nutrition canada

national survey

Nutrition:
A National Priority

NUTRITION

A NATIONAL PRIORITY

A REPORT BY NUTRITION CANADA

TO THE DEPARTMENT OF NATIONAL HEALTH AND WELFARE

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The Honourable Marc Lalonde, P.C., M.P.,
Minister of National Health and Welfare,
Ottawa, Ontario.

Dear Mr. Lalonde:

On behalf of the many who worked on and participated in Nutrition Canada, I take pleasure in submitting to you the report of the Nutrition Canada National Survey.

You and your Department have shown initiative in following up the recommendation of the Canadian Council on Nutrition for a comprehensive nutrition survey, and in supporting us through the years of preparation and implementation. Our data are as up-to-date as possible and will provide a solid foundation for nutrition programs in Canada. With the continual changes in life styles, it is extremely important now, and in the future, to be able to assess nutritional health, both on an individual and on a collective basis.

Nutrition Canada exemplifies collaborative work between governments in the interest of making vital information available to the public, the health professional community and industry. Canadians have good reason to be proud of this achievement.

The challenge lies ahead: information gathering was only the first step. It is hoped that the momentum now developed will continue.

Respectfully,

Z.I. Sabry,
National Coordinator.

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CHAPTER 1 - NUTRITION CANADA SCOPE AND IMPACT

Canadians need to know their nutritional status because nutritional health is fundamental to normal general health and the prevention or reduction in the severity of disease. The "need to know" has steadily increased over tne past decade because of the tremendous changes in the nature of the national food supply and in the eating habits and life style of Canadians. Consumption of fresh produce and of foods subjected to simple preservative processes has steadily declined and been replaced by foods shipped over long distances, stored for long periods, and frequently processed by the extremely complex methods developed by modern food technology. Our life style centers more on urban living with increased frequency of eating away from home, less chance for physical activity and more time for leisure.

There need not be any inherent undesirable nutritional consequences to these changes, because modern science and technology should be able to cope with the maintenance and improvement of our nutritional health. The problem has been the lack of understanding of the nutritional status of the Canadian population in the first place and of the impact of our changing diet and life style on our nutritional health. Once nutritional status has been determined, the information can be used as a starting point and scientific base for efforts to encourage people to improve their nutrition where needed and to continuously monitor for changes in the future.

The objective of Nutrition Canada is to provide a sound body of precise scientific information on the nutritional status of the Canadian population. This information should be the basis for planning future informational, educational, public health and welfare programs, for further evolution of Food and Drug Regulations affecting

the nutritional quality of the national food supply, and for the identification of problem areas where existing knowledge is inadequate and warrants further research. To accomplish this objective, Nutrition Canada was designed:

a. To determine the prevalence of nutritional diseases in the Canadian population, on the basis of: geographical location (provincial and regional); type of community (metropolitan, urban or rural); seasons; age and sex; pregnancy; and income levels. Prevalence determinations are based on assessment of: clinical evidence; anthropometric measurements; biochemical determinations on blood and urine samples; and dietary intakes of each nutrient.

b. To identify and determine the quantity of food items consumed by the Canadian public. This provides, in addition to the nutrient intake of each individual, an understanding of food consumption patterns across Canada and the degree of variation in such patterns; the re-evaluation of food enrichment and fortification policies and programs; and the estimation of consumption of substances such as food additives and pesticide residues.

In brief, evolution of Nutrition Canada began in 1964, when the Canadian Council on Nutrition recommended that a comprehensive nutrition survey be undertaken. The Dominion Council of Health supported this recommendation. The Food and Drug Directorate (now restructured into the Health Protection Branch, Health and Welfare Canada) then examined the feasibility of such a survey on a national scale. The concept received the support of health officials at provincial and federal levels of government and within the nutrition and related scientific communities in the nation. Program content and funding approval was granted in August 1969.

A headquarters staff was organized, and a national coordinator and regional directors appointed. The national coordinator directed the organization of the study. A series of committees defined the scope of the survey; the over-all survey design and population sampling; the specific methods for collecting dietary, clinical, dental and biochemical data; the standards to be used for data interpretation; and the actual data interpretation itself. (See Appendix A for lists of the many individuals involved in these activities).

Regional directors and provincial departments of health throughout the country played a major role in organizing the field operations which commenced in September 1970 and were completed in December 1972. Three teams conducted all the field work. Local public health units were extremely helpful at the community level in assuring the cooperation of the individuals selected. The entire survey represents an outstanding example of federal-provincial coordination and cooperation at all levels. Since the completion of the field and laboratory work, the Report Preparation Group, the Data Processing Staff and the Committee on Data Interpretation have been working to assemble, analyze, and interpret the results. This report is the first completed output from these efforts.

Nutrition Canada is the first national nutrition survey conducted in Canada. As far as is known, in terms of its scope and detail, it is the most comprehensive survey ever conducted of the nutritional status of the population of a country. It involved the collection of approximately 28 million individual pieces of information. Over 19 thousand individuals of all ages had medical, dental and anthropometric examinations, a dietary interview and the vast majority of these provided blood and urine samples for analysis.

This initial report is concerned with the over-all national situation in terms of the prevalence of nutritional abnormalities. It presents separately the findings in the total provincial populations, the

Indians and the Eskimos but otherwise does not describe observed differences between provinces and regions. It does not describe food consumption patterns in terms of individual foods or classes of foods, and does not provide a detailed presentation of the distribution patterns of the various biochemical and dietary parameters measured. However, this report includes a section (Appendix B) on the ecological factors which might affect the nutritional status of Canadians. It discusses the population characteristics, the health services available and the food supply in Canada.

During the first half of 1974, 12 additional volumes will be published simultaneously (one for each province, one for Indians on reserves and one for Eskimos in settlements), providing the prevalence of abnormalities as in this national report, and the detailed distribution patterns of biochemical and dietary parameters. Subsequent to the publication of this initial series of volumes, attention will be directed to the preparation and publication of separate reports one by one on special aspects of the survey including dental health and disease status; anthropometric status; food consumption patterns; transient youth status; and many cross-correlations of clinical, biochemical and dietary parameters.

When the Nutrition Canada reports are completed, Canadians will have a sound baseline for the assessment of the significance of nutrition in our life style in the future.

CHAPTER 2 - SAMPLE DESIGN AND RESPONSE

Nutrition Canada designed the survey to provide estimates of nutritional characteristics in the following populations:

1. the residents of the 10 provinces, excluding Indians in bands and persons living in institutions and military camps;

2. Indians in bands on reserves and crown lands in the provinces and Territories;

3. Eskimos living in four settlements in the Territories.

Separate sample designs were developed for each of these population groups.

2.1 POPULATION IN THE PROVINCES

Sample Design

Nutrition Canada designed this sample to assess nutritional status according to region, population type, income and season. The sampling allowed for representation from the following five regions:

1. Atlantic (Newfoundland, Prince Edward Island, New Brunswick and Nova Scotia);

2. Quebec;

3. Ontario;

4. Prairies (Manitoba, Saskatchewan and Alberta);

5. British Columbia.

Enumeration Areas (EA's), i.e., Statistics Canada census units of approximately 150 households, formed the basis of stratification within the regions. The 1966 census was used to stratify EA's into three population types: *metropolitan* (over 100,000 persons), *urban* (between 5,000 and 100,0000 persons), and *rural* (less than 5,000 persons).

To ensure representation of families with different incomes, Nutrition Canada further stratified the EA's into two income levels, using 1961 census data. *Low income* areas were those with average income less than a defined level for family size. *Other income* areas were those with an average income more than a defined level for family size.

The defined levels were as follows:

Family Size	Income Per Annum
1 person	$1,500
2 persons	$2,500
3 persons	$3,000
4 persons	$3,500

with increments of $500 for each additional person.

This stratification by income reflected poverty line figures defined by the Economic Council of Canada and expressed in the

dollar's purchasing power of 1961. This was necessary since the sample design was based on the 1961 census data.

The design provided for two seasonal strata so that the effect of seasonal variations in food availability and selection, on nutritional characteristics, could be evaluated. The seasonal strata (January to May and June to December) corresponded to the parts of the year during which the effects of *winter* or *summer* were expected to influence food habits.

Nutrition Canada selected the sample (i.e., the participants in the survey) in three stages. Initially, a sample of EA's was selected according to the basic strata. The selection for population type, made in the proportion 5:3:2, corresponded to the ratios of the population in metropolitan, urban and rural areas in Canada's larger regions. Approximately eight EA's from each population type were selected from a region, a total selection of 80 EA's (40 metropolitan, 24 urban, and 16 rural). The selection of EA's provided, as well, equal representation from areas of low income and areas of other income. Two matched sets of EA's were identified and used for the seasonal strata. Table 2-1 gives a summary of the number of EA's selected for region, population type, income and season. The total number of EA's selected for the five regions was 403. Table 2-2 identifies the metropolitan areas selected.

TABLE 2-1 **IDENTIFICATION BY STRATA OF THE ENUMERATION AREAS SELECTED FOR THE NUTRITION CANADA SURVEY OF THE 10 PROVINCES**

		ATLANTIC						PRAIRIES				
SEASON[a]	INCOME	NFLD.	P.E.I.	NOVA SCOTIA	N.B.	QUEBEC	ONTARIO	MANITOBA	SASK.	ALBERTA	B.C.	AREA TYPE
I	Low	2	0	2	2	10	10	2	1	2	10	
I	Other	2	0	2	2	10	10	2	2	2	10	METRO
II	Low	2	0	2	2	9	10	2	3	2	10	> 100,000
II	Other	2	0	2	2	10	10	2	2	2	10	PERSONS
Provincial Total		**8**	**0**	**8**	**8**	**39**	**40**	**8**	**8**	**8**	**40**	
Regional Total			**24**			**39**	**40**		**24**		**40**	
I	Low	2	2	2	2	4	6	2	4	2	6	
I	Other	2	2	2	2	6	6	2	1	2	6	URBAN
II	Low	2	2	2	2	8	6	2	0	2	6	5,000-100,000
II	Other	2	2	2	2	7	6	2	3	2	6	PERSONS
Provincial Total		**8**	**8**	**8**	**8**	**25**	**24**	**8**	**8**	**8**	**24**	
Regional Total			**32**			**25**	**24**		**24**		**24**	
I	Low	2	2	2	2	4	4	2	2	2	4	
I	Other	2	2	2	2	4	4	2	2	2	4	RURAL
II	Low	2	2	2	2	6	4	2	2	2	4	< 5,000
II	Other	2	2	2	2	5	4	2	2	2	4	PERSONS
Provincial Total		**8**	**8**	**8**	**8**	**19**	**16**	**8**	**8**	**8**	**16**	
Regional Total			**32**			**19**	**16**		**24**		**16**	

Regional Totals: Metro + Urban + Rural	**88** Atlantic	**83** Que.	**80** Ont.	**72** Prairie	**80** Pacific

TOTAL ENUMERATION AREAS SELECTED **403**

[a]Season I was winter, Season II was summer for all regions except British Columbia and Ontario where the sequence was reversed.

TABLE 2-2

IDENTIFICATION BY STRATA OF THE METROPOLITAN ENUMERATION AREAS SELECTED FOR THE NUTRITION CANADA SURVEY OF THE 10 PROVINCES

Region	Province	Metropolitan Area	Season I[a] Income		Season II[a] Income	
			Low	Other	Low	Other
Atlantic	Newfoundland	St. John's	2	2	2	2
	Prince Edward Is.		–	–	–	–
	Nova Scotia	Halifax	2	2	2	2
	New Brunswick	St. John	2	2	2	2
		Total	6	6	6	6
Quebec	Quebec	Quebec City	2	2	2	2
		Montreal	8	8	7	8
		Total	10	10	9	10
Ontario	Ontario	Toronto	2	2	2	2
		Hamilton	2	2	2	2
		Ottawa	2	2	2	2
		Sudbury-Windsor	2	2	2	2
		London-Kitchener	2	2	2	2
		Total	10	10	10	10
Prairie	Manitoba	Winnipeg	2	2	2	2
	Saskatchewan	Regina-Saskatoon	1	2	3	2
	Alberta	Edmonton-Calgary	2	2	2	2
		Total	5	6	7	6
Pacific	British Columbia	Vancouver	8	8	8	8
		Victoria	2	2	2	2
		Total	10	10	10	10
		Total Canada	**41**	**42**	**42**	**42**

[a]Season I was winter, Season II was summer for all regions except British Columbia and Ontario where the sequence was reversed.

The second stage of sampling involved selection of households. Approximately one month in advance of the survey, Statistics Canada prepared a list of all households within each EA selected, and drew a random sample.

The third stage involved selection of persons within households. Table 2-3 outlines the 10 age-sex categories used to classify members of the selected households. The survey included a random sample from each category so that all ages and both sexes were adequately represented.

TABLE 2-3 AGE-SEX CATEGORIES FOR THE NUTRITION CANADA SURVEY OF THE POPULATION OF THE 10 PROVINCES

Sex	Years of Age
Males and Females	0 through 4
Males and Females	5 through 9
Males	10 through 19
Females	10 through 19
Males	20 through 39
Females	20 through 39
Males	40 through 64
Females	40 through 64
Males	65+
Females	65+

The survey design required that 48 people participate from a single EA. Thus, for the 403 EA's, the target was 19,344 persons. The Statistics Canada enumerators selected an additional 12 to 15 persons from each EA to compensate for anticipated non-response. Participants selected in the above manner constituted a probability sample.

In addition, the plan provided for the examination and interview of 1,000 women in the last trimester of pregnancy. Local health units referred these women to the Nutrition Canada clinic. Because of the mode of selection of these individuals, they were not intended to constitute a probability sample.

Table 2-4 gives the total number of persons selected for the sample.

TABLE 2-4 THE TOTAL NUMBER OF PERSONS SELECTED FOR THE NUTRITION CANADA SURVEY OF THE 10 PROVINCES

Physiological Group	Persons Selected
0-4 M & F	2,459
5-9 M & F	2,472
10-19 M	2,891
10-19 F	2,884
20-39 M	3,045
20-39 F	3,110
40-64 M	3,071
40-64 F	3,123
65+ M	2,146
65+ F	2,131
Total	27,332
Pregnant Women	894

Response

The survey was conducted between October 1970 and October 1972. Table 2-5 gives, for each physiological group, population type and income level in the sample design, the total number of persons from the 10 provinces who attended the survey clinics. These figures refer to those persons selected for the survey by probability sampling.

Forty-six per cent of those persons initially selected attended the survey clinics.

In general, women had a higher rate of response than men, except for those over 65 years of age. Persons 20 and over had lower response rates than those under 20. Men 20 through 39 had the lowest response rates, while children 5 through 9 had the highest.

The response rates were highest among those living in rural areas and lowest among those in metropolitan areas. There was no consistent difference in the response rates of low income and other income areas.

TABLE 2-5

THE TOTAL NUMBER OF SELECTED PERSONS FROM THE 10 PROVINCES ATTENDING THE NUTRITION CANADA CLINIC

Physiological Group	METROPOLITAN		URBAN		RURAL		Total Attended
	Other Income	Low Income	Other Income	Low Income	Other Income	Low Income	
0-4 yrs M & F	260	215	216	245	197	198	**1,331**
5-9 yrs M & F	269	224	237	263	209	213	**1,415**
10-19 yrs M	272	256	266	250	215	219	**1,478**
10-19 yrs F	274	238	267	294	223	239	**1,535**
20-39 yrs M	221	164	165	180	173	142	**1,045**
20-39 yrs F	283	214	229	237	226	207	**1,396**
40-64 yrs M	228	192	239	215	196	191	**1,261**
40-64 yrs F	290	224	267	257	259	252	**1,549**
65 yrs + M	143	131	160	170	150	172	**926**
65 yrs + F	143	136	154	167	117	142	**859**
Total	**2,383**	**1,994**	**2,200**	**2,278**	**1,965**	**1,975**	**12,795**
Pregnant Women	**167**	**154**	**182**	**156**	**129**	**106**	**894**

2.2 INDIANS IN BANDS ON RESERVES AND CROWN LANDS

Sample Design

Nutrition Canada designed the sample of Indians to assess nutritional status according to region, distance from urban centres, and cultural area. The Indians were grouped into six regions, as follows:

1. Maritime (Prince Edward Island, New Brunswick, and Nova Scotia);

2. Quebec;

3. Ontario;

4. Prairie (Manitoba, Saskatchewan and Alberta);

5. British Columbia;

6. Yukon and Northwest Territories.

Within each region, Nutrition Canada identified areas close to urban centres and areas remote from urban centres. Generally, close areas were in the southern parts of the provinces; remote areas were in the north. All areas in the Maritimes were close to urban centres; all in the Territories were remote.

Indian and Northern Affairs defines six Indian culture areas in Canada: Algonkian, Iroquoian, Mackenzie River, Plains, Plateau, and Pacific. In recognition of cultural differences Nutrition Canada selected bands representative of each culture area.

Regions, distance from urban centres, and cultural groups combined produced 13 strata.

Nutrition Canada selected the sample in two stages: bands from each stratum; and members from the selected bands.

Indian and Northern Affairs supplied lists of bands for each of the 13 strata. Bands of fewer than 150 persons were combined with a nearby band in the same stratum to form a single sampling unit. Thus each unit contained a minimum of 150 people. At least two such units were selected in each stratum. In all, 29 band units participated in the survey.

Indian and Northern Affairs supplied a list of members of each selected band. A sample of participants was selected from each band. The sampling procedure insured that all the age-sex categories shown in Table 2-6 would be represented equally. The oldest age group for the Indian sample is 55 years and over, rather than 65 years and over, as in the main survey. This recognizes that the Indian population has a lower proportion of persons 65 years of age and over.

TABLE 2-6 AGE-SEX CATEGORIES FOR THE NUTRITION CANADA SURVEY OF INDIANS

Sex	Years of Age
Males and Females	0 through 4
Males and Females	5 through 9
Males	10 through 19
Females	10 through 19
Males	20 through 39
Females	20 through 39
Males	40 through 54
Females	40 through 54
Males and Females	55 +

The target sample size was 80 persons from each of the 29 band units, a total of 2,320 persons. To compensate for anticipated non-response, Nutrition Canada selected additional persons from each band unit. Participants selected in the above manner constituted a probability sample.

The sample included as well a small number of women in the last trimester of pregnancy selected from each band by the local health authorities. Because of the mode of selection of these individuals, they were not intended to constitute a probability sample.

Response

The Indian survey was conducted between September 1971 and September 1972. Table 2-7 gives the number of persons selected for the survey and the number of persons who attended the clinic.

The method of selection used for Indians was different from that for the other surveys. A large number of those selected could not be contacted so that only 30% of the persons initially selected participated in the survey.

Women had a higher response rate than men. Men 20 through 39 years of age and pre-school children had the lowest response rates. The highest rates were among children 5 through 9 years of age and among persons over the age of 55.

TABLE 2-7 THE TOTAL NUMBER OF INDIANS SELECTED FOR THE NUTRITION CANADA SURVEY AND THE TOTAL NUMBER OF INDIANS WHO ATTENDED THE CLINIC

Physiological Group	Total[a] Selected	Total[b] Attended
0-4 M & F	473	211
5-9 M & F	373	253
10-19 M	478	202
10-19 F	474	265
20-39 M	507	136
20-39 F	509	197
40-54 M	425	133
40-54 F	385	179
55+ M	423	116
55+ F		114
Total	4,047	1,806
Pregnant Women		59

[a]Includes persons who could not be contacted.
[b]Includes volunteers who were not selected.

2.3 ESKIMOS IN SETTLEMENTS

Sample Design

Nutrition Canada designed this sample to assess the nutritional status of Eskimos living in four settlements in the Northwest Territories: Eskimo Point, Pelly Bay, Frobisher Bay, and Coppermine. These settlements are major centres of Eskimo population. Small settlements and sparsely-inhabited areas of the Territories were impractical to survey. One hundred persons from each settlement were to be surveyed, a total target population of 400.

Local health authorities provided lists of Eskimos living in each settlement. The sampling used the same age-sex categories as the Indian survey (Table 2-6).

Persons were selected from each category so that all age-sex groups were similarly represented. Participants selected in the above manner constituted a probability sample from the four settlements.

In addition, the sample included a small number of women in the last trimester of pregnancy selected from each settlement by the local health authorities. Because of the mode of selection of these individuals, they were not intended to constitute a probability sample.

Response

The survey of Eskimos was conducted from April to June 1972. Table 2-8 gives the number of persons selected for the survey and the number of persons who attended the clinics.

Sixty per cent of those persons initially selected attended the survey.

Generally, women showed a higher response rate than men. Persons 40 years of age and older had higher response rate than younger people.

TABLE 2-8 THE TOTAL NUMBER OF ESKIMOS SELECTED FOR THE NUTRITION CANADA SURVEY AND THE TOTAL NUMBER OF SELECTED ESKIMOS WHO ATTENDED THE CLINIC

Physiological Group	Total Selected	Total Attended
0-4 M & F	74	37
5-9 M & F	66	40
10-19 M	71	38
10-19 F	63	31
20-39 M	72	34
20-39 F	70	40
40-54 M	61	39
40-54 F	59	39
55+ M	65	29
55+ F		19
Total	601	346
Pregnant Women		20

CHAPTER 3 - SURVEY PROCEDURES

Nutrition Canada convened Expert Groups (Appendix A provides lists of members) to develop valid and practical procedures for the assessment of nutritional status according to the objectives of the survey. The survey procedures, i.e., clinical, dental and anthropometric examinations; dietary interviews; and blood and urine analyses, provided a comprehensive search of each individual's health and nutritional status.

Survey teams of physicians, dentists, nurses, nutritionists, dental hygienists, laboratory technologists and support staff travelled across Canada surveying in each Enumeration Area selected. In Ottawa, Nutrition Canada operated a laboratory specially equipped for analyses of blood and urine samples and a data processing centre which edited, and processed by computers the data from the survey team and the laboratory.

Specialists in various components of the survey operation trained the team members in the survey procedures. Training stressed standardization in collecting, interpreting and recording data. Frequent checks during the survey operations assisted in maintaining the high standard of initial training.

A complex logistical support system maintained the entire survey effort, including procurement of supplies, transportation of personnel and equipment, housing for team members, and rapid transport of biochemical samples to the central laboratory.

Appendix A provides lists of all personnel involved in the Nutrition Canada surveys.

3.1 HOME VISITS

Nutrition Canada advance team personnel accompanied by staff members of the local public health units visited the selected individuals in their homes. They encouraged each to accept an appointment for the survey centre and described the tests and interviews to be given. During the home visit the advance team recorded basic demographic data, and information on food buying and preparation. They forwarded the completed records to the survey team who came to the community about one week later.

3.2 SURVEY CENTRE

The site chosen for the survey centre was usually a school auditorium or a church hall close to the area being surveyed. Examinations were held Monday through Friday, usually from 1:00 p.m. until 10:00 p.m.

Each participant received a two-hour examination that included clinical, anthropometric and dental examinations and a dietary interview. Blood and urine samples were collected from all participants except from those who were not able to give samples.

A receptionist received and registered participants before they proceeded to the various examination units at the survey centre. The receptionist kept a daily record of all who participated in the survey and insured that each participant had been given all examinations. Appendix C includes a copy of each form used by the survey team.

Dietary

The dietary interviewer asked each participant to recall all the foods and beverages consumed on the previous day and the frequency with which certain foods were consumed over the previous month. Participants were not informed beforehand of the nature of the dietary interview so the bias of a conscious food selection, atypical of the participant's eating pattern, was minimized.

The dietary interviewer assisted each person's food recall by encouraging a review of the previous day's activities. Once the foods consumed were recorded, portion-size models, specially designed for the survey, assisted the interviewer in determining the amount of each food eaten. The intake of vitamin and mineral supplements was determined and included as part of the dietary record.

The interview for children under 12 years of age was conducted with their mothers, or with adults responsible for their meals. Children 6 through 12 were present and contributed to the interview.

