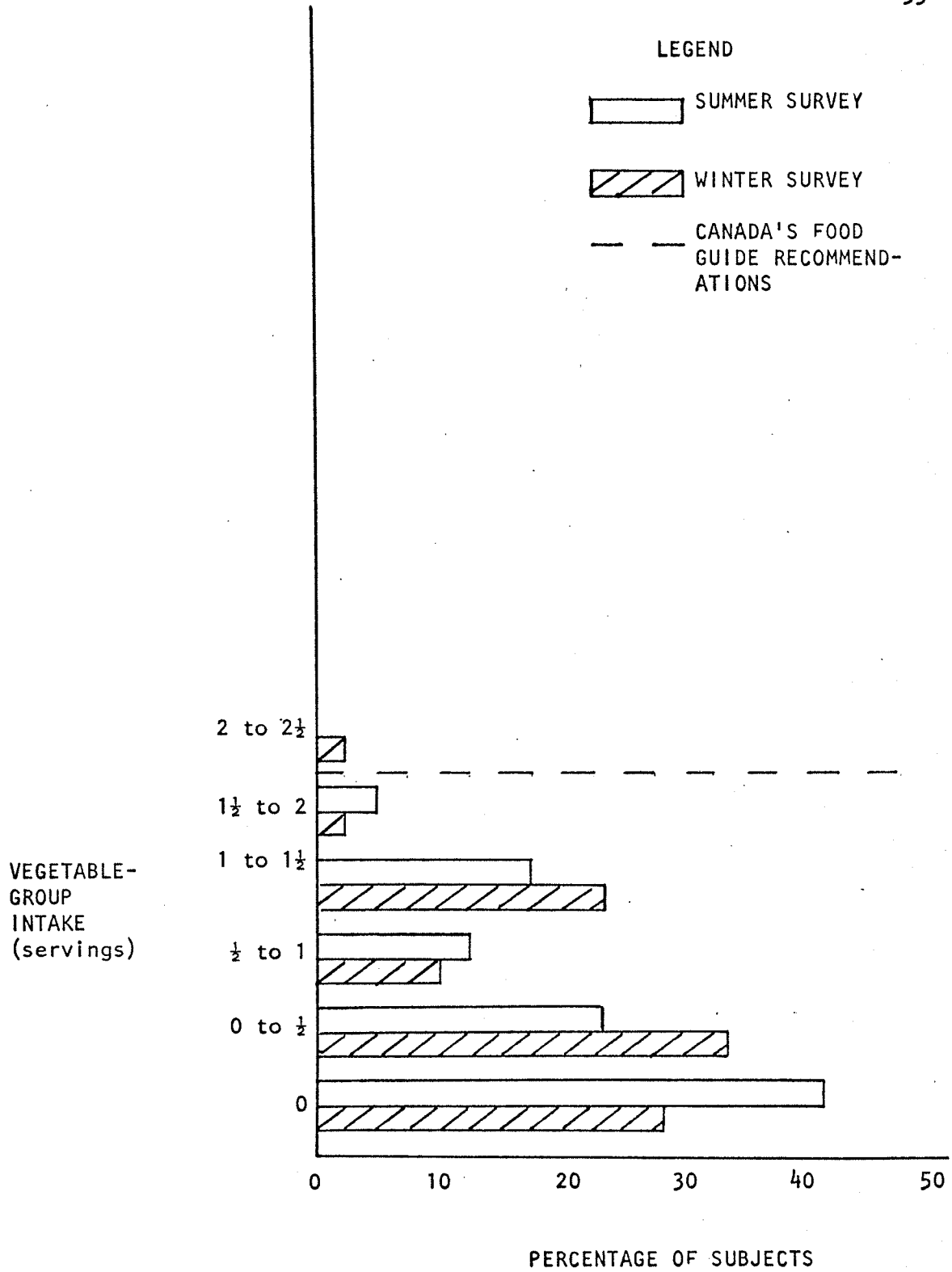


FIGURE 11

VEGETABLE-GROUP INTAKES OF 39 SUBJECTS IN STUDY THREE

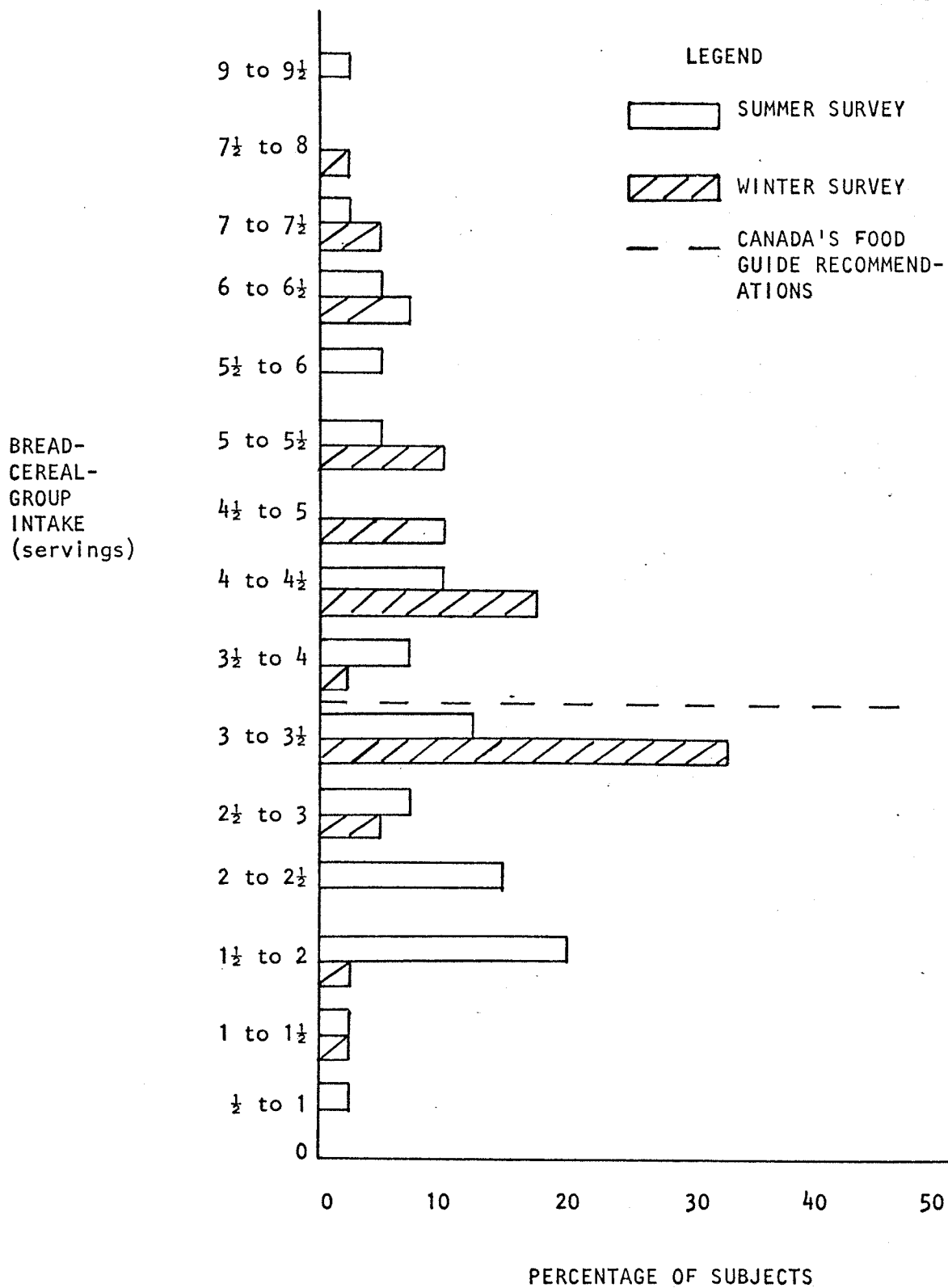


FIGURE 12

BREAD-CEREAL-GROUP INTAKES OF 39 SUBJECTS IN STUDY THREE

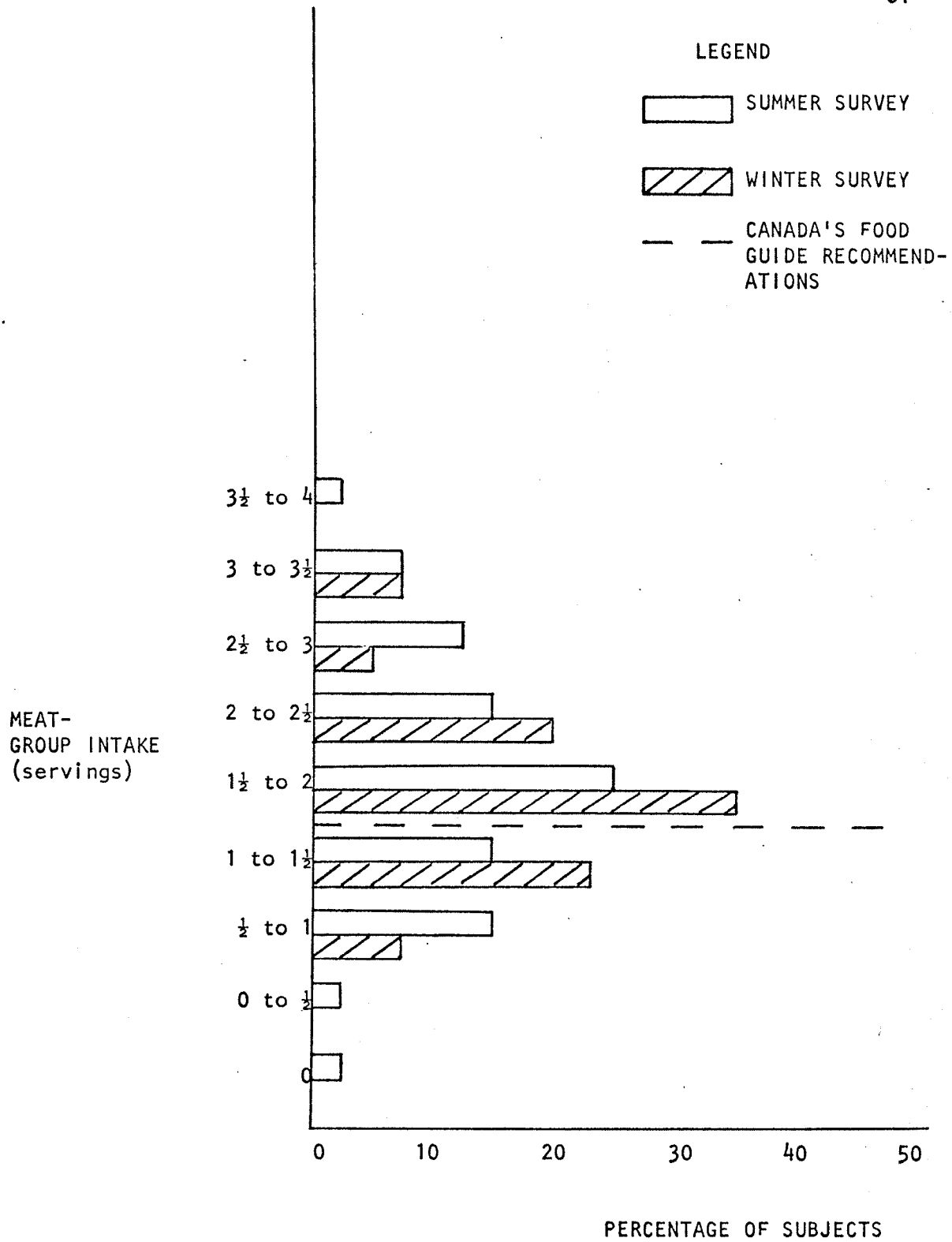


FIGURE 13

MEAT-GROUP INTAKES OF 39 SUBJECTS IN STUDY THREE

However, it was found that the pattern of milk-group intake changed for those subjects who were included in both the summer and winter surveys and this finding was significant at the 0.10 level ( $p < 0.0522$ ) (Table XII). It was also noted that the thirty-nine subjects who participated in both surveys, two subjects did not receive any milk and twelve consumed less than one cup before supplementation, and all the children received some milk and only three consumed less than one cup following supplementation of milk at school.

Data from Study Three showed that although milk supplementation did increase the milk-group intake of the children, it was not increased to the extent anticipated. Those factors noted in Study Two as being possibly influential in the milk food-group intakes of the children would also apply to the findings of Study Three.

The vegetable food-group intake of Study Three subjects was extremely low. None of the children in the summer survey met the recommended two servings of vegetables, other than potatoes, suggested by Canada's Food Guide and only one child in the winter survey met the recommended intake.

Study Three also indicated particularly low intakes of the fruit food-group. In this study approximately 77% of the summer-survey subjects and 74% of the winter-survey subjects did not meet the suggested two servings of fruit recommended by the Food Guide. It was learned that teachers in some schools provided children with orange juice during the school term. This contribution to the diet of the children may have been responsible for the similar mean fruit-group intakes of Study Three children in the summer and winter surveys and the increased percentage of Study Three subjects who met or exceeded Food Guide



recommendations for fruit.