Clinical

The medical staff interviewed participants for their medical history, including present and past illnesses, major surgical operations and the use of drugs. They recorded specific information about smoking habits and women's reproductive history. Parents supplied information about their children, including details of eating patterns during infancy, histories of contagious diseases and other health problems. The medical examination was designed to detect abnormalities that could reflect past or present malnutrition. The physician performed a general physical examination, noting particularly abnormalities which could be caused by nutrient deficiencies.

Medical problems requiring immediate attention were referred to the local public health unit.

An anthropometrist recorded a profile of 14 separate measurements, including height and weight, chest and shoulder width and skin-fold thicknesses.

Dental

The dental examination consisted of a review of recent use of dental services and a thorough examination of the teeth and supporting structures. The examiner recorded details of the status of first and permanent teeth and assessed each tooth as decayed, missing, or filled. The examiner also assessed the condition of the gums and underlying supporting structures, the amount of debris on the surface of the teeth, the accuracy of the "bite" and the need, fit and function of dentures or partial dentures.

Laboratory

Each survey centre included a laboratory for the collection and initial processing of blood and urine samples. Hemoglobin[1] and hematocrit[2] levels of the blood, and glucose (Clinistix[a]) and albumin (Albustix[a]) in the urine were determined immediately after collection.

Laboratory technologists centrifuged the blood samples to obtain the serum. They added a stabilizing solution to a portion of the serum for later determination of vitamin C, and acidified the urine samples. All samples were frozen immediately after this initial processing, packed in dry ice, and forwarded to the central laboratory in Ottawa.

[a]Registered trademark reagent strips manufactured by Ames Chemical, Division of Miles Laboratories Ltd., Rexdale, Ontario.

3.3 CENTRAL LABORATORY

The central laboratory received most samples within 72 hours of collection. Laboratory staff checked all samples for over-all physical quality and stored them at minus 15[6] centigrade until the biochemical tests could be performed. The stability of the factors being measured determined the order in which the analyses were conducted. The vitamin C determinations, for example, were completed within three weeks of collection.

Biochemical determinations, the results of which form part of this report, included serum analyses for total protein[3], iron[4] and transferrin saturation[4], folate[5], calcium[6], phosphorus[7], vitamin A[8,9], vitamin C[10], and cholesterol[11]; and urine analyses for creatinine[12], thiamin[13], riboflavin[14] and iodine[15]. Other determinations, the results of which will be published in subsequent reports, included serum analyses for vitamin E[9], alkaline phosphatase[16], albumin[17], triglycerides[18] and bilirubin[19]; and urine analyses for vitamin B_6[20].

Most biochemical determinations were carried out on automated analytical equipment. Where necessary, conventional methods were adapted to the new equipment. Comparative studies with other acceptable methods and collaborative investigations with laboratories in Canada and the United States validated the methods and ensured compatibility of the data. The validity of daily results was monitored by analytical control procedures.

Both family doctor and participant were advised by letter whenever biochemical tests indicated the need for medical follow-up.

3.4 DATA PROCESSING CENTRE

The data processing centre developed a quality assurance system to minimize the level of error in data handling. The system

applied to the gathering of data by the survey team and the processing of data at the centre. Specialized staff reviewed all forms collected by the team before the information was transferred to punch cards and magnetic tape. The centre developed and carried out procedures for checking all data against the original forms received from the team and the central laboratory.

Food composition tables from the United States Department of Agriculture[21] formed the basis for computer computation of nutrient intakes from dietary records. The centre converted International Units (I.U.) of vitamin A into retinol equivalents (1 retinol equivalent = 3.33 I.U. of preformed vitamin A or 10 I.U. of B-carotene[22]) and replaced niacin values in milligrams with niacin equivalents (1 niacin equivalent = 60 mg tryptophan or 1 mg of niacin). Tables of amino acid composition[23] facilitated the development of estimates of the tryptophan content of foods containing more than five per cent protein. In addition the staff added nutrient content data for foods enriched according to Canadian regulations and for some convenience foods and wild game not included in the U.S. publications. Calculation of nutrient intakes includes the contribution of mineral and vitamin supplements taken by participants.

Calculations of laboratory data were also computerized. A special reporting and reviewing system verified all laboratory findings before they were entered into each individual's computer file.

Nutrition Canada carefully monitored each successive phase of the data processing operation so that the quality of the collected information was maintained.

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CHAPTER 4 - THE INTERPRETATION OF DATA

The assessment of nutritional status required a variety of methods. As discussed in Chapter 3, Nutrition Canada used biochemical, clinical, anthropometric and dietary techniques. Of these measurements, only those which have a solid scientific basis for interpretation are presented in this report. In order to understand the data collected, it is important to recognize that each of these measurements has established meanings.

Dietary information on intakes of nutrients is essential in determining whether eating patterns and trends are leading to or causing malnutrition. Nutrition Canada collected this information by the 24-hour recall method, the most practical technique for surveying a large population. Although this method does not accurately describe the nutrition practices of each individual, it does reflect dietary intakes of groups within the population[1].

Biochemical measurements of levels of nutrients and metabolites in the blood and urine are valuable in furnishing an indication of the current state of metabolism. Biochemical analyses are preferably made on fasting specimens so that the possible effects of very recent intakes of nutrients are minimized. In a study of the magnitude of the Nutrition Canada survey, it was not practical to have participants follow a fasting regimen. Moreover, the World Health Organization Expert Committee on Medical Assessment of Nutritional Status states that, in a population survey, samples from unfasted subjects do not seriously bias results[2].

Anthropometric measurements of various physical dimensions can be used to estimate lean body mass, adipose tissue and bone structure[3]. These measurements reflect the genetic and environ-

mental history of individuals rather than their current state and are therefore valuable in assessing growth and development. Recent work indicates that environmental determinants, particularly nutrition, are of greater influence than genetic background in the over-all stature of a population[2].

Clinical examinations of malnutrition are most valuable in situations where the deficiency of one or more nutrients has reached the stage of overt disease, i.e., where the health and, in fact, the life of the individual is jeopardized. The value of physical examinations is therefore extremely high for impoverished populations and diminishes in importance as the adequacy of the food supply for a population improves. In mild to moderate deficiency states, clinical findings are often non-specific[4]. Clinical signs indicative of nutritional deficiencies may be produced by non-nutritional factors such as the weather or heredity. However, the association of clinical findings with biochemical and dietary data can aid in eliminating non-nutritional factors and in identifying specific nutritional deficiencies.

Nutrition Canada used these survey techniques to assess the nation's health with reference to specific nutritional parameters.

4.1 PARAMETERS OF NUTRITIONAL STATUS

Protein

Protein is essential in normal body functioning, in tissue repair, and in compensating for normal losses of nitrogen in feces, urine and skin. Because protein is needed in building body tissue, the demand is highest during periods of accelerated growth: infancy, childhood, adolescence and pregnancy. In this report, the adequacy

of dietary protein is estimated according to body needs that reflect the weight, age and physiological state of each individual.

Biochemical measurements of total serum protein were analyzed in order to evaluate the extent of protein stores in the body and the adequacy of protein intake over an extended period of time[5]. Low serum levels are a reflection of severe protein deprivation[6].

Because protein can be used for energy in time of low caloric intake, clinical signs indicative of protein malnutrition often occur in conjunction with caloric malnutrition. Participants under six years of age were examined for clinical signs of protein-calorie malnutrition such as edema, body weight deficits, and changes in the hair.

Iron

Iron is vital for the formation of red blood cells, and in the functioning of certain enzyme systems. The demand for this mineral is highest during the years from nine to sixteen and during pregnancy when the relative amounts of all body constituents must keep pace with growth. With the commencement of menstruation, this increased requirement continues in women until menopause, whereas after adolescence, men's need for iron is decreased.

Levels of transferrin saturation (an iron carrier in the blood) and mean corpuscular hemoglobin concentration (MCHC) were measured to provide a biochemical assessment of iron adequacy[7,8]. Both are affected by low intakes of iron. Low levels indicate a reduction in the body's ability to transport oxygen to cells, a condition clinically described as anemia. The measurement of the hemoglobin level is used as a measure of the severity of anemia[7].

Folic Acid

Folic acid has several important functions in metabolism. Because of the utilization of folate, as well as iron, in hemoglobin synthesis, folic acid deprivation can result in a reduction in hemoglobin concentration. Megaloblastic anemia, characterized by enlarged red blood cells, can occur with severe deficiency of either folic acid or vitamin B_{12}. In the clinical examinations, signs of folate and vitamin B_{12} deficiency anemia noted were changes in tongue color, low hemoglobin levels and absence of vibratory sense in the ankle.

Biochemical status was estimated by measuring concentrations of folate in the serum. Low serum folate values can reflect a deficiency of folic acid in the red blood cells and bone marrow. Serum levels are also influenced by recent food intakes[9,10]. Dietary calculation of intakes was not possible because of the dearth of information regarding the folic acid content in most foods.

Calcium and Vitamin D

Calcium is fundamental in bone and teeth formation, and is particularly important for skeletal growth during childhood, adolescence, and pregnancy. It is essential in adulthood as well because bone constituents are continually renewed. Calcium acts as a catalyst for biological reactions and as a regulator of cell permeability. Dietary intakes must be higher than actual body needs to overcome the low absorption of this mineral by the body.

Vitamin D enhances the rate of absorption of both calcium and phosphorus, another mineral essential in bone calcification. Because vitamin D is present in foods in small and inconsistent amounts and can be formed in the body by exposure to the ultra-violet rays of the sun, dietary intakes of vitamin D were calculated only from foods "potentially" fortified with vitamin D. The Food and Drug Regulations in Canada permit, but do not require, the addition of

vitamin D to infant formulas, milks, and margarine[11]. While most processors add the vitamin to their products, there are some who do not. Because most participants in the survey could not identify specific brands of foods eaten, dietary vitamin D has been evaluated as potential intakes assuming that all infant formulas, milks and margarine contain vitamin D at the permitted levels. It should be recognized that the actual intakes could be substantially below these potential intakes. Since children, adolescents up to 18 years of age, and women during pregnancy have recognizable needs for a dietary source of this vitamin, their potential intakes have been analyzed in this study.

Biochemically, concentrations of serum calcium were measured. Because serum calcium levels are rigidly controlled by homeostatic mechanisms in the body, low levels of serum calcium occur only after extended periods of calcium deprivation or from interference in absorption. Serum phosphorus levels were also measured and classified in combination with serum calcium for the assessment of rickets in children four years of age and under.

Rickets is a severe manifestation of deprivation of calcium, phosphorus and/or vitamin D in which bones remain soft and pliable instead of becoming calcified. In the examinations, symptoms looked for in children under six years of age included bowed legs, abnormal softness of the skull and irregular enlargements in the rib area.

Vitamin C

Vitamin C is used to provide the intercellular strength necessary for connective tissues, capillary walls and other supportive structures in the body. It also functions in the utilization of folic acid and in amino acid metabolism. Since there is no appreciable storage of vitamin C in the body, intakes should be high enough to saturate the tissues.

The biochemical measurement of serum vitamin C indicates recent dietary intake[12] and reflects the level of saturation of body tissues.

Clinical signs of dietary deprivation usually appear after four to six months. Participants in this survey were examined for such characteristic signs as swollen, bleeding gums, hyperkeratinization of follicles and small pinpoint hemorrhages under the skin.

Vitamin A

Vitamin A is essential in the formation and maintenance of healthy skin and membranes, and is a component in the biochemical reaction that enables vision in dim light. For this report, total dietary intakes of vitamin A have been calculated as retinol equivalents. This expression combines the biological activity of both preformed vitamin A and B-carotene, a precursor form which is converted to vitamin A by the body[13]. In children the intake has been assessed in relation to individual body weights. By the age of 13, weight is no longer a valuable indicator of need and total intake has been used to assess the adequacy of vitamin A intake. Vitamin A is one of the most difficult nutrient intakes to measure. It appears in high concentration in only a few foods which are not consumed consistently from day to day. Thus the 24-hour recall method yields imprecise estimates of this nutrient.

To aid in a more precise assessment of vitamin A status, concentrations were measured in the serum. Excess vitamin A is deposited in the liver and the level of serum vitamin A is maintained at the expense of this reserve. Therefore, low serum vitamin A levels can be related to extremely low liver stores. Low reserves can be caused by inadequate intakes over an extended period of time, or by interference with the absorption and storage of the nutrient[4]. On a deficient diet, these reserves can be depleted within four months in

children and within a year in adults, resulting in clinical signs of deficiency.

Specific signs that were sought during this study included keratinization of both follicles and the bulbar conjunctiva of the eye.

Thiamin, Riboflavin and Niacin

Thiamin, riboflavin and niacin are involved in energy metabolism: thiamin acts as a co-enzyme in the metabolism of carbohydrates, and riboflavin is necessary in oxidative systems and niacin in respiratory systems of energy metabolism. Thus, requirements for these nutrients can be directly related to energy expenditure[13,14]. Because caloric intake and expenditure are related, the adequacy of the dietary intake of these nutrients is best assessed in relation to caloric intake. Therefore in this report, intakes of thiamin, riboflavin and niacin have been calculated and assessed per 1,000 Calories of intake per day with the following exceptions: those individuals consuming less than 2,000 Calories per day and infants where fixed values were used for assessment.

Biochemically, thiamin and riboflavin were measured in casual urine samples taken from the participants. Only small amounts of thiamin and riboflavin are stored in the body and intakes in excess of body needs are rapidly excreted in the urine. Therefore, urinary levels are a measure of recent intake[15]. Because of the variations in excretion concentrations from sample to sample, it is preferable to measure urinary thiamin and riboflavin over a 24-hour period. This is not practical in a survey situation, so excretions from casual samples are expressed in terms of the amount of vitamin excreted per gram of creatinine from the same sample. Creatinine, a urinary constituent resulting from tissue breakdown, is eliminated over 24 hours in amounts roughly proportional to body weight[16] and is regarded as a

useful reference base in estimating 24-hour excretions of nutrients from a casual urine sample[17].

The physical examinations included a check for long term deficiencies of thiamin, riboflavin and niacin. The deficiency of any one of these nutrients is often concurrent with symptoms characteristic of multiple vitamin B deficiencies. Specific symptoms of thiamin deficiency are changes in the central nervous system as evidenced by absence of vibratory sense in the ankle and absence of knee jerks. The final manifestation of thiamin deficiency is beriberi. In North America, severe thiamin deficiency has been reported in chronic alcoholics[18]. Riboflavin does not have a discrete deficiency syndrome, but produces symptoms such as dermatitis, cheilosis, and changes in the tongue colour. Deficiency of niacin results in a characteristic form of dermatitis. Pellagra, a disease which affects the central nervous system and gastrointestinal tract, is the most severe stage of niacin deficiency.

Iodine

Iodine is essential in the normal functioning of the thyroid gland. The biochemical status was estimated by measuring the excretion level in the urine. High urinary excretion levels are a result of iodine intakes in excess of body requirements[19]. Low urinary levels reflect a deficit in the quantity of iodine available to the thyroid gland. As with thiamin and riboflavin, creatinine is used as a baseline for the expression of iodine excretion[17].

Iodine deficiency or the impairment of its utilization can result in enlargement of the thyroid gland. Participants were checked for this sign and enlargement was rated according to WHO classifications. Dietary measurements of intakes were not possible because of the lack of reliable information concerning iodine content in food and water.

Calories, Ponderal Index and Serum Cholesterol

Calories are an expression of the energy value of food. Energy is required for the various biochemical and mechanical functions of the body and the maintenance of body temperature. The individual's need for calories is governed by several factors, primarily basal metabolism and level of activity. In an adult population, when caloric intake is equal to caloric expenditure, weight is constant. When caloric intake is in excess of need, the surplus calories are stored as adipose tissue in the body. Median caloric intakes have been expressed in this report according to the ponderal index of each participant.

Ponderal index is an assessment of weight in relation to height. A low ponderal index correlates well with mortality rates in adult men with coronary heart disease[20]. It is used as an indicator of excess body weight, whereas high ponderal index is an indicator of leanness. It should be noted that its application to women and to Indians and Eskimos has not been adequately examined.

Epidemiological studies also have shown the association of high serum cholesterol levels with increased incidence of heart disease[21]. Cholesterol levels are dependent upon the rate of synthesis, degradation, and excretion of cholesterol by the body. An elevation in serum cholesterol can result from many influences including such dietary factors as high cholesterol intake and a high ratio of saturated to polyunsaturated fatty acids. In this study, serum cholesterol concentrations are assessed for all adults except pregnant women.

4.2 DEVELOPMENT OF THE INTERPRETIVE STANDARD

In 1969, a Committee on Standards and Data Interpretation, comprised of the chairmen of four expert groups on Methodology, i.e., Survey Design and Sampling, Clinical Assessment, Biochemical Determinations, and Dietary Evaluation, developed a standard for the interpretation of the Nutrition Canada data. This standard has been set on the basis of available research knowledge in the literature.

The Committee defined the criteria of malnutrition as the presence of clinical signs indicative of a nutritional disease, or as an abnormal level of a nutrient or metabolite in the blood or urine.

In order to assess malnutrition, the Committee categorized each of the biochemical and clinical parameters in the Standard into three risk groups (high, moderate and low). Cut-off points were set for the biochemical parameters that defined the limits of each risk group. For the clinical measurements, signs indicative or suggestive of specific nutrient deficiencies were grouped to define risk classifications. The Committee designated a high probability that malnutrition exists as high risk, an average probability that malnutrition is present or developing as moderate risk, and a low probability that malnutrition exists as low risk. Although it is difficult to set absolute limits for these risk groups, the Committee considered this approach to be the most appropriate basis for evaluation of the findings.

For dietary standards, the Committee classified the nutrient intakes into three levels, with corresponding cut-off points, designated as inadequate, less-than-adequate, and adequate. Inadequate intakes are considered to be below the desirable amount of a nutrient. Less-than-adequate intakes are those above the minimum requirement but below the desirable amount of a nutrient. Adequate intakes are those providing a desirable margin of safety in meeting the body's needs of a nutrient.

4.3 NUTRITION CANADA INTERPRETIVE STANDARD

	RISK CATEGORIES					
	HIGH	MODERATE			LOW	
A. BIOCHEMICAL DATA						
TOTAL SERUM PROTEIN[15,22] (g/100 ml)						
0-5 mos M & F	below	5.0	5.0	- 6.0	above	6.0
6-71 mos M & F	below	6.0	6.0	- 6.4	above	6.4
6+ yrs M & F	below	5.5	5.5	- 6.0	above	6.0
Pregnant Women						
HEMOGLOBIN[15,22] (g/100 ml)						
0-1 yr M & F	below	9.0	9.0	- 10.0	above	10.0
2-5 yrs M & F	below	10.0	10.0	- 11.0	above	11.0
6-12 yrs M & F	below	10.0	10.0	- 11.5	above	11.5
13-16 yrs M	below	12.0	12.0	- 13.0	above	13.0
13-16 yrs F	below	10.0	10.0	- 11.5	above	11.5
17+ yrs M	below	12.0	12.0	- 14.0	above	14.0
17+ yrs F	below	10.0	10.0	- 12.0	above	12.0
Pregnant Women	below	9.0	9.0	- 10.5	above	10.5
MCHC(%)[a,23,24]						
All ages M & F	below	30	30	- 32	above	32
SERUM TRANSFERRIN[b,12,22] (% saturation)						
All ages M & F	below	16	16	- 20	above	20
SERUM FOLATE[7] (ng/ml)						
All ages M & F	below	2.5	2.5	- 5.0	above	5.0
SERUM CALCIUM (mg/100 ml)						
All ages M & F	below	9	-		9 and above	
SERUM PHOSPHORUS (mg/100 ml)						
0-4 yrs M & F	below	4	-		4 and above	

a $\frac{\text{Hemoglobin (g/100 ml)}}{\text{Hematocrit (\%)}} \times 100$

b $\frac{\text{Serum Iron (mcg/100 ml)}}{\text{Total serum iron binding capacity}} \times 100$

	RISK CATEGORIES		
	HIGH	*MODERATE*	*LOW*
COMBINED CLASSIFICATION SERUM CALCIUM SERUM PHOSPHORUS (vitamin D deficiency rickets)	Ca below 9 P below 4	Ca below 9 P 4 and above or	Ca 9 and above P 4 and above
0-4 yrs M & F		Ca 9 and above P below 4	
SERUM VITAMIN A[15] (mcg/100ml)			
All ages M & F	below 10	10 - 30	above 30
SERUM VITAMIN C[25] (mg/100ml)			
0-19 yrs M & F	below 0.2	0.2 - 0.6	above 0.6
20+ yrs M & F	below 0.2	0.2 - 0.4	above 0.4
URINARY THIAMIN[12,15,22] (mcg/g creatinine)			
0-2 yrs M & F	below 120	120 - 170	above 170
3-5 yrs M & F	below 85	85 - 120	above 120
6-8 yrs M & F	below 70	70 - 180	above 180
9-12 yrs M & F	below 60	60 - 180	above 180
13-16 yrs M & F	below 50	50 - 150	above 150
17+ yrs M	below 40	40 - 120	above 120
17+ yrs F	below 30	30 - 100	above 100
URINARY RIBOFLAVIN[12,15,22] (mcg/g creatinine)			
0-2 yrs M & F	below 150	150 - 500	above 500
3-5 yrs M & F	below 100	100 - 300	above 300
6-8 yrs M & F	below 85	85 - 270	above 270
9-16 yrs M & F	below 70	70 - 200	above 200
17+ yrs M & F	below 30	30 - 80	above 80
SERUM CHOLESTEROL[26] (mg/100ml)			
20-21 yrs M & F	above 220	-	220 and below
22-39 yrs M	above 240	-	240 and below
22-39 yrs F	above 220	-	220 and below
40-64 yrs M	above 250	-	250 and below
40-64 yrs F	above 230	-	230 and below
65+ yrs M & F	above 250	-	250 and below
URINARY IODINE[17] (mcg/g creatinine)			
All ages M & F	below 50	-	50 and above

	RISK CATEGORIES		
	HIGH	*MODERATE*	*LOW*
B. CLINICAL SIGNS[4,27,28,29,30]			
PROTEIN-CALORIE MALNUTRITION			
1. Pretibial pitting, bilateral edema 2. Major weight deficit (less than 0.6 of median for age)[29] 3. Minor weight deficit (between 0.8 & 0.6 of median for age)[29] 4. Painless pluckability of hair			
0-5 yrs M & F	Sign 1 or 2	Sign 3 or Signs 3 + 4	Sign 4 or no signs
FOLATE & VITAMIN B_{12} DEFICIENCY ANEMIA			
1. High risk in hemoglobin 2. Abnormally-smooth or abnormally-red tongue 3. Absent vibratory sense, ankle			
6+ yrs M & F	All signs	-	No signs
RICKETS			
1. Rachitic rosary 2. Craniotabes 3. Bowed legs 4. Delayed walking (more than 18 mos.)			
0-1 yrs M & F	Combinations that include Signs 1 + 2	Other Combinations that include Signs 1 + 4	All Other Combinations
2-5 yrs M & F	Signs 1 + 3	Signs 1 + 4	All Other Combinations

	RISK CATEGORIES		
	HIGH	*MODERATE*	*LOW*
VITAMIN A DEFICIENCY			
1. Thickened opaque bulbar conjunctivae 2. Follicular hyperkeratosis - arms, back			
0-5 yrs M & F	-	Sign 2	No signs
6+ yrs M & F	Sign 1	Sign 2	No signs
VITAMIN C DEFICIENCY			
1. Scorbutic rosary 2. Diffuse bleeding of gums 3. Purpura or petechiae and/or follicular hyperkeratosis - arms, back			
0-5 yrs M & F	Sign 1 or Signs 2 + 3	Sign 2 or 3	No signs
6+ yrs M & F	Signs 2 + 3	Sign 2 or 3	No signs
THIAMINE DEFICIENCY			
1. Absent knee jerks, bilateral 2. Absent vibratory sense, ankle(under 55 years) 3. Pretibial pitting bilateral edema			
6-54 yrs M & F	Any 2 signs	Any 1 sign	No signs
55+ yrs M & F	Signs 1 + 3	Sign 1 or 3	Sign 2 or no signs
RIBOFLAVIN DEFICIENCY			
1. Abnormally smooth or abnormally red tongue 2. Angular lesions of the eyelids or lips 3. Cheilosis 4. Nasolabial seborrhoea			
All ages M & F	Any 3 or 4 signs	Any 2 signs	Fewer than 2 signs

	RISK CATEGORIES		
	HIGH	*MODERATE*	*LOW*
NIACIN DEFICIENCY			
1. Pellagrous dermatitis or skinfold dermatitis 2. Abnormally smooth or abnormally red tongue 3. Abnormal pigmentation of skin			
6+ yrs M & F	Signs 1 + 2	Any 1 sign	No signs
GOITRE[30]			
Thyroid enlargement			
WHO Class I, II, III			
All ages M & F	Class II or Class III	Class I	No signs

C. **ANTHROPOMETRIC MEASUREMENTS**

PONDERAL INDEX[c,20]			
20+ yrs (except pregnant women)	below 12.5	-	12.5 and above

[c]Ponderal Index = $\frac{\text{Height (in)}}{\text{cubic root weight(lbs)}}$

	CLASSIFICATION OF INTAKES						
	INADEQUATE		LESS-THAN-ADEQUATE			ADEQUATE	
D. NUTRIENT INTAKES							
PROTEIN (g/kg body weight/day)							
0-5 mos M & F	below	2.0	2.0	-	2.5	above	2.5
6-11 mos M & F	below	1.2	1.2	-	1.8	above	1.8
1-2 yrs M & F	below	0.9	0.9	-	1.6	above	1.6
3-8 yrs M & F	below	0.7	0.7	-	1.3	above	1.3
9-16 yrs M & F	below	0.6	0.6	-	1.0	above	1.0
17+ yrs M & F	below	0.5	0.5	-	0.7	above	0.7
Pregnant Women[d]		+ 4	+ 4	-	6		+ 6
IRON[1,14,31,32] (mg/day)							
0-8 yrs M & F	below	6	6	-	8	above	8
9-16 yrs M & F	below	10	10	-	15	above	15
17+ yrs M	below	6	6	-	10	above	10
17-54 yrs F	below	10	10	-	15	above	15
55+ yrs F	below	6	6	-	10	above	10
Pregnant Women[e]		+ 2	+ 2	-	3		+ 3
CALCIUM[14] (mg/day)							
0-11 mos M & F	below	400	400	-	500	above	500
1-5 yrs M & F	below	500	500	-	700	above	700
6-8 yrs M & F	below	500	500	-	1000	above	1000
9-16 yrs M & F	below	700	700	-	1200	above	1200
17-21 yrs M & F	below	600	600	-	900	above	900
22+ yrs M & F	below	300	300	-	500	above	500
Pregnant Women[e]		+ 500	+ 500	-	700		+ 700
VITAMIN D[14] (I.U./day)							
0-18 yrs M & F and Pregnant Women	below	150	150	-	400	above	400

[d]This allowance should be added after calculation for age and non-pregnant weight.

[e]This allowance is added to the standard set for age.

	CLASSIFICATION OF INTAKES					
	INADEQUATE		LESS-THAN-ADEQUATE		ADEQUATE	
VITAMIN A[13] (retinol equivalent /kg body wt/day)[f]						
0-5 mos M & F	below	40	40	- 60	above	60
6-11 mos M & F	below	25	25	- 35	above	35
1-3 yrs M & F	below	15	15	- 25	above	25
4-12 yrs M & F	below	12	12	- 20	above	20
(retinol equivalent/day) 13+ yrs M & F	below	500	500	- 750	above	750
VITAMIN C[14,31] (mg/day)						
0-5 yrs M & F	below	10	10	- 20	above	20
6+ yrs M & F	below	10	10	- 30	above	30
Pregnant Women[g]		+ 8	+ 8	- 10		+ 10
THIAMIN[13]						
0-11 mos M & F (mg/day)	below	0.25	0.25	- 0.4	above	0.4
1-12 yrs M & F (mg/1000 Cal/day)	below	0.25	0.25	- 0.4	above	0.4
13+ yrs M & F (mg/day)	below	0.5	0.5	- 0.8	above	0.8
or, if calorie intake is above 2000 (mg/1000 Cal/day)	below	0.25	0.25	- 0.4	above	0.4
RIBOFLAVIN[13]						
0-11 mos M & F (mg/day)	below	0.30	0.30	- 0.55	above	0.55
1-12 yrs M & F (mg/1000 Cal/day)	below	0.30	0.30	- 0.55	above	0.55
13+ yrs M & F (mg/day)	below	0.60	0.60	- 1.10	above	1.10
or, if calorie intake is above 2000 (mg/1000 Cal/day)	below	0.30	0.30	- 0.55	above	0.55

[f]Retinol equivalent is the biological equivalent of 1 mcg retinol, calculated as:

$$\frac{\text{Preformed Vitamin A(I.U.)}}{3.33} + \frac{\beta\text{-Carotene}}{10}$$

[g]This allowance should be added to non-pregnant standard.

	CLASSIFICATION OF INTAKES						
	INADEQUATE		LESS-THAN-ADEQUATE			ADEQUATE	
NIACIN[13] (Niacin equivalent)[h]							
0-11 mos M & F (equiv./day)	below	4.4	4.4	-	6.6	above	6.6
1-12 yrs M & F (equiv./1000 Cal/day)	below	4.4	4.4	-	6.6	above	6.6
13+ yrs M & F (equiv./day)	below	8.8	8.8	-	13.2	above	13.2
or, if calorie intake is above 2000 (equiv./1000 Cal/day)	below	4.4	4.4	-	6.6	above	6.6

[h] Niacin equivalent is the biological equivalent of 1 mg niacin, calculated as:

$$\frac{\text{tryptophan(mg)}}{60} + \text{niacin (mg)}$$

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CHAPTER 5 - NUTRITION PROBLEMS IN CANADA

In order to obtain a comprehensive picture of the nutrition problems in different age and sex groups and during pregnancy, the findings are discussed in section 5.1 for infants and toddlers (0 through 4 years), children (5 through 9 years), adolescents (boys and girls, 10 through 19 years); in section 5.2 for young adults (men and women, 20 through 39 years), middle-aged adults (men and women, 40 through 64 years), senior adults (men and women, 65 years and over); and in section 5.3 for pregnant women.

The findings discussed cover three populations: the General Population of the provinces (excluding Indians in bands living on reserves and Eskimos), Indians in bands living on reserves and Eskimos living in settlements in the Territories. These populations will be referred to as the General Population, the Indians and the Eskimos, respectively.

The biochemical and clinical data are presented in tables. These display the estimated percentage of each age and sex group and of the pregnant sample, classified, according to the Interpretive Standard, as high or moderate risk (the remainder is at low risk). The dietary data are presented in tables of the estimated percentage of the population whose intake of specific nutrients is inadequate or less-than-adequate. The percentages of each population with adequate intakes are not shown in the tables.

The percentages are estimated using methods appropriate to the survey design (see Chapter 2). Because the proportion of persons selected from each stratum was intentionally different from the actual proportion in the population, appropriate weighting factors

were applied to the data to provide unbiased estimates of the actual proportion in the population.

5.1 NUTRITION PROBLEMS FROM INFANCY THROUGH ADOLESCENCE

This group includes infants and toddlers (0 through 4 years), children (5 through 9 years) and adolescent boys and girls (10 through 19 years).

The prevalence data for these age groups are displayed in Tables 5-1 to 5-12.

Adequate nutrition during these growing years is crucial. In infancy the tissues are increasing in both composition and size; in older children and in adolescents, the demands for growth continue but at a somewhat slower rate. The nutritional needs of these age groups are necessarily higher per unit body weight than in adults. Poor nutrition can have far-reaching adverse effects on health.

Examinations for clinical signs of *protein-calorie* malnutrition were made on children under 6 years of age. Only 2 children had body weights less than 60% of the median for their age, indicating severe growth retardation and wasting. A small but significant proportion (5%) had moderate degrees of weight deficit (60% to 80% of medians). Generally, the prevalence of moderate weight deficits were higher among Indians and Eskimos than the General Population.

The levels of *total serum protein* appear normal for children and adolescents in the General, Indian and Eskimo Populations.

Evaluation of the diets of these groups show satisfactory amounts of protein, except for about 15% of Eskimo children 0 to 4 years of age and 15 to 25% of adolescent girls. More Indian and Eskimo girls have protein intakes below adequate levels than girls of similar age in the General Population.

These findings are indicative of protein and/or caloric deficits in a significant proportion of infants, children under 6 years of age, and in many adolescent girls. In all cases, the deficit is more severe among Indians and Eskimos than in the General Population.

The values for *hemoglobin,* and particularly for *MCHC* and *transferrin saturation* suggest widespread iron deficiency among children and adolescents. This state of deficiency appears to be slightly more severe in Indians and Eskimos than it is in the General Population.

The values for *transferrin saturation* classify at risk (high and moderate) over a third of the infants and toddlers and more than a quarter of the children aged 5 to 9 years in the General Population. The prevalence is higher among adolescent girls (one out of three at risk) than it is among adolescent boys (one out of six at risk). The proportions at risk among Indians include two thirds of infants and toddlers and about half of the school-aged children and adolescents. For the Eskimos, three quarters of infants and toddlers and about half of the children and adolescents are at risk.

The shortage of *iron in the diet* of children and adolescents is marked and widespread. Almost half of the infants and toddlers and a third of older children in the populations surveyed have dietary iron intakes below adequate levels. The prevalence figures for adolescents having less-than-adequate and inadequate intakes are higher for girls (over 70%) than boys (50% or less). Again, the

situation appears to be slightly worse among Indians and Eskimos than in the General Population.

These findings are indicative of widespread iron deficits in infants, children and adolescents. The iron shortage in the diet at these ages makes it difficult for body stores of iron to be built up to normal levels later in life.

The values for *serum folate* classify at high risk about 10% of children and adolescents among the Indians and in the General Population. The prevalence is higher among the Eskimos where about 25% of children and 40% or more of adolescents are at high risk. These low values of serum folate are not associated with clinical manifestations of folate-vitamin B_{12} deficiency anemia. The public health consequences of such a prevalence pattern of low serum folate levels are not known. However, the findings must be viewed with concern until further research in this area allows better definition of the importance of the situation.

Serum calcium values are within the normal range. Even when serum calcium is considered in relation to serum phosphorus, there is no indication of rickets in children under 5 years of age in any of the populations surveyed. This is a welcome observation in view of the concern of physicians and nutritionists in the late 1960's over the occurrence of substantial numbers of cases of rickets.

In spite of this lack of evidence for rickets, the levels of *calcium and vitamin D in the diet* are below desirable levels for a large proportion of the populations surveyed. About a fifth of the children, a quarter of the adolescent boys and a third or more of the adolescent girls have inadequate intakes of both nutrients. The situation is worse for Indians and particularly poor for Eskimos. It

should be noted that the vitamin D data are potential intakes and assume that milk, margarine and infant formulas are fortified to the permitted levels. The actual intakes are likely to be even lower than those reported.

There is no clinical evidence of *vitamin A deficiency.* However, in the General Population, the values for *serum vitamin A* classify at moderate risk about a quarter of infants and toddlers, about 15% of school-aged children and less than 5% of the adolescents. The same trend is shown with Indians and Eskimos although the proportion of each age group classified at moderate risk is higher than in the General Population. Almost 20% of Indian and Eskimo adolescents are at moderate risk. There are virtually no cases in the high risk range for serum vitamin A.

Dietary intakes of vitamin A of those in the General Population are marginal. A considerable number of adolescents, particularly girls (25%), consume inadequate amounts of this vitamin. The insufficiency of dietary vitamin A is more prevalent among Indians and Eskimos than in the General Population. These findings are suggestive of limited supplies of vitamin A in infancy and limited storage because of marginal intakes during childhood and adolescents.

There is little or no clinical evidence suggestive of *vitamin C deficiency* in children and adolescents. The values for *serum vitamin C* classify at high and moderate risk one quarter of the infants and toddlers (0-4 years) in the Indian and General Populations and about half of Eskimo children of the same age. The proportion at risk is slightly lower among school-aged children. About a third of adolescents in the Indian and General Populations and over half of the

Eskimo adolescents (70% of the boys and 55% of the girls) are at risk.

The *intakes of vitamin C* for children and adolescents in the General Population appear to be satisfactory; only 10 to 15% have intakes below adequate amounts. Among Indian and Eskimo children, the insufficiency of intakes is more prevalent. The situation reaches serious proportions among Eskimos: 25% of infants and 50% of older children and adolescents have below adequate intakes.

These findings are indicative of a serious vitamin C deficit among Eskimo children and adolescents. This deficit is moderate among Indians and in the General Population.

There is no clinical evidence of *thiamin deficiency* among children and adolescents and the *excretion levels of thiamin* are normal for children in all three populations. The excretion values are also normal for Indian and Eskimo adolescents. However, one out of every seven adolescents in the General Population is at moderate risk.

The values for *thiamin intake* in relation to caloric intake appear satisfactory in the General Population; less than 5% of children and adolescent boys, and about 10% of adolescent girls have inadequate intakes. Indians and Eskimos have similar intakes except that 10% of Eskimo infants and toddlers have inadequate intakes. These findings are indicative of a satisfactory thiamin status among children and adolescent boys and a marginal status among girls.

There is no clinical evidence of *riboflavin deficiency* among children and adolescents. The *urinary riboflavin* levels are also normal. A small percentage of 0 to 4 year old Indian children (11%)

and adolescent girls in the General Population (8%) are at moderate risk.

The values for *dietary riboflavin* in relation to caloric intakes are less-than-adequate for almost one quarter of the adolescents in the General Populations. The diets of Indian children and adolescents are inferior in terms of riboflavin content to the diets of these age groups in the Eskimo and General Populations.

Dietary intakes of niacin in relation to caloric intakes are within or near the adequate range for children and adolescents in all three populations. There is no clinical evidence suggestive of *niacin deficiency.*

The values for *urinary iodine* indicate that adequate amounts of iodine are consumed by children and adolescents in all three populations. However, *moderate thyroid enlargement* is observed with clinically significant frequency in adolescent girls in the General Population but not among the Indians and Eskimos. As well, examination of the data on a regional basis (to be reported in subsequent reports) indicates considerable variation in prevalence rates in different parts of the country with the highest rates occurring in the prairie regions. The cause of the thyroid enlargement observed is not clear. Under the circumstances, it is prudent to voice some concern and to hope that further research in this area will reveal the etiology of this condition.

Table 5-1

CLINICAL ASSESSMENT OF CHILDREN (0-4 YEARS OLD) PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Protein-Calorie Malnutrition, Moderate Risk	3.6	3.2	9.2
Vitamin C Deficiency, High Risk	0.0	0.0	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	1.8	0.0	0.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-2

BIOCHEMICAL EVALUATION OF CHILDREN (0-4 YEARS OLD) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.0	1.2	0.0	0.0	0.0	0.0
Hemoglobin	0.4	4.0	0.1	6.1	0.0	5.2
MCHC	3.9	16.5	3.9	24.3	0.0	31.5
Transferrin Saturation	12.7	27.9	33.6	32.3	24.0	47.3
Serum Folate	9.6	32.9	3.1	44.0	28.5	7.7
Serum Calcium[c]	0.5	–	0.0	–	0.0	–
Serum Vitamin A	0.2	22.8	0.0	35.7	0.0	40.7
Serum Vitamin C	3.2	16.6	3.1	22.5	14.3	32.5
Urinary Thiamin	0.2	0.3	0.0	0.0	0.0	0.0
Urinary Riboflavin	0.5	3.2	0.0	11.3	0.0	0.0
Urinary Iodine[c]	0.0	–	0.9	–	0.0	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-3

DIETARY EVALUATION OF CHILDREN (0-4 YEARS OLD) PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE
Protein	1.1	1.6	2.4	4.4	11.2	4.6
Iron	23.5	20.7	30.1	21.0	37.7	6.4
Calcium	13.1	13.0	21.4	20.7	35.4	16.2
Potential Vitamin D[c]	17.9	42.5	34.3	42.5	28.1	51.7
Vitamin A	3.2	6.3	14.3	9.3	29.0	26.7
Vitamin C	3.9	6.6	3.4	12.0	14.1	11.6
Thiamin	1.4	15.0	2.3	13.6	10.3	3.6
Riboflavin	0.7	4.6	4.0	4.3	4.0	10.4
Niacin	0.3	2.0	1.1	1.7	10.3	2.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Assumes all milk and margarine contain added Vitamin D as permitted by the Food and Drug Regulations.

(Nutrition Canada National Survey 1970–1972)

Table 5-4

CLINICAL ASSESSMENT OF CHILDREN (5-9 YEARS OLD) PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Protein-Calorie Malnutrition, Moderate Risk[c]	4.7	7.7	6.1
Vitamin C Deficiency, High Risk	0.0	1.7	0.0
Thiamin Deficiency, High Risk[d]	0.0	0.0	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	4.7	0.0	0.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. 5 year olds only.

d. Excludes 5 year olds.

(Nutrition Canada National Survey 1970–1972)

Table 5-5

BIOCHEMICAL EVALUATION OF CHILDREN (5-9 YEARS OLD) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.1	5.5	0.2	0.5	0.0	0.0
Hemoglobin	0.2	3.8	0.0	1.8	0.8	9.4
MCHC	0.6	15.2	0.3	10.5	0.0	31.7
Transferrin Saturation	11.5	17.6	23.2	27.5	13.1	31.9
Serum Folate	4.8	46.5	7.7	53.4	27.2	52.7
Serum Calcium[c]	0.1	–	1.0	–	0.0	–
Serum Vitamin A	0.0	15.3	0.0	25.7	0.0	41.4
Serum Vitamin C	2.2	14.8	1.6	12.4	18.2	22.7
Urinary Thiamin	0.0	1.8	0.0	0.0	0.0	3.4
Urinary Riboflavin	0.3	1.3	0.0	1.1	0.0	1.7
Urinary Iodine[c]	0.0	–	0.1	–	0.0	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-6

DIETARY EVALUATION OF CHILDREN (5-9 YEARS OLD) PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE
Protein	0.1	2.9	1.2	3.7	0.0	4.8
Iron	13.9	21.6	16.1	27.4	10.2	16.4
Calcium	14.8	28.9	32.2	39.2	42.1	28.0
Potential Vitamin D[c]	23.4	50.8	46.6	44.5	59.8	18.9
Vitamin A	5.0	12.7	14.4	19.8	37.9	14.6
Vitamin C	2.2	12.3	10.6	15.9	31.0	19.0
Thiamin	1.3	21.9	0.4	14.8	1.1	12.5
Riboflavin	1.1	9.2	0.9	23.7	1.1	9.7
Niacin	0.3	1.5	0.3	4.1	1.1	3.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Assumes all milk and margarine contain added Vitamin D as permitted by the Food and Drug Regulations.

(Nutrition Canada National Survey 1970–1972)

Table 5-7

CLINICAL ASSESSMENT OF ADOLESCENT BOYS (10-19 YEARS OLD) PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Vitamin C Deficiency, High Risk	0.3	2.9	0.7
Thiamin Deficiency, High Risk	0.0	0.0	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	7.8	0.0	0.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-8

BIOCHEMICAL EVALUATION OF ADOLESCENT BOYS (10-19 YEARS OLD)
PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.0	1.4	0.3	0.3	0.0	0.0
Hemoglobin	0.4	5.4	0.8	12.7	9.6	8.0
MCHC	1.2	12.4	1.6	15.6	4.6	12.0
Transferrin Saturation	3.3	15.7	19.5	20.6	16.6	38.8
Serum Folate	10.3	56.3	14.3	51.5	51.5	46.6
Serum Calcium[c]	0.7	–	0.8	–	0.0	–
Serum Vitamin A	0.0	4.5	0.0	13.3	0.0	25.1
Serum Vitamin C	3.9	26.6	6.0	23.6	22.1	48.7
Urinary Thiamin	0.1	10.2	0.0	4.1	0.0	0.0
Urinary Riboflavin	0.2	3.7	0.1	2.8	0.0	0.0
Urinary Iodine[c]	0.4	–	0.4	–	3.0	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-9

DIETARY EVALUATION OF ADOLESCENT BOYS (10-19 YEARS OLD) PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	1.1	5.2	4.0	6.5	2.7	7.9
Iron	17.0	29.4	20.5	36.1	10.8	18.6
Calcium	20.3	30.5	53.3	25.4	46.5	44.7
Potential Vitamin D[c,d]	26.5	46.0	55.6	37.9	67.4	32.5
Vitamin A	10.8	17.9	30.6	18.9	38.9	27.1
Vitamin C	2.8	10.9	5.1	21.4	21.8	27.0
Thiamin	2.4	25.9	3.6	18.8	0.0	5.9
Riboflavin	2.9	19.1	2.3	25.0	5.3	8.5
Niacin	0.5	2.5	3.0	5.2	0.0	2.5

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Assumes all milk and margarine contain added Vitamin D as permitted by the Food and Drug Regulations.

d. Excludes 19 year olds.

(Nutrition Canada National Survey 1970–1972)

Table 5-10

CLINICAL ASSESSMENT OF ADOLESCENT GIRLS (10-19 YEARS OLD) PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Vitamin C Deficiency, High Risk	0.8	4.6	0.0
Thiamin Deficiency, High Risk	0.1	0.2	0.0
Goitre, High Risk	0.4	1.3	0.0
Moderate Risk	10.4	1.6	0.6

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-11

BIOCHEMICAL EVALUATION OF ADOLESCENT GIRLS (10-19 YEARS OLD) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.4	1.5	0.0	0.0	0.0	0.0
Hemoglobin	0.0	2.6	0.9	5.0	0.0	3.2
MCHC	1.9	19.0	3.1	23.9	0.0	13.4
Transferrin Saturation	10.9	21.5	24.0	28.2	10.7	42.8
Serum Folate	13.5	59.0	12.1	61.8	40.9	45.6
Serum Calcium[c]	1.9	–	1.1	–	0.0	–
Serum Vitamin A	0.1	5.7	0.0	13.4	0.0	14.2
Serum Vitamin C	3.7	23.8	5.9	25.9	12.2	42.4
Urinary Thiamin	0.2	16.4	0.0	3.4	0.0	0.4
Urinary Riboflavin	0.6	8.2	0.0	5.1	0.0	0.0
Urinary Iodine[c]	0.2	–	0.1	–	0.0	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-12

DIETARY EVALUATION OF ADOLESCENT GIRLS (10-19 YEARS OLD) PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE
Protein	3.5	10.7	10.2	17.1	11.5	13.8
Iron	40.0	38.2	44.1	30.9	33.4	34.6
Calcium	34.9	27.3	63.2	22.8	69.6	23.0
Potential Vitamin D[c,d]	39.1	46.0	62.0	29.6	53.2	39.3
Vitamin A	25.5	23.1	41.8	22.0	68.9	7.4
Vitamin C	4.7	13.2	8.9	24.1	25.3	31.5
Thiamin	10.7	27.4	11.8	26.2	14.3	0.0
Riboflavin	7.9	24.1	10.7	34.9	2.4	17.3
Niacin	2.7	7.6	4.4	11.0	2.4	2.8

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Assumes all milk and margarine contain added Vitamin D as permitted by the Food and Drug Regulations.

d. Excludes 19 year olds.

(Nutrition Canada National Survey 1970–1972)

5.2 NUTRITION PROBLEMS IN ADULTHOOD

This group includes young adult men and women (20 through 39 years), middle-aged men and women (40 through 64 years in the General Population, and 40 through 54 years in Indians and Eskimos), and senior men and women (65 years and over in the General Population and 55 years and over in Indians and Eskimos).