Fifty-nine percent and 41% of the summer-survey and winter-survey subjects, respectively, in Study Three consumed the suggested one serving of potato recommended by Canada's Food Guide. The decrease in consumption apparent in the winter-survey subjects' intake may be an indication that potatoes were unavailable to the communities during the winter months.

It was found that the recommended three servings of bread and cereal was met or exceeded by 51% of the Study Three summer-survey subjects and 90% of Study Three winter-survey subjects. The pattern of the bread-cereal-group intake of Study Three subjects changed from the first to the second survey and this change was significant at the 0.10 level ( $p < 0.0002$ ) (Table XII). The increase in the bread-cereal-group intake may have helped to compensate for the decrease in the potato-group intake, as both of these food-groups contributed a large proportion of calories to the diets of the children.

Canada's Food Guide suggested intake of one and one-half servings from the meat food-group was met or exceeded by approximately 64% of Study Three summer-survey subjects and 69% of Study Three winter-survey subjects. This fairly satisfactory intake was felt to be due to the use of indigenous foods by many of the participating households (Table VI).

It was found that approximately 36% of the summer-survey and winter-survey subjects in Study Three did not include sweets in their diets during the survey periods. It was also found that 59% of the summer-survey subjects in Study Three consumed one food from the

sweets food-group and 5% of the summer-survey subjects included two sweet foods in their diets, as compared with 51% of the winter-survey subjects in Study Three who consumed one food from the sweets food-group and 13% of the winter-survey subjects who included two or more sweet foods in their diets (Refer to Appendix F). The increase in intake of sweet foods during the winter survey may have been due to the tendency of school children to consume sweets during school breaks.

#### Relevant Studies

The results of this investigation suggest that the vegetable, fruit, and milk food-groups are those most lacking in the diets of the sample of children studied and this would probably be true for the population of children. These food-groups are those which provide good and excellent dietary sources of protein, calcium, ascorbic acid, vitamin A, and riboflavin. The findings of Nutrition Canada (13) also support the observations made in this investigation. Data from Nutrition Canada provided information on all segments of the Canadian population including Indian children aged five to nine years - the same population and age group of many of the subjects studied in the present investigation. Nutrition Canada found that dietary intakes of this group were marginal or low in vitamins A and D, calcium, and iron when assessed by determined standards, and biochemical levels of vitamin A, calcium, ascorbic acid, riboflavin, iron and folacin were below adequate standards.

Findings, similar to those of Nutrition Canada, were also reported in a study (14) conducted in 1967 in British Columbia with nine to fourteen year-old Indian and non-Indian children. Information

about the nutrient intakes of these children was obtained by means of the Burke dietary history method and three-day food records. Results indicated that both groups of children had intakes of vitamin A and calcium below Canadian Dietary Standard levels, and it was also found that the Indian children had significantly lower intakes of ascorbic acid and calcium than the non-Indian group.

Two earlier Canadian studies (45, 48) conducted in 1952 and 1956, assessed 24 hour diet recalls of school children in terms of Canada's Food Guide recommendations. In the first study (45), with grade six students, intakes of citrus fruits, vegetables, whole grain cereals, and vitamin D were found to be particularly low. Results of the second study (48), with eighth grade students, determined that only meat appeared to be used to a satisfactory extent by the group as a whole.

American investigators have also noted that vegetables and ascorbic acid-rich foods appear to be of particular concern in the diets of school children. In a comprehensive Massachusetts study (6, 7) done in 1969, the diets of children in grades one through twelve were assessed on the basis of the Basic Four Food Guide. It was found that intakes of vegetables and fruits were particularly low, especially among grades one through three children, where only 16% consumed the recommended servings of this food group.

Another study conducted by Myers and co-workers (35, 36) in Boston in 1965, with nine through thirteen years olds, assessed the food-group intakes of the children on the basis of "satisfactory" or "unsatisfactory" scores developed by the investigators. Those food-groups

which received largely "unsatisfactory" scores were green and yellow vegetables, citrus fruit, and milk. Other studies (16, 49) done with teenagers, where dietary intake was assessed by food-groups on the basis of the Basic Seven Food Guide, have also found low intakes of green and yellow vegetables and fruits rich in ascorbic acid.

The studies cited have indicated that the diets of school children are especially low in green and yellow vegetables and ascorbic acid-rich foods. In some studies (6, 7, 35, 36, 45, 48) milk intake was also noted as being low. It is also of interest that the dietary intakes of Indian children were found to be lower than those of non-Indian children in vitamins A and D, calcium, and iron (13, 14). These findings and the results of the present investigation, imply that intakes of the vegetable, fruit, and milk food-groups are not being consumed in recommended amounts by this population group.

#### Guttman Analysis of Food Intake Records

The Guttman scale (41) is one method of scalogram analysis.

To quote Abell:

"The essential feature of the Guttman scale is that it provides a measure of the cumulative, unidimensional pattern of development of a characteristic of a given population. It is built on the premise that persons at the top of the scale - who indicate certain individual attributes - also share the attributes of others at lower points on the scale. No other single step on the scale can exist unless all preceding steps coexist."

The Guttman scale was originally developed by and for social scientists for the purpose of attitude measurement. However, Abell (1) demonstrated that scalogram analysis could be applied to factual as well as attitudinal data. In demonstrating this use of scale analysis,

she applied the technique to information on the nutrition practices of homemakers using as the base the food groups in the Basic Seven Food Guide.

More recently several investigators have employed this method of analysis to measure the complexity of the diet, based on the frequency with which a food or food-group is consumed. Chassy and co-workers ( 9 ) in a study of food habits in an industrializing area, relating the complexity of the diet to the economic and social level of the individual. Sanjur and Scoma ( 40 ), in an investigation of food habits of low-income children in New York State, assessed eating patterns of preschoolers in relation to their mothers' social characteristics. More recently, a study conducted in Ontario by Sabry and co-workers (39 ) investigated the appropriateness of scaling for the assessment of adequacy of dietary patterns of preschool children using as the base Canada's Food Guide food-groups.