The prevalence data are shown in Tables 5-13 to 5-37.

With adulthood, full physical growth has been attained; the nutritional needs are limited to those for maintenance of body size and for physiological functioning. Weight control becomes a matter of concern especially when sedentary living and overeating characterize life style.

The *ponderal index* values, calculated from *height* and *weight,* indicate that half or more of the adult population is overweight. This problem applies to both sexes and reaches extremes in many age and population groups (e.g., between 65 and 87% of women 40 years old or older). The prevalence of high risk ponderal index is similar in Indian men and men in the General Population, whereas among women, the prevalence of overweight is appreciably higher in Indians. Eskimos of both sexes show the highest prevalence of risk according to ponderal index.

The median values of *caloric intakes* in the three populations show little difference in food consumption between those who are overweight (high risk on the basis of the ponderal index) and those who are not overweight. In the General Population these intakes, expressed as Calories, are approximately: 3200 and 1900 for young adult men and women, 2400 and 1700 for middle-aged adult men and women, and 1900 and 1500 for senior men and women, respectively.

The caloric consumption among young adult Indians is less than among young adults in the General Population. Eskimos, with the exception of young, lean men, apparently consume fewer calories than do Indians and the General Population.

These data indicate that major differences in daily caloric intakes do not account for differences in body weight. Two factors may be involved: first, small caloric excesses over long periods of time lead to overweight (e.g., an excess of 120 Calories per day will result in approximately a one pound gain per month); second, a sedentary life style among those who are overweight results in a decreased need for calories so that excesses are converted to body fat even when intakes are relatively low.

The values for *serum cholesterol* show 10 to 13% of adult men and 14 to 34% of adult women in the General Population at risk. The higher prevalences of elevated levels are among women over 40 years of age. This finding may be an indication that middle-aged and senior men with high cholesterol values succumb more frequently than women with similarly high values, leaving only those men with low serum cholesterol values. It is also possible that women have serum cholesterol values as high as men because the present life style exposes them to many of the same stress factors. The prevalence figures for those at risk are generally lower among Indians and Eskimos than among those in the General Population. This may reflect a difference in life style among these populations. Many of the factors that contribute to high serum cholesterol values and susceptibility to atherosclerosis are probably more common in the General Population than among Indians and Eskimos.

Total serum protein levels appear normal for young and middle-aged adults, but, among senior adults, 6% of the men and 9%

of women in the General Population, show levels at moderate and high risk. Adult Indians and Eskimos have normal serum protein values.

The *dietary protein intakes* are adequate for most of the young and middle-aged men in the General Population, but about a quarter of the men and almost half the women in the senior age groups have poor intakes of protein. Diets consumed by women of all ages are poorer in over-all protein adequacy than are the diets of men. This may be partially a consequence of their lower total food intake as compared to men. There is a general tendency towards lower protein intakes among adult Indians than among adults in the General Population. Again, women are more poorly nourished in terms of protein than are men. Eskimo men have adequate levels of protein in their diet while Eskimo women appear to be just as limited in their dietary protein as Indian women and women in the General Population.

The values for *hemoglobin,* and particularly *MCHC* and *transferrin saturation,* indicate a high prevalence of iron deficiency among men and women in all three populations. The prevalence figures are higher among Indians and Eskimos than they are in the General Population. For some adult age groups, the prevalence of anemia, as judged by hemoglobin, is higher in men than women, a trend most apparent in the Eskimo Population, where 16% of the young and 42% of the senior adult men are at moderate risk. By comparison, the values for Indian men and men in the General Population range from 5% in the young to 16% in the senior adult years. Transferrin saturation findings show a greater shortage of iron among women than among men. In all three populations, 20 to 60% of women are at risk compared with 15 to 35% of men. The prevalence figures suggest a greater lack of iron in Indians and Eskimos than in the General Population.

A shortage of *iron in the diet* is more common among women than men. About three quarters of young and middle-aged women and one half of senior women among the Indians and in the General Population do not have a desirable intake of iron. By comparison, less than a quarter of the young and middle-aged men and a third of senior men in these populations consume diets low in iron. Eskimo men are in a more fortunate position. The young and middle-aged men have diets that provide a satisfactory intake of iron, and only one out of five senior men has an intake below the adequate level. Eskimo women, however, fare poorly. From 30 to 50% have diets that are deficient in iron. Among Eskimo men, the higher prevalence of anemia, coupled with higher intakes of iron, raises uncertainties in attributing the etiology of the anemia primarily to iron deficits. More research is needed on this matter.

These findings collectively indicate a serious and widespread iron deficiency affecting both men and women. The myth that only women of child-bearing age are susceptible to iron deficiency is negated by the results observed among men.

The values for *serum folate* classify almost a quarter of the adults among the Indian and General Populations at high risk. The prevalence is considerably higher (60% and above) among Eskimo adults. As with children and adolescents, these low serum folate values are not associated with clinical manifestation of folate-vitamin B_{12} deficiency anemia. The possibility exists that this folate deficiency plays a major role in the development of anemia observed in Eskimos. It is difficult within the limits of present knowledge to assess the consequences of these low serum folate values.

The *serum calcium* levels are within the acceptable range for adults in all three populations with the exception of 15% of the senior adults in the Eskimo population.

Calcium intakes are inadequate for one out of five women in the General Population. The insufficiency of calcium in the diet is more marked for adult Indians and Eskimos than it is for the General Population. Almost a quarter of Indian men and a third or more of the Indian women have inadequate intakes. Among Eskimos, 15% of young and middle-aged men, 40% of senior men, and about half the women of all ages have inadequate dietary calcium intakes. The findings suggest a widespread insufficiency of calcium in the diets of women generally, and among senior men and women in the Indian and Eskimo populations.

There is no clinical evidence of *vitamin A deficiency.* Furthermore, serum vitamin A values are within the normal range for all except about 10% of Indian women and Eskimo men and women in the senior adult years.

Dietary vitamin A, however, falls short of desirable levels for a large number of adults. This is more pronounced among women than men, among senior than young adults, and among Eskimos than Indians or the General Population. This shortage of vitamin A in the diet with normal serum concentrations suggests that the storage levels of the vitamin in the body are satisfactory. The only case where these stores appear to become critically low and are not compensated for by adequate levels in the diet is among senior adults, particularly in the Indian and Eskimo Populations.

There is no clear clinical evidence of *vitamin C deficiency* in the General Population. There is clinical evidence to suggest

mild-to-moderate vitamin C deficiency in small numbers of young Indian men. Eskimos have the highest prevalence of clinical signs of vitamin C deficiency.

A comparative pattern exists in the *serum values of vitamin C.* In the General Population, one out of ten adults is at high risk and one out of six at moderate risk whereas half or more of adult Indians are at risk (moderate plus high). Among Eskimos, half the young adults and about three quarters of the middle-aged and senior adults are at high risk.

The *dietary intakes of vitamin C* for adults in the General Population are satisfactory except for 10 to 15% who are receiving less-than-adequate amounts. About a quarter of adult Indians do not get adequate amounts of vitamin C in their diet. The proportion of Eskimos having intakes below adequate levels range from 50% or more of young adults, to about 70% of the middle-aged, and 90% of senior adults.

These findings relative to vitamin C collectively indicate a deficit of minor proportions in the General Population, a moderate deficit among Indians and a serious deficit in the Eskimo Population.

Clinical signs suggestive of *thiamin deficiency* are observed in appreciable proportions of adults in the General and Indian Populations, more frequently in women than in men and in higher proportions in the older adults. There are no clinical suggestions of thiamin deficiency among Eskimos.

Similarly, *excretion levels of thiamin* are within the normal range for Eskimo adults but not for Indians and the General Population. The excretion data show that more men than women are at risk. In the General Population, 20% of young men and 30% of middle-

aged and senior men are at risk. Among Indians, 14% of young and middle-aged men and 29% of senior men are at risk.

Thiamin intakes in relation to calories show that more women (50%) than men (40%) have intakes below adequate levels. This pattern exists in all three populations. Indian men and men in the General Population are more at risk, on the basis of urinary thiamin levels, even though their diets contain more thiamin in relation to calories. This phenomenon is not observed among Eskimos.

Collectively these data indicate a moderate thiamin deficit for a substantial number of adults in the Indian and General Populations.

The *urinary riboflavin* levels are normal for virtually all adults in the three populations surveyed. The values for *dietary intakes of riboflavin* indicate that many adults receive less-than-adequate amounts. These marginal intakes are less frequent among men than among women, and among Eskimos than among Indians and the General Population.

Niacin intakes in relation to calories are within or near adequate levels for adults in all three populations.

The values for *urinary iodine* indicate adequate intakes of iodine for adults in the Indian and General Populations. Some 10% of Eskimo adults show urinary iodine excretions suggestive of inadequate intakes of iodine. However, there is no clinical evidence of *thyroid enlargementlargement* among Eskimos and little among Indians. Moderate thyroid enlargement is observed with significant frequency among the General Population, particularly in women. As

observed among adolescents, the highest rates occur in the prairie regions; the detailed distribution patterns are to be displayed in subsequent reports. It is hoped that further research in this area will elucidate this phenomenon and its causes.

Table 5-13

MEDIAN CALORIC INTAKES OF ADULTS AS RELATED TO RISK CLASSIFICATIONS OF PONDERAL INDEX

AGE–SEX	GENERAL POPULATION[a]		AGE–SEX	INDIANS[b]		ESKIMOS
	HIGH RISK	LOW RISK[c]		HIGH RISK	LOW RISK	HIGH RISK[d]
20-39 M	3172	3285	20-39 M	2767	2597	2584
20-39 F	1820	2018	20-39 F	1653	1547	1586
40-64 M	2454	2470	40-55 M	2269	2422	1744
40-64 F	1595	1801	40-55 F	1566	1621	941
65+ M	1836	1947	55+ M	1753	1888	1165
65+ F	1446	1553	55+ F	1351	1263	873

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. The population not classified as high risk is classified as low risk.

d. The number of Eskimos at low risk constituted too small a sample to be meaningful.

(Nutrition Canada National Survey 1970–1972)

Table 5-14

PONDERAL INDEX OF YOUNG ADULT MEN (20-39 YEARS OLD)
PERCENTAGE AT HIGH RISK

	PROVINCIAL POPULATION[a] HIGH RISK	INDIANS[b] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	42.5	46.4	72.1

Table 5-15

CLINICAL ASSESSMENT OF YOUNG ADULT MEN (20-39 YEARS OLD)
PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Vitamin C Deficiency, High Risk	0.4	5.7	3.3
Thiamin Deficiency, High Risk	0.4	0.0	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	6.0	0.0	0.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-16

BIOCHEMICAL EVALUATION OF YOUNG ADULT MEN (20-39 YEARS OLD) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	1.1	0.8	0.0	0.2	0.0	0.0
Hemoglobin	1.0	5.2	0.5	7.6	0.0	16.3
MCHC	1.0	13.2	0.0	16.8	1.8	3.4
Transferrin Saturation	3.5	14.4	3.8	22.1	1.9	27.8
Serum Folate	11.1	55.8	14.8	66.1	69.6	29.6
Serum Calcium[c]	0.6	–	1.1	–	1.9	–
Serum Vitamin A	0.0	0.6	0.0	2.9	0.0	3.8
Serum Vitamin C	7.0	18.5	13.6	37.8	57.3	33.6
Urinary Thiamin	0.5	20.4	2.2	13.2	0.0	0.6
Urinary Riboflavin	0.0	2.0	0.0	1.0	0.0	0.0
Urinary Iodine[c]	0.1	–	2.3	–	7.6	–
Serum Cholesterol[c]	12.7	–	7.7	–	0.6	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-17

DIETARY EVALUATION OF YOUNG ADULT MEN (20-39 YEARS OLD) PERCENTAGE WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE
Protein	1.6	7.4	3.7	14.5	0.0	10.8
Iron	3.8	11.5	2.7	12.2	0.0	9.9
Calcium	8.6	13.2	16.5	23.1	14.9	42.6
Vitamin A	14.3	12.9	25.7	17.6	46.1	3.6
Vitamin C	3.5	11.0	6.2	15.7	24.0	31.8
Thiamin	7.7	34.8	9.4	19.7	0.6	20.5
Riboflavin	5.2	27.0	3.8	31.3	0.0	9.9
Niacin	1.6	0.3	3.6	2.4	0.0	0.6

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-18 **PONDERAL INDEX OF YOUNG ADULT WOMEN (20-39 YEARS OLD) PERCENTAGE AT HIGH RISK**

	PROVINCIAL POPULATION[a] HIGH RISK	INDIANS[b] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	42.9	69.9	73.6

Table 5-19 **CLINICAL ASSESSMENT OF YOUNG ADULT WOMEN (20-39 YEARS OLD) PERCENTAGES AT RISK**

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[a]	INDIANS[b]	ESKIMOS
Vitamin C Deficiency, High Risk	0.6	1.2	8.4
Thiamin Deficiency, High Risk	0.3	0.7	0.0
Goitre, High Risk	1.3	0.1	0.8
Moderate Risk	9.0	4.4	0.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

Table 5-20

BIOCHEMICAL EVALUATION OF YOUNG ADULT WOMEN (20-39 YEARS OLD) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.6	1.9	0.0	0.0	0.0	0.0
Hemoglobin	0.4	6.7	1.6	11.9	0.0	7.7
MCHC	4.1	24.5	4.8	22.9	1.9	14.2
Transferrin Saturation	10.5	20.9	34.3	26.1	11.4	20.5
Serum Folate	21.2	46.7	23.1	54.7	84.4	11.4
Serum Calcium[c]	1.4	–	2.1	–	3.5	–
Serum Vitamin A	0.0	2.3	0.0	6.2	0.0	3.5
Serum Vitamin C	6.5	17.5	13.2	27.4	53.3	20.9
Urinary Thiamin	0.0	11.6	0.0	1.6	0.0	0.0
Urinary Riboflavin	0.1	2.2	0.0	0.5	0.0	0.0
Urinary Iodine[c]	0.1	–	0.0	–	7.2	–
Serum Cholesterol[c]	14.4	–	11.5	–	11.6	–

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-21

DIETARY EVALUATION OF YOUNG ADULT WOMEN (20-39 YEARS OLD) PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[a]		INDIANS[b]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	9.2	8.8	10.2	19.9	8.2	15.9
Iron	37.7	38.4	41.7	35.7	28.2	12.5
Calcium	19.3	22.3	41.4	21.6	44.9	25.9
Vitamin A	24.4	22.4	45.3	16.4	85.0	8.2
Vitamin C	5.8	14.8	10.8	26.4	21.6	30.0
Thiamin	11.9	35.9	19.6	28.2	28.6	11.7
Riboflavin	8.8	33.0	8.4	46.4	0.0	22.8
Niacin	1.1	8.2	5.5	4.7	7.6	7.0

a. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

b. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-22

PONDERAL INDEX OF MIDDLE-AGED MEN (40-64 YEARS OLD)[a]
PERCENTAGE AT HIGH RISK

	PROVINCIAL POPULATION[b] HIGH RISK	INDIANS[c] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	61.4	60.8	81.8

Table 5-23

CLINICAL ASSESSMENT OF MIDDLE-AGED MEN (40-64 YEARS OLD)[a]
PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[b]	INDIANS[c]	ESKIMOS
Vitamin C Deficiency, High Risk	0.2	1.0	5.0
Thiamin Deficiency, High Risk	0.4	0.0	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	3.0	0.3	0.0

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-24

BIOCHEMICAL EVALUATION OF MIDDLE–AGED MEN (40–64 YEARS OLD[a]) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.4	2.0	0.0	0.7	0.0	0.0
Hemoglobin	0.3	10.7	0.9	5.4	0.0	36.6
MCHC	0.5	12.9	2.0	13.0	1.0	28.4
Transferrin Saturation	2.3	11.4	9.4	16.8	1.5	19.6
Serum Folate	14.0	46.6	24.4	50.2	58.1	33.6
Serum Calcium[d]	1.0	–	0.9	–	0.0	–
Serum Vitamin A	0.0	0.4	0.0	1.1	0.0	3.7
Serum Vitamin C	8.7	21.2	27.7	31.7	75.2	12.6
Urinary Thiamin	0.8	30.2	0.4	12.7	0.0	0.0
Urinary Riboflavin	0.1	1.9	0.0	1.5	0.0	0.0
Urinary Iodine[d]	0.1	–	4.5	–	1.5	–
Serum Cholesterol[d]	10.9	–	7.5	–	2.2	–

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

d. Standard does not provide for moderate risk category.

(Nutrition Canada *National Survey 1970–1972*)

Table 5-25

DIETARY EVALUATION OF MIDDLE-AGED MEN (40-64 YEARS OLD)[a] PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE	INADEQUATE	LESS-THAN ADEQUATE
Protein	7.2	5.6	4.6	17.8	0.0	0.0
Iron	3.5	14.8	4.8	23.6	0.0	0.0
Calcium	4.4	18.4	16.8	31.8	9.7	15.2
Vitamin A	15.1	15.2	27.6	15.0	74.5	12.7
Vitamin C	3.4	10.3	12.7	14.5	26.5	37.4
Thiamin	7.6	32.8	11.3	32.1	4.0	1.6
Riboflavin	2.9	27.3	8.4	31.3	0.0	0.0
Niacin	1.4	3.2	0.2	6.4	0.0	0.0

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-26 **PONDERAL INDEX OF MIDDLE-AGED WOMEN (40-64 YEARS OLD)[a] PERCENTAGE AT HIGH RISK**

	PROVINCIAL POPULATION[b] HIGH RISK	INDIANS[c] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	65.0	86.7	73.7

Table 5-27 **CLINICAL ASSESSMENT OF MIDDLE-AGED WOMEN (40-64 YEARS OLD)[a] PERCENTAGES AT RISK**

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[b]	INDIANS[c]	ESKIMOS
Vitamin C Deficiency, High Risk	0.2	0.0	2.4
Thiamin Deficiency, High Risk	0.7	2.2	0.0
Goitre, High Risk	1.7	0.7	0.0
Moderate Risk	8.5	2.1	0.0

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

Table 5-28

BIOCHEMICAL EVALUATION OF MIDDLE–AGED WOMEN (40–64 YEARS OLD[a]) PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.6	4.2	0.0	0.6	0.0	0.0
Hemoglobin	1.5	5.7	0.0	11.9	1.8	14.1
MCHC	3.6	21.9	3.1	27.6	13.7	41.6
Transferrin Saturation	8.2	20.3	21.1	25.5	28.4	20.7
Serum Folate	12.5	46.3	19.5	44.3	65.5	32.0
Serum Calcium[d]	2.3	–	2.3	–	1.8	–
Serum Vitamin A	0.0	2.5	0.0	2.3	0.0	3.7
Serum Vitamin C	3.8	13.9	10.5	31.4	66.3	18.2
Urinary Thiamin	0.2	9.6	0.0	7.5	0.0	0.0
Urinary Riboflavin	0.0	2.9	0.0	1.7	0.0	0.0
Urinary Iodine[d]	0.2	–	0.0	–	14.2	–
Serum Cholesterol[d]	33.8	–	21.2	–	12.3	–

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

d. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-29

DIETARY EVALUATION OF MIDDLE-AGED WOMEN (40-64 YEARS OLD)[a] PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	11.1	15.9	22.8	16.2	5.5	39.9
Iron	30.7	36.1	52.7	31.5	40.5	11.0
Calcium	17.8	26.1	28.5	25.1	41.8	39.5
Vitamin A	29.6	25.2	37.0	23.1	78.1	1.5
Vitamin C	4.2	12.4	7.3	24.8	43.8	35.9
Thiamin	16.1	33.7	23.6	28.1	34.9	3.2
Riboflavin	11.6	36.9	13.8	36.2	1.8	6.0
Niacin	3.6	7.4	5.5	12.5	2.9	28.1

a. Indians and Eskimos (40-54 years old).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-30

PONDERAL INDEX OF SENIOR ADULT MEN (65 YEARS OLD AND OVER)[a] PERCENTAGE AT HIGH RISK

	PROVINCIAL POPULATION[b] HIGH RISK	INDIANS[c] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	65.8	68.9	79.6

Table 5-31

CLINICAL ASSESSMENT OF SENIOR ADULT MEN (65 YEARS OLD AND OVER)[a] PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[b]	INDIANS[c]	ESKIMOS
Vitamin C Deficiency, High Risk	0.6	0.0	5.5
Thiamin Deficiency, High Risk	5.6	2.2	0.0
Goitre, High Risk	0.0	0.0	0.0
Moderate Risk	1.2	0.0	0.0

a. Indians and Eskimos (55 years old and over).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-32 **BIOCHEMICAL EVALUATION OF SENIOR ADULT MEN (65 YEARS OLD AND OVER[a]) PERCENTAGES AT HIGH AND MODERATE RISK**

BIOCHEMICAL TEST	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.1	5.4	0.0	0.7	0.0	0.0
Hemoglobin	2.4	16.5	0.8	14.8	7.3	41.9
MCHC	2.6	23.2	3.1	16.6	1.6	36.1
Transferrin Saturation	7.2	10.6	4.4	17.9	0.0	35.9
Serum Folate	17.7	51.5	19.5	59.9	77.2	22.7
Serum Calcium[d]	1.3	–	4.7	–	14.7	–
Serum Vitamin A	0.0	0.6	0.0	2.6	0.0	10.0
Serum Vitamin C	15.8	17.3	40.8	28.3	68.4	24.9
Urinary Thiamin	0.6	29.5	0.0	28.9	0.0	0.0
Urinary Riboflavin	0.0	3.4	0.0	0.0	0.0	0.0
Urinary Iodine[d]	0.8	–	4.5	–	15.1	–
Serum Cholesterol[d]	10.5	–	13.1	–	4.4	–

a. Indians and Eskimos (55 years old and over).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

d. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-33

DIETARY EVALUATION OF SENIOR ADULT MEN (65 YEARS OLD AND OVER)[a] PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	7.1	20.2	14.0	22.6	0.0	2.3
Iron	4.9	30.0	11.5	24.4	15.8	5.0
Calcium	9.9	22.4	25.7	34.2	38.7	32.1
Vitamin A	23.1	22.9	34.2	20.8	76.9	0.0
Vitamin C	4.0	12.8	9.0	29.5	33.7	53.7
Thiamin	10.7	29.9	18.7	29.7	19.2	6.6
Riboflavin	4.3	36.8	9.2	29.6	5.8	8.1
Niacin	1.6	7.2	1.3	10.5	9.2	3.4

a. Indians and Eskimos (55 years old and over)

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-34 **PONDERAL INDEX OF SENIOR ADULT WOMEN (65 YEARS OLD AND OVER)[a] PERCENTAGE AT HIGH RISK**

	PROVINCIAL POPULATION[b] HIGH RISK	INDIANS[c] HIGH RISK	ESKIMOS HIGH RISK
Ponderal Index	79.9	86.6	75.0

Table 5-35 **CLINICAL ASSESSMENT OF SENIOR ADULT WOMEN (65 YEARS OLD AND OVER)[a] PERCENTAGES AT RISK**

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[b]	INDIANS[c]	ESKIMOS
Vitamin C Deficiency, High Risk	0.0	0.5	6.9
Thiamin Deficiency, High Risk	7.2	9.1	0.0
Goitre, High Risk	0.4	2.3	0.0
Moderate Risk	3.5	1.0	0.0

a. Indians and Eskimos (55 years old and over).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

Table 5-36 **BIOCHEMICAL EVALUATION OF SENIOR ADULT WOMEN (65 YEARS OLD AND OVER[a]) PERCENTAGES AT HIGH AND MODERATE RISK**

BIOCHEMICAL TEST	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	0.7	8.0	0.3	1.4	0.0	0.0
Hemoglobin	0.8	4.0	1.4	7.8	0.0	22.6
MCHC	2.3	22.1	5.4	24.7	8.7	33.1
Transferrin Saturation	2.6	15.4	21.2	22.4	5.7	9.5
Serum Folate	13.7	47.8	26.8	50.9	77.8	13.6
Serum Calcium[d]	1.5	–	4.6	–	12.8	–
Serum Vitamin A	0.0	0.2	0.0	9.4	0.0	10.5
Serum Vitamin C	4.7	11.7	21.0	26.5	80.4	3.9
Urinary Thiamin	0.4	11.7	0.0	9.6	0.0	9.0
Urinary Riboflavin	0.4	4.1	0.0	0.0	0.0	0.0
Urinary Iodine[d]	0.0	–	0.2	–	9.5	–
Serum Cholesterol[d]	29.4	–	21.6	–	25.0	–

a. Indians and Eskimos (55 years old and over).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

d. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-37 **DIETARY EVALUATION OF SENIOR ADULT WOMEN (65 YEARS OLD AND OVER)[a] PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS**

NUTRIENT	GENERAL POPULATION[b]		INDIANS[c]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	14.5	23.2	27.4	16.0	23.1	18.5
Iron	8.4	47.5	18.4	34.2	22.1	8.8
Calcium	20.0	27.8	34.0	22.5	47.1	52.8
Vitamin A	32.1	21.6	49.9	12.5	88.0	0.0
Vitamin C	1.9	11.2	7.8	29.2	43.6	56.3
Thiamin	14.5	38.3	36.5	27.8	30.9	14.8
Riboflavin	14.8	32.8	13.2	44.7	11.0	34.8
Niacin	4.7	14.1	6.5	19.5	22.1	8.8

a. Indians and Eskimos (55 years old and over).

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Includes volunteers; does not constitute a probability sample.

(Nutrition Canada National Survey 1970–1972)

5.3 NUTRITION PROBLEMS DURING PREGNANCY

This group includes pregnant women of all ages. It should be recalled that pregnant women in the three populations surveyed do not constitute a probability sample. Most of the pregnant women were referred to Nutrition Canada by local health authorities. It may be expected, therefore, that the data on pregnant women are biased and show a superior picture of health compared to that which actually exists in the pregnant population.

The data are presented in Tables 5-38 to 5-40.

Pregnancy is a period of increased nutritional needs. In the course of pregnancy, an adequate supply of nutrients must be provided to meet the demands of the developing fetus as well as those of the mother. It is crucial therefore that food intake be of sufficient quantity and quality to meet all the nutritional needs of pregnancy.

Total serum protein levels classify at risk about 30% of the pregnant women examined in the General Population, compared with 12% of Indians and only 5% of Eskimos.

The levels of *protein in the diet* of pregnant women are adequate except for about 15% of Eskimos and those in the General Population and about 25% among Indians. Even a moderate protein deficiency in pregnancy is of importance and demands attention because of the potential serious consequences.

The values of *hemoglobin, MCHC* and *transferrin* saturation are indicative of widespread iron deficiency. There is a moderate risk of anemia in 25% of pregnant women in the Indian and General Population and in 65% of the Eskimos. Iron deficiency, as indicated by transferrin saturation values, exists in a third of pregnant women in

the General Population and in half of the Indian and Eskimo Populations.

The shortage of *iron in the diet* is severe, particularly among Indians. More than a third of Indian pregnant women have intakes in the inadequate range and a third in the less-than-adequate range. In the General Population, a quarter of pregnant women have inadequate iron intakes and another quarter have less-than-adequate intakes. On the other hand, only one out of five pregnant Eskimo women shows iron intakes in the less-than-adequate range.

These findings indicate a serious iron deficiency that is particularly crucial since it occurs during pregnancy.

The values for *serum folate* classify at high risk 16% of pregnant women in the General Population, 26% among Indians, and 42% among Eskimos. No clinical manifestations of folate-vitamin B_{12} deficiency are evident. As pointed out earlier, the possibility of folate deficiency playing a major role in the anemia observed among Eskimos remains open to question. The full significance of low serum folate levels in pregnancy is not clearly understood. However, their consequence, particularly in terms of the health of the fetus, should be adequately investigated.

The *serum calcium* values are normal in pregnant women among the Indians and in the General Population, but one out of five in the Eskimo sample is at risk.

Diets of pregnant Eskimo and Indian women are lower in *calcium and vitamin D* than are diets of pregnant women in the General Population: half to two thirds have inadequate intakes of both nutrients. In the General Population, 15% have inadequate intakes of

calcium and over 25% have inadequate intakes of vitamin D. Since the vitamin D data are potential intakes, the actual intakes are likely to be lower than those reported.

These findings are indicative of a serious calcium deficit, particularly among pregnant Eskimo women, a moderate deficit among Indians and a less than satisfactory situation in the General Population.

There is no clinical evidence of *vitamin A deficiency.* Furthermore, *serum vitamin A* values are within or near the normal range for pregnant women in all three populations. About 5% of pregnant women in the General Population are at moderate risk, compared with about 12% of pregnant women in Indian and Eskimo Populations.

Vitamin A intakes in the diet are inadequate for about a quarter of the pregnant Indian women and half of the pregnant Eskimo women. These data suggest a moderate vitamin A deficit among some pregnant Indians and Eskimos but a generally satisfactory vitamin A status among the pregnant women in the General Population.

Clinical evidence of *vitamin C deficiency* was equivocal in some pregnant Indian women and not present among pregnant women in the Eskimo and General Populations. The *serum vitamin C* values classify at risk about 10% of the pregnant women in the General Population, 40% in the Indian and 70% in the Eskimo samples.

Vitamin C intakes in the diet show a similar trend: satisfactory for pregnant women in the General Population (10% with less-than-adequate intake), restricted for those in the Indian sample (26% with less-than-adequate intakes), and severely restricted for

those in the Eskimo sample (almost 65% with less-than-adequate intakes).

These findings indicate a widespread deficit of vitamin C among pregnant Eskimos and Indians but not among those in the General Population.

There is no clinical manifestation of *thiamin deficiency* among pregnant Eskimos. Only small numbers in the General Population and among Indians exhibited signs suggestive of thiamin deficiency. The *urinary thiamin levels* are normal for virtually all pregnant women examined in the three populations.

The *dietary intakes of thiamin* in relation to calories, are satisfactory for pregnant Eskimo women, marginal for many pregnant women in the General Population, and inadequate for 15% of pregnant Indian women.

The *excretion levels of riboflavin* are normal for all pregnant women in the three populations. The intakes of riboflavin in relation to calories in the diets of pregnant women are generally satisfactory.

The *dietary intakes of niacin* in relation to calories are within or near the adequate levels for pregnancy in all three populations.

The values for *urinary iodine* reflect adequate levels in the diet of all pregnant women in the three populations. However, as observed in adolescents and the adult population, moderate thyroid

enlargement is observed in appreciable numbers of pregnant women, particularly among those in the General Population. Again the prevalence is higher in prairie regions.

Table 5-38

CLINICAL ASSESSMENT OF PREGNANT WOMEN[a] PERCENTAGES AT RISK

CLINICAL EVIDENCE AND SEVERITY	GENERAL POPULATION[b]	INDIANS[a]	ESKIMOS
Vitamin C Deficiency, High Risk	1.5	5.1	0.0
Thiamin Deficiency, High Risk	0.4	3.3	0.0
Goitre, High Risk	2.4	0.0	0.0
Moderate Risk	14.0	3.4	6.2

a. Includes volunteers; does not constitute a probability sample.

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

(Nutrition Canada National Survey 1970–1972)

Table 5-39

BIOCHEMICAL EVALUATION OF PREGNANT WOMEN[a] PERCENTAGES AT HIGH AND MODERATE RISK

BIOCHEMICAL TEST	GENERAL POPULATION[b]		INDIANS[a]		ESKIMOS	
	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK	HIGH RISK	MODERATE RISK
Total Serum Protein	5.0	25.5	0.0	12.5	5.0	5.0
Hemoglobin	0.8	27.1	3.3	18.6	10.0	55.0
MCHC	2.4	23.0	13.5	15.2	5.5	27.7
Transferrin Saturation	8.8	20.3	32.1	21.4	25.0	25.0
Serum Folate	16.3	26.7	25.9	37.0	42.1	21.0
Serum Calcium[c]	5.6	–	5.2	–	20.0	–
Serum Vitamin A	0.0	5.1	0.0	12.5	0.0	10.0
Serum Vitamin C	2.3	8.5	10.3	29.3	47.3	21.0
Urinary Thiamin	0.1	1.9	0.0	1.7	0.0	0.0
Urinary Riboflavin	0.0	2.9	1.8	1.8	0.0	0.0
Urinary Iodine[c]	0.0	–	1.6	–	0.0	–

a. Includes volunteers; does not constitute a probability sample.

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in settlements.

c. Standard does not provide for moderate risk category.

(Nutrition Canada National Survey 1970–1972)

Table 5-40

DIETARY EVALUATION OF PREGNANT WOMEN[a]
PERCENTAGES WITH INADEQUATE AND LESS-THAN-ADEQUATE INTAKES OF NUTRIENTS

NUTRIENT	GENERAL POPULATION[b]		INDIANS[a]		ESKIMOS	
	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE	INADEQUATE	LESS–THAN ADEQUATE
Protein	3.3	8.5	9.7	17.0	8.3	8.3
Iron	24.8	22.6	37.9	32.7	5.0	20.0
Calcium	19.9	18.6	58.6	18.9	60.0	15.0
Potential Vitamin D[c]	28.9	28.6	66.6	15.6	50.0	50.0
Vitamin A	10.9	14.9	24.3	21.9	50.0	20.0
Vitamin C	2.0	8.2	10.5	15.7	30.0	35.0
Thiamin	3.9	21.5	15.5	22.4	5.0	5.0
Riboflavin	5.0	17.0	6.8	34.4	5.0	5.0
Niacin	0.8	3.9	1.7	10.3	0.0	5.0

a. Includes volunteers; does not constitute a probability sample.

b. Residents in provinces exclusive of Indians in bands living on reserves and Eskimos in Settlements.

c. Assumes all milk and margarine contain added Vitamin D as permitted by the Food and Drug Regulations.

(Nutrition Canada National Survey 1970–1972)

5.4 NUTRITION PROBLEMS IN PERSPECTIVE

The results of Nutrition Canada probably present an optimistic view of the nutrition problem in Canada. In surveys of this magnitude, the persons selected who do not take part are often the ones with nutritional or other health problems. Those who participate are usually aware of the importance of nutrition and are likely to be fairly well nourished.

The problems revealed by the survey can have varying consequences: a lowering of the quality of life, mild or serious illness, or even death. When prevalence and severity (e.g., proportion of the population at risk) are high, the consequences are great; when the population is particularly vulnerable as during pregnancy or fetal development, the problems become serious.

The survey examined the effect of such broadly-defined factors as season, average household income, and community type for the General Population.

It is valuable to consider all of these factors in analyzing the results and to view the nutritional problems in perspective.

Preliminary analysis of the results revealed no consistent effect of season, income or community type. The data collected for the Indian and Eskimo populations has not yet been analyzed for these characteristics. Since nutrition problems are essentially the same in summer as in winter and in metropolitan, urban or rural areas, the food distribution system in Canada seems to be effective. The fact that communities classified above the poverty line are generally plagued with the same nutrition problems as those in the poverty zone suggests that the critical factor is not the number of food dollars that are spent. This does not exclude the possibility that families on very low incomes are adversely affected. The preliminary analysis included a compari-

son of nutritional status between *low* income areas and *other* income areas. Further analysis in terms of individual family incomes, may give some indication of income levels below which nutrition problems are related primarily to food dollars rather than to nutrition knowledge and eating practices.

The problem of overweight plagues very large proportions of adults in Canada. The initial analyses of the data show that calories alone do not account for the overweight problem. Those who are overweight and those who are not do not differ greatly in the number of calories they consume. The main cause is likely to be a sedentary life and therefore both factors, caloric intake and physical activity, need to be considered. Over the past few decades, Canadians have reduced their physical activity to minimal levels because of changes in life style and the misuse of advances in technology. The impact of such changes on metabolism and the consequences to health are indeed complex and remain only partially understood. Since the level of physical activity and the amounts and types of foods consumed are matters of personal choice, overweight may be viewed as a self-inflicted health problem.

Iron deficiency affects a large proportion of Canadians. Since many women have an iron deficit during pregnancy, many babies are born with low iron stores and are not likely to attain normal tissue storage of iron if iron intakes subsequently remain marginal. Iron deficiency is usually considered to occur in infants and women. The survey findings show it to be a problem for men as well. The shortage of iron in the diet may be due to an increased consumption of refined foods and a reduced total intake of food. The use of aluminum and stainless steel cookware rather than iron vessels also eliminates a valuable source of iron. There is no doubt that our food supply is generally low in iron and that, in certain foods, the iron has a low degree of bioavailability.

The results of Nutrition Canada also show a protein deficit during pregnancy, and protein and/or caloric deficit among a small but noteworthy proportion of children under 5 years of age. Considering the bias in the selection of the pregnant women, it is likely that the examined were in better health than many of the pregnant women not examined. Even so, a substantial number of pregnant women do not consume adequate amounts of protein and many have total serum protein levels that place them at risk. At the root of this protein deficit is probably unsatisfactory eating practices among adolescent and adult women. The consequence is a disadvantaged child of low birth weight and with nutritional deficits of a multiple nature. The weight deficit observed in some infants and children may be similarly explained. The importance of adequate protein and calorie nutrition prior to and during pregnancy to both the mother and child warrants major emphasis.

Shortage of calcium and vitamin D in the diets of many infants, children and adolescents is another problem documented by Nutrition Canada. Adequacy of calcium at this stage is essential to building a healthy skeleton and maintaining it throughout adult years. While the shortage of vitamin D is not severe enough to have resulted in any observed cases of rickets, such cases may still exist among hospital or non-respondent populations. Since the vitamin D intakes assumed that all milk was fortified, and since milk is the major dietary source of vitamin D, the shortage in dietary vitamin D indicates a low consumption of milk among children and adolescents.

Thiamin deficiency is limited to adults, and to pregnant women in the General and Indian Populations. The prevalence, on the basis of urinary thiamin data, is higher among men than women, but suggestive clinical evidence is the reverse. Dietary intakes of thiamin in relation to calories, however, are similar for men and women. These findings are suggestive of moderate thiamin deficiency among adults.

Evidence of vitamin C deficiency exists in the Eskimo and to a lesser extent in Indian Populations. The evidence includes clinical signs suggestive of vitamin C deficiency, low levels of serum vitamin C and a deficit of the vitamin in the diet. Foods high in vitamin C may not be currently available in remote areas of the north nor do they form part of the customary Indian and Eskimo diet.

There is a moderate vitamin A deficit among pregnant Indians and Eskimos. This reflects inadequate stores of the vitamin prior to, and less-than-adequate intakes during pregnancy. This moderate deficiency during pregnancy may also explain the low serum levels of vitamin A observed in many infants and toddlers. Dietary intakes among infants, toddlers and children are satisfactory. Furthermore, there is no indication of deficiency among adolescents and adults.

A surprising finding of the study is that large numbers of Canadians of all ages have low serum folate values. However, there is no clinical evidence of folate and vitamin B_{12} deficiency anemia since most of the anemia observed is best explained on the basis of iron deficiency. It is not possible to assess the clinical significance and public health consequences of these findings without further hematological studies and an evaluation of dietary folate intakes. Folic acid, one of the B vitamins, plays a major role in intermediary metabolism and in the metabolism of the nucleic acids responsible for transfer of hereditary characteristics among cells. Low levels in the serum are generally associated with low levels in tissues. Therefore, this observation should be viewed with concern.

The prevalence of moderate enlargement of the thyroid in the General Population is another finding that requires further elucidation. Its cause is not clearly understood. The data for urinary iodine excretion indicate adequate or even high intakes in some individuals. It is unlikely that the goitre observed can be attributed to iodine

deficiency. In addition, there is considerable variation in prevalence rates in different parts of the country; the highest rates occur in the prairie regions. It is evident that further research is required to define the cause and clinical significance of the problem.

Nutrition Canada has documented specific nutrition problems. Corrective measures are therefore required to deal with these problems. Furthermore, attention should be given to early detection of such problems and to the development of prevention programs for the future.

CHAPTER 6 - NUTRITION PRIORITIES IN CANADA

Nutrition has a strong impact on our health and life in general. It affects both physical and mental development, susceptibility to disease and ability to resist infections and tolerate stress. In setting nutrition priorities, it is fundamental to recognize the right of every Canadian to be well nourished. Government policies, industry's actions and consumer attitudes should be geared towards the fulfilment of this right. It is in this vein that Nutrition Canada was commissioned to assess the nutritional status of Canadians. With the study completed, Canada is in a strong position to formulate a National Nutrition Policy. Priorities need to be set and roles of governments, industry and consumers defined. Mechanisms for monitoring the nutritional health of the nation should be established and systems should be developed for dealing with problems before they reach serious proportions and adversely affect the quality of life.

A. Government has a vital regulatory role to play in ensuring that the Canadian food supply is nutritionally adequate. Every effort should be made to formulate and implement nutrition standards for foods sold in Canada in the following general context:

1. Nutrition standards for foods in Canada should set minimum levels of appropriate nutrients to be expected in a food to ensure that foods devoid of nutrients are not marketed to the unsuspecting public. Regulations should ensure the balance of nutrients in foods likely to be consumed as snacks or in place of meals. Encouraging moves have been made with the issuance by Health Protection Branch in 1971 of proposed guidelines for the addition of nutrients to foods.

2. Present enrichment and fortification programs need to be re-evaluated in the light of the findings of Nutrition Canada. The data base of this study is suited to identification of the specific foods and the level of enrichment or fortification required to alleviate a deficiency of a particular nutrient in the Canadian diet.

3. Revision of enrichment and fortification programs should specify the form of nutrient to be added as well as the quantity to take into consideration the bioavailability and stability of the nutrient.

B. Effective motivation of the Canadian public to see the value of nutrition and related health aspects is of paramount importance. Many of the current nutrition problems can be significantly reduced if the consumer's level of knowledge and motivation leads to a wiser selection of foods and better eating practices. To achieve such a goal, the professionals involved – nutritionists, physicians, physical fitness experts, and communication specialists – will have to demonstrate imagination and ingenuity in developing programs. Government and industry must provide the framework within which professionals can operate. Industry should develop and promote foods which enhance such programs.

1. Professional nutritionists should orient their training and work to aim directly at the recognized nutrition problems of public health significance, and increase their contact with the public. The availability of nutritionists for direct counselling in the community will be an effective measure in increasing the consumers' awareness of the importance of diet to health and general well-being. To most Canadians a reliable answer to a nutrition inquiry

should be as close as the telephone. In disadvantaged communities, measures should be implemented to reach out to those who need help.

2. Communicators and media experts are sensitive to the public's needs and attitudes. Their contribution to nutrition and health has been limited, yet amongst them lie valuable resources and talents that need to be tapped.

3. Development of meaningful nutrition education programs will necessitate trying imaginative approaches and assessing their effectiveness. It would be advisable therefore to pool resources, coordinate efforts and collate results across Canada. Such a coordinating role should be assumed by the Federal Government.

4. Industry bears an enormous responsibility for the shaping and evolution of eating practices of the population. Yet considerations of the nutritive value of a food and its impact on the health of consumers often do not play a role in the development of new food products. It would be in the public interest for industry to routinely consider nutrition in the same way as it does texture, flavour and colour. The alternative would have to be strong regulatory measures. These measures would be rather complex to formulate but government should not hesitate to act in the public's interest.

C. Nutrition education can take many forms, some direct, some indirect. The approach used must recognize the particular concerns of the audience. For example, pregnant women and mothers are highly motivated towards nutrition and other health subjects for the benefit of their children. The influence of advertising on childrens' food

selection patterns suggests that children too could be receptive to nutrition education. Nutritionists are well aware of the beneficial influence of a well-executed nutrition component in the school curriculum on eating practices, not only on the school children themselves but on their family at home as well. Adults could benefit greatly from well-planned food selections in cafeterias and from availability of realistic and viable gymnasium facilities at places of work.

1. Proper nutrition during pregnancy is vital to the development of the fetus and maintenance of the health of the mother. In many communities, health authorities sponsor pre-natal clinics to emphasize the importance of health to mothers-to-be. It is essential that they present an adequate and practical coverage of nutrition.

Satisfactory nutritional status of the mother-to-be depends not only on her diet and eating practices during pregnancy but also on her nutritional status before pregnancy. Women should plan their nutrition along with planning pregnancies. Family planning clinics have an important role to play in promoting such nutritional preparation for pregnancy.

2. Industry should take positive steps towards promoting good eating practices in their advertising campaigns and government should encourage such efforts on the part of industry.

3. Nutrition is an essential part of health and should be adequately emphasized in school curricula. The subject should be taught in practical terms and relate to facilities and practices in the home and the school. Eating facilities

and food selections in school should encourage sound eating habits.

In addition to nutrition, physical activity and fitness programs should be emphasized. These deserve much more attention than highly competitive sports which lead to more spectators and fewer participators.

4. The problem of overweight identified in adults has to be viewed as a result of calories consumed being in excess of energy expended. In our technologically-advanced society, men and women are finding fewer opportunities for physical activity. Sport and exercise facilities should be available at places of work.

D. In spite of all that government and industry can do, the ultimate responsibility lies with the consumer. Consumers should make it their business to acquire reliable nutrition information and to selectively promote nutritious foods and reject foods that offer little nutrition. Consumers should not depend on government to spoon-feed them information nor should they be misled by excessive promotion of goods of questionable nutritional value. There is no substitute for a well-informed consumer. Organized consumer and community-based groups, representing the interest of all Canadians as consumers, should launch vigorous campaigns to promote this concept amongst their memberships and the consumers at large.

E. The training of professionals should be geared to meet the existing needs in society. There are major discrepancies between the types of professionals being trained and the types that are needed in Canada today.

There is a dearth of professionals trained in community nutrition, nutrition education and nutrition and food technology. University programs have traditionally trained nutritionists in laboratory research activities, an emphasis which perpetuates the employment of graduates in university and/or government research programs rather than in the community.

Nutrition aimed at public health problems is seldom included in medical curricula with the result that few physicians are able to converse with their patients on the subject.

It is self-evident that effective programs cannot be built without properly-trained professionals. Universities have an important role to play in the training of nutritionists, physicians and nutrition-oriented health professionals for the proper evolution of effective nutrition programs in Canada.

F. A sound National Nutrition Policy has to be based on accurate up-to-date assessment of the nutritional status of the population. Systems shall have to be developed for monitoring and surveillance of the nutritional health of Canadians to allow early detection of problems and initiation of corrective measures. In the meantime, full use must be made of existing information in the Nutrition Canada data bank. Researchers inside and outside government agencies should be called upon to participate in the further analysis and the exploration of the data. In addition, there is a need for follow-up research to elucidate many of the nutrition problems revealed by Nutrition Canada. For example, more work is needed on the clinical significance and public health consequence of the obs-

erved low serum folate values, the causative factor of the apparent thiamin deficiency in adults and the etiology of the geographic differences in the prevalence of goitre in Canada. This need for further research should not be used as an excuse for delaying corrective programs at the present time. The problem of malnutrition in Canada is too serious to await further research.

It should be of concern that many of the nutritional problems revealed in Nutrition Canada have been suspected for many years. Hopefully, now that these problems are adequately documented, government will strengthen their regulatory and education programs, industry will show more concern for the nutritional quality of their products and consumers will awaken to the benefits derived from wise eating habits.

APPENDIX A LISTS OF COMMITTEE AND TEAM MEMBERS

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APPENDIX B - CANADA

SOME ECOLOGICAL FACTORS INFLUENCING NUTRITIONAL STATUS

The nutritional status of any population is a function of a number of basic factors: the people, their customs and their occupations; their general health status and the health services available to them; the agricultural productivity and the food supply as influenced by manufacturing, transporting, storing and marketing capabilities.