In the present investigation Guttman analysis was used to assess the complexity of food-group intakes of 145 children. Mean food-group intakes of the children were calculated from the three-day food intake record of each child for six food-groups. The six food-groups being: milk; fruit; potato; vegetable; bread-cereal; and meat. The application of scalogram analysis consisted of treating the food-groups as sets of items and the mean food-group intakes as responses. Based on the usage of each food-group as suggested in Canada's Food Guide (refer to Appendix B), the child's mean food-group intake received a plus if his intake met or exceeded the recommended number of servings, and a minus if it failed to meet this standard. Responses were then

ranked from highest to lowest, based on the number of pluses recorded and the cutting points for each step of the scale established. Guttman's Coefficient of Reproducibility (refer to Appendix G) ( 41) was used to measure the degree of scalability obtained.

The scalogram pattern and the distribution of the childrens' food-group intakes according to food scale score based on Canada's Food Guide recommendations is presented in Table XIV. The mean food-group intake evaluated on the basis of the Food Guide gave evidence of scalability. The required scalogram picture emerged and it was possible to rank the children by a food scale score according to the complexity of the consumption of the six food-groups. Guttman's Coefficient of Reproducibility was 0.90 in Study One, 0.91 in Study Two, and 0.91 and 0.92 for those children who were included in both the summer and winter surveys, respectively, referred to as Study Three. These values were within acceptable limits for scale reproducibility.

The fact that acceptable coefficients of scale reproducibility were obtained indicates that the food-group intakes so treated are scalable and possess a cumulative, as distinct from random, pattern. That is, there was a consistency to the order in which the food-group recommendations were fulfilled in the diets of this group of children. Verification of scalability meant that, in this population, an individual ranking at the top of the scale would have included in her or his dietary intake all the food-groups characteristic of the lower point on the scale.

From the scalogram patterns which emerged for Studies One, Two, and Three it can be seen that the meat and bread-cereal food-groups were most frequently consumed in amounts recommended by the Food Guide. It was also noted that the potato food-group moved down one

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TABLE XIV

SCALOGRAM PATTERN AND DISTRIBUTION OF CHILDRENS'  
FOOD-GROUP INTAKES ACCORDING TO FOOD SCALE SCORE  
BASED ON CANADA'S FOOD GUIDE RECOMMENDATIONS

SCALOGRAM PATTERN BY FOOD-GROUPS	FOOD SCALE SCORE	NUMBER OF SUBJECTS	PER CENT OF SUBJECTS
STUDY ONE			
MEAT	1	68	66.02
MEAT, BREAD-CEREAL	2	44	42.72
MEAT, BREAD-CEREAL, POTATO	3	30	29.13
MEAT, BREAD-CEREAL, POTATO, MILK	4	10	9.71
MEAT, BREAD-CEREAL, POTATO, MILK, FRUIT	5	4	3.88
MEAT, BREAD-CEREAL, POTATO, MILK, FRUIT, VEGETABLE	6	0	0.00
N = 103 Coefficient of Reproducibility = 0.90			
STUDY TWO			
BREAD-CEREAL	1	75	92.59
BREAD-CEREAL, MEAT	2	44	54.32
BREAD-CEREAL, MEAT, MILK	3	27	33.33
BREAD-CEREAL, MEAT, MILK, POTATO	4	12	14.81
BREAD-CEREAL, MEAT, MILK, POTATO, FRUIT	5	3	3.70
BREAD-CEREAL, MEAT, MILK, POTATO, FRUIT, VEGETABLE	6	0	0.00
N = 81 Coefficient of Reproducibility = 0.91			



TABLE XIV (continued)

SCALOGRAM PATTERN BY FOOD-GROUPS	FOOD SCALE SCORE	NUMBER OF SUBJECTS	PERCENT OF SUBJECTS
STUDY THREE			
SUMMER SURVEY			
MEAT	1	25	64.10
MEAT, POTATO	2	18	46.15
MEAT, POTATO, BREAD-CEREAL	3	12	30.77
MEAT, POTATO, BREAD-CEREAL, MILK	4	6	15.38
MEAT, POTATO, BREAD-CEREAL, MILK, FRUIT	5	3	7.69
MEAT, POTATO, BREAD-CEREAL, MILK, FRUIT, VEGETABLE	6	0	0.00
N = 39			
Coefficient of Reproducibility = 0.91			
STUDY THREE			
WINTER SURVEY			
BREAD-CEREAL	1	35	89.74
BREAD-CEREAL, MEAT	2	23	58.97
BREAD-CEREAL, MEAT, MILK	3	18	46.15
BREAD-CEREAL, MEAT, MILK, POTATO	4	8	20.51
BREAD-CEREAL, MEAT, MILK, POTATO, FRUIT	5	2	5.13
BREAD-CEREAL, MEAT, MILK, POTATO, FRUIT, VEGETABLE	6	0	0.00
N = 39			
Coefficient of Reproducibility = 0.92			

point on the food scale score from Study One to Study Two and this food-group moved down two points on the food scale score from the summer survey to the winter survey of Study Three, and thus it might be assumed that the decrease in consumption of the potato food-group during the winter months could be responsible for the shift in scalogram pattern. It was also observed from these data that the vegetable and fruit food-groups were most poorly consumed and none of the children consumed all the six food-groups with sufficient frequency to reach the highest food scale score of six.

## CONCLUSIONS

Obtaining valid information about the food intake of individuals is, at its best, a difficult task. No method now in use is free from errors or limitations (3). The validity of any method is influenced by the intelligence, motivation, and cooperation of the subject, by the technique and finesse of the investigator, and by the rapport between them (2). The choice of method of any one study depends on the number and characteristics of the subjects to be studied, the time element involved, the foods or nutrients to be evaluated, and the limitations of time and personnel (3). And finally, the group of subjects selected must be randomly sampled in order that the results be representative of the population.

There are certain limitations in this investigation which may have influenced the validity of the data obtained. Three-day food records were used to assess the childrens' intakes. It has been found that seven-day food records present a more accurate picture of dietary intake, as a time period of less than seven days may make dietary conditions appear better than they actually are (17, 29, 46). In this case the decision to use three-day food records was based on the time and personnel available to administer the food intake records.

It was not feasible in this investigation to have the food intake recorded by weighed amounts. Eppright (17) has stated that when records are kept by untrained people, it is probably as satisfactory to obtain information on food items by servings as by weighed amounts. It has also been noted by several investigators (5, 29, 46, 47) that estimation of intake is subject to errors of observation and memory, and to conscious or unconscious exaggeration or minimization of intake

by the subjects when under investigation. Thus, the apparent food intakes of the children studied in this investigation are not necessarily their absolute food intakes and should not be interpreted as such.

The criterion used to assess the food intakes of the children was Canada's Food Guide. Several researchers (22, 24) have noted that the use of a food guide to assess diets may produce biased information. Food guides provide a good nutritional foundation, but not a fully adequate diet, because guides suggest minimum servings rather than total food needed to round out meals and meet caloric needs (22, 23). It has also been noted that combinations of food other than those suggested in Canada's Food Guide, the Basic Seven, and the Basic Four can provide an adequate diet (22, 25, 28, 30). In particular, in a study done by McClinton and co-workers (26), Canada's Food Guide recommendations were found to be too rigid and partly unrealistic.

Consequently, in interpreting the data obtained in this investigation the studies limitations must be realized in order that the results are not interpreted beyond the scope of their dependability. However, if the information obtained is considered on its own merits and as it pertains to the subjects in this investigation, it is evident that many of the children who were studied were eating poorly.

The milk food-group intakes of many of the children were below Canada's Food Guide recommendations both before and after milk supplementation. Supplementation did increase the number of children who met Food Guide recommendations, but not to the extent anticipated.

The childrens' food-group intakes of vegetables, other than potatoes, and fruits were found to be particularly poor in both surveys. These two food-groups appear to warrant special consideration. The need to supplement the childrens' diets with these two food-groups is evident.

Intakes of the potato, bread-cereal, and meat food-groups appeared to be in closer agreement with Canada's Food Guide recommendations than the other food-groups considered. There appeared to be some seasonal variation in the potato food-group intake which might be attributed to availability, however, the bread-cereal food-group increase may have compensated for the potato food-group decrease, for both groups contributed a large proportion of calories to the childrens' diets. The meat food-group intake often met recommended levels and this was attributed to the availability and consumption of indigenous foods.

There appeared to be little change in food consumption between the first survey and the second survey, after the School Milk Program had been in operation for approximately eight months. School feeding alone does not necessarily assure improvement in the food habits of children and school feeding alone may be insufficient to overcome deficiencies in the child's home diet.

The Northern School Milk Program was designed to provide a milk supplement and nutrition education program for children attending kindergarten through Grade Four in communities "where poor nutritional habits are noted because of low socio-economic status and inaccessibility to a reasonably priced food supply"\*. Milk supplementation was planned on the supposition that it would provide needed nutrients to the childrens' diets. Preliminary study of the actual needs of the children was not undertaken and, therefore, it was not known that vegetables and fruits were the foods most lacking in the diets of the

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\* School Milk Program. 1974. Submission To The Health, Education And Social Policy Committee of Cabinet. Province of Manitoba.

children. It was found, however, that the milk intake of many children did improve with the supplementation provided, but the level of intake was lower than anticipated.

While the need for a school feeding program is clear, there is no reason for it to be a stereotyped program. In this particular population, the particular needs of the children could be used as a basis for planning. Fresh vegetables and fruits, or juices and dehydrated forms of these foods might prove effective in improving the childrens' diets in relation to the recommendations of Canada's Food Guide.

## SUGGESTIONS FOR FUTURE INVESTIGATIONS

It is now realized that an applied nutrition program is more likely to be successful if the objectives are clearly stated at the beginning and careful planning and evaluation are undertaken. The investigation reported pertains to program evaluation. Such evaluation involves a systematic process of collecting and analyzing data related to planning and executing a program and, especially to the measure of its progress, its results, and its side-effects. Evaluation should form an integral, continuous built-in part of any applied nutrition program.

Supplementary feeding of children at school has been an important part of many nutrition programs. However, in only a few instances have there been evaluation of the effect of feeding programs on the children involved. There are relatively few reports which give good baseline data on the effect of the supplementation.

Often the supposition of benefits from supplementary food programs is based on an assumption that the supplement will fill nutrient gaps in the total diet; but unless good evidence is obtained that the supplement as consumed leads to the ingestion on a daily basis of adequate amounts of required nutrients, this supposition is unfounded. Thus when any applied nutrition program is put into action baseline data must first be collected in order to state specific objectives, decide who the program is designed to help, describe the criteria which will be selected for measurement, and the techniques which will be used (19).

According to available literature, the most successful school feeding programs have been based on the nutritional needs of the children involved (37). Consequently, when initiating a supplementary feeding program it is important to know these needs. The most satisfactory methods for obtaining a picture of dietary habits is the dietary survey.

A dietary survey, properly conducted and interpreted, can provide specific information concerning the kinds and amounts of food in the diet, the dietary pattern, and the nutritional state of an individual or of a population group. Good dietary surveys are possible. They require the right interviewer, respondent, time, circumstance, and method - the who, when, where, and how - to produce the why (50).

The quality of data from a dietary survey depends greatly on the ability of both the interviewers and respondents and the understanding and care with which they perform their duties (2). It is important that good interviewers be employed to conduct a dietary survey. The interviewers may be persons trained and experienced in survey work or indigenous people who have been given intensive schooling in survey procedures for the particular study.

The selection of subjects to be surveyed should be representative of the population and care should be given to the apparent characteristics of the population involved. Statistical advice should be obtained on sampling procedures in setting up surveys and to determine the statistical significance of changes recorded by the respondents during subsequent surveys (19).

Once the sample has been chosen it is necessary to secure



the voluntary cooperation of individuals and/or families. The community must be prepared in advance, by means of public meetings or individual contracts, to receive survey personnel. The survey personnel, in return, should respect local customs and culture to foster survey participation.

It is important that the survey be carefully timed and the circumstances of the survey be carefully considered. The survey should be pretested and timed and ideally it should be no longer than absolutely necessary to accomplish its purpose. In deciding on the length of any survey it is essential that one consider the subjects, and the facilities available for collecting and evaluating the data obtained. The location of the survey and the atmosphere of the survey setting will also influence the data collected. Often an inadequate time allotment and a confused environment will lead to meaningless information.

The method involved in conducting a dietary survey is crucial to the purpose of the inquiry and dependent upon the information desired. In supplementary feeding programs for school children it is essential that one obtain information on dietary habits and nutritional status to formulate and evaluate the nutritional requirements for the population group and to measure the effectiveness of the program as a tool for improving the dietary intake and habits of the children.

It is important that a valid and reliable instrument be chosen to obtain survey information. Such an instrument might be a seven-day dietary record, a twenty-four hour dietary recall, or a comprehensive questionnaire, any of which, used in conjunction with

physical and biochemical measurements, would provide desired information on nutritional status.

The instrument chosen should be pretested on a group similar to that to whom it is to be administered in order that one may be sure that the questions are clear, are asked in the language of the people, and are asking what one intends to ask or obtaining the information one wishes. Pretesting may also help to increase the accuracy of results and to reduce the amount of work to be done.