The material contained in this Appendix is a brief review of these factors. Much of the information will be known to those familiar with Canada but may be valuable to those who do not know the country.

B.1 POPULATION CHARACTERISTICS

Age Distribution

The estimated population of Canada at the time of the 1971 census was 21.6 million. The age distribution of the population, divided according to the age groupings used by Nutrition Canada, was as follows: 0-4 years, 8.4%; 5-9 years, 10.4%; 10-19 years, 20.4%; 20-39 years, 28.0%; 40-64 years, 24.5%; 65+ years, 8.1%. The declining birthrates of the 1960's resulted in a 19% decrease in the size of the 0-4 year age group in the 1961-1971 intercensal period. At the same time, the proportion of older persons in the population increased: between 1961 and 1971, the numbers of persons over 65

years increased by 350,000 or 26% while the over-all population increased by 18.2%.

Ethnic Origins

The Canadian population is composed of more than 37 ethnic groups. At the time of the 1971 census, the major groups were British (45%), French (29%), German (6%) and Italian (3.4%). Other groups which each comprised more than 1% of the population were the Ukrainians, Dutch, Jews and Canadian Indians.

Immigrants coming to Canada between 1946 and 1971 settled, mainly, in Ontario and in urban centres. Over one half (1.3 million) of the 2.3 million postwar immigrants residing in Canada in 1971 lived in Ontario; 32% of the 2.3 million were in Metropolitan Toronto. Eighty-nine per cent of the 371,000 postwar immigrants in Quebec in 1971 lived in Montreal. This concentration in urban localities has permitted many immigrants to preserve their original food habits since it has been feasible to either manufacture or import foods to meet their preferences.

The Canadian Indians are widely scattered across Canada while the 18,000 Eskimos are concentrated in the Territories and Northern Quebec.

Urbanization

Canada's population is one of the most urbanized in the world. In 1971, three quarters (76%) of the population were living in urban centres of 1,000 or more and slightly less than half (47.5%) of the population were living in centres of 100,000 or more. In 1851, less than 15% of the population was urbanized but by 1931, 50% of the population lived in centres of 1,000 or more. The periods 1941-1951 and 1951-1961 showed the highest intercensal increase in the level

of Canadian urbanization since 1851. In 1971, while 24% of the population lived in rural areas, only 6.6% lived on farms. The rural farm population has been declining in absolute numbers since 1931. It experienced a 27% decrease in the 1951-1961 intercensal period and a further 31.5% decrease during the 1961-1971 intercensal period.

Occupations

The urbanization of the Canadian population is reflected in occupational statistics. The proportion of persons engaged in "white collar" jobs increased from 25% of the labour force in 1941 to 37% in 1961. During the same period, the proportion of persons working in the primary industries – farming, logging, fishing and mining – decreased from 30% to 13% of the labour force. The proportions of the "blue collar", and transport and communications workers remained unchanged while those in service and recreation occupations increased from 10% to 12% of the labour force. In 1970, total employment in agriculture was 511,000 persons (6.5% of the labour force) – 17,000 persons fewer than in 1961.

The trend in job occupations is towards less and less physical labour. Jobs in the "white collar" category are mainly sedentary while mechanization has decreased the physical labour required in many of the jobs in the other categories.

Vital Statistics

The advances in medicine and improvements in socio-economic conditions have resulted in an increased life expectancy and a decreased infant mortality rate. Life expectancy at birth for males rose from 63 years in 1941 to 69 years in 1966 and for females from 66 to 75 years. The infant mortality rate of 61.1 per 1000 live births in 1941 dropped to 18.8 per 1000 live births in 1970. Across

Canada, however, the infant mortality rates ranged from 16.9 in Ontario to 68.1 in the North West Territories in 1970. Nutritional factors are implicated in mortality and morbidity of the newborn and infants. Maternal mortality fell from 36.4 per 10,000 live births in 1941 to 2.0 in 1970.

Diseases in which nutrition has been implicated as an etiologic factor are among the major causes of death in Canada. Ischemic heart disease due to atherosclerosis is the leading killer, with a death rate of 230 per 100,000 population. Other causes of death are cerebrovascular disease (74.3/100,000 population), and diabetes mellitus (13.6/100,000 population).

B.2 HEALTH SERVICES

Medical and Hospital Services

The administration of health services in Canada is a provincial responsibility under the British North America Act. However, the federal government has become involved increasingly as the scope, scale and cost of health care has expanded. The federal government, through the Medical Care Act (1966) and the Hospital Insurance and Diagnostic Service Act (1959), has entered into agreements with the provinces to share the cost of medical and hospital care. In order to take part in the shared cost scheme, the provincial health plans must adhere to certain criteria which ensure that uniform coverage for all essential hospital, medical and diagnostic services is available to all people. The only dental care covered specifically by these programs is in-hospital work done by dental surgeons.

In hospitals employing dietitians, dietetic counselling is available to in-patients and to certain out-patients such as those attending diabetic clinics. In general, however, there is very little dietetic or nutrition counselling available to the general public through medical channels.

Indian Health Services

The federal government is directly responsible for health services for all registered Indians and Eskimos. In the provinces, Indians are entitled to the benefits of provincial medical care and hospital insurance. In addition, the Medical Services Branch of the Department of National Health and Welfare provides dental care for children, immunization, school health services, health education, pre-natal and post-natal clinics, and well baby clinics. Since many Indians live in isolated areas, health facilities – nursing stations, health centres, and out-patient clinics – are maintained in about 200 remote areas.

Northern Health Services

In the Yukon and Northwest Territories, medical care and hospital insurance benefits are available to all inhabitants including Indians and Eskimos. Medical Services arrange for the transportation of patients from isolated communities and maintain 4 hospitals, 6 clinics, 40 nursing stations and 15 health stations to serve the needs of the inhabitants.

Nutrition Services

Federal

The first centrally organized efforts in nutrition in Canada began with the Canadian Council on Nutrition, formed in 1937 and

formally established by Order-in-Council in 1942. Its function was to advise the Minister of Pensions and National Health on nutrition matters. The earliest activities of the Council included dietary surveys, food composition analyses, preparation of publications and the adoption of the Canadian Dietary Standard. World War II brought about increased involvement of the Council in national nutrition matters. This additional activity led to the appointment in 1941 of a full-time Secretary of the Council who was also the Director of the newly-formed Nutrition Services in the Department of Pensions and National Health. The Canadian Council on Nutrition continued to meet annually until 1969.

Nutrition Services became the Nutrition Division of the Department of National Health and Welfare in 1944. Before 1964 the Division actively carried out nutrition programs in the areas of field surveys, group feeding, education and publications. After 1964, the Division functioned in an advisory, consulting and co-ordinating capacity until it was finally phased out at the end of 1971. Its duties were then assigned to other areas of the Department.

The nutrition programs in the Department of National Health and Welfare, as of 1972, are largely concentrated in the Health Programs Branch and the Health Protection Branch. Health Services of the Health Programs Branch provide consultation services in dietetics and clinical nutrition. The Nutrition Bureau of the Health Protection Branch has assumed many of the responsibilities of the former Nutrition Division (e.g. education, publications, Canadian Dietary Standard). In addition, there are the nutrition programs of the Research Laboratories and the Food Advisory Bureau connected with the administration of the Food and Drugs Act and Regulations.

Provincial and Municipal

During World War II, Provincial Nutrition Committees were formed in six of the nine provinces and, by 1945, four provinces had employed nutritionists. As of 1971, all 10 provinces employed provincial nutritionists, but there was a wide disparity in the programs offered. The ratio of nutritionists per 100,000 population ranged from 0.1 to 1.6. In most provinces, the nutritionists act in a purely consultant role to other health professionals and have no contact with the public. In two provinces, however, the nutritionists are located in health units or regional offices where they are actively involved in the community, providing consultation services to groups and individuals as well as to professionals and to schools.

Within each province, a number of municipalities and regional health units employ nutritionists who are similarly involved with their community. However, the health professional most frequently involved in the direct dissemination of nutrition information to the public is the public health nurse.

B.3 FOOD SUPPLY

Agriculture

Farms occupy 270,000 square miles or seven per cent of the total area of Canada. While these farms are distributed unevenly throughout the 10 provinces, practically all of them are within 300 miles of the southern border.

There are five main agricultural regions in Canada which correspond to the five main geographic regions of the country.

1. The Atlantic Region (Appalachian – Acadian Region): This includes the Atlantic Provinces and the Gaspé District of Quebec. The farmland is located in the main valleys and smoother uplands. The climate is moderated by the sea and the annual precipitation is from 30 to 55 inches. The farming is mixed with large areas devoted to potatoes and orchard crops.

2. The Central Region (St. Lawrence Region): This is the second largest agricultural region in Canada. The farms are mainly situated on the shores of the St. Lawrence, and in the Ottawa Valley and Southern Ontario. The climate is modified by the Great Lakes, particularly in Southwestern Ontario. Annual precipitation varies from 30 to 45 inches per year. In addition to livestock and dairy products, the mild climate permits the cultivation of fruits and vegetables, as well as livestock and dairy production.

3. The Prairie Region (Interior Plains Region): The region comprising the three Prairie provinces contains 75% of the farmland in Canada. The climate is one of extremes, i.e., cold winters and warm summers. Annual precipitation is light, ranging from 13.5 to 20 inches. Farms principally produce grains and livestock.

4. The Pacific Region (Cordilleran Region): This is a mountainous region with farmland confined to the valleys and smoother plateaus. The climate of the coastal area is mild with a high rainfall. Inland, the range of temperature increases and the rainfall decreases. Due to the wide variation in climate, agricultural production ranges from ranching to fruit.

5. The Northern Region: This region lies north of latitude 60[6], and consists mainly of parts of northern British Columbia and the Yukon and the Mackenzie River Valley. Farming is limited both by climate and by lack of a local market.

Food Production

Cereals, Oilseeds, and Legumes:

Canada's principal grain crop is wheat. Annual production averaged about 680 million bushels during the 1960's. With domestic utilization accounting for approximately 170-180 million bushels during this period, wheat is the major agricultural export. Production is concentrated in the Prairie provinces, particularly Saskatchewan which grows more than 60% of the wheat.

Feed grains (corn, oats, rye, barley, mixed grain and buckwheat) are produced throughout Canada: corn and mixed grains are known mainly in Ontario. The other grains are mainly protected in the Prairie region.

Rapeseed is now the major oilseed crop in Canada and is grown in the Prairie region. Production averaged 18.9 million bushels during 1963-67 and increased to 72.2 million bushels by 1970. Exports from 1969-70 amounted to 22 million bushels. Flaxseed, sunflower seed, and mustard seed are also grown in the Prairie region.

Soybeans are grown in Ontario. In Canada the acreage for soybeans has been limited by climatic conditions but production increased from an average of 7.4 million bushels in 1963-67 to 10.4 million bushels in 1970.

Meat and Poultry Production:

Cattle and hogs are the two major species raised for meat in Canada. In 1970, Alberta had the highest number of beef cattle, followed by Ontario, Saskatchewan, Manitoba and Quebec. Ontario had the largest number of hogs, followed by Alberta, Quebec, Saskatchewan and Manitoba.

Poultry meat production in 1970 (1,035 million pounds) was in excess of domestic disappearance (958 million pounds). Over half the poultry in Canada in 1970 was raised in Ontario and Quebec.

Dairy Products:

Commercial dairy herds supply the local population with milk, with the exception of Newfoundland, the Yukon, and the Northwest Territories. The largest concentration is in Ontario and Quebec where 73% of the total milk production of approximately 18 billion pounds is produced. Dairy product production in Canada exceeds domestic utilization.

Fruits and Vegetables:

Due to climatic conditions, the areas in Canada suited to the growing of fruit are limited. Apples and small fruits are grown in Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia. Tender tree fruits and commercial vineyards are restricted largely to Ontario and British Columbia.

Apples are by far the largest fruit crop produced in Canada. Sixty-seven per cent of the crop enters the fresh fruit market; 33% is processed. Other fruits in order of quantity produced are grapes, peaches, pears, strawberries, cherries, blueberries, raspberries, plums, prunes and apricots.

In spite of the highly localized areas of production, the fresh fruit is distributed to all areas of the country.

Potatoes are the major vegetable grown in Canada. New Brunswick and Prince Edward Island are the principal producers with 42% of the crop, followed by Ontario, Quebec, Alberta and Manitoba.

Other vegetable crops are produced in all provinces with Ontario and Quebec having more than 80% of the total commercial acreage. Tomatoes are the major crop, followed by carrots, corn, onions, turnips, cabbages, cucumbers, peas, beans, lettuce, beets, cauliflower, celery, parsnips, spinach and asparagus.

Food Industry

The food industry in Canada is technologically advanced and highly diversified as in any developed country.

In 1970, there were 5,778 establishments in Canada with food and beverage factory sales of $8.6 billion. The food industry employed a total of 221,764 persons in 1970. More than half of the establishments are located in Ontario and Quebec.

The types of establishments include meat processing, poultry processing, fish products industry, dairy factories, fruit and vegetable canneries, milling and baking industries, confectionery manufacturers, miscellaneous food industries such as breakfast cereals, food and drink powders, alimentary pastes, coffee and tea, sugar processors, vegetable oil mills, soft drink manufacturers, distilleries, and breweries.

The fruit and vegetable canning and processing plants are located in the areas of production and the produce, once canned or frozen, is transported to central warehouses for distribution.

A sophisticated transportation system, by air, water, railway and road, distributes domestic food production and imported food to most areas of the country. The isolated communities in the north may be supplied either by water or air. Staples and non-perishable items are transported to the communities in the Arctic either by supply ships from Montreal or via the Mackenzie River and Arctic Ocean. Perishables may be flown in by air which adds considerably to their cost.

Retail Supply and Food Consumption

Most Canadian consumers have an abundant and varied supply of food available at the retail level. Due to Canada's surplus food production and ability to import foods, the only limitation to consumption could be the cost. The importation of fresh produce from the U.S. and Mexico means that many fruits and vegetables are available on virtually a year-round basis despite the single growing season in Canada.

Per capita food consumption data indicate that eating patterns have changed since 1949. The consumption of cereals and dairy products has declined while that of meat and poultry, and fats and oils (excluding butter), has increased.

The average proportion of total family income spent on food in 1969 was 18.7%. This varied however, from 27.9% in families with incomes under $3,000 to 13.4% in families with incomes of $15,000 plus.

Food Legislation

In Canada, there is a multiplicity of legislation – federal, provincial, and municipal – governing the manufacture and sale of food.

The legislation pertaining to the addition of nutrients to foods under the Food and Drugs Act has a significant impact on the nutritional value of Canadian foods. The Food and Drug Regulations require that all salt sold in Canada for table or general household use contain 0.01% potassium iodide.

The Regulations also permit the enrichment of flour with thiamin, riboflavin, niacin and iron; the addition of vitamin D to all forms of milk; the addition of vitamin C to evaporated milk; the addition of thiamin, riboflavin, niacin, and iron to breakfast cereals and alimentary pastes; and the addition of vitamin C to non-citrus fruit juices, fruit drinks and bases and mixes for fruit and vegetable drinks.

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APPENDIX C - SURVEY FORMS

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FORM 1

HOUSEHOLD AND FAMILY PROFILE

CARD TYPE: 1 (1) | CONTROL: A (2)

A SEASON, REGION & STRATUM (3-5) | SURVEY AREA (6-7) | HOUSEHOLD NO. (8-10)

B REASON FOR NON-RESPONSE (13)

SURNAME

C USUAL LANGUAGE (14): ENGLISH 1 | FRENCH 2 | BOTH 3 | OTHER 4

D APT. NO. _____ STREET AND NO. _____ (OR LOT, CONCESSION, TOWNSHIP, ETC.)

MUNICIPALITY _____

COUNTY/CENSUS DIVISION _____ PROV. (15-16)

TELEPHONE _____ CIRCLE FOR TELEPHONE: AT HOME | NEIGHBOR

E TYPE OF DWELLING (17): SINGLE 1 | MULTIPLE 2 — SPECIFY MULTIPLE _____

F TYPE OF HOUSEHOLD (18): FAMILY 1 | OTHER 2 — SPECIFY OTHER _____

G SOURCE OF WATER (19): TREATED/INSPECTED 1 | DEEP WELL 2 | SHALLOW WELL 3 | SURFACE WATER 4

H TYPE OF COOK STOVE (20-22): ELECTRIC RANGE OR RANGETTE 1 | NATURAL GAS RANGE 2 | HOT PLATES 3 | WOOD/COAL/OIL 4 | PRIMITIVE 5 | OTHER 6

J WHERE DO YOU USUALLY STORE PERISHABLE FOODS? (23): REFRIGERATOR 1 | ICE BOX 2 | ROOT CELLAR 3 | OTHER 4

(24): REFRIGERATOR & FREEZER 1 | FREEZER 2 | LOCKER 3 | OTHER 4

K NUMBER OF RESIDENTS IN DWELLING (25-27)

L RESIDENCE OF FAMILY HEAD (IN YEARS): IN THIS AREA (28-29) | IN THIS PROVINCE (30-31) | IN CANADA (32-33) | IN OTHER COUNTRY * (34-35) — * SPECIFY COUNTRY _____ (36-37)

M TOTAL ANNUAL FAMILY INCOME (FROM ALL SOURCES) (38): UNDER $2,000 1 | $2,000 - $3,999 2 | $4,000 - $5,999 3 | $6,000 - $9,999 4 | $10,000 - $14,999 5 | $15,000 & OVER 6

N WHERE DO YOU DO MOST OF YOUR SHOPPING? (39): SUPERMARKET 1 | NEIGHBORHOOD STORE 2 | OPEN MARKET 3 | OTHER 4

P DO YOU USE 'FREE FLOWING' TABLE SALT? (40): YES 1 | NO 2

Q WHO USUALLY DECIDES WHAT FOOD TO PURCHASE? (41): WIFE 1 | HUSBAND 2 | HUSBAND & WIFE 3 | OTHER ADULT 4 | CHILD (12 - 18 YRS) 5

R WHO USUALLY PREPARES FOOD? (42): WIFE 1 | HUSBAND 2 | HUSBAND & WIFE 3 | OTHER ADULT 4 | CHILD (12 - 18 YRS) 5

S WEEKLY AMOUNT SPENT ON FOOD BOUGHT FOR HOME CONSUMPTION (IN WHOLE DOLLARS) $ (43 - 46)

U FARM OR SMALL HOLDING (I.E. IN EXCESS OF 2½ ACRES) (48): FARM, OR SMALL HOLDING: 1 | NEITHER: 2

V DATE OF INTERVIEW (49-54): DAY | MONTH | YEAR

NAME OF INTERVIEWER _____

W DATE FIRST VISIT _____ 19__

DATE SECOND VISIT _____ 19__

DATE THIRD VISIT _____ 19__

ADDITIONAL INFORMATION

TRANSPORTATION: (CIRCLE ONE) OWN | PICK-UP

VITAMIN/MINERAL SUPPLEMENT BRAND NAME(S):

DATE OF VISIT TO CLINIC _____ 19__

HOUR(S) _____

LOCATION OF CLINIC _____

II

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FORM 1A

LIST OF HOUSEHOLD MEMBERS

CARD TYPE: 1 (1) | CONTROL: B (2)

A — SEASON, REGION & STRATUM (3-5) | SURVEY AREA (6-7) | HOUSEHOLD NO. (8-10)

B — DATE OF INTERVIEW: DAY | MONTH | YEAR

INTERVIEWER'S NAME _____

INDIVIDUAL'S SURVEY NUMBER (16-20)	SEQ. NO. (21-22)	NON-ATTEND X (23)	RELATIONSHIP TO HEAD OF FAMILY: 1-HEAD, 2-SPOUSE, 3-CHILD, 4-STEPCHILD, 5-PARENT, 6-GRANDPARENT, 7-OTHER RELATIVE, 8-NOT RELATED	SURNAME (24-25-34)	SEX AND PREGNANCY STATUS: M-MALE, F-FEMALE (NOT PREGNANT), IF PREGNANT GIVE NUMBER OF MONTHS OF PREGNANCY FROM 1 TO 9 MONTHS	CHRISTIAN NAME(S) (35-44-45)	DATE OF BIRTH: DAY (46-47)	MONTH (48-49)	YEAR (50-53)	HIGHEST SCHOOL GRADES OBTAINED: 01-13 GRADES, 21-29 (AFTER HIGH SCHOOL, OTHER THAN COLLEGE) - # YEARS, 30 COLLEGE, BLANK PRESCHOOL (54-55)	PLACE OF BIRTH (56-67)	EMPLOYMENT STATUS: 1-FULL TIME, 2-HOUSEKEEPER, 3-PART TIME, 4-SCHOOL, 5-UNEMPLOYED, 6-RETIRED, 7-OTHER	PROVINCE (IF IN CANADA) OR COUNTRY (OUTSIDE CANADA) OF BIRTH (68-79-80)
	01								19				
	02								19				
	03								19				
	04								19				
	05								19				
	06								19				
	07								19				
	08								19				
	09								19				
	10								19				
	11								19				
	12								19				
	13								19				
	14								19				
	15								19				
	16								19				
	17								19				
	18								19				
	19								19				
	20								19				

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FORM # 2

24 HOUR DIETARY RECALL

36 MONTHS AND OVER

CARD TYPE: 2 (1) | CONTROL: A (2)

A
REGION & SEASON: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B NAME & SURVEY NUMBER OF PERSON FOR WHOM RECORDED:
Surname:
Christian Name(s):
Person's Survey Number: (11-15)

C TIME OF DAY: ENTER TIME FROM 00:01 TO 24:00 IN HOURS AND MINUTES (31-34) (56-59)	PLACE OF EATING: 1. Home 2. School 3. Work, Field 4. Restaurant 5. Other (35) (60)	SOURCE: 1. Home 2. Self Purchased 3. Other (36) (61)	FOOD CODE: (37-40) (62-65)	FOOD OR DRINK	DESCRIPTION, OR DRUG ACCESSION NUMBER: (41-45) (66-70)	WORK AREA	AMOUNT CONSUMED (46-49) (71-74) Whole . Decimal	FOOD UNIT OR MODEL NO. (50-53) (75-78)

D ARE YOU FOLLOWING A SPECIAL DIET?
No: 1
Yes, Low Calorie: 2
Diabetic: 3
Sodium Restricted: 4
Modified Fat: 5
Other: 6
(16)

E IS WHAT YOU ATE YESTERDAY TYPICAL OF YOUR MEAL PATTERN?
Yes: 1
No: 2
(17)

F DO YOU TAKE ANY VITAMIN, MINERAL SUPPLEMENT?
No: 1
Yes, Within the Past 3 Months: 2
Yes, but not Within the Past 3 Months: 3
(18)

G WHAT KIND?
Vitamins: 1
Minerals: 2
Both: 3
Don't Know: 4
(21)

H
DATE OF INTERVIEW:
DAY MONTH 1 9 YEAR

Date for which food intake is recorded, if not day immediately prior to interview: (22-29)
DAY MONTH 1 9 YEAR

INTERVIEWER:

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FORM # 2A

24 HOUR DIETARY RECALL

EXPECTANT MOTHERS

CARD TYPE: P (1) | CONTROL: A (2)

A REGION & SEASON: (3-5)

SURVEY AREA: (6-7)

HOUSEHOLD NUMBER: (8-10)

B NAME & SURVEY NUMBER OF PERSON FOR WHOM RECORDED:

Surname:

Christian Name(s):

Person's Survey Number: (11-15)

C TIME OF DAY: ENTER TIME FROM 00:01 TO 24:00 IN HOURS AND MINUTES (31-34) (56-59)	PLACE OF EATING: 1. Home 2. School 3. Work, Field 4. Restaurant 5. Other (35) (60)	SOURCE: 1. Home 2. Self Purchased 3. Other (36) (61)	FOOD CODE: (37-40) (62-65)	FOOD OR DRINK	DESCRIPTION, OR DRUG ACCESSION NUMBER: (41-45) (66-70)	WORK AREA	AMOUNT CONSUMED (46-49) (71-74) Whole . Decimal	FOOD UNIT OR MODEL NO. (50-53) (75-78)

DATE OF INTERVIEW:

DAY | MONTH | YEAR 1 9

Date for which food intake is recorded, if not day immediately prior to interview: (22-29)

DAY | MONTH | YEAR 1 9

INTERVIEWER:

CONTROL (DUPLICATE COL. 1 & COL. 3-15) **B** (2)

D IS WHAT YOU ATE YESTERDAY, TYPICAL OF YOUR MEAL PATTERN?