Once the pretesting is done it is advisable to conduct a survey keeping in mind the previously mentioned factors which are important to its success. The next step is collection and evaluation of the survey data. It is general practice to measure the adequacy of the diet by comparing its nutritive composition with standard daily requirements and to evaluate other nutrition-related parameters to established standards and recommendations. However, it is important to remember that methods for evaluation must be practicable within the particular needs of the study as well as within available facilities.

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APPENDIX A  
RESEARCH INSTRUMENT



FOOD INTAKE RECORD

Instructions for keeping food intake record:

1. Record everything you eat or drink everyday for three days.
2. List the food or drink in the order taken. If nothing is eaten, write the word nothing.
3. In the column when, please write the time of day the food was eaten, for example, morning 9 a.m.
4. In the column where, please write the place the food was eaten, for example, at home or at school.
5. Use a separate line for each food or drink item.
6. In the amount column enter the amount in teaspoons, tablespoons, cups, ounces, or pounds.
7. In the description column enter the description of the item such as; raw, boiled, baked, etc.
8. For combination foods, list each item separately. For example, stew would be entered as, flour, meat, potatoes, etc.
9. Do not forget to include items added to or eaten with other foods such as lard or margarine on bannock, gravy, sauces, jam, sugar, canned milk, etc. Include candy, pop, and alcoholic beverages.

EXAMPLE:

<u>When</u>	<u>Where</u>	<u>Amount</u>	<u>Item</u>	<u>Description</u>
9 a.m.	home	1 cup	tea	boiled
9 a.m.	home	1 tbsp.	milk	canned
9 a.m.	home	1 tsp.	sugar	
12 a.m.	school	1 slice	bannock	baked
12 a.m.	school	1 cup	juice	orange



Reason for no response \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Date \_\_\_\_\_

Telephone \_\_\_\_\_

Usual language (at home)

English	_____
Cree	_____
Saulteaux	_____
Chippewyan	_____
French	_____
Other	_____

Relation (to head of family)

- 1 - head
- 2 - spouse
- 3 - child
- 4 - stepchild
- 5 - parent
- 6 - grandparent
- 7 - other relative
- 8 - not related

Employment

- 1 - full time
- 2 - housekeeper
- 3 - part time
- 4 - school
- 5 - seasonal
- 6 - unemployed
- 7 - retired
- 8 - other

Relation	Surname	Given Names	Birth Date Day/Mo./Yr.	Employment
_____	_____	_____	___/___/___	_____
_____	_____	_____	___/___/___	_____
_____	_____	_____	___/___/___	_____
_____	_____	_____	___/___/___	_____
_____	_____	_____	___/___/___	_____

What kind of stove do you use to cook your food?

- Electric stove \_\_\_\_\_
- Hot plate \_\_\_\_\_
- Gas stove \_\_\_\_\_
- Oil stove \_\_\_\_\_
- Wood stove \_\_\_\_\_
- Coal stove \_\_\_\_\_
- Other \_\_\_\_\_

Where do you keep food to stop it from spoiling?

- Electric refrigerator \_\_\_\_\_
- Ice box \_\_\_\_\_
- Root cellar \_\_\_\_\_
- Electric freezer \_\_\_\_\_
- Locker \_\_\_\_\_
- Other \_\_\_\_\_

Where do you do most of your shopping?

- Supermarket \_\_\_\_\_
- Co-op store \_\_\_\_\_
- The Bay Store \_\_\_\_\_
- Privately owned store \_\_\_\_\_
- Other \_\_\_\_\_

Who usually decides what food you buy?

- Woman \_\_\_\_\_
- Man \_\_\_\_\_
- Woman and man \_\_\_\_\_
- Children \_\_\_\_\_
- Other \_\_\_\_\_

Who usually prepares food?

- Woman \_\_\_\_\_
- Man \_\_\_\_\_
- Woman and man \_\_\_\_\_
- Children \_\_\_\_\_
- Other \_\_\_\_\_

Do you nurse your babies?

- Yes \_\_\_\_\_
- No \_\_\_\_\_

If you do not nurse your babies, what is the baby given instead of breast milk? \_\_\_\_\_

At what age do you stop nursing your babies? \_\_\_\_\_

When you stop nursing your babies do you continue to give them milk?  
\_\_\_\_\_

At what age do you start giving other food to your babies? \_\_\_\_\_



APPENDIX B  
CANADA'S FOOD-GUIDE

CANADA'S FOOD GUIDE\*  
 THESE FOODS ARE GOOD TO EAT. EAT THEM EVERYDAY FOR HEALTH  
 HAVE THREE MEALS EACH DAY

FOOD-GROUPS

SUBSTITUTIONS  
 (for 1 cup milk or 1 serving other groups)

MILK  
 CHILDREN (up to about 11 years) . . . . 2½ CUPS  
 ADOLESCENTS . . . . . 4 CUPS  
 ADULTS . . . . . 1½ CUPS  
 EXPECTANT AND NURSING MOTHERS . . . . . 4 CUPS

8 OZ. COTTAGE CHEESE  
 2 OZ. PROCESSED CHEESE  
 1 OZ. CHEDDAR CHEESE  
 8 OZ. YOGHURT  
 8 OZ. ICE CREAM

FRUIT  
 TWO SERVINGS OF FRUIT OR JUICE, INCLUDING A SATISFACTORY SOURCE OF VITAMIN C (ASCORBIC ACID) SUCH AS ORANGES, TOMATOES, AND VITAMINIZED APPLE JUICE.

½ CUP RAW, COOKED, CANNED FRUIT OR JUICE

VEGETABLES  
 ONE SERVING OF POTATOES  
 TWO SERVINGS OF OTHER VEGETABLES, PREFERABLY YELLOW OR GREEN, AND OFTEN RAW.

½ CUP RAW, COOKED, CANNED POTATO

½ CUP RAW, COOKED, CANNED VEGETABLE OR JUICE

BREAD-CEREAL  
 TWO SERVINGS OF BREAD (WITH BUTTER OR FORTIFIED MARGARINE) AND ONE SERVING OF WHOLE GRAIN CEREAL.

¾ CUP PORRIDGE  
 1 CUP CEREAL FLAKES  
 1 SLICE BREAD  
 ¾ CUP SPAGHETTI  
 ¾ CUP MACARONI

MEAT  
 TWO SERVINGS (ONE AND ONE-HALF SERVINGS FOR CHILDREN UNDER 10 YEARS) OF MEAT, FISH, OR POULTRY. EAT LIVER OCCASIONALLY. EGGS, CHEESE, DRIED BEANS OR PEAS MAY BE USED IN PLACE OF MEAT. IN ADDITION, EGGS AND CHEESE AT LEAST THREE TIMES A WEEK.

3 - 4 OZ. MEAT, FISH OR POULTRY  
 2 EGGS  
 2 WIENERS  
 1 CUP BAKED BEANS  
 4 TBSP. PEANUT BUTTER

VITAMIN D: 400 INTERNATIONAL UNITS, FOR A GROWING PERSONS AND EXPECTANT AND NURSING MOTHERS

\* Approved by the Canadian Council on Nutrition. 1961. Nutrition Division, Department of National Health and Welfare, Ottawa.

APPENDIX C  
SUPPLEMENTARY INFORMATION DATA



## SUPPLEMENTARY INFORMATION DATA

## Part 1

Distribution of Responses to Supplementary Information Questions on the Methods of Cooking, Storage, Purchase, and Preparation of Food by Participant-Households.

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	Respondents	
	No.	%
<hr/>		
What kind of stove do you use to cook your food?		
Electric Stove	34	40.00
Hot Plate	3	3.53
Gas Stove	17	20.00
Oil Stove	0	0.00
Wood Stove	18	21.18
Coal Stove	0	0.00
Combination of two or more of the above	12	14.12
No Response	1	1.17
TOTAL	85	100.00

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	Respondents	
	No.	%
<hr/>		
Where do you keep your food to stop it from spoiling?		
Electric Refrigerator	29	34.12
Ice Box	1	1.17
Root Cellar	2	2.35
Electric Freezer	7	8.24
Locker	3	3.53
Combination of two of the above	26	30.59
No Response	17	20.00
TOTAL	85	100.00

Where do you do most of your shopping?

Supermarket	4	4.71
Co-op Store	18	21.18
The Bay Store	19	22.35
Privately Owned Store	33	38.82
Combination of two of the above	3	3.53
No Response	8	9.41
TOTAL	85	100.00

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	Respondents	
	No.	%
<hr/>		
Who usually decides what food you buy?		
Woman	55	64.71
Man	0	0.00
Woman and Man	26	30.59
Children	0	0.00
Combination of two of the above	3	3.53
No Response	1	1.17
TOTAL	85	100.00

## Who usually prepares the food?

Woman	74	87.06
Man	0	0.00
Woman and Man	10	11.77
Children	0	0.00
No Response	1	1.17
TOTAL	85	100.00

---

## Part 11

Distribution of Responses to Supplementary Information Questions on  
Infant Feeding Practices.

	Respondents	
	No.	%
Do you nurse your babies?		
Yes	23	30.67
No	44	58.66
Some	6	8.00
No Response	2	2.67
TOTAL	75	100.00
If you do not nurse your babies, what is the baby given instead of breast milk?		
Evaporated Milk	28	37.33
Whole Milk	5	6.67
Evaporated and Whole Milk	3	4.00
Partly Skimmed Milk	1	1.33
SMA	1	1.33
Partly Skimmed Milk and SMA	1	1.33
Skimmed Milk	1	1.33
No Response	35	46.68
TOTAL	75	100.00

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	Respondents	
	No.	%
<hr/>		
At what age do you stop nursing your babies?		
Less than 3 months	5	6.67
3 months to 6 months	4	5.33
6 months to 9 months	6	8.00
9 months to 12 months	7	9.33
12 months to 18 months	12	16.00
18 months to 24 months	5	6.67
24 months	1	1.33
No Response	35	46.67
TOTAL	75	100.00

When you stop nursing your babies do you continue to give them milk?

Yes	45	60.00
No	3	4.00
No Response	27	36.00
TOTAL	75	100.00

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	Respondents	
	No.	%
<hr/>		
At what age do you start giving other food to your babies?		
4 days to 1 month	10	13.33
1 month to 2 months	9	12.00
2 months to 3 months	9	12.00
3 months to 4 months	11	14.67
4 months to 5 months	6	8.00
5 months to 6 months	0	0.00
6 months to 9 months	17	22.67
9 months to 12 months	1	1.33
12 months to 18 months	6	8.00
18 months to 24 months	1	1.33
No Response	5	6.67
TOTAL	75	100.00

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APPENDIX D

FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY ONE

FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY ONE

FOOD-GROUP	QUANTITY																				Total	
	0	0 to ½	½ to 1	1 to 1½	1½ to 2	2 to 2½	2½ to 3	3 to 3½	3½ to 4	4 to 4½	4½ to 5	5 to 5½	5½ to 6	6 to 6½	6½ to 7	7 to 7½	7½ to 8	8 to 8½	8½ to 9	9 to 9½		9½ to 10
MILK (cups)	no. 6	10	19	9	7	15	13	12	5	1	0	2	1	0	1	0	0	0	0	2	0	103
	% 5.83	9.71	18.45	8.74	6.80	14.56	12.62	11.65	4.85	0.97	0.00	1.94	0.97	0.00	0.97	0.00	0.00	0.00	0.00	1.94	0.00	100.00
FRUIT (servings)	no. 26	5	15	26	6	11	3	3	0	5	1	0	0	1	0	1	0	0	0	0	0	103
	% 25.25	4.85	14.56	25.25	5.83	10.68	2.91	2.91	0.00	4.85	0.97	0.00	0.00	0.97	0.00	0.97	0.00	0.00	0.00	0.00	0.00	100.00
POTATO (servings)	no. 15	13	25	30	7	6	2	4	0	1	0	0	0	0	0	0	0	0	0	0	0	103
	% 14.56	12.62	24.27	29.13	6.80	5.83	1.94	3.88	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
VEGETABLE (servings)	no. 39	25	19	14	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103
	% 37.87	24.27	18.45	13.59	4.85	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
BREAD-CEREAL (servings)	no. 0	0	1	2	17	13	8	15	8	7	3	10	7	7	0	2	0	0	1	1	1	103
	% 0.00	0.00	0.97	1.94	16.50	12.62	7.77	14.56	7.77	6.80	2.91	9.71	6.80	6.80	0.00	1.94	0.00	0.00	0.97	0.97	0.97	100.00
MEAT (servings)	no. 1	2	10	22	22	24	9	7	2	4	0	0	0	0	0	0	0	0	0	0	0	103
	% 0.97	1.94	9.71	21.36	21.36	23.30	8.74	6.80	1.94	3.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
SWEETS (incidence)	no. 43	0	0	50	0	8	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	103
	% 41.75	0.00	0.00	48.54	0.00	7.77	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00