Yes:	1	(16)
No:	2	

E HAVE YOU MADE ANY CHANGES IN WHAT YOU EAT OR DRINK, BECAUSE YOU ARE PREGNANT?

Yes:	1	(17)
No:	2	

F HAVE YOU INCREASED OR DECREASED YOUR CONSUMPTION OF THE FOLLOWING FOOD GROUPS, BECAUSE OF YOUR PREGNANCY?

	INCREASE	DECREASE	NO CHANGE	
Bread:	1	2	3	(18)
Cakes & Pastry:	1	2	3	(19)
Candy:	1	2	3	(20)
Cheese:	1	2	3	(21)
Eggs:	1	2	3	(22)
Fruits:	1	2	3	(23)
Meat, Fish, & Poultry:	1	2	3	(24)
Milk:	1	2	3	(25)
Potatoes:	1	2	3	(26)
Soft Drinks:	1	2	3	(27)
Vegetables:	1	2	3	(28)

G HOW DID YOU KNOW HOW TO MAKE THESE CHANGES?

Doctor or Clinic:	1	(29)
Family Member:	2	
Friend or Neighbour:	3	
Self Imposed:	4	
Other:	5	
Not Applicable: (ie: Answer to "E" was "No")	8	

H ARE YOU TAKING ANY VITAMIN/MINERAL SUPPLEMENTS?

No:	1	(30)
Vitamins:	2	
Minerals:	3	
Both:	4	

J ARE YOU TAKING ANY CALCIUM OR IRON SUPPLEMENTS?

No:	1	(31)
Calcium:	2	
Iron:	3	
Both:	4	

K DID THE DOCTOR OR NURSE TELL YOU TO TAKE THESE SUPPLEMENTS?

Yes:	1	(32)
No:	2	

PLACE OF INTERVIEW NAME OF INTERVIEWER

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FORM # 3
PAGE 1

DIETARY FORM — FREQUENCY

CARD TYPE 3 | CONTROL | (1)

A REGION & SEASON: (3-5) | SURVEY AREA: (6-7) | HOUSEHOLD NUMBER: (8-10)

B NAME & SURVEY NAME OF PERSON INTERVIEWED: Surname: | Christian Name(s): | Person's Survey Number: (11-15)

FOOD CODE (16-19)	DESCRIPTION OF FOOD OR DRINK	Average Size Serving	WORK AREA	No. of Servings (20-23) Whole	No. of Servings (20-23) Decimal	Frequency of Serving (24) Day	Frequency of Serving (25) Week	Frequency of Serving (26) Month
R 0 0 1	MEALS EATEN IN RESTAURANTS ⇨		BREAKFAST					
R 0 0 2			NOON MEAL					
R 0 0 3			EVENING MEAL					
F 0 0 1	MILK: Reconstituted Skim	8 oz.			.			
F 0 0 2	Evaporated	1 oz.			.			
F 0 0 3	Flavoured	8 oz.			.			
F 0 0 4	FORMULA MEALS	8 oz.			.			
F 0 0 5	BREAKFAST DRINKS	4 oz.			.			
F 0 0 6	HOT WEATHER DRINKS	4 oz.			.			
F 0 0 7	COLAS: Regular	10 oz.			.			
F 0 0 8	Diet	10 oz.			.			
F 0 0 9	OTHER SOFT DRINKS: Regular	10 oz.			.			
F 0 1 0	Diet	10 oz.			.			
F 0 1 1	TEA	6 oz.			.			
F 0 1 2	COFFEE	6 oz.			.			
F 0 1 3	COFFEE CREAMER	1 tsp.			.			
F 0 1 4	ARTIFICIAL SWEETENERS	1 equiv.			.			
F 0 1 5	BEER, ALE	12 oz.			.			
F 0 1 6	WINE	3 oz.			.			
F 0 1 7	SPIRITS	1.25 oz.			.			
F 0 1 8	POWDERED COCKTAIL MIXES	1 pkg.			.			
F 0 1 9	DRY CEREALS	1 cup			.			
F 0 2 0	BREADS: All Kinds	1 slice			.			
F 0 2 1	ROLLS: Plain & Sweet	1 unit			.			
F 0 2 2	TEA BISCUITS, DOUGHS	1 unit			.			
F 0 2 3	CRACKERS: Plain	4 (2x2)			.			
F 0 2 4	Seasoned	6 small			.			
F 0 2 5	MUFFINS	1 unit			.			
F 0 2 6	PAN CAKES, WAFFLES	2			.			
F 0 2 7	PASTA	2 cups			.			
F 0 2 8	PIZZA	12 inch			.			
F 0 2 9	POTATOES: Mashed	1/2 cup			.			
F 0 3 0	French Fried	1 cup			.			
F 0 3 1	Other	1 medium			.			
F 0 3 2	HAM	1 oz.			.			
F 0 3 3	BACON: Side	1 strip			.			
F 0 3 4	Back	1 slice			.			
F 0 3 5	MEATS: Sliced, Process	1 slice			.			
F 0 3 6	Canned	1/4 cup			.			
F 0 3 7	CORN BEEF	2 oz.			.			
F 0 3 8	SMOKED MEAT	2 oz.			.			
F 0 3 9	WEINERS	1 unit			.			
F 0 4 0	LIVER	3 oz.			.			
F 0 4 1	LIVERWURST & PÂTE DE FOIE	1tbs.			.			

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FORM #3
PAGE 2

DIETARY FORM — FREQUENCY

CARD TYPE 3 | CONTROL A | (1)

REGION & SEASON: (3-5)

SURVEY AREA: (6-7)

HOUSEHOLD NUMBER: (8-10)

Person's Survey Number: (11-15)

FOOD CODE (16-19)	DESCRIPTION OF FOOD OR DRINK	Average Size Serving	WORK AREA	No. of Servings (20-23) Whole . Decimal	Frequency of Serving (24) Day	(25) Week	(26) Month
F 0 4 2	KIDNEY	3 oz.		.			
F 0 4 3	OTHER ORGANS	3 oz.		.			
F 0 4 4	FISH: Fresh, Frozen	4 oz.		.			
F 0 4 5	Canned	2 oz.		.			
F 0 4 6	SHELLFISH: Fresh, Frozen	2 oz.		.			
F 0 4 7	Canned	2 oz.		.			
F 0 4 8	SMOKED: Fresh	4 oz.		.			
F 0 4 9	Canned	1 oz.		.			
F 0 5 0	CHEESE: Process	1 slice		.			
F 0 5 1	Cream	1 tbs.		.			
F 0 5 2	Cottage	2 oz.		.			
F 0 5 3	SALAD DRESSING: Mayonnaise	1 tsp.		.			
F 0 5 4	French	1 tbs.		.			
F 0 5 5	Low Calorie	1 tbs.		.			
F 0 5 6	PEANUT BUTTER	1 tbs.		.			
F 0 5 7	JAM, JELLY, MARMALADE: Regular	1 tsp.		.			
F 0 5 8	Diet	1 tsp.		.			
F 0 5 9	MOLASSES, ARTIFICIAL SYRUP	1 tbs.		.			
F 0 6 0	ICE CREAM	1/2 cup		.			
F 0 6 1	SHERBET	1/2 cup		.			
F 0 6 2	FLAVOURED GELATIN	1/2 cup		.			
F 0 6 3	PACKAGED PUDDINGS & FILLINGS	1/2 cup		.			
F 0 6 4	WHIPPED CREAM SUBSTITUTES	1 tbs.		.			
F 0 6 5	PIES, TARTS	1 wedge		.			
F 0 6 6	CAKES	1 piece		.			
F 0 6 7	QUICK BREADS	1 slice		.			
F 0 6 8	COOKIES	1		.			
F 0 6 9	CANDY: Hard	1 oz.		.			
F 0 7 0	Soft	1 oz.		.			
F 0 7 1	Chocolate	1 oz.		.			
F 0 7 2	Diet	1 oz.		.			
F 0 7 3	Peanut	1 oz.		.			
F 0 7 4	PEANUTS	1/4 cup		.			
F 0 7 5	CHEWING GUM	1 stick		.			
F 0 7 6	POTATO CHIPS	1 cup		.			
F 0 7 7	COCKTAIL SNACKS	1 cup		.			
F 0 7 8	POPSICLES	2 halves		.			
F 0 7 9				.			
F 0 8 0				.			
F 0 8 1				.			
F 0 8 2				.			
F 0 8 3				.			
F 0 8 4				.			
F 0 8 5				.			

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FORM # 4

24 HOUR DIETARY RECALL

UP TO 36 MONTHS

CARD TYPE	CONTROL
4	A
(1)	(2)

A REGION & SEASON: (3-5)

SURVEY AREA: (6-7)

HOUSEHOLD NUMBER (8-10)

B NAME & SURVEY NUMBER OF PERSON FOR WHOM RECORDED:

Surname

Christian Name(s):

Person's Survey Number: (11-15)

C TIME OF DAY: ENTER TIME FROM 00:01 TO 24:00 IN HOURS AND MINUTES (31-34) (56-59)	PLACE OF EATING: 1. Home 2. School 3. Restaurant 4. Other (35) (60)	SOURCE: 1. Table Food 2. Home Prepared 3. Commercially Prep. (36) (61)	FOOD CODE: (37-40) (62-65)	FOOD OR DRINK	DESCRIPTION, OR DRUG ACCESSION NUMBER: (41-45) (66-70)	WORK AREA	AMOUNT CONSUMED (46-49) (71-74) Whole	Decimal	FOOD UNIT OR MODEL NO. (50-53) (75-78)

CONTROL (DUPLICATE COL. 1. & COL. 3-15) B (2)

D IS CHILD ON DIET? No: 1
Yes – Diabetic: 2
– Allergy: 3
– Other: 4 (16-18)

E IS WHAT THE CHILD ATE YESTERDAY TYPICAL OF HIS MEAL PATTERN? Yes: 1 No: 2 (19)

F WAS THE MILK THE CHILD TOOK: Breast: 1 Bottle: 2 Other: 3

NO. OF TIMES PER DAY: Breast: (23-24) Bottle: (25-26) Other: (27-28)

G DID THE CHILD TAKE ANY VITAMIN/MINERAL SUPPLEMENTS? No, Never: 1 Yes, regularly: 2 Seasonally: 3 (29)

Stopped more than 1 yr. ago: (30)

Age: (in months) when stopped: (31-32)

H

DATE OF INTERVIEW:

DAY MONTH YEAR 1 9

Date for which food intake is recorded, if not day immediately prior to interview: (73-80)

DAY MONTH YEAR 1 9

INTERVIEWER:

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FORM D
PAGE 1

DENTAL EXAMINATION

CARD TYPE: D (1) | CONTROL: A (2)

A REGION, SEASON & STRATUM: (3-5)

SURVEY AREA: (6-7)

HOUSEHOLD NUMBER: (8-10)

B PERSON'S NAME & SURVEY NUMBER:
Surname:
Christian Name(s):
Person's Survey Number: (11-15)

C SEX: MALE: FEMALE:

AGE:
IN MONTHS, IF UNDER 2 YRS.
YEARS, IF 2 YRS & OVER:

DATE OF EXAMINATION:
DAY MONTH YEAR
e.g: 0.4 0.5 71 = 4th. May, 1971 (16-21)

UTILIZATION OF DENTIST

1 HOW LONG SINCE YOUR LAST VISIT TO THE DENTIST?

12 Months or Less:	1
2 Years or Less:	2
5 Years or Less:	3
More Than 5 Years:	4
N/A	

(22)

2 IF 12 MONTHS OR LESS SINCE LAST VISIT, HOW MANY VISITS IN LAST 12 MONTHS?

One Visit:	1
Two Visits:	2
Three Visits:	3
More Than Three Visits:	4
N/A	

(23)

3 WHAT WERE THE MAIN REASON(S) FOR THE VISITS?

Relief of Pain, or Other Emergency:	A
Check-up and Prophylactic Services:	B
Restorative Services:	C
Prosthetic Services, Including Repair:	D
Periodontal Services:	E
Orthodontic Services:	F
Oral Surgery, Including Routine Extractions:	G
N/A	

(CHECK ONE OR MORE) (24-28)

PERSON'S RESPONSES & EXAMINER'S ASSESSMENTS.

4 DO YOU HAVE ANY DIFFICULTY IN BITING OR CHEWING, SEVERE ENOUGH TO INTERFERE WITH EATING? (IN PERSON'S OWN OPINION.)

No:	1
Yes:	2

(29)

5 PERSON'S ABILITY TO BITE & CHEW SO FAR AS EATING IS CONCERNED, IMPOSES:

No Restrictions, – Can Eat All Types of Food:	1
Some Restrictions, – Can Eat Most Types of Food:	2
Major Restrictions, – Can Only Eat Soft Food:	3

(30)

(EXAMINER'S ASSESSMENT)

6 DOES PERSON REQUIRE EMERGENCY TREATMENT, & IF SO, WHICH TYPE? (CHECK ONE BOX)

No:	1
Yes, – Surgical:	2
– Periodontal:	3
– Restorative:	4
– Prosthetic:	5

(31)

7 IS PERSON EDENTULOUS IN EITHER OR BOTH ARCHES?

Neither:	1
Upper Arch Only:	2
Lower Arch Only:	3
Both Arches:	4

(32)

8 IF EDENTULOUS IN EITHER, OR BOTH ARCHES, HOW LONG AGO WAS THE LAST TOOTH REMOVED IN EACH ARCH?

	UPPER ARCH	LOWER ARCH
12 Months or Less:	1	1
2 Years or Less:	2	2
5 Years or Less:	3	3
More Than 5 Years:	4	4
N/A	(33)	(34)

(33-34)

9 IF FULL DENTURE HAS BEEN IN PLACE, IT HAS BEEN WORN FOR HOW LONG?

	UPPER ARCH	LOWER ARCH
12 Months or Less:	1	1
2 Years or Less:	2	2
5 Years or Less:	3	3
More Than 5 Years:	4	4
N/A	(35)	(36)

(35-36)

10 IF FULL DENTURE NOT IN PLACE, WHY NOT?

	UPPER ARCH	LOWER ARCH
Never Had:	1	1
Had, But Became Loose or Broken:	2	2
Had, But Lost:	3	3
Had, But Could Never Wear Regularly:	4	4
-N/A	(37)	(38)

(37-38)

11 DO YOU WANT A FIRST OR REPLACEMENT DENTURE?

	UPPER ARCH	LOWER ARCH
Yes:	1	1
No:	2	2
N/A	(39)	(40)

(39-40)

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FORM D
PAGE 2

DENTAL EXAMINATION

12 NUMBER OF DECIDUOUS TEETH WITH 2/3 OR MORE OF CROWN PRESENT:

	UPPER ARCH		LOWER ARCH		
None:		1		1	1
1 to 3:		2		2	2
4 to 6:		3		3	3
7 or 8:		4		4	4
9 or 10:		5		5	5
	(41)		(42)		(41-42)

13 NUMBER OF PERMANENT TEETH WITH 2/3 OR MORE OF CROWN PRESENT:

	UPPER ARCH		LOWER ARCH		
None:		1		1	1
1 to 3:		2		2	2
4 to 6:		3		3	3
7 or 8:		4		4	4
9 or 10:		5		5	5
11:		6		6	6
12:		7		7	7
13:		8		8	8
14:		9		9	9
15 or 16:		0		0	0
	(43)		(44)		(43-44)

14 GINGIVAL & PERIODONTAL CONDITIONS:

None:		1	
Mild Gingivitis:		2	
Severe Gingivitis:		3	(45)
N/A Obvious Pockets:		4	
Loose Teeth:		5	

15 OTHER CONDITIONS OF SOFT TISSUES ABOUT THE TEETH:

None Observed:		A
Ulcers:		B
Acutely Tender and Severe Inflammation of the Gums with a Very Foul Odour:		C
		(46-49)
N/A Chronic Bleeding of Gums:		D
Hypertrophy of Gingivae:		E

16 IS THERE A CLEFT LIP AND HAS IT BEEN REPAIRED?

No:		1
Yes, – Unilateral, Repaired:		2
– Unilateral, Unrepaired:		3 (50)
– Bilateral, Repaired:		4
– Bilateral, Unrepaired:		5

17 IS THERE A CLEFT PALATE AND HAS IT BEEN REPAIRED?

No:		1
Yes – Repaired:		2 (51)
– Unrepaired:		3

18 HEIGHT OF SOFT DEBRIS, IF ANY, ON ONE OR MORE TEETH:

None:		1
Less Than 1/3:		2 (52)
N/A Less Than 2/3:		3
2/3 or More:		4

19 HEIGHT OF CALCULUS, IF ANY, ON ONE OR MORE TEETH:

None:		1
Less Than 1/3		2 (53)
N/A Less Than 2/3		3
2/3 or More		4

20 CHECK FIRST LOCATION, READING THE COLUMN(S) DOWN, IN WHICH THERE IS DECAY OR A FILLING:

	DECIDUOUS TEETH		PERMANENT TEETH		
Lower Anterior Interproximal:		1		1	
Labial:		2		2	
Upper Anterior Interproximal:		3		3	
Posterior Interproximal:		4		4	
Pit or Fissure:		5		5	
N/A No Decay or Restorations:		6		6	
	(54)		(55)		(54-55)

21 ENAMEL: HYPOPLASIA, INCLUDING COMPLETE ABSENCE OF ENAMEL:

None:		1
N/A Some:		2 (56)
Marked:		3

22 ENAMEL WITH OPACITIES OR MOTTLED:

None:		1
Very Mild:		2
Mild:		3 (57)
N/A Moderate:		4
Severe:		5

23 TREATMENT STATUS: RESTORATIONS, DECIDUOUS & PERMANENT TEETH COMBINED:

Never Needed:		1
N/A Had Need, now Complete:		2 (58)
Still Needs Restoration:		3

24 IF IN NEED OF RESTORATION, CHECK NUMBER:

1 to 3:		1
4 to 6:		2 (59)
N/A 7 to 10:		3
More Than 10:		4

25 EXTRACTIONS, DECIDUOUS AND PERMANENT TEETH COMBINED:

None Needed:		1
Had Need, now Complete:		2 (60)
Still Required:		3

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FORM D
PAGE 3

DENTAL EXAMINATION

26 IF EXTRACTIONS ARE STILL REQUIRED, HOW MANY?

	3 or Less:	1
	4 to 6:	2
	7 to 10:	3 (61)
N/A	*More than 10:*	4
	All Remaining (Any Number):	5

27 IS AN ORTHODONTIC APPLIANCE IN PLACE?

	No:	1
N/A		(62)
	Yes:	2

28 IS A SPACE MAINTAINER IN PLACE?

	No:	1
N/A		(63)
	Yes:	2

29 IS A PARTIAL DENTURE OR A BRIDGE IN PLACE?

	No:	1
N/A		(64)
	Yes:	2

OCCLUSION

30 OVERJET:

	Normal (0 to 4 mm.):	1
	5 mm.:	2
	6 mm.:	3 (65)
N/A	*7 mm.:*	4
	8 to 9 mm.:	5

31 UNDERJET:

	0 to 1 mm.:	1
	2 mm.:	2
		(66)
N/A	*3 mm.:*	3
	More Than 3 mm.:	4

32 OPENBITE:

	Less Than 1 mm.:	1
	1 to 2 mm.:	2 (67)
N/A	*3 to 4 mm.:*	3
	More Than 4 mm.:	4

33 OVERBITE:

	Less Than 2/3 of Crown:	1
	Less Than 3/3 of Crown:	2 (68)
N/A	*3/3 of Crown or More:*	3
	Into Soft Tissue:	4

34 IS THERE ANY ANTERIOR TOOTH, MORE THAN 2mm. OUT OF LINE, OR ROTATED MORE THAN 45°?

	No:	1
N/A		(69)
	Yes:	2

35 DISTOCCLUSION:

	None:	1
	One Side:	2 (70)
N/A	*Two Sides:*	3

36 MESIOCCLUSION:

	None:	1
	One Side:	2 (71)
N/A	*Two Sides:*	3

37 NEUTROCCLUSION:

	None:	1
	One Side:	2 (72)
N/A	*Two Sides:*	3

38 POSTERIOR CROSSBITE: HOW MANY MAXILLARY POSTERIOR TEETH LOCATED LINGUAL OR BUCCAL TO THE OPPOSING MANDIBULAR TEETH?

	None:	1
	1:	2
	2:	3
		(73)
	3:	4
N/A	*4:*	5
	More Than 4:	6

39 COMMENTS:
(WITH CROSS REFERENCE TO BLOCK NUMBERS.)

CLERK:

EXAMINING OFFICER:

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FORM D
PAGE 4

DENTAL EXAMINATION

CARD TYPE	CON-TROL	A
D	B	
(1)	(2)	

REGION, SEASON & STRATUM: [ ][ ][ ] (3-5)

SURVEY AREA: [ ][ ] (6-7)

HOUSEHOLD NUMBER: [ ][ ][ ] (8-10)

Person's Survey Number: [ ][ ][ ][ ][ ] (11-15)

CLINICAL EXAMINATION MOUTH MIRROR AND EXPLORER

DECIDUOUS TEETH 40

UPPER RIGHT

	Central: (16)	Lateral: (17)	Cuspid: (18)	1st Molar: (19)	2nd Molar: (20)
Decayed (d)					
To be Extracted (e)					
Filled (f)					

UPPER LEFT

	Central: (42)	Lateral: (43)	Cuspid: (44)	1st Molar: (45)	2nd Molar: (46)
Decayed (d)					
To be Extracted (e)					
Filled (f)					

LOWER RIGHT

	Central: (21)	Lateral: (22)	Cuspid: (23)	1st Molar: (24)	2nd Molar: (25)
Decayed (d)					
To be Extracted (e)					
Filled (f)					

LOWER LEFT

	Central: (47)	Lateral: (48)	Cuspid: (49)	1st Molar: (50)	2nd Molar: (51)
Decayed (d)					
To be Extracted (e)					
Filled (f)					

PERMANENT TEETH 41

UPPER RIGHT

	Central: (26)	Lateral: (27)	Cuspid: (28)	1st Bicuspid: (29)	2nd Bicuspid: (30)	1st Molar: (31)	2nd Molar: (32)	3rd Molar: (33)
Decayed (D)								
Missing (M)								
Filled (F)								

UPPER LEFT

	Central: (52)	Lateral: (53)	Cuspid: (54)	1st Bicuspid: (55)	2nd Bicuspid: (56)	1st Molar: (57)	2nd Molar: (58)	3rd Molar: (59)
Decayed (D)								
Missing (M)								
Filled (F)								

LOWER RIGHT

	Central: (34)	Lateral: (35)	Cuspid: (36)	1st Bicuspid: (37)	2nd Bicuspid: (38)	1st Molar: (39)	2nd Molar: (40)	3rd Molar: (41)
Decayed (D)								
Missing (M)								
Filled (F)								

LOWER LEFT

	Central: (60)	Lateral: (61)	Cuspid: (62)	1st Bicuspid: (63)	2nd Bicuspid: (64)	1st Molar: (65)	2nd Molar: (66)	3rd Molar: (67)
Decayed (D)								
Missing (M)								
Filled (F)								

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FORM #6
ANTHROPOMETRY

A CARD CONTROL TYPE: 6 A (1) (2)

REGION SEASON & STRATUM: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B PERSON'S NAME & SURVEY NUMBER:
Surname:
Christian Name(s):
Person's Survey Number: (11-15)

C PERSON'S SEX: MALE: FEMALE:
PERSON'S AGE: IN MONTHS, IF UNDER 2 YEARS: YEARS:
DATE OF EXAMINATION: DAY MONTH YEAR (16-21)
eg: 0.5 0.7 7.1 = 5th. May, 1971.