APPENDIX E

FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY TWO

## FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY TWO

FOOD GROUP	QUANTITY																					Total					
	0	0 to ½	½ to 1	1 to 1½	1½ to 2	2 to 2½	2½ to 3	3 to 3½	3½ to 4	4 to 4½	4½ to 5	5 to 5½	5½ to 6	6 to 6½	6½ to 7	7 to 7½	7½ to 8	8 to 8½	8½ to 9	9 to 9½	9½ to 10		10 to 10½	10½ to 11			
MILK (cups)	no. %	0 0.00	3 3.70	6 7.41	6 7.41	10 12.35	13 16.05	24 29.63	6 7.41	5 6.17	6 7.41	1 1.23	1 1.23	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00		
FRUIT (servings)	no. %	25 30.67	9 11.11	8 9.88	17 30.60	5 6.17	5 6.17	2 2.47	3 3.70	5 6.17	1 1.23	0 0.00	1 1.23	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00	
POTATO (servings)	no. %	20 24.69	11 13.58	21 25.93	16 19.75	2 2.47	10 12.35	1 1.23	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00	
VEGETABLE (servings)	no. %	27 33.33	25 30.67	11 13.58	14 17.28	2 2.47	2 2.47	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00	
BREAD-CEREAL (servings)	no. %	0 0.00	0 0.00	0 0.00	1 1.23	1 1.23	0 0.00	4 4.94	20 24.69	2 2.47	17 30.00	10 12.35	7 8.64	1 1.23	6 7.41	3 3.70	6 7.41	2 2.47	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 1.23	81 100.00
MEAT (servings)	no. %	0 0.00	0 0.00	10 12.35	22 27.16	27 33.33	11 13.58	7 7.41	6 6.17	5 6.17	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00
SWEETS (incidence)	no. %	32 39.51	0 0.00	0 0.00	41 50.62	0 0.00	7 8.64	0 0.00	1 1.23	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	81 100.00

APPENDIX F

FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY THREE

### FOOD-GROUP INTAKE DISTRIBUTION OF SUBJECTS IN STUDY THREE

FOOD GROUP		QUANTITY	0																		Total			
			0 to 1/2	1/2 to 1	1 to 1 1/2	1 1/2 to 2	2 to 2 1/2	2 1/2 to 3	3 to 3 1/2	3 1/2 to 4	4 to 4 1/2	4 1/2 to 5	5 to 5 1/2	5 1/2 to 6	6 to 6 1/2	6 1/2 to 7	7 to 7 1/2	7 1/2 to 8	8 to 8 1/2	8 1/2 to 9		9 to 9 1/2		
MILK (cups)	SUMMER SURVEY	no.	2	5	7	2	2	4	5	6	1	0	0	2	1	0	0	0	0	0	0	0	2	39
	%	5.13	12.82	17.95	5.13	5.13	10.26	12.82	15.38	2.56	0.00	0.00	5.13	3.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	100.00	
FRUIT (servings)	WINTER SURVEY	no.	0	0	3	4	3	5	13	3	3	3	1	1	0	0	0	0	0	0	0	0	35	
	%	0.00	0.00	7.69	10.26	7.69	12.83	33.34	7.69	7.69	7.69	2.56	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
POTATO (servings)	SUMMER SURVEY	no.	10	2	7	10	1	4	0	2	0	1	0	0	0	1	0	0	0	0	0	0	39	
	%	25.64	5.13	17.56	25.64	2.56	10.26	0.00	5.13	0.00	2.56	0.00	2.56	0.00	0.00	2.56	0.00	0.00	0.00	0.00	2.56	0.00	100.00	
VEGETABLE (servings)	WINTER SURVEY	no.	11	4	4	6	4	3	1	1	4	0	0	1	0	0	0	0	0	0	0	0	39	
	%	28.21	10.26	10.26	15.38	10.26	7.69	2.56	2.56	10.26	0.00	0.00	10.26	0.00	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
BREAD-CEREAL (servings)	SUMMER SURVEY	no.	5	3	8	12	3	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	39	
	%	12.82	7.68	20.52	30.78	7.69	7.69	2.56	2.56	0.00	2.56	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
MEAT (servings)	WINTER SURVEY	no.	11	2	10	9	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	28.21	5.13	25.64	23.08	0.00	15.38	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
SWEETS (incidence)	SUMMER SURVEY	no.	16	9	5	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	41.02	23.08	12.82	17.95	5.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
MILK (cups)	WINTER SURVEY	no.	11	13	4	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	28.21	33.33	10.26	23.08	2.56	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
FRUIT (servings)	SUMMER SURVEY	no.	0	0	1	1	8	6	3	5	3	4	0	2	2	2	2	1	0	0	0	1	39	
	%	0.00	0.00	2.56	2.56	20.52	15.39	7.69	12.82	7.69	10.26	0.00	5.13	5.13	5.13	0.00	2.56	0.00	0.00	0.00	0.00	2.56	100.00	
POTATO (servings)	WINTER SURVEY	no.	0	0	0	1	1	0	2	13	1	7	4	4	0	3	0	2	1	0	0	0	39	
	%	0.00	0.00	0.00	2.56	2.56	0.00	5.13	33.34	2.56	17.95	10.26	10.26	0.00	7.69	0.00	5.13	2.56	0.00	0.00	0.00	0.00	100.00	
VEGETABLE (servings)	SUMMER SURVEY	no.	1	1	6	6	10	6	5	3	1	0	0	0	0	0	0	0	0	0	0	0	39	
	%	2.56	2.56	15.39	15.39	25.64	15.39	12.82	7.69	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
BREAD-CEREAL (servings)	WINTER SURVEY	no.	0	0	3	9	14	8	2	3	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	0.00	0.00	7.69	23.08	35.90	20.51	5.13	7.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
MEAT (servings)	SUMMER SURVEY	no.	14	0	23	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	35.90	0.00	0.00	58.97	0.00	5.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	
SWEETS (incidence)	WINTER SURVEY	no.	14	0	0	20	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	39	
	%	35.90	0.00	0.00	51.28	0.00	10.26	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	

APPENDIX G  
GUTTMAN'S COEFFICIENT OF REPRODUCIBILITY

## GUTTMAN'S COEFFICIENT OF REPRODUCIBILITY

The coefficient of reproducibility represents the degree of accuracy with which one is able to reproduce the responses of individuals if one knows in which grouping of respondents they belong. It may be calculated using the following formula:

$$\text{COEFFICIENT OF REPRODUCIBILITY} = \frac{1 - \text{NUMBER OF ERRORS}^*}{\text{NUMBER OF QUESTIONS} \times \text{NUMBER OF RESPONDENTS}}$$

\* the number of times the responses vary from simple order

According to Guttman there is evidence of scalability if this coefficient is greater than or equal to 0.90.