D
Body Weight (KG.) to Nearest Tenth of KG. Whole KGS. • Tenth (22-25)
Has Your Weight Changed Significantly (> 10% of Body Weight) in the Past 6 Months? Yes: 1 No: 2 (26)
IF 'YES'
How Much Weight Did You Lose in the Past Six Months? IN EVEN LBS. X .453 (conversion) IN EVEN KGS. (27-29)
How Much Weight Did You Gain in the Past Six Months? IN EVEN LBS. X .453 IN EVEN KGS. (30-32)
ANY SIGNIFICANT REASON KNOWN FOR THE CHANGE? (e.g. ILLNESS, DIETING, PREGNANCY ETC.):

E
Height Standing (m.m.) (Supine Length if Under Two Years of Age.): (43-46)
Height Sitting (m.m.) (Crown-Rump Length if Under Two Years of Age.): (47-50)
Height of Anterior Superior Iliac Spine (m.m.) (Left Side.): (51-54)

F
Biacromial Diameter (m.m.): (55-57)
Bi-Ilio-Cristal Diameter (m.m.): (58-60)
Chest Diameters: Antero-Posterior (m.m.): (61-63)
Transverse (m.m.): (64-66)
Wrist Breadth (m.m.) Left: (67-68)
Bicondylar Femur Breadth (m.m.) Left: (69-71)

G
Calf Circumference (m.m.) Left: (72-74)
Upper Arm Circumference (m.m.) Left: (75-77)
(For Children Under Six Years Only) — Head Circumference (m.m.): (78-80)

CONTROL (DUPLICATE COLUMN 1 & COLUMNS 3-15) B (2)

H
Upper Arm Skinfold (m.m.) Left: (16-17)
Subscapular Skinfold (m.m.) Left: (18-19)

COMMENTS:

PLACE OF EXAMINATION | EXAMINING OFFICER

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FORM # 7

PHYSICAL ASSESSMENT

UNDER 6 YEARS OF AGE

CARD TYPE: 7 (1) | CONTROL

A REGION SEASON: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B NAME & SURVEY NUMBERS:
Surname:
Christian Name(s):
Child's Survey Number: (11-15)

C SEX: MALE: FEMALE:
AGE: IN MONTHS IF UNDER 2 YRS: YEAR, IF 2 YRS & OVER:
DATE OF EXAMINATION: eg: 0,4 0.5 71 = 4th, May 1971 DAY MONTH YEAR (16-21)

D HAIR: Normal: 1; Abnormal: 2 (22)

E EYES: Normal: 1; Circumcorneal Injection, Bilateral: 2; Conjunctival Injection, Bilateral: 3; Other: 4 (23-26)

F LIPS: Normal: 1; Angular Lesions: 2; Angular Scars: 3; Cheilosis: 4; Other: 5 (27-31)

G TONGUE: Normal: 1; Abnormally Smooth: 2; Abnormally Red: 3; Other: 4 (32-35)

H ORO-PHARYNX: Normal: 1; Tonsils Enlarged: 2; Tonsils Infected: 3; Tonsils Cryptic or Scarred: 4; Other Abnormality: 5 (36-40)

J GUMS: Normal: 1; Bleeding, Diffuse: 2; Other: 3 (41-43)

K HEAD AND NECK: Normal: 1; Nasolabial Seborroea: 2; Thyroid Enlargement: Smooth: 3; Nodular: 4; Size of Enlargement (W.H.O. Classification) Enter 0,1,2,3 (44-46) (47)

L EARDRUM: Normal: 1; Obscurred: 2; Infected: 3; Discharging: 4 (48-50)

M FINGERNAILS: Normal: 1; Clubbed: 2; Spooned: 3; Other: 4 (51-55)

N SKIN: Normal: 1; Follicular Hyperkeratosis – Arms: 2; " " – Back: 3; Abnormal Bruising: 4 (54-56)

P ABDOMEN: Normal: 1; Pot Belly – Normal: 2; Abnormal: 3; Hepatomegaly: 4; Centimeters Below Costal Margin at the Mid-Clavicular Line: 5 (57-59) (60-61)

Q LOWER EXTREMITIES: Normal: 1; Pretibial Pitting Edema, Bilateral: 2 (62)

NOTE SPECIFIC OBSERVATIONS UNDER "REMARKS"

R SKELETAL: Normal: 1; Beading of Ribs: 2; Rachitic: 3; Scorbutic: 4; Bowed Legs: 5; Other Signs of Rickets: 6 (63-67)

S IMPRESSIONS: Healthy: 1; Apathetic: 2; Irritable: 3 (68-69)

T REFERRAL: Refer to Local Physician: 1 (70); Parent or Guardian Advised: 1 (71)

REMARKS: A B C D E F G H (72-79)

PLACE OF EXAMINATION:

NAME OF EXAMINING OFFICER:

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FORM # 8
PAGE 1

HEALTH REVIEW

UNDER 6 YRS OF AGE

8 A (1) (2)

A REGION & SEASON: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B NAME AND SURVEY NUMBER OF CHILD:
Surname:
Christian Name(s):
Child's Survey Number: (11-15)

C SEX: MALE: FEMALE:
AGE: In Months if Under 2 Yrs: Years, (if 2 Yrs. or Over)
DATE OF EXAMINATION: eg: 0,4 0.5 71 = 4th May, 1971 DAY MONTH YEAR (16-21)

D PREGNANCY:
Anemia: Not Known: 1
– Yes: 2 (24)
– No: 3
Medication – Yes: 1 (25)
– No: 2
Nutritional Supplement – Yes: 1 (26)
No: 2

E AT WHAT AGE DID CHILD WALK ALONE?
Number of Months if Known: (27-28)
Check if Unknown: 1 (29)

F WAS/IS THE CHILD BREAST FED? Yes: 1 (30)
No: 2
The Age in Weeks at Which Breastfeeding was Discontinued: (31-32)
Was/is the Child Bottle Fed? Yes: 1 (33)
No: 2
Age at which Bottle-Feeding was Started: 0-2 Weeks: 1
3-12 Weeks: 2 (34)
Over 12 Weeks: 3
Age at which Bottle-Feeding was Discontinued:
Under One Month: 1
1-3 Months: 2 (35)
3-6 Months: 3
6-12 Months: 4
If Over 12 Months, Give Number of Months: . (36-37)

G AGE AT WHICH NON-MILK FOODS WERE STARTED: Not as Yet: 1 (38)
Don't Know: 2
Age Expressed in Number of Months: (39-40)

H DOES CHILD HAVE CONGENITAL DEFECTS? No: A
YES: – Heart: B
– Cleft Lip and/or Cleft Palate: C
– Eyes: D
– Upper Limbs: E (41-49)
– Lower Limbs: F
– G.U. Systems: G
– Mental Deficiency: H
– Cerebral Palsy: J

J DOES THE CHILD PASS WORMS? No: 1
Yes, Tiny White: 2 (50)
Yes, Pencil White: 3
Yes, Other: 4

HISTORY OF CONTAGIOUS DISEASES:

K IN THE PAST 2 MONTHS, HAS THE CHILD HAD MEASLES? No: 1
Yes, Without Complications: 2 (52)
Yes, With Complications: 3

IN THE PAST 2 MONTHS, HAS THE CHILD HAD CHICKEN POX? No: 1
Yes, Without Complications: 2 (53)
Yes, With Complications: 3

IN THE PAST 2 MONTHS, HAS THE CHILD HAD MUMPS? No: 1
Yes, Without Complications: 2 (53)
Yes, With Complications: 3

IN THE PAST 6 MONTHS, HAS THE CHILD HAD PERTUSSIS? No: 1
Yes, Without Complications: 2 (54)
Yes, With Complications: 3

HAS THE CHILD HAD TUBERCULOSIS AT ANY TIME? No: 1
Yes, Without Complications: 2 (55)
Yes, With Complications: 3

HAS CHILD HAD ANY OTHER CONTAGIOUS DISEASE IN THE PAST 6 MONTHS? Yes: 1 (56)
No: 2
Code for Disease (I.C.D.A.) (57-60)

HAS THE CHILD HAD ANY OTHER SIGNIFICANT ILLNESSES, OR DOES IT HAVE ANY NOW? No: (61)
Yes, 1. Code for Illness (I.C.D.A.) (62-65)
Number of Months Ago: (66-67)
2. Code for Illness (I.C.D.A.) (68-71)
Number of Months Ago: (72-73)
3. Code for Illness (I.C.D.A.) (74-77)
Number of Months Ago: (78-79)

CONTROL (DUPLICATE COL. 1 & COL. 3-15) B (2)

L HOW MANY TIMES IN HIS LIFE HAS THE CHILD HAD PNEUMONIA? (IF NEVER, ENTER ZEROS) (16-17)

M HAS THE CHILD EVER BEEN JAUNDICED? No: 1
Yes, First Week of its Life: 2 (18)
Yes, at Other Time(s): 3

N HAS THE CHILD HAD DIARRHEA? Yes: 1
CURRENTLY: No: 2 (19)
IN THE PAST SIX MONTHS: Yes: 1 No: 2 (20)
IF YES, STATE NUMBER OF TIMES IN THE PAST 6 MONTHS: (21-22)

P HOW MANY TIMES IN THE PAST YEAR HAS THE CHILD HAD EAR INFECTIONS, OR RUNNING EARS?
(ENTER ZEROS, IF NONE DURING PAST YEAR.) (23-24)

Q IF THE CHILD HAS A COUGH NOW, HOW LONG HAS HE HAD IT?
Number of Weeks: (25-26)
or
Number of Days: (27)

R HOW MANY COLDS HAS THE CHILD HAD IN THE PAST 6 MONTHS?
(ENTER ZEROS IF NONE) (28-29)

S PICA

None:	1	(30)
Soil:	2	(31)
Starch:	3	(32)
Paint:	4	(33)
Other:	5	(34)

T HAS CHILD EVER ACCIDENTALLY TAKEN MEDICINE OR POISON?

No:	1	(35)
YES, THE LATEST ACCIDENT: *– Within Last Six Months:*	2	
– Within Last Twelve Months:	3	
– More Than Twelve Months Ago:	4	

Number of Occurrences: (36-37)

NATURE OF MEDICINE OR POISON ACCORDING TO GROUPS:
(THE MOST RECENT OCCURRENCES FIRST)
I.C.D.A. CODE.
(38-42)
(43-47)

SIGNIFICANCE IN RELATION TO CURRENT NUTRITIONAL STATUS:
(ACCORDING TO JUDGEMENT OF MEDICAL PRACTITIONER)

Negligible:	1	(48)
Slight:	2	
Serious:	3	
Very Serious:	4	

U HAS THE CHILD HAD ONE OR MORE SERIOUS ACCIDENTS, RESULTING IN PHYSICAL INJURY IN THE PAST 6 MONTHS?

No:	1	(49-55)
Burn(s):	2	
Auto Accident(s):	3	
Fall(s):	4	
Flying Object:	5	
Suffocation:	6	
Other:	7	

CONTINUED:
Number of Accidents in Past 6 Months: (56-57)

SIGNIFICANCE TO CURRENT NUTRITIONAL STATUS:
(ACCORDING TO JUDGEMENT OF MEDICAL PRACTITIONER)

Negligible:	1	(58)
Slight:	2	
Serious:	3	
Very Serious:	4	

V OPERATIONS:

None:	1	(59)
Removal of Tonsils and/or Adenoids:	2	
Other Major Operations:	3	

REMARKS:

A	B	C	D	E	F	G	H

(60-6

PLACE OF INTERVIEW

NAME OF INTERVIEWER

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FORM # 9
PAGE 1

PHYSICAL ASSESSMENT

6 YEARS AND OVER

CARD TYPE (1): 9 | CONTROL (2): A

A — REGION SEASON & STRATUM: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B — PERSON'S NAME AND SURVEY NUMBER:
Surname:
Christian Name(s):
Person's Survey Number: (11-15)

C SEX: MALE: FEMALE:
AGE: Number of Yrs.
DATE OF EXAMINATION: DAY MONTH YEAR
eg: 0.4 0.5 71 = 4th May 1971 (16-21)

D HAIR:
Normal: 1
Abnormal: 2 (22)

E EYES:
Normal: 1
Circumcorneal Injection, Bilateral: 2
Conjunctival Injection, Bilateral: 3
Angular Lesions of the Eyelids: 4
Thickened Opaque Bulbar Conjunctivae: 5
Other: 6 (23-28)

F LIPS:
Normal: 1
Angular Lesions: 2
Angular Scars: 3
Cheilosis: 4
Other: 5 (29-33)

G TONGUE:
Normal: 1
Abnormally Smooth: 2
Abnormally Red: 3
Other: 4 (34-37)

H ORO-PHARYNX:
Normal: 1
Tonsils Enlarged: 2
Tonsils Infected: 3
Tonsils Cryptic or Scarred: 4
Other Abnormality: 5 (38-42)

J GUMS:
Normal: 1
Bleeding, Diffuse: 2
Other: 3 (43-45)

K HEAD AND NECK:
Normal: 1 (46)
Nasolabial Seborrhea: 2 (47)
Thyroid Enlargement – Smooth: 3 (48)
– Nodular: 4 (49)
Size of Enlargement: (Enter 0, 1, 2 or 3 W.H.O. Classif.) (50)

L FINGERNAILS:
Normal: 1
Clubbed: 2
Spooned: 3
Other: 4 (51-54)

M SKIN:
Normal: A (55)
Follicular Hyperkeratosis: – Arms: B
– Back: C
Abnormal Pigmentation: D
Purpura or Petechiae: E
Perifolliculosis: F
Loss of Elasticity: – Present: G (56-66)
– Questionable: H
Pellagrous Dermatitis: J
Skinfold Dermatitis: K
Xanthomata: (Specify Location in Remarks) L

COMPLICATIONS AND/OR SPECIFIC OBSERVATIONS TO BE NOTED ON BACK OF PAGE UNDER REMARKS.

N CHEST & CARDIOVASCULAR SYSTEM:
Normal: 1 (67)
Murmurs – Functional: 2 (68)
– Organic: 3 (69)
Pulmonary Adventitious Sounds: – Rales: 4 (70)
– Wheezing: 5 (71)
Diastolic Blood Pressure: (Record only if over 100) Sitting: (72-74)
Pulse at Rest: (if over 120): (75-77)

CONTROL (DUPLICATE COL. 1 & COL. 3-15) B (2)

P ABDOMEN:
Normal: (16)
Hepatomegally: (17)
If Yes: – Enlargement in Midclavicular Line In c.m.: (18-19)
Splenomegally, Enter Grade: (20)
Number of Abdominal Scars: (21)
Indicate quadrant(s): RU LU LL RL (22-25)

Q LOWER EXTREMITIES:
Normal: 1 (26)
Calf Tenderness: 2 (27)
Pretibial Pitting Edema, Bilateral: 3 (28)
Absent Knee Jerk, Bilateral: 4 (29)
Absent Ankle Jerk, Bilateral: 5 (30)
Absent Vibratory Sense, Ankle: 6 (31)
Dorsalis Pedis Pulse not Palpable: 7 (32)

R
Refer to Local Physician: 1 (33)
Person, Parent or Guardian Advised: 1 (34)

FOR THOSE 6-10 YEARS OF AGE			
S EARS:	*Normal:*		*1*
	Obscured:		*2* (35-38)
	Infected:		*3*
	Discharging:		*4*
T SKELETAL:	*Normal:*		(39)
	Bowed Legs:		(40)
	Other Signs of Past Ricketts: (Specify in "Remarks")		(41)

REMARKS:

PLACE OF EXAMINATION

NAME OF EXAMINING OFFICER

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FORM # 0
PAGE 1

HEALTH REVIEW

6 YEARS AND OVER

CARD TYPE: 0 ZERO (1) | CONTROL: A (2)

A REGION SEASON & STRATUM: (3-5)
SURVEY AREA: (6-7)
HOUSEHOLD NUMBER: (8-10)

B PERSON'S NAME & SURVEY NUMBER:
Surname:
Christian Name(s):
Person's Survey Number: (11-15)

C SEX:
MALE:
FEMALE:
AGE: IN NUMBER OF YRS:
DATE OF INTERVIEW: DAY MONTH YEAR (16-21)
eg: 4th. May, 1971: 0 4 | 0 5 | 7 1

D GENERAL MEDICAL HISTORY:

	PRESENT	WITHIN PAST YR.	OVER 1 YR. AGO
NOT TREATED BY PHYSICIAN	1	2	3
TREATED BY PHYSICIAN (IN HOME OR OFFICE)	4	5	6
HOSPITALIZED	7	8	9

ENTER APPROPRIATE NUMBER IN BOXES

- Anemia: (22)
- Abnormal Bleeding: (23)
- Asthma: (24)
- Food Allergy, or Food Sensitivity: (25)
- Other Allergy, Including Hay Fever: (26)
- Tuberculosis: (27)
- Chronic Respiratory Disease: (28)
- Thyroid Disease or Goitre: (29)
- Diabetes Mellitus: (30)
- Obesity: (31)
- Gall Bladder Disease: (32)
- Liver Disease: (33)
- Jaundice: (34)
- Diarrhea: (35)
- Hernia: (36)
- Hemorrhoids: (37)
- Kidney or Bladder Disease: (38)
- Arthritis or Rheumatism: (39)

D (Continued)

- Rheumatic Fever: (40)
- High Blood Pressure: (41)
- Heart Disease: (42)
- Stroke: (43)
- Convulsive Disorder: (44)
- Mental Illness: (45)
- Fractures: (46)
- Tumors: (47)
- Disorders of the Female Reproductive System: (48)
- Prostate Disease: (49)
- Other: (Specify I.C.D.A. Code:) (50-54)

E DID YOU GIVE BLOOD WITHIN THE LAST 2 MONTHS? Yes: 1 (55) / No: 2
If Yes – Number of Weeks Since Last Donation: (56)

F MAJOR OPERATION(S): None: (57)
IF YES, SPECIFY & GIVE I.C.D.A. CODE
(58-60)
(61-63)
(64-66)

G HAVE YOU A CHRONIC CONDITION AFFECTING YOUR WORK OR DAILY LIFE?
No: 1
Yes, Unable to Work: 2 (67)
Yes, Some Activities Restricted: 3
SPECIFY CONDITION & GIVE I.C.D.A. CODE (68-71)

HOW MANY DAYS IN THE PAST YEAR HAVE YOU BEEN ILL ENOUGH TO MISS WORK OR SCHOOL? (72-74)

CONTROL (DUPLICATE COL. 1 & COL. 3-15) B (2)

H DO YOU TAKE ANY MEDICINES, DRUGS, VITAMINS, ETC?
No, Not at All: (16)
IF YES, SPECIFY: A – REGULARLY and/or B – WITHIN PAST 3 DAYS

	A	B	
Vitamin Preparations:			(17-18)
Tonics:			(19-20)
Cough Medicine:			(21-23)
Sedatives or Hypnotics:			(23-24)
Tranquilizers:			(25-26)
Antibiotics:			(27-28)
Anti-Convulsants, Other than Dilantin:			(29-30)
Dilantin:			(31-32)
Anti-Hypertensives:			(33-34)
Anti-Coagulants:			(35-36)
Cardiac Medication (Digitalis Etc):			(37-38)
Appetite Depressants:			(39-40)
Amphetamine, Dexedrine, or Other CNS Stimulents:			(41-42)
Diuretics:			(43-44)
Cholesterol-Depressants:			(45-46)
Anti-Diabetic Agents:			(47-48)
Thyroid:			(49-50)
Anti-Thyroid Preparations:			(51-52)
Female Hormones:			(53-54)
Other Hormones:			(55-56)

SPECIFY OTHER MEDICATIONS, INCLUDING INJECTIONS:

	A	B	(57-58)
	A	B	(59-60)

(Record use of Oral Contraceptives on next Page)

XX

J SMOKING

DO YOU SMOKE CIGARETTES? Yes: 1 / No: 2 (61)

IF 'YES'– DO YOU USUALLY SMOKE THEM EVERY DAY? Yes: 1 / No: 2 (62)

HOW MANY CIGARETTES DO YOU SMOKE EACH DAY? (63-65)

FOR HOW LONG? (NO. OF YEARS): (66-67)

IF YOU DO NOT NOW USUALLY SMOKE CIGARETTES EVERY DAY, DID YOU EVER DO SO IN THE PAST? Yes: 1 / No: 2 (68)

HOW MANY PER DAY? (69-71)

FOR HOW LONG? (NO. OF YEARS): (72-73)

WHEN DID YOU LAST SMOKE CIGARETTES REGULARLY? MONTH YEAR (74-77)

CONTROL (DUPLICATE COL. 1 & COL. 3-15) C (2)

MALES ONLY

K

DO YOU SMOKE A PIPE? Yes: 1 / No: 2 (16)

IF 'YES', DO YOU USUALLY SMOKE A PIPE EVERY DAY? Yes: 1 / No: 2 (17)

IF 'YES' – HOW MANY PIPEFULS DO YOU SMOKE EACH DAY? (18-19)

DO YOU SMOKE CIGARS? Yes: 1 / No: 2 (20)

IF 'YES' DO YOU USUALLY SMOKE CIGARS EVERY DAY? Yes: 1 / No: 2 (21)

IF 'YES' HOW MANY CIGARS DO YOU SMOKE EACH DAY? (22-23)

FEMALES ONLY

L

Age at Menarche: (24-25)

No. Weeks Since Last Period: (26-28)

Age at Menopause: (29-30)

CURRENTLY PREGNANT– Yes: 1 / No: 2 (31)

Number of Past Pregnancies: (32-33)

Number of Live Births: (34-35)

Number Terminated Before 28 Weeks: (36-37)

Number of Stillbirths After 28 Weeks: (38-39)

NUMBER OF LIVE BORN, STILL LIVING:

Less Than 1 Month: (40)

1 Month to 1 Year: (41)

1 to 6 Years: (42)

6 Years & Over: (43)

NUMBER OF LIVE BORN NOW DEAD:

AGE AT DEATH: Less Than 1 Month: (44)

1 Month to 1 Year: (45)

1 to 6 Year: (46)

6 Years & Over: (47)

RECORD CAUSE(S) OF DEATH (IF KNOWN) OCCURING WITHIN PAST 6 YRS., OF THOSE UNDER AGE 6. I.C.D.A. CODE

(48-51)

(52-55)

(56-59)

M CONTRACEPTIVE PILLS:

HAVE YOU USED ORAL CONTRACEPTIVES?

No, Never: 1

Yes, But Not Within Past 6 Months: 2

Yes, Currently: 3

Yes, Within Past 3 Months: 4

Within Past 6 Months: 5 (60)

SPECIFY BRANDS:

(61-62)

(63-64)

CHILDREN AGE 6-10 YEARS

N IN THE PAST 2 MONTHS, HAS THE CHILD HAD ANY CONTAGIOUS DISEASES:

No: (65)

Measles: (66)

Chicken Pox: (67)

Mumps: (68)

Specify Other (I.C.D.A. Code:) (69-72)

Complications: (Specify in Remarks) Yes: 1 / No: 2 (73)

DOES THE CHILD PASS WORMS? No: (74)

Yes, Tiny, White: (75)

Pencil, White: (76)

Other: (77)

CONTROL (DUPLICATE COL. 1 & COL. 3-15) D 2

REMARKS: A B C D E F G H (16-23)

NAME OF INTERVIEWER:

PLACE OF INTERVIEW:

Health and Welfare Canada

Santé et Bien-être social Canada